

Final Engineering Evaluation/Cost Analysis

Former Camp Butner
Butner, North Carolina

Prepared for



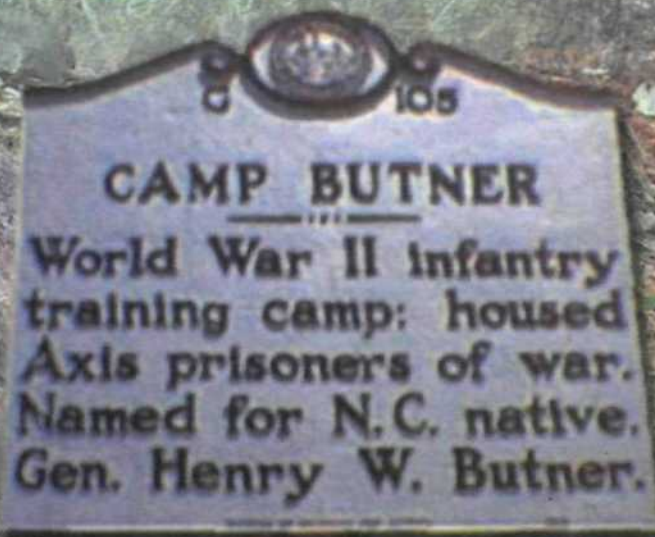
U.S. Army Corps of Engineers
Wilmington District
and
U.S. Army Corps of Engineers
Huntsville Center

Contract Number DACA87-95-D-0018
Task Order 0067
FUDS Project Number I04NC000902

Prepared by

PARSONS
100 West Walnut Street
Pasadena, CA 91124

July 2004




Don Silkebakken, P.E.

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5390 Triangle Parkway • Suite 100 • Norcross, Georgia 30092 • (770) 446-4900 • Fax: (770) 446-4910 • www.parsons.com

July 9, 2004

U.S. Army Engineering & Support Center
ATTN: CEHNC-OE-DC (Terry Steuart)
4820 University Square
Huntsville, AL 35816-1822
256-895-1562

Subject: Contract DACA87-95-D-0018, Delivery Order 0067
Final Engineering Evaluation/Cost Analysis Report
Former Camp Butner, Butner, North Carolina

Dear Mr. Steuart:

Enclosed please find three (3) copies of the Final Engineering Evaluation/Cost Analysis Report for the former Camp Butner for your files. Twelve (12) additional copies have been prepared and distributed to Mr. Bob Keistler, USACE Wilmington District for CESAW files, Administrative Record, and other distribution. The Final document submitted includes all post Public Meeting revisions associated with EPA comments as agreed by the project team during the June 14, 2004 conference call. Preparation of the four Action Memorandums is in progress with submittal of Draft copies scheduled to be sent on July 19, 2004 for review.

Please contact me at (678) 969-2384 (direct line) or (404) 606-0346 (cell) if you have any questions regarding this report.

Sincerely,

PARSONS



Don Silkebakken, P.E.
Project Manager

cc: Contracting Officer
Mr. Bob Keistler, P.E. (CESAW PM, 12 copies)
Project File (738001.14000)



FINAL
ENGINEERING EVALUATION/COST ANALYSIS
FORMER CAMP BUTNER
BUTNER, NORTH CAROLINA

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100 West Walnut Street
Pasadena, CA 91124

Contributing Authors:

Michael Short, Ordnance Expertise
Bai Tian and Brett Weise, GIS
Ed Grunwald, CIH, Health and Safety
John Kertesz and Laura Kelley, Technical Expertise
Neil Feist, Quality Control
Jae Yun and Greg Van, Geophysics
Richard Satkin, Risk Assessment

July 2004



Don Silkebakken, PE



QC Reviewer
Laura Kelley

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LIST OF ACRONYMS

A/E	architect/engineer
AOI	area of interest
AP-T	armor piercing w/tracer (Table 3.1)
ARAR	applicable or relevant and appropriate requirement
ASR	Archives Search Report
bgs	Below Ground Surface
CESAW	Corps of Engineers, Wilmington District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulation
DA	Department of the Army
DERP	Defense Environmental Restoration Program
DGM	Digital Geophysical Mapping
DID	Data Item Description
DoD	U.S. Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EMS	Emergency Management System
EOD	Explosives and Ordnance Disposal
ESA	Endangered Species Act
FDE	Findings of Fact and Determination of Eligibility
FSC	Federal Species of Concern
FUDS	Formerly Used Defense Site
GIS	Geographic Information System
GPS	Global Positioning System
HE	High Explosive
HTW	Hazardous and Toxic Waste
IA	Institutional Analysis
IC	Institutional Controls
ID	Identification
INPR	Inventory Project Report
mm	millimeter
MMR	Military Munitions Response
MSD	Minimum Separation Distance
MPM	Most Probable Munition

LIST OF ACRONYMS (CONTINUED)

NCNG	North Carolina National Guard
NCNHP	North Carolina Natural Heritage Program
NCP	National Contingency Plan
NDAI	No DoD Action Indicated
NHPA	National Historic Preservation Act
NOES	Non Ordnance-Related Scrap
OE	Ordnance and Explosives
OE RIA	OE Risk Impact Assessment
OES	Ordnance and Explosives Scrap
Parsons	Parsons, Inc.
PM	Project Manager
POW	Prisoner-of-War
PPCA	Plant Protection and Conservation Act
PTT	Powder Time Train (Table 3.1)
QA	Quality Assurance
QC	Quality Control
RAB	Restoration Advisory Board
RAC	Risk Assessment Code
ROE	Right-of-Entry
RTK	Real-Time Kinematic
SARA	Superfund Amendments and Reauthorization Act
SC	Species of Special Concern
SOW	Statement of Work
SI	Site Investigation
SR	Significantly Rare
SUXOS	Senior UXO Supervisor
TBC	To Be Considered
TCRA	Time Critical Removal Action
TDMD	Time Domain Metal Detector
TEC	Topographic Engineering Center
TNT	Trinitrotoluene
TPP	Technical Project Planning
USA	USA Environmental, Inc.
USACE	U.S. Army Corps of Engineers

LIST OF ACRONYMS (CONTINUED)

USAESCH	U.S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
WP	Work Plan

EXECUTIVE SUMMARY

ES1 The former Camp Butner Site is a 40,384 acre site located approximately 15 miles north of Durham, partly in Durham, Granville, and Person Counties, North Carolina. The U.S. Army Engineering and Support Center, Huntsville (USAESCH) contracted Parsons to perform an Engineering Evaluation/Cost Analysis (EE/CA) at the project site. The purpose of the EE/CA is to characterize the type, location and distribution of unexploded ordnance (UXO), assess the risk posed by any residual UXO, evaluate risk management alternatives, and identify and recommend the appropriate response action alternatives to address the risk to the public.

ES2 The War Department acquired the former Camp Butner property from private land owners in 1942 to be used as a training and cantonment facility during World War II. The camp was primarily established for the training of infantry divisions (including 78th, 89th, and 4th) and miscellaneous artillery and engineering units. The ordnance used at the camp included rockets, mortars, grenades, and artillery rounds up to 240mm. UXO/ordnance and explosives (OE) that may be encountered within the camp include: 2.36-inch rockets (practice and high explosive [HE]), rifle and hand grenades, 20mm through 155mm HE projectiles, 60mm and 81mm mortars, anti-personnel practice mines, and demolition items to include TNT.

ES3 On January 31, 1947, the War Department declared Camp Butner excess. Dedudding operations were initiated in 1947 and subsequent inspections resumed in 1949. Six areas identified during dedudding inspections in 1949 and 1950 received land restrictions to 'surface use only' due to numerous HE duds found (Figure ES-1a). These areas do not all correspond to known historic training ranges. Most of the affected property was sold back to the original owners, with provisions outlined in the property deed restricting land use to 'surface use only'. The State of North Carolina negotiated the purchase of 10,000 acres to be used to support the existing hospital. On November 3, 1947, the State purchased the hospital, later named the John Umstead Hospital, and 1,600 acres of the cantonment area to be used for various projects and agricultural development. The North Carolina National Guard (NCNG) was conveyed 4,750 acres of the former Camp Butner for training purposes.

ES4 As part of the Archives Search Report (ASR), an OE risk assessment was conducted for the former Camp Butner as a whole using the procedure developed by the U.S. Army Corps of Engineers (USACE) in accordance with MIL-STD-882C and AR 385-10. The site was divided into 6 areas for evaluation purposes (Figure ES-1b). A Risk Assessment Code (RAC) score was calculated and the camp received a RAC score of 1. As a result, performance of an EE/CA was recommended on Areas 1, 2, 3, and 4. Area 5 was

defined as uncontaminated. Area 6, the active NCNG training site, was not eligible for characterization under this EE/CA.

ES5 Parsons performed digital geophysical mapping within Areas 1 through 5 for the purposes of identifying and locating the presence of UXO/OE items. Supplementary geophysical sampling was conducted using "mag and dig" methods. A total of 7087 anomalies were intrusively investigated within the 5 areas of interest (AOIs) covering approximately 108 acres of the site during this EE/CA. During intrusive sampling, a total of 13 UXO items were recovered: 2 UXO (including an Mk II hand grenade and M1 practice landmine with fuze) in Area 1; and 11 [including a nose fuze, three 37mm projectiles, three 2.36-inch rockets, one 57mm projectile, two 105mm projectiles, and one 155mm projectile] in Area 4. Although OE scrap was recovered, no UXO was identified in Areas 2, 3, or 5.

ES6 During the EE/CA investigation, findings made by a property owner at the Lakeview Subdivision resulted in the allocation of sampling grids at this location. Based on the intrusive results, which included the demolition of a 37mm projectile, a Time Critical Removal Action (TCRA) was conducted at the Lakeview Subdivision. The 0 to 6-inch removal action was conducted over a 26-acre site. A total of six additional UXO items were recovered including an electric blasting cap, M1 A1 practice landmine fuze, Mk II hand grenade, 37mm projectile, and two 2.36-inch rocket warheads.

ES7 Based on results of the EE/CA intrusive investigation, the AOIs designated in the ASR were revised in order to delineate localized regions where UXO was recovered (see Figures ES-1b and ES-1c). The modified AOI boundaries coincided with former ranges identified in the ASR, as well as facilitated the selection of response alternatives. A total of 9 sectors were created from the re-sectorization of the original 5 AOI boundaries. The process of re-sectorization combined Areas 1 (excluding the water tower/flamethrower range), 2, 3, and 5 into a modified Area 5. In contrast, Area 4 was parceled into 7 AOIs which now include: Areas 4A, 4B, 4C, 4D, 4E, 4 (remaining land), and Lakeview Subdivision. Area 1A was formed to capture the unanticipated findings around the former Camp Butner water tower/flamethrower range.

ES8 A qualitative baseline risk evaluation was conducted using the OE Risk Impact Assessment (OE RIA) model to evaluate ordnance and explosive risk to the public from residual UXO items within these 9 AOIs. Results of the evaluation concluded that the explosive safety risk in Area 4A, Area 4B, Area 4C, and Lakeview Subdivision is high. Risk levels for Area 4D, 4E, and Area 4 (proper) ranged from low to moderate. The risk model indicated that the explosive safety risk for Area 1A is moderate to high. Area 5, comprising the largest AOI, was deemed low.

ES9 Four OE response action alternatives were identified and screened for each AOI within the former Camp Butner. An initial screening was performed using the general criteria of effectiveness, implementability, and cost. The response alternative remaining after the initial screenings included: No DoD Action Indicated (NDAI); Institutional Controls (ICs); Surface Clearance; and Clearance to Depth. Results from a

comprehensive analysis of the screened alternatives identified the most appropriate alternatives for each AOI (Figure ES-1d). Although the NDAI alternative was technically recommended for Area 5 based on strict application of the comparative analysis, the project team recommends site-wide IC. The Clearance to Depth alternative is recommended for Areas 1A, 4A, 4B, and 4C. In light of the recently completed TCRA at the Lakeview Subdivision and subsequent interpretation of potential remaining subsurface ordnance, Clearance to Depth is also recommended for this AOI. The Surface Clearance alternative was analyzed but was not recommended for any of the AOIs within the former Camp Butner.

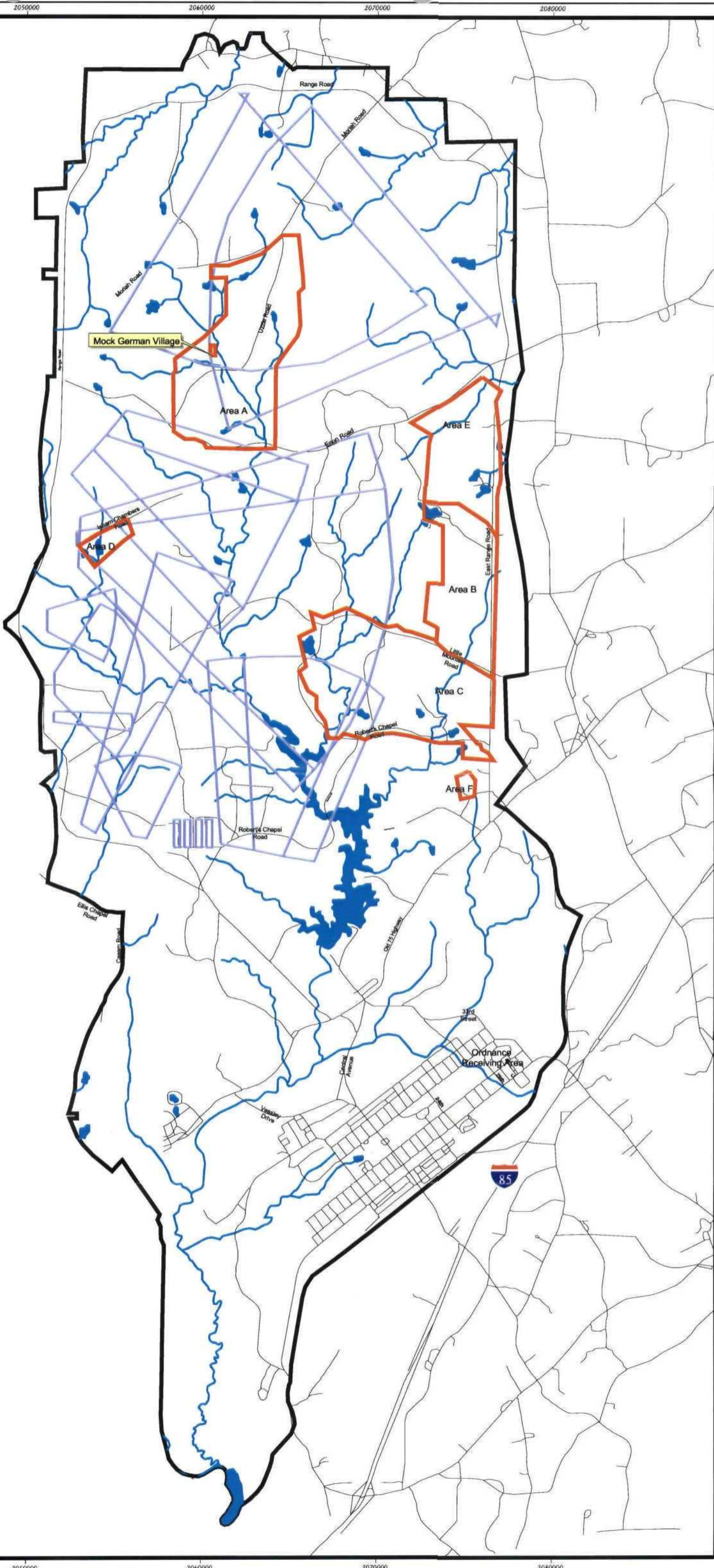
ES10 For Area 4D, Area 4E, and Area 4 (remaining land) site-wide IC strategies are recommended despite the confirmed presence of UXO during the EE/CA. This recommendation was based on current and future anticipated land use, terrain, exposure pathways, and other factors outlined in Chapter 4 that indicate a removal action is not justified at this time. However, to ensure public safety associated with the residential component in each of these areas, a subsurface removal action is recommended (comprising a two-acre residential footprint) encompassing each existing residential dwelling. It should be noted that site-wide IC components will also be implemented, although not selected as necessary via comparative analysis evaluation, for the entire site. The overall estimated cost (in 2004 dollars) to implement the EE/CA recommendations (identified in paragraphs ES9 and ES10) is \$9,618,666.

ES11 The project Administrative Record, which includes the ASR and other pertinent project documents, is maintained at two locations. The records are available for public access at the South Branch of the Granville County Library at 1547 S. Campus Drive, Creedmoor, North Carolina as well as the Town of Butner Operations Center, 205C West E Street, Butner, North Carolina.

Figure ES-1a

Deed Restricted Areas

Former Camp Butner
Butner, NC



Legend

- Road
- Former Camp Butner Boundary
- Firing Fan
- Stream and Lake
- Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)



Site Location in North Carolina

Map Units: NAD 1983 North Carolina State Plane (Feet)

0 5500 Feet

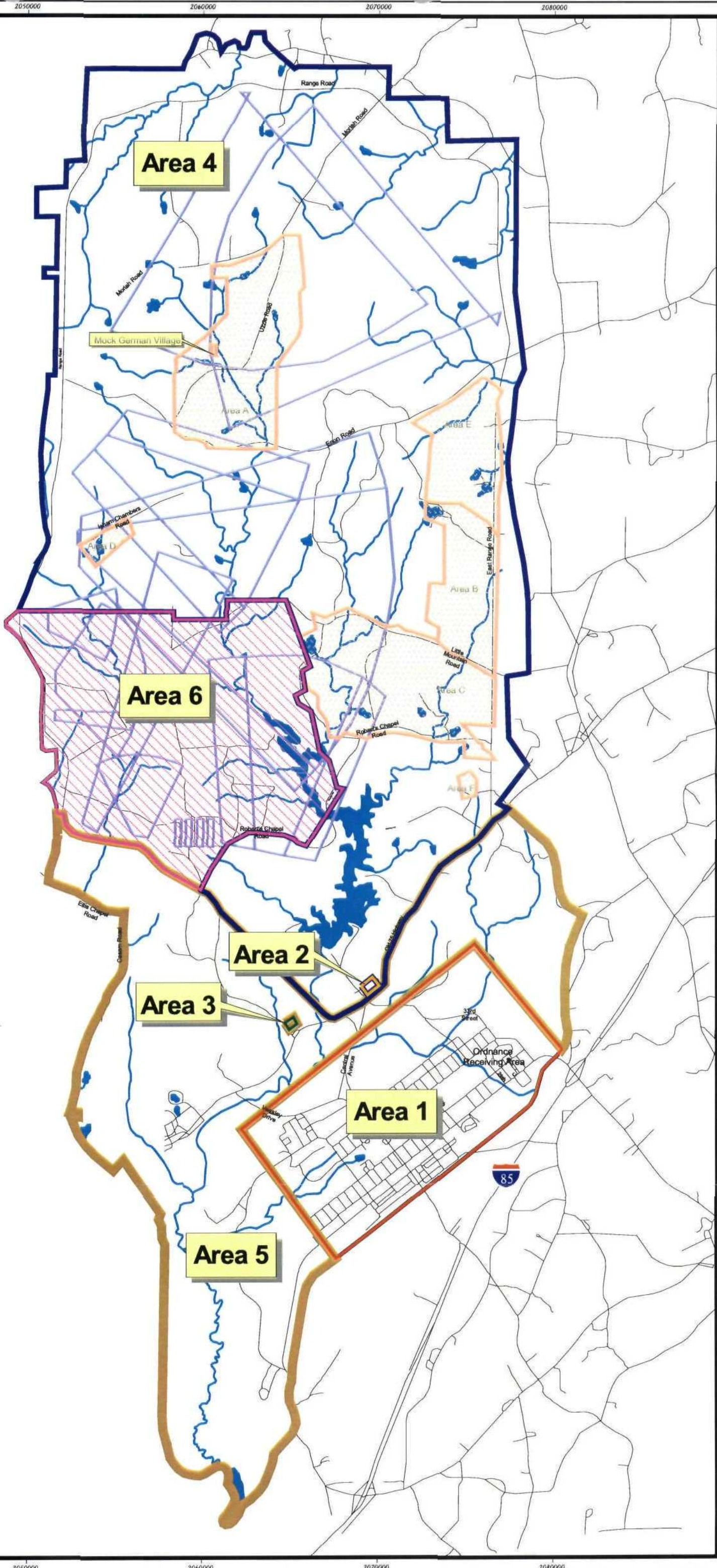
PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Deed Restricted Areas	
DRAWN BY: BT		
CHECKED BY: DS	SCALE: As Shown	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: ES-4
	FILE: X:\g16\738001\rv_project\ECK.apr	

Figure ES-1b

ASR-Designated Project Areas

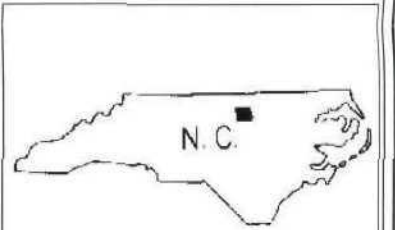
Former Camp Butner
Butner, NC



Legend

ASR-Designated Areas:

- Area 1 - Cantonment Area & Vicinity
- Area 2 - Ammunition Storage Area & Dump
- Area 3 - Grenade Training Ranges
- Area 4 - Ammunition Training Ranges & Impact Area
- Area 5 - Remaining Land
- Area 6 - National Guard Training Center
- Road
- Firing Fan
- Stream and Lake
- Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)



Site Location in North Carolina

Map Units: NAD 1983 North Carolina State Plane (Feet)
0 5500 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	ASR-Designated Project Areas	
DRAWN BY: BT		
CHECKED BY: DS	SCALE: As Shown	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: ES-5
	FILE: x:\p1\738001\av_project\FECA.apr	

Figure ES-1c

Final Project Areas

Former Camp Butner
Butner, NC

Legend

Areas of Interest

-  Areas 4A through 4E, 1A, and Lakeview
-  Areas 4 through 6
-  Firing Fan
-  Stream and Lake
-  Road
-  Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)




Site Location in North Carolina

Map Units: NAD 1983 North Carolina State Plane (Feet)

0 6000 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Final Project Areas	
DRAWN BY: BT		
CHECKED BY: DS	SCALE: As Shown	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: ES-6
	FILE: \\g:\proj\738001\av_project\FECA.apr	

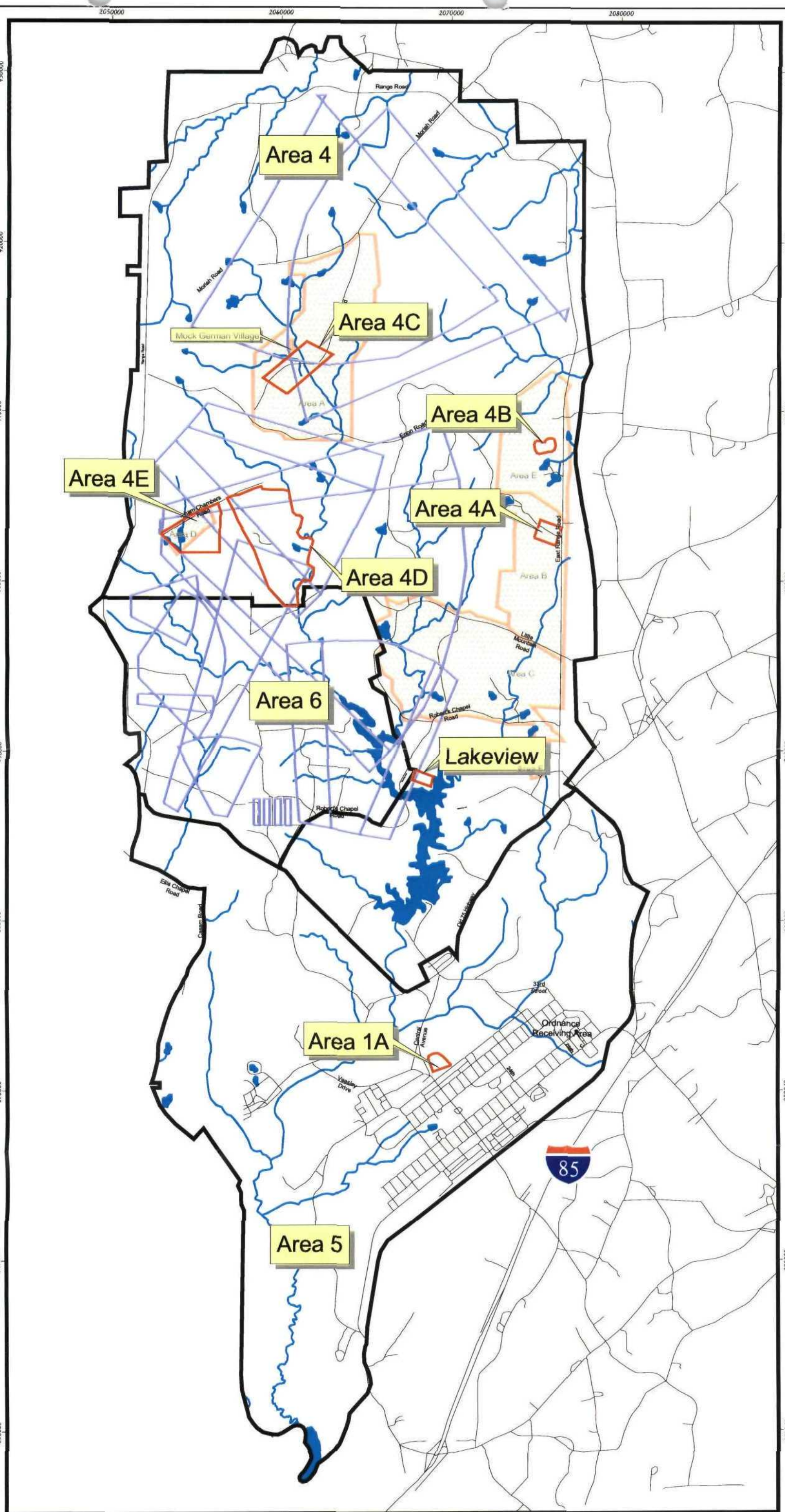


Figure ES-1d

OE Response Recommendations




Former Camp Butner
Butner, NC

Legend

Areas of Interest

-  Areas 4A through 4E, 1A, and Lakeview
-  Areas 4 through 6
-  Firing Fan
-  Stream and Lake
-  Road

Recommendation:

-  Site Wide IC (Areas 4D, 4E, and 5)
-  Subsurface Clearances (Areas 1A, 4A, 4B, 4C, and Lakeview)
-  Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)




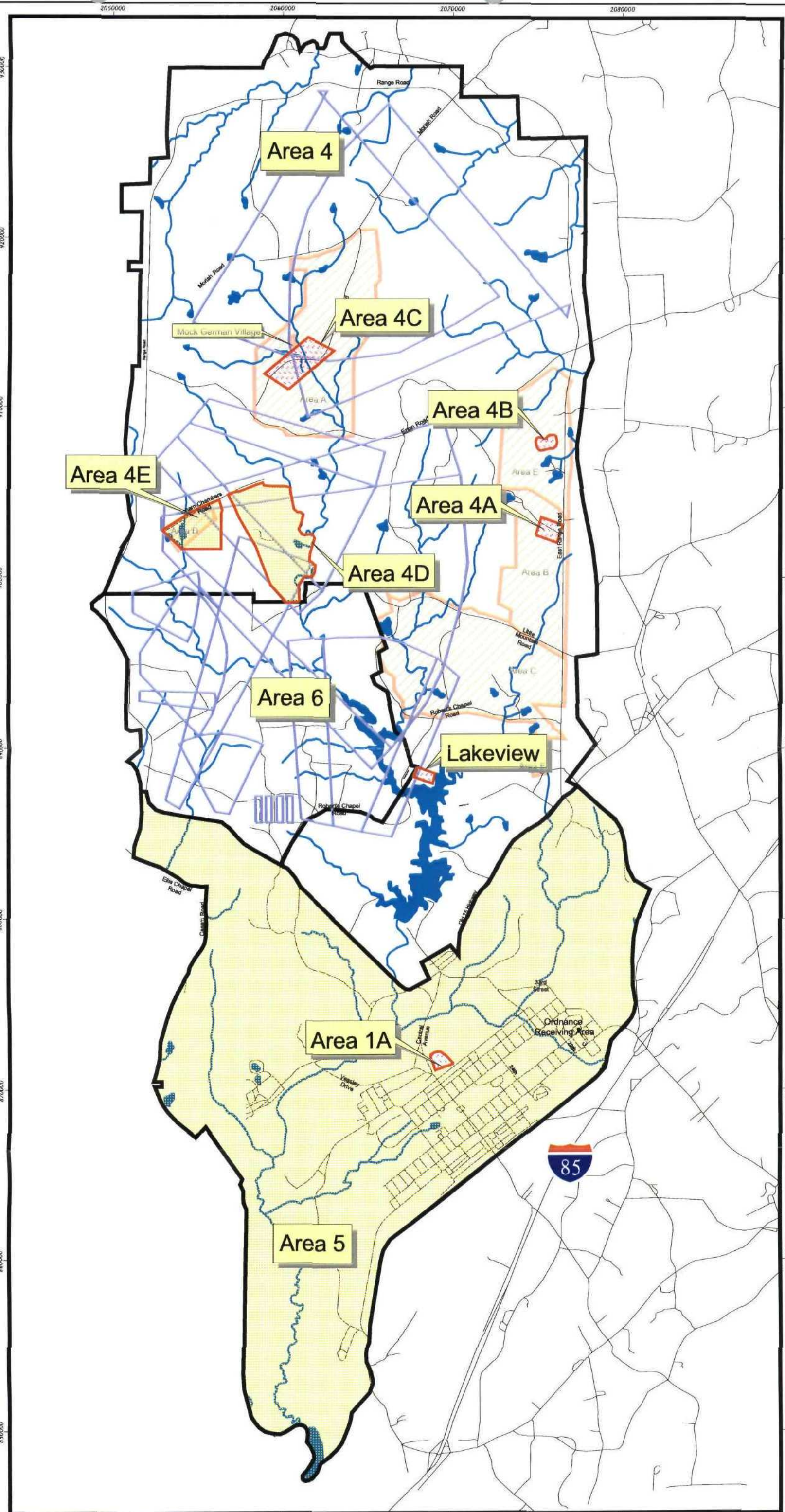
Site Location in North Carolina

Map Units: NAD 1983 North Carolina State Plane (Feet)

0 6000 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	OE Response Recommendations	
DRAWN BY: BT		
CHECKED BY: DS	SCALE: As Shown	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: ES-7
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CHAPTER 1

INTRODUCTION

This Engineering Evaluation/Cost Analysis (EE/CA) report presents a characterization of the type, location and distribution of ordnance and explosives (OE) and unexploded ordnance (UXO) present within the boundaries of the former Camp Butner as identified for investigation in the project Work Plan (Parsons, 2002). In addition, an assessment of safety risk to the public from residual UXO/OE as well as an evaluation of feasible UXO/OE response actions was conducted.

1.1 BACKGROUND

1.1.1 Camp Butner consists of approximately 40,384 acres that includes the town of Butner and the North Carolina National Guard (NCNG) Camp Butner Training Site. Because the NCNG training site is an active range, the 4,750 acres comprising the range area were excluded from the EE/CA investigation.

1.1.2 The War Department acquired the former Camp Butner property from private land owners in 1942 to be used as a training and cantonment facility during World War II. The Camp was primarily established for the training of infantry divisions (including 78th, 89th, and 4th) and miscellaneous artillery and engineering units. At least 15 ammunition training ranges were established within the Camp. The ordnance used at the Camp included rockets, mortars, grenades, and artillery rounds up to 240mm, and various initiating and priming material used as obstacles and mine field clearing devices. UXO/OE that may be encountered within the Camp include: 2.36-inch rockets (practice and high explosive [HE]), rifle and hand grenades, 20mm through 240mm HE projectiles, 60mm and 81mm mortars, anti-personnel practice mines, and demolition items to include trinitrotoluene (TNT). A detailed description of the site and its historical use is presented in Chapter 2 of this report.

1.1.3 The U.S. Army Corps of Engineers (USACE), U.S. Army Defense and Ammunition Center and School, and the USACE Rock Island District (Rock Island Illinois), conducted a records search and reconnaissance of the project site in March 1993. The findings are documented in the Archives Search Report (ASR) and ASR Supplement (USACE, 1997/2003). A summary of the ASR is presented in Chapter 2 of this report.

1.2 PROJECT AUTHORIZATION

Parsons received Contract No. DACA87-95-D-0018, Task Order No. 0067, from the U.S. Army Engineering and Support Center, Huntsville (USAESCH) to conduct an

EE/CA of the former Camp (Appendix A). This EE/CA was performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; and the National Contingency Plan (NCP). All activities involving work in areas potentially containing UXO hazards were conducted in accordance with USAESCH, USACE, Department of the Army (DA) and Department of Defense (DoD) requirements regarding personnel, equipment, and procedures. The 29 Code of Federal Regulations (CFR) 1910.120 were applied to all actions taken at this site.

1.3 PURPOSE AND SCOPE

The purpose of this EE/CA at the former Camp Butner Site is to characterize OE nature, location, and concentration; provide a description of the OE-related hazards affecting human use of the site; identify and analyze reasonable risk management alternatives; and provide a convenient record of the process for use in final decision making and judicial review. The scope of work conducted to achieve the objectives of this EE/CA included a review of existing documents, site visit, collection of geophysical data to identify potential OE, subsurface investigation of selected anomalies, and preparation of this report as detailed in the Statement of Work (SOW [Appendix A]).

1.4 PROJECT TEAM

The technical project team consisted of USACE Wilmington District (CESAW), USAESCH, Parsons, and USA Environmental, Inc. (USA). The roles of these team members are described below and depicted in Figure 1.1. A detailed description of the project team members can be found in Chapter 3 of the approved project Work Plan (WP, [Parsons, 2002]).

1.4.1 U.S. Army Corps of Engineers, Wilmington District

CESAW is the Life Cycle Project Manager (PM) and funding agency for this project. CESAW's responsibilities include review of project plans and documents, obtaining Right-Of-Entry (ROE) to properties in the investigation areas, working with the news media and the public, and coordinating with State and local regulatory agencies on issues pertaining to protection of ecological and cultural resources. Mr. Robert Keistler is CESAW's PM for this project and Mr. John Baden is the Technical Lead.

1.4.2 U.S. Army Engineering and Support Center, Huntsville

USAESCH is the lead technical agency for this project. USAESCH responsibilities include procurement of architect/engineer (A/E) services, direction of the A/E contractor, review and coordination of project plans and documents, and working with the news media and the public. USAESCH provided technical expertise for OE activities during the field activities. As the technical project manager, USAESCH is also responsible for controlling the budget and schedule. Mr. Roland Belew is USAESCH's PM for this project.

1.4.3 Parsons

Parsons is the prime A/E contractor to USAESCH and provides overall engineering support and services for the EE/CA. Parsons was responsible for performance of the activities detailed in the SOW (Appendix A). Parsons' responsibility also included the control of project schedule and budget. Mr. Don Silkebakken is Parson's PM for this project.

1.4.4 USA Environmental, Inc.

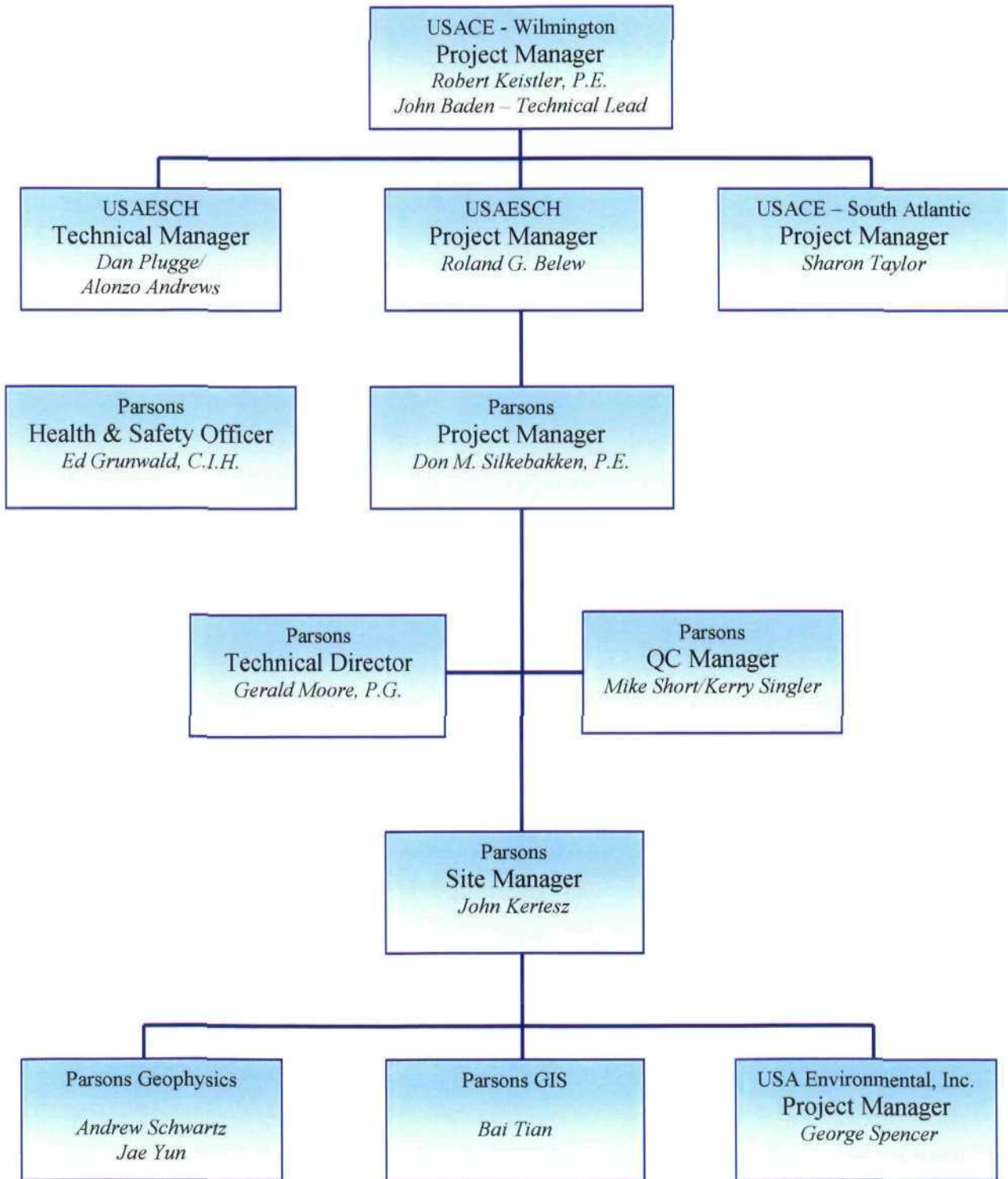
USA was the UXO subcontractor to Parsons. USA provided qualified UXO personnel needed to conduct the field investigation. Services provided by USA included escort and visual OE clearance of areas designated for geophysical investigation and access routes identified by Parsons, and performance of intrusive investigations of anomalies identified and reacquired by Parsons. USA was also responsible for all UXO/OE operations, including handling, detonating, and storage of OE and OE scrap. Parsons was responsible for ensuring and coordinating final disposal of OE scrap. Mr. George Spencer was USA's PM for this project.

1.5 PROJECT OBJECTIVES

The objective of this task order is for Parsons to prepare an EE/CA report (this document) containing the following elements:

- Characterization of OE nature, location and concentration.
- A description of the OE-related hazards affecting human use of the site.
- Identification and analysis of reasonable risk management alternatives.
- A convenient record of the process for use in final decision-making and judicial review, if necessary.

**FIGURE 1.1
ORGANIZATIONAL STRUCTURE FOR
FORMER CAMP BUTNER EE/CA**



CHAPTER 2

SITE DESCRIPTION AND HISTORY

2.1 LOCATION

The former Camp Butner, consists of approximately 40,384 acres and encompasses portions of Person, Durham, and Granville Counties, North Carolina (Figure 2.1). The boundary of the site is loosely defined by the old Range Road, which makes a contiguous loop around the site although identified by multiple names and County designations. Approximately 75 percent of the Camp is located within Granville County. The northern and eastern boundary roughly follows Range Road (County Road 1126). County Road 1721 (continuation of Range Road into Person County) defines the western boundary and continues southward onto Cassam Road. The Southern Railroad defines the southeastern border. A general layout map of the former Camp Butner Site is presented in Figure 2.2.

2.2 PHYSICAL DESCRIPTION

2.2.1 Terrain and Vegetation

2.2.1.1 The terrain within the project site area is in the Piedmont Plateau physiographic province. The topography is characterized by rolling hills with moderate to steep slopes. Lake Butner (Holt Reservoir) is located in the south-central portion of the former Camp Butner and stretches northeast into NCNG property. The most common land use is agriculture and forestry. This combination of land use is typified by cropland clearings within expanses of woodland.

2.2.1.2 The vegetation in the undeveloped areas is primarily moderate to dense forest. The understory is predominantly dogwood, poison ivy, Christmas fern, and Japanese honeysuckle. Wooded areas typically consist of hardwoods and pine located throughout the hillsides. Presently, forested areas in the northeastern region of the site are undergoing commercial logging that has denuded the landscape and created hummocky terrain. Vegetation in farmed areas consists of grasses and agricultural crops, often tobacco.

2.2.2 Geologic and Soil Conditions

Former Camp Butner is located within the Durham Sub-basin. The predominate bedrock formation is Arkosic Sandstone. The sandstone is tan in color, medium to very coarse grained, and contains mica. The soil is from the Triassic Age and is an acidic bedrock material. The Site, located within the White Store-Creedmoor soil association, has gently sloping to moderately steep, moderately well drained (sandy loam) soils with a subsoil of firm clay.

2.2.3 Climate

The project site is subject to warm, humid summers and mild winters. The lowest mean temperature of 28 °F occurs in January and the highest mean temperature of 90 °F in July. The annual average rainfall is approximately 47 inches with an average monthly rainfall between 3 to 4 inches. The estimated maximum frost penetration for the general area is 4 inches.

2.3 HISTORY

2.3.1 On February 12, 1942, the War Department issued an order for the acquisition of land near the Durham, North Carolina area to be used as a training and cantonment facility during World War II. At the time, the land use was primarily low density residential in nature. The original authorization was for 60,000 acres of real property; however, the actual amount of land acquired was approximately 40,384.39 acres.

2.3.2 The land to establish Camp Butner was obtained by the War Department from private landowners primarily by fee with only 128.40 acres in easements, 2.51 acres in licenses, and 52.40 acres in leased tracts. Although the Camp was considered active until 1946, its use for training exercises lasted only for approximately 18 months from early 1942 to June 1943.

2.3.3 The construction of Camp Butner began February 25, 1942 and proceeded at a high rate until its completion in August of the same year. The camp was primarily established for the training of infantry divisions (including 78th, 89th, and 4th) and miscellaneous artillery and engineering units. Camp Butner was designed to house up to 40,000 troops. In addition to infantry training, the site was the location of the one of the Army's largest general and convalescent hospitals and the War Department's Army Redeployment Center.

2.3.4 The first Division to arrive at Camp Butner was the 78th "Lightning" Division on August 15, 1942. Soon after that, other Divisions began arriving. The primary mission of Camp Butner was to train combat troops for deployment and redeployment overseas. There were approximately 15 live-fire ammunition-training ranges encompassing a combined approximately 23,000 acres. Other training ranges included a grenade range, a 1000-inch range, a gas chamber, and a flame-thrower training pad. There was also an ammunition storage area. In September of 1943, the first Prisoners of War (POWs) arrived at the camp. Figure 2.3 identifies the historical military land use for the Camp.

2.3.5 On January 31, 1947, the War Department declared Camp Butner excess. At that time, the Federal government was negotiating with the State of North Carolina for a lease on the hospital. The State was interested in using the hospital as a State mental hospital. The State was also negotiating the purchase of 10,000 acres to be used to support the hospital. On November 3, 1947, the State purchased the hospital, later named the John Umstead Hospital, and 1,600 acres of the cantonment area to be used for various

projects and agricultural development. The NCNG was conveyed 4,750 acres of the former Camp Butner for training purposes.

2.3.6 After Camp Butner was declared surplus, deduoding operations were initially conducted in 1947 and continued through 1950. The Recapitulation Deduoding Report presented in the ASR stated that 1366 UXO/OE items had been discovered and destroyed by the completion of deduoding operations. Six areas were identified during deduoding inspections as warranting land restrictions to 'surface use only' due to the numerous amount of HE duds found. These six areas (Figure 2.3) identified were defined as the following: Area A (an artillery impact area); Area B (a bazooka and rifle grenade impact area); Area C (an artillery and rifle grenade impact area); Area D (a moving target area); Area E (a bazooka and rifle grenade impact area); and Area F (a hand grenade court). Much of the property was sold back to the original owners, with provisions outlined in the property deed restricting land use to 'surface use only'.

2.3.7 Periodic inspections of the six areas with land restrictions were conducted between 1958 and 1969. During the inspections and removal of ordnance from the restricted areas other property owners identified ordnance for disposal that had been found in unrestricted areas. Table 2.1 lists the type of ordnance items found during the annual/semiannual inspections of restricted areas (as well as general findings within unrestricted areas) at the former Camp Butner Site:

AREA RESTRICTED TO 'SURFACE USE ONLY'	TYPE OF UXO RECOVERED
Area A	Rifle grenade, 2.36-inch rockets, 37mm, 40mm, 81mm mortar, 105mm, 155mm, and 240mm projectiles
Area B	2.36-inch rockets and 81mm mortars
Area C	81mm mortars, 37mm, 105mm, 155mm, and 240mm projectiles
Area D	2.36-inch rocket, 37mm and 40mm projectiles
Area E	2.36-inch rocket
Area F	No findings reported
Other "Unrestricted" Areas	Hand grenades, 37mm, 40mm, 60mm, 81mm, 105mm, and 155mm projectiles and 2.36-inch rockets

2.3.8 The ordnance used during training at Camp Butner included small arms, grenades, artillery rounds ranging from 20mm through 240mm, and various initiating and priming material used as obstacles and minefield clearing devices. UXO/OE recoveries made during the deduoding operations confirmed historic munitions use. UXO/OE that may be encountered within the site include: 2.36-inch rockets (practice and HE), rifle and hand grenades, 20mm through 240mm HE projectiles, 60mm and 81mm mortars, anti-personnel practice mines, and demolition items to include TNT.

2.4 DEMOGRAPHIC PROFILE

2.4.1 The 2000 census (US Census Bureau) estimates the population of the Town of Butner at 5,792 and for the County of Granville 48,498. According to the 2000 census estimates for Granville County, population by gender is 52.5% male and 47.5% female; population by race is 60.7% white, 34.9% black or African American, 4% Hispanic or Latino, 0.5% American Indian and Alaska Native, and 0.4% Asian. The largest population by age is between 35 to 44 years with a median age of 36.2 years. The 2000 census for Granville County determined an average household size of 2.58 persons, with a median household annual income of \$39,965.

2.4.2 An estimated population growth rate of 17.6% is expected for Granville County (within which the majority of the areas of interest [AOIs] reside) between the years 2005 and 2015. Projected economic development for Granville County indicates an increase in total annual earnings by 29.8% and a rise in employment of 11.6%. Manufacturing is predicted to remain the leading industry in Granville County over the next ten years. Over the same time period, agricultural production and employment are forecasted to slow, although earnings are still expected to increase (Holland, 2002). In general, indicators show moderate regional economic and development growth in and around Granville County over the next ten years.

2.5 CURRENT AND FUTURE LAND USE

2.5.1 The current stakeholders within the former Camp Butner Site include:

- North Carolina Department of Agriculture and Consumer Services - operates Umstead Farm Unit (4,200 acres);
- North Carolina State University – operates Beef Cattle Field Laboratory (1,300 acres);
- NCNG Training Site (4,750 acres);
- State Department of Corrections – operates Polk Youth Institution and Umstead Correctional Center (160 acres);
- State Department of Health and Human Services – operates John Umstead State Hospital and Murdoch Center (394 acres);
- U.S. Army Corps of Engineers – northern part of Falls Lake State Park and Waterfowl Impoundment Reserve (2300 acres);
- Federal Government – operates four Federal Correctional Complexes comprised of a correctional facility and federal hospital (770 acres); and
- Various private landowners.

2.5.2 Presently, a large percentage of the land within the former Camp Butner Site is undeveloped, with the exception of the Town of Butner. Current land use assignment for the areas of the site encompassed by Durham, Granville, and Person Counties are predominantly agriculture / open space and residential / agriculture (>5 acres) (Holland, 2002). Private land ownership parcels may exceed 200 acres in areas utilized for agriculture and forestry. Residential land use also makes up a significant percentage of the site and is typified by low-density development manifesting along main roads. The

majority of these parcels are multi-use for a combination of agricultural and residential purposes.

2.5.3 Current residential development is encroaching in areas to the south and stretching north along the eastern boundary of the site. Sprawling development will continue to be experienced in these regions due to migration from Durham and Wake Counties. With an estimated population growth rate of 17.6% for Granville County forecasted by 2015, the projected housing development will increase as well by an estimated 1,748 additional housing units by 2010 (Holland, 2002). The long-range master plan for the Town of Butner predicts an additional 1,850 acres of residential land will be developed by 2020 (OBrien/Atkins, 1998). The majority of residential development in Granville County is expected to take place in the Butner and Creedmoor areas. As growth and residential development continue throughout the region, land used for agriculture and forestry will consequently diminish.

2.6 PREVIOUS INVESTIGATIONS

2.6.1 DERP-FUDS Field Inspection for Preliminary Assessment

2.6.1.1 During March 1990 USACE CESAW conducted a field inspection of the former Camp Butner to gather data regarding potential applicability of the Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP-FUDS) (USACE, 1990a). Historical documentation of inspections of restricted areas and dedudding reports were reviewed and numerous interviews were conducted. A summary of the findings include:

- Identification of a Final Ownership Map of Camp Butner showing the dedudding operations as of April 6, 1950.
- Confirmation that ordnance has been periodically found within the former ranges and Fort Bragg explosives ordnance disposal (EOD) has been responding.
- Personnel interviewed from the Federal Correctional Institution stated they knew of no reports of ordnance being found on their facility. A POW camp was previously located at this location.
- The largest round reportedly used at the Camp was a 240mm projectile.
- Three tear gas chambers existed at the facility.
- Lightning Lake may have a military trash dump beneath it.

2.6.1.2 The report (included as part of the ASR and available in the project Administrative Record) concluded that “ordnance is a major problem” and that “there are ranges with impact areas for artillery, bazooka, rifle grenades, moving target, rifle, pistol, mortars, rockets, and hand grenades that are not fenced or marked as dangerous areas.” The report estimated “the number of rounds per acre” at “10 to 100”. Action items identified included preparation of an Inventory Project Report (INPR) and a risk assessment as well as follow-up phone calls to several interviewees.

2.6.2 Findings and Determination of Eligibility

Under the DERP, CESAW prepared a Findings and Determination of Eligibility (FDE) for the former Camp Butner in July 1990 (USACE, 1990b). The report confirmed that the Camp was formerly used by DoD and eligible for DERP FUDS consideration. A risk assessment code (RAC) score of 4 (further action and completion of INPR recommended) was assigned to the Camp as a whole. The report noted the establishment of deed restrictions on the much of the property prior to sale, as well as area restrictions. Government inspections were conducted at the site until 1973. In October 1990 the INPR was completed. The preliminary assessment recommended two projects for consideration. This resulted in the EE/CA investigation (Project Number I04NC000902) conducted by Parsons, as well as a recommendation for Hazardous Toxic Waste (HTW) Project (Project Number I04NC000901). The HTW project was an investigation of the Lightning Lake Area. A letter dated January 5, 1999 from the State of North Carolina concurred with the classification of the HTW site as a "No Further Action Site".

2.6.3 1992 Site Investigation Report

A site investigation was conducted by Black & Veech Waste Science and Technology Corporation for the USACE Savannah District dated May 26, 1992. This investigation addressed the Camp Butner Landfill at the bottom of Lightning Lake. The landfill site was part of the former Camp Butner and designated for disposal of excess brass and ammunition that could not be packed for shipment when the 78th Division transferred to Europe. The report included background information, remedial investigation results, and qualitative risk factors at the landfill site (ASR).

2.6.4 1993 Archives Search Report (ASR)

In September of 1993 the USACE, Rock Island District, conducted a records search and site inspection for the Camp. The final report, the ASR, documents the extent and nature of their findings of UXO/OE contamination (USACE, 1997/2003). The former Camp Butner was divided into 6 areas for evaluation purposes (Figure 2.4). Areas 1 and 4 were classified as having "confirmed" ordnance present. Areas 2 and 3 were classified as "potential" areas for ordnance present. Area 5 was identified as "uncontaminated" and Area 6, which is currently used as the NCNG Training Center, was not assessed due to its active status and ineligibility for DERP-FUDS. A RAC score was developed based on best available information resulting from record searches, field observations, interviews, and measurements. This information was used to assess risk based upon the potential OE hazards identified at the site. The risk assessment was composed of two factors: hazard severity and hazard probability.

2.6.5 1998 Site Visit

A Site Visit was conducted by USACE on July 21 and 22, 1998 to evaluate the applicability of implementation of a Time Critical Removal Action (TCRA) and to reevaluate the overall RAC score of 1 (assigned through the ASR process). The investigation team visited Areas 1, 2, 3, and 4. The conclusion was a TCRA was not

warranted although the RAC score was not modified.

2.6.6 Other Investigations

A Final Environmental Impact Statement was prepared for the U.S. Department of Justice, Federal Bureau of Prisons in May 1992. This report provided an assessment of the environmental consequences of a proposed action to expand the existing Federal Correctional Institution.

2.6.7 2000 Site Visit

Parsons conducted a Site Visit between June 5 and 7, 2000 (Parsons, 2000a). The purpose of the Site Visit was to develop a familiarity with the former Camp, visually inspect areas identified as confirmed or potentially contaminated with OE in the ASR, and photograph the AOIs for the potential EE/CA. In addition, the intention was to qualitatively evaluate applicability of various geophysical approaches for implementation during the EE/CA.

2.6.8 2001 Topographic Engineering Center (TEC) Report

Maps created and produced by the U.S. Army Corps of Engineers, Engineer Research and Development Center, Topographic Engineering Center (TEC), have been compiled in a report following evaluation of historic aerial photographs of the former Camp Butner (USACE, 2001a). Although subjective, this process identified potential ground scars and impact areas. This information was used in the preparation of the project Work Plan to support or refute the locations of suspect ranges impact areas as well as aid in the selection of grid and transect locations (Parsons, 2002). Ground scars identified by TEC could represent ill-defined impact craters or be the result of otherwise benign military activity to include general construction, logging, small arms ranges, obstacle courses, or a variety of other uses. They only suggest activity at the location was occurring during the active military occupation of the facility. Major impact areas identified by TEC confirm the usage and configuration of many suspect firing ranges described in the ASR (USACE, 1997/2003).

2.6.9 2003 ASR Supplement

In 2003 the USACE, Rock Island District, prepared a supplement to the existing ASR in support of preparation of the Military Munitions Response (MMR) Range Inventory (USACE, 2003). The former Camp was divided into five primary areas (encompassing multiple ranges). All of these areas were previously documented in the original ASR (and considered during this EE/CA) only the groupings were revised to fit the input and evaluation criteria requirements of the MMR database. Subchapters 3.2 and 3.5 provide details of the EE/CA range designations. The MMR groupings are presented below:

- Gas Chamber
- Flamethrower Range
- Hand Grenade Range

- Range Complex 1 (South of Enon Road and North of Old NC 75/Southern Range Road excluding the NCNG)
 - Central Artillery Impact Area
 - Rifle Ranges
 - Landscape 1000 inch .22 caliber Range
 - AA 1000 inch .22 caliber Range
 - Pistol Range
 - AT 1000 inch .22 caliber Range
 - MG 1000 inch .30 caliber Range
 - 37mm Range
 - 60mm/81mm Mortar Range 1
 - 60mm/81mm Mortar Range 2
- Range Complex 2 (North of Enon Road)
 - West Artillery Impact Area
 - Rifle/MG Range 1
 - Rifle/MG Range 2
 - Mock German Village

Aside from the former Gas Chamber, not considered as a potential source of OE contamination, each of the above ranges were included within the EE/CA investigation presented within this document.

2.7 PREVIOUS REMOVAL ACTIONS

2.7.1 A TCRA was initiated at the Lakeview Subdivision in tandem with the EE/CA investigation for removal of the immediate and imminent danger to public safety posed by the presence of UXO (Parsons, 2003). The removal action was in response to public concern stemming from several UXO findings at Lakeview Subdivision that occurred during this EE/CA investigation. The TCRA was conducted between November 2002 and March 2003 and included land survey, brush clearance, intrusive removal action, and digital geophysical mapping (DGM).

2.7.2 A total of 26 acres were designated for clearance in and around the Lakeview Subdivision for the TCRA, inclusive of a 100-foot buffer zone. Parsons and USA conducted the TCRA inclusive of a clearance of all metallic items comparable in mass or larger than a 37mm projectile in the top 6 inches of soil at the TCRA site. During the clearance, six UXO items were recovered and destroyed including: an electric blasting cap, Mk II hand grenade, 37mm HE projectile, M1 A1 Mine fuze, 2.36-inch rocket motor with fuze, and 2.36-inch HE warhead. Following the clearance, DGM was conducted over the 26-acre site for evaluation as to whether further subsurface removal actions were warranted. The DGM survey conducted after completion of the TCRA suggests that additional subsurface investigation is warranted (Appendix B). The USAESCH reviewed the DGM survey and had the following conclusions:

“The geophysical maps prepared subsequent to field activities confirm the presence of additional

metallic debris concentrated within the immediate vicinity of the Cash Property with lesser amounts dispersed throughout the Lakeview Subdivision area. Review of the geophysical data collected, historical information, utility locations, surface feature maps, and the TCRA excavation results indicate the origin of recovered UXO, OE scrap, and non-OE scrap may be the result of periodic debris disposal in addition to fired projectiles". "The only way to confirm the remaining anomalies are not UXO is to conduct a clearance to depth removal action beginning in the northwest corner of the site in the immediate vicinity of the Cash Property and proceeding grid by grid towards the south and east until no additional UXO are recovered".

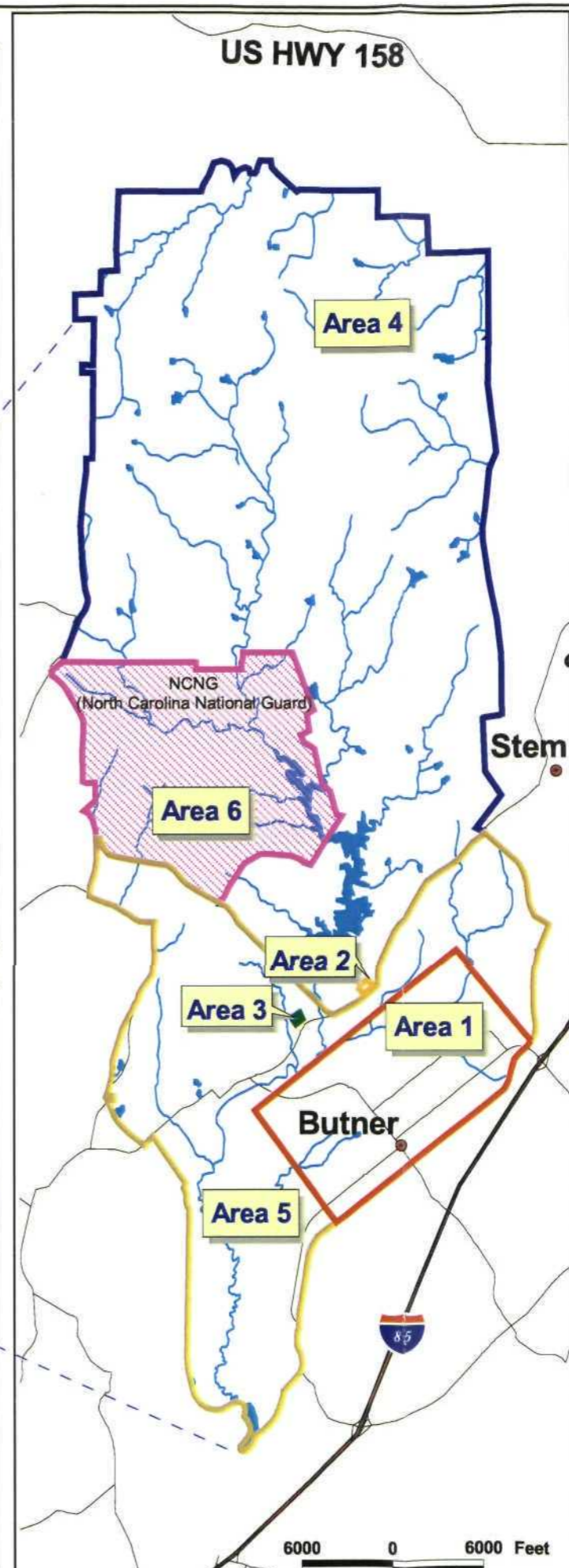
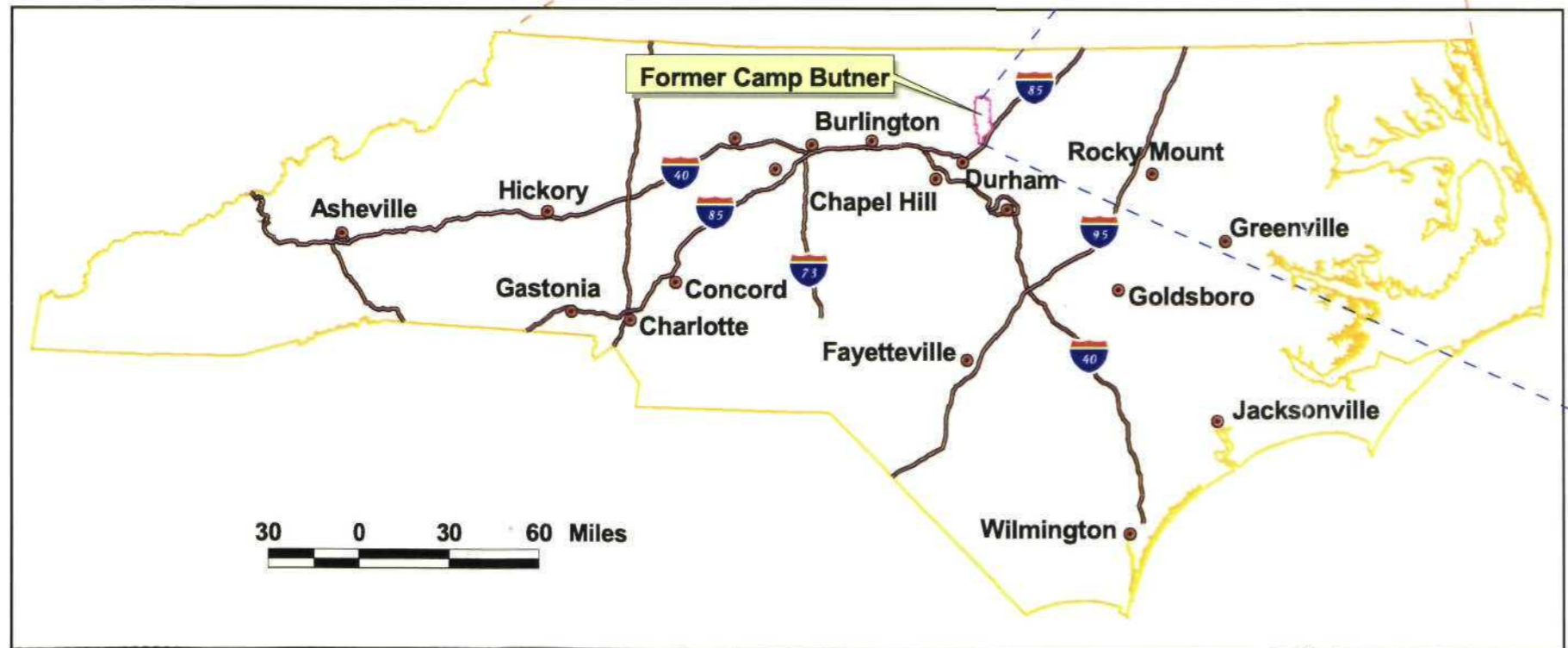
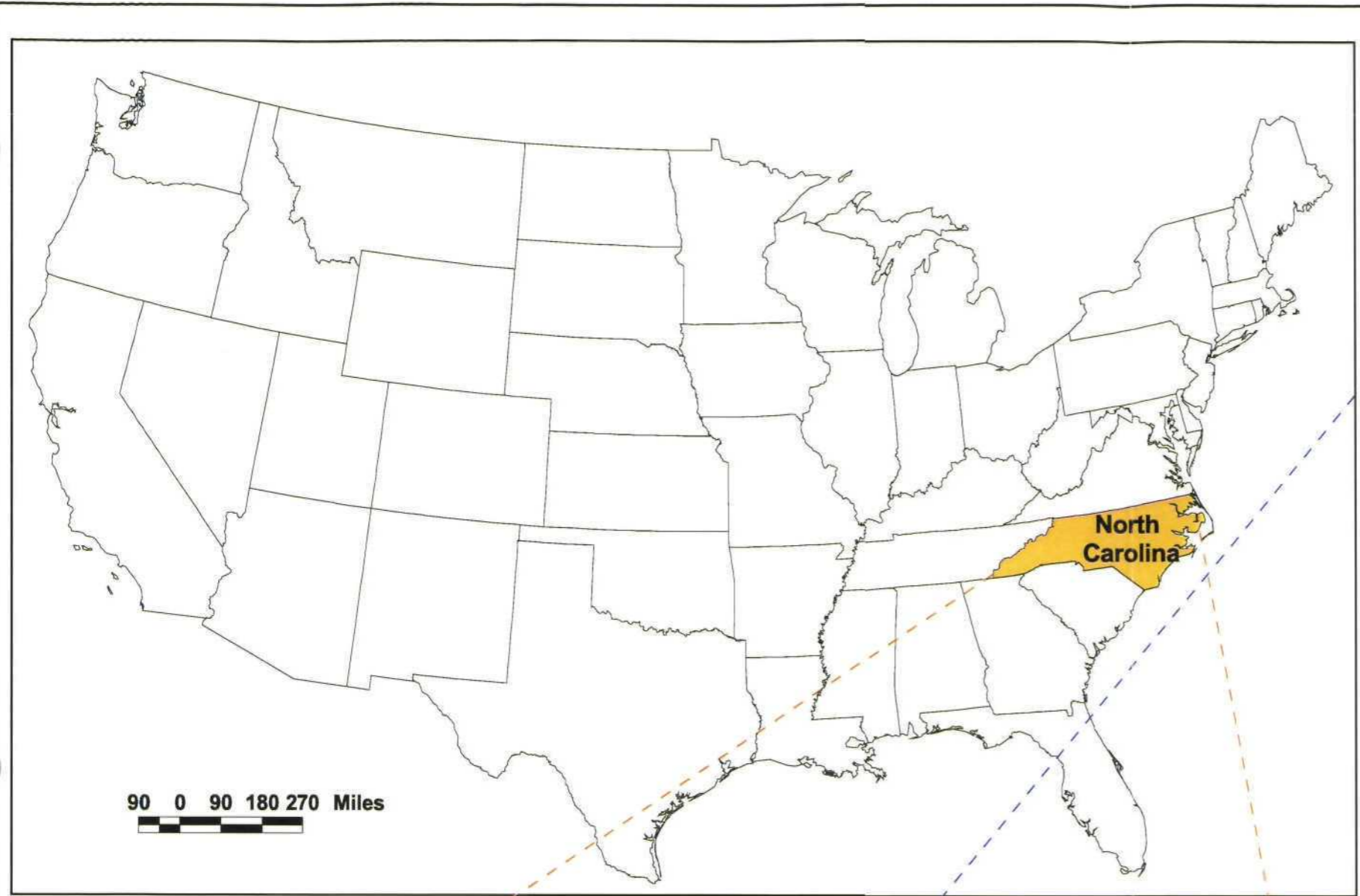


Figure 2.1
General Location Map
Former Camp Butner
Butner, NC

PARSONS		U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER	
DESIGNED BY: BT	General Location Map		
DRAWN BY: BT	SCALE: As Shown	PROJECT NUMBER: 738001	
CHECKED BY: JK	DATE: July 2004	PAGE: 2-10	
SUBMITTED BY: DS	FILE: x:\glis\738001\av_project\EECA.apr		

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Figure 2.2
Former Camp Butner
Butner, NC
General Layout

Legend

-  Former Camp Butner Boundary
-  Stream and Waterbody

Map Units: NAD 1983 North Carolina State Plane (Feet)




PARSONS		U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE	
DESIGNED BY: BT	General Layout		
DRAWN BY: BT	PROJECT NUMBER: 738001		
CHECKED BY: LK	SCALE: 1 inch equals 8,500 feet	DATE: July 2004	PAGE NUMBER: 2-11
SUBMITTED BY: DS	FILE: x:\gls\738001\av_project\TCRA_loc.apr		

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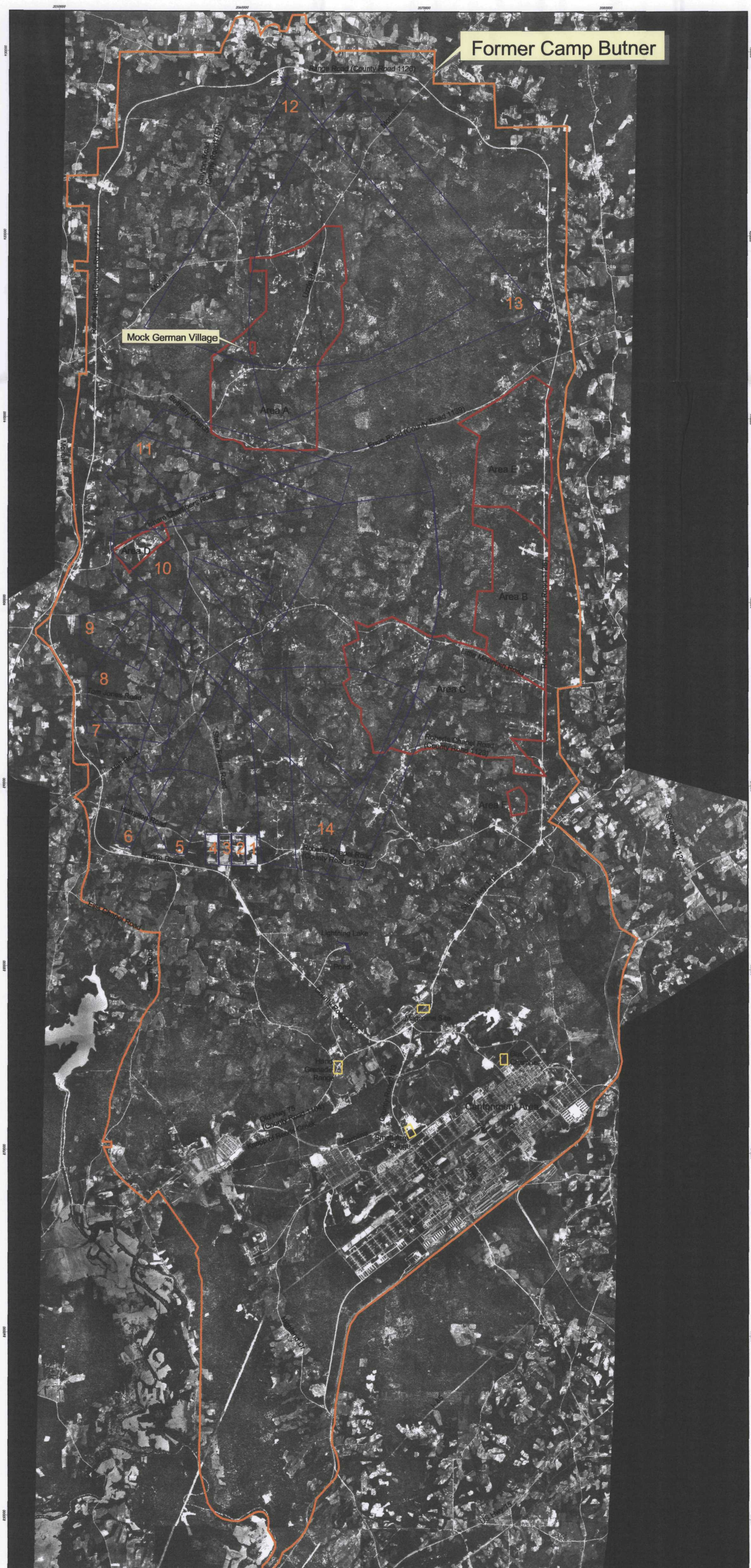
2100000

2120000





Figure 2.3

Historical Military Land Use

**Former Camp Butner
Butner, NC**



Legend

-  Former Camp Butner Boundary
-  Historic Designated Range
-  Historic Training Area
-  Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)

- A - Artillery Impact Area
- B - Bazooka and Rifle Grenade Impact Area
- C - Artillery and Rifle Grenade Impact Area
- D - Moving Target Area
- E - Bazooka and Rifle Grenade Impact Area
- F - Hand Grenade Court

List of Ranges:

- 1-9 Small Arms
- 10 37 mm
- 11, 14 Trench Mortar, 60 and 81 mm
- 12, 13 Heavy Artillery



Site Location in North Carolina

Image Source: 1945 Aerial Photo from TEC
Map Units: NAD 1983 North Carolina State Plane (Feet)



PARSONS

U.S. ARMY CORPS
OF ENGINEERS
HUNTSVILLE CENTER

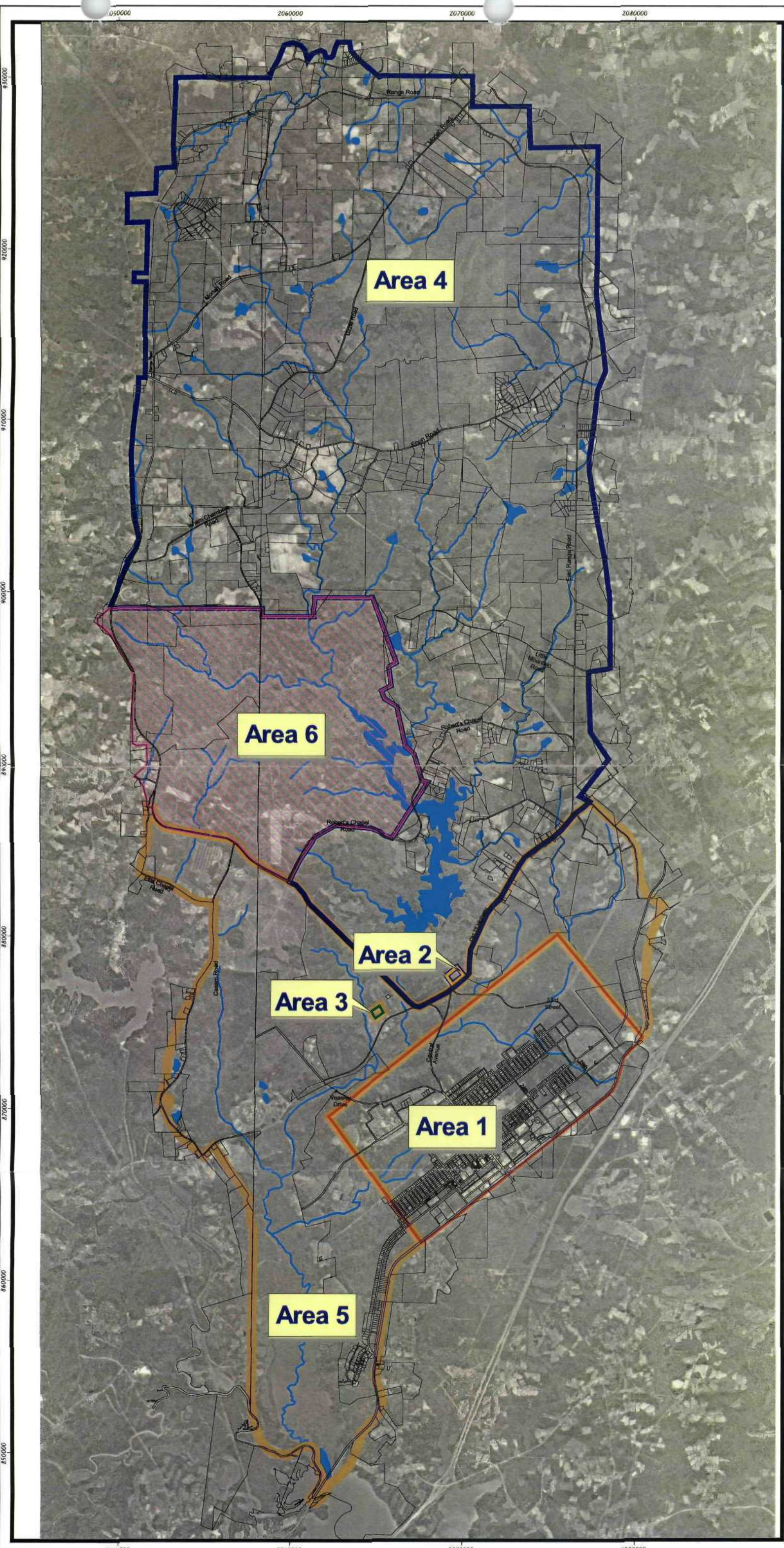
DESIGNED BY: BT	Historical Military Land Use	
DRAWN BY: BT		
CHECKED BY: JK	SCALE: 1 inch equals 2,600 feet	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: 2-17



Figure 2.4

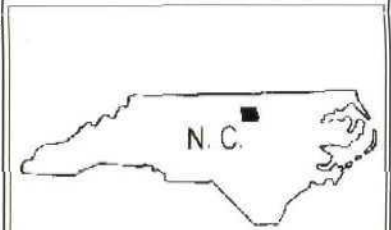
ASR-Designated Project Areas

Former Camp Butner
Butner, NC



Legend

- Area 1 - Cantonment Area & Vicinity
- Area 2 - Ammunition Storage Area & Dump
- Area 3 - Grenade Training Ranges
- Area 4 - Ammunition Training Ranges & Impact Area
- Area 5 - Remaining Land
- Area 6 - National Guard Training Center
- Stream and Lake



Site Location in North Carolina

Image Source: 1993 Aerial Photo from TEC
 Map Units: NAD 1983 North Carolina State Plane (Feet)



PARSONS U.S. ARMY CORPS OF ENGINEERS
 HUNTSVILLE CENTER

DESIGNED BY: BT	ASR-Designated Project Areas	
DRAWN BY: BT		
CHECKED BY: JK	SCALE: As Shown	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: 2-13
	FILE: x:\gms\738001\sv_project\ERCA.apr	

CHAPTER 3

SITE CHARACTERIZATION

3.1 SITE INVESTIGATION

DGM was performed at the former Camp Butner using the EM-61 and EM-61 MK 2 metal detectors to identify and locate surface and subsurface geophysical anomalies for intrusive sampling. A ranking algorithm was developed and applied to the geophysical data in order to select anomalous responses characteristic of suspect ordnance for intrusive investigation (see Subchapter 3.1.4.2). The main objective of geophysical/intrusive investigation is to characterize the nature and extent of UXO/OE at the site and support the risk-based recommendations of OE response alternatives. This chapter describes the geophysical methods and procedures, intrusive results, and the nature and extent of UXO presence.

3.1.1 Instrumentation

Two site-specific geophysical prove-outs were conducted from September 18 through September 22, 2000 and from March 12 through March 16, 2001 to identify the most effective geophysical equipment to be used during the EE/CA geophysical investigation. Based on the analysis of current available geophysical technologies, familiarity with site conditions, and Parsons' experience at other sites, two geophysical methods selected for testing included time domain electromagnetic metal detectors and flux-gate magnetometers. The results from the prove-out demonstrated that the Geonics® EM-61 and EM-61 MK 2 Time Domain Metal Detectors (TDMD) were most effective overall. These instruments were selected (and USAESCH-approved) for use at the former Camp Butner Site based on high detection rates and low false alarm rates (Parsons, 2002). The Schonstedt® Magnetic Locator also indicated acceptable performance and was used for "mag and dig" clearance of a limited number of grids with particularly rough terrain, as described later in this chapter.

3.1.1.1 Geonics® EM-61 TDMD

The EM-61 instrument is a high-sensitivity high-resolution TDMD, which is used to detect both ferrous and non-ferrous metallic objects. A transmitting coil emits a pulsed electromagnetic signal that generates subsurface eddy currents. As the transmitted signal decays in time, a secondary signal is induced within conductive bodies that oppose the change in magnetic flux. The decay rate of the secondary magnetic field depends on the conductivity of the subsurface environment. Receiver coils measure the intensity of the secondary response decay rate by integrating the voltage induced at the receiver coils for a given duration. The EM-61 data logger collects data at automatic time intervals determined by the user. During the EE/CA at the former Camp Butner Site, the EM-61

was operated in a hand-pulled configuration using automatic time intervals for surveying grids. Figure 3.1 presents a photograph showing the usage of the EM-61 at the site.

3.1.1.2 Geonics® EM-61 MK 2 TDMD

The EM-61 MK 2 instrument is a high-sensitivity high-resolution four-channel TDMD. The EM-61 MK 2 operates under the same principles as the standard EM-61, and utilizes the same top and bottom coil system. Receiver coils of the EM-61 MK 2 measure the intensity of the secondary response decay rate in a conductor by integrating the voltage induced in the receiver coils over four different time gates. Data from four channels corresponding to four time gates are recorded to provide a more complete measurement of the response decay rate for improved target characterization. The decay rate is a complex function of the conductivity, magnetic permeability and shape of the target, so analysis of the decay rate could allow discrimination to some degree of the subsurface metallic items. Early time gates enhance the detection of smaller targets; a mid-range time gate (channel 3) is the same time gate used for the standard EM-61 and is useful for comparative analysis. The EM-61 MK 2 was used in the hand-pulled configuration and deployed during Phase I data acquisition (comprising approximately 50% of the geophysical mapping effort). Because the instrument used on-site was a prototype, difficulties arose when instrument components required replacement. The decision was made to discontinue using the EM-61 MK 2 for the standard EM-61 during Phase II. Since both units have a common recording channel data from both instruments can be compared and evaluated.

3.1.1.3 Schonstedt® Magnetic Locator

Schonstedt® Magnetic Locators detect subsurface ferrous metal items. The technology utilizes two fluxgate sensors mounted a fixed distance apart and aligned in a gradiometer configuration. The Schonstedt locator is a hand-held unit that detects changes in the earth's ambient magnetic field caused by ferrous metal (the sensors are fixed and aligned to eliminate a response to the earth's ambient field). The Magnetic Locators generate an audible analog response when the two sensors detect a disturbance of the earth's ambient field associated with a ferrous target. Schonstedt® Magnetic Locators were used by UXO-qualified personnel at the former Camp Butner Site prior to advancement of any stakes, pin flags, or similar subsurface markers, to prescreen anomaly locations for subsequent reacquisition in grids, and for "mag and dig" clearance of a limited number of grids.

3.1.1.4 Trimble® 4700 Real-Time Kinematic (RTK) Total Station Global Positioning System (GPS)

The Trimble® 4700 RTK GPS consists of a high precision rover unit linked by radio to a fixed base station that allows real time acquisition of geodetic data. The Trimble® 4700 RTK GPS is capable of attaining centimeter accuracy dependent on satellite constellation and unobstructed transmission signal path between satellite and ground based receivers. Meandering path surveys were performed using the Trimble® 4700 RTK GPS system in conjunction with the EM61 MK 2, which enabled positioning

and geophysical data to be merged real time. Due to mature forest canopy and varying topography, usage of the Trimble® 4700 RTK GPS for meandering path surveys was confined to areas of the site that were generally flat and open/non-vegetated. The Trimble® 4700 RTK GPS was also used for establishing the grid corners and reacquisition of selected geophysical anomalies.

3.1.2 Quality Control of Geophysical Instruments

3.1.2.1 The field crew performed and recorded the following Quality Control (QC) tests for all instruments on a daily basis:

- Static background test twice daily (beginning and end of each day) to record background response for 3 minutes over a quiet area considered to represent known site conditions.
- Static spike test twice daily (beginning and end of each day) to record instrument response over a standard QC item for 3 minutes.
- Latency test was conducted before and after data acquisition in a grid or transect line. The test line was 100 feet or the length of the grid and included a standard QC item (e.g., trailer ball) placed at a known location. The test line was traversed twice, once in each direction that data was to be collected in the grid.

3.1.2.2 Additional QC was achieved by leaving the QC item placed for the latency test within the grid for the duration of data collection. The location of this item was recorded by the field crew and the anomaly response from the QC item was analyzed during the data processing. The response and location of this item within the survey grid provided QC of both instrument functionality and data positioning. On occasion, EM-61 response to the trailer ball was found to vary by more than 25%, and upon review, the variations were found to be due to either varying instrument heights over the trailer ball or differences in the orientation of the trailer ball with respect to the instrument sensors. In all such cases, the data were reviewed by the Senior Project Geophysicist and found to be of good quality and were accepted. Corrective actions were also taken by informing the survey teams of the variations and providing instructions to modify their procedures.

3.1.2.3 The QC test readings taken at the beginning and end of each day and for each grid were compared, and if they differed by more than 25%, then the data were reevaluated and, if necessary, the problem was corrected or the instrument was replaced.

3.1.2.4 Quality Assurance (QA) was conducted by USAESCH on selected grids, unknown to Parsons, to verify instrument response and reacquisition of anomalies. QA was accomplished by the burial of seed items at anonymous grid locations by a USAESCH Geophysicist. Seed items were selected to generate a response characteristic to ordnance likely encountered at the site. Seed items buried within grids intrusively investigated were successfully recovered during the EE/CA investigation.

3.1.3 Geophysical Survey

The geophysical mapping effort conducted at former Camp Butner was performed in two phases. The first phase was conducted between March 26 and July 11, 2001 and the second phase between March 18 and May 24, 2002. The total area geophysically surveyed was approximately 132 acres. A combination of grids and "meandering paths" were used during the geophysical mapping. The locations of the sampling areas were dispersed as detailed in Section 4.2 of the approved project Work Plan (Parsons, 2002). The selection/location process was dynamic and involved a number of factors including statistical validity, representative coverage, biased sampling, available right-of entry grants from property owners, and project team input. Locations were adjusted in the field on occasion due to terrain or vegetation conditions and new information obtained as the result of the ongoing study. Several grids were relocated to properties where UXO was recently found or from comments received at Public Meetings.

3.1.3.1 Grid Survey

3.1.3.1.1 The majority of geophysical mapping was achieved using grid survey techniques. Data was acquired using the hand-pulled EM-61 and EM-61 MK 2, which required an operator to collect data along survey lines within a pre-established grid. The hand-pulled unit consisted of a single set of 0.5-meter by 1-meter coils, with a top and bottom coil separation of 40 centimeters. The unit was pulled from a plastic handle that extended perpendicular from the long axis of the lower coil.

3.1.3.1.2 The grid surveys were conducted by first establishing the corners of a grid using professional land surveyors or qualified Parsons' personnel. Grid corners were surveyed using conventional land survey techniques in conjunction with GPS. To ensure the future reestablishment of each grid at the time of reacquisition and intrusive investigation, wood stakes and metal spikes were inserted at each corner of a grid. A UXO-qualified escort conducted a visual and surface sweep using a Schonstedt magnetic locator over the area where a stake or spike was to be driven prior to insertion. Grid dimensions were generally 100 feet by 100 feet. The grid was divided into parallel lines spaced 2.5 feet apart for EM-61 and EM-61 MK 2 surveys.

3.1.3.1.3 The grid survey method used by the geophysical data collection teams relied on the instrument operator(s) walking straight lines at a constant pace to achieve accurate reacquisition. The geophysical data were collected by traversing these lines with the geophysical survey equipment. During data acquisition, the instrument operator inserted fiducial markers into the data as they were recorded. The fiducial markers were used to reference the data to positional coordinates at the time of processing. Geophysical data were recorded in automatic mode using a polycorder or Pro4000 data logger at a rate of 12 samples per second. The data was initially referenced in local coordinates and translated into U.S. state plane coordinates during the data processing phase. Approximately 118 acres were digitally geophysically mapped using the grid survey method.

3.1.3.2 Meandering Path Survey

Prevailing site conditions limited the application of meandering path surveys due to varying topography and mature tree canopy that limited GPS coverage. Meandering path surveys were selectively conducted in open fields and where satellite reception was unimpeded. The EM-61 MK 2 was used in conjunction with a Trimble 4700 RTK GPS to allow both geophysical and geodetic data streams to be merged during data acquisition. The GPS antenna was set over the center of the coils to capture positional data using a logging rate of one reading per second. The instrument operator then traversed within the limits of the open area using this hand-pulled system. Approximately 9 acres were digitally mapped using the meandering path technique.

3.1.3.3 Analog Detection (Mag and Dig)

In addition to the grid survey techniques, a "mag-and-dig" method was also used during the geophysical investigation. The "mag-and-dig" method was used in two instances: to survey those grids that posed unusually difficult access for the larger EM-61 units; and for grids assigned during the intrusive phase of the investigation. A Schonstedt® Magnetic Locator was used to locate ferrous subsurface anomalies in such grids. Immediately after anomaly identification, UXO-qualified personnel excavated and identified the anomaly sources. In cases where large numbers of anomalies were detected, a method was devised to reduce the digging of non-ordnance anomalies (e.g. ferrous containing rocks). The method involved a UXO-qualified operator sweeping an entire grid and placing a pin flag at each location where a geophysical anomaly was detected. The method required the surveyed grid to be divided into four quadrants from which 7 to 8 anomalies per quadrant were selected for excavation. A total of 30 anomalies were excavated per "mag and dig" grid in this manner. Approximately 5 acres were intrusively investigated using this survey technique.

3.1.4 Anomaly Identification

3.1.4.1 Data Processing

3.1.4.1.1 At the end of each day, the geophysical data were downloaded from the data loggers to the field laptop computer. The downloaded data files (daily static tests, latency tests, and geophysical surveys) were then imported into manufacturer supplied software programs (DAT61™ for Windows for the EM-61 data and DAT61 MKII™ for the EM-61 MK 2). Preprocessing of the transferred data was then performed, which included the adjustment of start, end and fiducial marker positions entered by the instrument operator. Data spikes, defined as a single datum or set of data points that diverge significantly from contiguous values, were edited to ensure that terrain-induced spikes (not representing subsurface metallic debris) were removed. This process involves review and interpretation of field notes and other data by the project geophysicist and results in a clearer picture of anomaly presence.

3.1.4.1.2 Following the preprocessing phase, data files were converted into XYZ format and exported from DAT61™ or DAT61 MKII™ into Geosoft Oasis Montaj for post-processing and graphical display. The geophysical data were leveled, lagged, and

translated from latitude/longitude to state plane coordinates. EM-61 MK 2 data included data from 4 channels, corresponding to the 4 separate time gates, from which the sum was taken to create a fifth channel for use in graphical interpretation. Meandering path survey data did not require translation because it had been previously merged with positional data upon collection. Finally, processed data from the bottom coil response was gridded and graphically displayed in preparation for analysis and interpretation.

3.1.4.2 Anomaly Selection and Ranking

3.1.4.2.1 Interpretation of anomalies was based upon the instrument response from the bottom coil (EM-61) or sum of four channels bottom coil (EM-61 MK 2). The gridded data were analyzed for anomalous responses characteristic of suspect ordnance. Color contour maps were generated from the gridded data to display anomalous features and make anomaly selections. In order for the ranking algorithm to rank reliably, anomalies were selected at the location corresponding to the maximum response value. A database containing the selected anomalies was then compiled in Geosoft and imported into an Access database where a ranking algorithm was then applied.

3.1.4.2.2 The ranking process focused on assigning higher ranks to anomalies that were more likely to be associated with buried or unknown ordnance items, and on reducing the number of false positive anomalies. The ranking process was based on the comparison and analysis of several anomaly characteristics, including: comparing the detected anomaly signals to prove-out signatures of known inert ordnance seed items; comparing the anomaly signals to background levels; and, the analysis of response characteristics. Specifically, the ranking process considered the following criteria:

EM-61 and EM-61 MK 2 Anomaly Ranking Criteria:

- A data channel distinguishable above “background” (location-specific baseline signal influenced by numerous factors including power lines, temperature, soil type, etc.).
- Similarity between anomalous responses on all channels compared to the observed response over inert ordnance seed items detected in the prove-out grid.
- Association between anomalous response characteristics and instrument noise or terrain features.

Once each anomaly was compared against these criteria, an anomaly rank was assigned using the following logic, depending on the instrument used:

EM-61 MK 2 Anomaly Ranking (Phase 1)

- Rank 1: The anomaly responses in all 4 channels was within the ranges of at least two of the inert ordnance seed items detected in the prove-out grid and the anomaly response was distinguishable above background in either all or channels 1 through 3.
- Rank 2: The anomaly responses in all 4 channels were within the ranges of at least one of the inert ordnance seed items detected in the prove-out

grid and an above background response in at least channel 1 or the anomaly responses in all 4 channels were within the ranges of 4 of the inert ordnance seed items detected in the prove-out grid, regardless of whether any of the responses were noticeably above background. In addition upon review, some anomalies that received rankings of 3 were revised to 2 based upon professional judgment.

- Rank 3: All anomalies that do not fall within the criteria of Rank 1 or Rank 2 anomalies and are not associated with items used to establish navigation controls or to perform QC functions.
- Rank 4: The anomaly is associated with an item or object observed on the ground surface or known to exist in the surveyed area (e.g. corner nail, fence post, utility, etc.); or, the anomaly is associated with a QC object.

EM-61 Anomaly Ranking (Phase 2)

- Rank 1a: The anomaly responses can be associated with three or more inert ordnance seed items detected in the prove-out grid and both the top and bottom channel readings were distinguishable above background.
- Rank 1b: The anomaly responses can be associated with at least one of the inert ordnance seed items detected in the prove-out grid and either the bottom or the top and bottom channel readings are distinguishable above background.
- Rank 2: The anomaly responses may be associated with one or more of the inert ordnance seed items detected in the prove-out grid but the bottom channel is not distinguishable above background; or, the anomaly is suspected of being associated with instrument noise or terrain features; or, the anomaly could not be associated with any of the items seeded in the prove-out grid.
- Rank 3: The anomaly is suspected to be the result of geologic features or other cultural features but could not be confirmed through logbook notes.
- Rank 4: The anomaly is associated with an item or object observed on the ground surface or known to exist in the surveyed area as documented in the project logbook (e.g., corner nail, fence post, and other cultural features).

3.1.4.2.3 The ranked anomalies were then categorized by area and area-specific anomaly selections criteria formulated by the project team to enhance anomaly selection on an area-specific basis. The area specific selection criteria considered both the anomaly rank and the type or types of UXO targets that were anticipated in each of the areas of the site. However, due to uncertainty regarding potential multiple use ranges and potential dumpsites, a percentage of anomalies not suspected to be ordnance were investigated at all sites.

3.1.4.2.4 In general 100% of the Rank 1, 1a, and 1b anomalies were selected for intrusive investigation. To account for the possibility that a designated Rank 2 anomaly may be associated with a suspected or an unknown ordnance item, percentages of Rank 2

anomalies were selected for intrusive investigation. A smaller percentage of Rank 3 anomalies were also investigated to validate the anomaly ranking methodology. By definition, Rank 4 anomalies are comprised of known sources that did not warrant investigation.

3.1.4.2.5 The cumulative area geophysically investigated at the former Camp Butner Site was approximately 132 acres, inclusive of "mag-and-dig" acreage. Final analysis from the geophysical mapping effort identified 10,743 Phase 1 anomalies and 4,185 Phase 2 anomalies. Based on the area selection criteria, a total of 8,545 Phase 1 anomalies were selected for intrusive investigation, inclusive of all Rank 1 anomalies and percentages of Rank 2 and 3. Similarly, the selection criteria applied to the Phase 2 ranked anomalies identified a total of 3,086 anomalies for investigation. Due to the relatively low number of Rank 2 and Rank 3 anomalies (707) in Phase 2, it was considered prudent by the project team to investigate 100% of the Phase 2 anomalies rather than select percentages by area for investigation as was done in Phase 1. A total of 570 "mag-and-dig" anomalies were also intrusively investigated as part of Phase 2.

3.1.5 Anomaly Dig Sheets

All anomalies identified during the field investigation were uniquely numbered and listed on Anomaly Dig Sheets. The unique number included an anomaly identification (ID), which reflected the grid ID and the sequential anomaly ID for that grid. The Anomaly Dig Sheet also included the location of the anomaly in either local grid coordinate system or North Carolina State plane coordinates, as well as the millivolt response of the peak signal associated with the anomaly.

3.1.6 Anomaly Reacquisition

Approximately 11,631 (8545 Phase 1 and 3086 Phase 2) anomalies were selected as candidates for reacquisition and subsequent intrusive investigation based on application of the anomaly ranking and selection strategy. When reacquiring grid anomalies, measuring tapes were initially pulled across the length (y-axis) of the grid; one measuring tape was pulled from the southwest to northwest corner and another from the southeast to northeast corner. A third measuring tape was then pulled across the width (x-axis) of the grid and held at each end by a member of the dig team in order to facilitate movement of the tape measure along the y-axis. A non-metallic pin flag (displaying the anomaly ID) was then placed at the point of intersection of the x and y-axes measuring tapes, as indicated in local coordinates on the dig sheet. Finally, the precise anomaly location was refined using the Schonstedt Magnetic Locator.

3.1.7 Intrusive Investigation

3.1.7.1 The intrusive investigation at former Camp Butner was conducted from August 5 through October 17, 2002. A total of 7071 anomalies were intrusively investigated including 6501 anomalies selected from the digitally mapped geophysical data and the 570 anomalies identified during the "mag-and-dig" survey. Some anomalies, although selected for investigation via the screening process identified above, could not

be excavated. Although not all inclusive, reasons for deletion of a selected anomaly from the investigation included:

- The area or subarea was considered characterized (for example, many anomalies identified for investigation in Area 3 – Grenade Training Range were not investigated following project team concurrence that the findings indicated that a grenade range was never present at the location).
- The area digitally mapped was subsequently covered by an agricultural crop and the property owner would not allow the intrusive investigation to proceed.
- UXO was present within a grid or group of grids. In such cases the grid is determined to be characterized and all remaining anomalies are deleted from further investigation.
- Evacuation refusal by resident within the minimum separation distance (MSD) for the area of concern.
- High concentration of anomalies in a low-likelihood area (for example, due to the numerous anomalies in Area 1 – Cantonment Area and the absence of any historical firing fans, anomalies were eliminated when present in large clusters). Anomalies displaying significantly large readings, representative of potential burial areas, were investigated.

3.1.7.2 The Parsons project geophysicist compared the findings from each intrusively investigated anomaly (with the exception of “mag-and-dig” anomalies) with the maximum amplitude originally recorded by the geophysical instrument to ensure the item recovered was reasonable for the reading. If the item excavated was not consistent with the selected anomaly data, further investigation of the anomaly location was conducted.

3.1.7.3 All 7071 anomalies intrusively investigated were excavated by UXO-qualified personnel. During the intrusive excavation, each anomaly was treated as a suspect UXO/OE item until it was determined otherwise. Occasionally, intrusive investigation teams could not identify any metallic objects within the “critical radius” (three feet for grids, five feet for meandering path) at an anomaly location. These locations were designated as “false positives” (shown as “no contact” on the dig sheets). Site wide, 390 “false positives” (6%) were identified from the 6,501 anomalies selected from the digitally recorded data. The presence of some “false positives” is inherent in geophysical/intrusive investigations; with 15% considered the maximum acceptable occurrence level (USACE Data Item Description [DID] OE-005-05, March 2000, paragraph 10.4.3). Many reasons exist for the presence of “false positives” including residual rust in the soil, proximity of power lines, metallic surface debris moved after initial survey, rough terrain causing equipment jolts, etc. None of the “mag-and-dig” anomalies, by definition, resulted in a “false positive.”

3.1.7.4 After an anomaly was excavated, the intrusive investigation team recorded the anomaly type, a brief description of their finding(s), the anomaly depth and any actions taken. All of this information was recorded on the Anomaly Dig Sheet. The available choices for anomaly types were predetermined as UXO, Ordnance-Related Scrap, Non Ordnance-Related Scrap, False Positive, and Other. In addition, the project geophysicist continually compared the actual findings with the anticipated findings given the anomaly rank and signature. All of the UXO items found as a result of interpretation of DGM survey were Rank 1 anomalies, thus validating the selection scheme. Conversely, several thousand investigated Rank 1 anomalies were not UXO. Further, OE scrap items (indicative of potential UXO presence) cannot be similarly ranked due to their variability in size and shape.

3.1.7.5 The anomaly types identified on the Anomaly Dig Sheets are briefly described in the following sub-chapters.

3.1.7.1 Unexploded Ordnance (UXO)

Anomalies were identified as UXO (noted as “U” in the Anomaly Dig Sheets) if the recovered item was “a military munition that contains explosive, pyrotechnic, or a chemical agent and has been primed, fuzed, armed, or otherwise prepared for action, and which has been fired, placed, dropped, launched, projected, and remains unexploded by design or malfunction” (USACE, 1998b).

3.1.7.2 Ordnance Scrap (OE Scrap)

Anomalies were identified as Ordnance Scrap items (noted as “OES” in the Anomaly Dig Sheets), if the recovered item was “a military munition or component thereof which contains no explosive, pyrotechnic, or chemical agent. Fragments of military munitions, which have functioned as designed or were destroyed, are ordnance scrap if they have no explosive, pyrotechnic, or chemical filler.” (USACE, 1998b).

3.1.7.3 Other

By definition, anomalies identified as non-munitions found at ordnance sites are designated as Other (USACE, 1998b). Due to the geologic conditions and the high number of anomalies attributed to iron-bearing rocks, the Other category was sub-divided as described below to distinguish between man-made items and geologic conditions.

3.1.7.3.1 Non Ordnance-Related Scrap (NOES)

Anomalies were identified as Non Ordnance-Related Scrap (noted as “NOES” in the Anomaly Dig Sheets), if the recovered items were not related to any ammunition and/or ammunition components. These items included metal scrap such as nails, chains, cables, metal wire, and pipes.

3.1.7.3.2 Geological Interference

Anomalies were identified as geological interference (noted as “O” in the dig sheets), if the recovered items were not related to ammunition nor were they man-made

metallic debris. These items included materials such as iron-bearing rock (ubiquitous in the area), ferrous soil with no visible metallic item, and any item not fitting one of the categories above.

3.1.7.4 False Positive

Anomalies were identified as False Positive (noted as "FP" in the dig sheets), if no discernable metallic objects were identified at the anomaly excavation location and the magnetometer did not display an audible signal either at the triangulated location or in the general vicinity (approximate 5 foot radius around the pin-flagged location).

3.1.8 Intrusive Investigation Findings

3.1.8.1 A total of thirteen UXO items were recovered during the EE/CA investigation, as summarized on Table 3.1. In addition, 6 UXO were recovered during the TCRA as described in Subchapter 2.7. A total of 1491 out of the 7,071 anomalies intrusively investigated during the EE/CA contained items designated by the intrusive field teams as OE Scrap. A table summarizing all anomaly findings is presented in Appendix C.

3.1.8.2 Following the identification and removal of the anomaly, the excavated area was backfilled and restored to its original pre-intrusive condition. Upon completing the intrusive investigation at the former Camp Butner Site, QC checks were performed in accordance with the approved Work Plan procedures [Parsons, 2002].

3.1.9 Recovered UXO

UXO recovered during the EE/CA investigation at the former Camp Butner Site included one 155mm projectile, two 105mm projectiles, a 57mm projectile, three 2.36-inch bazooka rockets, three 37mm projectiles, Mk II hand grenade, M52-series nose fuze, and M1 practice mine with spotting charge and fuze. Additionally, 6 UXO were recovered during the TCRA at the Lakeview Subdivision. A list of the UXO items recovered during the EE/CA and TCRA, as well as the corresponding grid IDs and depths of findings are tabulated in Table 3.1. Discussion of the UXO items identified at the former Camp Butner Site is presented in Subchapter 3.3.

3.1.10 OE Scrap Disposal

At the completion of the EE/CA, the recovered OE scrap items were inspected by the Parsons UXO Safety Officer and the USA Senior UXO Supervisor (SUXOS) and certified as non-hazardous scrap and disposed of through Swartz and Sons, Inc. in Durham, NC. A DoD Form 1348-1A was completed for the OE scrap items turned in to the scrap metal dealer. The DoD Form 1348-1A, signed by the USA SUXOS and the Parsons Safety Officer, is provided in Appendix D.

TABLE 3.1
UXO RECOVERED AND DETONATED (EE/CA AND TCRA)
CAMP BUTNER SITE, DURHAM/GRANVILLE/PERSON COUNTIES, NC

Grid ID	Depth (inches)	UXO Item	Comments	Ordnance Scrap Findings¹	Map Location²	Number of OE Scrap Items
A1G0209 (EE/CA)	1	Mk II hand grenade	Detonated	Two M15 grenades	D9	2
A1G0211 (EE/CA)	10	M1 practice mine with spotting charge and fuze	Detonated	NA	D9	0
A4G0020 (EE/CA)	3	105mm projectile unfuzed ³	Detonated	Two M51 fuzes and HE fragments	C3	28
A4G0071 (EE/CA)	30	155mm shrapnel round unfuzed with expelling charge ³	Detonated	155mm base plate and HE fragments	C3	22
A4G0093 (EE/CA)	10	2.36-inch warhead unfuzed ³	Detonated	HE fragments	C2	4
A4G0284 (EE/CA)	3	M52 Series nose fuze	Detonated	HE fragments	C6	34
A4G0366 (EE/CA)	6	57mm HE fuzed	Detonated	57mm AP-T	C5	1
A4G0402 (EE/CA)	1	37mm HE fuzed	Detonated	NA	B5	0
A4G0418 (EE/CA)	2	37mm HE fuzed	Detonated	NA	B4	0
A4G0525 (EE/CA)	Surface	105mm projectile unfuzed ³	Detonated	37mm , PTT fuze , 57mm AP-T, and HE fragments	C5	11
A4G1436 (EE/CA)	3	37mm HE fuzed	Detonated	60mm mortar fin	C7	1

TABLE 3.1, CONTINUED
UXO RECOVERED AND DETONATED (EE/CA AND TCRA)
CAMP BUTNER SITE, DURHAM/GRANVILLE/PERSON COUNTIES, NC

Grid ID	Depth (inches)	UXO Item	Comments	Ordnance Scrap Findings ¹	Map Location ²	Number of OE Scrap Items
A4G1439 (EE/CA)	18	2.36-inch HE	Detonated	HE fragments	D4	2
A4P/3 (EE/CA)	3	2.36-inch HE	Detonated	Two 2.36-inch rockets, two 2.36-inch rocket motors, and M9 rifle grenade	D5	5
334 (TCRA)	6	M1 A1 Landmine fuze	Detonated	NA	C7	0
335 (TCRA)	1	2.36-inch warhead fuzed	Detonated	2.36-inch nose cone and HE fragments	C7	2
349 (TCRA)	4	Mk II hand grenade	Detonated	NA	C7	0
349 (TCRA)	2	37mm HE fuzed	Detonated	NA	C7	0
358 (TCRA)	1	2.36-inch warhead unfuzed ³	Detonated	2.36-inch rocket motors, 60mm mortar fins and rifle grenade tail boom	C7	7
375 (TCRA)	2	Electric basting cap	Detonated	M1 mine fuzes	C7	2

NA - Not Applicable, AP-T = Armor piercing w/tracer, PTT = Powder Time Train, HE = High Explosive

1 - All "other ordnance-related findings" were determined inert or fully expended and handled as Ordnance and Explosives Scrap (OES).

2 - Map Location identified on Figures 3.2a and 3.2b

3 - This item was not fuzed, however, it was considered hazardous in its recovered state due to the presence of residual explosives and was detonated.

3.2 SOURCE, NATURE, AND EXTENT OF UXO/OE

This chapter provides an overview of the results of the intrusive investigation performed at the former Camp Butner Site. The ASR divided the site into six (6) areas based on several factors including historic military land use, suspect impact or overshoot areas, and property controlled by the NCNG. The AOIs, initially designated as Areas 1 through 6, are shown on Figures 3.2a and 3.2b along with the intrusively sampled grid locations. The property designated as Area 6 (NCNG Training Center) encompasses approximately 4750 acres of training ranges, impact areas, and buffer zones and is owned and operated by the NCNG. Area 6 was not included in the EE/CA investigation due to its current status as an active training range. The results of the EE/CA investigation are presented for each of the remaining five areas discussed in the following paragraphs.

3.2.1 Area 1

3.2.1.1 Area 1, referred to as the Cantonment Area and Vicinity, encompasses approximately 3,300 acres of the east-central portion of the site now known as the unincorporated Town of Butner (Figure 3.3). The Town of Butner consists of a network of roadways historically utilized by the Cantonment and presently providing access to residential communities and institutional facilities. Ranges and training areas known to have been present in Area 1 included a flamethrower range, a small arms range, a 1000-inch range, an ordnance shipping and receiving area, a magazine storage area, and a tear gas chamber (USACE, 1997/2003).

3.2.1.2 The ASR recommended an EE/CA investigation of Area 1 based on the "potential" presence of UXO. Only .30 caliber cartridge cases were discovered during the ASR reconnaissance and no records of OE findings since facility closure were found (USACE, 1997). However, interviews with NCNG personnel and other sources indicated that OE items have been found in recent years, especially in the vicinity of the "1942" Camp Butner water tower located off Central Avenue (Figures 3.2a and 3.2b). The water tower is situated within proximity to the ASR-designated former flame thrower/small arms ranges, which may have served other training purposes. A discovery of a 2.36-inch HE rocket located adjacent to the Camp Butner water tower was made in 2000.

3.2.1.3 Approximately 5.3 acres geophysically mapped in Area 1 were intrusively investigated during the EE/CA investigation. This acreage represents approximately 0.2% of the 3,300 acres encompassed by Area 1. Due to widespread development within the Town of Butner including: residential housing, public schools, and state and federal facilities, placement of sampling grids in Area 1 was focused primarily in undeveloped areas.

3.2.1.4 Locations of the intrusively investigated grids are presented in Figures 3.2a and 3.2b. Based on the anomaly ranking criteria and selection strategy (described in Subchapter 3.1.4), a total of 315 (311 Rank 1, 2 Rank 2, and 2 Rank 3) anomalies were intrusively investigated. Results from the intrusive investigation identified two (0.6%)

UXO and 5 (1.5%) OE scrap items out of the 311 investigated in Area 1. Thirty-four (11%) of the anomalies investigated were considered "false positives" as no discernible metallic debris were found. The two UXO items were confined to a small training area near the water tower. Appendix C presents the intrusive findings of the UXO, OE scrap, and non-OE scrap/Other items found in Area 1.

3.2.1.5 The intrusive results from Area 1 show recovered UXO and OE scrap items concentrated in grids located northeast of the water tower off Central Avenue. The two UXO items recovered from the general area included an Mk II hand grenade and an M1 practice mine with spotting charge and fuze recovered at 1 inch and 10 inches below ground surface (bgs), respectively. Intrusive findings identified OE scrap consisting of five inert (expended) M15 grenades. The ordnance related intrusive findings and concrete fortification are indicative of a grenade training range at this location.

3.2.1.6 *Area 1 has been found to contain UXO items and OE scrap items as identified during the EE/CA.* The UXO and OE scrap findings of the EE/CA investigation were recovered from four of the six total grids within the vicinity of the water tower located off Central Avenue. Both UXO items recovered were Rank 1 anomaly selections. The remainder of intrusive findings, approximately 98% of the anomalies investigated, in Area 1 consisted of non-OE scrap and Other.

3.2.2 Area 2

3.2.2.1 Area 2 is identified as the Ammunition Storage Area and Dump located north of the Town of Butner along State Route 75/County Road 1104 (Figure 3.4). Area 2 was designated as an approximately 7 acre tract. The land is owned by the State of North Carolina and is currently idle. Several World War II vintage earth covered magazines remain; otherwise the parcel is partially forested with thick underbrush. Some magazines have been used by local farmers to store agricultural products.

3.2.2.2 The ASR recommended an EE/CA investigation of Area 2 based on the "potential" presence of UXO. Aside from the storage magazines remaining, no OE was discovered during the ASR reconnaissance and no records of OE findings since facility closure were found (USACE, 1997).

3.2.2.3 A total of approximately 5.8 acres were geophysically mapped during the EE/CA investigation of Area 2. This acreage represents approximately 83% of the 7 acres designated for this area. Sampling was not conducted atop the magazine locations. Figure 3.4 depicts the location of grids sampled in Area 2. Based on the anomaly ranking criteria and the approved anomaly selection strategy, 288 (235 Rank 1, 34 Rank 2, and 19 Rank 3) geophysical anomalies were selected for intrusive investigation.

3.2.2.4 During the intrusive investigation, the Project Geophysicist evaluated intrusive results for the presence of ordnance related findings. Based on the intrusive results, an assessment was made after 195 (77%) of the selected anomalies had been

investigated. The results revealed that no UXO or OE scrap items had been recovered in Area 2. Thirteen (7%) of the anomalies investigated were considered "false positives" as no discernible metallic debris was found. Because the distribution of sampling provided representative coverage (approximately 4.2 acres) in conjunction with the lack of presence of UXO or OE scrap in the sampled population, the decision was made by the project team, in accordance with the USAESCH PM, to discontinue further intrusive investigation of Area 2.

3.2.2.5 No UXO items were found in Area 2. Non-OE scrap recovered included items such as nails, wires, metal rods, barbed wire, pipes, steel strap, metal scrap, etc. Appendix C presents the intrusive investigation summary of non-OE scrap and Other items found in Area 2.

3.2.3 Area 3

3.2.3.1 Area 3 is identified as Grenade Training Ranges that were reportedly located within the current Umstead Farm (North Carolina Department of Agriculture and Consumer Services), a dairy cattle research farm (Figure 3.5). The approximately 5-acre parcel designated for the EE/CA investigation is located in open pasture located approximately 0.25 mile west of the intersection of County Road 1004 and County Road 1121.

3.2.3.2 The ASR recommended investigation of Area 3 based on the "potential" presence of UXO. No OE was discovered during the ASR reconnaissance and no records of OE findings since facility closure were found (USACE, 1997). The Umstead Farm Unit Superintendent was interviewed during the Site Visit (Parsons, 2000) and stated he was familiar with the history of the grenade range but was unaware of its exact location within the farm.

3.2.3.3 Approximately 8.5 acres were geophysically mapped in and around Area 3. A total of 1173 (743 Rank 1, 231 Rank 2, and 199 Rank 3) anomalies were selected for intrusive investigation based on the anomaly ranking criteria and the approved anomaly selection strategy. Concurrent to the intrusive investigation in Area 3, intrusive results were evaluated by the Project Geophysicist for the presence of ordnance related items. Following the excavation of 829 (71%) of the selected anomalies, a review of the intrusive results found no UXO or OE scrap items recovered from the approximately 6.4 acres investigated. Forty (5%) of the anomalies investigated were considered "false positives" as no discernible metallic debris were found. The project team, with USAESCH PM approval, concluded that no further characterization was warranted in Area 3 based on the lack of ordnance related findings.

3.2.3.4 No UXO items were found in Area 3. Non-OE scrap recovered included items such as horse shoes, plow blades, leaf springs, hinges, an ax head, nails, wires, metal scrap, etc. Appendix C presents information tabulated from dig sheets that summarizes and describes non-OE scrap/Other items found in Area 3.

3.2.4 Area 4

3.2.4.1 Area 4, the Ammunition Training Ranges and Impact Area, is the largest AOI, comprising the entire northern half and east-central portion of the site (Figure 3.6). Area 4 includes nearly 21,950 acres (greater than 34 square miles) of training ranges, impact areas, and buffer zones. The land is owned by private and state entities with a variety of land uses including agriculture and low density residential development. The areas not utilized for agricultural or residential purposes consist of moderate to heavy forest.

3.2.4.2 The ASR recommended further investigation of Area 4 based on the "confirmed" presence of UXO (USACE, 1997). This determination was based on direct witness of ordnance items, documented evidence verifying actual witness by others since closure, or statements from individuals with factual knowledge of ammunition presence/recovery. Two 155mm projectiles were observed at a homestead located off Enon Road in Area 4, during the ASR reconnaissance (USACE, 1997). The ASR team located the remains of a mock German village and movable ammunition targets, which was subsequently verified by Parsons' field teams. During the site visit, the Site Investigation (SI) team discovered a large fragment of a 105mm HE projectile located at a homestead within this sector. Based on the discoveries made by the ASR team, Area 4 was confirmed as having ordnance present.

3.2.4.3 During the course of the EE/CA investigation, ongoing field investigation activities generated public awareness, which triggered numerous calls from local residents. Parsons received several reports from local residents and authorities that pertained to past and present ordnance related findings throughout Area 4. For example, one property owner, residing along the eastern boundary of the site, informed Butner Public Safety and Parsons of findings uncovered while tilling one of his fields. The items were later identified as inert 2.36-inch practice rockets and were disposed of by Fort Bragg EOD. Another property owner, located in the northern central region of the site, reportedly discovered several fuzes and a 155mm HE projectile on his property and contacted Fort Bragg EOD for removal and disposal of the ordnance items. This same property owner also subsequently found a 105mm HE projectile. Another finding was reportedly made by an adjacent neighbor who described discovering a 155mm HE projectile on his property approximately ten years ago, which Fort Bragg EOD detonated. These reported findings prompted the placement of sampling grids on the above properties in the vicinity of the discovered items.

3.2.4.4 At a public meeting held in April 2002, a Lakeview Subdivision property owner informed USAESCH and Parsons of the recent discovery of a 2.36-inch rocket on his property in November 2001. As a result of the meeting, USAESCH instructed Parsons to place sampling grids (A4G1436 and A4G1437) on the property where the 2.36-inch rocket was found. A total of 82 anomalies were selected for investigation; all Rank 1, Rank 2, and Rank 3 anomalies were excavated. A 37mm projectile (UXO), an inert 60mm mortar tail boom, and various other OE scrap items were recovered during

the intrusive investigation. Based on the UXO finding from the EE/CA investigation, a TCRA was conducted at the Lakeview Subdivision (Parsons, 2003).

3.2.4.5 Due to the large size of Area 4, the implemented sampling strategy focused on sampling within known impact and suspect areas, while also achieving a broad distribution of sampling coverage (representative coverage). As discussed above, when local residents reported discovering ordnance items coincident to the ongoing field investigation, sampling grids were placed at the general location of the finding as approved by USAESCH. Representative coverage was attained mainly by using sampling grids, but also included small areas mapped by meandering path transects. In areas of very rugged terrain and steep inclines, "mag-and-dig" operations were performed (as described in Subchapter 3.1.3) to supplement the geophysical mapping. "Mag and Dig" surveys were also performed on newly assigned grids that were placed in areas of concern identified during the intrusive phase of the EE/CA investigation.

3.2.4.6 A total of approximately 77 acres were intrusively investigated in Area 4 during the EE/CA investigation. This acreage represents 0.4% of the 21,950 acres designated within Area 4. Based on the anomaly ranking criteria and the approved anomaly selection strategy, a total of 4968 anomalies were intrusively investigated. A total of 11 UXO (0.2%) and 1485 OE scrap items (30%) were recovered from the anomalies investigated in Area 4. The UXO items found included an M-series nose fuze, two 2.36-inch rockets, a 2.36-inch warhead, three 37mm projectiles, a 57mm projectile, two 105mm projectiles, and a 155mm shrapnel round. These items were recovered from depths ranging from ground surface to 30 inches bgs (Table 3.1). Two hundred and thirty (5%) of the anomalies investigated were characterized as "false positives" as no discernible metallic debris was found. Included in the total acreage investigated are "mag-and-dig" sampling grids totaling 19 grids with 570 anomalies excavated. Appendix C presents information tabulated from dig sheets that summarizes and describes UXO, OE scrap, and non-OE scrap/Other items found in Area 4.

3.2.4.7 An additional 26 acres were intrusively investigated as part of the TCRA at the Lakeview Subdivision. The "mag and dig" method was used during the 0 to 6 inch clearance, which consequently biased findings in this area to within 6 inches bgs. Six UXO were recovered including an electric blasting cap, a M1 A1 landmine fuze, a Mk II hand grenade, a 37mm HE projectile, and (2) 2.36-inch rocket warheads. A total of 66 OE scrap items were recovered including remnants of M1 landmine fuzes, 2.36-inch rocket motors and fins, 60mm fins, and rifle grenade tail booms.

3.2.4.8 *Area 4 has been found to contain UXO items and OE scrap items as identified during the EE/CA and TCRA investigations.* The spatial distribution of UXO and OE scrap findings in the north, west and central regions of Area 4 is generally consistent with known impact areas from former firing ranges. UXO items originally selected from digitally mapped data consisted of 9 Rank 1 and 1 Rank 2 selections. The remainder of the UXO items, (1) EE/CA and (6) TCRA, were recovered using the "mag and dig" operations.

3.2.5 Area 5

3.2.5.1 Area 5, referred to as Remaining Land, is the second largest AOI, comprising most of the southern third of the project site (Figure 3.7). Area 5 includes nearly 10,372 acres (16.2 square miles) of outlying land between the cantonment area and the artillery training ranges. The land included in Area 5 is currently owned by such entities as Federal Correctional Facilities, state owned cattle farms, Waterfowl Impoundment Reserve, as well as private property. The majority of the land is dedicated to agriculture and forestry.

3.2.5.2 The ASR recommended no action for Area 5. This determination was based on lack of confirmed or potential evidence of UXO. No OE was discovered during the ASR reconnaissance and no records of OE findings since facility closure were found (USACE, 1997).

3.2.5.3 Approximately 14.3 acres were intrusively investigated during the EE/CA investigation. This acreage represents approximately 0.1% of the 10,372 acres encompassed by Area 5. Geophysical survey techniques utilized in Area 5 primarily consisted of grid surveys, with some meandering path transects. Sampling coverage in Area 5 was broadly distributed. Based on the anomaly ranking criteria and the approved anomaly selection strategy, a total of 754 anomalies were intrusively investigated. A single "spider" plate (pressure plate) from an M1 anti-tank practice mine was recovered from grid A5G0018 located in a wooded area adjacent to a cultivated field and represented the only OE scrap item. Seventy-three (10%) of the anomalies investigated were considered "false positives" as no discernible metallic debris were found. No other ordnance related findings were discovered in Area 5.

3.2.5.4 *No UXO items were found in Area 5.* One OE scrap item was recovered from Area 5 during the EE/CA investigation. The item, an inert "spider" plate (pressure plate) from an M1 anti-tank practice mine, was found at ground surface. Appendix C presents information tabulated from dig sheets that summarizes and describes OE scrap and non-OE scrap/Other items found in Area 5.

3.3 RECOVERED ORDNANCE ITEMS

The OE-related items recovered during the EE/CA and TCRA investigations are presented in Table 3.1. Recovered OE scrap items included remnants from practice mines, various fuzing mechanisms, 2.36-inch bazooka rockets, 37mm projectiles, 57mm projectiles, 60mm mortars, 81mm mortars, 105mm projectiles, and 155mm projectiles. Appendix E provides a brief description of the UXO items recovered during the EE/CA intrusive investigation at the former Camp Butner.

3.4 FIRING FANS

3.4.1 Presently, the only archival evidence delineating the various firing ranges is the 1942 Target Range Locations Layout Map contained in the ASR. Firing fans are

known only to have been configured throughout Area 4 and Area 6 (currently the NCNG training site) and are presented in Figure 2.3. The layout map designated Range 10 as a proposed 37mm Anti-Tank Range. Range 11 was designated for 60mm and 81mm trench mortars and was placed to the north of Range 10. Ranges 10 and 11 were both established for firing west to east. Range 14 was also designated for 60mm and 81mm trench mortars but was oriented for firing south to north. The impact areas used by each of these three ranges fall within the same general location of the site.

3.4.2 Range 12 and Range 13 were located in the northern half of Area 4. Range 12 was configured to fire from north to south and was originally proposed for rifle and light machine gun training. Range 13 was originally proposed for the same purpose and configured to fire from east to west, consequently sharing the same impact area as Range 12. It is unlikely that either Range 12 or Range 13 were used for small arms based on impact craters and recovered ordnance (consists mostly of 105mm and 155mm projectiles) from the presumed impact area. Therefore, the most likely designation for both of these ranges would have been for the firing of 105mm and 155mm artillery. The dedudding map presented in the ASR depicting ordnance found during annual inspections between 1958 and 1967 confirmed that numerous HE ordnance including 37mm, 40mm, 81mm, 105mm, 155mm, 240mm, 2.36-inch rockets, and rifle grenades were discovered in and around the firing fans and impact area of Area 4. In addition, TEC's historical aerial photographic interpretation identified numerous impact craters within these firing ranges consistent with heavy artillery training (USACE, 2001a).

3.5 RE-SECTORIZATION OF AOI BOUNDARIES

As a result of the EE/CA site characterization, the original AOI boundaries have been modified in order to facilitate selection of OE response alternatives. The re-sectored AOI boundaries are based on UXO type, UXO distribution, and current and near future land use. Refinement of the area boundaries enhances distinction of the spatial distribution of UXO and ordnance related findings. In general, grids identified as containing UXO and OE scrap usually appear in clusters with findings of similar ordnance type. Areas 1 through 5 have undergone boundary modifications as described below. A breakdown of re-sectored AOIs with respective boundary revisions is presented in Table 3.2.

3.5.1 Area 1A

3.5.1.1 The boundary that now delineates Area 1A includes sampled grids characterized with UXO and OE scrap located just north and east of the water tower and is comprised of approximately 20 acres (Figure 3.8). Area 1A falls within the Flamethrower Range identified in the MMR Range Inventory (Subchapter 2.6.9). The EE/CA findings for this newly designated AOI included two UXO items (a M1 practice anti-tank landmine with spotting charge and fuze and a Mk II hand grenade) and five OE scrap items (all expended and inert M15 smoke grenades) from 98 anomalies investigated (Appendix C). The land is currently undeveloped, primarily wooded, with moderate soil

erosion in drainage areas caused by storm runoff at the northeast portion of the AOI. The Butner Long Range Master Plan proposes future land use in this area will be for recreational activities and include the passage of a greenway/trail system (O'Brien/Atkins, 1998). However, other uses are actively being considered to include a day care facility and adjacent development.

3.5.1.2 In addition to the UXO findings, several concrete fortifications (possibly used as grenade throwing bays) located a few hundred feet from the water tower have been identified in the ASR and verified by Parsons field teams. Other findings include a 2.36-inch bazooka rocket reportedly found in unknown condition by a private citizen near the water tower concurrent to this EE/CA investigation. Historically this area was designated as a flame thrower/small arms range; however, the findings from the EE/CA suggest that this area was also used as a grenade training range.

3.5.2 Area 4

3.5.2.1 Area 4 falls within both Range Complex 1 and Range Complex 2 identified in the MMR Range Inventory (Subchapter 2.6.9). Based on results from the intrusive investigation, clusters of sampled grids containing UXO or high density OE scrap emerged in various regions of the AOI (Appendix C). These localized regions within this area will be addressed independently. The advantage to partitioning Area 4 is that response alternatives can be tailored on the basis of site-specific findings that take into account local land use and type of UXO recovered. The proposed boundary modifications will delineate five additional areas (sub-sectors) within Area 4 according to these criteria. The remainder of land within the original boundary will still be defined as Area 4 and includes approximately 21,139 acres (Figure 3.9).

3.5.2.2 Although 5 UXO were recovered within the modified boundary of Area 4 (now 21,139 acres), all of the UXO and much of the OE scrap presence was concentrated in two areas: a generally undeveloped woodland area and an extensive hayfield area. In the woodland area, generally adjacent to the northern and eastern boundary of the NCNG training site (Area 6), three of the 5 UXO items were recovered. This portion of modified Area 4 encompasses the general location of impact areas associated with former Ranges 10 (37mm range) and 14 (60-81mm mortar range). The terrain consists mostly of forest with moderate to steep topography characterized by predominantly undeveloped woodlands well suited for the seasonal hunting activities that occur. Access is limited in this area due to adverse terrain and a small number of unpaved access roads. Only a few homesteads exist with future significant residential development is unlikely. UXO items identified included a 57mm HE projectile, a M-series fuze, and a low-order 105mm HE projectile (Table 3.3). OE scrap recovered from this same area included a total of 613 items consisting of HE projectile fragments from 37mm, 57mm, 75mm, 105mm, and 155mm projectiles. All items were recovered from less than 24 inches bgs with the majority recovered within 6 inches of the surface.

3.5.2.3 The second area (mostly comprised of hayfields operated by a single owner) generally encircles the area from north of the intersection of Moriah Road and Uzzle Road and southward approximately 10,000 feet and enveloping open areas to the east and west of Uzzle Road (Figure 3.9). This area lies within the general location of impact areas associated with former Ranges 12 and 13 (both former heavy artillery ranges). UXO items recovered from this area included a 155mm shrapnel projectile and an unfuzed 2.36-inch HE bazooka rocket warhead (Table 3.3). OE scrap consisted primarily of 217 HE projectile fragments recovered from less than 24 inches bgs with the majority recovered within 6 inches of the surface.

3.5.2.4 A total of 288 OE scrap items were distributed throughout the balance of Area 4 (in addition to those mentioned above). No additional UXO was discovered. Land use is primarily dedicated to agriculture and forestry, with low to moderate density residential development distributed along the primary roads.

3.5.3 Area 4A

3.5.3.1 Area 4A encompasses the tract of land approximately 34 acres, bordered to the east by East Range Road (Figure 3.10). The single UXO item recovered from the intrusive investigation was a 2.36-inch HE bazooka rocket from a total of 150 anomalies investigated (Table 3.3). Sixteen out of the twenty OE scrap items recovered were remnants of 2.36-inch rockets, with one OE scrap item identified as a M9 rifle grenade fragment. All ordnance related items were recovered within 0 to 6 inches bgs. Parsons observed land features resembling fox holes in the northern area of the AOI indicative of a former military training site. These features were included within the EE/CA sampling coverage.

3.5.3.2 Area 4A lies within the general location associated with former bazooka and rifle grenade training ranges. Evaluation of historic aerial photographs indicated the presence of ground scars in this area of the site (USACE, 2001a). Further, the regular presence of UXO, particularly 2.36-inch bazooka rockets and 81mm mortars, during post-closure dedudding inspections confirm "live-fire" military training in Area 4A (within an area designated as Area B in historical records), as described in Subchapter 2.3.

3.5.3.3 The terrain in Area 4A consists mostly of forest with level to moderate slope topography. Recent findings included inert 2.36-inch rockets discovered by a property owner within the AOI. The property has recently been parceled in anticipation of residential development. As of July 3, 2003 some land clearing has been initiated, utilities are actively being sited, and residential lots are currently for sale and/or have been sold.

3.5.4 Area 4B

3.5.4.1 Area 4B encompasses the tract of land approximately 20 acres, bordered to the east by East Range Road. (Figure 3.10). The only UXO item recovered from the intrusive investigation of this area was a 2.36-inch HE bazooka rocket (Table 3.3). All

four OE scrap items recovered from this area were identified as unidentifiable HE fragments, possibly from 2.36-inch rockets. Site characterization was initiated at this location following a recent recovery of 2.36-inch inert bazooka rocket and related OE scrap by the property owner (paragraph 3.2.4.3). All OE scrap items were recovered within 0 to 6 inches bgs, although the single UXO item was encountered at 18 inches bgs.

3.5.4.2 Area 4B lies within the general location associated with former bazooka and rifle grenade training ranges. Evaluation of historic aerial photographs indicated the presence of ground scars and impact craters in this area of the site (USACE, 2001a). Further, the occasional presence of UXO, particularly 2.36-inch bazooka rockets, during post-closure dedudding inspections confirm "live-fire" military training in Area 4B (within an area designated as Area E in historical records), as described in Subchapter 2.3.

3.5.4.3 Land use in this area is light residential and dedicated for primarily farming purposes.

3.5.5 Area 4C

3.5.5.1 Area 4C encompasses the tract of land approximately 126 acres intersected by the power line easement and Uzzle Road (Figure 3.11). One UXO item was recovered during the intrusive investigation, which was identified as a 105mm low order HE projectile (Table 3.3). OE scrap recovered from grids centrally located to the UXO predominantly consisted of HE projectile fragments ranging in depth from 1 to 30 inches bgs.

3.5.5.2 Area 4E lies within the general location of impact area associated with former Range 12. The ASR lay out map designated Range 12 for heavy artillery such as 105mm to 240mm. Evaluation of historic aerial photographs indicated the presence of substantial impact craters in this area of the site (USACE, 2001a). Further, the regular presence of UXO (ranging from 37mm to 240mm and 2.36-inch bazooka rockets) during post-closure dedudding inspections confirm "live-fire" military artillery training in Area 4C (entirely within an area designated as Area A in historical records), as described in Subchapter 2.3.

3.5.5.3 Historic reports and present day site reconnaissance have identified the structural remnants of a target area known as the mock German village. Northern and southern target structures have been visually identified and are included within the AOI boundaries. Recent discoveries of 105mm and 155mm projectiles have been made by a property owner in the southern area of the AOI (paragraph 3.2.4.3).

3.5.5.4 Land use in Area 4C varies and is divided at the power line easement intersection: the northern portion is undeveloped woodland privately owned; and the southern portion consists of low density residential development.

3.5.6 Area 4D

3.5.6.1 Area 4D encompasses an area of land approximately 453 acres to the east of Isham Chambers Road (Figure 3.12). In Area 4D, the only UXO item identified was a 37mm projectile recovered at a depth of 2 inches bgs (Table 3.3). A total of 27 OE scrap items were identified as remnants from 37mm and 57mm projectiles, as well as HE projectile fragments. All were located at depths less than 10 inches bgs.

3.5.6.2 The ASR identified the general location as an impact area for Range 10 and Range 11, which were designated as a 37mm and 60mm/81mm mortar firing ranges, respectively. Evaluation of historic aerial photographs indicated the presence of minimal impact craters in this area of the site within the former Range 11 firing fan (USACE, 2001a). This AOI is not within an area that was included in post-closure dedudding inspections.

3.5.6.3 The area is mostly undeveloped consisting of forest with dense understory and rugged terrain. Signs of past and present logging activities (e.g. spoils and pine groves) have been observed at the southern portion of the AOI.

3.5.7 Area 4E

3.5.7.1 Area 4E is a parcel of land approximately 152 acres bordered by Isham Chambers Road to the north and east, and forest to the west and south (Figure 3.12). The single UXO item recovered during the intrusive investigation was a 37mm HE projectile (Table 3.3). The OE scrap item found in this area was a single piece of suspected HE projectile fragment recovered from 1 inch bgs.

3.5.7.2 Area 4E lies within the general location of impact areas associated with former Range 10. The ASR lay out map designated Range 10 for 37mm training. Evaluation of historic aerial photographs indicated the presence of impact craters and ground scars in this area of the site (USACE, 2001a). Further, the occasional presence of UXO (ranging from 37mm to 40mm and 2.36-inch bazooka rockets) during post-closure dedudding inspections confirm "live-fire" military artillery training in Area 4E (entirely within an area designated as Area D in historical records), as described in Subchapter 2.3.

3.5.7.3 A local farmer has reportedly uncovered 37mm OE items in the process of tilling the fields encompassed by this AOI over the years. Land use in Area 4E is almost exclusively dedicated to the cultivation of tobacco.

3.5.8 Area 5

3.5.8.1 The initial boundary assignment for Area 5 enveloped, but did not include Area 1, Area 2, or Area 3 within its confines. Intrusive efforts in Area 5 identified a single OE scrap item ("spider" plate to an M1 anti-tank mine) recovered from ground surface near a crop field. Other results from the intrusive investigations of Area 1 (excluding water tower findings), Area 2, and Area 3 indicate a lack of UXO/OE presence.

3.5.8.2 Due to the consistent lack of UXO/OE findings within each of these areas, the boundaries previously defining Area 1, Area 2, and Area 3 have been disbanded and these areas are now melded within the modified Area 5, which now totals 13,672 acres (Figure 3.13). Land use in this AOI includes agriculture, institutional, recreational, and residential. A comprehensive summary of intrusive results within the modified boundary of Area 5 shows 2,028 out of 2,029 anomalies investigated were identified as non-OE scrap and other findings.

3.5.9 Lakeview Subdivision

3.5.9.1 The Lakeview Subdivision (previously included in Area 4) is defined as a unique AOI due to regional findings and the establishment of boundaries occurring from the recently conducted TCRA. The Lakeview Subdivision Site encompasses approximately 26 acres including 16 acres that comprise the subdivision, and 10 acres of buffer zone extending around the entire site (Figure 3.14). Placement of sampling grids at this site during the EE/CA investigation was in response to a reported 2.36-inch rocket finding made by a local property owner (paragraph 3.2.4.4).

3.5.9.2 Findings made during the EE/CA investigation included one UXO (37mm projectile) and various OE scrap items, including 60mm mortar fins, were recovered at depths of less than 3 inches bgs. Subsequent to the EE/CA investigation, a TCRA was conducted at the site in which six UXO items (including an electric blasting cap, a Mk II hand grenade, a 37mm HE projectile, a M1 A1 landmine fuze, a 2.36-inch bazooka rocket, and a 2.36-inch bazooka rocket warhead) were recovered from within six inches of the ground surface (Table 3.3). A total of 80 OE scrap items were recovered from within six inches of the ground surface. Review of historic aerial photographs by TEC and the ASR findings did not indicate past training activities occurred at the site location.

**TABLE 3.2
BREAKDOWN OF RE-SECTORED AOIs**

RE-SECTORED AOI	TOTAL ACREAGE	BOUNDARY REVISIONS
Area 1A	20	Independent sub-sector previously part of Area 1
Area 4	21,139	Perimeter boundary remains the same; however independent sub-sectors formed within perimeter
Area 4A	34	Independent sub-sector previously part of Area 4
Area 4B	20	Independent sub-sector previously part of Area 4
Area 4C	126	Independent sub-sector previously part of Area 4
Area 4D	453	Independent sub-sector previously part of Area 4
Area 4E	152	Independent sub-sector previously part of Area 4
Area 5	13,672	Perimeter boundary remains the same; however Area 1, Area 2, and Area 3 are now dissolved within the perimeter
Lakeview Subdivision	26	Independent sub-sector previously part of Area 4

**TABLE 3.3
SUMMARY OF RECOVERED UXO AND OE SCRAP BY AOI**

AOI	UXO/OE Recovered	Depth (inches)	OE Scrap /Description
Area 1A	M1 anti-tank mine with spotting charge and fuze	10	5 Items: All expended/Inert M15 Smoke Grenades
	Mk II hand grenade	1	
Area 4	105mm HE fuzed	Surface	1118 Items: 37mm, 57mm, 75mm, 105mm, and 155mm HE projectile fragments
	57mm HE fuzed	6	
	Nose fuze M52 series (likely to a 60mm or 81mm)	3	
	2.36-inch HE bazooka warhead unfuzed	10	
	155mm shrapnel round unfuzed w/ expelling charge	30	
Area 4A	2.36-inch bazooka HE rocket	3	20 Items: 2.36-inch rocket debris, M9 rifle grenade fragment
Area 4B	2.36-inch bazooka HE rocket	18	4 Items: Unidentifiable HE fragments
Area 4C	105mm HE unfuzed	3	313 Items: 81mm, 105mm, and 155mm HE projectile fragments and fuzes

TABLE 3.3 (CONTINUED)
SUMMARY OF RECOVERED UXO AND OE SCRAP BY AOI

AOI	UXO/OE Recovered	Depth (inches)	OE Scrap /Description
Area 4D	37mm HE fuzed	2	27 Items: 37mm and 57mm fragments
Area 4E	37mm HE fuzed	1	1 Item: Unidentifiable HE projectile fragment
Lakeview Subdivision-EE/CA	37mm HE projectile	3	1 Item: 60mm mortar fins
Lakeview Subdivision – TCRA	Electric blasting cap	2	80 Items: Landmine parts, 2.36-inch rocket debris, mortar fins
	Mk II hand grenade	4	
	37mm HE projectile	2	
	M1 A1 Mine fuze	6	
	2.36-inch bazooka rocket motor w/fuze	1	
	2.36-inch HE bazooka warhead unfuzed	1	

Figure 3.1
EM-61 Digital Mapping Equipment in Operation



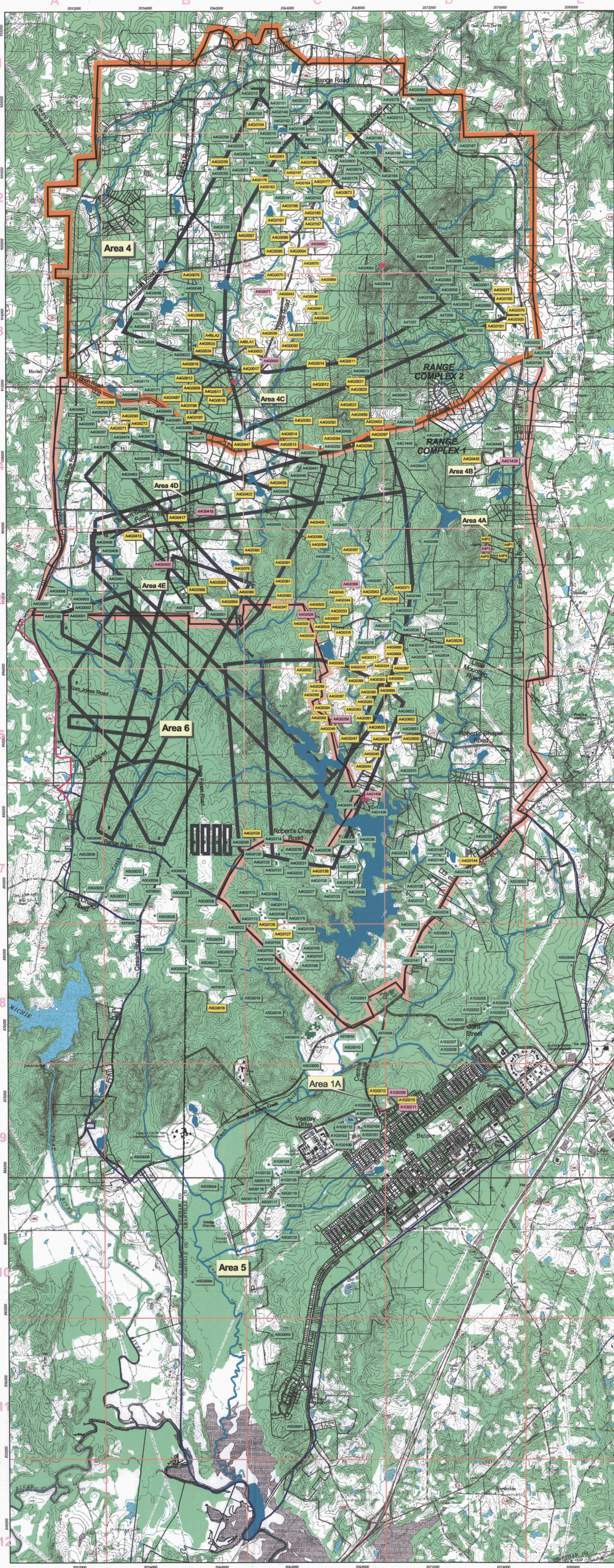
Photograph #1 – EM61/GPS Geophysical Survey in Progress – Single Cart EM61 Manual Configuration.



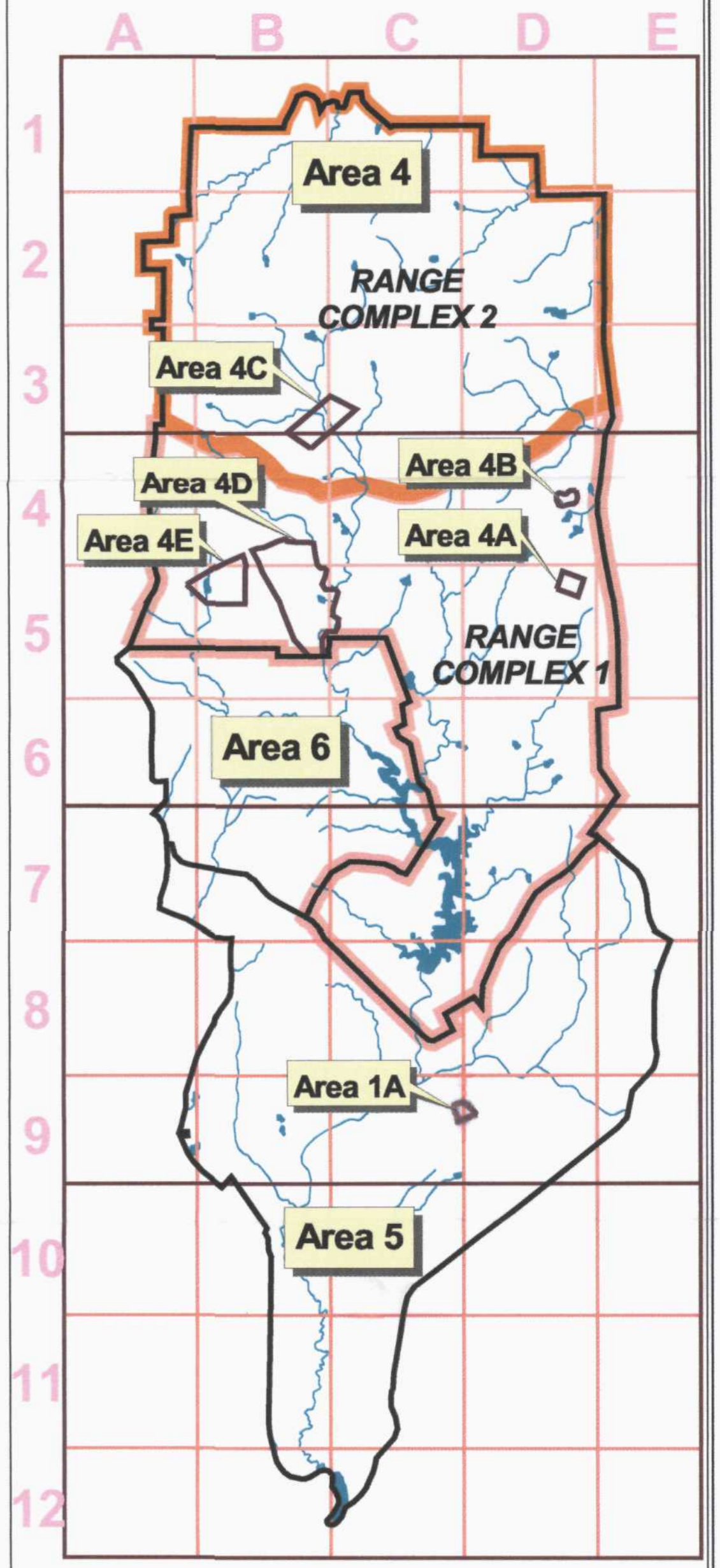
Photograph #2 – EM61 on Prove-Out Grid During Media Day.

Figure 3.2a
**Intrusively Investigated
 Grid Locations**

Former Camp Butner
 Butner, NC



Index Map



Legend

- Firing Fan
- Range Complex 1
- Range Complex 2

Resected Areas of Interest

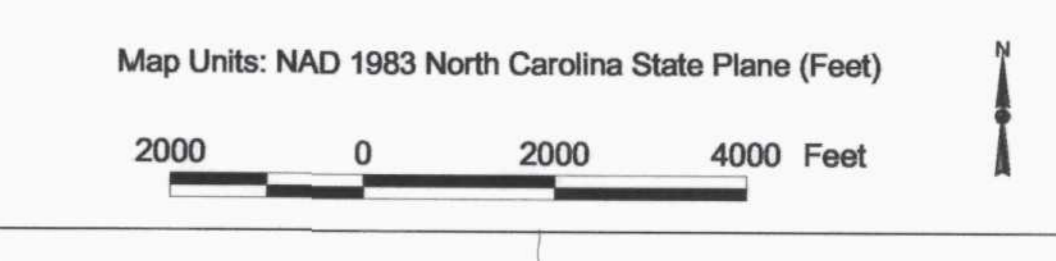
- Areas 4A through 4E and 1A
- Area 4
- Area 5
- Area 6
- Parcel Boundary

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Waterbody (SDTS Data, Buffered 50 Feet)
- Completed Transect (Intrusively Investigated - No OES)
- Recent Non-EE/CA UXO Findings
- Recent Non-EE/CA OES Findings
- UXO Findings 10 Years Ago

List of Ranges:

- 1 - 9 Small Arms
- 10 37 mm
- 11, 14 Trench Mortar, 60 mm and 81 mm
- 12, 13 Heavy Artillery



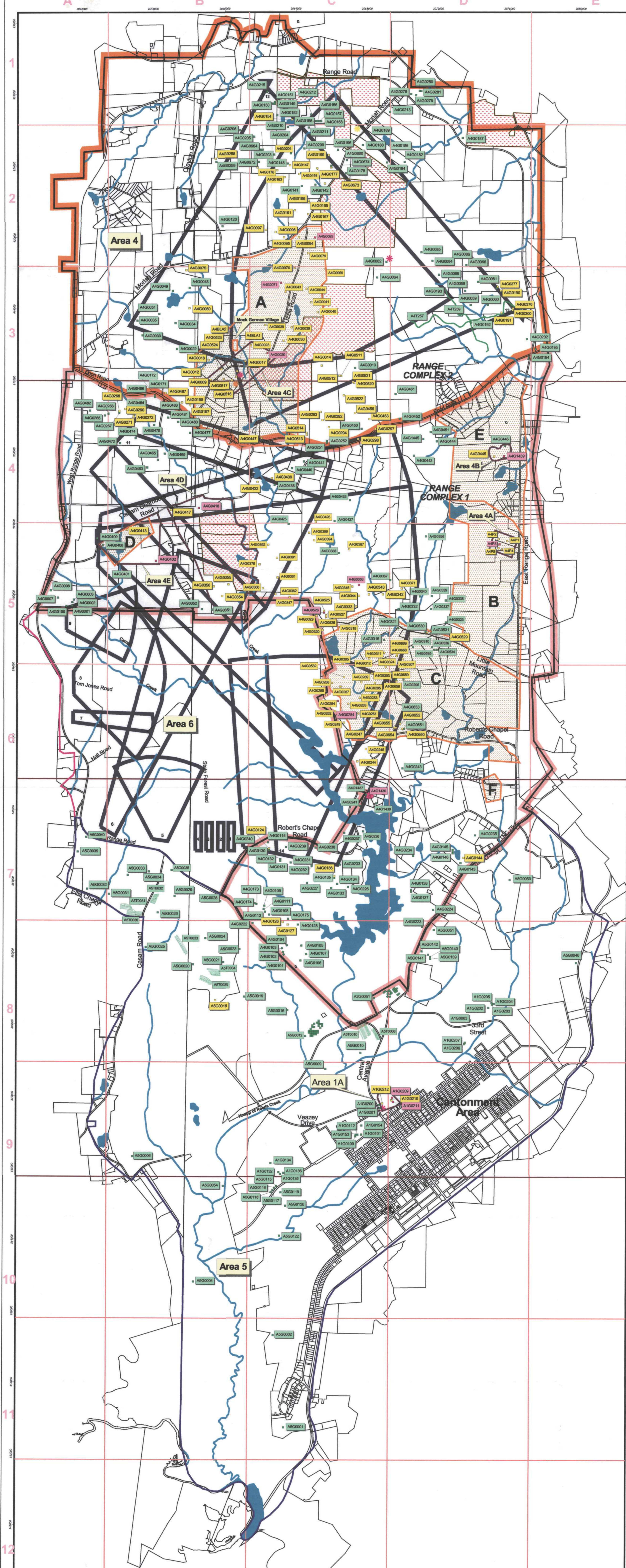
PARSONS
 U.S. ARMY CORPS OF ENGINEERS
 HUNTSVILLE CENTER

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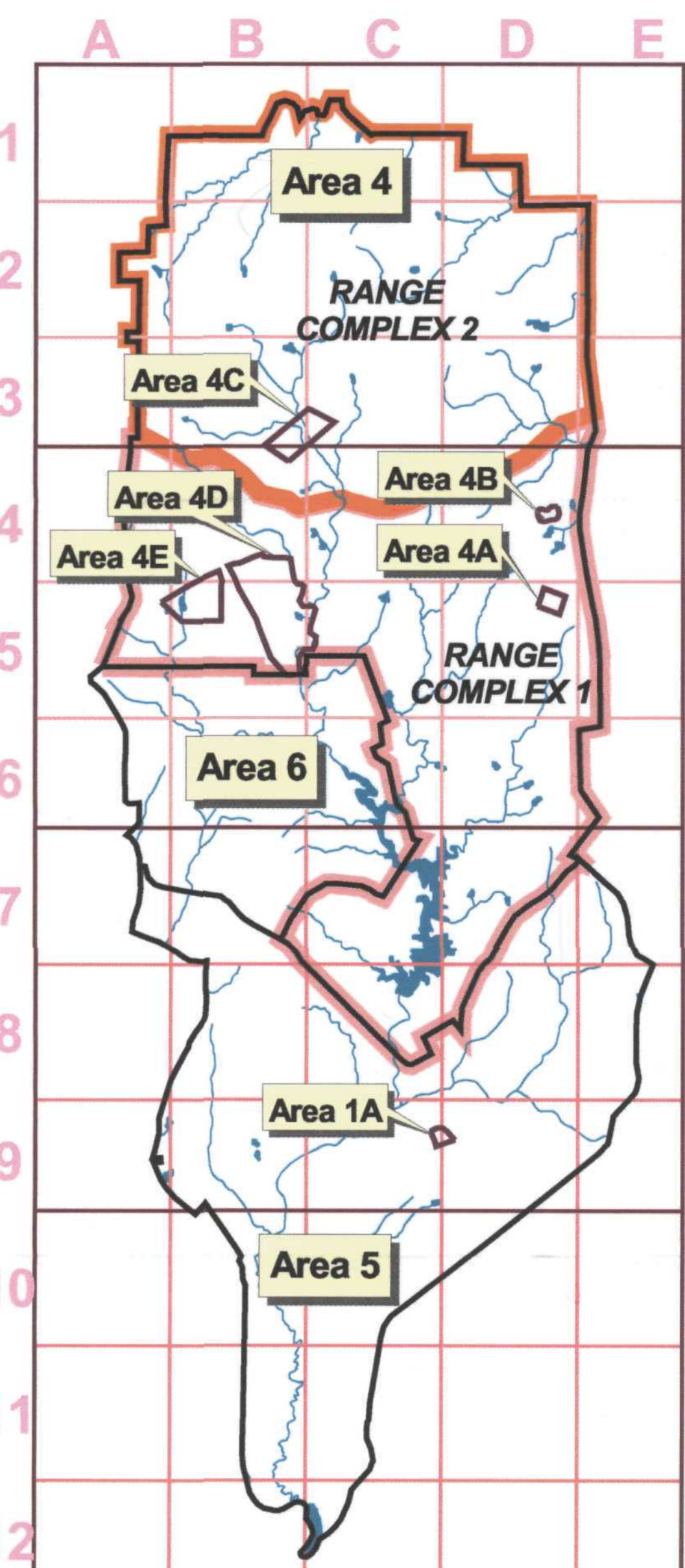
Figure 3.2b

Intrusively Investigated Grid Locations

Former Camp Butner
Butner, NC

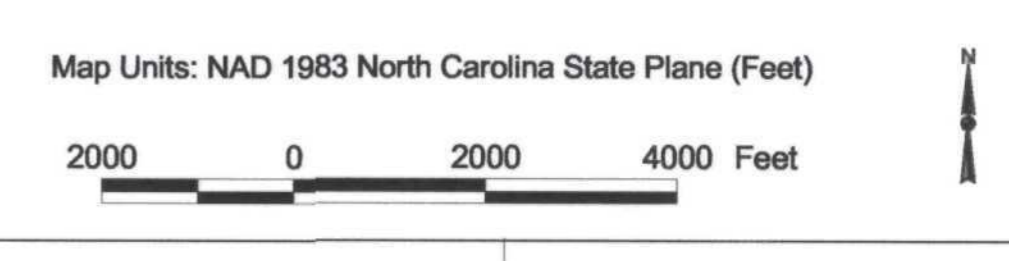


Index Map



Legend

- Firing Fan
- Range Complex 1
- Range Complex 2
- Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A - F) Due to Extensive Ordnance Presence (See Subchapter 2.3)
- Right of Entry Refused
- Resected Areas of Interest**
 - Areas 4A through 4E and 1A
 - Area 4
 - Area 5
 - Area 6
 - Parcel Boundary
- 100'x100' Grid**
 - Intrusively Investigated - No OES
 - Intrusively Investigated - OES Present/No UXO
 - Intrusively Investigated - UXO Present
 - Waterbody (SDTS Data, Buffered 50 Feet)
 - Completed Transect (Intrusively Investigated - No OES)
 - Recent Non-EE/CA UXO Findings
 - Recent Non-EE/CA OES Findings
 - UXO Findings 10 Years Ago
- List of Ranges:**
 - 1 - 9 Small Arms
 - 10 37 mm
 - 11, 14 Trench Mortar, 60 mm and 81 mm
 - 12, 13 Heavy Artillery



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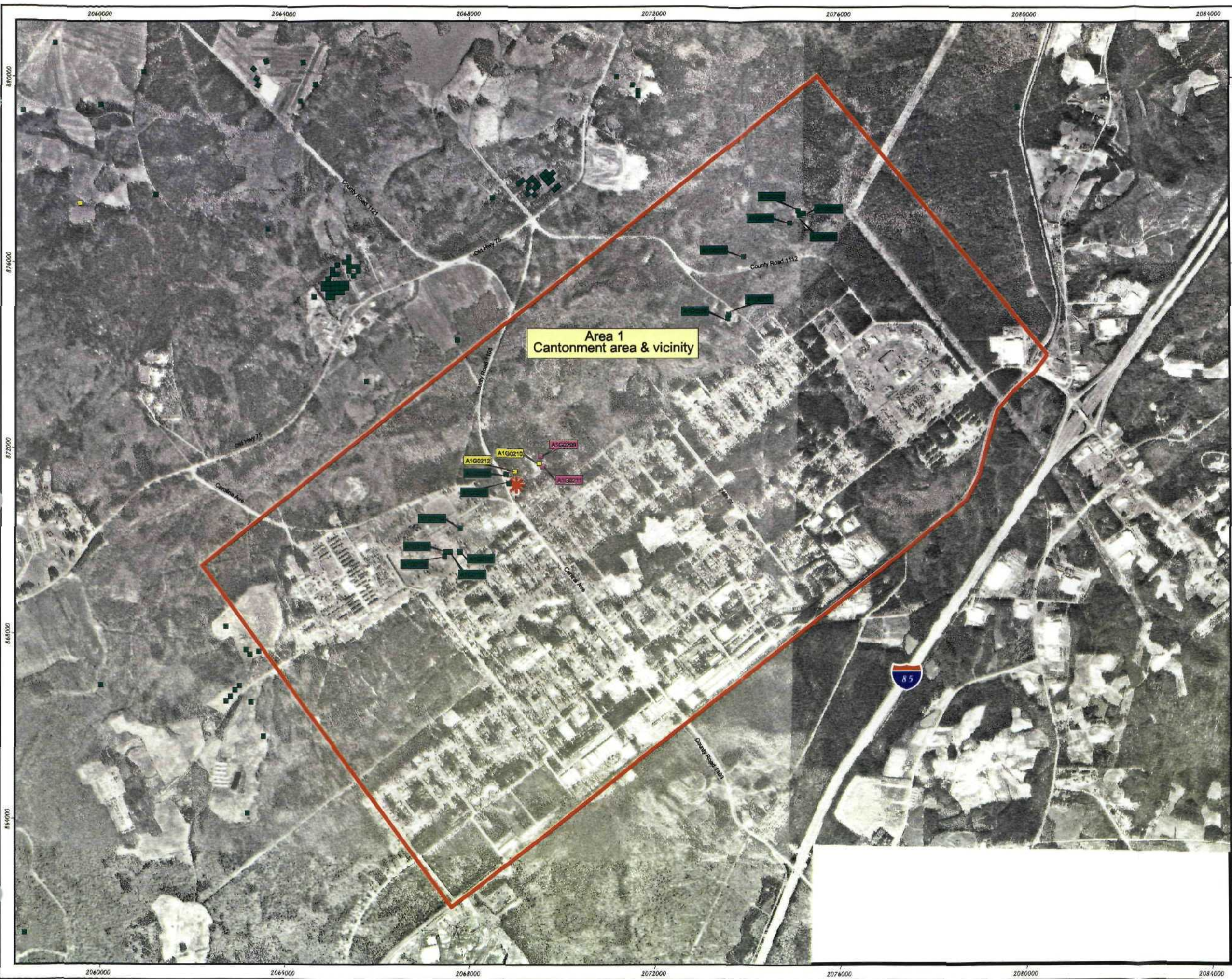
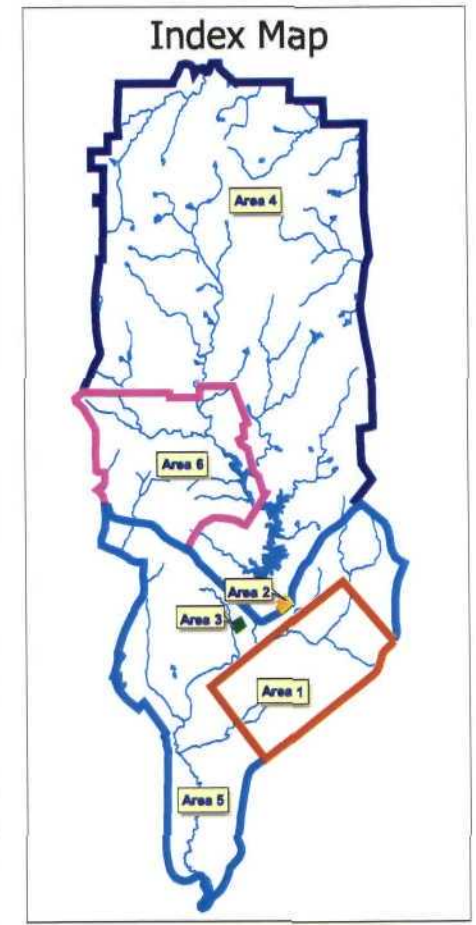


Figure 3.3
 Completed Grids in
 Original Area 1
 Former Camp Butner
 Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Recent Non-EE/CA UXO Findings

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

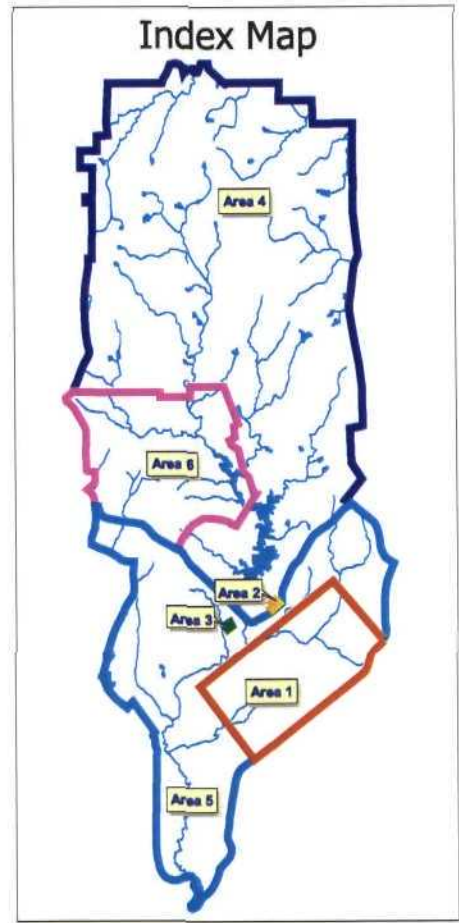
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SUBMITTED BY: DS	DATE: July 2004	PAGE:	3-32
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Figure 3.4
Completed Grids in
Original Area 2
Former Camp Butner
Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present

Image Source: 1995 Aerial Photo from USGS
Map Units: NAD 1983 North Carolina State Plane (Feet)

500 0 500 Feet

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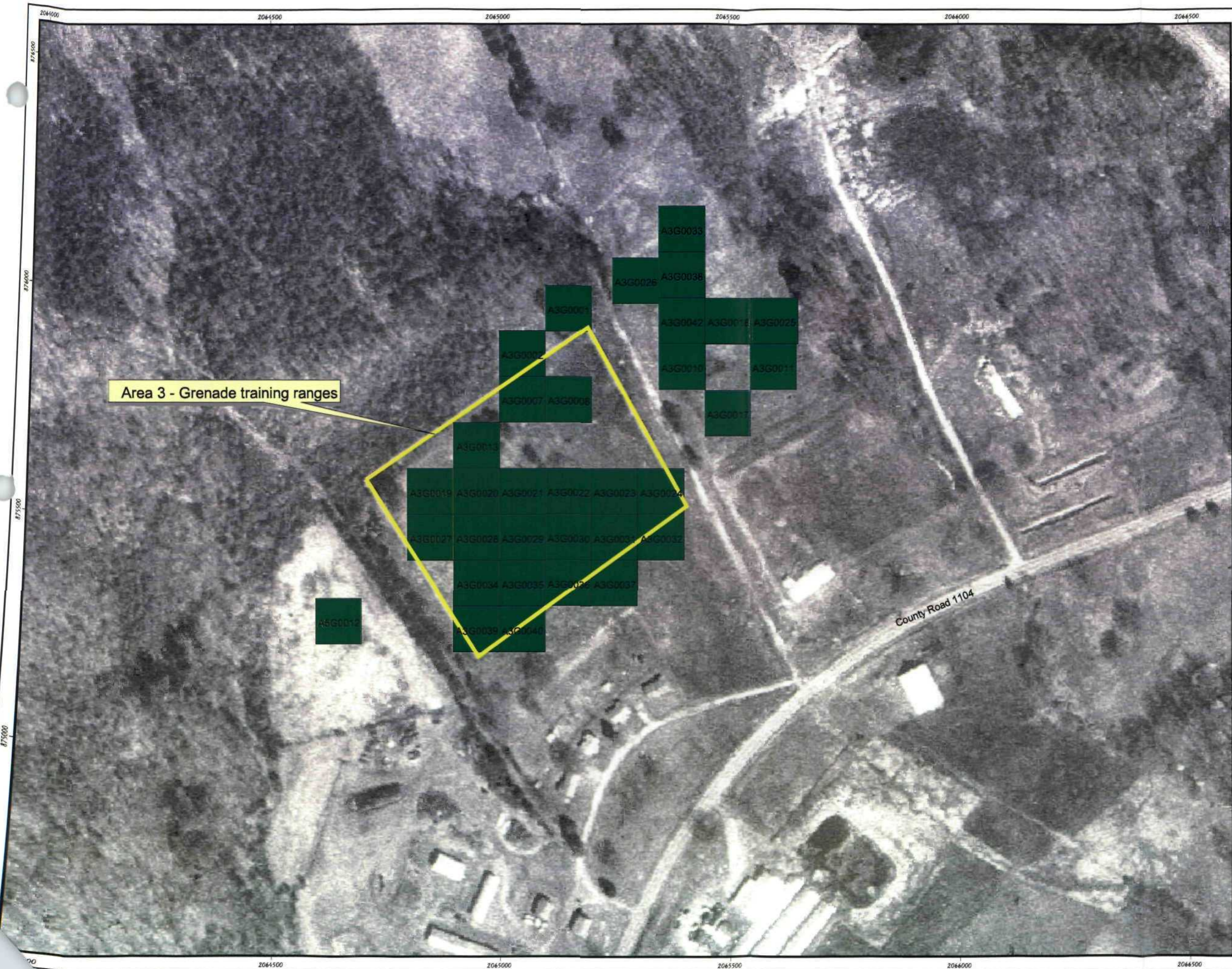
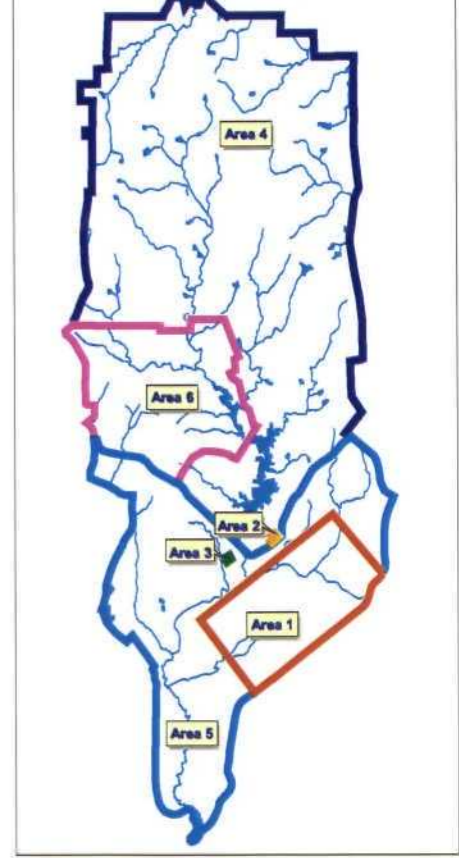


Figure 3.5
 Completed Grids in
 Original Area 3
 Former Camp Butner
 Butner, NC

Index Map



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

200 0 200 Feet

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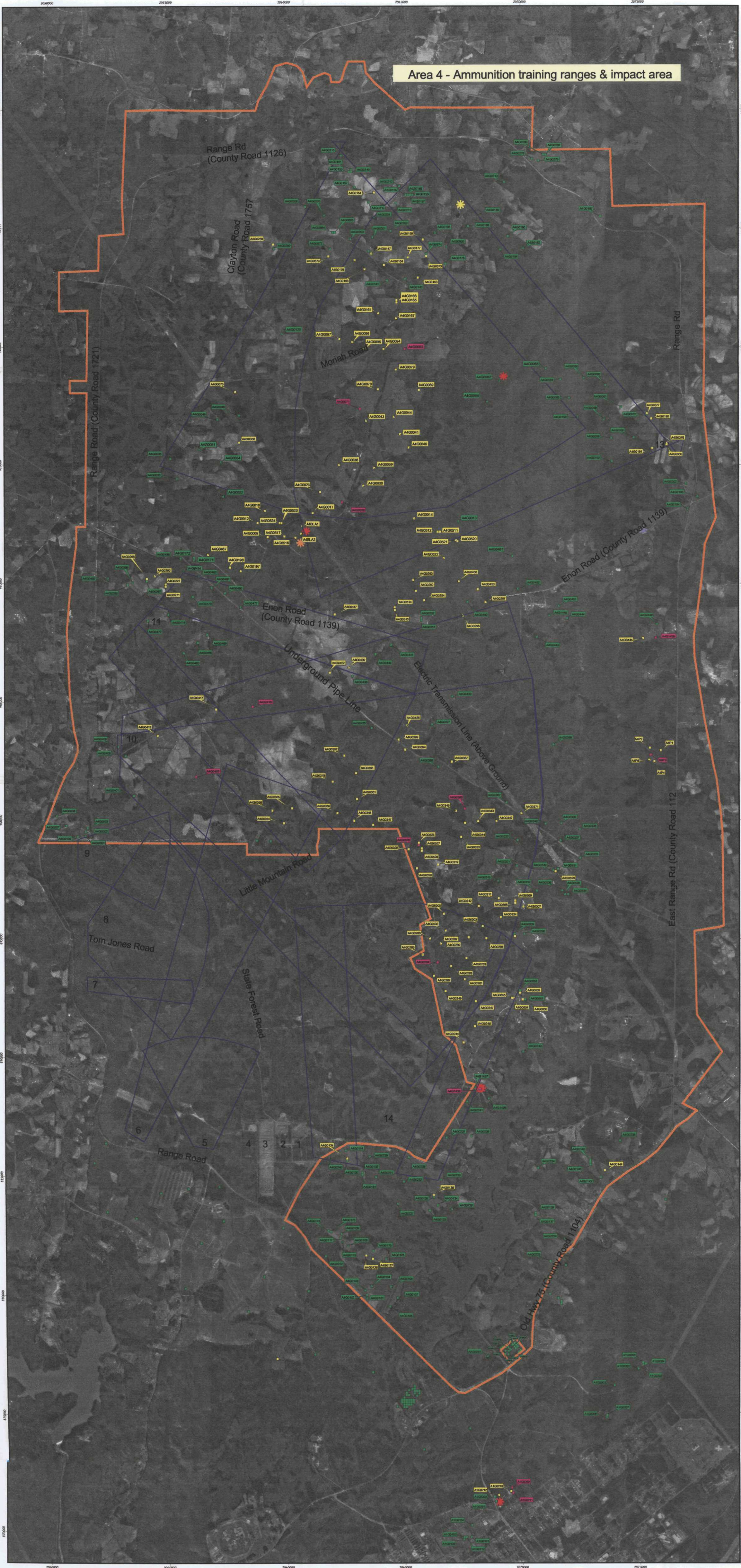
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Figure 3.6

Completed Grids in Original Area 4

Former Camp Butler
Butner, NC

Area 4 - Ammunition training ranges & impact area



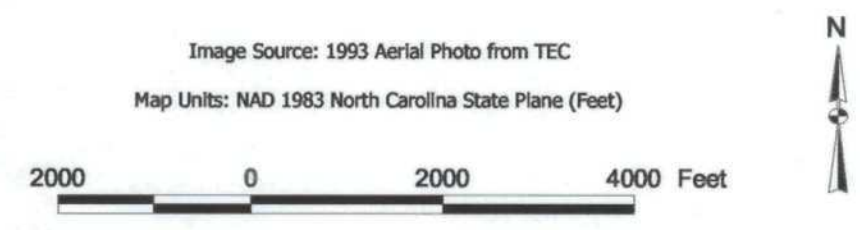
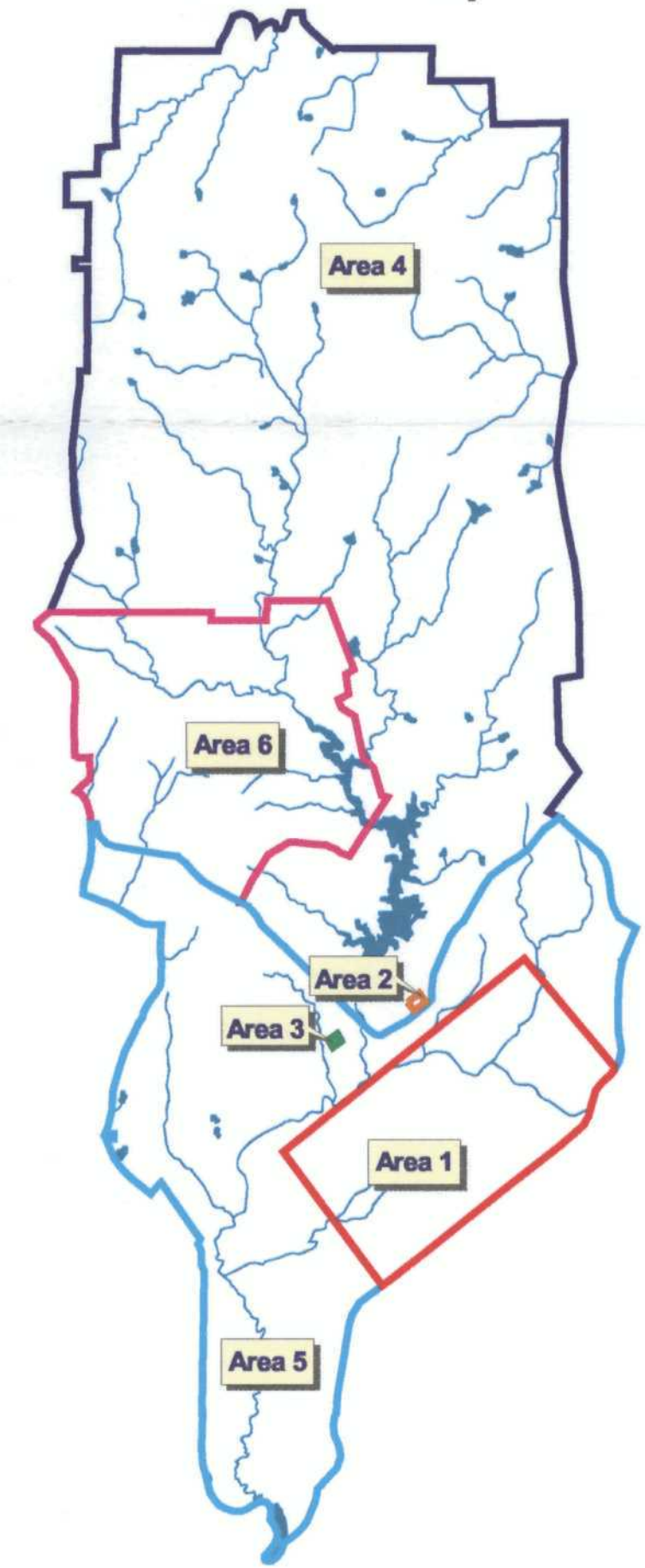
Legend

- 100'x100' Grid
- Intrusively Investigated - No OES
 - Intrusively Investigated - OES Present/No UXO
 - Intrusively Investigated - UXO Present
 - Historic Designated Range
 - ★ Recent Non-EE/CA UXO Findings
 - ★ Recent Non-EE/CA OES Findings
 - ★ Possible Well Disposal Site
 - ★ UXO Findings 10 Years Ago

List of Ranges:

- 1-9 Small Arms
- 10 37 mm
- 11, 14 Trench Mortar, 60 and 81 mm
- 12, 13 Heavy Artillery

Index Map



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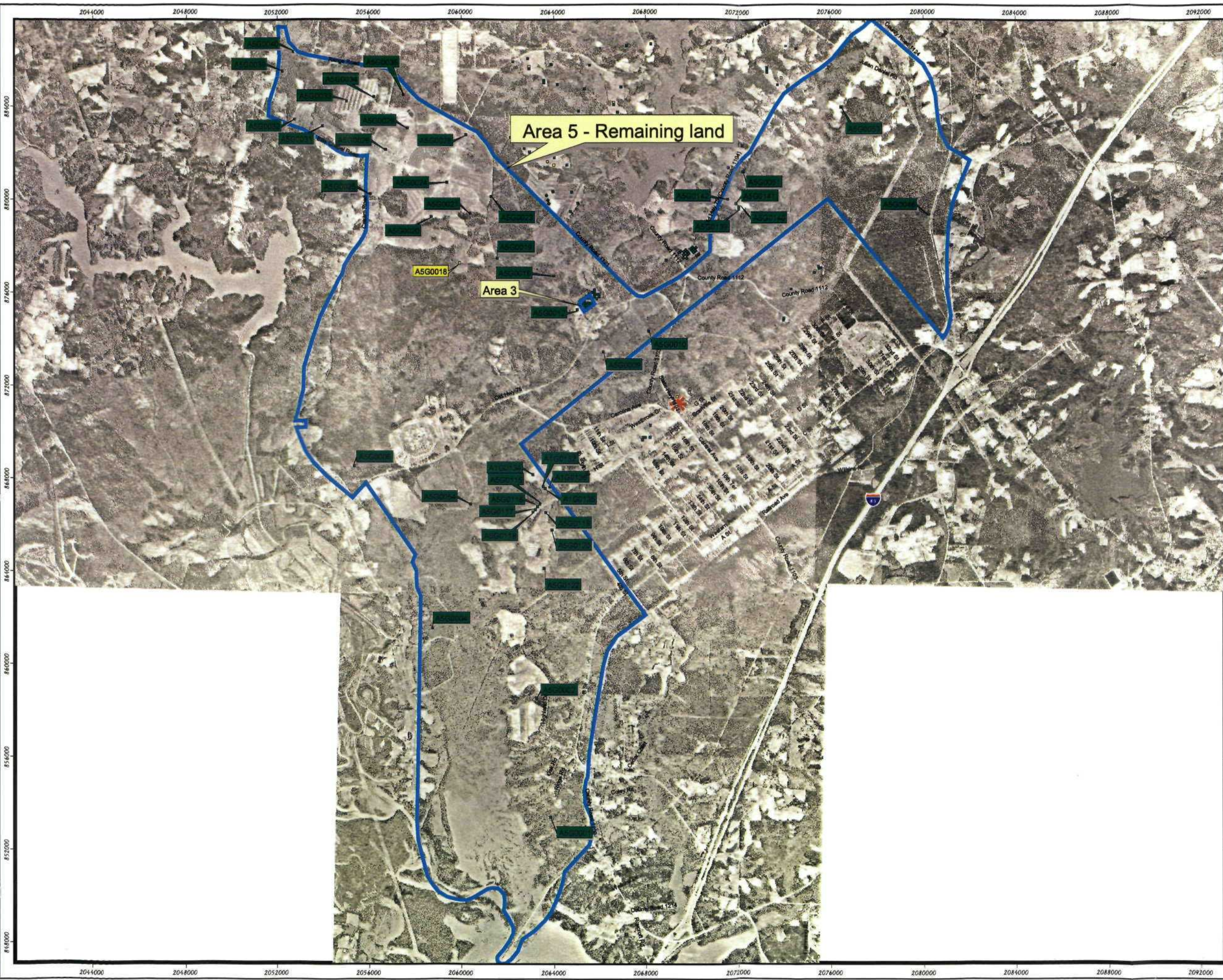
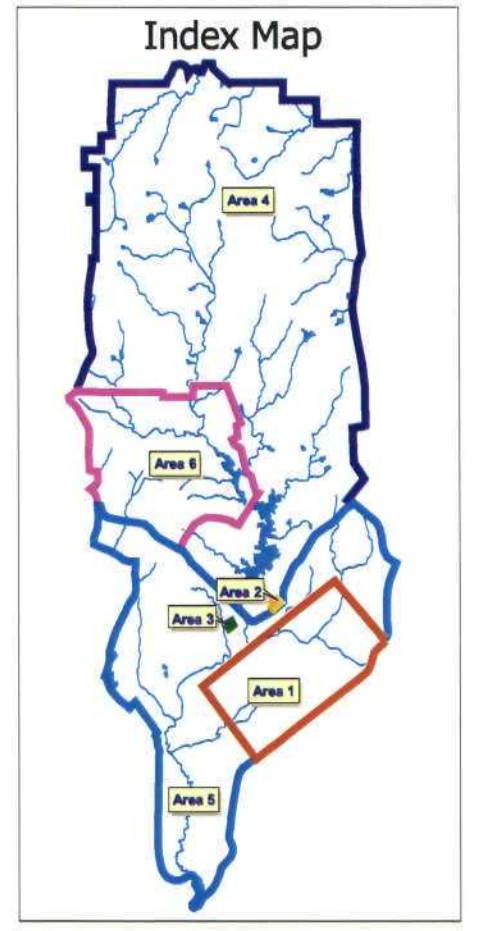


Figure 3.7
 Completed Grids in
 Original Area 5
 Former Camp Butner
 Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Recent Non-EE/CA UXO Findings

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

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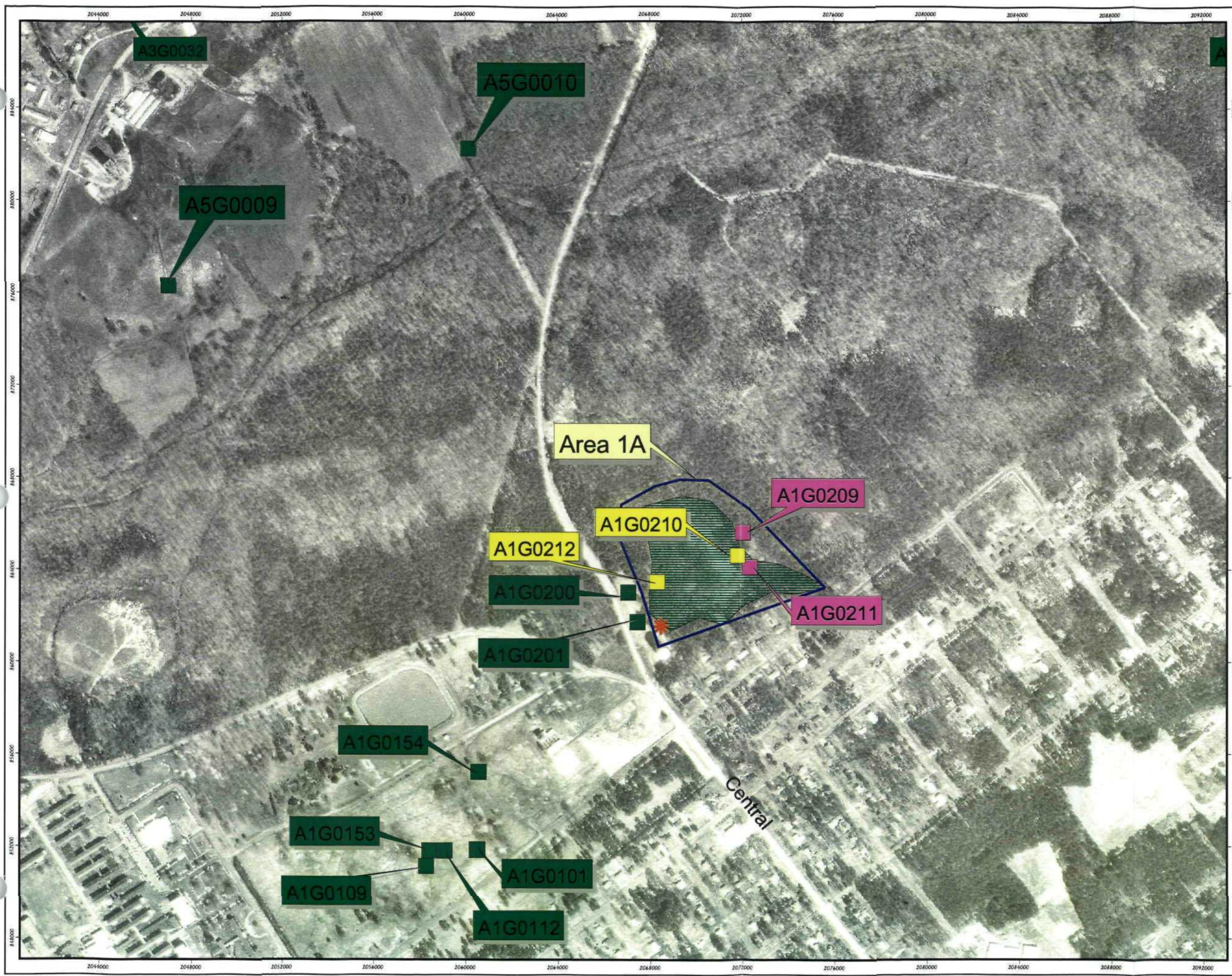
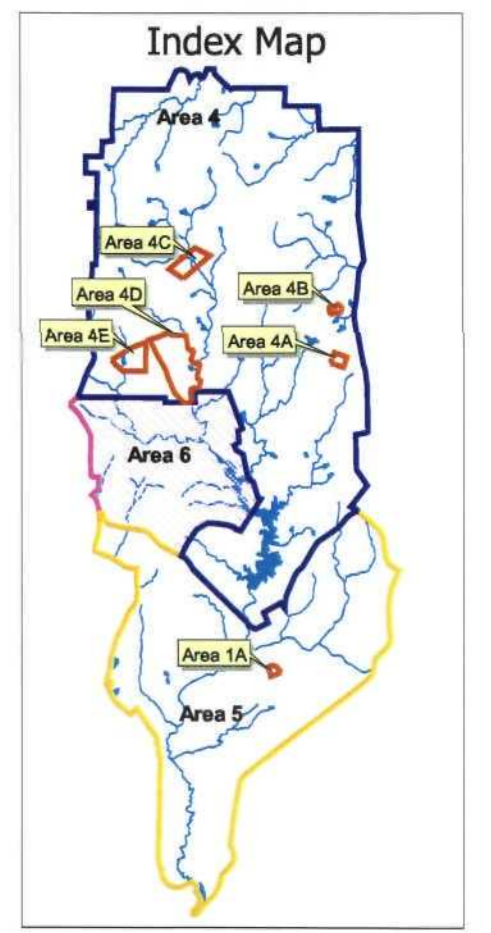


Figure 3.8
 Completed Grids in
 Resected Area 1A
 Former Camp Butner
 Butner, NC



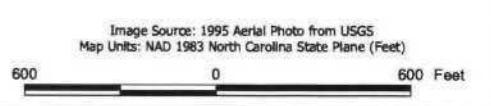
Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present

Aerial Photo Interpretation -
 USACE TEC, 2001

- Ground Scar
- Recent Non-EE/CA UXO Findings



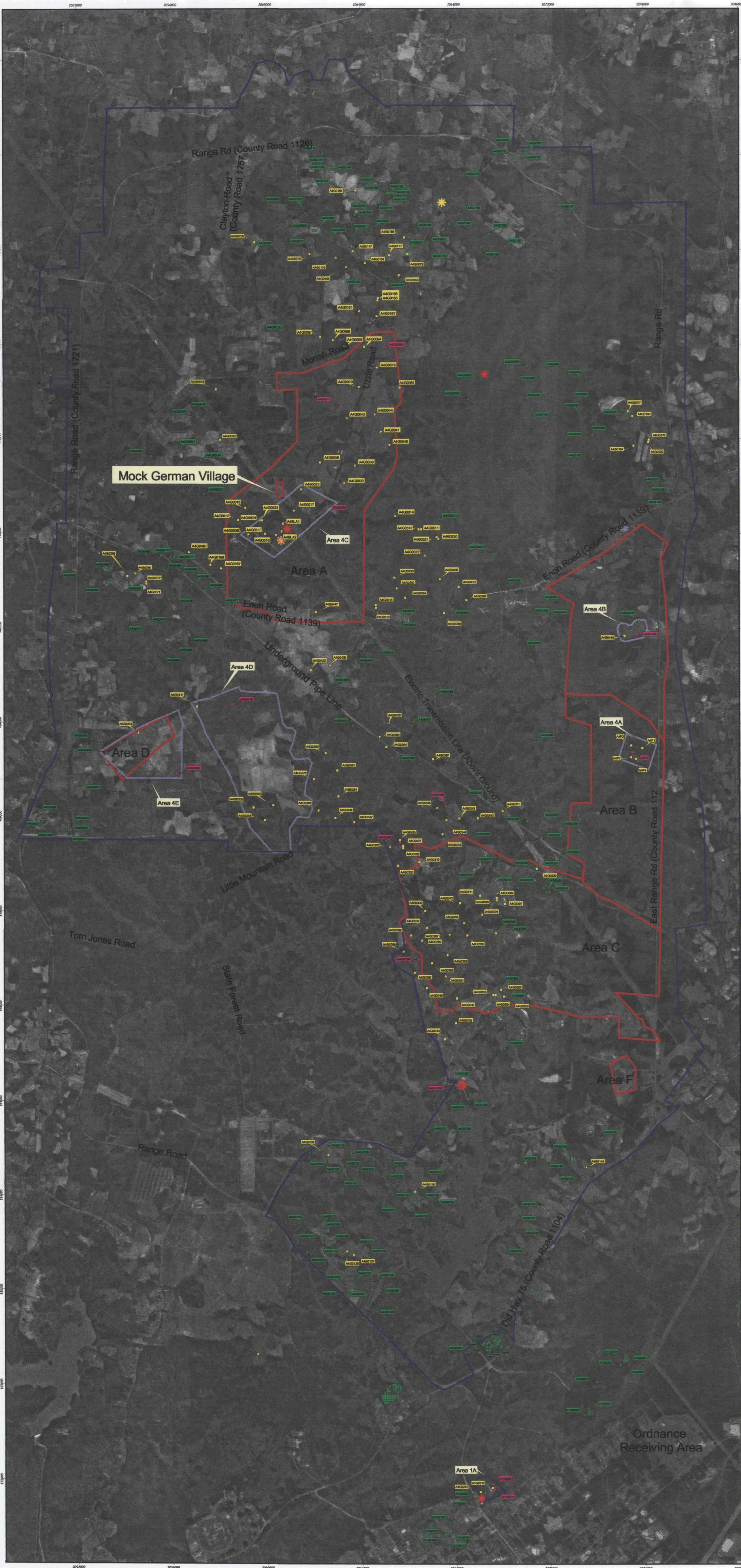
PARSONS	U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER
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DESIGNED BY: BT	Completed Grids in Resected Area 1A	
DRAWN BY: BT		
CHECKED BY: JK	SCALE: 1 inch equals 600 feet	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: 3-37
	FILE: x:\gls\738001\av_project\EECA.apr	

Figure 3.9

Completed Grids in Resected Area 4

Former Camp Butler
Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Property Deed Restricted Prior to Government Release as "Surface Use Only" (Areas A-F) Due to Extensive Ordnance Presence (See Subchapter 2.3)
- ★ Recent Non-EE/CA UXO Findings
- ★ Recent Non-EE/CA OES Findings
- ★ Possible Well Disposal Site
- ★ UXO Findings 10 Years Ago

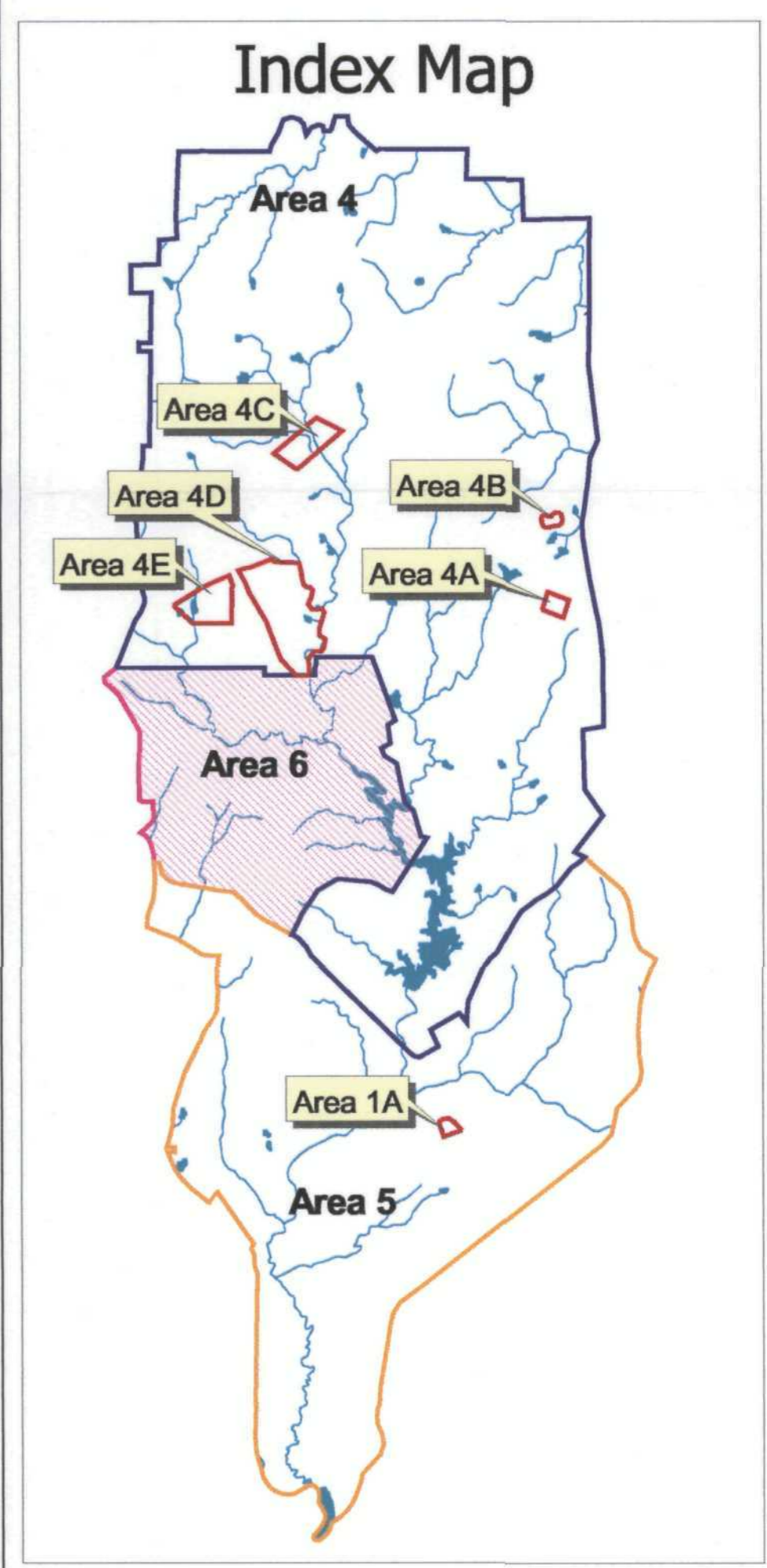


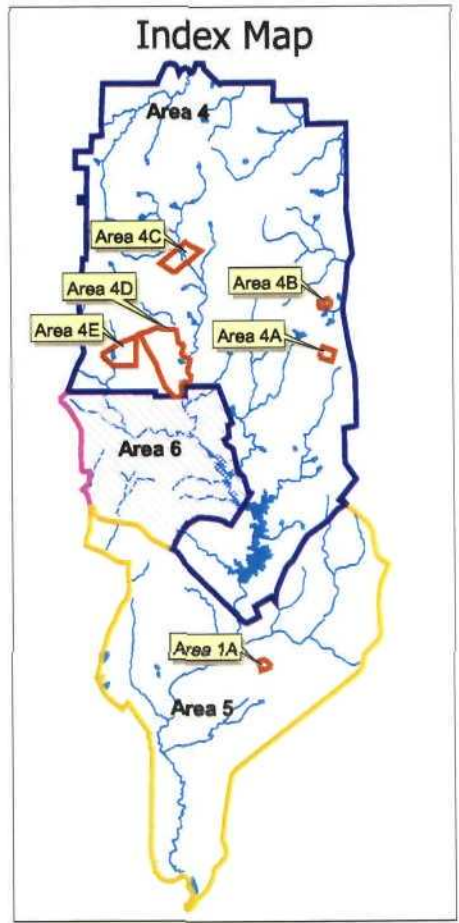
Image Source: 1993 Aerial Photo from TEC
Map Units: NAD 1983 North Carolina State Plane (Feet)

2000 0 2000 4000 Feet

N

PARSONS		U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER	
DESIGNED BY: BT	Completed Grids in Resected Area 4		
DRAWN BY: BT			
CHECKED BY: JK	SCALE: 1 inch equals 2,000 feet	PROJECT NUMBER: 738001	PAGE: 3-38
SUBMITTED BY: DS	DATE: July 2004	FILE: c:\p1\738001\pr_p1\g01\25CA30F	

Figure 3.10
 Completed Grids in
 Reseored Area 4A&4B
 Former Camp Butner
 Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present

Aerial Photo Interpretation - USACE TEC, 2001

- Ground Scar
- Impact Crater
- Recent Non-EE/CA UXO Findings

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

1000 0 1000 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Completed Grids in Reseored Area 4A&4B		PROJECT NUMBER: 738001
DRAWN BY: BT			SCALE: 1 inch equals 1,000 feet
CHECKED BY: JK	DATE: July 2004	PAGE:	3-39
SUBMITTED BY: DS	FILE: X:\gis\738001\rv_project\EECA.apr		

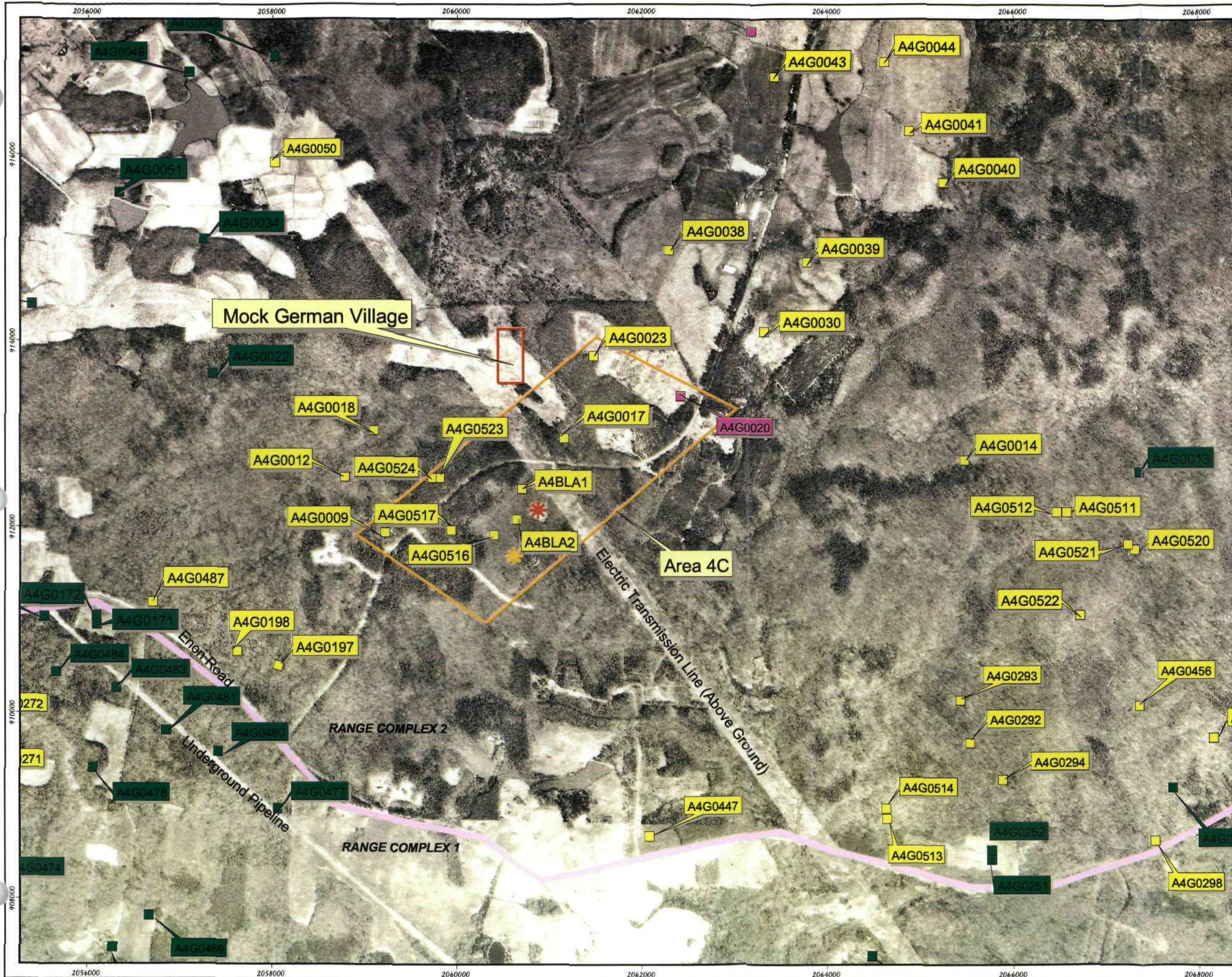
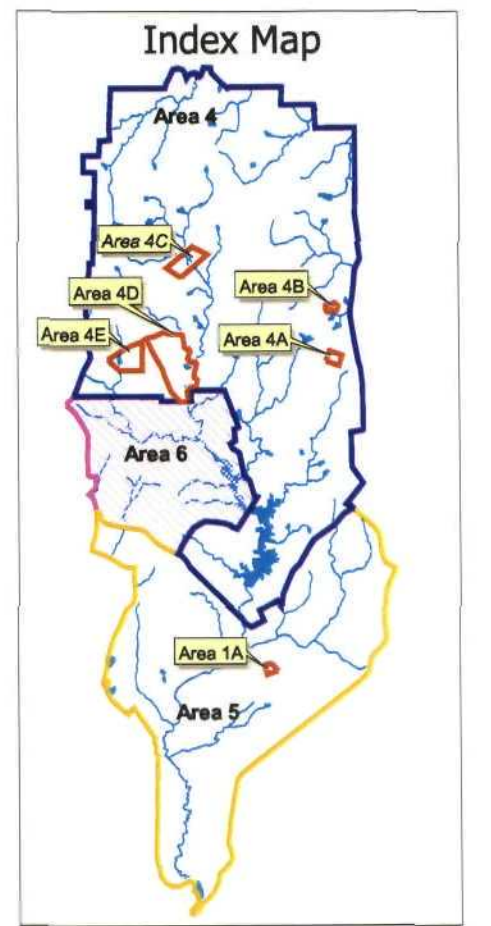


Figure 3.11
 Completed Grids in
 Resected Area 4C
 Former Camp Butner
 Butner, NC



Legend
 100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- * Recent Non-EE/CA UXO Findings
- * Recent Non-EE/CA OES Findings
- * Possible Well Disposal Site
- * UXO Findings 10 Years Ago

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

1000 0 1000 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Completed Grids in Resected Area 4C		PROJECT NUMBER: 738001
DRAWN BY: BT			
CHECKED BY: JK	SCALE: 1 inch equals 1,000 feet	DATE: July 2004	PAGE: 3-40
SUBMITTED BY: DS	FILE: x:\gis\738001\av_project\EECA.apr		

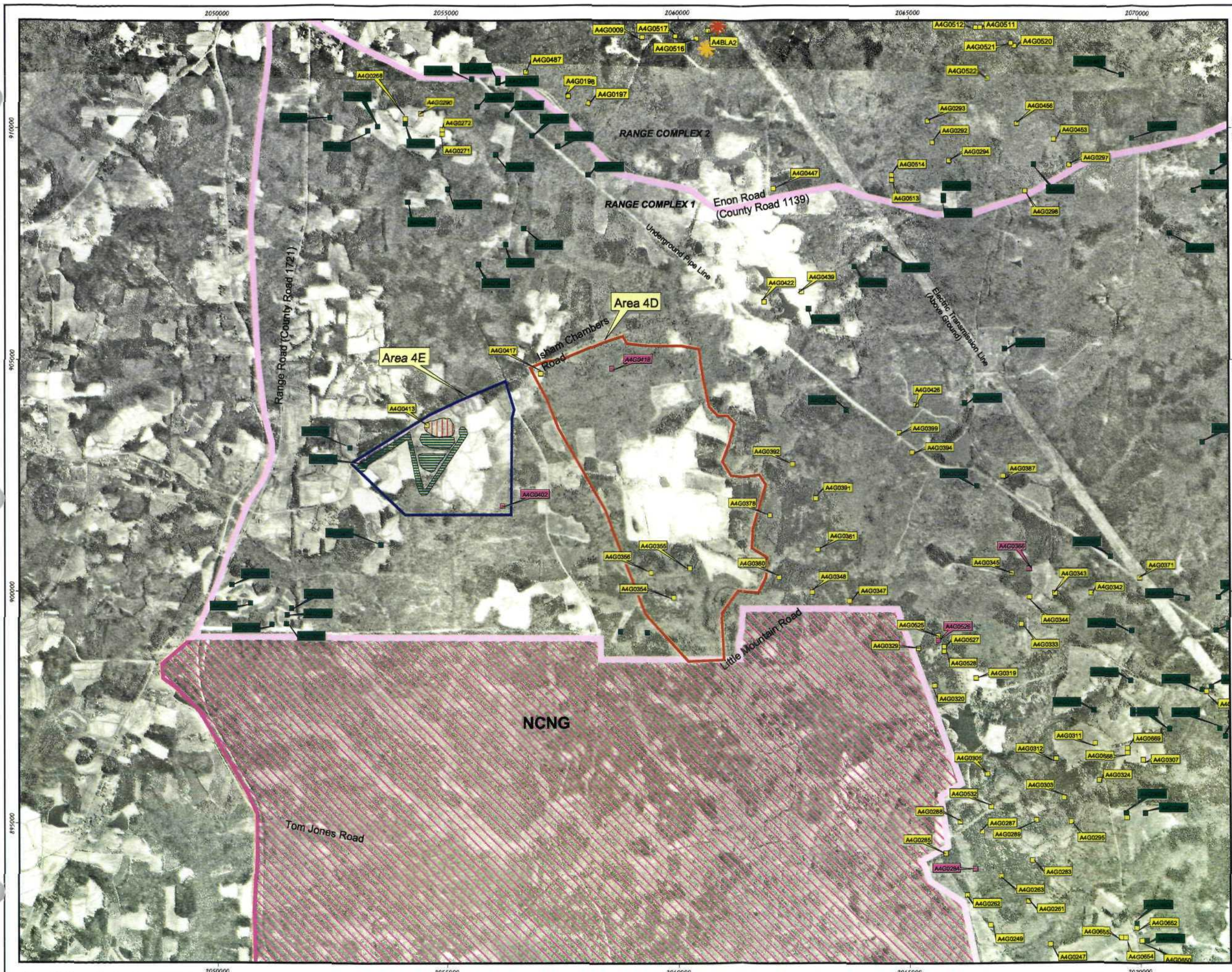
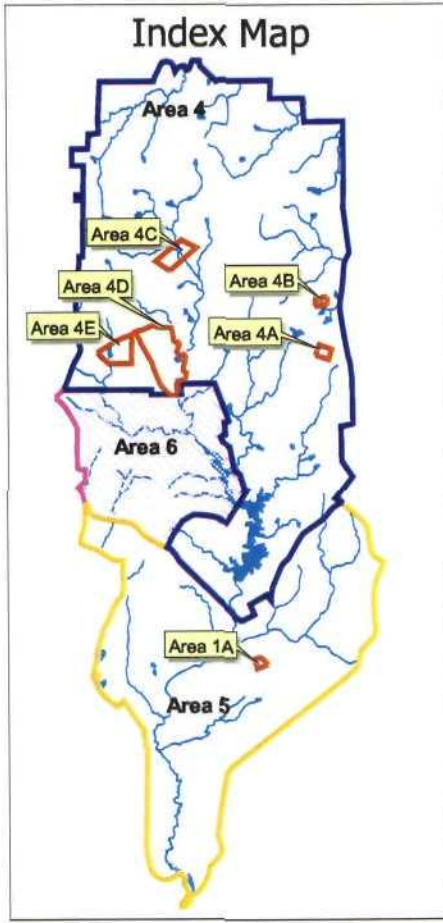


Figure 3.12
 Completed Grids in
 Resected Area 4D&4E
 Former Camp Butner
 Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present

Aerial Photo Interpretation - USACE TEC, 2001

- Ground Scar
- Impact Crater
- Recent Non-EE/CA UXO Findings

Image Source: 1995 Aerial Photo from USGS
 Map Units: NAD 1983 North Carolina State Plane (Feet)

2000 0 2000 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Completed Grids in Resected Area 4F&4G		PROJECT NUMBER: 738001
DRAWN BY: BT			SCALE: 1 inch equals 2,000 feet
CHECKED BY: JK	DATE: July 2004	PAGE:	3-41
SUBMITTED BY: DS	FILE: x:\gis\738001\av_project\EECA.apr		

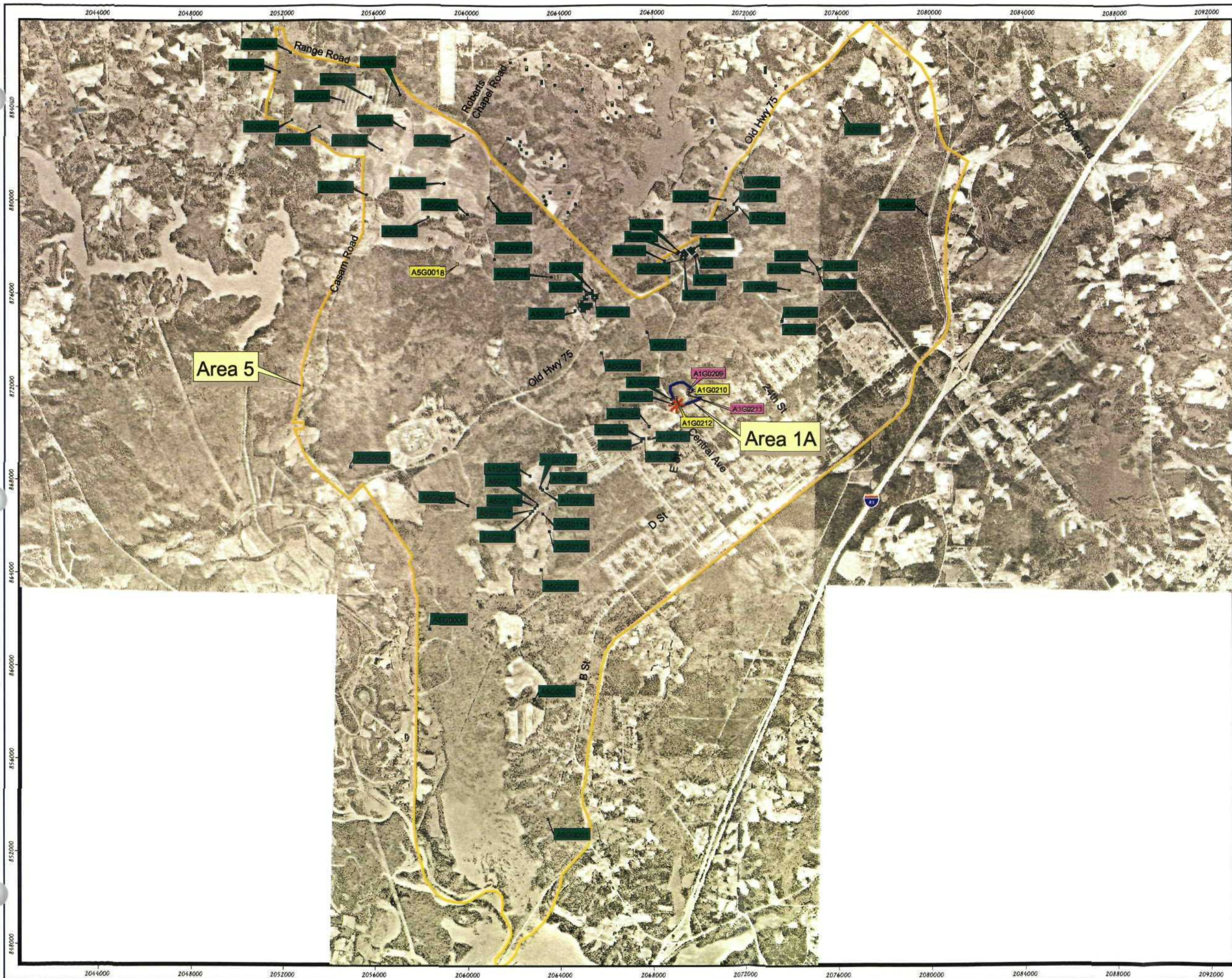
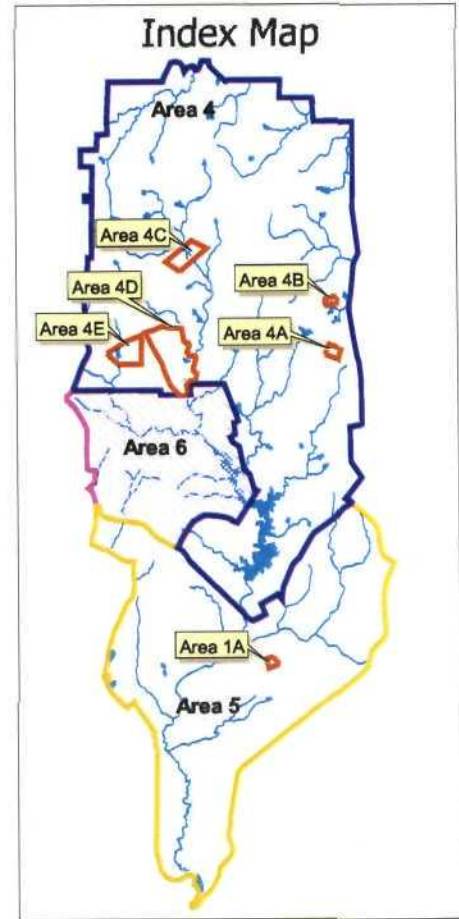


Figure 3.13
Completed Grids in
Resected Area 5
Former Camp Butner
Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Recent Non-EE/CA UXO Findings

Image Source: 1995 Aerial Photo from USGS
Map Units: NAD 1983 North Carolina State Plane (Feet)

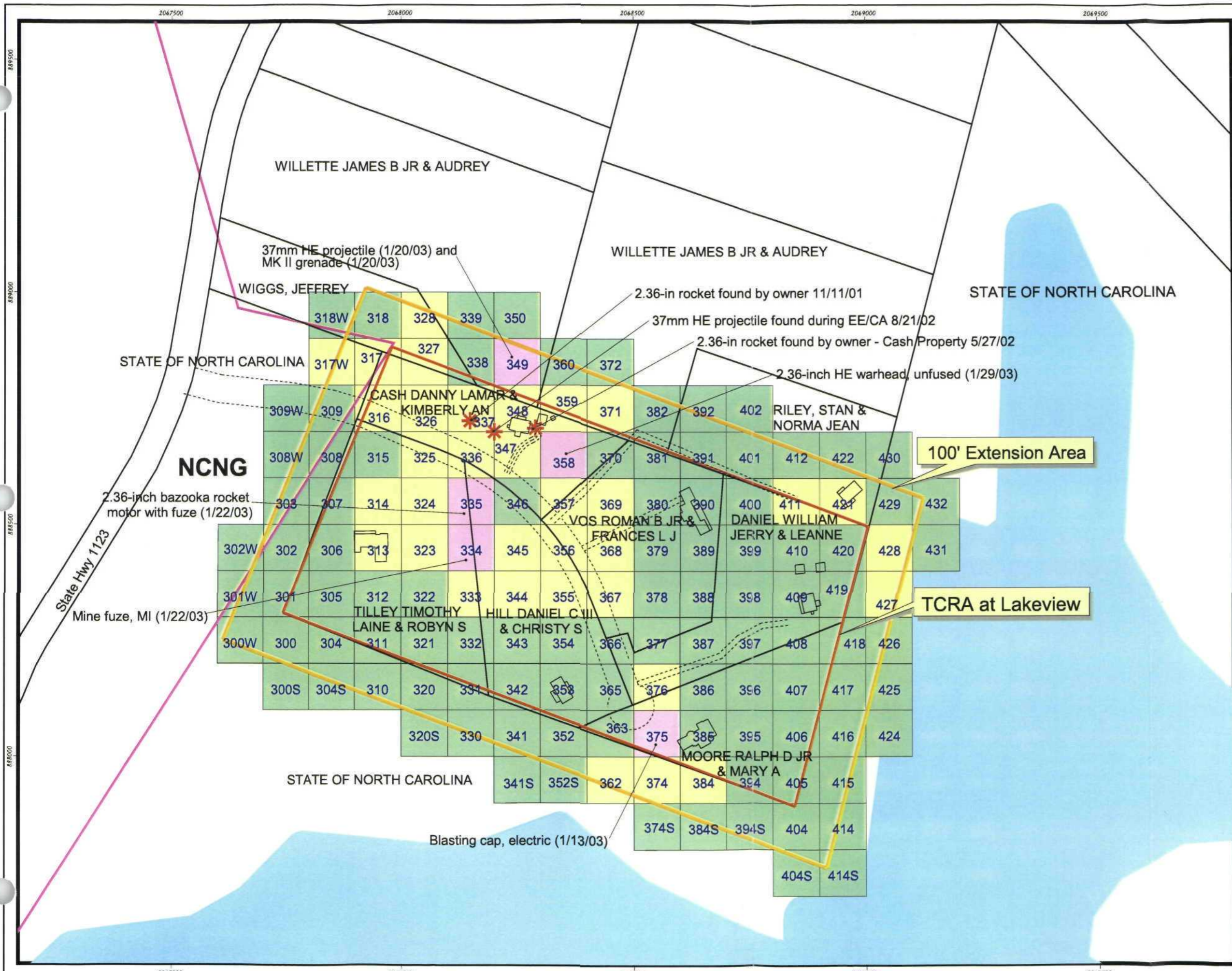
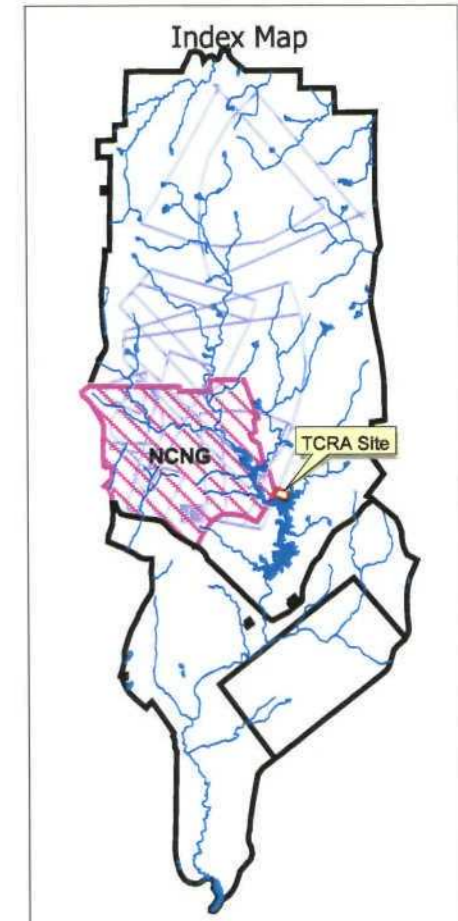
4000 0 4000 Feet

PARSONS

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OF ENGINEERS
HUNTSVILLE CENTER

DESIGNED BY: BT	Completed Grids in Resected Area 5	
DRAWN BY: BT		
CHECKED BY: JK	SCALE: 1 inch equals 4,000 feet	PROJECT NUMBER: 738001
SUBMITTED BY: DS	DATE: July 2004	PAGE: 3-42
	FILE: x:\gis\738001\av_project\EECA.spr	

Figure 3.14
Intrusively Investigated
Grid Locations
Former Camp Butner
Butner, NC



Legend

- Firing Fan
- 100'x100' Grid**
- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Waterbody (SDTS Data, Buffered 50 Feet)
- Recent Non-EE/CA UXO Findings

Map Units: NAD 1983 North Carolina State Plane (Feet)
100 0 100 200 Feet

PARSONS U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Intrusively Investigated Grid Location Lakeview Subdivision		
DRAWN BY: BT			
CHECKED BY: DS	SCALE: 1 inch equals 200 feet	PROJECT NUMBER: 738001	
SUBMITTED BY: DS	DATE: July 2004	PAGE: 3-43	
FILE: X:\gis\738001\av_project\investigated_grids.apr			

CHAPTER 4 RISK EVALUATION

4.1 INTRODUCTION

4.1.1 A qualitative risk evaluation was conducted using the OE Risk Impact Assessment (OE RIA) for OE EE/CA Evaluations Interim Guidance document (USACE, 2001b) to assess explosive safety risk to the public at the former Camp Butner Site. The purpose of the risk evaluation is to communicate the magnitude of the risk at the site and the primary causes of that risk, and to aid in the development, evaluation, and selection of OE response alternatives. The risk evaluation presented herein is based on the site characterization findings presented in Chapter 3 for each of the 9 AOIs remaining after re-sectorization (as described in Subchapter 3.5).

4.1.2 An explosive safety risk is the probability for a UXO to detonate and potentially cause harm as a result of human activities. An explosive safety risk exists if a person can come near or into contact with a UXO and act on it to cause a detonation. The potential for an explosive safety risk depends upon the presence of three critical elements: a source (presence of UXO), a receptor or person, and interaction between the source and receptor (such as picking up the item or disturbing the item by plowing). There is no risk if any one element is missing. Each of the three elements provides a basis for implementing effective risk-management response actions.

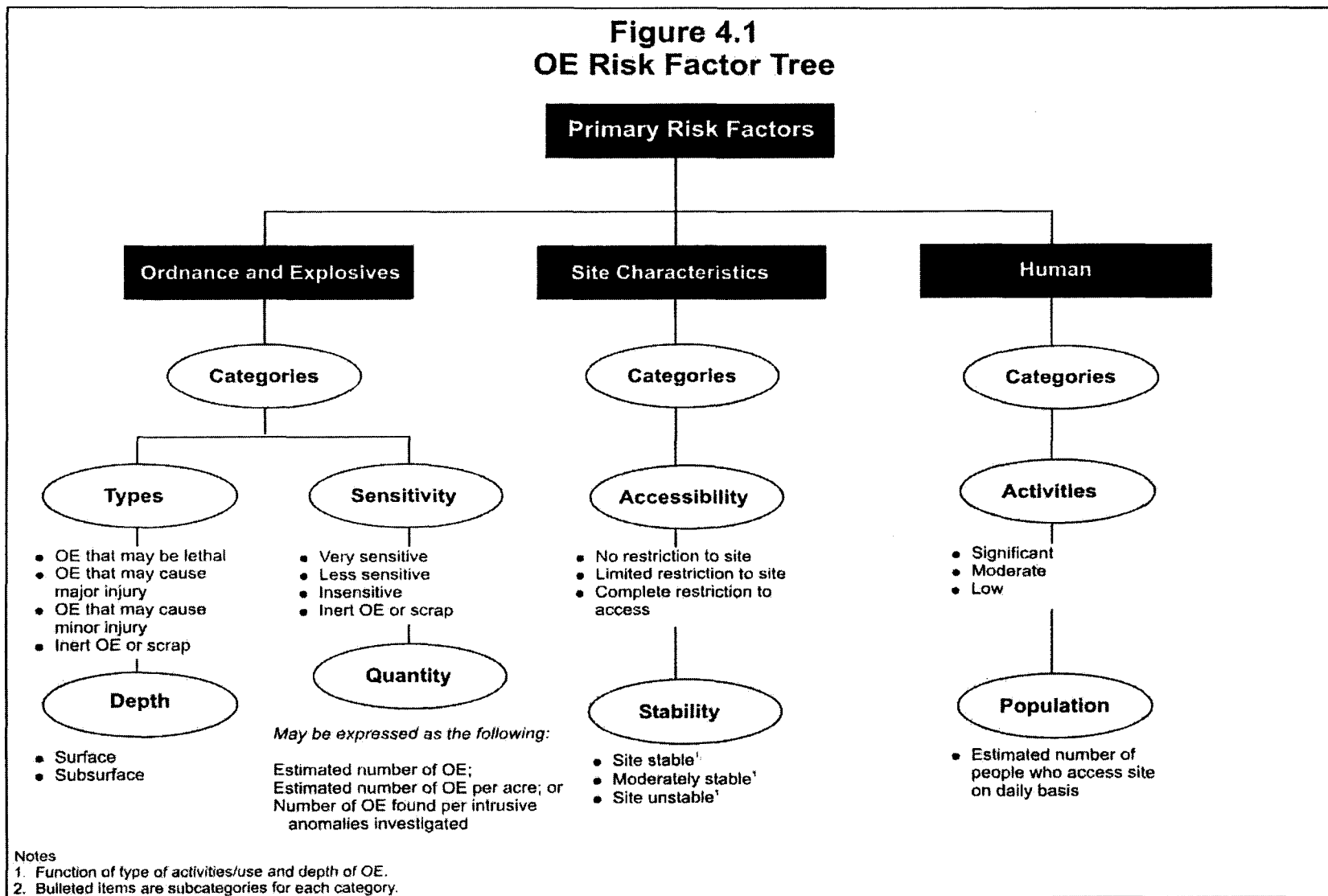
4.1.3 The exposure route for a UXO to a receptor is primarily direct contact as a result of some human activity. Agricultural or construction activities involving subsurface intrusion are examples of human activities that will increase the likelihood for direct contact with buried UXO. A UXO will tend to remain in place unless disturbed by human or natural forces, such as erosion or frost heave. Movement of the UXO may increase the probability for direct human contact but not necessarily result in a direct contact or exposure.

4.2 DEFINITION OF RISK EVALUATION FACTORS, CATEGORIES, AND SUBCATEGORIES

4.2.1 Introduction

The potential risk posed by UXO was characterized qualitatively by evaluating three primary risk factors. The three primary risk factors include: 1) presence of a UXO source, 2) site characteristics that affect the accessibility or pathway between the source and human receptor, and 3) human factors that define the number of receptors and type of activities that may result in direct contact between a receptor and UXO source. By performing a qualitative assessment of these three factors, an overall assessment of the safety risk posed by UXO was evaluated. The following paragraphs describe the components of each of the primary risk factors and an overview of the risk evaluation factors is shown in Figure 4.1.

**Figure 4.1
OE Risk Factor Tree**



4.2.2 Presence of UXO Factors

4.2.2.1 There are four categories that are used to evaluate the presence of UXO risk. These include the UXO type, UXO sensitivity, UXO density, and UXO depth distribution.

4.2.2.2 Type. The UXO type affects the likelihood of injury and the severity of exposure. If multiple UXO items are identified in an area, that item which poses the greatest risk to public health is selected for risk evaluation. There are four subcategories of UXO type, as shown in Table 4.1. These subcategories are presented in order of severity from highest to lowest risk.

Table 4.1
UXO Type Subcategories

Subcategory	UXO Type Description
Most severe	UXO that may be lethal if detonated by an individual's activities
Moderate severity	UXO that may cause major injury to an individual if detonated by an individual's activities
Least severity	UXO that may cause minor injury to an individual if detonated by an individual's activities
No injury	Ordnance scrap (inert), will cause no injury

4.2.2.3 **Sensitivity.** UXO sensitivity affects the likelihood of detonation and the severity of exposure. Factors considered in evaluating sensitivity include fuzing and environmental factors such as weathering. There are four potential subcategories of UXO sensitivity. The category of sensitivity is based on the results of the EE/CA field investigation as well as the results of archival searches. When multiple subcategories of UXO types are discovered in an area, the highest risk subcategory is used in the risk evaluation. The subcategories of sensitivity are defined and presented in order from highest to lowest in Table 4.2.

4.2.2.4 **Density.** UXO density affects the likelihood that an individual will be exposed to UXO. There exists a direct relationship between density and potential for harm. For example, the more ordnance per acre, the greater the likelihood of exposure to a UXO item and thereby an opportunity to create an incident. Density can be estimated either qualitatively or quantitatively.

Table 4.2
UXO Sensitivity Subcategories

Subcategory	UXO Sensitivity
Very Sensitive	UXO that is very sensitive, i.e., electronic fuzing, land mines, booby traps
Less sensitive	UXO that has standard fuzing
Insensitive	UXO that may have functioned correctly, or is unfuzed, but has a residual risk
Inert	Ordnance scrap (inert), will cause no injury

4.2.2.5 Depth Distribution. The UXO depth distribution refers to where the UXO is located vertically in the subsurface. The UXO depth distribution affects the likelihood that an individual will be exposed to UXO. There exists a direct relationship between the depth at which UXO are found and the likelihood of exposure to the UXO. That is, the greater the depth where the UXO are found, the lower the risk of exposure. There are two subcategories within the UXO depth distribution category: surface and subsurface. The surface subcategory includes those items recovered either on the ground surface, protruding from the ground surface, or beneath the leaf litter. The subsurface subcategory includes those items recovered from beneath the ground surface. Assessment of this risk category reflects the findings of the EE/CA field investigation.

4.2.3 Site Characteristics Factors

4.2.3.1 There are two categories that are evaluated in the site characteristics risk factor. These are site accessibility and site stability.

4.2.3.2 **Site Accessibility.** The accessibility of a sector affects the likelihood of encountering UXO. Natural or physical barriers can limit the accessibility. Natural barriers can include the terrain or topography of the site as well as the vegetation. Physical barriers can include walls and fences that limit the public's accessibility to the sector. Both the physical and natural barriers found at a sector are considered when evaluating this category. Site accessibility has three subcategories. These subcategories are presented in Table 4.3.

4.2.3.3 **Site Stability.** This category relates to the probability of being exposed to UXO by natural processes. These natural processes include recurring natural events (e.g., frost heave, sand movement, erosion) or extreme natural events (e.g., tornadoes, hurricanes). The local soil type, topography, climate, and vegetation affect stability of the site. The soil type and climate primarily affects the depth of penetration of the UXO. Over time, the soil type and climate will also affect the degree of erosion that takes place at a site. Topography and vegetation in the area will also affect the rate of erosion that takes place in an area. Site stability has three subcategories. Table 4.4 describes these subcategories.

**Table 4.3
Site Accessibility Subcategories**

Subcategory	Accessibility Description
No Restriction to Site	No man-made barriers, gently sloping terrain, no vegetation that restricts access, no water that restricts access
Limited Restriction to Access	Man-made barriers, vegetation that restricts access, water, snow or ice cover, and/or terrain restricts access
Complete Restriction to Access	All points of entry are controlled

**Table 4.4
Site Stability Subcategories**

Subcategory	Stability Description
Site Stable	UXO should not be exposed by natural events
Moderately Stable Site	UXO may be exposed by natural events
Site Unstable	UXO most likely will be exposed by natural events

4.2.4 Human Factors

4.2.4.1 There are two categories that are evaluated in the primary human risk factor. These include activities and population.

4.2.4.2 **Site Activity.** The types of activities conducted at a site affect the likelihood of encountering UXO. The types of activities may be generally classified as recreational and occupational. This category examines whether the impact from an activity on UXO is significant, moderate or low. In order to assign such a score, the general guidelines presented in Table 4.5 were considered. First, the type of activity should be identified. Then, the depth of the activity must also be considered. For example, at a site where UXO is at the surface, all activities that can impact UXO at the surface are considered activities that have significant impact or contact level. Conversely, if all UXO is located at depths greater than 1 foot and only surface impact activities are being performed then the activities are considered as moderate or low impact. After the type of activity and depth of UXO are identified, then a score of significant, moderate or low may be assigned.

**Table 4.5
UXO Contact Probability Levels**

Examples of Activities	Actual Depth of UXO	Contact Level
Child Play, Picnic, Short Cuts, Hunting, Fishing, Hiking, Swimming, Jogging, Ranching, Surveying, Off-Road Driving,	Surface Below Surface -12" >12"	Significant Low Low
Camping, Metal Detecting	Surface Below Surface -12" >12"	Significant Moderate Low
Construction, Archaeology, Crop Farming	Surface Below Surface -12" >12"	Significant Significant Moderate

4.2.4.3 Population. This category refers to the number of people that potentially access the AOI on a daily basis. The number of people using the AOI affects the likelihood of encountering UXO. A direct relationship exists between the number of people and the risk of exposure. An estimate of the number of people accessing the AOI on a daily basis was made using census data and best professional judgment based on knowledge of the type of site, land use, and site accessibility.

4.3 RISK EVALUATION

4.3.1 Introduction

Each of the primary risk factors identified above was evaluated using the data collected during the EE/CA field investigation, the data presented in the ASR, and the results of the TCRA. The risk evaluation for the 11 AOIs is presented in Table 4.6. The following sections discuss the risk evaluation by each primary risk factor.

4.3.2 Presence of UXO Factor

4.3.2.1 Type

4.3.2.1.1 **Area 1A:** Two UXO items were recovered during the EE/CA investigation in Area 1A. One Mk II hand grenade was recovered at a depth of 1 inch and a M1 practice anti-tank landmine with spotting charge and fuze was recovered at a depth of 10 inches. The ASR report indicated that a small arms range and flamethrower range was located in this area. During the ASR site visit small arms ammunition casings (.30 caliber) were identified. Ordnance items that are 30mm and smaller are classified as small arms by the U.S. Military (USACE, 1994). These items pose a very low explosive safety risk and are not considered a UXO hazard. For small arms, a deliberate effort must be applied to a very specific and small point (the primer) to make the round function. If the round functions outside the weapons chamber, the propellant gas would cause the bullet and cartridge to separate and, in addition, the cartridge could also rupture. If this took place in close proximity to a person, possible injury could result (USACE, 1999).

The explosive safety risk posed by small arms ammunition is very small and is not further discussed in this report

4.3.2.1.2 During this EE/CA investigation, a 2.36-inch rocket was reportedly found in unknown condition near the water tower and detonated by Fort Bragg EOD. Although this potential UXO was found within the confines of Area 1A, it cannot be confirmed as UXO and is uncharacteristic of the items observed within Area 1A during the EE/CA. Based on the verified UXO (grenade and practice mine), the Mk II hand grenade was selected as the munition of most concern for Area 1A and was assigned a subcategory of "most severe" because it may be lethal if detonated by an individual's activities.

4.3.2.1.3 **Area 4A:** One UXO item was recovered in Area 4A during this EE/CA investigation. One 2.36-inch HE bazooka rocket was recovered at a depth of 3 inches. Area 4B is located entirely within one of six areas restricted for 'surface use only' when the government sold the land back to the public (see paragraph 2.3.6, Figure 2.3). Area B was designated as a bazooka and rifle grenade impact area in historical records. The UXO findings corroborate this historical designation. The 2.36-inch HE bazooka rocket was assigned a subcategory of "most severe" because it may be lethal if detonated by an individual's activities.

4.3.2.1.4 **Area 4B:** One UXO item was recovered in Area 4B during this EE/CA investigation. One 2.36-inch HE bazooka rocket was recovered at a depth of 18 inches. In addition, coincident with the EE/CA investigation, the property owner uncovered an inert 2.36-inch bazooka rocket. Area 4B is located entirely within one of six areas restricted for 'surface use only' when the government sold the land back to the public (see paragraph 2.3.6, Figure 2.3). Area 4B was reportedly within a bazooka and rifle grenade impact area. The UXO findings corroborate this historical designation. The 2.36-inch HE bazooka rocket recovered during the EE/CA investigation was assigned a subcategory of "most severe" because it may be lethal if detonated by an individual's activities.

4.3.2.1.5 **Area 4C:** One UXO item was recovered during the EE/CA investigation in Area 4E. One unfuzed 105mm HE projectile was recovered at a depth of 3 inches. Additionally, an unfuzed 105mm HE projectile was recovered by a resident during this EE/CA investigation and disposed of by Fort Bragg EOD. A second projectile (155mm) was found by the resident during preparation of this report. This item was also disposed of by Fort Bragg EOD. Another adjacent resident reported finding a 155mm HE projectile approximately 10 years ago; however this item was not verified. Area 4C is located within one of six areas restricted for 'surface use only' when the government sold the land back to the public (see paragraph 2.3.6, Figure 2.3). Area 4C falls within the main artillery impact area. The TEC historical photographic analysis identified a large number of suspect impact craters in this area. In addition, the ASR report identified the structural remnants of the mock German village used as an artillery target and was later verified by Parsons' personnel during this EE/CA investigation. The 155mm HE projectile (UXO item) was assigned a subcategory of "most severe" because it has the potential to cause the most injury if detonated by an individual's activities.

4.3.2.1.6 **Area 4D:** One UXO item was recovered during the EE/CA investigation in Area 4D. One 37mm HE projectile was recovered at a depth of 2 inches. This AOI is

located within the former Range 10 (37mm projectile training) and Range 11 (60mm mortar training) impact areas. Area 4D *does not* fall within any of six areas restricted for 'surface use only' when the government sold the land back to the public (see paragraph 2.3.6, Figure 2.3). The 37mm projectile identified during this EE/CA investigation corroborates the historical designation of this AOI. The UXO item was assigned a subcategory of "most severe" because it may be lethal if detonated by an individual's activities.

4.3.2.1.7 **Area 4E:** One UXO item was recovered during the EE/CA investigation in Area 4E. One 37mm HE projectile was recovered at a depth of 1 inch. Area 4E is located almost entirely within one of six areas restricted for 'surface use only' when the government sold the land back to the public (see paragraph 2.3.6, Figure 2.3). Area 4E falls within the area reportedly used as a moving target area within the former Range 10 (37mm projectile training range). The 37mm HE projectile (UXO item) was assigned a subcategory of "most severe" because it may be lethal if detonated by an individual's activities.

4.3.2.1.8 **Area 4:** Five UXO and 1118 ordnance scrap items were identified during the EE/CA investigation in Area 4. The peripheries of several firing ranges are located throughout this AOI. The UXO items included one 105mm HE projectile recovered at the surface, one 57mm HE projectile recovered at a depth of 6 inches, one unfuzed 2.36-inch HE bazooka rocket recovered at a depth of 10 inches, an unfuzed 155mm shrapnel projectile with expelling charge recovered at a depth of 30 inches, and a M52 series nose fuze recovered at a depth of 3 inches. The likelihood for occurrence of additional UXO within this AOI is considered moderate based on both the number of UXO and ordnance scrap items found as well as the configuration of historical firing ranges. The unfuzed 155mm projectile and the 105mm HE projectile recovered during this EE/CA were selected as the munitions of most concern for Area 4 and assigned a subcategory of "most severe" because they may be lethal if detonated by an individual's activities. Note, however, that the 57mm HE projectile also meets the criteria for the subcategory of "most severe".

4.3.2.1.9 Historical photographic analysis by TEC identified a large concentration of suspect impact craters along the northern and eastern portions of Area 4 (adjacent to the NCNG property) as well as much of the northcentral portion of the AOI near the Mock German Village (USACE, 2001a). This AOI includes the former Range 10 (37mm projectile training) and former Range 14 (60mm mortar training) impact areas as well as the heavy artillery target areas. All or part of each of the six parcels restricted for 'surface use only' when the government sold the land back to the public fall within Area 4 (see paragraph 2.3.6, Figure 2.3). The large quantity of ordnance scrap items and UXO recovered in this area during the EE/CA investigation corroborate the historical usage of this AOI as an artillery impact area.

4.3.2.1.10 **Area 5:** No UXO was identified during the EE/CA investigation in Area 5. Only one ordnance scrap item was recovered from the 750 anomalies that were intrusively investigated. The ASR report indicated that the cantonment area and small arms ammunition training range were located within this AOI. Area 5 *does not* fall within any of the six areas restricted for 'surface use only' when the government sold the land

back to the public (see paragraph 2.3.6, Figure 2.3). The findings from this EE/CA corroborate the historical use of this AOI. The likelihood for occurrence of UXO within this AOI is considered remote based on the findings from this EE/CA investigation. The ordnance scrap item recovered in this AOI is assigned a subcategory of “no injury”.

4.3.2.1.11 Lakeview Subdivision: One UXO item was recovered during the EE/CA investigation and six UXO items were recovered during the TCRA in the Lakeview Subdivision. The Lakeview Subdivision *is not* located within any of six areas restricted for ‘surface use only’ when the government sold the land back to the public (see paragraph 2.3.6). A 37mm HE projectile was recovered from a depth of 3 inches during the EE/CA. During the TCRA, UXO items recovered include one electric blasting cap, one Mk II hand grenade, one 37mm HE projectile, one M1 A1 mine fuze, one 2.36-inch bazooka rocket motor with fuze, and one 2.36-inch HE bazooka rocket warhead. All the UXO items recovered during the TCRA were between a depth of 1 – 6 inches. The Mk II hand grenade was assigned a subcategory of “most severe” because it has the potential to cause the most injury if detonated.

4.3.2.2 Sensitivity

A subcategory of “less sensitive” was assigned to Areas 1A, 4A, 4B, 4D, 4E, and the Lakeview Subdivision based on the recovery of munitions in these areas having standard fuzes as defined in Table 4.2. Sensitivity affects the likelihood of detonation and the severity of exposure. The UXO items recovered during this EE/CA in Area 4C did not have intact fuzing as a result of shearing at impact. However, there is a reasonable likelihood that other UXO items may exist in these areas within intact fuzing; therefore, a subcategory of “less sensitive” was also assigned to Area 4C. The UXO sensitivity for Area 4 was also assigned “less sensitive” based on the presence of projectiles with standard fuzing. Area 5 was assigned a subcategory of “inert”, as only ordnance scrap that can not cause any injury was recovered in this area.

4.3.2.3 Density

Density was estimated qualitatively for the each AOI based on the number of UXO found and the number of acres investigated. No UXO were found in Area 5. A total of 13 UXO items were recovered during the EE/CA investigation and 6 UXO items were recovered during the TCRA in the Lakeview Subdivision. In addition, during the EE/CA investigation, two verified UXO items were recovered by a resident at unspecified depths in Area 4C and one verified UXO item was recovered by another resident at an unspecified depth in Area 4B.

4.3.2.4 Depth

4.3.2.4.1 The UXO depth distribution affects the likelihood that an individual will be exposed to UXO. There is a direct relationship between the depth at which UXO are found and the likelihood of exposure to the UXO. There are two subcategories within the distribution depth category: surface and subsurface (as defined in paragraph 4.2.2.5). No UXO were found in Area 5. The depth distribution factor is not applicable to this area. The 13 UXO items found at the former Camp Butner Site during the EE/CA investigation ranged in depth from 0 – 30 inches (one surface UXO in Area 4). The 6 UXO items recovered during the TCRA at the Lakeview Subdivision ranged in depth from 1 inch – 6

inches. It should be noted that the depth distribution of the UXO items found during the TCRA is biased because the TCRA was limited to between 0 – 6 inches.

4.3.2.4.2 Table 4.6 summarizes the results of the EE/CA and TCRA investigations in terms of the depth of UXO for each area.

4.3.3 Site Characteristics Factors

4.3.3.1 Site Accessibility

All areas investigated during the EE/CA are accessible by both road and foot. There are mountainous areas and densely wooded areas with thick understory scattered throughout the entire site that limits easy access. The terrain in portions of Area 4 (north and east of NCNG) and Area 4D are more rugged and remote than other areas in the former Camp Butner Site and provides a natural barrier that limits easy access to much of the area. Regions in Area 4 and Area 4D are also heavily forested and almost entirely undeveloped; however, hunters are known to frequent these areas. All areas are assigned a subcategory of no restriction as the entire area is accessible by road and foot. It should be noted, that the federal correctional facility, which encompasses a very small fraction of Area 5, is completely restricted.

4.3.3.2 Site Stability

The large amount of wooded area makes it possible that UXO may become exposed through natural processes, particularly burning initiated by lightning. In addition, frost heave (estimated at 4 inches, see also Subchapter 2.2.3) and localized erosion along creek banks over time may occur and potentially cause migration of subsurface UXO to the surface. The site stability is assigned a subcategory of moderately stable for the entire former Camp Butner Site.

4.3.4 Human Factors

4.3.4.1 Site Activities

4.3.4.1.1 The type of activities conducted at the former Camp Butner Site in combination with the depth distribution of UXO is related to the likelihood of individuals encountering UXO. Table 4.6 describes the type of activity expected in each AOI based on the current land use. The future land use is anticipated to continue along the existing land use tracks currently in place as discussed in Chapter 2.

4.3.4.1.2 Area 1A is a partially wooded undeveloped area. There are no residences within Area 1A; however, there is the potential for future recreational development (hiking trail) in this area. Current activities in this area are primarily trespassing and hiking. The detection of UXO (above the frost heave depth of 4 inches) combined with the potential for erosion results in a significant contact level rating for Area 1A.

4.3.4.1.3 Some of Area 4 and the majority of Area 4D is rugged, sparsely populated (few residential dwellings), and primarily used for hunting. Although hunting is a non-intrusive activity, the detection of UXO within the frost heave depth of 4 inches combined with the surficial hunting activity results in a significant contact level rating for

both areas. Other portions of Area 4 are largely open areas used primarily for farming. In these areas, the predominant agriculture activities include grazing, hay production, and seasonal tilling. The intrusive activities combined with the presence of UXO also supports the significant contact level rating assigned to Area 4.

4.3.4.1.4 Area 4A is largely wooded and undeveloped with a single private landowner (two residential dwellings). The property has recently been parceled in anticipation of future residential development and initial land clearing has been observed (July 2003). The planned future construction activities combined with recovery of UXO (above the frost heave depth of 4 inches) results in a significant contact level rating for Area 4A.

4.3.4.1.5 Area 4B is largely an open area used primarily for farming. There are two residential dwellings in this AOI. The current farming practice in this area, as reported by the property owner, includes tilling to a depth of approximately 10 inches. The intrusive activity combined with the presence of UXO results in a significant contact level rating for Area 4B.

4.3.4.1.6 Area 4C is partly residential (8 total residential dwellings) and partly undeveloped. The predominant activities include construction, child play, and hunting. The intrusive activities combined with the presence of UXO (above the frost heave depth of 4 inches) results in a significant contact level rating for Area 4C.

4.3.4.1.7 Area 4E is predominantly used for tobacco cultivation. There is one residential dwelling in the area. The predominant activities include farming and construction. The intrusive activities combined with the presence of UXO (above the frost heave depth of 4 inches) results in a significant contact level rating for Area 4E.

4.3.4.1.8 Five UXO were recovered in Area 4 and there is considered to be a moderate likelihood of occurrence for additional UXO based on the presence of impact craters, firing fans, and ordnance scrap items recovered in this area. Intrusive activities in Area 4 include child play, construction, farming, hunting, logging, and forestry. The moderate likelihood of occurrence for UXO in combination with the site activities, large size and population of the area results in an overall significant contact level rating for Area 4.

**TABLE 4.6
RISK EVALUATION**

AOI	Ordnance and Explosives Factors					Site Characteristics Factors		Human Factors		Summary
	Type ¹		Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population (Daily) / Number of Residential Dwellings	Qualitative OE RIA Safety Risk
Area 1A	EE/CA: (1) M1 anti-tank practice landmine w/fuze, (1) Mk II hand grenade	Most Severe	Less Sensitive	2 in 1.15 acres	Surface – 0 Subsurface – 2	No Restriction	Moderately Stable	Significant (Trespassing and hiking)	0 – 5 / 0	Moderate to High
Area 4A	EE/CA: (1) 2.36-inch HE bazooka rocket	Most Severe	Less Sensitive	1 in 1.15 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction, child play)	5 – 10 / 2	High
Area 4B	EE/CA: (1) 2.36-inch HE bazooka rocket Other: (1) 2.36-inch bazooka rocket	Most Severe	Less Sensitive	1 in 0.7 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming, child play)	2 – 5 / 2	High
Area 4C	EE/CA: (1) unfuzed 105mm HE projectile Other: (2) 155mm HE projectile	Most Severe	Less Sensitive	1 in 2.3 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction, child play, hunting)	35 – 60 / 8	High
Area 4D	EE/CA: (1) 37mm HE projectile	Most Severe	Less Sensitive	1 in 1.15 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Hunting, hiking, child play)	5 – 10 / 6	Low to Moderate
Area 4E	EE/CA: (1) 37mm HE projectile	Most Severe	Less Sensitive	1 in 0.7 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming and construction)	20 – 40 / 1	Moderate

**TABLE 4.6
RISK EVALUATION**

AOI	Ordnance and Explosives Factors					Site Characteristics Factors		Human Factors		Summary
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population (Daily) /Number of Res. Dwellings	Qualitative OE RIA Safety Risk	
Area 4	EE/CA: (1) 105mm HE projectile, (1) unfuzed 155mm shrapnel projectile with expelling charge, (1) 57mm projectile, (1) unfuzed 2.36-inch bazooka rocket, and (1) M52 series nose fuze.	Most Severe	Less Sensitive	5 in 94.32 acres	Surface – 1 Subsurface – 4	No Restriction	Moderately Stable	Significant (Child play, construction, hunting, farming, forestry, logging)	500 – 750 /several hundred	Moderate
Area 5	EE/CA: Ordnance Scrap	No Injury	Inert	0 in 30 acres	Not Applicable	No Restriction	Moderately Stable	Low (Child play, construction, hunting, farming, forestry)	5000 – 8000	Low
Lake-view Sub-division	EE/CA: (1) 37mm HE projectile TCRA: (1) electric blasting cap, (1) MkII hand grenade, (1) 37mm HE projectile, (1) M1 A1 Mine fuze, (1) 2.36-inch HE rocket motor w/ fuze, (1) 2.36-inch HE bazooka rocket warhead	Most Severe	Less Sensitive	EE/CA: 1 in 0.7 acre TCRA: 6 in 26 acres	Surface – 0 Subsurface – 7	No Restriction	Moderately Stable	Significant (Construction, child play)	30 – 50 /7	High

¹ Denotes items found during the EE/CA and TCRA investigations, as indicated. Other denotes items found by residents and disposed of by Fort Bragg EOD during the EE/CA investigation.

The bolded UXO item was used to establish the Category.

² Denotes the number of UXO items found at the surface and in the subsurface during the EE/CA field investigation and TCRA. The TCRA removal was limited to the upper 6 inches.

4.3.4.1.9 No UXO was recovered in Area 5. There is considered to be a remote likelihood of occurrence for UXO in Area 5 based on the absence of firing fans, very few impact craters, and lack of ordnance scrap findings during the EE/CA investigation. Intrusive activities in Area 5 include child play, construction, farming, hunting, forestry. The remote likelihood of occurrence for UXO in combination with the site activities results in an overall low contact level rating for Area 5.

4.3.4.1.10 The Lakeview Subdivision area is a residential area that presently contains seven residences with one additional residence under construction. The primary activities in this area include construction and child play. The intrusive activities combined with the potential presence of residual UXO in the subsurface results in a significant contact level rating for the Lakeview Subdivision.

4.3.4.2 Population

The population living within the former Camp Butner is low. The 2000 census indicates the majority of people live in the Town of Butner in Area 5 and along the western and southern perimeter of Area 5. Additional concentrations of people are located throughout the site distributed along the main roads. The number of people that potentially access an AOI on a daily basis was estimated using professional judgment, site reconnaissance, and census data.

4.4 RISK ASSESSMENT SUMMARY

4.4.1 The risk to public safety associated with the presence of UXO were evaluated for each of the AOIs. The explosive safety risk is due to a combination of each of the primary risk factors that are presented above. The ASR report indicated that over 1000 UXO items were recovered during the dedudding operations in 1949 and 1950 (USACE, 1997). Following the dedudding operations, the government conveyed property in six areas with a 'surface use only' deed restriction and recommended periodic inspection of these areas (Figure 2.3). The periodic inspections in the six restricted areas (encompassing much of Area 4 proper as well as most or all of Area 4A-4E, except Area D) were conducted through 1969 and the ASR documented the recovery and destruction of over 100 additional UXO items. UXO items can be lethal if detonated by an individual's activities.

4.4.2 Despite the dedudding operation and periodic inspections, nineteen UXO items were identified both on the surface and subsurface in the AOIs during this EE/CA investigation and recent TCRA. Even though a removal action has been completed within the Lakeview Subdivision, a residual risk still remains because the removal actions were not completed to depth (TCRA limited to 6 inches bgs) and potential residual subsurface UXO may become exposed in the future as a result of natural events (erosion or frost heave) and/or human activities.

4.4.3 The explosive safety risk in Area 1A is considered moderate to high. Two UXO items were identified during the EE/CA and an additional ordnance discovery was

reported by an area resident. Although there are no residents living within this AOI, potential receptors include area residents, hikers, and trespassers. Potential future construction as a result of the encroachment from the Town of Butner and planned future passive recreational use for this area contributes to the explosive safety risk.

4.4.4 The explosive safety risk in AOIs Area 4A, Area 4B, and Area 4C is high. UXO items were identified during this EE/CA investigation in these AOIs. The property in each of these areas were originally sold back to private individuals with a 'surface use only' deed restriction because of the potential for residual UXO. Despite the 'surface use only' deed restriction, intrusive agricultural activities and significant recent residential development has occurred. Ongoing agricultural practices and additional future residential development contribute to an explosive safety risk for the area residents and workers.

4.4.5 The explosive safety risk in Area 4D is considered low to moderate. The terrain is heavily vegetated and mostly frequented by hunters. Only five residential dwellings have been identified within this AOI. The primary activities are non-intrusive and include hunting and hiking.

4.4.6 The explosive safety risk in Area 4E is considered moderate. The land is used primarily for agricultural purposes and has been tilled for several decades without an incident. Only one residential dwelling has been identified within this AOI.

4.4.7 The explosive safety risk in Area 4 is considered low to moderate. Five UXO were recovered during the EE/CA investigation and there is considered to be a moderate likelihood for additional occurrence of UXO based on the configuration of firing fans. The unrestricted access, intrusive agricultural activities and potential for future development (in some areas) contribute to the explosive safety risk.

4.4.8 The explosive safety risk in Area 5 is low. Only one ordnance scrap item was recovered during the EE/CA investigation in Area 5; no UXO was found. The ASR report indicated that this portion of former Camp Butner was used as a cantonment area and also for small arms ammunition training. The archival evidence does not indicate the presence of any firing ranges and the likelihood for occurrence of any UXO is considered remote.

4.4.9 The explosive safety risk in the Lakeview Subdivision is high. Multiple UXO items were recovered during the EE/CA and the TCRA in this area. The area is residential (7 residential dwellings) with unrestricted access. Intrusive activities include child play and construction. Additional residential construction and residential activities contribute to the post-TCRA residual explosive safety risk in this AOI.

CHAPTER 5

INSTITUTIONAL ANALYSIS

5.1 INTRODUCTION

Parsons prepared an Institutional Analysis (IA) Report as part of the former Camp Butner Site EE/CA Report. The IA was performed in accordance with USACE guidance DID OE-100. The report supports the development of institutional control (IC) alternative plans for actions known as institutional control strategies, that are included in Chapter 7. These strategies rely on the cooperation of local and state authorities and private interest to protect the public at large from potential OE risks. The detailed IA is included in this report as Appendix F. The site-wide IC Plan will be prepared by the USACE CESA Office subsequent to the public review period. This plan will provide details on the agreements relative to establishing, managing, and enforcing the specific IC recommendations presented in this EE/CA.

5.2 METHODOLOGY

The methodology used to analyze potential IC strategies for reducing the ordnance-related risk at the site included the review of government institutions and non-government entities that have some form of jurisdiction or ownership of the property within the site. Because the former Camp Butner Site extends over three counties and encompasses over 40,000 acres, multiple entities exercise control throughout the various regions of the site including: Durham County Sheriff, Granville County Sheriff, Town of Butner Public Safety, and North Carolina Department of Agriculture and Consumer Services. Interviews were conducted to determine the capabilities and willingness of these public agencies to support and enforce short and long-term IC measures. A list of the agencies interviewed and interview results is provided Appendix F. The information gathered during discussions with these agencies was included in the development of the recommended IC strategies.

5.3 RECOMMENDATIONS

5.3.1 The recommended site-wide IC strategies have been selected as a result of discussions with the USACE; State, County, and City officials; Parsons' professional experience with institutional analysis; and overall knowledge of the site and site conditions. The recommendations are considered to be appropriate methods for reducing the risk of ordnance hazards to the public. The recommended alternatives are intended to be an effective complement to the response action alternatives discussed later in this document.

5.3.2 Upon implementation of the recommended IC components, public access should be restricted or limited in Area 1A until budgets and schedules allow removal actions in the affected area. For Areas 4A, 4B, and 4C (also recommended for removal actions) UXO construction support for new residential development is recommended until removal actions are implemented. Recommendations for the balance of Area 4 consider public education and awareness as the most practical response, so that the intended land-use (agricultural, hunting, hiking, and municipal activities) may continue with the inclusion of established institutional controls. In addition, UXO construction support for new residential development and removal actions encompassing the "footprint" of existing residential dwellings is recommended for all of Area 4 and its subsectors (discussed in detail in later chapters). The IC recommendations provided below have been recommended to most effectively inform the largest population, modify their behavior, and/or adequately restrict public access to areas of potential UXO contamination.

5.3.1 Notification During Permitting

5.3.1.1 The existing permitting procedures for zoning and building permits provide an excellent means to inform property owners regarding the potential presence of ordnance on their property. Currently, each county provides standard application forms and brochures that outline and explain the procedures involved in the zoning and building permit processes. The application for rezoning and/or building permits on properties within the former range area could include an affidavit stating that the owner has been informed that ordnance may be present on their property. No applications within the former Camp Butner areas would be accepted unless accompanied by the signed affidavit. This process would assure each jurisdiction that the applicant has been informed about the unexploded ordnance that may be located on his/her property. At the time of the writing of this report Granville County was actively developing a notification process.

5.3.1.2 The existing brochures that provide an explanation of the permit review and approval procedures could include a one-page information document that describes ordnance hazards. The document may include information on how to recognize ordnance and what procedures should be followed if ordnance is found on the site.

5.3.1.3 The proposed affidavit and information sheet can be prepared by the USACE and provided at no charge to the county. The county should agree to include the disclosure form in land development permitting. The cost for the initial documents would be approximately \$500 and could be photocopied as needed by the counties and included in the rezoning, building permit, or utility permit application/information packet.

5.3.1.4 The proposed affidavit and information sheet would be distributed only to individuals applying for zoning, building permits, and utility permits on parcels of land located within the former Camp Butner. Each jurisdiction's computer system should have the capability of identifying these parcels via Geographic Information System (GIS) capabilities in planning and zoning departments. The cost to document all properties by

legal description, input this information into the county system, and train employees to use and provide the information is estimated to be between approximately \$10,000 and \$15,000.

5.3.2 Notification During Property Transfer

The filing of a disclosure document with the Registrar of Deeds Office provides an excellent means of informing the potential property owners about the potential for ordnance to exist within the former Camp Butner. The document would be filed under the names of all current owners of property within target and safety zones. When title searches are carried out pending the sale of property, information on the properties' history and the potential of ordnance would be made known.

5.3.3 Notification on Tax Bills

The insertion of notification of the potential for ordnance in all tax bills sent to property owners within the site is a very effective means of public education. The counties currently send tax forms through their tax offices; hence, very minimal addition to staffing will be required. This approach will inform property owners on a yearly basis of the potential for ordnance on their property. Additional expense to the county would be minimal.

5.3.4 Notification with Hunting Permit

The inclusion of notification of the potential for ordnance with the issuance of seasonal hunting permits provides effective public education for non-residents traversing areas of the site. This informative brochure would alert hunters to the potential hazard that may be encountered within the site. In addition, the document may include information on how to recognize ordnance and what procedures should be followed if ordnance is found on the site. Costs incurred to generate such notifications could be offset by the addition of a nominal fee to the cost of the permit.

5.3.5 Brochure/Fact Sheet

5.3.5.1 The existing fact sheet should be distributed to all property owners within the site. The names and addresses of all property owners have already been collected and are in digital format. The USACE or the counties could distribute the existing brochure to all property owners at a cost of less than \$1,000.

5.3.5.2 Later in the EE/CA process, this existing fact sheet should be updated when additional details are available on the amount and location of ordnance, plans for removal, and institutional controls. The cost to prepare, print, and distribute the revised fact sheet is \$10,000.

5.3.6 Newspaper Articles/Interviews

Positive newspaper articles that discuss the existence of ordnance, the potential danger, and how that danger can be minimized through education will serve as a very effective tool for educating the public at no cost to the county or the USACE.

5.3.7 Information Packages to Public Officials

The existing fact sheet and all proposed updates should be provided to public officials in Person, Granville, and Durham Counties. Local public officials will be invited to the public presentations of the EE/CA. These presentations will provide the officials with information they require. Copies of the EE/CA will also be made available to these individuals. The information packets should be updated to reflect current land use and zoning decisions.

5.3.8 Visual and Audio Media

5.3.8.1 An educational visual media program, approximately 7 to 10 minutes in length, will be prepared television, classroom, and community groups. Through television and classrooms, this program could reach a majority of the people in the region. The estimated cost of preparation of the visual media program and making adequate copies available is \$26,000. The estimated annual cost to maintain the video and update it every 3 years averages \$2,000 per year. The target audience should be youth from Kindergarten age to 18.

5.3.8.2 The use of local radio programming is also recommended to inform and educate the public about the history, current status, and future information concerning the presence of ordnance on the former range property. Local talk shows can be tapped to provide effective venues to have updates and discussions on ordnance safety. The existing and future fact sheets should be made available to the radio stations. Public service announcements on targeted, youth oriented radio stations are recommended, similar to no-smoking campaigns.

5.3.9 Classroom Education

Short presentations and courses in local schools and the community college are also recommended strategies to disseminate information. The 7 to 10 minute visual media video prepared for community groups can be used in the school presentations that are to be facilitated by the USACE. No additional expenses should be necessary for the schools. The USACE would have expenses of approximately \$5,000 for the first year and \$2,500 annually for future years.

5.3.10 Ad Hoc Committee

This committee of community leaders and other interested citizens will oversee the process for educating the public about the existence and potential danger of ordnance. It would be the responsibility of this committee to see that the other recommendations for public education are instituted and maintained. The cost to organize and maintain the committee is estimated at \$2,000 for the first year with an ongoing annual cost of \$1,000. A kickoff meeting for the creation of a Restoration Advisory Board (RAB) was conducted on May 25, 2004. The RAB will meet twice a year until the selected response actions are fully implemented.

5.3.11 Reverse 911 System

Investigate the use of a reverse 911 system with the county emergency management agency to address potential evacuations. This can be a joint police, fire, and Emergency Management System (EMS) function with various federal, state, and local dollars to purchase the system.

5.3.12 Signs

Signs can be posted along the perimeter of specific areas to warn the public about the risk of exposure to ordnance items. Signs can also include information regarding access restrictions, how to respond to discoveries of ordnance items, telephone numbers and addresses to contact with questions or concerns, and any other applicable site-specific information.

5.3.13 Fencing

Fencing would provide a physical barrier to prevent the public from entering specific areas and inadvertently coming in contact with ordnance. However, construction of fences is generally considered only as a last resort IC strategy due to generally negative public acceptance. The only AOI for which fencing was considered a viable option is Area 1A.

5.3.14 Land Use Restrictions and Regulatory Control

5.3.14 The current development patterns involving the ranges at the former Camp Butner necessitate that adequate notice of safety issues related to unexploded ordnance be provided through a variety of land use controls. It is recommended that planning and zoning officials revise their respective county comprehensive or master plan and zoning approval process to reflect knowledge associated with the former Camp Butner. GIS mapping and the development permit application process should be utilized as resources to convey information and regulate development in areas where unexploded ordnance has been located. Planning changes should be installed as "Smart Growth" or compact development techniques that minimize construction on target or safety zones. Where development does occur in target or safety zones, land use density for residential use should be low, or should be designated as green space, (i.e. conservation subdivisions).

5.3.15 Recordation of unexploded ordnance potential in individual deeds should be encouraged, but because of the difficulty in establishing whether individual ordnance is located on a particular parcel, mandatory deed recordation on individual parcels is not considered a viable land use control at properties comprising the former Camp Butner site.

5.3.15 Internet Website

Setup and maintenance of a website on the Internet about the former Camp Butner Site would provide another means of public information. The site would be effective to notify the public of changing site restrictions/activities. It would be inexpensive to create and would reach a broad cross section of the region.

CHAPTER 6

IDENTIFICATION OF RESPONSE ACTION OBJECTIVES

6.1 RESPONSE ACTION GOAL

6.1.1 Results from the EE/CA investigation identified one area as warranting an immediate (time-critical) UXO removal action. Intrusive sampling at this location was initiated by the reported finding of a 2.36-inch rocket by the property owner's child, which was subsequently identified as UXO by Fort Bragg EOD. Following the recovery of a 37mm HE projectile (UXO) during the EE/CA investigation, USAESCH deemed it necessary to conduct a TCRA at the Lakeview Subdivision (Appendix B; Parsons, 2003). The criteria of effectiveness, implementability and cost were used to evaluate the potential UXO removal action in accordance with USAESCH guidance. The goal of the TCRA was to minimize the explosive risk and achieve an acceptable level of protection to public safety and the human environment within a reasonable time frame.

6.1.2 No other AOIs within the former Camp Butner Site investigated as part of this EE/CA were initially identified as warranting an immediate (time-critical) UXO response action. However, fast track residential development in Area 4A warrants continued monitoring and periodic reevaluation. In addition, post-EE/CA UXO findings by a property owner in Area 4C (see paragraph 3.2.4.3) during the preparation of this report led to a second TCRA conducted by USAESCH and USA Environmental, Inc. Although a large amount of HE fragments were recovered, no UXO was identified. Several expended intact projectiles, including two 105mm smoke canisters and one 81mm mortar trench casing were also recovered. Preparation of a detailed reporting by USA is pending.

6.1.3 Non-time-critical OE response actions were evaluated for applicability at each AOI within the former Camp Butner Site. The goal of a non-time-critical UXO response action is public safety, which can be achieved by reducing the explosive threat posed by the UXO that potentially remains on the property. This goal was achieved by determining the appropriateness of a potential UXO response action for minimizing the public's exposure to UXO.

6.2 RESPONSE ACTION OBJECTIVES

6.2.1 A number of factors were considered for establishing the specific objectives for a response action. The objectives had to meet the requirements set forth in the applicable or relevant and appropriate requirements (ARARs) while still being realistic and achievable in terms of cost. To attain the goal of reducing the explosive threat posed by the potential for UXO/OE remaining within the former Camp Butner Site, the objectives identified had to be effective, implementable, and economical. The criteria

of effectiveness, implementability and cost were used to evaluate the potential UXO/OE response actions in accordance with USAESCH guidance.

6.2.2 The UXO/OE response action objectives guided the development of alternatives for the former Camp Butner Site and focused the comparison of potential UXO/OE response action alternatives. These objectives also assisted in clarifying the goal of minimizing the explosive risk and achieving an acceptable level of protection to public safety and the human environment. These objectives included:

- Identifying the degree and horizontal and vertical extent of UXO/OE presence;
- Evaluating the effectiveness of various response alternatives;
- Determining the ability to implement various response alternatives; and
- Determining the cost to implement the various response alternatives.

CHAPTER 7

IDENTIFICATION AND ANALYSIS OF UXO/OE RESPONSE ACTION ALTERNATIVES

7.1 INTRODUCTION

7.1.1 In this chapter, UXO response action alternatives are identified and analyzed for the nine AOIs, described in Subchapter 3.5, at the former Camp Butner Site. The alternatives are selected to achieve the UXO response action objectives discussed in Chapter 6. The identification of alternatives for the former Camp Butner Site included two principal groups: intrusive and non-intrusive. Non-intrusive alternatives included: the No DoD Action Indicated (NDAI) and IC alternatives; while intrusive approaches included surface and subsurface UXO clearance activities. This chapter provides a brief, general description of UXO clearance technologies. From this general description, four specific UXO response action alternatives for each sector are introduced and developed.

7.1.2 For each of the UXO response action alternatives identified, an analysis and screening was conducted against the three general categories of effectiveness, implementability, and cost to ensure that they met the minimum standards within each of the three categories. This screening was performed on UXO response action alternatives where UXO risk was identified. The purpose of this screening was to ensure that only viable UXO response alternatives were ranked against each other. Once this screening was completed, the remaining alternatives were compared against each other to identify the most appropriate UXO response action for each sector.

7.2 DESCRIPTION OF UXO CLEARANCE TECHNOLOGIES

7.2.1 Introduction

Various technologies and approaches exist for the clearance of UXO. A UXO clearance operation falls into three distinct areas: detection, recovery, and disposal. A discussion of the techniques used in each of these areas is presented in the following paragraphs.

7.2.2 UXO Detection

7.2.2.1 The detection of UXO includes those methods and instruments that can be used to locate UXO. The selection of the best technology depends on the properties of the UXO to be located, including whether the ordnance is likely to be found on the surface or below the surface and the characteristics of the location where the UXO is located, such as topography, vegetation, and geology.

7.2.2.2 Detection technologies have two basic forms. One form, visual searching, has been successfully used on a number of sites where UXO is located on the ground surface. When performing a visual search of a site, the area to be searched is divided into five-foot lanes that are then, systematically, inspected for UXO. A metal detector is sometimes used to supplement the visual search in areas where ground vegetation may conceal UXO. Typically, any UXO found during these searches is flagged or marked on a grid sheet for later removal.

7.2.2.3 The other form of UXO detection, geophysics, includes a family of detection instruments designed to assist in the location of UXO. This family of instruments includes magnetic instruments, electromagnetic instruments, and ground-penetrating radar. Each piece of equipment has its own inherent advantages and disadvantages based on its operating characteristics, making the selection of the type of geophysical instrument to be used on an UXO survey key to the success of the project. The equipment designed for UXO geophysical surveys is lightweight, easily maintained, and very effective. However, there are limitations to geophysics. Geophysical equipment cannot usually distinguish UXO items from other metallic objects located below the surface. "Cultural interference," such as underground utility lines, construction debris, or ferrous rock can result in a similar signature as UXO/OE. Therefore, it is necessary for the geophysical survey team to carefully document any known cultural interference while in the survey area. Another limitation to the equipment is that metallic objects have to be much larger when at greater depths so that the geophysical equipment can obtain a reading.

7.2.2.4 Various pieces of geophysical equipment were used during the EE/CA field investigation of the former Camp Butner Site. This equipment included the Geonics[®] EM-61 TDMD, Geonics[®] EM-61 MK 2 TDMD and Schonstedt[®] fluxgate magnetometers, as selected during the site-specific geophysical equipment prove-out (Parsons, 2002). While the technical characteristics and operating parameters of each of these pieces of equipment varied greatly, each was found to be effective in the specific application where the equipment was used in the field investigation.

7.2.3 UXO Recovery

7.2.3.1 Once a site has been surveyed by either visual or geophysical means, the recovery of UXO can begin. Recovery operations can take the form of a surface-only clearance of UXO, an intrusive (subsurface) clearance of UXO, or a combination of the two. The decision on the degree of clearance operation (depth and lateral extent) to engage in is based on the nature and extent of the UXO presence as well as the future use of the site.

7.2.3.2 During a surface clearance operation, UXO or suspected UXO on the ground surface, protruding from the ground, or beneath the leaf litter, are identified during the detection phase. Then the UXO are inspected, identified, and transported to a

designated area for cataloging and eventual disposal. If it is determined during the inspection that the item cannot be safely moved, it would be destroyed in place.

7.2.3.3 During a subsurface clearance operation, buried UXO or suspected UXO identified by the geophysical survey or other detection methods requires excavation for removal. Because the actual nature of the buried UXO item cannot be determined without it being uncovered, non-essential personnel evacuations are necessary and may also include the use of engineering controls to ensure the safety of the operation. The excavation of the UXO item then takes place with either hand tools or mechanical equipment depending on the suspected depth of the object. Once the UXO item has been exposed, it is then inspected, identified, and transported to a designated area for cataloging and eventual disposal. If it is determined during the UXO inspection that the item cannot be safely moved, it would be destroyed in place.

7.2.3.4 Evacuations are sometimes necessary when conducting intrusive investigations to minimize the risk of the operation. The evacuation area will be within a predetermined MSD to ensure the safety of the operation. The MSD is initially based on the anticipated type of UXO that may be encountered and is adjusted for the actual identified UXO item prior to demolition activities. All non-essential/non-UXO personnel and the general public must be evacuated from and maintain their distance beyond the MSD during intrusive operations. The MSD may be reduced if appropriate engineering controls are applied, such as sandbag mounds and sandbag walls over and around the potential UXO item. However, evacuations may be required if excavations take place close to inhabited areas and engineering controls cannot reduce the MSD to preclude the need to evacuate. Available options will be explored, as appropriate, to minimize potential evacuations with the exception of compromising public safety.

7.2.4 UXO Disposal

7.2.4.1 Disposal of recovered UXO can take one of three different forms: off-site demolition and disposal; remote, on-site demolition and disposal; and in-place demolition and disposal. The decision regarding which of these techniques to use is based on the risk involved in employing the disposal option, as determined by the specific AOI characteristics and the nature of the UXO recovered.

7.2.4.2 If a UXO item is transported off-site for destruction, the UXO would be transported by either Army personnel or by a qualified UXO subcontractor. The UXO is typically transported to an active military installation where it can be safely destroyed. The transportation of OE is performed in accordance with the provisions of 49 CFR 100-199, TM 9-1300-206, and applicable state and local laws. A Transportation Plan detailing the route and procedures used during the transportation is prepared and approved prior to engaging in any off-site OE transport to ensure all safety aspects of the movement have been addressed. Off-site transportation of OE for destruction was not necessary during this investigation as all items designated as UXO were destroyed in place.

7.2.4.3 If UXO is discovered in proximity to occupied buildings it may not be possible to safely destroy the UXO item in place without the use of engineering controls. If an OE item is safe to move, it can be moved to a remote part of the project site where demolition and disposal can safely take place. A countercharge can be used to destroy the UXO item.

7.2.4.4 Finally, an UXO item may be destroyed in place. This technique is typically employed when the UXO item cannot be safely moved to a remote location or if the UXO items are located in an area that is sufficiently remote. When employing this technique, procedures similar to those described above are used that will detonate the UXO item. When this technique is employed, engineering controls such as sandbag mounds and sandbag walls over and around the UXO item are often used to minimize the blast effects. All UXO recovered at the former Camp Butner Site during the EE/CA were destroyed in place due to safety concerns.

7.3 DESCRIPTION OF UXO/OE RESPONSE ACTION ALTERNATIVES

7.3.1 Introduction

7.3.1.1 The alternatives identified for evaluation were selected based on the results of the characterization activities performed at the former Camp Butner Site. Four alternatives were developed to address the explosive safety risk that remains at the site. These alternatives are as follows:

- Alternative 1 – No DoD Action Indicated (NDAI);
- Alternative 2 – Institutional Controls (ICs);
- Alternative 3 – Surface Clearance of UXO/OE; and
- Alternative 4 – Clearance of UXO/OE to Depth.

7.3.1.2 Implementation of a recurring review program (see Chapter 10) was not evaluated as a separate alternative, but will be an integral part of any alternative. The recurring review program will be used in conjunction with the UXO/OE clearance alternatives. As part of this program, visual surveys will be performed on a proposed schedule to ensure that appropriate site safety and security measures remain in place and the integrity of any site controls is maintained. These visual surveys will also include: inspection of areas within AOIs to determine the effectiveness of the UXO/OE response action alternative implemented. During the periodic inspections, changes in the land uses will be assessed. The visual inspections will occur yearly for the first five years after the selected UXO/OE response action has been completed. After five years, the inspections will continue at a five-year frequency beginning at the end of the first five-year duration and continuing every five years up to 25 years from the completion of UXO/OE response action. If the results of these inspections indicate that the conditions of the AOI have changed significantly, additional actions may be taken to address the public safety

associated with the presence of residual UXO/OE. Chapter 10 of this document provides additional details regarding the recurring review process.

7.3.1.3 Each of the four UXO/OE response action alternatives listed above was developed for each of the nine AOIs within the former Camp Butner Site investigated in this EE/CA. This approach has been taken to ensure that a tailored UXO/OE response action alternative suitable for each AOI was developed based on the identified receptors and varying results of the UXO/OE investigation.

7.3.2 Alternative 1: No DoD Action Indicated

Alternative 1 is for the government to take no action in regards to locating, removing, and disposing of any potential UXO/OE present within a specific AOI at the former Camp Butner Site. The NDAI alternative assumes continued use of the AOI in its present state. If the potential exposure and hazards associated with the AOI are compatible with current and future development in the area as well as the UXO/OE response action objectives, then NDAI may be warranted. Revised Area 5 (comprised of former Area 5 plus most of former Area 1 and all of former Area 2 and former Area 3, as described in Subchapter 3.5.8) is a candidate for NDAI consideration since no UXO/OE was recovered in this AOI during the EE/CA or other prior investigations. It is important to note that the government will respond to any future UXO discovery within the former Camp Butner Site regardless of whether the affected parcel was designated for NDAI. Since either UXO or ordnance-related items were present in all other areas of the site, development of UXO/OE response action alternatives are warranted.

7.3.3 Alternative 2: Institutional Controls

7.3.3.1 Alternative 2, Institutional Controls, would provide a means for the DoD and their representatives to reduce UXO/OE exposure risk to the public through behavior modification resulting from public awareness programs and administrative restrictions, as summarized in Chapter 5 and Appendix F of this report. The IC alternative can be used in combination with other UXO/OE response actions or in cases where it may not be possible or practical to physically clear UXO/OE from the AOI. Successful implementation of IC is contingent on the cooperation and active participation of the existing powers and authorities of other government agencies to protect the public from UXO/OE risks.

7.3.3.2 IC strategies such as access control, public awareness programs, or a combination of strategies can be used to complement UXO/OE response actions and manage risk. It is important to understand that the UXO/OE risk is associated with three causative factors that, if any of these three factors is completely avoided, would prevent an UXO/OE-related accident. These three factors are: presence, access, and behavior. If there is no presence of ordnance within the AOI, then there is no possibility of an UXO/OE-related accident. If ordnance exists within the AOI, but people do not have access, then there will be no UXO/OE accident. Even if ordnance exists within the AOI and people have access to the ordnance, if their behavior is appropriate, then there will be

no UXO/OE accident. An accident requires all three events or circumstances to be present. No UXO/OE accident can happen if any one causative factor is missing. Each factor provides the basis for a separate implementation strategy.

7.3.3.3 Behavior modification is an IC that relies on the personal responsibility of the property user. Even if the UXO/OE exists and there is open access to it, there is minimal risk if suitable behavior is observed. Appropriate behavior requires an understanding of the situation and voluntary reaction in a responsible manner. Aside from development in the Town of Butner, land use within the former Camp Butner Site is typified by agriculture and forestland. Much of this land, both private and state owned, is included in the managed State Game Lands system and is used by hunters. Mechanisms may be implemented that modify the behavior of hunters; however, enforcement may present a challenge. The power of the federal government is limited in any situation where local enforcement is available. Therefore, the local authorities must be convinced that the risks are sufficient to warrant their participation. The concept of behavior modification through public awareness extends to agencies that have jurisdiction over the property within the former Camp Butner Site. Some behaviors that must be modified may belong to the local government. The full Institutional Analysis Plan for the former Camp Butner Site is provided in Appendix F.

7.3.4 Alternative 3: Surface Clearance of UXO/OE

7.3.4.1 Alternative 3 entails implementation of a surface clearance of UXO/OE. Surface clearance would be completed by experienced UXO-qualified personnel who would visually search the ground surface for any UXO/OE. In addition, UXO-qualified personnel would also use metal detection devices for screening to ensure that any UXO/OE items that may be present under the existing ground cover (leaves and vegetation) are located during the sweep. The UXO-qualified personnel would perform the sweep in fixed width intervals depending on the sweep reach of the type of metal detection equipment used, to ensure complete surface coverage. All metallic contacts on the ground surface would then be visually identified.

7.3.4.2 Any UXO/OE located during the sweep would be inspected to ensure its stability. During this inspection, a determination would be made whether the uncovered UXO/OE item could be moved. If a determination is made that the item is UXO, then it would be destroyed in place. Otherwise, removal of the item to a remote location for onsite destruction and disposal may be considered. If necessary, engineering controls would be used to minimize the need for evacuation of the public. All inert ordnance-related scrap would be removed from the area and transported offsite for disposal.

7.3.5 Alternative 4: Clearance of UXO/OE to Depth

7.3.5.1 Alternative 4 includes clearance of UXO/OE to depth. The removal depth is AOI-specific and defined based on consideration of the depths of the EE/CA findings, types of ordnance found and associated known maximum penetration depth, frost heave (4 inches, see Subchapter 2.2.3), and the current and future land use. This alternative

would be implemented in one of two scenarios. One scenario would include the surface clearance of UXO/OE as described in Subchapter 7.3.4 but inclusive of real-time “mag and dig” excavation of subsurface anomalies (to a predetermined maximum depth) otherwise excluded from the surface clearance option. The second scenario would utilize DGM of the entire site followed by intrusive investigation of selected anomalies. In this manner the excavation activities would focus only on those anomalies displaying characteristics of suspect ordnance in an effort to reduce excavation of smaller inert metallic debris that could otherwise not have been discriminated in Scenario 1 above. Similar to Scenario 1 the maximum excavation depth would be determined by AOI-specific considerations.

7.3.5.2 For implementation of this alternative, land surveying and brush clearing operations would be necessary. A professional land surveyor (aided by a UXO-qualified individual performing visual UXO/OE avoidance) would establish control points for the areas that require clearance, as well as establish a contiguous grid network system. Brush clearing crews would clear enough undergrowth so that the UXO/OE clearance crews could adequately perform their work. Geophysical instruments would be used to conduct the subsurface survey whether real-time “mag and dig” or DGM is implemented.

7.3.5.3 This alternative includes the intrusive investigation of surface and subsurface metallic anomalies identified during the metal detection survey to determine their exact nature. Engineering controls may have to be used to decrease the evacuation distance that would be required during the conduct of these investigations. Evacuation distances are determined by USAESCH based on the Most Probable Munition (MPM) or worst-case scenario for the potential detonation of an ordnance item that could be found at the site (or within the AOI). All non-essential personnel are evacuated based on this distance to maximize the safety of the operation. During the intrusive investigation, each selected anomaly is excavated until the source of the geophysical instrument reading is identified or until a predetermined clearance depth has been reached. Once the UXO/OE item is identified, the MSD may be adjusted accordingly for demolition operations.

7.4 INTRODUCTION OF SCREENING CRITERIA

7.4.1 In the EE/CA process, the alternatives described above are analyzed and screened against the three general categories of effectiveness, implementability, and cost to ensure that they meet the minimum standards of the criteria within each category. This screening was performed for all four alternatives identified above for each AOI individually within the former Camp Butner Site. The three general categories are described below along with the specific evaluation criteria contained within each of the categories.

7.4.2 The effectiveness of an alternative refers to its ability to meet the clean-up objective within the scope of the UXO/OE response action. The effectiveness category is divided into four evaluation criteria. These include Overall Protection of Public Safety

and the Human Environment; Compliance with ARARs (Table 7.1); Long-Term Effectiveness; and Short-Term Effectiveness.

7.4.3 The implementability category includes the technical and administrative feasibility of implementing an alternative, the availability of various services and materials required during its implementation, and the acceptance of local residents and agencies. The implementability category is divided into six evaluation criteria including: Technical Feasibility; Administrative Feasibility; Availability of Services and Materials; Property Owner Acceptance; Local Agency Acceptance; and Community Acceptance.

7.4.4 Finally, each alternative is evaluated to estimate the overall implementation cost. Included in the cost calculation is an estimate as to the amount of time that will be necessary to complete the proposed alternative. Each of the evaluation criteria introduced above will be discussed in greater detail in the following paragraphs.

7.4.1 Effectiveness

7.4.1.1 **Overall Protection of Public Safety and the Human Environment:** Alternatives are evaluated under this criterion on how well they achieve and maintain protection of public safety and the human environment. A qualitative risk assessment process known as OE RIA is applied in evaluating this criterion, as described in Chapter 4. At this stage of the EE/CA, the OE RIA analysis consists of a qualitative evaluation of whether the alternative will have an impact on the potential for harm and the level of protectiveness at the AOI if the alternative is implemented, as compared to the existing or baseline condition. The evaluation is based on the ten factors used in the OE RIA presented in Chapter 4. Tables 7.2 through 7.10 present the evaluation of the OE RIA risk factors at each AOI for the four alternatives identified.

7.4.1.2 **Compliance with ARARs:** Evaluation under this criterion ensures that all requirements can be met without regulatory problems. The assessment may also include the to-be-considered (TBC) criteria. The applications of ARARs for each alternative will primarily focus on what ARARs apply as well as how they will be met.

7.4.1.3 Section 121(d)(1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), requires that remedial actions must attain a degree of cleanup that assures protection of human health and the environment. Moreover, all potential ARARs must be outlined. ARARs include federal standards, requirements, criteria, and limitations under state environmental or facility siting regulations that are more stringent than federal standards.

7.4.1.4 Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, USEPA's policy for response actions is that ARARs will be identified and attained to the extent practicable. Three factors were

applied to determine whether identifying and attaining ARARs at the former Camp Butner Site was practical in a particular removal situation. These factors included:

- The exigencies of the situation;
- The scope of the potential UXO/OE response action to be taken; and
- The effect of ARAR attainment on the statutory limits for potential response action duration and cost.

7.4.1.5 ARARs were identified on a site-specific basis and involved a two-part analysis: first, a determination was made whether a given requirement was applicable; then if it was not applicable, a determination was made of whether it was nevertheless both relevant and appropriate. When this analysis resulted in a determination that a requirement was both relevant and appropriate, such a requirement was complied with to the same degree as if it were applicable.

7.4.1.6 "Applicable" requirements are those cleanup standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, remedial action, location, or other circumstance at a remedial action site. "Relevant and appropriate" requirements are cleanup standards and control standards, and the substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to ordnance, a remedial action, the location, or other circumstance at a remedial action site, address problems or situations sufficiently similar to those encountered at a site to where their use is well-suited.

7.4.1.7 Three categories of ARARs have generally been used in ordnance projects: chemical-specific, location-specific, and action-specific. According to the NCP, chemical-specific ARARs are usually health or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Location-specific ARARs generally are restrictions placed upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations. Some examples of special locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats. Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to hazardous wastes, or requirements to conduct certain actions to address particular circumstances at a site. Table 7.1 summarizes the ARARs identified for the former Camp Butner Site.

7.4.1.8 Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of potential ARARs. However, these TBC criteria may be used in determining the necessary level of cleanup for protection of public safety and the human environment. Potential ARARs and TBCs for each of the three

categories (i.e., chemical-specific, location-specific, and action-specific) are listed in Table 7.1 and discussed in the following paragraphs.

7.4.1.9 No chemical-specific ARARs or TBCs were identified for the potential UXO/OE response actions that may be applicable at the former Camp Butner Site. Removal of UXO is the primary concern of this EE/CA and not residual contamination that may have occurred due to ordnance burial, detonation, or disposal. After selected UXO/OE response actions are implemented, an evaluation of potential chemical contamination, if warranted, will be conducted as part of an environmental investigation.

7.4.1.10 The EE/CA investigation at the former Camp Butner Site has been managed pursuant to CERCLA and the NCP. The NCP regulations require that all removal actions or investigations on the site comply with the substantive requirements of federal, state, and local regulations. However, administrative permitting procedures are not required.

7.4.1.11 There are five potential location-specific ARARs that have been identified for review prior to implementation of an UXO/OE response action at an AOI within the former Camp Butner Site. These include the National Historic Preservation Act (NHPA), Protection of Wetlands, Endangered Species Act (ESA), Protection of Archaeological Resources, and Preservation of American Antiquities.

7.4.1.12 The ASR indicated archaeological findings from all eras of the regional prehistoric-early historic period in the piedmont (USACE, 1997). Prior coordination with the North Carolina State Historic Preservation Office has been conducted by CESAW and Parsons to ensure compliance with all relevant state and/or local historic preservation legislation. Through the process, no significant resources were identified.

7.4.1.13 Current information regarding endangered, threatened, and protected species was compiled for Durham, Granville, and Person counties using the U.S. Fish and Wildlife Service ESA List (updated 02/18/2003) and the North Carolina Natural Heritage Program (NCNHP), Divisions of Parks and Recreation, Department of Environmental and Natural Resources List (updated May 2003). The information provided included ten vertebrate animal species (two bird, one reptile, four fish, and three amphibians) and nine invertebrate animal species that potentially occur in the local area. Federal and State agencies identified the following information concerning threatened and endangered species:

- The following species of vertebrates occur within Durham, Granville, and Person counties with the status of Federal Species of Concern (FSC) under the ESA or as a Species of Special Concern (SC) or Significantly Rare (SR) under the NCNHP Plant Protection and Conservation Act (PPCA): Roanoke bass (*Ambloplites cavifrons*) – SC; Pinewoods shiner (*Lythrurus matutinus*) – FSC, SC; four-toed salamander (*Hemidactylium scutatum*) – SC; and the Neuse River waterdog (*Necturus lewisi*) - SC.

The following species occur within Durham and Granville counties: Carolina darter (*Etheostoma collis lepidinion*) – FSC, SC and Timber Rattlesnake (*Crotalus horridus*) – SC. The following species occurs in Durham county: Carolina madtom (*Noturus furiosus*) – SC. The following species occurs in Granville county: Loggerhead Shrike (*Lanius ludovicianus*) – SC. The following species occurs in Person county: mole salamander (*Ambystoma talpoideum*) – SC.

- The only vertebrate species that has Federal status as Threatened under the ESA and Threatened status under the NCNHP PPCA in the project area is the Bald Eagle (*Haliaeetus leucocephalus*) occurring within Durham and Granville counties.
- The only invertebrate species that has Federal status as Endangered under the ESA and Endangered status under the NCNHP PPCA in the project area is the Dwarf Wedgemussel (*Alasmodonta heterodon*) occurring in Granville county. There are eight invertebrates (all mollusks) listed as endangered or threatened by the NCNHP PPCA within one or more of Granville, Durham, or Person counties. Additional information regarding the NCNHP listed threatened and endangered species can be found at the website <http://www.nc-es.fws.gov/es/es.html>.

7.4.1.14 The action-specific TBC, AR 385-64 requires that safety measures be taken for the handling of explosive ordnance. Moreover, DoD 6055.9-STD requires that specialized personnel be employed to detect, remove, and dispose of ordnance. This standard also defines safety precautions and procedures for detonation or disposal of ordnance. The TBCs and ARARs that define excavation, disposal, and transportation requirements of OE are summarized in Table 7.1.

7.4.1.15 **Long Term Effectiveness:** This criterion measures how an alternative maintains the protection of human health and the environment after the UXO/OE response action objective has been met. The long-term effectiveness focuses on:

- the permanence of the UXO/OE response action alternative;
- the magnitude of residual risk following completion of the UXO/OE response action; and
- the adequacy and reliability of controls, if any, used to manage the treated residuals or untreated wastes that remain at the site following the UXO/OE response action.

7.4.1.16 **Short-Term Effectiveness:** This criterion addresses the effects of an alternative during the implementation phase. Alternatives are evaluated for their effects on human health and the environment prior to the UXO/OE response action objectives being met. More specifically, each alternative will be examined for:

- protection of the community and workers during the UXO/OE response action;
- adverse impacts resulting from construction and implementation; and
- the time required to meet the UXO/OE response objectives.

7.4.2 Implementability

7.4.2.1 **Technical Feasibility:** This criterion evaluates the ease of implementing a specific alternative. The analysis of the technical feasibility for each course of action focuses on difficulties in:

- the operation and construction of the UXO/OE response action;
- the reliability of the UXO/OE response action in relation to implementation; and
- the need and ease of conducting future UXO/OE removal actions/requirements following the initial undertaking.

7.4.2.2 **Administrative Feasibility:** This criterion focuses on the planning for a course of action. The evaluation of this criterion considers difficulties in:

- obtaining permits applicable to a proposed alternative;
- coordinating services needed to carry out an alternative; and
- arranging the delivery of services in a timely manner.

7.4.2.3 **Availability of Services and Materials:** This criterion primarily deals with the availability of services needed to carry out an alternative. Two issues are of primary importance under this criterion:

- convenient delivery of services and materials; and
- availability and timeliness of the quantities needed to implement the UXO/OE response action.

7.4.2.4 **Property Owner Acceptance:** Each of the alternatives will have a varying degree of impact on the future use of the area. As a result, each alternative is rated based on the degree of acceptance expressed by the current property owner, as identified during the IA (Appendix F). The majority of the land at the former Camp Butner Site is privately owned, with the remainder owned by State and Federal agencies.

7.4.2.5 **Local Agency Acceptance:** Each alternative is rated based on the degree of acceptance expressed by local, county and state environmental government agencies towards the various alternatives examined in the analysis, as identified during the IA (Appendix F).

7.4.2.6 Community Acceptance: Each alternative is rated based on the degree of acceptance expressed by local community members toward each of the UXO/OE response actions that are being analyzed, as identified during the IA (Appendix F).

7.4.3 Cost

As the scope of work for each alternative is developed, a cost estimate is calculated for costs associated with the implementation of each response action alternative. These costs include the direct and indirect capital costs incurred in implementing the UXO/OE response action alternative. The cost estimates are presented in Chapter 8.

7.5 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 1A

Intrusive results from the EE/CA investigation of Area 1A identified two UXO items (Mk II hand grenade and M1 practice anti-tank landmine with spotting charge and fuze) recovered at depths of 1 inch and 10 inches, respectively. A total of five OE scrap items (all inert and expended M15 grenades) were recovered at depths ranging from ground surface to one inch. All other anomalies were encountered within one foot of ground surface with the majority at depths less than six inches bgs. A summary of the UXO items recovered during the EE/CA investigation for each AOI is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C. Detailed descriptions and photographs of ordnance items are presented in Appendix E.

7.5.1 Alternative 1: No DoD Action Indicated

7.5.1.1 Effectiveness

During the EE/CA investigation, two UXO items were recovered from Area 1A. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment at any of these areas (see Table 7.2). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.5.2 Alternative 2: Institutional Controls

7.5.2.1 Effectiveness

7.5.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. It should be noted; however, that a reduction in the number of exposures (although unquantifiable) will result from the site-specific IC (fencing) for this area. The short-term and long-term effectiveness criteria are met in this alternative for the area discussed in this chapter, although the risk is not quantifiably reduced (see Table 7.2). It is important to note that the government will respond to any future UXO discovery that may occur within Area 1A.

7.5.2.1.2 The following *site-wide* ICs were recommended in Subchapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.5.2.1.3 In addition to site-wide ICs, a site-specific IC (fencing) is applicable in Area 1A due to the relatively localized extent of UXO/OE present and limited acreage of the site (approximately 20 acres). This IC will require the construction of a boundary fence that will encompass the entire area in order to restrict public access to this property permanently or until a clearance action has occurred.

7.5.2.2 Implementability

Implementation of the site-wide and site-specific ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.5.2.3 Cost

The estimated cost for construction of a perimeter fence to prohibit public access is \$30,400 – \$38,000. This cost is based on installation of approximately 3,800 linear feet (20 acres) of standard eight-foot chain-link fence, inclusive of two access gates. The cost to perform site-wide IC is presented in Subchapter 8.4.

7.5.3 Alternative 3: Surface Clearance of UXO/OE

7.5.3.1 Effectiveness

7.5.3.1.1 Two UXO findings were made during the EE/CA investigation in Area 1A, neither of which was located on the ground surface. Of the 7 OE scrap items recovered from the 98 anomalies intrusively investigated within this AOI only one (expended M15 smoke grenade) was located on the ground surface. However, all UXO and OE scrap items were recovered from depths 10 inches or less bgs. Completion of the Surface Clearance alternative for Area 1A will not provide significant protection to public safety and the human environment since the site conditions (minimal understory and eroded washes) suggest any surface residual UXO or OE scrap would likely have been picked up over the last 60 years. The short-term and long-term effectiveness criteria are also not met in this alternative for the area (see Table 7.2).

7.5.3.1.2 As described in Subchapter 3.5.1, Area 1A was designated as a flamethrower training range. Its proximity to the main base camp precludes the range from being utilized as an impact range. Frequently training ranges served dual purposes. Based on the intrusive findings from Area 1A, the most commonly found ordnance type was a hand grenade, which typically is hand thrown and not expected to penetrate significantly beyond the ground surface. Similarly, the second UXO item (M1 practice

landmine with spotting charge and fuze) was recovered relatively shallow at 10 inches bgs. However, in light of intrusive findings, the likelihood of residual (practice landmines and grenades) UXO deeper than ground surface is anticipated. Therefore, this alternative would not be effective long-term because it would not permanently remove the majority of the residual UXO/OE suspected at the AOI. Therefore, further analysis of this alternative will not be performed (Table 7.2).

7.5.4 Alternative 4: Clearance of UXO/OE to Depth

7.5.4.1 Effectiveness

7.5.4.1.1 Two UXO findings were made during the EE/CA investigation in Area 1A, neither of which was located on the ground surface. Of the five OE scrap items recovered from the 98 anomalies intrusively investigated within this AOI only one (expended M15 smoke grenade) was located on the ground surface. However, all UXO and OE scrap items were recovered from depths 10 inches or less bgs. Completion of the Subsurface Clearance alternative (to a depth of one foot bgs) for Area 1A will provide significant protection to public safety and the human environment based on the vertical distribution of UXO and OE scrap identified during the EE/CA. The short-term and long-term effectiveness criteria are also met in this alternative for the area (see Table 7.2).

7.5.4.1.2 As described in Subchapter 3.5.1, Area 1A was designated as a flamethrower training range. Its proximity to the main base camp precludes the range from being utilized as an impact range. Frequently training ranges served dual purposes. Based on the intrusive findings from Area 1A, the most commonly found ordnance type was a hand grenade, which typically is hand thrown and not expected to penetrate beyond ground surface. Similarly, the second UXO item (M1 practice landmine with spotting charge and fuze) was recovered relatively shallow at 10 inches bgs. However, in light of intrusive findings, the likelihood of residual (practice landmines and grenades) UXO deeper than ground surface is anticipated. Therefore, this alternative would be effective long-term because it would permanently remove the majority of the residual UXO/OE suspected at the AOI.

7.5.4.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative would be implemented as described in Subchapter 7.3.5 for Scenario 1 ("mag and dig" technique). Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. In addition, Area 1A is entirely owned by the State of North Carolina and other government agencies. Input received from these stakeholders as a part of the public response period for this EE/CA report was incorporated into this final report.

7.5.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.6 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4A

Intrusive results from the EE/CA investigation of Area 4A identified one UXO item (2.36-inch HE bazooka rocket) recovered at a depth of 3 inches. OE scrap items excavated from this area consisted predominantly of remnants from 2.36-inch rockets, with one OE scrap item identified as an M9 rifle grenade fragment. A total of 20 OE scrap items were recovered from Area 4A at depths ranging from surface to 6 inches. A summary of the UXO/OE items recovered during the EE/CA investigation is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.6.1 Alternative 1: No DoD Action Indicated

7.6.1.1 Effectiveness

During the EE/CA investigation, UXO was recovered from Area 4A. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment in this area (see Table 7.3). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.6.2 Alternative 2: Institutional Controls

7.6.2.1 Effectiveness

7.6.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable, some reduction in the number of exposures will result. For Area 4A, no site-specific IC components were identified as viable. The short-term and long-term effectiveness criteria for site-wide IC are met in this alternative, although the risk is not reduced (see Table 7.3). It is important to note that the government will respond to any future UXO discovery that may occur in Area 4A.

7.6.2.1.2 The following *site-wide* ICs were recommended in Chapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.6.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.6.2.3 Cost

The cost to perform this alternative is presented in Subchapter 8.4.

7.6.3 Alternative 3: Surface Clearance of UXO/OE

7.6.3.1 Effectiveness

7.6.3.1.1 Completion of the Surface Clearance alternative for Area 4A would likely provide some protection to public safety and the human environment. The short-term and long-term effectiveness criteria are also met in this alternative (see Table 7.3). A surface clearance of 34 acres would be conducted by qualified UXO clearance personnel, as described in Subchapter 7.3.4. Overall results from the EE/CA investigation identified no surface UXO but numerous surface OE scrap was present. The recovered UXO item and all OE scrap items were all encountered within 6 inches of ground surface.

7.6.3.1.2 Based on the vertical extent of UXO and OE scrap recovered during this EE/CA investigation, this alternative would be effective long-term because it permanently removes a portion of the residual UXO/OE suspected at this AOI. However, no clearance can ever assure complete removal of all UXO/OE with the current level of available technology and the EE/CA findings suggest UXO is likely present in the subsurface. In consideration of future land use plans (residential development) in Area 4A, this alternative would provide some increased overall protection of public safety and the human environment. Thus, the Surface Clearance alternative meets the criteria in the Effectiveness category and further analysis will be performed.

7.6.3.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative will be implemented as described in Subchapter 7.3.4. Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4A was owned by a single private landowner but has recently been parceled and sold to additional private owners for new residential construction. Input received from these stakeholders as a part of the public response period for this EE/CA report was incorporated into this final report.

7.6.3.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.6.4 Alternative 4: Clearance of UXO/OE to Depth

7.6.4.1 Effectiveness

7.6.4.1.1 Completion of the Subsurface Clearance alternative for Area 4A would likely provide significant protection to public safety and the human environment. The short-term and long-term effectiveness criteria are also met in this alternative (see Table

7.3). There is a high likelihood that UXO/OE items are present in the subsurface based on the depths of recovery of UXO and OE scrap items during the EE/CA in Area 4A. A subsurface clearance of 34 acres would be conducted by qualified UXO clearance personnel, as described in Subchapter 7.3.5 Overall results from the EE/CA investigation identified no surface UXO but numerous surface OE scrap was present. The recovered UXO item and all OE scrap items were all encountered within 6 inches of ground surface.

7.6.4.1.2 This alternative includes clearance to depth for a total of 34 acres. The clearance removal would be conducted for items identified between the surface and a predetermined depth influenced by the anticipated types of UXO (2.36-inch bazooka rockets) and recovery depths of ordnance related items. The UXO recovered with the greatest potential for depth of penetration is the 2.36-inch bazooka rocket. Studies conducted at the Jefferson Proving Ground estimated the maximum penetration depth for a 2.36-inch rocket at six inches. Based on this information, and considering the EE/CA findings and impending residential development, a clearance depth of 12 inches bgs would be effective in mitigating the majority of the explosive safety hazard. Therefore, this alternative would provide significant protection to public safety and the human environment. In addition, considering the imminent residential development, UXO construction support is warranted and should be provided to the property owners at their request (provided funds are available). As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.6.4.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. Implementation of this alternative is preferred using the technique described in Subchapter 7.3.5 for Scenario 2 (DGM followed by anomaly selection technique) because of the relatively level terrain and single anticipated UXO type. In this manner the excavation activities would focus only on those anomalies displaying characteristics of suspect ordnance (2.36-inch bazooka rocket) in an effort to reduce excavation of smaller inert metallic debris that could otherwise not have been discriminated in Scenario 1 ("mag and dig" technique). Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4A is entirely owned by private landowners. Input received from these stakeholders as a part of the public response period for this EE/CA report was incorporated into this final report.

7.6.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.7 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4B

Intrusive results from the EE/CA investigation of Area 4B identified one UXO item (2.36-inch HE bazooka rocket) recovered from a depth of 18 inches. Four OE scrap items identified as undistinguishable HE projectile fragments were excavated at depths between 2 inches and 6 inches bgs. A summary of the UXO/OE items recovered during the EE/CA investigation for Area 4B is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.7.1 Alternative 1: No DoD Action Indicated

7.7.1.1 Effectiveness

During the EE/CA investigation, one UXO item was recovered from Area 4B. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment in this area (Table 7.4). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.7.2 Alternative 2: Institutional Controls

7.7.2.1 Effectiveness

7.7.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable, some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative for Area 4B, although the risk is not reduced (Table 7.4). It is important to note that the government will respond to any future UXO discovery within Area 4B.

7.7.2.1.2 The following *site-wide* ICs were recommended in Subchapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.7.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.7.2.3 Cost

The cost to perform this alternative is presented in Subchapter 8.4.

7.7.3 Alternative 3: Surface Clearance of UXO/OE

7.7.3.1 Effectiveness

One UXO finding (2.36-inch HE bazooka rocket) was made during the EE/CA investigation in Area 4B at a depth of 18 inches bgs. Similarly, OE scrap items were also identified in the subsurface. Of the four OE scrap items recovered from the 42 anomalies intrusively investigated within this AOI none were located on the ground surface. However, all UXO and OE scrap items were recovered from depths of 18 inches or less bgs. Unlike Area 4A, completion of the Surface Clearance alternative for Area 4B will not provide additional protection to public safety and the human environment since the AOI conditions (regularly tilled agricultural land) suggest any surface residual UXO or OE scrap would likely have been previously encountered over the last 60 years. The short-term and long-term effectiveness criteria are also not met in this alternative for the area (see Table 7.4). Therefore, this alternative would not be effective long-term because it would not permanently remove the residual UXO/OE suspected at the AOI. Therefore, further analysis of this alternative will not be performed (Table 7.4).

7.7.4 Alternative 4: Clearance of UXO/OE to Depth

7.7.4.1 Effectiveness

7.7.4.1.1 The Clearance to Depth alternative for Area 4B will provide the level of removal for this AOI to achieve significant protection to public safety and the human environment. The short-term and long-term effectiveness criteria are met in this alternative (Table 7.4). The UXO item found was recovered at a depth of 18 inches bgs.

7.7.4.1.2 This alternative includes clearance to depth for a total of 10 of the 20 acres within the AOI which is regularly farmed. The balance of the property supports two residential dwellings and forest. The primary property owner has indicated that there are no plans for expanding the agricultural portion of his property nor the residence.

7.7.4.1.3 The subsurface clearance (within the 10 acres) would be conducted for items identified between the surface and a predetermined depth influenced by the type of UXO and recovery depths of ordnance related items. In Area 4B, the UXO recovered was identified as a 2.36-inch rocket, and would not typically be expected to penetrate to the depth at which it was recovered (Jefferson Proving Ground). Taking into account the type and the recovery depths (6 inches or less) of the OE scrap items found at this AOI, residual UXO at depths of 18 inches would appear atypical. In determining the depth of clearance, intrusive farming practices were assessed. In particular, the invasive process of soil tilling which is penetrative to the depth of the tiller tines. The primary property owner indicated that for this AOI, tilling is known to penetrate 10 inches bgs. Therefore a clearance depth of 18 inches will effectively mitigate the exposure pathway most likely to be encountered by tilling associated with the current and future anticipated land use. This alternative will provide significant protection to public safety and the human environment. As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.7.4.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. Implementation of this alternative is preferred using the technique described in Subchapter 7.3.5 for Scenario 2 (DGM followed by anomaly selection technique) because of the relatively level terrain and single anticipated UXO type. In this manner the excavation activities would focus only on those anomalies displaying characteristics of suspect ordnance (2.36-inch bazooka rocket) in an effort to reduce excavation of smaller inert metallic debris that could otherwise not have been discriminated in Scenario 1 ("mag and dig" technique). Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4B is entirely owned by two private landowners. Input received from the property owners as a part of the public response period for this EE/CA report was incorporated into this final report.

7.7.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.8 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4C

Intrusive results from the EE/CA investigation of Area 4C identified one UXO item as an unfuzed 105mm HE projectile recovered from 3 inches bgs. A total of 313 OE scrap items were recovered from depths ranging from 1 inch to 30 inches bgs. A large amount (approximately 259 lbs) of the OE scrap was identified as heavy artillery HE fragments. A summary of the UXO/OE items recovered during the EE/CA investigation is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.8.1 Alternative 1: No DoD Action Indicated

7.8.1.1 Effectiveness

During the EE/CA investigation, one UXO item was recovered (unfuzed 105mm HE projectile) from Area 4C. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment in this area (Table 7.5). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.8.2 Alternative 2: Institutional Controls

7.8.2.1 Effectiveness

7.8.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable,

some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative for the area discussed in this chapter, although the risk is not reduced (Table 7.5). It is important to note that the government will respond to any future UXO discovery within Area 4C.

7.8.2.1.2 The following *site-wide* ICs were recommended in Subchapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.8.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.8.2.3 Cost

The cost to perform this alternative is presented in Subchapter 8.4.

7.8.3 Alternative 3: Surface Clearance of UXO/OE

7.8.3.1 Effectiveness

One UXO finding was made during the EE/CA investigation in Area 4C at a depth of 3 inches bgs. Of the 313 OE scrap items recovered from the 442 anomalies intrusively investigated within this 126-acre AOI, approximately 25% were on the surface. During the EE/CA investigation, OE scrap items were recovered from depths up to 30 inches; indicative of the potential presence of UXO at similar depths. Completion of the Surface Clearance alternative for Area 4C would provide minimal additional protection to public safety and the human environment. The short-term and long-term effectiveness criteria are also met (Table 7.5). As described in Subchapter 3.5.5, Area 4C lies within the primary impact/target area (inclusive of the Mock German Village target) for several former ranges utilizing heavy artillery. These type projectiles tend to have significant penetration depths and are not frequently present on the ground surface. A surface clearance of the entire 126 acres comprising Area 4C would do little, if anything, to reduce the presence of residual UXO within the AOI. Therefore, further analysis of this alternative will not be performed (Table 7.5).

7.8.4 Alternative 4: Clearance of UXO/OE to Depth

7.8.4.1 Effectiveness

7.8.4.1.1 The Clearance to Depth alternative for Area 4C will provide the level of removal for this AOI to achieve significant protection to public safety and the human environment. The short-term and long-term effectiveness criteria are met in this alternative (Table 7.5). The likelihood exists that subsurface UXO/OE items are present

based on the type and depths of UXO and OE scrap items recovered during the EE/CA and recovered by one of the property owners in Area 4C. Two projectiles (one 105mm and one 155mm) were reported to local authorities during the time of the EE/CA investigation (Subchapter 3.5.5).

7.8.4.1.2 Due to the existence of 8 residential dwellings and potential for future residential development in the southern portion of Area 4C (30 acres), the most effective alternative that would significantly reduce the exposure pathway is the Clearance to Depth. The clearance removal would be conducted for items identified between the surface and a predetermined depth influenced by the type of UXO and recovery depths of ordnance related items. The UXO recovered with the greatest potential for depth of penetration is the 155mm projectile. Based on the deepest penetrating ordnance type and taking into account the recovery depths of UXO and OE scrap, a clearance depth of 48 inches would effectively mitigate the explosive safety hazard. This approach would involve an initial surface clearance in an effort to mitigate surface debris, which will then be followed by DGM survey coverage (Subchapter 7.3.5, Scenario 2). The digital geophysical data will then be analyzed and evaluated, and suspect anomalies will be intrusively investigated down to 48 inches bgs. Therefore this alternative will provide significant protection to public safety and the human environment. In addition, considering the potential for additional residential development, UXO construction support is warranted and should be provided to the property owners at their request (provided funds are available). As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.8.4.1.3 Subsurface removal action is not warranted for the undeveloped portions of the AOIs (approximately 96 acres) given the incomplete exposure pathway. If development of this area for additional residential use or for commercial logging becomes evident in the future, UXO support is recommended (if funds are available).

7.8.4.2 Implementability

7.8.4.2.1 This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative would be implemented as described in Subchapter 7.3.5 for Scenario 2 (DGM followed by anomaly selection technique). In this manner the excavation activities would focus only on those anomalies displaying characteristics of suspect ordnance (heavy artillery) in an effort to reduce excavation of smaller inert metallic debris that could otherwise not have been discriminated in Scenario 1 ("mag and dig" technique). In the interim, a TCRA is recommended for a portion of one of the residential properties within the AOI. This approximately 5-acre parcel contained the two HE projectile (105mm and 155mm) findings and the property owner has indicated plans for both a garden and construction of out buildings.

7.8.4.2.2 Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE

risk. Area 4C is owned by several private landowners. Input received from the property owners as a part of the public response period for this EE/CA report was incorporated into this final report.

7.8.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.9 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4D

Intrusive results from the EE/CA investigation of Area 4D identified one UXO item as a 37mm projectile recovered at a depth of 2 inches bgs. A total of 27 OE scrap items were recovered from depths between surface and 10 inches. A summary of the UXO/OE items recovered during the EE/CA investigation is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.9.1 Alternative 1: No DoD Action Indicated

7.9.1.1 Effectiveness

During the EE/CA investigation, one UXO item was recovered from within the 453 acres comprising Area 4D. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment at this area (Table 7.6). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.9.2 Alternative 2: Institutional Controls

7.9.2.1 Effectiveness

7.9.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable, some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative for the area discussed in this chapter, although the risk is not reduced (Table 7.6). It is important to note that the government will respond to any future UXO discovery that may occur in Area 4D.

7.9.2.1.2 The following *site-wide* ICs were recommended in Chapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.9.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.9.2.3 Cost

The cost to perform this alternative is presented in Subchapter 8.4.

7.9.3 Alternative 3: Surface Clearance of UXO/OE

7.9.3.1 Effectiveness

One UXO finding (37mm HE projectile) was made during the EE/CA investigation in Area 4D at a depth of 2 inches bgs. Similarly, OE scrap items were also identified in the subsurface. Of the 27 OE scrap items recovered from the 99 anomalies intrusively investigated within this AOI few were located on the ground surface. However, all UXO and OE scrap items were recovered from depths of 10 inches or less bgs. Completion of the Surface Clearance alternative for Area 4D will not provide additional protection to public safety and the human environment since the AOI conditions (combination of regularly tilled agricultural and forested land) suggest any surface residual UXO or OE scrap would likely have been previously encountered over the last 60 years. During the EE/CA investigation, OE scrap item was recovered from depths up to 10 inches, which suggests there is a potential for residual UXO at similar depths. The short-term and long-term effectiveness criteria are also not met in this alternative for the area (see Table 7.6). Therefore, this alternative would not be effective long-term because it would not permanently remove the residual UXO/OE suspected at the AOI. Therefore, further analysis of this alternative will not be performed (Table 7.6).

7.9.4 Alternative 4: Clearance of UXO/OE to Depth

7.9.4.1 Effectiveness

7.9.4.1.1 The Clearance to Depth alternative for Area 4D will provide a level of removal for this AOI to achieve significant protection to public safety and the human environment. The short-term and long-term effectiveness criteria are met in this alternative (Table 7.6). There is a high likelihood that UXO/OE items are present in the subsurface based on the depths of recovery of UXO and OE scrap items during the EE/CA in Area 4D.

7.9.4.1.2 This alternative includes clearance to depth for a total of 453 acres. The clearance removal would be conducted for items identified between the surface and a predetermined depth influenced by the anticipated types of UXO (37mm-155mm projectiles) and recovery depths of ordnance related items. The UXO recovered with the greatest potential for depth of penetration is the 155mm projectile. Based on the ordnance type with the greatest penetration depth potential and taking into account the recovery depths of OE scrap, a clearance depth of 24 inches would be effective in mitigating the majority of the explosive safety hazard. Therefore this alternative will provide significant protection to public safety and the human environment. As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.9.4.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative would be implemented as described in Subchapter 7.3.5 for Scenario 1 ("mag and dig" technique). Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4D is entirely owned by private landowners. Input received from these stakeholders as a part of the public response period for this EE/CA report was incorporated into this final report.

7.9.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.10 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4E

Intrusive results from the EE/CA investigation of Area 4E identified one 37mm projectile recovered at 1 inch bgs. The only OE scrap item found in this area was a single HE projectile fragment at a depth of one inch bgs. A summary of the UXO/OE items recovered during the EE/CA investigation is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.10.1 Alternative 1: No DoD Action Indicated

7.10.1.1 Effectiveness

During the EE/CA investigation, one UXO item was recovered from Area 4E. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment of this area (Table 7.7). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.10.2 Alternative 2: Institutional Controls

7.10.2.1 Effectiveness

7.10.2.1.1 The exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable, some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative for the area discussed in this chapter, although the risk is not reduced (Table 7.7). It is important to note that the government will respond to any future UXO discovery that may occur in Area 4E.

7.10.2.1.2 The following site-wide ICs were recommended in Chapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and

distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.10.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.10.2.3 Cost

The cost to perform this alternative is presented in Subchapter 8.4.

7.10.3 Alternative 3: Surface Clearance of UXO/OE

7.10.3.1 Effectiveness

Area 4E is generally utilized for tobacco production. One UXO finding (37mm HE projectile) was made during the EE/CA investigation in Area 4E at a depth of 1 inch bgs. Similarly, only one OE scrap item was identified, also at a depth of 1 inch bgs. Completion of the Surface Clearance alternative for Area 4E will not provide additional protection to public safety and the human environment since the AOI conditions (combination of regularly tilled agricultural and forested land) suggest any surface residual UXO or OE scrap would likely have been previously encountered over the last 60 years. The short-term and long-term effectiveness criteria are also not met in this alternative for the area (see Table 7.7). Therefore, this alternative would not be effective long-term because it would not permanently remove the residual UXO/OE suspected at the AOI. Therefore, further analysis of this alternative will not be performed (Table 7.7).

7.10.4 Alternative 4: Clearance of UXO/OE to Depth

7.10.4.1 Effectiveness

Only one UXO and one OE scrap item were recovered (both at 1 inch bgs) from within the 3 grids investigated during the EE/CA. Two of the grids did not contain either UXO or OE scrap. Area 4E is located within the former 37mm range but does not extend significantly past the firing point. Therefore, it is unlikely that firing targets were present within Area 4E which is supported by the lack of ordnance-related findings. Approximately 70% of the AOI is utilized for tobacco production and has been for many years. This land use is expected to continue. The balance of the AOI is undeveloped woodlands with a total of one residential dwelling within the AOI. A clearance to predetermined depth is expected to have minimal impact on the presence of residual ordnance within the AOI (as the EE/CA results do not indicate any significant ordnance presence). In light of current farming practices and lack of ordnance presence, the Clearance to Depth alternative would not meet the short-term and long-term effectiveness criteria for this AOI. Therefore, further analysis of this alternative will not be performed (Table 7.7).

7.11 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 4

Five UXO items were discovered during the EE/CA investigation within the modified boundaries of Area 4 (105mm projectile, 57mm projectile, unfuzed 155mm shrapnel round, unfuzed 2.36-inch HE bazooka rocket warhead, and M series fuze). A total of 1118 OE scrap items (predominantly HE projectile fragments consistent with the AOI location within the impact ranges) were recovered in Area 4 with the majority found within 0 and 12 inches bgs. A summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C. A summary of the UXO/OE items recovered during the EE/CA investigation is presented in Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.11.1 Alternative 1: No DoD Action Indicated

There is considered to be a moderate likelihood of occurrence for UXO within Area 4 based on the presence of impact craters, historic firing fans, and ordnance scrap items recovered in the area. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment (Table 7.8). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.11.2 Alternative 2: Institutional Controls

7.11.2.1 Effectiveness

7.11.2.1.1 Intrusive findings indicate the potential for residual UXO/OE presence within Area 4. Based on this assumption, the exposure risks associated with the site-specific IC alternative (those IC components over and above the site-wide IC) are the same as for the NDAI alternative because no ordnance will be removed. However, although unquantifiable, some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative, although the risk is not reduced (Table 7.8). It is important to note that the government will respond to any future UXO discovery that may occur in Area 4.

7.11.2.1.2 The following *site-wide* ICs were recommended in Subchapter 5.3 for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.11.2.2 Implementability

Implementation of the ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.11.2.3 Cost

The cost to perform this alternative is presented in Chapter 8.4.

7.11.3 Alternative 3: Surface Clearance of UXO/OE

7.11.3.1 Effectiveness

7.11.3.1.1 Five UXO findings were made during the EE/CA investigation in Area 4, one of which (105mm HE projectile) was located on the surface. Of the 1118 OE scrap items recovered during the intrusive investigation within this AOI very few were on the surface. However, completion of the Surface Clearance alternative for Area 4 will provide some additional protection to public safety and the human environment. The short-term and long-term effectiveness criteria are also met (Table 7.8). As described in Subchapter 3.5.2, portions of Area 4 lies within the impact area for several former ranges and impact areas utilizing projectiles between 37mm and 155mm in size. These type projectiles tend to have significant penetration depths and are not frequently present on the ground surface. A surface clearance of the entire 21,139 acres comprising Area 4 would be conducted by qualified UXO clearance personnel, as described in Subchapter 7.3.4. Recovery of OE scrap items during the EE/CA investigation from depths of 24 inches bgs suggests there is a likelihood of residual UXO at similar depths. Therefore, the Surface Clearance alternative will only mitigate the explosive safety hazard for Area 4.

7.11.3.1.2 Based on the vertical extent of UXO and OE scrap recovered during this EE/CA investigation, this alternative will be effective long-term because it should permanently remove a portion of the residual UXO/OE suspected at this AOI. However, no clearance can ever assure complete removal of all UXO/OE with the current level of available technology. In consideration of the residential component (>200 total dwellings) and public exposure due to various activities (hunting, hiking, child play, etc) in Area 4, this alternative will provide increased overall protection of public safety and the human environment. Thus, the Surface Clearance alternative meets the criteria in the Effectiveness category and further analysis will be performed.

7.11.3.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative will be implemented as described in Subchapter 7.3.4. Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4 is owned by private landowners. Input received from these stakeholders as a part of the public response period for this EE/CA report was incorporated into this final report.

7.11.3.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.11.4 Alternative 4: Clearance of UXO/OE to Depth

7.11.4.1 Effectiveness

7.11.4.1.1 The Clearance to Depth alternative for Area 4 will provide a level of removal for this AOI to achieve significant protection to public safety and the human environment. Three of the five UXO items found were recovered at depths less than 6 inches bgs (105mm projectile, 57mm projectile, and M series fuze). The two other UXO items were recovered from 10 inches bgs (2.36-inch bazooka rocket) and 30 inches bgs (155mm shrapnel projectile). The short-term and long-term effectiveness criteria are met in this alternative (Table 7.8). Further, there is a high likelihood that additional UXO/OE items are present in the subsurface based on the depths of recovery of UXO and OE scrap items during the EE/CA in Area 4.

7.11.4.1.2 This alternative includes clearance to depth for a total of 21,139 acres, much of which is regularly farmed. In addition, there are in excess of 200 residential dwellings. The clearance removal would be conducted for items identified between the surface and a predetermined depth influenced by the anticipated types of UXO (37mm-155mm projectiles) and recovery depths of ordnance related items. The types of UXO and OE scrap recovered confirm multiple use training ranges in this AOI. In addition, TEC interpretation of historical aerial photography indicates the presence of suspect impact craters (USACE 2001a). The UXO recovered with the greatest potential for depth of penetration is the 105mm projectile. Based on the ordnance type with the greatest penetration depth potential and taking into account the recovery depths of OE scrap, a clearance depth of 24 inches would be effective in mitigating the majority of the explosive safety hazard. Residual UXO at depths of 30 inches bgs would appear aypical.

7.11.4.1.3 In determining the depth of clearance, intrusive farming practices were assessed. In particular, the invasive process of soil tilling which is penetrative to the depth of the tiller tines. Tilling is known to penetrate 10 inches bgs based on discussions with local farmers. Therefore a clearance to a depth to one foot would effectively mitigate the exposure pathway most likely to be encountered by tilling (despite the fact the UXO would likely remain at greater depths). However, the anticipated cost impact to increase the effective clearance depth to 2 feet bgs is warranted (based on the residential component) and would provide additional protection in the event deeper intrusion occurs in the future. This alternative will provide significant protection to public safety and the human environment, given the current and future anticipated land use. Therefore this alternative will provide significant protection to public safety and the human environment. As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.11.4.2 Implementability

The alternative would be implemented as described in Subchapter 7.3.5 for a combination of Scenario 1 ("mag and dig") and Scenario 2 (DGM followed by anomaly selection technique). In this manner the excavation activities would focus only on those

anomalies displaying characteristics of suspect ordnance (2.36-inch bazooka rocket and heavy artillery) for farming areas in an effort to reduce excavation of smaller inert metallic debris. For residential areas all anomalies would be intrusively investigated. Based on the large acreage encompassed by this AOI (approximately 21,139 acres) and open land, the most effective strategy is to utilize a towed-array during DGM survey to increase production. Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. Area 4D is owned by numerous private landowners. Input received from the property owners as a part of the public response period for this EE/CA report was incorporated into this final report.

7.11.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.12 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR AREA 5

No UXO items were discovered during the EE/CA investigation within the modified boundaries of Area 5. A total of 754 anomalies were intrusively investigated in Area 5, from which a single OE scrap item (pressure plate to M15 anti-tank mine) was recovered at ground surface.

7.12.1 Alternative 1: No DoD Action Indicated

7.12.1.1 Effectiveness

For Area 5, the NDAI alternative complies with ARARs since no UXO/OE items were recovered during the EE/CA investigation. Therefore, UXO/OE response action alternatives will not be further developed for these areas. The short-term and long-term effectiveness criteria are met in this alternative for both areas although the risk is not reduced (Table 7.9). It is important to note that the government will respond to any future UXO discovery within Area 5, regardless of whether the affected parcel was designated for NDAI.

7.12.1.2 Implementability

The NDAI alternative is both technically and administratively feasible. No services or materials are necessary for implementation.

7.12.1.3 Cost

The NDAI alternative is a no-cost alternative. However, for all sectors a recurring review process will be implemented, as described in Chapter 10, to ensure the recommended alternative remains appropriate. The cost for the recurring review process will be developed as part of a Recurring Review Plan to be developed as part of a separate project after completion of the EE/CA process.

7.12.2 Alternative 2: Institutional Controls

7.12.2.1 Effectiveness

7.12.2.1.1 The exposure risks associated with the IC alternative (those IC components over and above the site-wide IC) are the same as for the NDAI alternative because no ordnance will be removed. However, no UXO/OE items were discovered during the EE/CA investigation Area 5.

7.12.2.1.2 Based on the intended future land use in Area 5 (agriculture, hunting, and residential development), no additional IC components (above the site-wide recommended components) were considered effective (see Table 7.9). As a result, neither the short-term nor long-term Effectiveness criteria are met in this alternative nor is the risk reduced. Thus, the IC alternative does not satisfy the Effectiveness criteria and further analysis of this alternative will not be performed.

7.12.3 Alternative 3: Surface Clearance of UXO/OE

7.12.3.1 Effectiveness

No UXO findings were made during the EE/CA investigation in Area 5. The single OE scrap item recovered from the 754 anomalies intrusively investigated within this AOI is an inexplicable outlier that does not merit a removal action in light of intrusive and archival evidence. Therefore, the finding does not indicate a public safety risk is present in Area 5 and implementation of a Surface Clearance alternative is not warranted, as it would not meet the Effectiveness criteria. Therefore, further analysis of this alternative will not be performed (Table 7.9).

7.12.4 Alternative 4: Clearance of UXO/OE to Depth

7.12.4.1 Effectiveness

No UXO/OE items were recovered during the EE/CA investigation of Area 5. The findings do not indicate a public UXO/OE safety risk is present, implementation of a Clearance to Depth alternative is not warranted, as it would not meet the Effectiveness criteria. Therefore, further analysis of this alternative will not be performed (Table 7.9).

7.13 APPLICATION OF THE EVALUATION CRITERIA BY ALTERNATIVE FOR LAKEVIEW SUBDIVISION

Intrusive results from the EE/CA and TCRA investigation of the Lakeview Subdivision Site identified 7 UXO items (1 during EE/CA and 6 during TCRA) recovered at depths from 0 to 6 inches bgs. OE scrap items excavated from this area consisted of landmine elements, 2.36-inch bazooka rockets and parts, 60mm mortar, 75mm projectile, and rifle grenade components. A total of 81 OE scrap items were recovered from this AOI at depths ranging from surface to 6 inches bgs. A summary of the UXO/OE items recovered during the EE/CA and TCRA investigation is presented in

Table 3.3 and a summary of the intrusive findings for the re-sectored AOIs is presented in Appendix C.

7.13.1 Alternative 1: No DoD Action Indicated

7.13.1.1 Effectiveness

During the EE/CA investigation, one UXO item (37mm HE projectile) was recovered from Lakeview Subdivision. In addition, several 2.36-inch bazooka rockets were discovered by one of the property owners. As a result, the TCRA was conducted during which another 6 UXO items were recovered. The NDAI alternative does not have an impact on the overall protection of public safety and the human environment in this area (Table 7.10). As this alternative fails the Effectiveness category, no further analysis of this alternative will be performed.

7.13.2 Alternative 2: Institutional Controls

7.13.2.1 Effectiveness

7.13.2.1.1 The exposure risks associated with the IC alternative (those IC components over and above the site-wide IC) is assumed to be the same as for the NDAI alternative because ordnance will not be removed. However, although unquantifiable, some reduction in the number of exposures will result. The short-term and long-term effectiveness criteria are met in this alternative for the area discussed in this chapter, although the risk is not reduced (Table 7.10). It is important to note that the government will respond to any future UXO discovery that may occur at this site.

7.13.2.1.2 The following *sitewide* ICs were recommended for AOIs with UXO present: Signage; land use restriction; notification during property transfer, during permitting, by tax bill, and during issuance of hunting permits; preparation and distribution of visual, audio, and printed media; classroom education; audio/visual media; creation of an internet website; establishment of an Ad Hoc committee; and reverse 911.

7.13.2.2 Implementability

Implementation of the site-wide ICs listed above are technically and administratively feasible and the services and materials necessary to implement such are readily available.

7.13.2.3 Cost

The cost to perform this alternative is presented in Chapter 8.4.

7.13.3 Alternative 3: Surface Clearance of UXO/OE

7.13.3.1 Effectiveness

Completion of the Surface Clearance alternative for the Lakeview Subdivision Site has already been conducted as part of the TCRA to provide immediate significant protection to public safety and the human environment. The short-term and long-term

effectiveness criteria were met in this alternative (Table 7.10). A surface clearance of the 26-acre site was completed by qualified UXO clearance personnel to a depth of 6 inches, as described in Subchapter 7.3.4.

7.13.4 Alternative 4: Clearance of UXO/OE to Depth

7.13.4.1 Effectiveness

7.13.4.1.1 No UXO or OE scrap was recovered beyond a depth of 6 inches bgs in the Lakeview Subdivision, the maximum depth investigated during the TCRA. The DGM survey conducted after completion of the TCRA suggests that additional subsurface investigation is warranted (Appendix B). The USAESCH reviewed the DGM survey and had the following conclusions:

“The geophysical maps prepared subsequent to field activities confirm the presence of additional metallic debris concentrated within the immediate vicinity of the Cash Property with lesser amounts dispersed throughout the Lakeview Subdivision area. Review of the geophysical data collected, historical information, utility locations, surface feature maps, and the TCRA excavation results indicate the origin of recovered UXO, OE scrap, and non-OE scrap may be the result of periodic debris disposal in addition to fired projectiles”. “The only way to confirm the remaining anomalies are not UXO is to conduct a clearance to depth removal action beginning in the northwest corner of the site in the immediate vicinity of the Cash Property and proceeding grid by grid towards the south and east until no additional UXO are recovered”.

7.13.4.1.2 This alternative will provide significant protection to public safety and the human environment, given the current and future anticipated land use. As a result, the Clearance to Depth alternative does satisfy the Effectiveness category and further analysis of this alternative will be performed.

7.13.4.2 Implementability

This type of UXO/OE removal activity is both technically and administratively feasible and the services and materials necessary to implement such a removal are readily accessible. The alternative would be implemented as described in Subchapter 7.3.5 for Scenario 2 (DGM [already completed] followed by anomaly selection technique). In this manner the excavation activities would focus only on those anomalies displaying characteristics of suspect ordnance (2.36-inch bazooka rockets, grenades, 37mm HE projectiles) in an effort to reduce excavation of smaller inert metallic debris that could otherwise not have been discriminated in Scenario 1 (“mag and dig” technique). Generally, clearance alternatives are acceptable to local agencies, property owners and the local community as a means to reduce the residual UXO/OE risk. The Lakeview Subdivision is owned by several private landowners with portions of the buffer zone owned by the State of North Carolina. Input received from the property owners and the State as a part of the public response period for this EE/CA report was incorporated into this final report.

7.13.4.3 Cost

The cost to perform this alternative is presented in Chapter 8.

7.14 SUMMARY OF REMAINING UXO/OE RESPONSE ACTION ALTERNATIVES

The UXO/OE response action alternatives for the former Camp Butner Site that remained after the initial screening of the four response action alternatives against the three general categories of effectiveness, implementability, and cost include:

Alternative 1 – No DoD Action Indicated at Area 5;

Alternative 2 – Site-specific Institutional Controls at Area 1A; Site-wide for all others;

Alternative 3 – Surface Clearance of UXO/OE at Area 4A and Area 4

Alternative 4 – Clearance to Depth of UXO/OE at Area 1A, Area 4, Area 4A, Area 4B, Area 4C, Area 4D, and Lakeview Subdivision.

**Table 7.1
Potential ARARs for UXO/OE Removal
Camp Butner, North Carolina**

Activity	ARAR/TBC	Citation	Applicability or Relevance
<u>Chemical-Specific</u>			
None			
<u>Location-Specific</u>			
Location of an action within an area where it may cause irreparable harm, loss or destruction of significant artifacts or historic landmarks	National Historic Preservation Act	36 CFR Part 65, and 800	During removal action, any material that may be considered historical will be reported pursuant to requirements
	Protection of Wetlands	33 CFR 320 et. seq. Executive Order 11988	Requires action to be taken to minimize loss or degradation of wetlands.
	Endangered Species Act	16 USC § 1531 et. Seq.	Requires that authorized actions do not jeopardize the continued existence of endangered or threatened species, or their habitats.
	Protection of Archaeological Resources	43 CFR Part 7 (also: 36 CFR Part 296, 32 CFR Part 229, and 18 CFR Part 1312 – same regulations)	Requires a permit to excavate, remove, or otherwise alter any archaeological resource
	Preservation of American Antiquities	43 CFR Part 3	Requires a permit for the examination of ruins, excavation of archaeological sites, and gathering of objects of antiquity

**Table 7.1
Potential ARARs for UXO/OE Removal
Camp Butner, North Carolina**

Activity	ARAR/TBC	Citation	Applicability or Relevance
<u>Action-Specific</u>			
Excavation	Department of Defense Ordnance Safety Standards	DoD 6055.9-STD	Requires specialized personnel be employed in the detection, removal, and disposal of UXO/OE.
Transportation	D.O.T. Hazardous Material Transportation Regulations	49 CFR 107, 171-177, 100-199	Regulates transportation of hazardous materials such as ordnance.
	E.P.A. Hazardous Materials Manifesting Requirements	40 CFR 262, 263	Manifesting for transportation of ordnance items may be required pursuant to RCRA.
Disposal	Disposal of Ordnance Items	40 CFR 264, Subpart X	Established ordnance disposal requirements.
	D.O.T. Hazardous Material Transportation Regulations	49 CFR 107, 171-177	Regulates transportation of hazardous materials such as ordnance.
<u>Action-Specific</u>			
Excavation	Department of Defense Ordnance Safety Standards	DoD 6055.9-STD	Requires specialized personnel be employed in the detection, removal, and disposal of UXO/OE.
Transportation	D.O.T. Hazardous Material Transportation Regulations	49 CFR 107, 171-177, 100-199	Regulates transportation of hazardous materials such as ordnance.
	E.P.A. Hazardous Materials Manifesting Requirements	40 CFR 262, 263	Manifesting for transportation of ordnance items may be required pursuant to RCRA.
Disposal	Disposal of Ordnance Items	40 CFR 264, Subpart X	Established ordnance disposal requirements.
	D.O.T. Hazardous Material Transportation Regulations	49 CFR 107, 171-177	Regulates transportation of hazardous materials such as ordnance.

**TABLE 7.2
IMPACT ANALYSIS
Area IA**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	Area IA: EE/CA: (1) M1 anti-tank practice mine w/fuze, (1) Mk II hand grenade	Less Sensitive	2 in 1.15 acres	Surface – 0 Subsurface – 2	No Restriction	Moderately Stable	Significant (Construction, trespass, hiking)	0 – 5 /0
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹¹ Denotes items found during the EE/CA investigation, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.3
IMPACT ANALYSIS
Area 4A**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 2.36-inch HE bazooka rocket	Less Sensitive	1 in 1.15 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction & child play)	5 – 10 /2
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.4
IMPACT ANALYSIS
Area 4B**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 2.36-inch HE bazooka rocket OTHER: (1) 2.36-inch bazooka rocket	Less Sensitive	1 in 0.7 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming, child play)	2 – 5 /2
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated. "Other" denotes items found during prior investigations or by the Public.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.5
IMPACT ANALYSIS
Area 4C**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) unfuzed 105mm HE projectile Other: (1) unfuzed 155mm HE projectile	Insensitive	1 in 2.3 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction, child play, hunting)	35 – 60 /8
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹ Denotes items found during the EE/CA, as indicated.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.6
IMPACT ANALYSIS
Area 4D**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 37mm HE projectile	Less Sensitive	1 in 1.15 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Hunting, hiking, child play)	5 – 10 /6
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.7
IMPACT ANALYSIS
Area 4E**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 37mm HE projectile	Less Sensitive	1 in 0.7 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming, child play, construction)	20 – 40 /1
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.8
IMPACT ANALYSIS
Area 4**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 105mm HE projectile, (1) 57mm HE projectile, (1) M52 series nose fuze, (1) 2.36-inch HE bazooka rocket warhead, (1) unfuzed 155mm shrapnel projectile with expelling charge.	Less Sensitive	5 in 94.32 acres	Surface - 1 Subsurface - 4	No Restriction	Moderately Stable	Moderate (Child play, construction, hunting, farming, forestry, residential)	500 – 750 />200
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact
Clearance to Depth	No Impact	No Impact	Impact	Impact	No Impact	No Impact	Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated. ¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.9
IMPACT ANALYSIS
Area 5**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population
Existing Condition	EE/CA: Ordnance Scrap	Inert	0 in 30 acres	Not Applicable	No Restriction	Moderately Stable	Low (Child play, construction, hunting, farming, forestry)	5000 – 8000
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

¹¹ Denotes items found during the EE/CA, as indicated. "Other" denotes items found during the ASR SI although specifics were not provided.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

**TABLE 7.10
IMPACT ANALYSIS
Lakeview Subdivision**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors	
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings
Existing Condition	EE/CA: (1) 37mm HE projectile TCRA: (1) electric blasting cap, (1) Mk II hand grenade, (1) 37mm HE projectile, (1) M1 A1 Mine fuze, (1) 2.36-inch HE rocket motor with fuze, (1) 2.36-inch HE bazooka rocket warhead	Less Sensitive	EE/CA: 1 in 0.7 acre TCRA: 6 in 26 acres	Surface – 7 Subsurface - 0	No Restriction	Moderately Stable	Significant (Construction, child play)	30 – 50 /7
NDAI	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Impact	Impact
Surface Clearance	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Clearance to Depth	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

¹ Denotes items found during the EE/CA and TCRA investigations, as indicated. "Other" denotes items found during the ASR SI although specifics were not provided.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation and the TCRA.

Note – For all subsites implementation of *site-wide* IC components (varying by area) are considered viable and prudent and will therefore be retained through the screening process.

CHAPTER 8

COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES

8.1 INTRODUCTION

8.1.1 The four alternatives identified for the former Camp Butner Site were analyzed in Chapter 7 with three evaluation criteria: effectiveness, implementability, and cost. The analysis was performed to screen the alternatives based on their compliance with the minimum requirements of the evaluation criteria. All four alternatives were retained for comparative analysis as outlined below:

Alternative 1 – No DoD Action Indicated at Area 5;

Alternative 2 – Site-specific Institutional Controls at Area 1A; Site-wide for all others;

Alternative 3 – Surface Clearance of UXO/OE at Area 4A and Area 4

Alternative 4 – Clearance to Depth of UXO/OE at Area 1A, Area 4, Area 4A, Area 4B, Area 4C, Area 4D, and Lakeview Subdivision.

Each of the above four alternatives met the minimum requirements of the evaluation criteria for at least one AOI. As discussed in Chapter 7, the criteria for NDAI is met for Area 5; therefore no further analysis is warranted. It should be noted that a subsurface clearance (to a depth of six inches bgs) has already been implemented at one AOI, Lakeview Subdivision, as part of the TCRA. Therefore, an analysis of the surface clearance alternative was not conducted for this AOI. A comparative analysis of the retained UXO/OE response action alternatives was conducted for the ten remaining AOIs.

8.1.2 A comparative analysis is presented in this chapter to determine the relative performance of the retained alternatives for each of the evaluation criteria. The purpose of this comparison was to determine the advantages and disadvantages of each of the alternatives relative to one another. This comparison was used to support the selection of the most appropriate UXO/OE response actions for each AOI. Similar to the initial alternative screening conducted in Chapter 7, the comparative analysis was performed by ranking each alternative relative to the other alternatives for effectiveness, implementability, and cost. However, each of the evaluation criteria were further analyzed by subcomponents.

8.1.3 For each of the subcomponents of an evaluation criterion, a ranking value was assigned for each of the retained alternatives, with “1” representing the best choice. In the case of two or more alternatives being equal for a criterion, an average ranking value was used for each alternative that is of equal value in the criterion. Ranking values were totaled for each alternative within the three evaluation criteria of effectiveness, implementability, and cost. However, not all subcomponents within each of the three evaluation criteria were weighted equally. The rankings for each evaluation criterion were combined and the alternative with the lowest overall score was selected as the preferred alternative for the AOI.

8.2 EFFECTIVENESS

8.2.1 Introduction

The retained alternatives for each AOI were ranked under the effectiveness category. The results of this ranking process are outlined in Tables 8.1 through 8.8. Based on this analysis, the site-wide IC only ranked highest in the effectiveness category for Area 4 and Area 4E (no other alternatives were retained during initial screening). Clearance to Depth ranked highest for the remaining areas (Area 1A, Area 4A, Area 4B, Area 4C, Area 4D, and Lakeview). The logic behind the rankings for the evaluation criteria is provided in the following paragraphs.

8.2.2 Overall Protection of Public Safety and Human Environment

8.2.2.1 The OE RIA process as described in “Interim Guidance, OE Risk Impact Assessment” (USACE, 2001b) was used to evaluate each alternative for overall protection of public safety and the human environment. This process provided a qualitative indication of the change in the potential for harm and level of protectiveness at the AOIs for each of the remaining alternatives. The impact of each of the remaining alternatives was evaluated by assigning an impact evaluation score of ‘No Impact’ or an alphabetical rank of ‘A’, ‘B’, or ‘C’ – with ‘A’ being the highest impact in reducing the potential for harm and increasing the level of protectiveness at the sector and a rank ‘C’ noting the lowest impact. This evaluation included three primary UXO/OE risk factors that were used in the risk assessment presented in Chapter 4 and the screening of the alternatives presented in Chapter 7. This evaluation is illustrated in Tables 8.9 through 8.16.

8.2.2.2 The implementation of site-wide ICs, as described in Chapter 7, would modify the behavior of the public and the activities they perform throughout the former Camp Butner Site. In Area 1A, an additional site-specific IC component was evaluated. This component includes installation of a boundary fence enclosure around the entire Area 1A AOI. This alternative was ranked as ‘B’ in Table 8.9 for the projected future activities and land use. The fence will restrict access to Area 1A, thus serving to modify behavior of pedestrian traffic. Finally, an overall rank of ‘B’ (moderate impact) was assigned to this alternative because while the fence will deter access by the public, it will not, by itself, eliminate the potential for harm from UXO/OE present in Area 1A.

Implementation of this alternative will not reduce the risk to the public from residual UXO/OE since it does not include any removal activity.

8.2.2.3 The Surface Clearance of OE alternative as described in Chapter 7 would remove UXO/OE items located on the surface in Area 4A, as described in Chapter 7. In Area 4A one UXO item (105mm HE projectile) and some ordnance related scrap was recovered on the ground surface. Therefore, surface clearance will provide some level of increased protection to the public in the AOI (over no removal action), based on current and future anticipated land use as well as contact level (see Chapter 4). This alternative was rated as having a moderate impact ('B') for most categories (Table 8.10).

8.2.2.4 The Clearance to Depth alternative for the remaining AOIs provides for enhanced overall protection of human health and the environment by removing residual UXO/OE suspected below the ground surface. Based on the confirmed presence of UXO combined with the current farming practices (primary land use) in Area 4B and Area 4D, the Clearance to Depth alternative will reduce the risk to the explosive hazard encountered from farm workers and other receptors (hunters, hikers, low-density residential, etc). Few residential dwellings are present (ranging from a low of two in Area 4B to a high of six in Area 4D) and near-term future development is not anticipated.

8.2.2.5 In Area 1A, Area 4A, and Area 4C, the exposure pathway is significant based on the confirmed presence of UXO, the definitive evidence of a pre-existing impact area (with exception of Area 1A), and the current and projected residential development in these AOIs. Although Area 4D consists of mostly undeveloped land (6 residential dwellings) the risk of exposure does potentially exist, and subsurface removal of residual UXO will increase the level of public protection.

8.2.2.6 The TCRA and DGM survey in the residential Lakeview Subdivision AOI indicate subsurface metallic debris remains, thus subsurface clearance would provide additional protection to the residential population. Therefore, the Clearance to Depth alternative would be more effective in reducing the explosive safety risk as it will mitigate UXO/OE items confirmed to be present in the subsurface.

8.2.2.7 Based on this evaluation, the Clearance to Depth alternative is the most protective of public safety for Area 1A, Area 4A, Area 4B, Area 4C, Area 4D, and the Lakeview Subdivision. In Tables 8.1 through 8.8 each alternative was ranked in order of overall effectiveness, ranking the Clearance to Depth alternative as Rank 1.

8.2.3 Compliance with ARARs

As described in Chapter 7, special consideration of ARARs that address activities within wetlands or areas exhibiting the characteristics of a wetland may be necessary for the surface clearance of UXO/OE alternative. For the purpose of this evaluation it is assumed that steps necessary to comply with these ARARs would be addressed if either

of the clearance alternatives were implemented for any of the AOIs. Therefore, since all the alternatives would comply with ARARs, they have been ranked equally.

8.2.4 Long-Term Effectiveness

The Clearance to Depth of UXO/OE alternative provides the best long-term effectiveness for all AOIs for which this alternative was retained after initial screening, with evaluation of each of the other alternatives resulting in a decreasing degree of long-term effectiveness. This ranking order has been selected for the same reasoning as that provided under the overall protection of public safety and environment criterion.

8.2.5 Short-Term Effectiveness

In Area 1A, the site-specific IC component (fencing) provides an increased level of protection to the public with regards to access restriction than does no action. However, because the IC alternative does not mitigate the explosive hazard risk from Area 1A, the Clearance to Depth alternative ranked higher with respect to effectiveness. The proper implementation of the IC alternative does directly impact public access to the AOI, thus providing short-term effectiveness to public safety (Table 8.1).

**TABLE 8.1
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 1A**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-specific IC)	2	1	2	1	6	2
Clearance to Depth of UXO/OE	1	1	1	2	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.2
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4A**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	3	1	3	1	8	3
Surface Clearance of UXO/OE	2	1	2	2	7	2
Clearance to Depth of UXO/OE	1	1	1	3	6	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.3
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4B**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	2	1	2	1	6	2
Clearance to Depth of UXO/OE	1	1	1	2	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.4
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4C**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	2	1	2	1	6	2
Clearance to Depth of UXO/OE	1	1	1	2	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.5
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4D**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	2	1	2	1	6	2
Clearance to Depth of UXO/OE	1	1	1	2	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.6
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4E**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	1	1	1	1	1	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.7
EFFECTIVENESS CRITERIA APPLICATION
FOR AREA 4**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	3	1	3	1	8	3
Surface Clearance of UXO/OE	2	1	2	2	7	2
Clearance to Depth of UXO/OE	1	1	1	3	6	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.8
EFFECTIVENESS CRITERIA APPLICATION
FOR LAKEVIEW SUBDIVISION**

ALTERNATIVE	EFFECTIVENESS				SCORE	RANK
	Protection of Public Safety & Human Environment	Compliance with ARARs	Long-Term Effectiveness	Short-Term Effectiveness		
Institutional Controls (site-wide)	2	1	2	1	6	2
Clearance to Depth of UXO/OE	1	1	1	2	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.9
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 1A**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ³
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	Area 1A: EE/CA: (1) M1 anti-tank practice mine w/fuze, (1) Mk II hand grenade	Less Sensitive	2 in 1.15 acres	Surface – 0 Subsurface – 2	No Restriction	Moderately Stable	Significant (Trespassing and hiking)	0 – 5 /0	
Institutional Controls (site-specific)	No Impact	No Impact	No Impact	No Impact	A	No Impact	B	A	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	A	No Impact	A

¹ Denotes items found during the EE/CA, as indicated.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'B' indicating the least impact.

**TABLE 8.10
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4A**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ¹³
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) 2.36-inch HE bazooka rocket	Less Sensitive	1 in 1.15 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction, child play)	5 – 10 /2	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	C
Surface Clearance	No Impact	No Impact	B	B	No Impact	No Impact	B	No Impact	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the and in the subsurface during the EE/CA field investigation.

¹³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'C' indicating the least impact.

**TABLE 8.11
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4B**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ¹³
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) 2.36-inch HE bazooka rocket Other: (1) 2.36-inch bazooka rocket	Less Sensitive	1 in 0.7 acre	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming, child play)	2 – 5 /2	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

¹³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'B' indicating the least impact.

**TABLE 8.12
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4C**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ³
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) unfuzed 105mm HE projectile Other: (2) unfuzed 155mm HE projectiles	Insensitive	1 in 2.3 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Construction, child play, hunting)	35 – 60 /8	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	No Impact	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹ Denotes items found during the EE/CA, as indicated. "Other" denotes items found by others during the EE/CA investigations.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'B' indicating the least impact.

**TABLE 8.13
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4D**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ³
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) 37mm HE projectile	Less Sensitive	1 in 1.15 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Hunting, hiking, child play)	5 – 10 /6	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹ Denotes items found during the EE/CA, as indicated.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'B' indicating the least impact.

**TABLE 8.14
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4E**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ³
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) 37mm HE projectile	Less Sensitive	1 in 0.7 acres	Surface – 0 Subsurface – 1	No Restriction	Moderately Stable	Significant (Farming construction)	20 – 40 /1	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	A

¹ Denotes items found during the EE/CA, as indicated.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk.

**TABLE 8.15
UXO/OE RISK IMPACT ANALYSIS
FOR AREA 4**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ¹³
	Type ¹¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ¹²	Accessibility	Stability	Contact Level / Activities	Population	
Existing Condition	EE/CA: (1) 105mm HE projectile, (1) 57mm HE projectile, (1) M52 series nose fuze, (1) 2.36-inch HE bazooka rocket warhead, (1) unfuzed 155mm shrapnel projectile with expelling charge.	Less Sensitive	5 in 94.32 acres	Surface - 1 Subsurface - 4	No Restriction	Moderately Stable	Moderate (Child play, construction, hunting, farming, forestry, residential)	500 – 750 />200	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	C
Surface Clearance	No Impact	No Impact	B	B	No Impact	No Impact	B	No Impact	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹¹ Denotes items found during the EE/CA, as indicated.

¹² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation.

¹³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'C' indicating the least impact.

**TABLE 8.16
UXO/OE RISK IMPACT ANALYSIS
FOR LAKEVIEW SUBDIVISION**

Alternative	Ordnance and Explosive Factors				Site Characteristics Factors		Human Factors		Overall Rank ³
	Type ¹	Sensitivity	Number of UXO Found	Number of UXO by Depth ²	Accessibility	Stability	Contact Level / Activities	Population /Number of Residential Dwellings	
Existing Condition	EE/CA: (1) 37mm HE projectile TCRA: (1) electric blasting cap, (1) MkII hand grenade , (1) 37mm HE projectile, (1) M1 A1 Mine fuze, (1) 2.36-inch HE rocket motor with fuze, (1) 2.36-inch HE bazooka rocket warhead	Less Sensitive	EE/CA: 1 in 0.7 acre TCRA: 6 in 26 acres	Surface – 0 Subsurface – 7	No Restriction	Moderately Stable	Significant (Construction, child play)	30 – 50 /7	
Institutional Controls (site-wide)	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	A	B	B
Clearance to Depth	No Impact	No Impact	A	A	No Impact	No Impact	B	No Impact	A

¹ Denotes items found during the EE/CA and TCRA investigations, as indicated.

² Denotes the number of UXO found at the surface and in the subsurface during the EE/CA field investigation and the TCRA.

³ Overall Rank 'A' being the alternative with most significant impact in reducing the safety risk within the sector and Rank 'B' indicating the least impact.

8.3 IMPLEMENTABILITY

8.3.1 Introduction

The alternatives for each of the AOIs were ranked within each of the six criteria within the implementability category based on a subjective analysis of the merits of each alternative. The results of this analysis are presented in Tables 8.17 through 8.24. Based on this comparative analysis, the site-wide IC alternative was ranked highest for Area 4D, Area 4E and Area 4. The Surface Clearance alternative did not rank the highest for any AOI. The Clearance to Depth alternative ranked highest in implementability for Area 1A, Area 4A, Area 4B, Area 4C, and Lakeview Subdivision. The logic behind the rankings for the evaluation criteria is provided in the following paragraphs.

8.3.2 Technical Feasibility

In this criterion, the alternatives for all ten AOIs were ranked with the site-wide IC alternative being the easiest to implement from a technical standpoint. In comparison, the Surface Clearance alternative increases in technical difficulty to implement while the Clearance to Depth of UXO/OE alternative is the most difficult to implement.

8.3.3 Administrative Feasibility

The site-wide IC alternative requires coordination between the local agencies associated with the former Camp Butner Site. This alternative also requires a long-term commitment from local agencies, including annual reinforcement and repair. Administratively, the clearance alternatives will likely be somewhat more difficult to implement than the IC alternative.

8.3.4 Availability of Services and Materials

The site-wide and site-specific IC alternatives, described in Chapter 5 require a moderate amount of readily available services and materials for implementation. The level of difficulty increases with the Surface Clearance alternative due to securing sufficient qualified labor resources. Difficulty increases further with the Clearance to Depth alternative given the services and materials associated with the involvement of more extensive excavation (greater land survey, more extensive brush clearance, mechanized excavation, etc.).

8.3.5 Property Owner Acceptance

Each alternative was rated based on the degree of acceptance anticipated by the property owner. This criteria is weighted in importance by a factor of two. Given the project team correspondence, public meetings responses, and direct interaction of Parsons personnel with local property owners, the level of acceptance to a particular UXO/OE response alternative can be gauged on a case by case basis. For example, in Area 4D the IC alternative was ranked highest due to the likely perception anticipated by land owners that any surface or subsurface removal action will displace them from their property and render the land unusable (for hunting) during the clearance interim. The Clearance to

Depth was ranked highest in Area 1A, Area 4A, Area 4B, Area 4C, and the Lakeview Subdivision where the property owners are perceived as amenable to UXO/OE clearance of their land as a means of reducing the explosive risk hazard. Because of the numerous property owners and various land uses within the greater Area 4, the IC alternative ranked highest based on the likelihood of majority acceptance in this area.

**TABLE 8.17
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 1A**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-specific)	1	1	1	4	2	2	11	2
Clearance to Depth	2	2	2	2	1	1	10	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2

**TABLE 8.18
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4A**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	6	3	3	15	3
Surface Clearance	2	2	2	4	2	2	14	2
Clearance to Depth	3	3	2	2	1	1	12	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2

**TABLE 8.19
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4B**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	4	2	2	11	2
Clearance to Depth	2	2	2	2	1	1	10	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2.

**TABLE 8.20
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4C**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	4	2	2	11	2
Clearance to Depth	2	2	2	2	1	1	10	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2.

**TABLE 8.21
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4D**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	2	2	2	9	1
Clearance to Depth	2	2	2	4	1	1	12	2

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2.

**TABLE 8.22
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4E**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	2	1	1	7	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2.

**TABLE 8.23
IMPLEMENTABILITY CRITERIA APPLICATION
FOR AREA 4**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	2	3	1	9	1
Surface Clearance	2	2	2	4	2	1	13	2
Clearance to Depth	3	3	2	6	1	1	16	3

Note: Ranking from best to worst; best = 1, worst = 3

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking. The size and demographic diversity of Area 4 combined with varying land use suggest that concurrence on a specific action may be difficult to obtain.
2. Property Owner Acceptance multiplied by 2.

**TABLE 8.24
IMPLEMENTABILITY CRITERIA APPLICATION
FOR LAKEVIEW SUBDIVISION**

ALTERNATIVE	IMPLEMENTABILITY						SCORE	RANK
	Technical Feasibility	Administrative Feasibility	Availability of Services & Materials	Property Owner Acceptance ^{1,2}	Local Agency Acceptance ¹	Community Acceptance ¹		
Institutional Controls (site-wide)	1	1	1	4	2	2	11	2
Clearance to Depth	2	2	2	2	1	1	10	1

Note: Ranking from best to worst; best = 1, worst = 2

1. Input has not been received regarding local agency and community acceptance of the response action alternatives. Generally, the stakeholders prefer the more ambitious response action alternative. However, input received from these stakeholders during the public comment period for this draft EE/CA report will be incorporated into the final EE/CA report and may affect this ranking.
2. Property Owner Acceptance multiplied by 2.

8.3.6 Local Agency Acceptance

Each alternative is rated based on the degree of acceptance expressed by local agencies. The local agency acceptance of the remaining alternatives is not fully known at this time; however, local agencies generally prefer the most ambitious clearance alternative. For the AOIs within the former Camp Butner Site, Clearance to Depth was ranked as the preferred alternative from the local agencies' perspective (for AOIs in which subsurface clearance was retained) and the IC alternative alone was ranked as the least preferred. Input received from local agencies as part of the public comment period for this EE/CA report was incorporated into this final report.

8.3.7 Community Acceptance

Each alternative is rated based on the degree of acceptance expressed by the local community. Through public meetings and IA interviews, the community places public safety as the primary goal. A heightened public awareness and concern has been generated in the course of the EE/CA and TCRA investigation at the former Camp Butner Site. It is anticipated that the community will generally support the most ambitious alternative based on input gathered to date. Input received from the community as part of the public comment period for this EE/CA report was incorporated into this final report.

8.4 COST

The IA performed for the former Camp Butner Site (Appendix F) indicated the initial capital cost to implement the recommended site-wide and site-specific ICs (as described in Appendix F, Section 4.5) is approximately \$80,750 with an estimated \$10,500 annual cost. The estimated cost Tables 8.25 through 8.33 present the estimated cost for the Surface Clearance and / or Clearance to Depth alternatives for the eight AOIs with confirmed or suspect UXO/OE. The recommended NDAI alternative for Area 5 has no initial cost. Recurring review costs are discussed in Chapter 10.

8.5 OVERALL RANKING

8.5.1 The overall ranking of the alternatives for the ten AOIs with confirmed or suspect UXO/OE are presented in Tables 8.34 through 8.41. Using the same methodology used in the previous categories, the preferred alternative is the one with the lowest overall score. Based on this analysis, site-wide Institutional Controls alternative ranked highest for Area 4D, Area 4E, and Area 4. The Clearance to Depth alternative is the preferred alternative for Area 1A, Area 4A, Area 4B, Area 4C, and the Lakeview Subdivision.

8.5.2 Further input from stakeholders will be solicited during subsequent Public Meetings and incorporated, where appropriate, into the recommended alternative for each of the AOIs.

Table 8.25
Area 1A¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$10,320	20	\$276,000
A-E Field Oversight ³	\$1,238	20	\$33,120
A-E Project Management ⁴	\$825	20	\$22,080
Land Survey ⁵	Lump-Sum	20	\$10,000
Brush Cut ⁶	\$3000	20	\$60,000
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$17,000
Costs Contracting & Oversight ⁹	N/A	N/A	\$51,180
Subtotal			\$410,000
10% Contingency			\$39,000
Total Cost Estimate*			\$449,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are no existing residential dwellings within Area 1A although development is present to the immediate south.

¹ The costing is based on the assumption that the *Subsurface Clearance to 1 foot* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on "Mag and Flag" removal technique.* The number of anomalies requiring investigation is estimated to be between 100 - 300 per acre based on the EE/CA data. A multiplier of 1.2 was used to account for vegetation and terrain. Two UXO items recovered during the EE/CA at depths of 1 inch and 10 inches. All other anomalies were encountered within 1 foot of ground surface, with most less than 6 inches in depth.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100'x100' contiguous grid network within the site.

⁶ Brush cutting costs based on the moderate vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.26
Area 4A¹
Surface Clearance of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Surface OE Removal ²	\$2,640	34	\$89,760
A-E Field Oversight ³	\$317	34	\$10,771
A-E Project Management ⁴	\$211	34	\$7,181
Land Survey ⁵	Lump-Sum	34	\$17,000
Brush Cut ⁶	\$1,700	34	\$57,800
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$3,060
Costs Contracting & Oversight ⁹	N/A	N/A	\$27,377
Subtotal			\$213,000
10% Contingency			\$21,000
Total Cost Estimate*			\$234,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 2 existing residential dwellings within Area 4A as of July 3, 2003 according to county records (both owned by the same property owner).

¹ The costing is based on the assumption that the *Surface Clearance* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. The number of surface anomalies requiring investigation is estimated to be between 100 - 300 per acre based on the EE/CA data. A multiplier of 1.2 was used to account for vegetation and terrain. No UXO items were recovered during the EE/CA on the surface in 1.15 acres investigated although several OE scrap items were present and the penetration depth of 2.36-inch rockets suggests UXO on the surface may be present.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 500'x500' contiguous grid network within the site.

⁶ Brush cutting costs based on the moderate vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.27
Area 4A¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$10,320	34	\$350,880
A-E Field Oversight ³	\$1,238	34	\$42,106
A-E Project Management ⁴	\$826	34	\$28,071
Land Survey ⁵	Lump-Sum	34	\$21,000
Brush Cut ⁶	\$2,100	34	\$71,400
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$5,100
Costs Contracting & Oversight ⁹	N/A	N/A	\$27,377
Subtotal			\$595,000
10% Contingency			\$60,000
Total Cost Estimate*			\$655,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 2 existing residential dwellings within Area 4A as of July 3, 2003 according to county records (both owned by the same property owner).

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be generally not greater than 1 foot bgs based on EE/CA findings, ordnance types anticipated, and soil/terrain)* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on manual digital geophysical mapping (DGM)*. The number of anomalies requiring investigation after DGM is estimated to be 25-75 per acre based on EE/CA data. A multiplier of 1.2 was used to account for vegetation and terrain. One UXO item was recovered during the EE/CA at a depth of 3 inches. All other anomalies were encountered within 6 inches of ground surface.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100'x100' contiguous grid network within the site.

⁶ Brush cutting costs based on the moderate vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.28
Area 4B¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$12,200	10	\$122,000
A-E Field Oversight ³	\$1,464	10	\$14,640
A-E Project Management ⁴	\$976	10	\$9,760
Land Survey ⁵	Lump-Sum	10	\$8,000
Brush Cut ⁶	\$250	10	\$2,500
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$680
Costs Contracting & Oversight ⁹	N/A	N/A	\$23,535
Subtotal			\$181,000
10% Contingency			\$18,000
Total Cost Estimate*			\$199,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 2 existing residential dwellings within Area 4B as of July 3, 2003 according to county records.

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be generally not greater than 1-2 feet bgs based on EE/CA findings, ordnance types anticipated, and soil/terrain)* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on manual digital geophysical mapping (DGM)*. The number of anomalies requiring investigation after DGM is estimated to be 25-75 per acre based on EE/CA data. A multiplier of 1.0 was used to account for vegetation and terrain. One UXO item was recovered during the EE/CA at a depth of 18 inches but not from within the farmed area. All other anomalies were encountered within 6 inches of ground surface.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100'x100' contiguous grid network within the site.

⁶ Brush cutting costs based on the light vegetation density at the agricultural portion of the site proposed for removal action and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.29
Area 4C¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$13,000	16	\$208,000
A-E Field Oversight ³	\$1,560	16	\$24,960
A-E Project Management ⁴	\$1040	16	\$16,640
Land Survey ⁵	Lump-Sum	16	\$15,000
Brush Cut ⁶	\$500	16	\$8,000
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$8,160
Costs Contracting & Oversight ⁹	N/A	N/A	\$40,890
Subtotal			\$321,000
10% Contingency			\$32,000
Total Cost Estimate*			\$353,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 8 existing residential dwellings within Area 4C as of July 3, 2003 according to county records.

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be no greater than 30 inches bgs based on EE/CA findings, ordnance types anticipated, and soil/terrain)* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on manual digital geophysical mapping (DGM)*. The number of anomalies requiring investigation after DGM is estimated to be >75 per acre based on EE/CA data. A multiplier of 1.0 was used to account for vegetation and terrain. One UXO item was recovered during the EE/CA at a depth of 3 inches. All other anomalies were encountered within 30 inches of ground surface, most within the top 12 inches.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100'x100' contiguous grid network within the site.

⁶ Brush cutting costs based on the light vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.30
Area 4D¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$15,000	317	\$4,755,000
A-E Field Oversight ³	\$1,800	317	\$570,600
A-E Project Management ⁴	\$1,200	317	\$380,400
Land Survey ⁵	Lump-Sum	317	\$180,000
Brush Cut ⁶	\$250	317	\$79,250
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$16,320
Costs Contracting & Oversight ⁹	N/A	N/A	\$894,7880
Subtotal			\$6,877,000
10% Contingency			\$686,000
Total Cost Estimate*			\$7,563,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 6 existing residential dwellings within Area 4D as of July 3, 2003 according to county records.

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be generally not greater than 2 feet bgs based on EE/CA findings, ordnance types anticipated, and soil/terrain)* will be implemented independently of any other OE removal action. The costs may be less if the clearance is contracted and implemented concurrently with other sites. Estimated 70% of site has been cleared for agricultural use (317 acres). Undeveloped/wooded tracts are not proposed for clearance.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on "Mag and Flag" technique as terrain deemed to difficult to DGM.* The number of anomalies requiring investigation is estimated to be between 100 - 300 per acre based on the EE/CA data. A multiplier of 1.2 was used to account for vegetation and terrain. One UXO item was recovered during the EE/CA at depths of 2 inches. All other anomalies were encountered within 1 foot of ground surface, with most less than 6 inches in depth.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100' x 100' contiguous grid network within the site.

⁶ Brush cutting costs based on the light vegetation density at the site (agriculturally-used fields) and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.31
Area 4¹
Surface Clearance of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Surface OE Removal ²	\$2,750	21139	\$58,132,250
A-E Field Oversight ³	\$330	21139	\$6,975,870
A-E Project Management ⁴	\$220	21139	\$4,650,580
Land Survey ⁵	Lump-Sum	21139	\$3,000,000
Brush Cut ⁶	\$750	21139	\$15,854,250
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$1,377,000
Costs Contracting & Oversight ⁹	N/A	N/A	\$13,291,942
Subtotal			\$103,282,000
10% Contingency			\$10,191,000
Total Cost Estimate*			\$113,473,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 225 existing residential dwellings within Area 4 as of July 3, 2003 according to county records (both owned by the same property owner).

¹ The costing is based on the assumption that the *Surface Clearance* will be implemented independently of any other OE removal action.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. The number of surface anomalies requiring investigation is estimated to be between 50+ per acre based on the EE/CA data. A multiplier of 1.25 was used to account for vegetation and terrain.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 500'x500' contiguous grid network within the site.

⁶ Brush cutting costs based on the moderate vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.32
Area 4¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$14,700	21139	\$310,743,300
A-E Field Oversight ³	\$1,764	21139	\$37,289,196
A-E Project Management ⁴	\$1,176	21139	\$24,859,464
Land Survey ⁵	Lump-Sum	21139	\$3,000,000
Brush Cut ⁶	\$1,500	21139	\$31,708,500
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$3,000,000
Costs Contracting & Oversight ⁹	N/A	N/A	\$61,140,069
Subtotal			\$471,741,000
10% Contingency			\$46,874,000
Total Cost Estimate*			\$518,615,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 225 existing residential dwellings within Area 4 as of July 3, 2003 according to county records (both owned by the same property owner).

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be generally not greater than 1 foot bgs based on EE/CA findings, ordnance types anticipated, and soil/terrain)* will be implemented independently of any other OE removal action.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost is based on towed digital geophysical mapping (DGM combined with mag and dig)*. The number of anomalies requiring investigation after DGM is estimated to be >300 per acre based on EE/CA data. A multiplier of 1.5 was used to account for vegetation and terrain.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs are lump sum estimates derived from actual costs incurred on similar efforts and include marking site boundaries and establishing a 100'x100' contiguous grid network within the site.

⁶ Brush cutting costs based on the moderate vegetation density at the site and is obtained from USAESCH Cost Estimating Guide combined with professional judgment and costs incurred for this task at similar sites.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

Table 8.33
Lakeview Subdivision¹
Clearance to Depth of UXO/OE Cost Estimate
Camp Butner EE/CA

Item	Cost per Acre	Acreage	Total Costs
Clearance to Depth OE Removal ²	\$8,400	26	\$224,172
A-E Field Oversight ³	\$1,008	26	\$26,900
A-E Project Management ⁴	\$672	26	\$17,934
Land Survey ⁵	Lump-Sum	26	\$5,000
Brush Cut ⁶	\$400	26	\$10,400
Institutional Controls ⁷	N/A	N/A	\$0
Evacuation Costs ⁸	N/A	N/A	\$13,600
Costs Contracting & Oversight ⁹	N/A	N/A	\$42,661
Subtotal			\$337,000
10% Contingency			\$37,000
Total Cost Estimate*			\$374,000

* Note: The total cost estimate is rounded to the nearest \$1000 for the EE/CA. Detailed cost estimates are presented in Appendix G. There are 7 existing residential dwellings within Lakeview as of July 3, 2003 according to county records.

¹ The costing is based on the assumption that the *Subsurface Clearance (estimated to be generally no greater than 24 inches bgs based on EE/CA findings, ordnance types anticipated, TCRA DGM interpretation, and soil/terrain)* will be implemented independently of any other OE removal action. Assumes reacquisition/investigation of approximately 1500 anomalies identified from interpretation of TCRA DGM survey (Appendix B). The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide and professional judgment for site-specific conditions. *Cost excludes manual digital geophysical mapping (DGM) which was already conducted as part of the TCRA.* The number of anomalies requiring investigation after DGM is estimated to be 25-75 per acre based on EE/CA data and USAESCH TCRA DGM interpretation. A multiplier of 1.2 was used to account for vegetation and terrain. Seven UXO items were recovered during the EE/CA and TCRA at a depths less than 6 inches. Includes police support costs for securing MSD and Road Closure, as detailed in Appendix G.

³ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁴ A-E Project Management estimated at 8% of ordnance removal costs.

⁵ Land survey costs based on actual costs incurred during TCRA and include marking site boundaries and re-establishing a 100'x100' contiguous grid network previously surveyed during the TCRA.

⁶ Brush cutting costs based on the light vegetation since the site was recently brush cut as part of the TCRA.

⁷ Site Specific Institutional Controls measures are not planned for this site.

⁸ Evacuation Costs estimated based on estimated project duration and residential population – see Appendix G.

⁹ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

**TABLE 8.34
SELECTION CRITERIA APPLICATION
FOR AREA 1A**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide and site-specific)	2	2	1	5	2
Clearance to Depth	1	1	2	4	1

Note: Ranking from best to worst; best = 1, worst = 2

**TABLE 8.35
SELECTION CRITERIA APPLICATION
FOR AREA 4A**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	3	3	1	7	3
Surface Clearance	2	2	2	6	2
Clearance to Depth	1	1	3	5	1

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.36
SELECTION CRITERIA APPLICATION
FOR AREA 4B**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	2	2	1	5	2
Clearance to Depth	1	1	2	4	1

Note: Ranking from best to worst; best = 1, worst = 2

**TABLE 8.37
SELECTION CRITERIA APPLICATION
FOR AREA 4C**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	2	2	1	5	2
Clearance to Depth	1	1	2	4	1

Note: Ranking from best to worst; best = 1, worst = 2

**TABLE 8.38
SELECTION CRITERIA APPLICATION
FOR AREA 4D**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	2	1	1	4	1
Clearance to Depth	1	2	2	5	2

Note: Ranking from best to worst; best = 1, worst = 2

**TABLE 8.39
SELECTION CRITERIA APPLICATION
FOR AREA 4E**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	1	1	1	3	1

Note: Ranking from best to worst; best = 1

**TABLE 8.40
SELECTION CRITERIA APPLICATION
FOR AREA 4**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	3	1	1	5	1
Surface Clearance	2	2	2	6	2
Clearance to Depth	1	3	3	7	3

Note: Ranking from best to worst; best = 1, worst = 3

**TABLE 8.41
SELECTION CRITERIA APPLICATION
FOR LAKEVIEW SUBDIVISION**

Alternatives	Effectiveness	Implementability	Cost	Total	Rank
Institutional Controls (site-wide)	2	2	1	5	2
Clearance to Depth	1	1	2	4	1

Note: Ranking from best to worst; best = 1, worst = 2

CHAPTER 9

RECOMMENDED RESPONSE ACTION ALTERNATIVES

9.1 INTRODUCTION

9.1.1 UXO/OE response action alternatives were evaluated for each of the AOIs within the former Camp Butner Site that were investigated during this EE/CA investigation. Each potential alternative was initially screened against the general evaluation criteria of effectiveness, implementability, and cost. The screening of alternatives detailed in Chapter 7 was used to identify candidate UXO/OE response alternatives for further qualitative evaluation as tabulated in Chapter 8. Site-wide IC components were evaluated and selected as presented in Appendix F. As a result of the comprehensive evaluation of alternatives by AOI, the following paragraphs present the recommendations for implementation.

9.1.2 A recommendation of implementation of site-wide IC only (no removal at this time) has been deemed appropriate for several areas (Area 4, Area 4D, and Area 4E). The presence of UXO was confirmed either during the EE/CA or inferred based on the presence of HE projectile fragments in these areas but current and future anticipated land use, terrain, exposure pathways, and other factors (outlined in Chapter 4) indicate a removal action is not justified at the present time. However, to ensure public safety associated with the existing residential component in each of these areas, a subsurface removal action is recommended (comprising a two-acre residential footprint) encompassing each existing dwelling. The depth of the removal action will be based on the EE/CA findings but as a general rule all anomalies identified by the geophysical equipment will be excavated. The cost associated with each residential removal action within the IC sectors is estimated as \$32,367 (per 2 acres), as detailed in Appendix G. Following property owner request, USACE will request funds for implementation of the removal action.

9.2 RECOMMENDATIONS

9.2.1 Area 1A

9.2.1.1 Presently, the 20 acres comprising Area 1A are undeveloped with no current land use assignment. The property *is not* within an area deed-restricted for "surface use only" following military occupation and property transfer. Future plans at this AOI include land use for recreational activities and the passage of a greenway / trail system. Recently obtained information also indicates plans for a day care facility and other development within, and adjacent to, this property. During the EE/CA

investigation, two UXO items were recovered including a Mk II hand grenade and a M4 practice landmine with spotting charge and fuze. A total of 5 OE scrap items identified as inert/expended M15 hand grenades were recovered at this AOI. Both UXO items and all OE scrap were found at 10 inches or less bgs.

9.2.1.2 EE/CA findings suggest that former military land use included grenade training (in addition to flamethrower training) and confirmed the risk of UXO explosive hazards within Area 1A. As discussed in Subchapter 7.5.3, the majority of residual UXO (if not all) is anticipated to be subsurface and extend to a depth of ten inches bgs. ***Therefore, the Subsurface Clearance and Institutional Controls (site-wide) alternatives are both recommended as the OE response alternative for implementation at Area 1A.*** The estimated cost to implement the subsurface clearance alternative for Area 1A is \$448,618. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.2 Area 4A

9.2.2.1 Area 4A, comprising approximately 34 acres, has been parceled in anticipation of residential development and is actively being marketed. Although currently most of the land remains wooded and undeveloped, some grading and tree removal has been initiated. The ASR and TEC report indicates former military use of this general area as a bazooka and rifle grenade range. Area 4A falls entirely within the boundary of the area deed-restricted for "surface use only" (see paragraph 2.3.6) following military occupation and property transfer. The single UXO and majority of OE scrap items recovered from this AOI were associated with 2.36-inch rockets. The only other ordnance type recovered from the AOI was a single OE scrap item identified as a component of an M9 rifle grenade. All ordnance related items were recovered within 6 inches bgs. ✓

9.2.2.2 The EE/CA findings concurred with ASR designation of the AOI. Based on the types of ordnance found and those historically reported in this area, depth of penetration is not anticipated to exceed 6 inches bgs (Subchapter 7.6.3.1). ***Therefore, the Subsurface Clearance to Depth and Institutional Controls (site-wide) alternatives are both recommended as the OE response alternative for implementation at Area 4A. In addition, considering the imminent residential development, UXO construction support is warranted and will be provided to the new property owners at their request (provided sufficient advance notice).*** The estimated cost to implement the subsurface clearance alternative for Area 4A is \$654,622. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance. In the interim, it is recommended that CESAW issue "prudent man letters" to the new property owners and residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered.

9.2.3 Area 4B

9.2.3.1 Land use within the approximately 20 acres comprising Area 4B is dedicated to farming, with future land use anticipated to remain the same. Findings

reported in the ASR refer to former military use of this AOI for bazooka and rifle grenade training (similar to Area 4A). Area 4B falls entirely within the boundary of the area deed-restricted for "surface use only" (see paragraph 2.3.6) following military occupation and property transfer. Findings made during the EE/CA investigation included one UXO identified as a 2.36-inch rocket (recovered at 18 inches bgs) and four OE scrap items identified as HE fragments recovered within 6 inches bgs. Other findings include the reported discovery of numerous inert 2.36-inch rockets made by one of the property owners in recent years as well as during the EE/CA investigation.

9.2.3.2 Based on the types of ordnance found and historically reported in this area, depth of penetration is not expected to exceed 6 inches bgs. The recovery of the 2.36-inch HE bazooka rocket (UXO) at 18 inches bgs in a wooded area is not considered indicative of the vertical extent of contamination. However due to intrusive farming activities (e.g. tilling) over a portion of the AOI, the top layer of soil is regularly being turned over which potentially affects the vertical distribution of and contact with residual UXO/OE. Per the property owner, tilling at this AOI only penetrates the top ten inches of soil. *Therefore, the Subsurface Clearance to Depth and Institutional Controls (site-wide) alternatives are both recommended as the OE response alternative for implementation within the agriculturally used portion of Area 4B (approximately 10 acres). No removal action within the undeveloped balance of the 20 acre AOI is warranted at this time. For the two existing homesteads identified within the AOI, a 2-acre subsurface removal action (per homestead) will be conducted encompassing the primary residential footprint.* If conditions at this AOI significantly change, re-evaluation will be conducted as part of the recurring review process (Chapter 10). In the interim, it is recommended that CESAW issue "prudent man letters" to both residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered. The estimated cost to implement the subsurface clearance alternative for Area 4C is \$199,159. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.4 Area 4C

9.2.4.1 Land use in the approximately 126-acre Area 4C is divided into low density residential development (8 total dwellings) in the southern half and undeveloped woodland in the northern half. Based on the current status of development in this area, future additional development is anticipated, particularly in the southern region. Analysis of TEC historic aerial photographs identifies suspect impact craters within the borders of Area 4E. The ASR and verified structural remnants indicate Area 4C was the location of the mock German village, an artillery target area. As a result, Area 4C falls within the boundary of the area deed-restricted for "surface use only" (see paragraph 2.3.6) following military occupation and property transfer. One UXO (105mm projectile) recovered at 3 inches bgs and approximately 217 pounds of HE projectile fragments were removed from this AOI. Other findings by an adjacent property owner in the southern portion of the AOI include one 105mm projectile and one 155mm projectile.

9.2.4.2 During the screening process several factors were assessed in the determination of the most suitable response action in Area 4C. These factors include land use, vertical extent of contamination, and associated costs with a UXO/OE removal action over 126-acre site. Initial, consideration was given to the different land uses for this AOI which can be divided at the power line easement into residential and undeveloped. Based on the ordnance type identified in this area and potential of exposure for local inhabitants, a removal action is recommended for the southern half of the AOI where the eight residential dwellings currently exist. ***Therefore, the Subsurface Clearance to Depth and Institutional Controls (site-wide) alternatives are both recommended as the OE response alternative for implementation within readily accessible and open residential parcels located within the southern half (estimated to encompass approximately 16 acres). In addition, UXO construction support is warranted and should be provided to the residential property owners at their request (provided sufficient advance notice).*** The estimated cost to implement the subsurface clearance alternative for Area 4C is \$352,999. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.4.3 Due to the current lack of development and limited public access, the northern half of Area 4C does not warrant the same level of clearance as is recommended for the southern half. ***Considering the potential for residential development, UXO construction support is warranted and should be provided to the property owners at their request (provided sufficient advance notice).*** In the interim, it is recommended that CESA issue "prudent man letters" to all the property owners and residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered.

9.2.5 Area 4D

9.2.5.1 Area 4D (comprised of approximately 453 acres) is largely wooded and generally undeveloped. The majority of the AOI is owned by a single owner/family who has indicated he plans to retain the property for some indefinitely. The residential component is low-density with only six established residential dwellings known to exist within the AOI. In addition, this area has limited near-term development potential due to poor infrastructure and minimal frontage along primary roads. Signs of logging activities have been observed at the southern portion of the AOI. The only UXO item recovered from this AOI was a 37mm projectile recovered at a depth of 2 inches bgs. A total of 27 OE scrap items were also recovered ranging from depths from 0 to 10 inches bgs. ✓

9.2.5.2 The findings from this EE/CA investigation, supported by archival evidence, confirm that the AOI is within a likely impact area. However, Area 4D ***does not*** fall within the boundary of an area deed-restricted for "surface use only" (see paragraph 2.3.6) following military occupation and property transfer. A number of factors were considered in the determination of the most suitable response action alternative for this AOI which included: limited public access; generally passive site activities (hunting and hiking); continuation of similar future land use; and unlikelihood

for additional residential development. *Therefore, the implementation of site-wide Institutional Controls will provide the necessary public awareness of the former military use of Area 4D to residents and workers in the area and no removal action is warranted at this time. For the six existing homesteads identified within the AOI, a 2-acre subsurface removal action (per homestead) will be conducted encompassing the primary residential footprint.* If conditions at this AOI significantly change, re-evaluation will be conducted as part of the recurring review process (Chapter 10). In the interim, it is recommended that CESAW issue “prudent man letters” to all residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered. Costs associated with the Area 4F residential removal action are estimated at \$194,202. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.6 Area 4E

Area 4E is a parcel of land dedicated primarily to the farming of tobacco. Similar land use is anticipated to continue in the future. A single 37mm projectile was recovered from the AOI at 1 inch bgs as well as a single piece of OE scrap (both from the same sample grid). The AOI is located within the firing fan for the historical 37mm range, however, its orientation is adjacent to the firing point. Therefore it is unlikely that firing targets were present within Area 4E. The lack of EE/CA findings supports this assertion. Additionally, Area 4E falls almost entirely within the boundary of the area deed-restricted for “surface use only” (see paragraph 2.3.6) following military occupation and property transfer. *Therefore, the implementation of site-wide Institutional Controls will provide the necessary public awareness of the former military use of Area 4E to residents, hunters, and workers in the area and no removal action is warranted at this time. For the five existing homesteads identified within the AOI, a 2-acre subsurface removal action (per homestead) will be conducted encompassing the primary residential footprint.* If conditions at this AOI significantly change, re-evaluation will be conducted as part of the recurring review process (Chapter 10). In the interim, it is recommended that CESAW issue “prudent man letters” to all residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered. Costs associated with the Area 4E residential removal action are estimated at \$32,367. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.7 Area 4

Land use in Area 4, comprised of 21,139 acres, is primarily dedicated to agriculture and forestry, with low density residential development spread along the main roads. Portions of Area 4 fall within the boundary of the areas deed-restricted for “surface use only” (see paragraph 2.3.6) following military occupation and property transfer. No UXO was recovered within the boundaries of this AOI. A total of 5 UXO items and 1118 OE scrap items were identified during the intrusive investigation. Because the majority of the AOI is privately owned, public access is limited or restricted throughout much of this

AOI. *Therefore, the implementation of site-wide Institutional Controls will provide the necessary public awareness of the former military use of Area 4 to residents, hunters, and workers in the area and no removal action is warranted at this time. For the existing homesteads identified within the AOI (estimated to be nearly 225), a 2-acre subsurface removal action (per homestead) will be conducted encompassing the primary residential footprint.* In the interim, it is recommended that CESA issue "prudent man letters" to all residents within the AOI advising them of the potential presence of UXO on their property and appropriate actions to take if UXO is encountered. Costs associated with the Area 4 residential removal action are estimated at \$7,282,575. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance. ✓

9.2.8 Area 5

Land use in Area 5, comprised of approximately 13,672 acres, is diverse and includes agriculture, institutional, recreational, and residential. No UXO was recovered from this AOI. A solitary OE scrap item identified as a landmine pressure plate was recovered at ground surface; however it is not considered indicative of UXO/OE presence at this AOI. Although no findings were made in support of UXO/OE presence, the most prudent response action includes the implementation of a public awareness program in Area 5. *Therefore, the implementation of Institutional Controls (site-wide) should provide the necessary public awareness of the former military use of Area 5 to residents, hunters, and workers in the area.*

9.2.9 TCRA Lakeview USAESCH Recommendation

During the EE/CA investigation UXO was encountered within the Lakeview Subdivision. In addition, several UXO items have been reported to local officials and required military EOD response. However, the AOI *does not* fall within the boundary of the area deed-restricted for "surface use only" (see paragraph 2.3.6) following military occupation and property transfer. Based on the UXO findings a TCRA was conducted which removed UXO from the ground surface to a depth of six inches bgs. Considering the residential land use and the diversity of UXO and OE scrap encountered, the potential presence of residual UXO in the subsurface remains. *Therefore, the Subsurface Clearance to Depth and Institutional Controls (site-wide) alternatives are both recommended as the OE response alternative for implementation within the Lakeview Subdivision. Digital mapping of the 26-acre site conducted following completion of the six inch removal was evaluated by USAESCH (Appendix B). USAESCH recommended an iterative removal action centered around the areas showing high residual anomaly concentrations with criteria for stopping based on lack of UXO presence. However, in order to ensure the subdivision property owner's confidence that their property is safe, investigation and removal of all anomalies within the 26-acre site is recommended.* The estimated cost to implement the subsurface clearance alternative for the Lakeview Subdivision is \$363,612. Site-wide IC costs are estimated at \$80,750 with \$10,500 annual maintenance.

9.2.10 MMR Divisions

As discussed in subparagraph 2.6.9, the former Camp Butner was divided into five primary ranges as part of a range inventory in the 2003 Supplemental ASR. Therefore, the summary of recommended clearance costs has been presented to coincide with these new designations. Similarly, separate Action Memorandum(s) will be prepared for each MMR range following the preparation of this Final EE/CA Report. Area 1A falls entirely within the designated "Flamethrower Range". The MMR designated "Range Complex 1" encompasses Area 4A, Area 4B, Area 4D, and Area 4E. Area 4C falls within "Range Complex 2". Area 4 falls within the confines of both Range Complex 1 and Range Complex 2.

**Table 9.1
Summary of Recommended Alternatives and Clearance Costs**

MMR Range /Site	Recommended Action	Clearance Acreage	Cost
FLAMETHROWER RANGE			
Site 1A	Subsurface Clearance to Depth	20	\$448,618
<i>SUBTOTAL - FLAMETHROWER RANGE</i>			<i>\$448,618</i>
RANGE COMPLEX 1			
Site 4A	Subsurface Clearance to Depth	34	\$654,622
Site 4B	Subsurface Clearance to Depth (10 agricultural acres only)	10	\$199,159
Site 4D	Site-Wide Institutional Controls	NA	NA
<i>Residential</i>	<i>Residential Footprint Clearance to Depth 6 Dwellings</i>	12	<i>\$194,202</i>
Site 4E	Site-Wide Institutional Controls	NA	NA
<i>Residential</i>	<i>Residential Footprint Clearance to Depth 1 Dwelling</i>	2	<i>\$32,367</i>
Site 4 (South of Enon)	Site-Wide Institutional Controls	NA	NA
<i>Residential</i>	<i>Residential Footprint Clearance to Depth 140 Dwellings</i>	280	<i>\$4,531,380</i>
Lakeview Subdivision	Subsurface Clearance to Depth	26	\$373,374
<i>SUBTOTAL - RANGE COMPLEX 1</i>			<i>\$5,985,104</i>
RANGE COMPLEX 2			
Site 4C	Subsurface Clearance to Depth (16 acres residential only)	16	\$352,999
Site 4 (North of Enon)	Site-Wide Institutional Controls	NA	NA
<i>Residential</i>	<i>Residential Footprint Clearance to Depth 85 Dwellings</i>	170	<i>\$2,751,195</i>
<i>SUBTOTAL - RANGE COMPLEX 2</i>			<i>\$3,104,194</i>

Table 9.1 (Continued)
Summary of Recommended Alternatives and Clearance Costs

MMR Range /Site	Recommended Action	Clearance Acreage	Cost
Site 5	Site-Wide Institutional Controls	NA	NA
Site-Wide IC	NA	NA	\$80,750/\$10,500 year
Total			\$9,618,666 \$10,500 year

*Number of residential dwellings as of July 3, 2003 per County records.
 Removal action to consist of clearance to depth for a 2-acre residential footprint around each existing dwelling. Cost is estimated at \$32,367 per 2-acre residential removal, as detailed in Appendix G and in 2004 dollars.

CHAPTER 10

RECURRING REVIEWS

10.1 FOLLOW-ON ACTIVITIES

10.1.1 Follow-on activities associated with the former Camp Butner Site will be conducted by the USACE in the form of recurring reviews. The recurring review process is consistent with Section 121(c) of CERCLA, as amended by SARA, and Section 300.430 (f) (4) (ii) of the NCP. Recurring review, as outlined by these statutes, requires that periodic (at least every five years) reviews be conducted for sites where hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions.

10.1.2 Recurring reviews will be conducted at the former Camp Butner Site to:

- Ensure that public health, safety, and the environment are being protected by the response actions that were implemented.
- Verify the integrity of any site controls.
- Determine if new information has become available that was not available for consideration during the EE/CA that may warrant further action.
- Determine if there is an immediate threat to the public or environment that may require an Accelerated Response.
- Review decision for Technical Impracticability to determine if new technology will address explosives safety risk.

10.1.3 The recurring review team will gather data to determine if any changes within AOIs are relevant and may affect the prior recommendations of the EE/CA. Changes to be evaluated consist of:

- Physical conditions of the AOI.
- Public accessibility and land use.
- New technology or techniques that have become available and may warrant reconsideration of the EE/CA recommendations.
- Effectiveness of the response action to reduce risk.

10.1.4 Data gathered during the review process will be used to determine if further action needs to be taken to protect public safety and the human environment. If no changes have taken place, the AOIs will continue to be monitored at the specified intervals. At the completion of the review, a Recurring Review Report will be prepared, a public notice will be placed in the local newspaper concerning the continued effectiveness of the OE response action, and a formal Decision Document referencing any actions taken will be prepared.

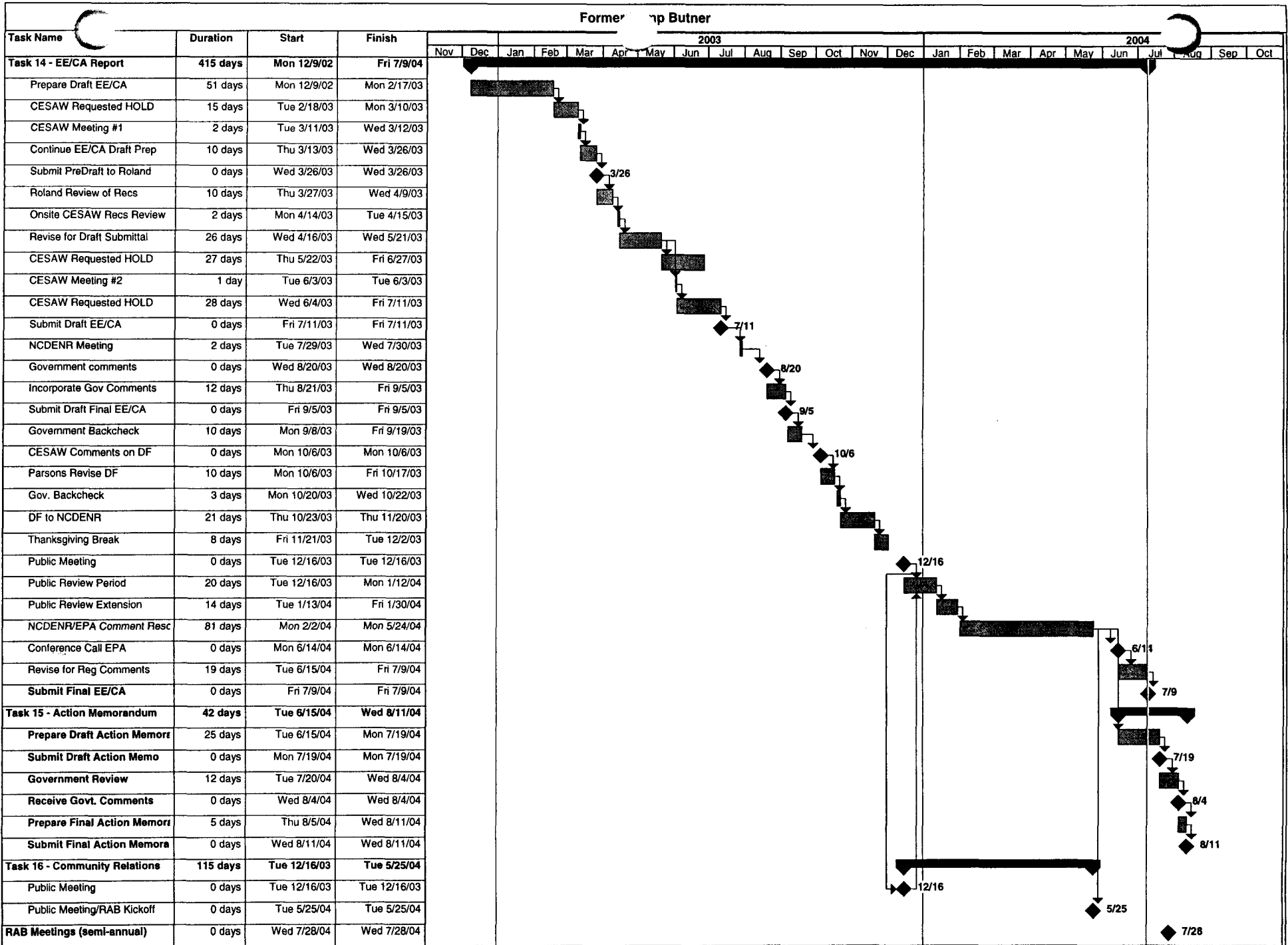
10.1.5 The initial recurring review will be scheduled by the government after the completion of the removal action phase to address the issues and evaluate the data as described above. The estimated cost for the site visit and review procedures is expected to be \$35,000.

CHAPTER 11 REFERENCES

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APPENDIX A
STATEMENT OF WORK



Project: Camp Butner EE/CA Date: Fri 7/9/04	Task		Summary		Rolled Up Progress		Split		External Milestone	
	Progress		Rolled Up Task		External Tasks		Rolled Up Split		Deadline	
	Milestone		Rolled Up Milestone		Project Summary		External Milestone			

**APPENDIX A
ANNEX ___**

**SCOPE OF WORK
FOR
ORDNANCE AND EXPLOSIVE (OE)
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
AT
THE FORMER CAMP BUTNER
DURHAM, NORTH CAROLINA**

**10 December 2001
Revised 16 August 2002**

General Comment 16 August 2002. The purpose of this modification is to have the contractor coordinate and pay for evacuation of local residents to be placed in local hotels for the day or days they are asked to evacuate their homes while the contractor is performing intrusive investigations within the frag radius of peoples homes. \$2,500 is the amount of this mod and will be increased if and as required.

General Comment: 10 December 2001. The purpose of this task order is to add additional in scope effort to the Butner EECA started under Contract DACA87-95-D-0018 Task Order 0067. That old Parsons contract is at its monetary limit and can not be added to. This task order will be under contract DACA87-00-D-0038 and will be for additional funds needed for tasks 6, 8, 9 and 17 only. All future modifications involving funding increases will be on this new task order and not on the old contract.

1.0 BACKGROUND AND OBJECTIVE

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2.0 INTRODUCTION

2.1 Background.

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- Grenade Training Area - 5 acres
- Ammunition Training Range and Impact Area - 21,950 acres
- Remaining Land - 10,372 acres

3.0 SPECIFIC REQUIREMENTS

3.1 **(Task 1) Not Used**

3.2 **(Task 2) Not Used**

3.3 **(Task 3) Not Used**

3.4 **(Task 4) Not Used**

3.5 **(Task 5) Not Used**

3.6 **Site Characterization.** The A-E shall characterize the site by implementing the work described in the Project Work Plans. Three things must be done to accomplish this. First the AE must prepare the surface, identify any surface OE and remove any UXO. Secondly, the AE must prepare a Geophysical Test Plot to establish methods of investigation and select proper equipment. The final step is to perform geophysical mapping. This work includes but is not necessarily limited to the following :

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The A-E shall, utilizing qualified personnel, implement site OE sampling as specified in the approved work plan. All aspects of the activities related to this task shall be reported in a weekly field activity report including DRMO turn in forms. This task shall be accomplished as follows:

3.7.1 OE Access, Evaluation and Management.

The A-E shall perform UXO sampling as described in the approved Work Plan. The A-E shall provide all necessary qualified personnel and equipment to perform surface and subsurface UXO sampling, evaluation and management.

3.7.2 Investigating Anomalies.

3.7.2.1 The A-E shall investigate anomalies identified by the geophysical investigations and as directed by the Contracting Officer. The A-E shall, using qualified UXO personnel, determine whether the UXO can be moved or destroyed in-place. This is a safety-driven decision that will be based solely on DoD munitions safety standards and requirements.

3.7.2.2 Evacuation of local residents. In conjunction with the Corps of Engineers, the contractor will coordinate evacuations with local residents trying to work while the home owner or others are not present but if required will pay for hotel rooms or other accommodations for the day or days required to dig anomalies in areas affecting that persons home.

3.7.3 OE Scrap Disposal.

The A-E shall be responsible for the destruction, if required, of all UXO and subsequent disposal of all scrap encountered during site investigations. This will be done utilizing qualified personnel in accordance with the approved Work Plan. The A-E shall establish in the Work Plan a method of disposal, if required, for all OE.

3.7.4 Backfilling Excavations.

All access/excavation/detonation holes shall be back-filled by the A-E. The A-E shall restore such areas to their prior condition.

3.7.5 OE Accountability.

The A-E shall maintain a detailed accounting of all OE items/components encountered. This accounting shall include the amounts of OE, the identification and condition, depth located, disposition and location. The accounting system shall also account for all demolition materials utilized to detonate OE on-site. This accounting shall be a part of an appendix to the EE/CA report.

3.7.5.1 DD Form 1348-1A.

The A-E shall complete a DD Form 1348-1A as turn-in documentation. Instructions for completing this form are contained in the Defense Utilization and Disposal Manual, DoD 4160.21-M. The Senior UXO Supervisor shall sign a certificate as follows:

"I certify 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."

DRMO turn-in documentation receipts shall be submitted as an appendix to the EE/CA Report.

3.7.5.2 UXO Quality Control (QC) Specialist.

UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC Specialist shall meet the minimum prerequisites of an UXO Supervisor and have the training, knowledge and experience necessary to implement the A-E's QC plan as outlined in DID OT-025. The Contracting Officer must approve any exceptions.

3.7.6 Quality Assurance Sampling Areas.

In order to evaluate the effectiveness of the geophysical investigation and evaluation methods utilized by the A-E, the Contracting Officer may direct an independent contractor provided by the Government or may provide Government personnel to independently map, locate and access some detected subsurface anomalies as deemed necessary.

3.8 (Task 10) Not Used

3.9 (Task 11) Not Used

3.10 (Task 12) Not Used

3.11 (Task 13) Not Used

3.12 (Task 14) Not Used

3.13 (Task 15) Not Used

3.14 (Task 16) Not Used

3.15 (Task 17) Meetings and Project Management. The A-E shall perform project management functions, as necessary to maintain project control and to meet required reporting requirements. This task will be in conjunction with task 17 in Contract DACA87-95-D-0018 task order 0067.

4.0 SUBMITTALS AND CORRESPONDENCE

4.1 Format and Content of Engineering Reports. Engineering Reports presenting all data, analyses, and recommendations shall be prepared and submitted by the A-E. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. When drawings are required, data may be combined to reduce the number of drawings. Reports shall consist of 8-1/2 inch by 11-inch pages with drawings other than the construction drawing folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers for each submittal shall consist of durable 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the site, the A-E, the Corps of Engineers District, Huntsville Center, and the date. The A-E identification shall not dominate the title page. All data, including raw analytical and electronic data, generated under this delivery order are the property of the DoD and the Government has unlimited rights regarding its use.

4.2 Computer Files. All final text files generated by the A-E under this contract shall be furnished to the Contract Officer in MS Word 6.0 or higher software, IBM PC compatible format. All final CADD/GIS data, design drawings and survey data generated by the A-E under this delivery order shall be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the Huntsville Center CADD/GIS workstations. All maps, figures, drawings or tables shall be conveyed on either 3-1/2 " HD floppy disks or PC CD-ROM. PC CD ROM is the preferred format for all electronic submittals.

4.3 HTML Deliverables. In addition to the paper and digital copies of submittals identified above, the final version of the EE/CA and the Action Memorandum shall be submitted, uncompressed, on one floppy disk or CD ROM in hypertext markup language (HTML) along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures included and suitable for viewing on the Internet. The contractor shall post the draft and final versions of the work plan, EECA report and Action Memo on the Web.

4.4 Review Comments. Various reviewers will have the opportunity to review submittals made by the A-E under this contract. The A-E shall review all comments received through the CEHNC Project Manager and evaluate their appropriateness based upon their merit and the requirements of the SOW. The A-E shall issue to the Project Manager a formal, annotated response to each in accordance with the schedule in paragraph 4.13

4.5 Draft Reports. Each page of draft reports shall be stamped "DRAFT". Submittals shall include incorporation and notation of all previous review comments accepted by the A-E.

4.6 Identification of Responsible Personnel. Each report shall identify the specific members and title of the A-E's staff and subcontractors that had significant, specific input into the reports' preparation or review. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.7 Minutes of Meetings. Following the presentation, the A-E shall prepare and submit minutes of all meetings attended to the Contract Officer or his representative within 10 calendar days.

4.8 Correspondence. The A-E shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this IDO. A summary of the phone conversations and written correspondence shall be submitted with the monthly progress report to the Contract Officer.

4.9 Project Control and Reporting. The A-E shall prepare and submit a master network schedule (using Microsoft "Project" software), cost and manpower plan, monthly progress reports, technical progress reports, monthly individual performance reports and cost/schedule variance report, work task proposal plan, and a program control plan.

4.10 Monthly Progress Report. The A-E shall prepare and submit a monthly progress report describing the work performed since the previous report, work currently underway and work anticipated. This report shall show the earned value curves for the amount of funds obligated, planned and actually spent to date on the project. This will allow the continuous tracking of the actual cost versus the proposed cost at the beginning of the project. 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 anticipated in order to get back on-schedule. The report shall be submitted not later than the 10th day of the following month.

4.11 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 site conditions to the local Corps District's Public Affairs Office, with a copy furnished to the CEHNC Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the A-E, unless authorized by the Contract Officer, is prohibited.

4.12 Addresses. The following addresses shall be used in mailing submittals:

<u>ADDRESSEE</u>	<u>QUANTITY</u>
Commander US Army Corps of Engineers, Huntsville Center ATTN: CEHNC-OE-DC (Roland Belew) P.O. Box 1600 Huntsville, Alabama 35807-4301	8
Commander U.S. Army Corps of Engineers, Wilmington District ATTN: CESA W-PM-C (John Baden) P.O. Box 1890 Wilmington, North Carolina, 28240-1890	8
Commander U.S. Army Corps of Engineers, South Atlantic Division ATTN: CESAD-PM (Sharon Taylor) 77 Forsyth St Atlanta, Georgia 30335-6801	1

Others TBD

4.13 Schedule and Submittals. The A-E shall submit all deliverable data to the Contract Officer and other reviewers shown in Paragraph 4.12 in accordance with the following schedule. All submittals shall be delivered to all addressees no later than the close of business on the day indicated in this paragraph. In addition, submittals to regulatory reviewers shall be shipped by registered mail or other method where a signed receipt is obtained indicating the date received and the individual accepting the submittal.

<u>DOCUMENT</u>	<u>DATE DUE</u>
ASSHP	5 days prior to Site Visit
Site Visit	Upon notice to KO
Site Visit Letter Report	3 working days after site visit
WTP	20 Days after site visit
EE/CA Work Plan, Draft	45 days after NTP
EE/CA Work Plan, Draft Final comments	10 working days after receipt of Gov.

Geophysical Equipment Test Report	TBD
EE/CA Work Plan, Final Report	TBD but after Geo. Equipment Test
Government Grants approval to commence field work.	TBD
Weekly Field Report *	Every Monday for the previous week
Monthly Progress Report	NLT 10th of the following month
Risk Evaluation & QC Report, Draft	TBD
Risk Evaluation & QC Report, Final	TBD
EE/CA Report, Draft	TBD
EE/CA Report, Final	TBD
Draft Action Memorandum	TBD
Public Meeting	TBD
Final Action Memorandum & Responsiveness Summary	TBD
Project Meeting, Alabama	TBD
Project Meeting, North Carolina	TBD
Minutes of Meetings	NLT 10 days after each meeting

The overall completion date of this delivery order is TBD.

5.0 SAFETY AND HEALTH PROGRAM

The A-E shall develop and maintain a Health and Safety Program (HSP) in compliance with the requirements of OSHA standards 29CFR1910.120(b)(1) through (b) (4). The A-E shall provide written certification the HSP has been submitted to the CO and make the HSP available upon request by the Government. The SSHP required by 29CFR1910.120(b)/29CFR1926.65(b)(4), and as defined by DID OT-005-06, shall be prepared and submitted with the Work Plan for approval. On-site activities shall not commence until the plan has been reviewed and accepted. The A-E's Site Safety and Health Officer (SSHO) shall have the training, knowledge and experience necessary to implement the SSHP and have the same minimum qualifications as an UXO Supervisor.

6.0 REFERENCES.

- 6.1 National Contingency Plan, 40 CFR 300.
- 6.2 Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.
- 6.3 Army Corps of Engineers Safety and Health Requirements Manual, EM-385-1-1, 3 September 1996.
- 6.4 Army Corps of Engineers, ER-385-1-92, Appendix B, Safety and Occupational Health Document Requirements for Hazardous Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities, 18 March 1994.
- 6.5 Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 1910.120/29CFR1926.65-"Hazardous Waste Site Operations and Emergency Response."
- 6.6 NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985. (DHHS(NIOSH) Publication No. 85-115).
- 6.7 CEHNC 1115-3-86, "Ordnance and Explosives Cost-Estimating Risk Tool (OECert) Standing Operating Procedure (SOP)", November 1996.
- 6.8 Explosives Safety Submission format, CEHNC, October 1998.

6.9 Explosives Safety Submission format, CEHNC, October 1998.

The following references are available on the CEHNC Web Page at <http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html>

- 6.10 CEHNC Data Item Description OE-001 000303 Type I Work Plan
- 6.11 CEHNC Data Item Description OE-005-02 000303 Technical Management Plan
- 6.12 CEHNC Data Item Description OE-005-03 000303 Explosives Management Plan
- 6.13 CEHNC Data Item Description OE-005-04 000303 Explosives Siting Plan
- 6.14 CEHNC Data Item Description OE-005-05 000303 Geophysical Mapping Plan
- 6.15 CEHNC Data Item Description OE-005-06 000303 Site Safety and Health Plan
- 6.16 CEHNC Data Item Description OE-005-07 000303 Location Surveys and Mapping Plan
- 6.17 CEHNC Data Item Description OE-005-08 000303 Work, Data, and Cost Management

- 6.18 CEHNC Data Item Description OE-005-09 000303 Property Management Plan
- 6.19 CEHNC Data Item Description OE-005-10 000303 Sampling and Analysis Plan
- 6.20 CEHNC Data Item Description OE-005-11 000303 Quality Control Plan
- 6.21 CEHNC Data Item Description OE-005-12 000303 Environmental Protection Plan
- 6.22 CEHNC Data Item Description OE-005-13 000303 Investigative Derived Waste Plan
- 6.23 CEHNC Data Item Description OE-005-14 000320 Geographical Information System Plan
- 6.24 CEHNC Data Item Description OE-010 000303 Engineering Evaluation/Cost Analysis (EE/CA)
Report
- 6.25 CEHNC Data Item Description OE-015 000303 Accidents/Incidents Reports
- 6.26 CEHNC Data Item Description OE-025 000303 Personnel/Work Standards
- 6.27 CEHNC Data Item Description OE-030 000303 Site Specific Removal Report
- 6.28 CEHNC Data Item Description OE-040 000303 Disposal Feasibility Report
- 6.29 CEHNC Data Item Description OE-045 000303 Report/Minutes, Record of Meetings
- 6.30 CEHNC Data Item Description OE-055 000303 Telephone Conversation/Correspondence Records
- 6.31 CEHNC Data Item Description OE-060 000303 Conventional Explosives Safety Submission
- 6.32 CEHNC Data Item Description OE-080 000303 Monthly Status Report
- 6.33 CEHNC Data Item Description OE-085 000303 Weekly Status Report
- 6.34 CEHNC Data Item Description OE-090 990427 Ordnance Filler Report
- 6.35 CEHNC Data Item Description OE-100 000303 Analysis of Institutional Controls

7.0 GOVERNMENT-FURNISHED.

- 7.1 Right-of-entry.
- 7.2 Available maps.
- 7.3 Not used.

7.3 Not used.

**APPENDIX A
ANNEX ___**

**SCOPE OF WORK
FOR
ORDNANCE AND EXPLOSIVE (OE)
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
AT
THE FORMER CAMP BUTNER
DURHAM, NORTH CAROLINA**

10 December 2001

General Comment: The purpose of this task order is to add additional inscope effort to the Butner EECA started under Contract DACA87-95-D-0018 Task Order 0067. That old Parsons contract is at its monetary limit and can not be added to. This task order will be under contract DACA87-00-D-0038 and will be for additional funds needed for tasks 6, 8, 9 and 17 only. All future modifications involving funding increases will be on this new task order and not on the old contract.

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3.7 (Task 9) Intrusive Investigations (OE Sampling).

The A-E shall, utilizing qualified personnel, implement site OE sampling as specified in the approved work plan. All aspects of the activities related to this task shall be reported in a weekly field activity report including DRMO turn in forms. This task shall be accomplished as follows:

3.7.1 OE Access, Evaluation and Management.

The A-E shall perform UXO sampling as described in the approved Work Plan. The A-E shall provide all necessary qualified personnel and equipment to perform surface and subsurface UXO sampling, evaluation and management.

3.7.2 Investigating Anomalies.

The A-E shall investigate anomalies identified by the geophysical investigations and as directed by the Contracting Officer. The A-E shall, using qualified UXO personnel, determine whether the UXO can be moved or destroyed in-place. This is a safety-driven decision that will be based solely on DoD munitions safety standards and requirements.

3.7.3 OE Scrap Disposal.

The A-E shall be responsible for the destruction, if required, of all UXO and subsequent disposal of all scrap encountered during site investigations. This will be done utilizing qualified personnel in accordance with the approved Work Plan. The A-E shall establish in the Work Plan a method of disposal, if required, for all OE.

3.7.4 Backfilling Excavations.

All access/excavation/detonation holes shall be back-filled by the A-E. The A-E shall restore such areas to their prior condition.

3.7.5 OE Accountability.

The A-E shall maintain a detailed accounting of all OE items/components encountered. This accounting shall include the amounts of OE, the identification and condition, depth located, disposition and location. The accounting system shall also account for all demolition materials utilized to detonate OE on-site. This accounting shall be a part of an appendix to the EE/CA report.

3.7.5.1 DD Form 1348-1A.

The A-E shall complete a DD Form 1348-1A as turn-in documentation. Instructions for completing this form are contained in the Defense Utilization and Disposal Manual, DoD 4160.21-M. The Senior UXO Supervisor shall sign a certificate as follows:

"I certify 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."

DRMO turn-in documentation receipts shall be submitted as an appendix to the EE/CA Report.

3.7.5.2 UXO Quality Control (QC) Specialist.

UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC Specialist shall meet the minimum prerequisites of an UXO Supervisor and have the training, knowledge and experience necessary to implement the A-E's QC plan as outlined in DID OT-025. The Contracting Officer must approve any exceptions.

3.7.6 Quality Assurance Sampling Areas.

In order to evaluate the effectiveness of the geophysical investigation and evaluation methods utilized by the A-E, the Contracting Officer may direct an independent contractor provided by the Government or may provide Government personnel to independently map, locate and access some detected subsurface anomalies as deemed necessary.

3.8 (Task 10) Not Used

3.9 (Task 11) Not Used

3.10 (Task 12) Not Used

3.11 (Task 13) Not Used

3.12 (Task 14) Not Used

3.13 (Task 15) Not Used

3.14 (Task 16) Not Used

3.15 (Task 17) Meetings and Project Management. The A-E shall perform project management functions, as necessary to maintain project control and to meet required reporting requirements. This task will be in conjunction with task 17 in Contract DACA87-95-D-0018 task order 0067.

4.0 SUBMITTALS AND CORRESPONDENCE

4.1 Format and Content of Engineering Reports. Engineering Reports presenting all data, analyses, and recommendations shall be prepared and submitted by the A-E. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. When drawings are required, data may be combined to reduce the number of drawings. Reports shall consist of 8-1/2 inch by 11-inch pages with drawings other than the construction drawing folded, if necessary, to this

size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers for each submittal shall consist of durable 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the site, the A-E, the Corps of Engineers District, Huntsville Center, and the date. The A-E identification shall not dominate the title page. All data, including raw analytical and electronic data, generated under this delivery order are the property of the DoD and the Government has unlimited rights regarding its use.

4.2 Computer Files. All final text files generated by the A-E under this contract shall be furnished to the Contract Officer in MS Word 6.0 or higher software, IBM PC compatible format. All final CADD/GIS data, design drawings and survey data generated by the A-E under this delivery order shall be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the Huntsville Center CADD/GIS workstations. All maps, figures, drawings or tables shall be conveyed on either 3-1/2 " HD floppy disks or PC CD-ROM. PC CD ROM is the preferred format for all electronic submittals.

4.3 HTML Deliverables. In addition to the paper and digital copies of submittals identified above, the final version of the EE/CA and the Action Memorandum shall be submitted, uncompressed, on one floppy disk or CD ROM in hypertext markup language (HTML) along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures included and suitable for viewing on the Internet. The contractor shall post the draft and final versions of the work plan, EECA report and Action Memo on the Web.

4.4 Review Comments. Various reviewers will have the opportunity to review submittals made by the A-E under this contract. The A-E shall review all comments received through the CEHNC Project Manager and evaluate their appropriateness based upon their merit and the requirements of the SOW. The A-E shall issue to the Project Manager a formal, annotated response to each in accordance with the schedule in paragraph 4.13

4.5 Draft Reports. Each page of draft reports shall be stamped "DRAFT". Submittals shall include incorporation and notation of all previous review comments accepted by the A-E.

4.6 Identification of Responsible Personnel. Each report shall identify the specific members and title of the A-E's staff and subcontractors that had significant, specific input into the reports' preparation or review. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.7 Minutes of Meetings. Following the presentation, the A-E shall prepare and submit minutes of all meetings attended to the Contract Officer or his representative within 10 calendar days.

4.8 Correspondence. The A-E shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this IDO. A summary of the phone conversations and written correspondence shall be submitted with the monthly progress report to the Contract Officer.

4.9 Project Control and Reporting. The A-E shall prepare and submit a master network schedule (using Microsoft "Project" software), cost and manpower plan, monthly progress reports, technical progress reports, monthly individual performance reports and cost/schedule variance report, work task proposal plan, and a program control plan.

4.10 Monthly Progress Report. The A-E shall prepare and submit a monthly progress report describing the work performed since the previous report, work currently underway and work anticipated. This report shall show the earned value curves for the amount of funds obligated, planned and actually spent to date on the project. This will allow the continuous tracking of the actual cost versus the proposed cost at the beginning of the project. 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 anticipated in order to get back on-schedule. The report shall be submitted not later than the 10th day of the following month.

4.11 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 site conditions to the local Corps District's Public Affairs Office, with a copy furnished to the CEHNC Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the A-E, unless authorized by the Contract Officer, is prohibited.

4.12 Addresses. The following addresses shall be used in mailing submittals:

ADDRESSEE	QUANTITY
Commander US Army Corps of Engineers, Huntsville Center ATTN: CEHNC-OE-DC (Roland Belew) P.O. Box 1600 Huntsville, Alabama 35807-4301	8
Commander U.S. Army Corps of Engineers, Wilmington District ATTN: CESA W-PM-C (John Baden) P.O. Box 1890 Wilmington, North Carolina, 28240-1890	8
Commander U.S. Army Corps of Engineers, South Atlantic Division ATTN: CESAD-PM (Sharon Taylor) 77 Forsyth St Atlanta, Georgia 30335-6801	1

Others TBD

4.13 Schedule and Submittals. The A-E shall submit all deliverable data to the Contract Officer and other reviewers shown in Paragraph 4.12 in accordance with the following schedule. All submittals shall be delivered to all addressees no later than the close of business on the day indicated in this paragraph. In addition, submittals to regulatory reviewers shall be shipped by registered mail or other method where a signed receipt is obtained indicating the date received and the individual accepting the submittal.

<u>DOCUMENT</u>	<u>DATE DUE</u>
ASSHP	5 days prior to Site Visit
Site Visit	Upon notice to KO
Site Visit Letter Report	3 working days after site visit
WTP	20 Days after site visit
EE/CA Work Plan, Draft	45 days after NTP
EE/CA Work Plan, Draft Final	10 working days after receipt of Gov.
comments	
Geophysical Equipment Test Report	TBD
EE/CA Work Plan, Final	TBD but after Geo. Equipment Test
Report	
Government Grants approval to commence field work.	TBD
Weekly Field Report *	Every Monday for the previous week
Monthly Progress Report	NLT 10th of the following month
Risk Evaluation & QC Report, Draft	TBD
Risk Evaluation & QC Report, Final	TBD
EE/CA Report, Draft	TBD
EE/CA Report, Final	TBD
Draft Action Memorandum	TBD
Public Meeting	TBD
Final Action Memorandum & Responsiveness Summary	TBD

Project Meeting, Alabama
Project Meeting, North Carolina
Minutes of Meetings

TBD
TBD
NLT 10 days after each meeting

The overall completion date of this delivery order is TBD.

5.0 SAFETY AND HEALTH PROGRAM

The A-E shall develop and maintain a Health and Safety Program (HSP) in compliance with the requirements of OSHA standards 29CFR1910.120(b)(1) through (b) (4). The A-E shall provide written certification the HSP has been submitted to the CO and make the HSP available upon request by the Government. The SSHP required by 29CFR1910.120(b)/29CFR1926.65(b)(4), and as defined by DID OT-005-06, shall be prepared and submitted with the Work Plan for approval. On-site activities shall not commence until the plan has been reviewed and accepted. The A-E's Site Safety and Health Officer (SSHO) shall have the training, knowledge and experience necessary to implement the SSHP and have the same minimum qualifications as an UXO Supervisor.

6.0 REFERENCES.

- 6.1 National Contingency Plan, 40 CFR 300.
- 6.2 Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.
- 6.3 Army Corps of Engineers Safety and Health Requirements Manual, EM-385-1-1, 3 September 1996.
- 6.4 Army Corps of Engineers, ER-385-1-92, Appendix B, Safety and Occupational Health Document Requirements for Hazardous Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities, 18 March 1994.
- 6.5 Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 1910.120/29CFR1926.65-"Hazardous Waste Site Operations and Emergency Response."
- 6.6 NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985. (DHHS(NIOSH) Publication No. 85-115).
- 6.7 CEHNC 1115-3-86, "Ordnance and Explosives Cost-Estimating Risk Tool (OECert) Standing Operating Procedure (SOP)", November 1996.
- 6.8 Explosives Safety Submission format, CEHNC, October 1998.

6.9 Explosives Safety Submission format, CEHNC, October 1998.

The following references are available on the CEHNC Web Page at <http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html>

- 6.10 CEHNC Data Item Description OE-001 000303 Type I Work Plan
- 6.11 CEHNC Data Item Description OE-005-02 000303 Technical Management Plan
- 6.12 CEHNC Data Item Description OE-005-03 000303 Explosives Management Plan
- 6.13 CEHNC Data Item Description OE-005-04 000303 Explosives Siting Plan
- 6.14 CEHNC Data Item Description OE-005-05 000303 Geophysical Mapping Plan
- 6.15 CEHNC Data Item Description OE-005-06 000303 Site Safety and Health Plan
- 6.16 CEHNC Data Item Description OE-005-07 000303 Location Surveys and Mapping Plan
- 6.17 CEHNC Data Item Description OE-005-08 000303 Work, Data, and Cost Management
- 6.18 CEHNC Data Item Description OE-005-09 000303 Property Management Plan
- 6.19 CEHNC Data Item Description OE-005-10 000303 Sampling and Analysis Plan
- 6.20 CEHNC Data Item Description OE-005-11 000303 Quality Control Plan
- 6.21 CEHNC Data Item Description OE-005-12 000303 Environmental Protection Plan
- 6.22 CEHNC Data Item Description OE-005-13 000303 Investigative Derived Waste Plan
- 6.23 CEHNC Data Item Description OE-005-14 000320 Geographical Information System Plan
- 6.24 CEHNC Data Item Description OE-010 000303 Engineering Evaluation/Cost Analysis (EE/CA) Report
- 6.25 CEHNC Data Item Description OE-015 000303 Accidents/Incidents Reports
- 6.26 CEHNC Data Item Description OE-025 000303 Personnel/Work Standards
- 6.27 CEHNC Data Item Description OE-030 000303 Site Specific Removal Report
- 6.28 CEHNC Data Item Description OE-040 000303 Disposal Feasibility Report
- 6.29 CEHNC Data Item Description OE-045 000303 Report/Minutes, Record of Meetings

- 6.30 CEHNC Data Item Description OE-055 000303 Telephone Conversation/Correspondence Records
- 6.31 CEHNC Data Item Description OE-060 000303 Conventional Explosives Safety Submission
- 6.32 CEHNC Data Item Description OE-080 000303 Monthly Status Report
- 6.33 CEHNC Data Item Description OE-085 000303 Weekly Status Report
- 6.34 CEHNC Data Item Description OE-090 990427 Ordnance Filler Report
- 6.35 CEHNC Data Item Description OE-100 000303 Analysis of Institutional Controls

7.0 GOVERNMENT-FURNISHED.

- 7.1 Right-of-entry.
 - 7.2 Available maps.
 - 7.3 Not used.
-
- 7.3 Not used.

**APPENDIX A
ANNEX ___**

**SCOPE OF WORK
FOR
ORDNANCE AND EXPLOSIVE (OE)
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
AT
THE FORMER CAMP BUTNER
DURHAM, NORTH CAROLINA**

20 March 2000

1.0 BACKGROUND AND OBJECTIVE

1.1 The objective of this delivery order is for the A-E to perform an Engineering Evaluation/Cost Analysis (EE/CA). The effort shall result in the characterization of ordnance and explosives (OE) according to nature, location and concentration, provide a description of the OE related problems affecting human use of the site, identify and analyze reasonable risk management alternatives and provide a convenient record of the process for use in final decision making and judicial review, if necessary. The effort shall allow and document meaningful stakeholder participation. The A-E is expected to use geophysical techniques to identify anomalies in the subsurface for subsequent OE sampling. The A-E shall conduct OE sampling and render safe any uncovered UXO and dispose of the UXO and other scrap uncovered during the OE sampling effort.

1.2 OE is a safety hazard and constitutes an imminent and substantial endangerment to site personnel and the local population. This action will be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; the National Contingency Plan (NCP). In accordance with the above, no federal, state or local permits are required nor will be obtained for actions, include on-site destruction of unexploded ordnance (UXO), that may be required. However, substantive permit requirements shall be fulfilled. In addition, all activities involving work in areas potentially containing unexploded ordnance hazards shall be conducted in full compliance with CEHNC, USACE, DA and DoD requirements regarding personnel, equipment and procedures. 29 CFR 1910.120 shall apply to all actions taken at this site.

1.3 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program (DERP) and the Formerly Used Defense Site (FUDS) program. Ordnance and Explosives (OE) may exist on property that was formerly owned, used or controlled by the Department of Defense. The framework underlying this response is the National Contingency Plan (NCP).

1.4 Others will accomplish the Archeological Survey to identify potential archeological sites. The Government will provide this survey for the A-E to consider in preparing the Work Plan. The A-E shall provide awareness training to all personnel involved with fieldwork, as outlined in the approved Work Plan.

1.5 Others will identify endangered/threatened species of concern. The Government will provide information that identifies areas of concern. The A-E shall consider this information in preparing the Work Plan. The A-E shall provide awareness training to all personnel involved with the field investigation. Work shall comply with the National Environmental Policy Act (NEPA).

2.0 INTRODUCTION

2.1 Background.

Camp Butner, a former U.S. Army installation, was located in the north central part of North Carolina in the counties of Granville, Durham and Person. Authorized for construction in 1942, the Camp, occupying approximately 40,384 acres, was officially activated in August 1942. The Camp was established for training of infantry divisions and miscellaneous artillery and engineer units within the Fourth Services Command, the Army Ground Forces. In addition to the troop cantonment area, the reservation included at least 15 ammunition training ranges, a 1000-inch small arms ammunition range, hand grenade ranges, a gas chamber, flame-thrower training range, a small arms training range and ammunition shipping, receiving and storage areas. Additionally, the Camp supported a large hospital and a prisoner of war camp.

Currently, the former Camp area is comprised of an area used by the North Carolina National Guard (approximately 4750 acres), areas of private agricultural and commercial use and various community/state/federal agency activities such as corrections, farming, natural and human services/resources, commerce, crime control and university/college involvement.

2.2 Site Definition. The "site" consists of all areas previously under DoD control except for the current National Guard area. This will amount to approximately 35,600 acres.

2.3 Chemical Warfare Material (CWM). CWM activities were associated with the training activities at Camp Butner. Items that may be present include gas identification kits, decontaminating agents and CWM munitions. Based on the lack of specific documentation citing CWM use, the site is not suspected to contain Chemical Warfare Materiel (CWM). However, if suspect CWM is encountered during any phase of site activities the A-E shall withdraw upwind from the work area, secure the site and contact CEHNC.

2.4 Areas To Be Evaluated. The areas identified below are to be evaluated under this SOW. Evaluation efforts shall be completed in cooperation with project stakeholders, which include the landowners, the Government, interested regulatory agencies, and others that may be identified prior to work plan finalization.

- Cantonment Area and vicinity - 3300 acres
- Ammunition Storage Area and Dump - 7 acres
- Grenade Training Area - 5 acres
- Ammunition Training Range and Impact Area - 21,950 acres
- Remaining Land - 10,372 acres

3.0 SPECIFIC REQUIREMENTS

3.1 (Task 1) Site Visit & Records Review. The A-E shall make a site visit, review pertinent records (see Paragraph 6.0) and interview personnel knowledgeable of site conditions. The purpose of this task is to permit the A-E's staff with direct project responsibility to gain necessary information about site conditions. It is not intended that this task be a "records locating task" where new information is located or developed. Prior to the site visit the A-E must obtain a Government approved Abbreviated Site Safety and Health Plan (ASSHP). A qualified UXO specialist must escort site visitors to areas potentially contaminated with OE. The A-E shall ensure that the site visit is fully coordinated and that all members of the site visit team maintain compliance with the ASSHP. A site visit letter report shall be provided to the Contracting Officer after the site visit.

3.2 (Task 2) Work Task Proposal. The A-E shall develop a work task proposal (WTP) to describe and plan the accomplishment of the related activities described in this SOW. Prior to initiating work on any task, the A-E shall submit, for Government concurrence, a WTP. The proposal shall be submitted to the Contracting Officer (CO) for review and concurrence. The WTP shall describe the work to be accomplished, recommendations on approach, coordination, organization, methods, personnel, schedule and estimated budget. The WTP shall identify the various elements of the work plans. The WTP is intended to be a brief description of the A-E's understanding of the proposed work.

3.3 (Task 3) - EE/CA Work Plan. The A-E shall prepare an EE/CA Work Plan in accordance with DID OT-005-01. The A-E shall include the following aspects in Chapter 10 of the work plan.

Quality Control Plan (QCP) and Quality Assurance. The A-E shall describe the A-E's Quality Control and the expected Government's Quality Assurance roles and responsibilities for this project. Note that the Contractor is responsible for developing and implementing only the project QCP. The Government will perform Quality Assurance. However, the plan shall describe both activities. The QCP shall specifically address digital data delivered in the OE GIS data standard format with communications, transmissions and receipt by the various participants. A flow chart may be used to identify the data collection, analysis, storage, transfer and QA/QC process to generate the final dig-sheets. The A-E shall ensure that the corporate quality policy is understood, implemented, and maintained at all levels in the organization. The A-E shall propose a system to manage, control, and document the performance of these tasks. The Quality Control Plan shall include:

- Location Surveying and Mapping QC,
- Geophysical QC,
- Data QC: digital data (communications; transmissions and receipt), along with all analog data

(administrative; contractual; survey and geophysical field notes).
GIS System QC
Anomaly reacquisition QC
Variance of surface & subsurface influence on geophysical data output across the site.

The most critical component in this project is the geophysical data. The Contractor shall perform continuous tracking, checks, representations, adjustments and visualization of the field data daily for quality control and to establish efficient field procedures. In addition a portion (approximately 2 to 4%) of the site shall be resurveyed and analyzed and compared to the previous results by the Government. The methodology to accomplish the quality control shall be proposed in the WP in accordance with Chapter 5 of the CX OE Quality Management Plan, dated 28 November 1994, which identifies the minimum QC activities. The QC activities shall be documented and included in the final investigation report. **Note: The Geophysical Test Plot (Task 7) shall be completed simultaneously with the Work Plan preparation so that the geophysical instrumentation recommendations can be incorporated into the Plan.**

3.4 (Task 4) Location Surveys and Mapping. The A-E shall perform topographic and location surveys as described in the approved Work Plan and in accordance with DID OT-005-07.

3.5 (Task 5) Establishment and Management of GIS. The A-E shall take the GIS Tri-Service Spatial Data Standard data, manual, file, and database structures from the Huntsville Center Ordnance GIS standard and apply it to this project. The Government will provide a digital copy of the required data structure. The standard will be used to create project-specific GIS for the specific OE investigative needs of this site. The GIS shall be assembled and used to direct the daily geophysical investigative activities and to compile and analyze the daily digital data into the GIS. Any changes from the standard shall be proposed to the contracting officer with fully documented changes and the reason or benefit of the proposed change. The A-E shall establish and manage the GIS as described in the approved Work Plan and in accordance with approved DID (currently being written).

3.6 Site Characterization. The A-E shall characterize the site by implementing the work described in the Project Work Plans. Three things must be done to accomplish this. First the AE must prepare the surface, identify any surface OE and remove any UXO. Secondly, the AE must prepare a Geophysical Test Plot to establish methods of investigation and select proper equipment. The final step is to perform geophysical mapping. This work includes but is not necessarily limited to the following :

3.6.1 (Task 6) Surface Preparation, OE Identification and Removal. The A-E shall provide all necessary qualified personnel and equipment to perform surface preparation, as well as surface OE identification, removal and disposal on the sampling grids (total sampling area to be proposed by the contractor). The A-E shall perform the minimum amount of work necessary to clear the areas of vegetation, surface OE and OE scrap where these impede the progress, effectiveness or safety of the geophysical investigation team. Trees two inches in diameter or greater shall not be cut unless specifically approved in writing by the Government. All OE-related activities shall be performed in accordance with applicable sections of the approved work plan.

3.6.2 (Task 7) Geophysical Test Plot. The A-E shall design and construct a test plot at the site to verify that the geophysical methods, equipment and procedures based upon the results of the Geophysical Test Plot are best suited to the site and data collection requirements. During proveout, the A-E shall coordinate with CEHNC to ensure that a CEHNC representative will be on site for verification and quality assurance. The A-E shall use the information gathered in this phase of work to evaluate the relative efficiencies of potentially appropriate geophysical investigation procedures. Various procedures must be defined such as, but not limited to, daily equipment standardization, data quality checks and data error resolution process. Afterwards, the A-E shall propose specific geophysical methods, equipment and personnel appropriate and necessary to accomplish the required geophysical investigations. The results of the test shall be documented in a letter report and submitted to the Government for concurrence. The A-E shall incorporate the appropriate methods and equipment into the work plan once Government concurrence is received.

3.6.3 (Task 8) Geophysical Investigation. The total cumulative area to be geophysically investigated and evaluated under this SOW shall be proposed in the work task proposal by the contractor. Actual number and location of grids may increase or decrease from that proposed based upon conditions encountered in the field, if so directed by the Contracting Officer. All aspects of anomaly evaluation, selection, and dig-sheet production shall be routinely reported in a weekly field activity report. See section 4.0 for additional reporting requirements and schedule.

3.6.3.1 Evaluation. After the site is geophysically mapped, the A-E shall utilize a qualified geophysicist to check and evaluate the geophysical data collected. The geophysicist shall make a professional determination regarding the identification of anomalies at the site. Based on this determination, the A-E shall provide a "dig-sheet" showing predicted location and character of all suspected anomalies to the CEHNC Project Manager and OE support staff. In addition, the A-E shall continually compare predicted results with actual results so that the A-E's geophysical evaluation methodology is constantly refined over the life of the project.

3.6.3.2 Anomaly Selection. Note that not all geophysical anomalies meeting the criteria to be considered a potential UXO will be dug. Representative anomalies will be excavated in order to characterize geophysical anomalies and to provide information necessary to estimate location, concentration and nature of UXO present at the site. The A-E shall propose methodology for selection of anomalies to be excavated. This might be based on OE calculator, percentages of anomalies, a specific number of excavations, anomaly apparent size, work-days, statistical approaches, or some other approach or combination of approaches. Also, the approach for individual anomalies might differ from the approach used for pits/trenches. Generally the Government expects more anomalies selected for sampling at the beginning of the effort with the amount of samples selected for digging reduced over the duration of the sampling effort. The particular approach for this project shall be described in the work plan.

3.6.3.3 Data Format and Storage.

The A-E shall utilize an appropriate data format and storage system for geophysical mapping data that is consistent with CEHNC computer/CADD systems in accordance with DID OT-005-05 and as described in the approved Work Plan. In addition the A-E shall maintain the data in such a way that the Government can remotely access any individual file or multiple files as necessary without day or time restrictions. See Section 4.0 for additional data requirements.

3.7 (Task 9) Intrusive Investigations (OE Sampling).

The A-E shall, utilizing qualified personnel, implement site OE sampling as specified in the approved work plan. All aspects of the activities related to this task shall be reported in a weekly field activity report including DRMO turn in forms. This task shall be accomplished as follows:

3.7.1 OE Access, Evaluation and Management.

The A-E shall perform UXO sampling as described in the approved Work Plan. The A-E shall provide all necessary qualified personnel and equipment to perform surface and subsurface UXO sampling, evaluation and management.

3.7.2 Investigating Anomalies.

The A-E shall investigate anomalies identified by the geophysical investigations and as directed by the Contracting Officer. The A-E shall, using qualified UXO personnel, determine whether the UXO can be moved or destroyed in-place. This is a safety-driven decision that will be based solely on DoD munitions safety standards and requirements.

3.7.3 OE Scrap Disposal.

The A-E shall be responsible for the destruction, if required, of all UXO and subsequent disposal of all scrap encountered during site investigations. This will be done utilizing qualified personnel in accordance with the approved Work Plan. The A-E shall establish in the Work Plan a method of disposal, if required, for all OE.

3.7.4 Backfilling Excavations.

All access/excavation/detonation holes shall be back-filled by the A-E. The A-E shall restore such areas to their prior condition.

3.7.5 OE Accountability.

The A-E shall maintain a detailed accounting of all OE items/components encountered. This accounting shall include the amounts of OE, the identification and condition, depth located, disposition and location. The accounting system shall also account for all demolition materials utilized to detonate OE on-site. This accounting shall be a part of an appendix to the EE/CA report.

3.7.5.1 DD Form 1348-1A.

The A-E shall complete a DD Form 1348-1A as turn-in documentation. Instructions for completing this form are contained in the Defense Utilization and Disposal Manual, DoD 4160.21-M. The Senior UXO Supervisor shall sign a certificate as follows:

"I certify 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."

DRMO turn-in documentation receipts shall be submitted as an appendix to the EE/CA Report.

3.7.5.2 UXO Quality Control (QC) Specialist.

UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC Specialist shall meet the minimum prerequisites of an UXO Supervisor and have the training, knowledge and experience necessary to implement the A-E's QC plan as outlined in DID OT-025. The Contracting Officer must approve any exceptions.

3.7.6 Quality Assurance Sampling Areas.

In order to evaluate the effectiveness of the geophysical investigation and evaluation methods utilized by the A-E, the Contracting Officer may direct an independent contractor provided by the Government or may provide Government personnel to independently map, locate and access some detected subsurface anomalies as deemed necessary.

3.8 (Task 10) Project Documentation. Project documentation including all correspondence generated by CEHNC will be given to the contractor monthly to scan onto CDs. This scanning is in addition to any documents that the contractor produces. The documentation will consist of but not be limited to all project correspondence both formal and email, contracts, modifications, and deliverables of all types. The purpose is to have a set of CDs at the end of the project that can be sorted to search for any document created on this project by the AE or by the Government. The AE shall propose in the work task proposal an estimate of pages that will be scanned based on past projects plus a unit price for any pages required about the estimate.

3.9 (Task 11) Technical Project Planning Recommendations. The A-E shall prepare a technical project-planning document for Camp Butner recommendations. This effort will be accomplished in four phases. These phases are; Phase I Identify Current Project, Phase II Determine Data Needs, Phase III Develop Data Collection Options, and Phase IV Finalize Data Collection Program. The goal of this effort is to start the project with the end or project closeout in mind. The A-E shall provide the following requirements or seek the appropriate input from others. The A-E shall facilitate all stakeholder input into finalizing the project recommendations. The Government will direct the A-E on any issues not resolved upon task completion. This task will involve 3 meetings to meet with stakeholders in the Raleigh Durham area. The contractor shall propose with 2 people for these 3 meetings lasting 2 days including travel.

3.9.1 Phase I, Identify Current Project & develop a Conceptual Site Model. The A-E shall identify:

The A-E shall identify the decision makers (USACE, land owner(s), regulatory agencies).

The A-E shall identify Project Objectives which includes the decision makers' perspectives and community needs and interests.

The A-E shall identify site constraints and dependencies.

The A-E shall identify Legal and regulatory constraints

The A-E shall identify Conceptual Site Model (known impact areas, disposal sites, other OE issues; all potential types of UXO expected at the site; geological setting; estimate of maximum probable depth for sampling).

The A-E shall identify a site closeout statement for each land use category or sector as appropriate. The closeout statement shall consider the current and future land use, incorporate local initiatives, enlist community support, and encourage recurring reviews. The closeout statement may identify more than one process to achieve site closure. The closeout statement shall identify decision points associated with each desired process.

3.9.2 Phase II, Data Needs. Data must be collected to address the decision point requirements. The A-E shall identify the data need requirements, intended use of the data, and appropriate sampling and analysis methods, and state data quality objectives for each data type. Some types of site data required may include, but is not limited to, physical nature of the site, regulatory framework, demographics, land use and nature and extent of UXO. The A-E must define the data needs, evaluate the usability of existing data, and identify the data gaps that must be filled. Generally this phase must document:

- "Who" needs the data?
- "What" data is needed?
- "What" project objectives will the data help to satisfy?
- "What" is the intended data uses?
- "What" number of samples is required to satisfy the intended uses?
- "What" are the performance requirements?
- "Where" is the area/location/depth of interest?

3.9.3 Phase III, Data Collection Options. The A-E shall develop and document data collection and analysis strategies. Items that should be presented include sampling strategy constraints, use of probabilistic or non-probabilistic sampling, and use of field screening and analysis techniques. Data types and needs should be categorized as screening data or definitive data. Data quality should be defined for each data type which is based upon the intended use of the data and accepted practices. Once the data "world" is defined for the project each data set shall be classified as "basic" (required data), "optimum" (data would facilitate better decisions and is cost effective to gather), and "excessive" (data would be nice to have but may not be worth the cost to gather the data)

3.9.4 Phase IV, Data Collection Program Design. The A-E shall present the data collection program requirements as options and schedules with the budget effects for the various options. Other items such as constraints and uncertainties and regulatory factors must be presented. Qualitative and quantitative comparisons of data collection requirements shall be performed. The A-E must clearly present the "optimum" data collection plan that ties together the data need requirements, data sampling and analysis methods, and the intended use of the data to satisfy the requirements of the closeout statements established in Phase I into a viable and appropriate process for completing site closure.

3.10 (Task 12) Performance of an Institutional Analysis. The A-E shall perform an institutional analysis in accordance with CEHNC guidance.

3.11 (Task 13) Performance of an Impact Analysis.

3.11.1 The A-E shall refine the Qualitative Impact Analysis (QIA) model CEHNC developed for the Jefferson Proving Ground EE/CA to determine the baseline public exposure and the predicted risk reduction for the selected risk reduction option for any areas recommended for removal action as a result of this EE/CA. These refinements will include but are not limited to developing numerical scales (i.e. rather than using qualitative terms) and adapting the QIA model to address site-specific conditions at the Former Camp Butner. These refinements will be provided to CEHNC for approval before use. Although OECert will not be used for this task, the A-E shall write a risk report in accordance with the OE Cert Standing Operating Procedure that supports the EE/CA report and that determines the baseline public exposure and the resultant public exposure for each alternative under consideration.

3.11.2 Site UXO Statistical Report. As part of the risk evaluation report the A-E shall write a statistical report that shows how the UXO densities were determined. The A-E shall use the UXO Calculator methodology for determining a range of sector densities unless the Government has approved an alternate statistical method.

3.12 (Task 14) Prepare EE/CA Report.

The A-E shall prepare and submit an EE/CA report fully documenting the field work and subsequent evaluations and recommendations made by the A-E. The textual portions of the report shall be fully supported with accompanying maps, charts, and tables as necessary to fully describe and document all work performed and all conclusions and recommendations presented.

3.13 (Task 15) Prepare Action Memorandum. The A-E shall, based upon close consultation with the Contracting Officer, prepare an Action Memorandum in accordance with applicable CEHNC guidance documents.

3.14 (Task 16) Community Relations Support. The A-E shall attend and participate in public meetings as directed by the Contract Officer. The support shall include preparation and delivery of briefings, graphics and presentations, and participation in site visits. The actions are independent of the field activities that involve interaction with the community.

3.15 (Task 17) Meetings and Project Management. The A-E shall perform project management functions, as necessary to maintain project control and to meet required reporting requirements. The contractor shall plan on 8 two person meetings of 3 days each including travel over the life of this task order. 4 trips to Huntsville and 4 Trips to the site are anticipated. These meetings are in addition to any meeting / trip requirements of Task 11.

4.0 SUBMITTALS AND CORRESPONDENCE

4.1 Format and Content of Engineering Reports. Engineering Reports presenting all data, analyses, and recommendations shall be prepared and submitted by the A-E. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. When drawings are required, data may be combined to reduce the number of drawings. Reports shall consist of 8-1/2 inch by 11-inch pages with drawings other than the construction drawing folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers for each submittal shall consist of durable 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the site, the A-E, the Corps of Engineers District, Huntsville Center, and the date. The A-E identification shall not dominate the title page. All data, including raw analytical and electronic data, generated under this delivery order are the property of the DoD and the Government has unlimited rights regarding its use.

4.2 Computer Files. All final text files generated by the A-E under this contract shall be furnished to the Contract Officer in MS Word 6.0 or higher software, IBM PC compatible format. All final CADD/GIS data, design drawings and survey data generated by the A-E under this delivery order shall be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the Huntsville Center CADD/GIS workstations. All maps, figures, drawings or tables shall be conveyed on either 3-1/2 " HD floppy disks or PC CD-ROM. PC CD ROM is the preferred format for all electronic submittals.

4.3 HTML Deliverables. In addition to the paper and digital copies of submittals identified above, the final version of the EE/CA and the Action Memorandum shall be submitted, uncompressed, on one floppy disk or CD ROM in hypertext markup language (HTML) along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures included and suitable for viewing on the Internet. The contractor shall post the draft and final versions of the work plan, EECA report and Action Memo on the Web.

4.4 Review Comments. Various reviewers will have the opportunity to review submittals made by the A-E under this contract. The A-E shall review all comments received through the CEHNC Project Manager and evaluate their appropriateness based upon their merit and the requirements of the SOW. The A-E shall issue to the Project Manager a formal, annotated response to each in accordance with the schedule in paragraph 4.13

4.5 Draft Reports. Each page of draft reports shall be stamped "DRAFT". Submittals shall include incorporation and notation of all previous review comments accepted by the A-E.

4.6 Identification of Responsible Personnel. Each report shall identify the specific members and title of the A-E's staff and subcontractors that had significant, specific input into the reports' preparation or review. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.7 Minutes of Meetings. Following the presentation, the A-E shall prepare and submit minutes of all meetings attended to the Contract Officer or his representative within 10 calendar days.

4.8 Correspondence. The A-E shall keep a record of each phone conversation and written correspondence affecting decisions relating to the performance of this IDO. A summary of the phone conversations and written correspondence shall be submitted with the monthly progress report to the Contract Officer.

4.9 Project Control and Reporting. The A-E shall prepare and submit a master network schedule (using Microsoft "Project" software), cost and manpower plan, monthly progress reports, technical progress reports, monthly individual performance reports and cost/schedule variance report, work task proposal plan, and a program control plan.

4.10 Monthly Progress Report. The A-E shall prepare and submit a monthly progress report describing the work performed since the previous report, work currently underway and work anticipated. This report shall show the earned value curves for the amount of funds obligated, planned and actually spent to date on the project. This will allow the continuous tracking of the actual cost versus the proposed cost out the beginning of the project. 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 anticipated in order to get back on-schedule. The report shall be submitted not later than the 10th day of the following month.

4.11 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 site conditions to the local Corps District's Public Affairs Office, with a copy furnished to the CEHNC Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the A-E, unless authorized by the Contract Officer, is prohibited.

4.12 Addresses. The following addresses shall be used in mailing submittals:

<u>ADDRESSEE</u>	<u>QUANTITY</u>
Commander US Army Corps of Engineers, Huntsville Center ATTN: CEHNC-OE-DC (Roland Belew) P.O. Box 1600 Huntsville, Alabama 35807-4301	8
Commander U.S. Army Corps of Engineers, Wilmington District ATTN: CESA-W-PM-C (John Baden) P.O. Box 1890 Wilmington, North Carolina, 28240-1890	8
Commander U.S. Army Corps of Engineers, South Atlantic Division ATTN: CESAD-PM (Sharon Taylor) 77 Forsyth St Atlanta, Georgia 30335-6801	1

Others TBD

4.13 Schedule and Submittals. The A-E shall submit all deliverable data to the Contract Officer and other reviewers shown in Paragraph 4.12 in accordance with the following schedule. All submittals shall be delivered to all addressees no later than the close of business on the day indicated in this paragraph. In addition, submittals to regulatory reviewers shall be shipped by registered mail or other method where a signed receipt is obtained indicating the date received and the individual accepting the submittal.

<u>DOCUMENT</u>	<u>DATE DUE</u>
ASSHP	5 days prior to Site Visit
Site Visit	Upon notice to KO
Site Visit Letter Report	3 working days after site visit
WTP	20 Days after site visit
EE/CA Work Plan, Draft	45 days after NTP
EE/CA Work Plan, Draft Final	10 working days after receipt of Gov. comments
Geophysical Equipment Test Report	TBD
EE/CA Work Plan, Final	TBD but after Geo. Equipment Test Report
Government Grants approval to commence field work.	TBD
Weekly Field Report *	Every Monday for the previous week
Monthly Progress Report	NLT 10th of the following month

Risk Evaluation & QC Report, Draft	TBD
Risk Evaluation & QC Report, Final	TBD
EE/CA Report, Draft	TBD
EE/CA Report, Final	TBD
Draft Action Memorandum	TBD
Public Meeting	TBD
Final Action Memorandum & Responsiveness Summary	TBD
Project Meeting, Alabama	TBD
Project Meeting, California	TBD
Minutes of Meetings	NLT 10 days after each meeting

The overall completion date of this delivery order is TBD.

5.0 SAFETY AND HEALTH PROGRAM

The A-E shall develop and maintain a Health and Safety Program (HSP) in compliance with the requirements of OSHA standards 29CFR1910.120(b)(1) through (b) (4). The A-E shall provide written certification the HSP has been submitted to the CO and make the HSP available upon request by the Government. The SSHP required by 29CFR1910.120(b)/29CFR1926.65(b)(4), and as defined by DID OT-005-06, shall be prepared and submitted with the Work Plan for approval. On-site activities shall not commence until the plan has been reviewed and accepted. The A-E's Site Safety and Health Officer (SSHO) shall have the training, knowledge and experience necessary to implement the SSHP and have the same minimum qualifications as an UXO Supervisor.

6.0 REFERENCES.

- 6.1 National Contingency Plan, 40 CFR 300.
- 6.2 Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.
- 6.3 Army Corps of Engineers Safety and Health Requirements Manual, EM-385-1-1, 3 September 1996.
- 6.4 Army Corps of Engineers, ER-385-1-92, Appendix B, Safety and Occupational Health Document Requirements for Hazardous Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities, 18 March 1994.
- 6.5 Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 1910.120/29CFR1926.65-"Hazardous Waste Site Operations and Emergency Response."
- 6.6 NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985. (DHHS(NIOSH) Publication No. 85-115).
- 6.7 CEHNC 1115-3-86, "Ordnance and Explosives Cost-Estimating Risk Tool (OECert) Standing Operating Procedure (SOP)", November 1996.
- 6.8 Explosives Safety Submission format, CEHNC, October 1998.

The following references are available on the CEHNC Web Page at <http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html>

- 6.9 CEHND-OE-CX, (28 NOV 94), OE Quality Management Plan.
- 6.10 CEHNC Data Item Description OT-005-01 990205 Work Plan
- 6.11 CEHNC Data Item Description OT-005-02 990205 Technical Management Plan
- 6.12 CEHNC Data Item Description OT-005-03 990205 Explosives Management Plan
- 6.13 CEHNC Data Item Description OT-005-04 990205 Explosives Siting Plan
- 6.14 CEHNC Data Item Description OT-005-05 990205 Geophysical Mapping Plan
- 6.15 CEHNC Data Item Description OT-005-06 990205 Site Safety and Health Plan
- 6.16 CEHNC Data Item Description OT-005-07 990205 Location Surveys and Mapping Plan
- 6.17 CEHNC Data Item Description OT-005-08 990205 Work, Data, and Cost Management
- 6.18 CEHNC Data Item Description OT-005-09 990205 Property Management Plan
- 6.19 CEHNC Data Item Description OT-005-10 990205 Sampling and Analysis Plan
- 6.20 CEHNC Data Item Description OT-005-11 990205 Quality Control Plan
- 6.21 CEHNC Data Item Description OT-005-12 990205 Environmental Protection Plan
- 6.22 CEHNC Data Item Description OT-005-13 990205 Investigative Derived Waste Plan
- 6.23 CEHNC Data Item Description OT-015 990205 Accidents/Incidents Reports

- 6.24 CEHNC Data Item Description OT-025 990205 Personnel/Work Standards
- 6.25 CEHNC Data Item Description OT-030 990205 Site Specific Removal Report
- 6.26 CEHNC Data Item Description OT-040 990205 Disposal Feasibility Report
- 6.27 CEHNC Data Item Description OT-045 990205 Report/Minutes, Record of Meetings
- 6.28 CEHNC Data Item Description OT-055 990205 Telephone Conversation/Correspondence Records
- 6.29 CEHNC Data Item Description OT-060 990205 Conventional Explosives Safety Submission
- 6.30 CEHNC Data Item Description OT-080 990205 Monthly Status Report
- 6.31 CEHNC Data Item Description OT-085 990205 Weekly Status Report
- 6.32 CEHNC Data Item Description OT-090 990427 Ordnance Filler Report

7.0 GOVERNMENT-FURNISHED.

- 7.1 Right-of-entry.
- 7.2 Available maps.
- 7.3 Not Used.
- 7.4 Personnel to perform controlled burns of the range if required. The HNC contractor must provide escorts.

APPENDIX B
USAESCH TCRA RECOMMENDATIONS REPORT

DRAFT
ANALYSIS OF GEOPHYSICAL MAPPING
TIME CRITICAL REMOVAL ACTION (TCRA)
for
LAKEVIEW SUBDIVISION - FORMER CAMP BUTNER
BUTNER, NORTH CAROLINA
16 May 2003

HISTORY OF LAKEVIEW SUBDIVISION

Lakeview Subdivision is located adjacent to the southeast corner of the North Carolina National Guard training facility near Butner, North Carolina, which was formerly a part of Camp Butner. Camp Butner previously comprised approximately 40,384 acres north of Durham, North Carolina. The facility was active for a few years during World War II and is now listed as a Formerly Used Defense Site (FUDS), which excludes the area currently encompassed by the North Carolina National Guard training facility. The Archives Search Report (ASR) indicates the western portion of Lakeview Subdivision was located within the eastern safety fan of a known firing fan for 60 and 81 mm mortars, which fired weapons from south to north, and was also slightly outside the southern safety fan for a 37 mm projectile range, which fired in a west to east orientation.

The present day Lakeview Subdivision area consists of six (6) residences situated on approximately sixteen acres, which is bordered on the east by Lake Holt (formerly Lake Butner), to the south by moderate to dense forest, to the west by forests of the North Carolina National Guard property, and to the north by pasture and several other residences. A current property survey superimposed on a 1945 aerial photo (refer to Figure 2.1 of the TCRA Report, a copy of same is attached) indicates the location of individual properties within the Lakeview Subdivision as well as the surrounding 100' buffer zone and adjacent properties.

During the Army Corps of Engineer's ordnance investigation in 2002, some sampling grids were placed on some residential property within the subdivision. One grid, placed on the Cash property, yielded a 37 mm high explosive projectile, which was very close to where the owner had previously found a 2.36-inch shoulder fired rocket a few months earlier. The Cash family and other residents of the subdivision requested something be done to clean up their property. This led to the award of a contract to Parsons Corporation, an engineering services contractor, who also specializes in performing ordnance investigations and recovery.

TIME CRITICAL REMOVAL ACTION (TCRA) SUMMARY

The U.S. Army Corps of Engineers contractor, Parsons, performed a Time Critical Removal Action (TCRA) at the Lakeview Subdivision in January and February 2003. A final clearance report was written by Parsons and is available for detailed information regarding the clearance activities conducted. Twenty-six (26) acres were investigated, which included sixteen (16) acres of the Lakeview Subdivision and a one hundred (100) foot buffer zone comprising ten (10) acres. The land was cleared using a magnetometer followed by digital geophysical mapping of the area. An analysis of the geophysical data collected by Parsons was done by Corps of Engineers geophysicists and is presented in this report along with recommendations for further action. All anomalies detected during the magnetometer search were investigated to a maximum depth of six (6) inches below ground surface (BGS) to mitigate the immediate hazard to residents of the subdivision and clear the shallow subsurface of any metallic objects, which could interfere with the subsequent geophysical mapping. A TCRA by regulation is implemented to remove the immediate threat to the population by doing a surface removal only followed by performance of an Engineering Evaluation Cost Analysis (EE/CA). After the EE/CA investigation is completed, a final long-term recommendation would be made. During this TCRA, a clearance was done to six (6) inches BGS because a 37mm high explosive projectile was found only three (3) inches deep near a child's play area. It is possible at that depth for small children to possibly dig up items while playing with toy shovels, etc. It was for this reason that the TCRA was scoped for a six (6) inch clearance. Finally, the Government felt that it would be prudent to geo-physically map the area after the removal action to get an indication of the degree of anomalies that remained below six (6) inches. All of these scoped actions were completed. Of the 8230 anomalies investigated during the magnetometer search, eighty (80) were described as OE scrap, six (6) were identified as UXO, and the remainder considered non-OE scrap. The recovered UXO items included a 37 mm HE projectile, two 2.36-inch bazooka rockets, a MKII hand grenade, an M1 mine fuze, and an electric blasting cap, which were all disposed by demolition. Refer to the Lakeview Subdivision TCRA Report for additional information related to specific project activities.

GEOPHYSICAL MAP INTERPRETATION

Corp of Engineer's personnel walked the Lakeview Subdivision area on 13 May 2003 with a map of all anomalies and marked on the map what clearly was not a suspect anomaly. Things like swing sets, water wells, utilities, and fences were noted. It was also noted that the roads within the Subdivision contained magnetic rock as can be observed on the attached geophysical maps. An aerial photo from 1945 details the locations of roads previously used by the military in the vicinity of Lakeview Subdivision. Of particular interest is the previous route of Lakeview Drive (Refer to Figure 2.1 of the TCRA Report, a copy of same is attached), which turned toward the north and crossed the western edge of the Cash Property instead of heading westward toward Roberts Chapel Road as the road is situated at present. Also shown on the aerial photo are several cleared areas adjoining Lakeview Drive, particularly two areas, one in the center of the Cash Property and the other immediately adjacent to the western edge of the Cash Property. These two

areas coincide with concentrated areas of geophysical anomalies, UXO, OE scrap, and non-OE related scrap detected in the northwest portion of the Lakeview Subdivision (primarily in the vicinity of the Cash Property) and associated buffer zone (west of the Cash Property) during the TCRA (refer to Figure 2.2, Figure 2.3, and Table 2.3 of the TCRA Report, copies of same are attached). The UXO, OE scrap, and non-OE related scrap items discovered during the TCRA appear to be concentrated along former roadways within the northwest portion of the Lakeview Subdivision. The UXO and OE scrap found in the Subdivision account for approximately 1% of the total anomalies detected and excavated. It is possible that in addition to impacts from fired weapons, some of the contamination in the vicinity of the Cash Property may be the result of periodic debris disposal at that time. Refer to the attached geophysical grid maps, which detail subsurface anomaly locations and annotated comments for anomalies identified as surface features.

CONCLUSION

The geophysical maps prepared subsequent to field activities confirm the presence of additional metallic debris concentrated within the immediate vicinity of the Cash Property with lesser amounts dispersed throughout the Lakeview Subdivision area. Review of the geophysical data collected, historical information, utility locations, surface feature maps, and the TCRA excavation results indicate the origin of recovered UXO, OE scrap, and non-OE scrap may be the result of periodic debris disposal in addition to fired projectiles. The majority of anomalies identified on the attached geophysical maps can be discounted through surface feature verification, subsurface utility locations, magnetic rocks, and/or construction debris from residential homes (refer to Figure 2.3 of the TCRA Report, a copy of same is attached). The only way to confirm the remaining anomalies are not UXO is to conduct a clearance to depth removal action beginning in the northwest corner of the site in the immediate vicinity of the Cash Property and proceeding grid by grid towards the south and east until no additional UXO are recovered. The property owner immediately north of the Cash Property denied Right of Entry access so additional delineation to the north is not considered possible at this time. Additional delineation to the west is also not possible since the Lakeview Subdivision abuts the active North Carolina National Guard Property. If no additional UXO are found within 200' south or east of Grids 334 and 358 (refer to Figure 2.2 of the TCRA report, a copy of same is attached), then the removal action for Lakeview Subdivision will be considered complete. If additional UXO are found the removal action shall continue until a 200' clear area is established. Additional investigation of the area surrounding Grid 375 is unwarranted considering the previous UXO found in that grid was an electric blasting cap, which was obviously dumped in that location and could not have been an overshoot from the aforementioned firing fans.

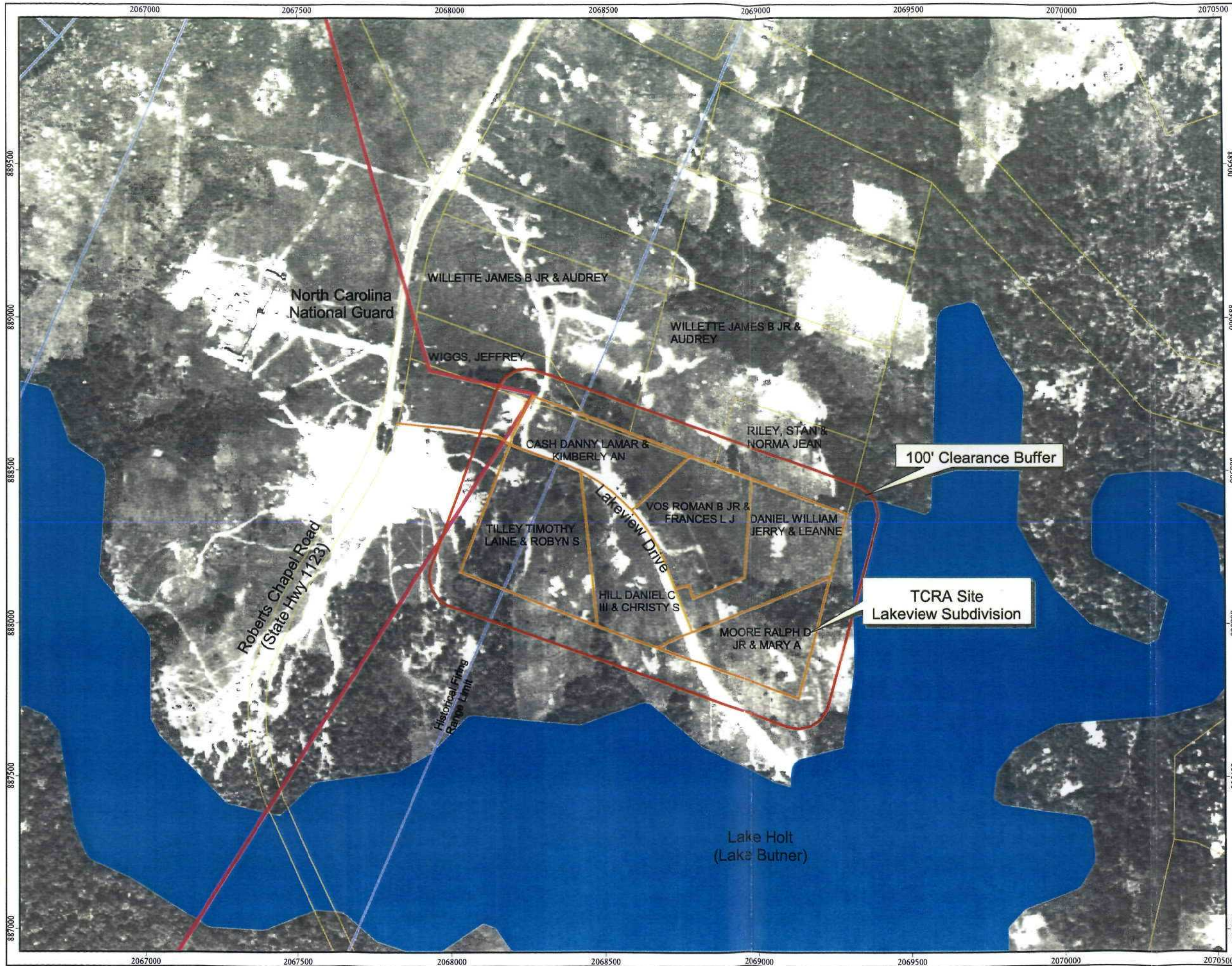
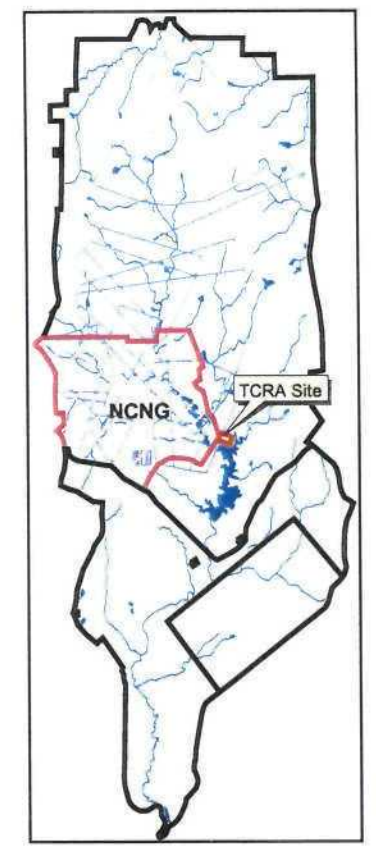


Figure 2.1
Former Camp Butner
Butner, NC

Index Map



Legend

- 100' TCRA Clearance Buffer
- North Carolina National Guard
- Historical Firing Fan Limit
- Stream and Waterbody

Image Source: 1945 Aerial Photo from TEC, US Army Engineer Research & Development Center

Map Units: NAD 1983 North Carolina State Plane (Feet)

100 0 100 200 300 Feet



PARSONS U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE

DESIGNED BY: BT	Time Critical Removal Action Lakeview Subdivision (1945 Aerial Photo)		
DRAWN BY: BT			
CHECKED BY: DS	SCALE: 1 inch equals 300 feet	PROJECT NUMBER: 742752	
SUBMITTED BY: DS	DATE: April 2003	PAGE NUMBER: 2-19	
	FILE: x:\gis\738001\av_project\TCRA.apr		

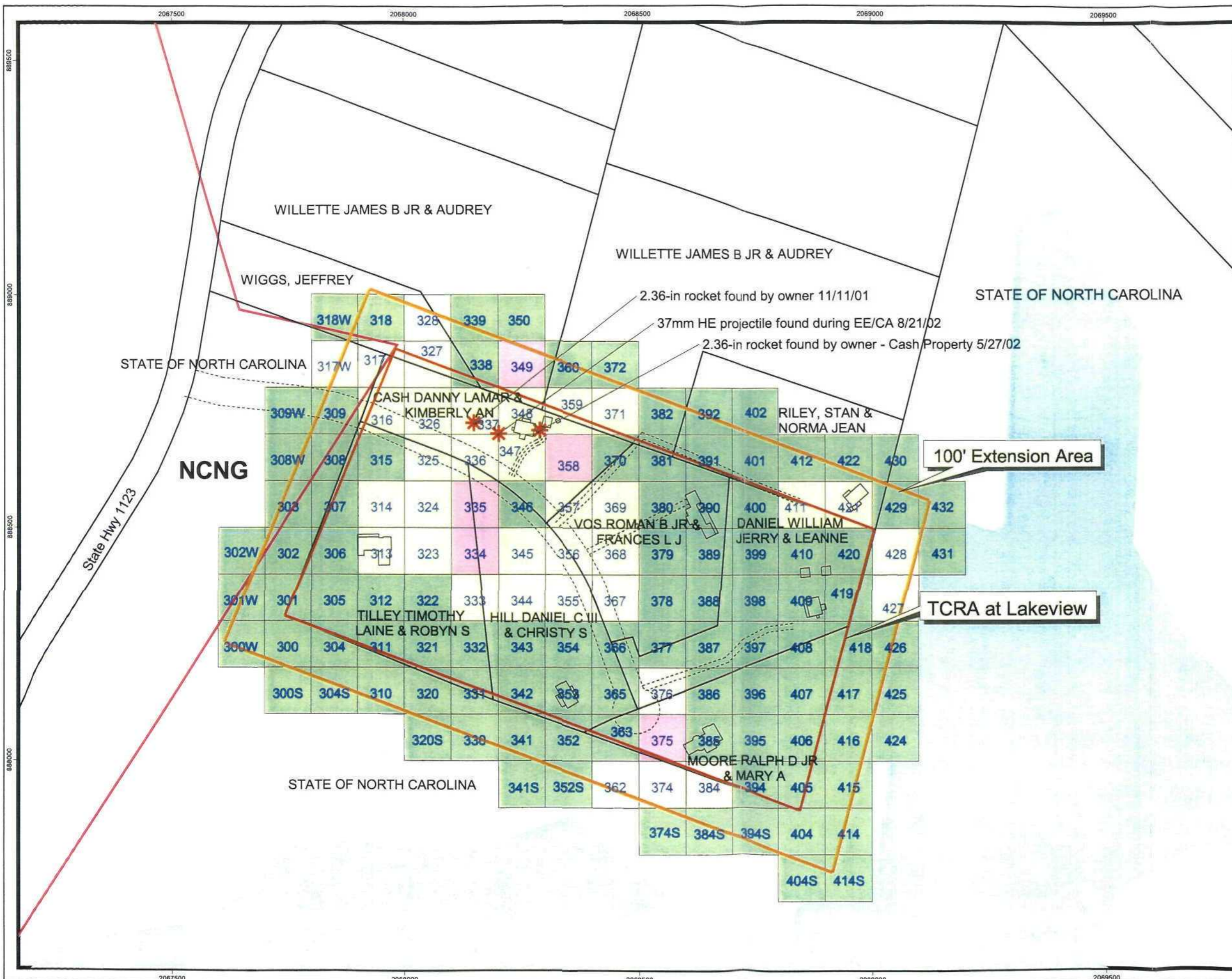
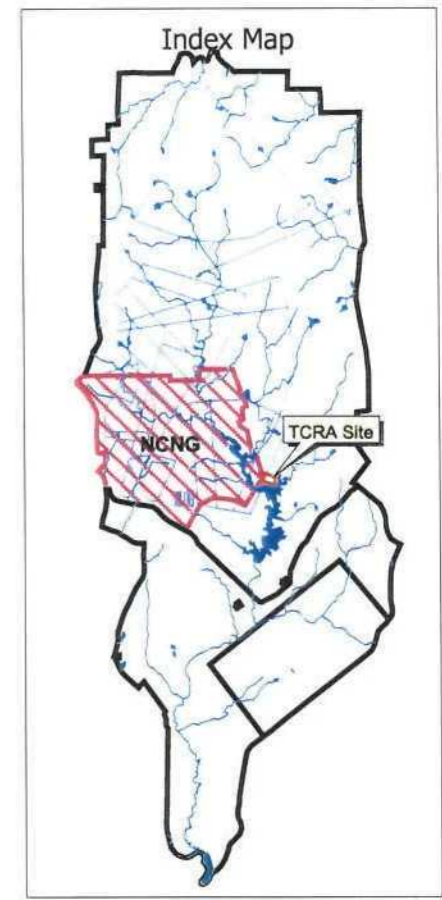


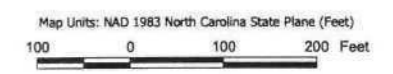
Figure 2.2
Intrusively Investigated
Grid Locations
Former Camp Butner
Butner, NC



Legend

100'x100' Grid

- Intrusively Investigated - No OES
- Intrusively Investigated - OES Present/No UXO
- Intrusively Investigated - UXO Present
- Waterbody (SDTS Data, Buffered 50 Feet)
- Recent Non-TCRA UXO Findings



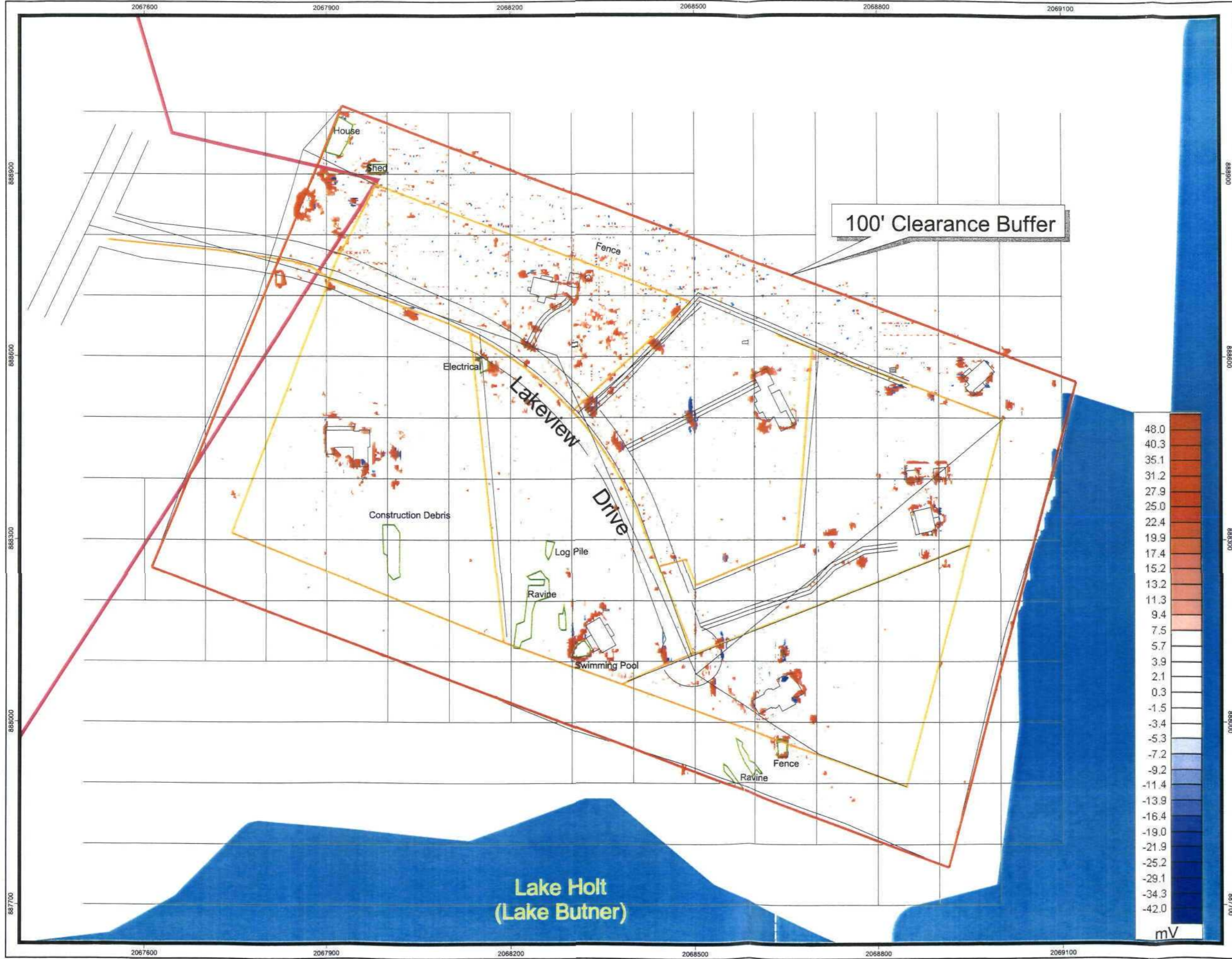
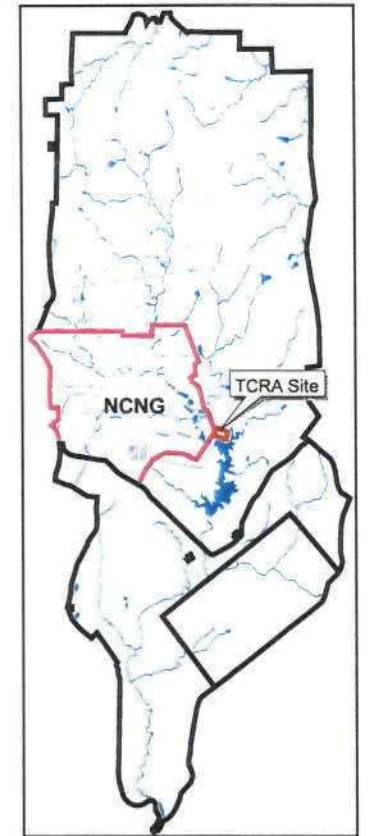
PARSONS

U.S. ARMY CORPS OF ENGINEERS
HUNTSVILLE CENTER

DESIGNED BY: BT	Intrusively Investigated Grid Location Lakeview Subdivision	
DRAWN BY: BT		
CHECKED BY: DS	SCALE: 1 inch equals 200 feet	PROJECT NUMBER: 742752
SUBMITTED BY: DS	DATE: April 2003	PAGE: 2-20
	FILE: x:\gis\738001\av_project\completed_grids.apr	

Figure 2.3
Former Camp Butner
Butner, NC

Index Map



- Legend**
- 100' TCRA Clearance Buffer
 - 100' x 100' Grid
 - North Carolina National Guard
 - Historical Firing Fan Limit
 - Stream and Waterbody
 - Obstruction Feature

Image Source: 1945 Aerial Photo from TEC, US Army Engineer Research & Development Center
 Map Units: NAD 1983 North Carolina State Plane (Feet)



PARSONS		U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE	
DESIGNED BY: BT	Geophysical Survey Time Critical Removal Action Lakeview Subdivision		
DRAWN BY: BT			
CHECKED BY: DS	SCALE: 1 inch equals 150 feet	PROJECT NUMBER: 742752	
SUBMITTED BY: DS	DATE: April 2003	PAGE NUMBER: 2-21	

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

Grid	M1 Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm HE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
300								65
300S								10
300W								33
301								49
301W								16
302								91
302W								3
303								125
304								14
304S								3
305								51
306								75
307								62
308								142
308W								56
309								107
309W								2
310								5
311								14
312								85

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

Grid	MI Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm IIE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
313						1	2.36" nose cone	76
314						1	0.3 lb ordnance fragment	204
315								208
316						1	cone, 2.36" rocket	285
317						1	2.36" rocket motor	416
317W						2	grenade fuze, M1 mine partial fuze	132
318								60
318W								8
320								66
320S								20
321								24
322								13
323						1	fragment	88
324						1	fragment	93
325						3	60mm tail boom, grenade fuze, frag	88
326						4	60mm mortar fin, frag	87
327						1	grenade debris	77
328						1	fragment	84
330								10
331								24

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

Grid	MI Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm IIE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
332								15
333						4	fragments	24
334	1							35
335		1				2	2.36" nose cone, fragment	207
336						2	grenade fuze, partial 2.36" rocket	292
337						5	60mm fins, grenade tail, 2.36" rocket motor	175
338								67
339								12
341								22
341S								3
342								41
343								49
344						1	rifle grenade tail boom	46
345						2	rifle grenade tail boom, 60mm fins	75
346								139
347						5	2.36" motor and nose cone, 60mm fins, grenade fuze	224
348						8	60mm fins, grenade tail, 2.36" rocket motor	138
349			1	1				33
350								1
352								90

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

Grid	M1 Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm HE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
352S								2
353								213
354								73
355						1	60mm mortar fins	76
356						1	2.36" rocket motor	76
357						5	75mm frag, 2.36" rocket motor and fins	260
358		1				5	2.36" rocket motor, rifle grenade tail boom	261
359						1	60mm tail fin	180
360								7
362						3	pressure plate, fuzes	6
363								39
365								57
366								92
367						1	fragment	125
368						2	fragments	52
369						2	60mm mortar fins	50
370								30
371						2	2.36" rocket motor, grenade fuze	25
372								3
374						2	M1 mine fuzes	48

**Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina**

Grid	M1 Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm HE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
374S								0
375					1	2	M1 mine fuzes	86
376						1	M1 mine fuze	49
377								14
378								10
379								50
380								32
381								36
382								13
384						1	M1 mine fuze	30
384S								8
385								74
386								43
387								11
388								47
389								43
390								47
391								12
392								12
394								18

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

Grid	MI Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm HE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
394S								26
395								19
396								27
397								32
398								87
399								12
400								23
401								17
402								1
404								14
404S								4
405								8
406								8
407								19
408								38
409								20
410								28
411						1	fragment	44
412								10
414								2

Table 2.3
Total UXO and OE Scrap Recovered by Grid
Time Critical Removal Action, Former Camp Butner/Lakeview Subdivision
Butner, North Carolina

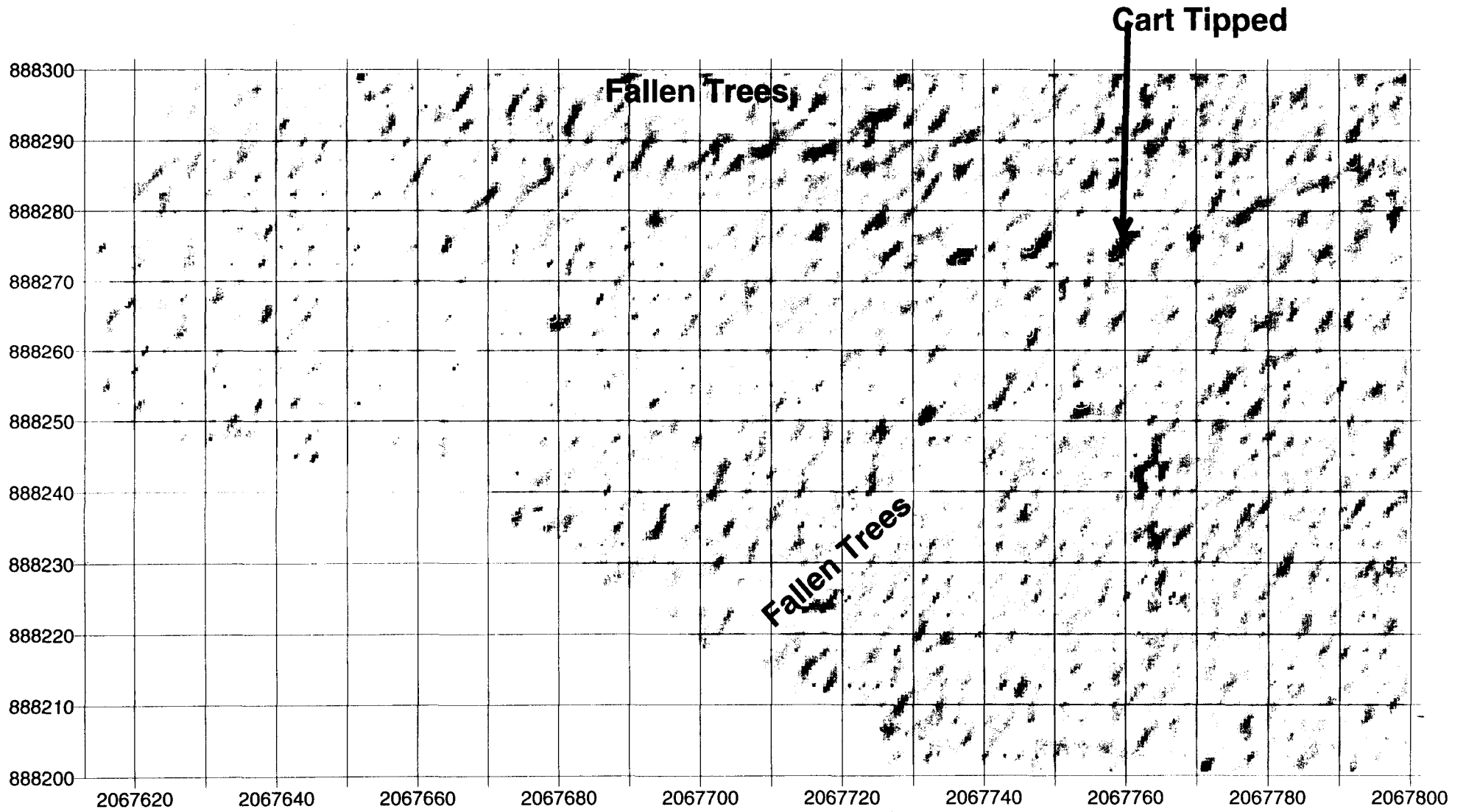
Grid	MI Practice Mine Fuze	2.36-inch Bazooka Rocket	MKII Hand Grenade	37mm HE Projectile	Electric Blasting Cap	OE Scrap Contacts	OE Scrap Description	Non-OE Scrap Contacts
414S								1
415								10
416								18
417								23
418								37
419								58
420								101
421						1	fragment	103
422								29
424								1
425								4
426								9
427						2	fragments	3
428						1	fragment	87
429								147
430								2
431								1
432								2
Total	1	2	1	1	1	80		8144

1 Number of UXO items present in grid.

Johnson's Lakeview Grids 300W (2) & 300 EM61 Bottom Coil

CEHNC JAD 25 Apr 03

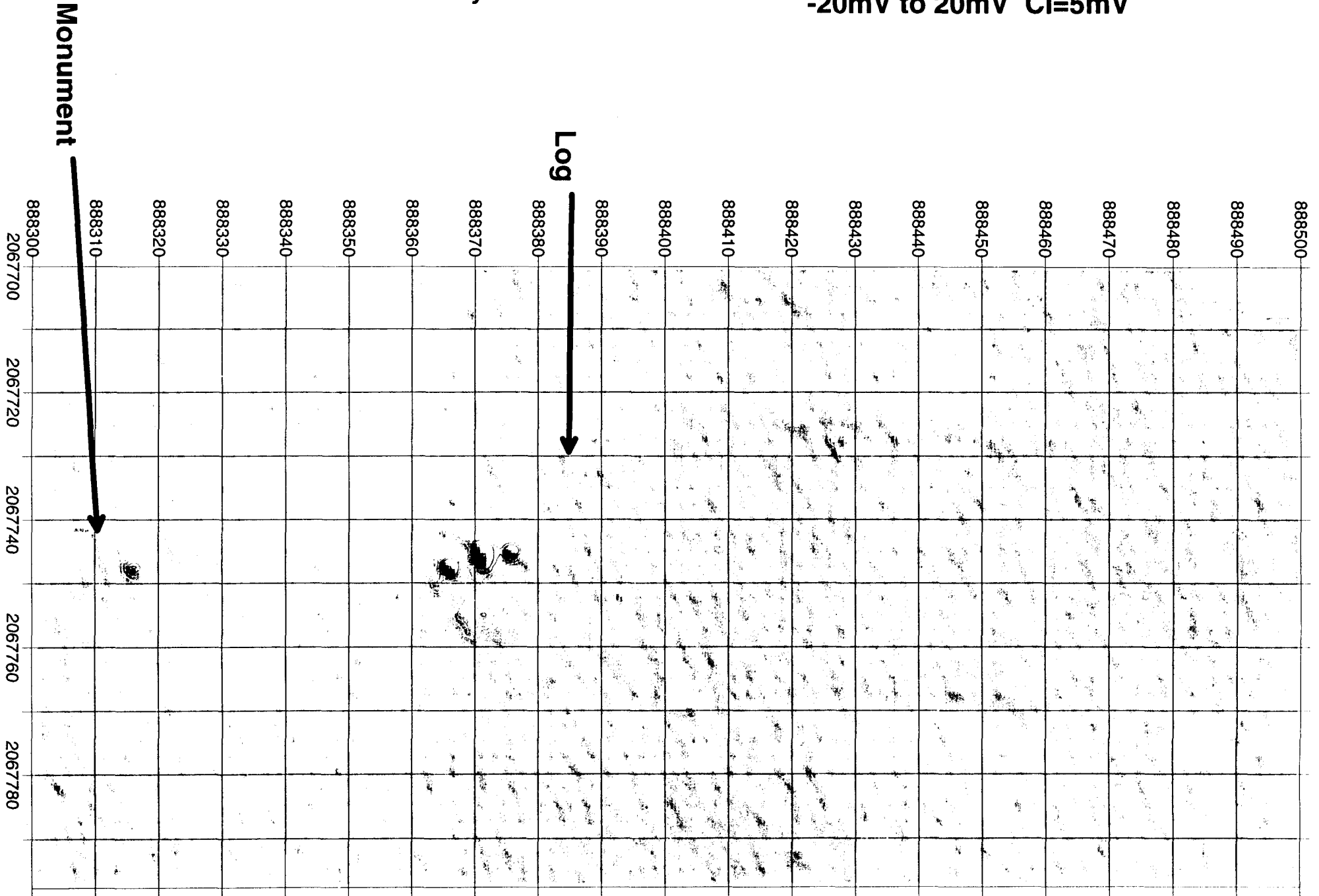
-20mV to 20mV CI=2mV, (-20 to -3/3 to 20)



Parsons' Lakeview Grids 301 & 302 EM61 Bottom Coil

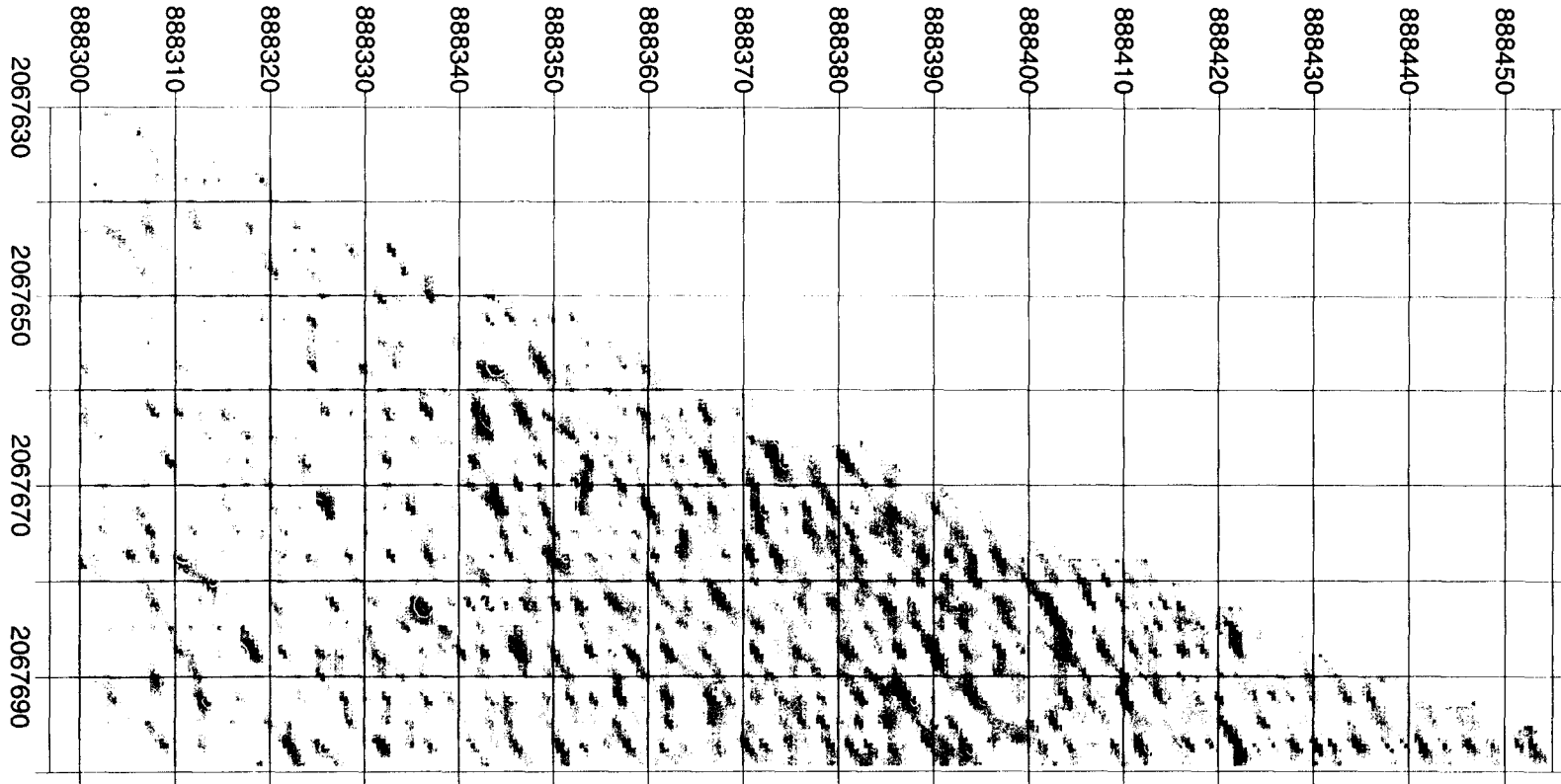
CEHNC JAD 14 May 03

-20mV to 20mV CI=5mV



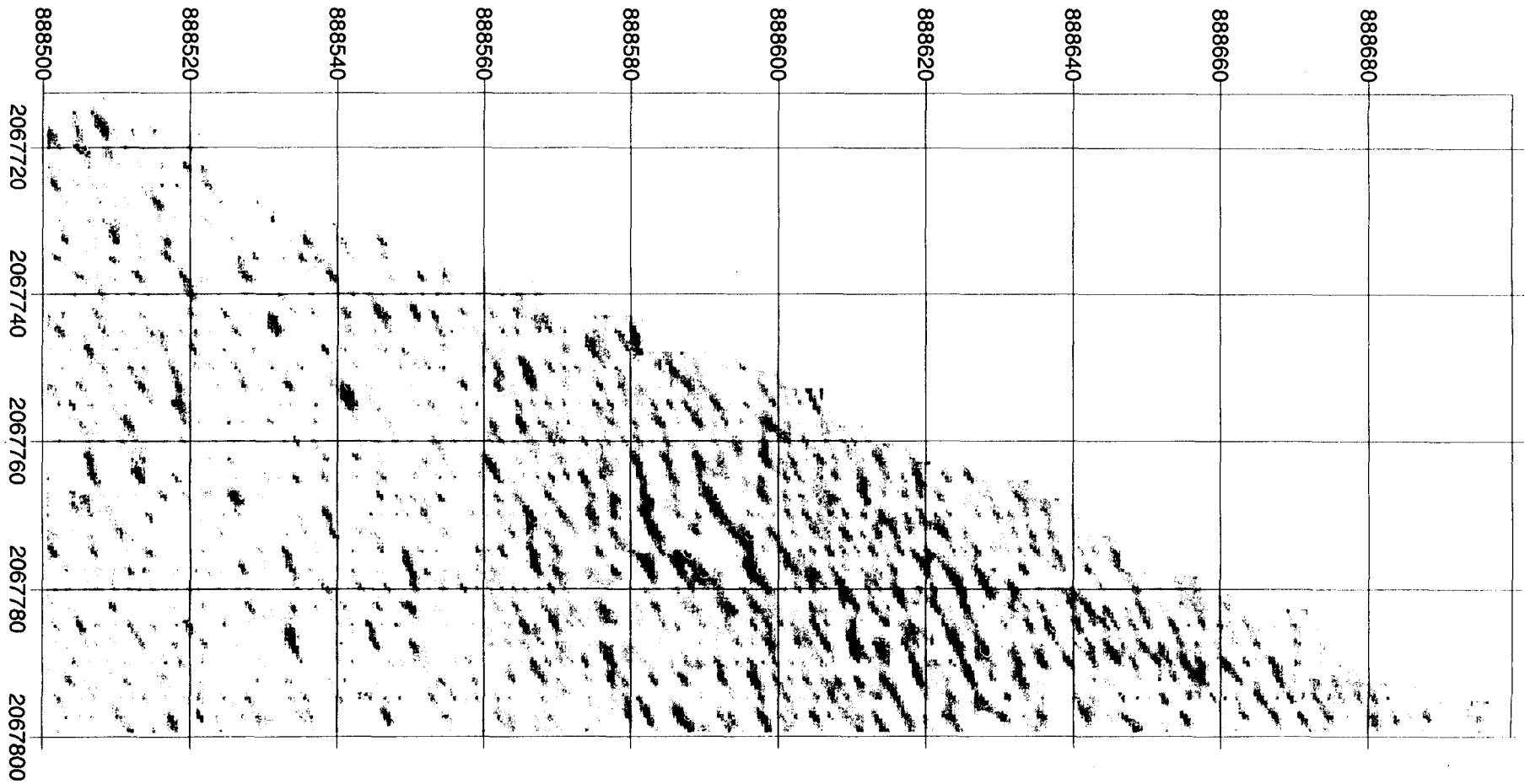
Butner - Lakeview Subdivision EM61 data Grid 301W & 302W

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)



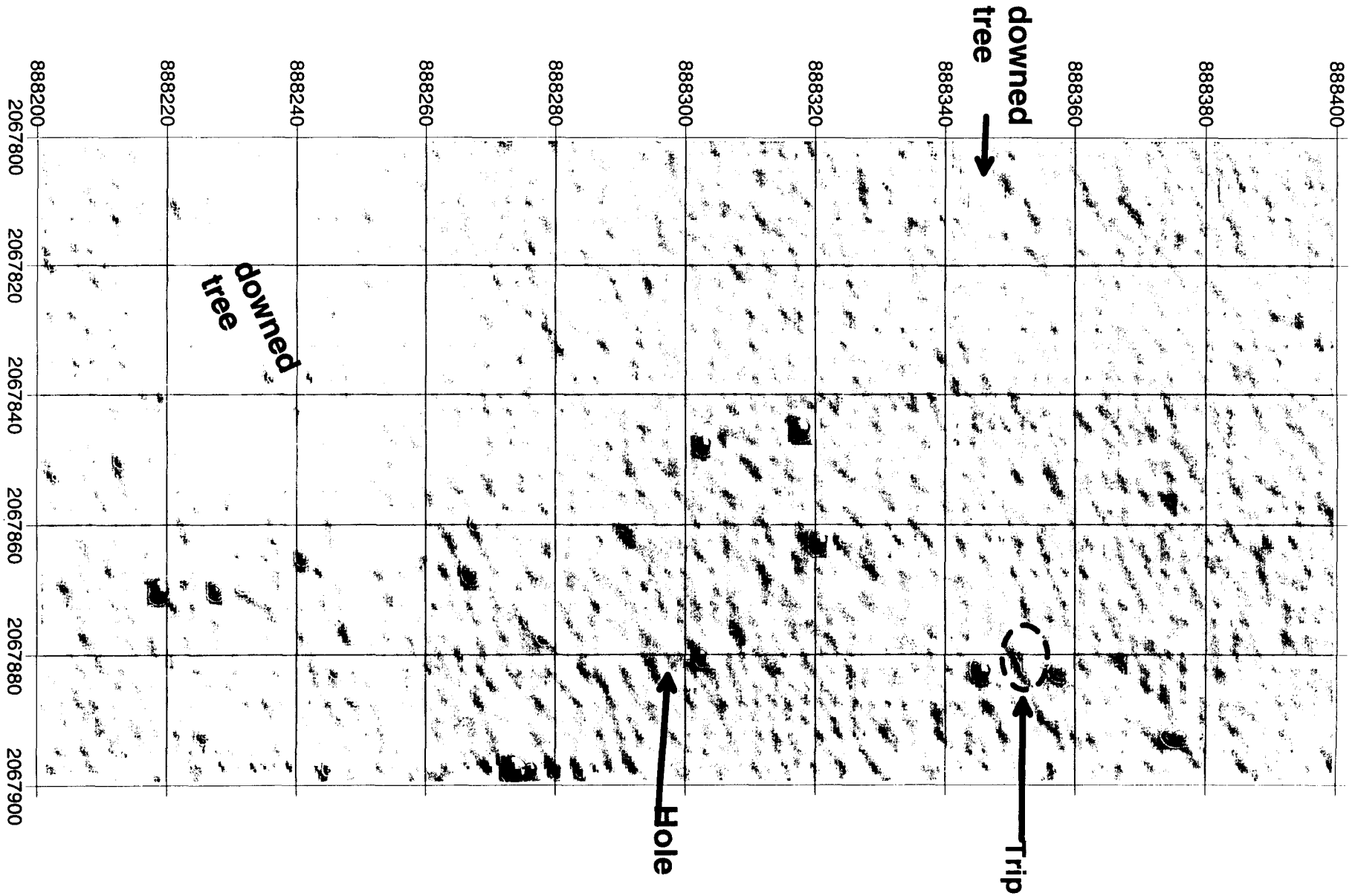
Butner - Lakeview Subdivision EM61 data Grids 303 & 308W

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

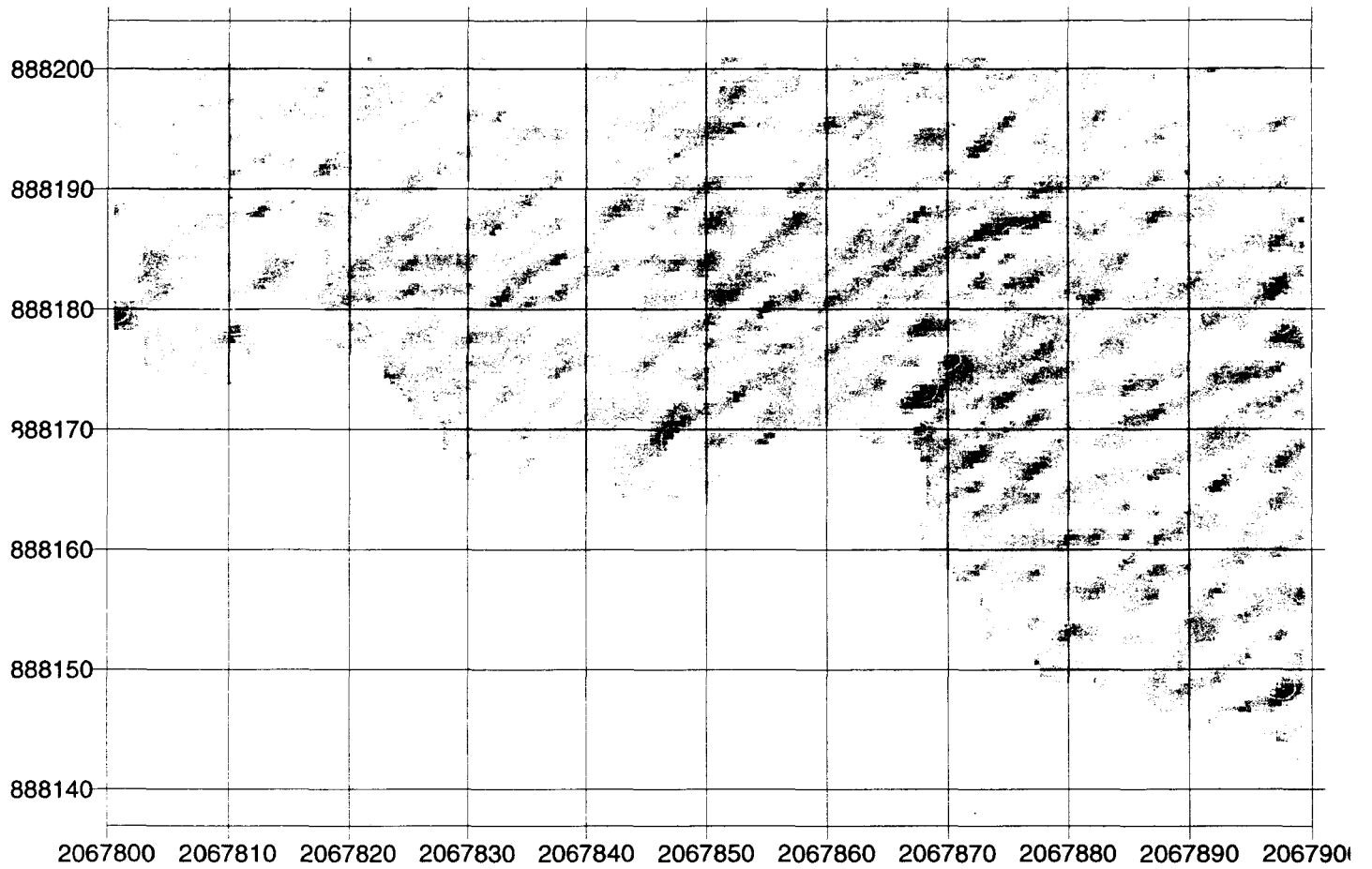


Butner - Lakeview Subdivision EM61 data Grid 304 & 305

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

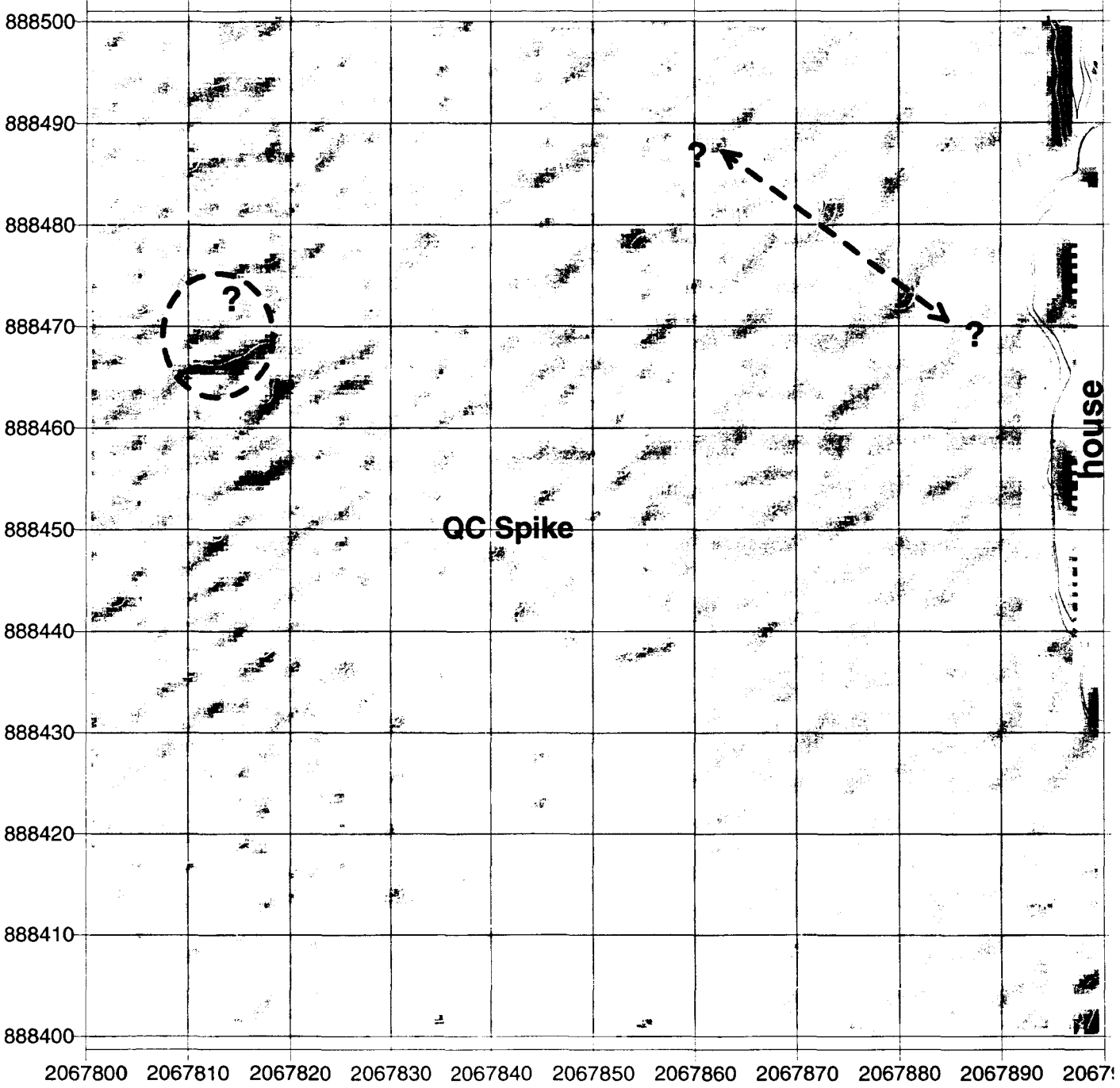


Butner - Lakeview Subdivision EM61 data Grid 304S



Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

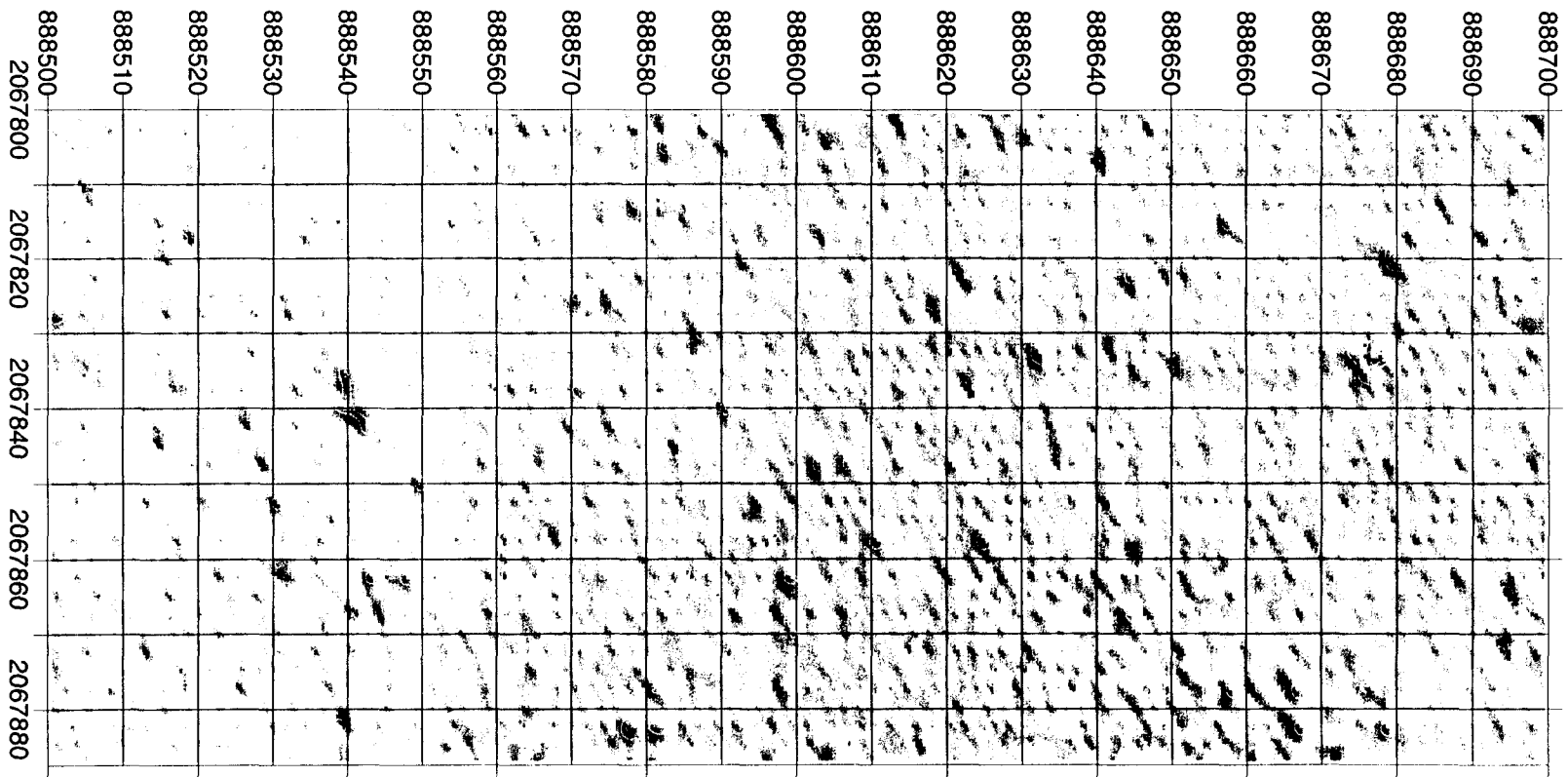
Butner - Lakeview Subdivision EM61 data Grid 306



Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

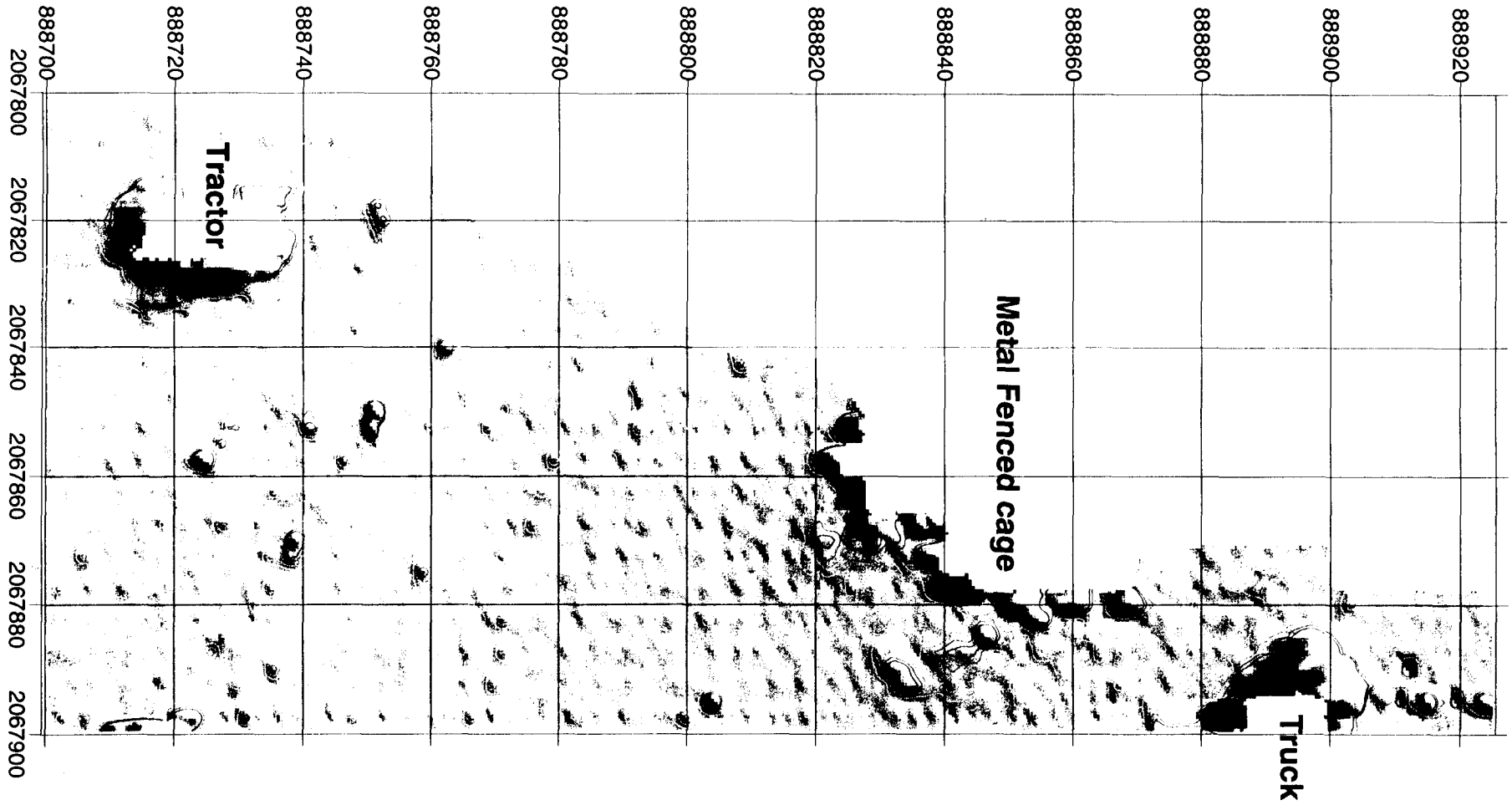
Butner - Lakeview Subdivision EM61 data Grid 307 & 308

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

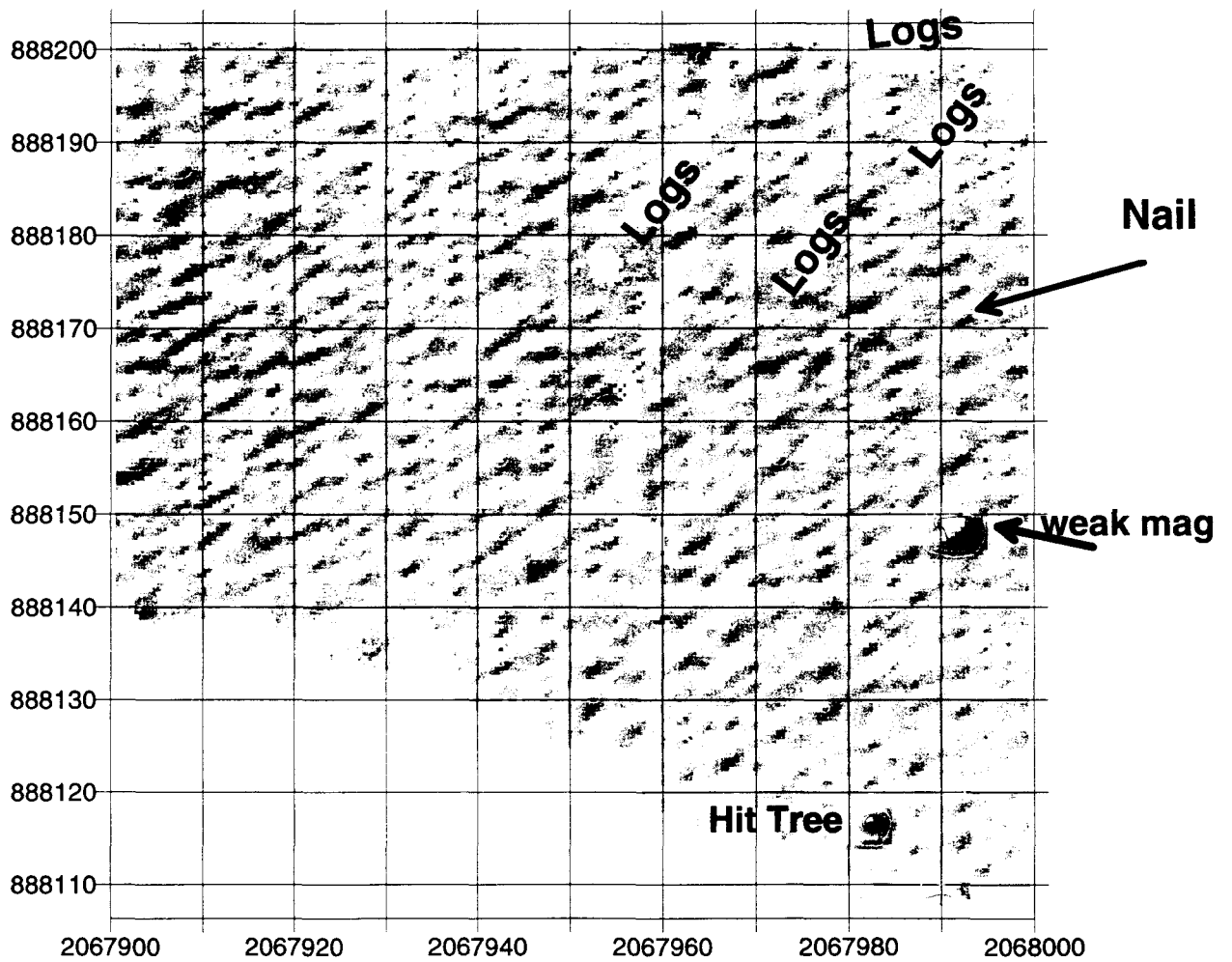


Butner - Lakeview Subdivision EM61 data Grid 309 & 317W

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)



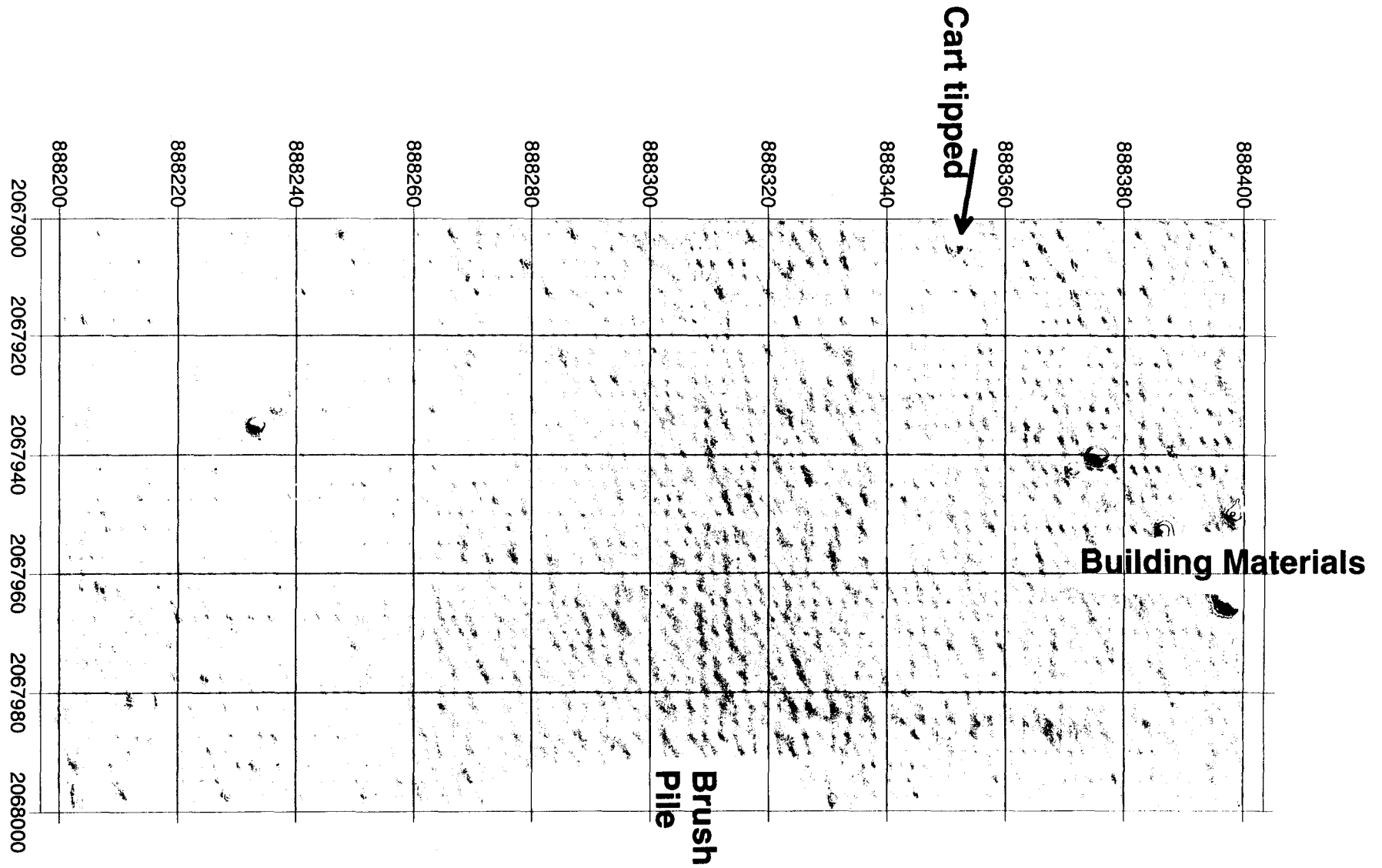
Butner - Lakeview Subdivision EM61 data Grid 310



Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

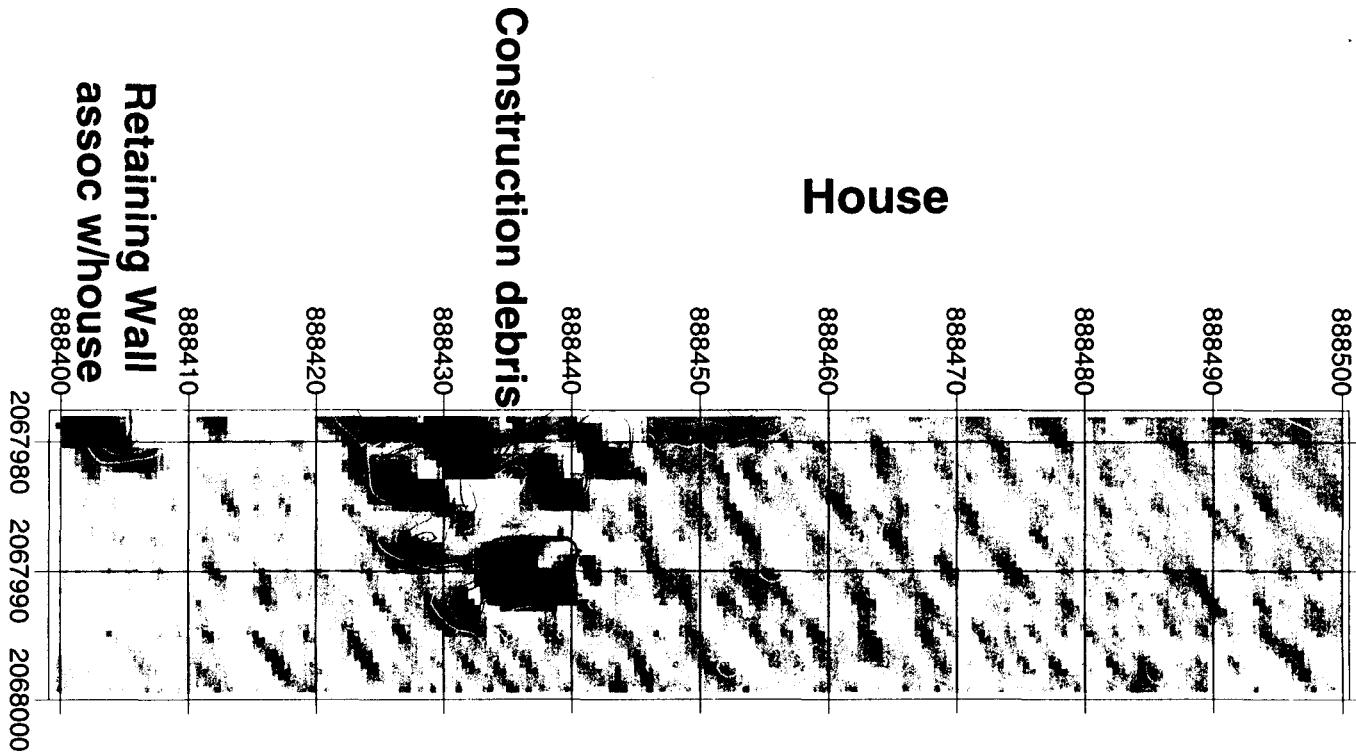
Butner - Lakeview Subdivision EM61 data Grid 311 & 312

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

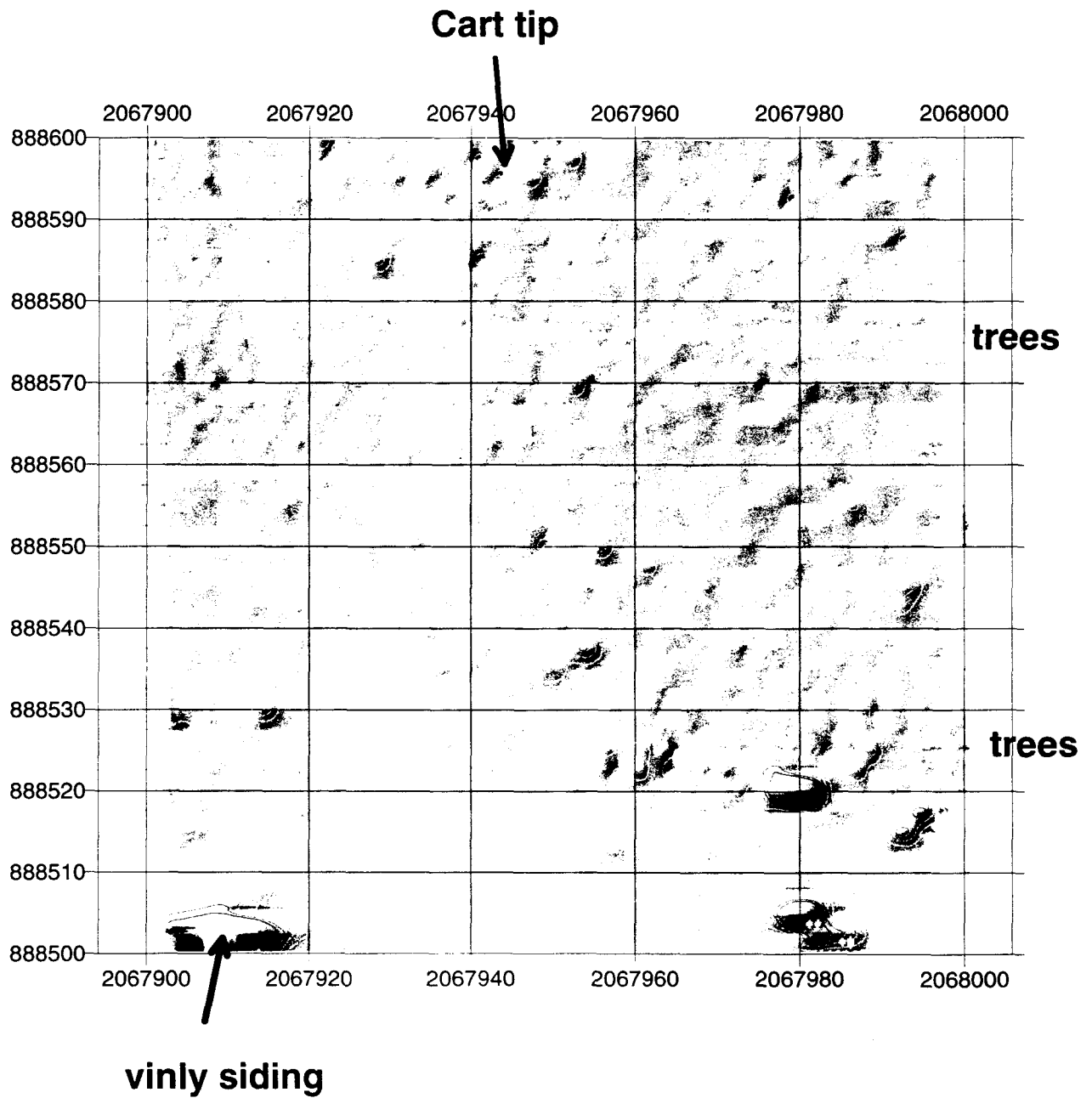


Butner - Lakeview Subdivision EM61 data Grid 313

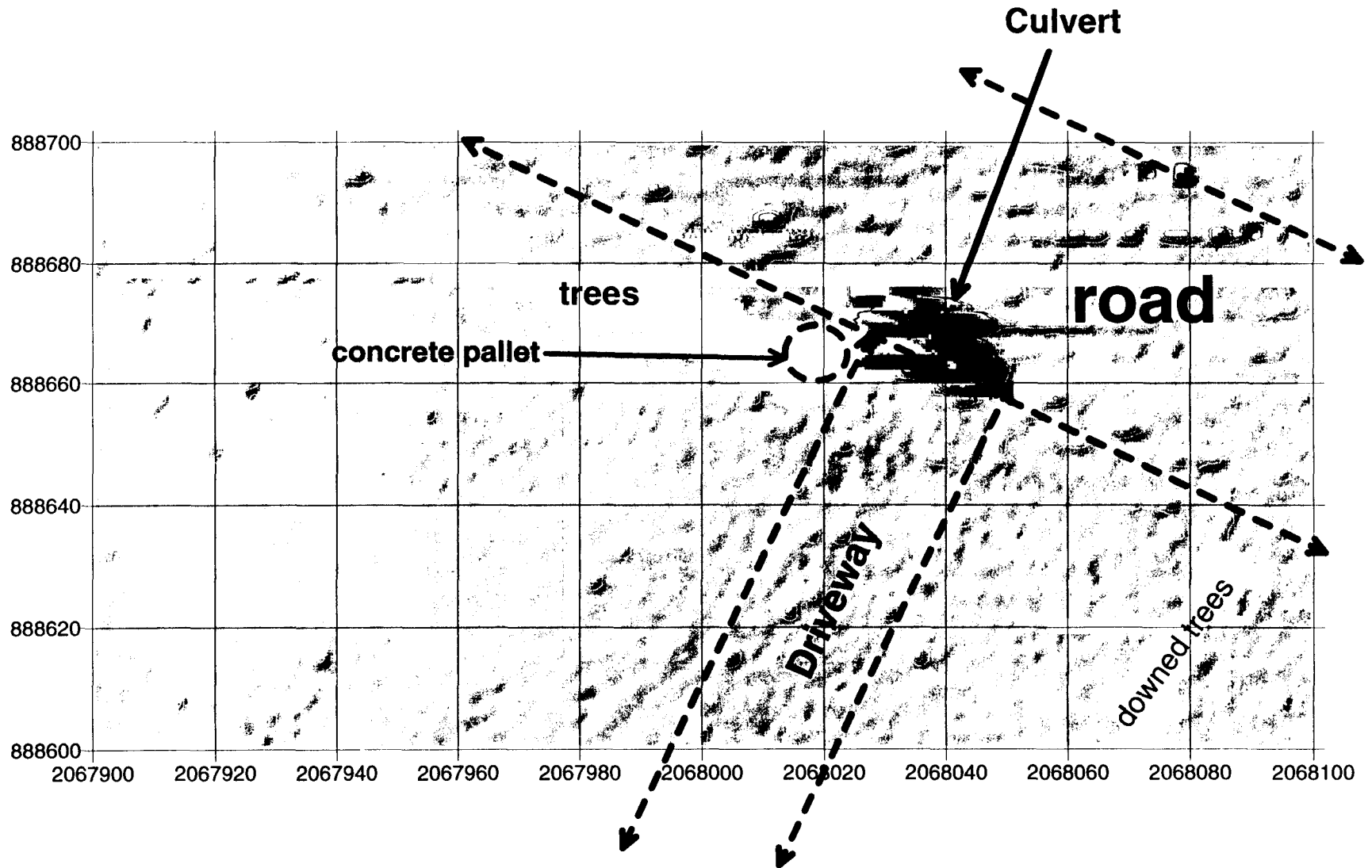
Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+5mV)



Butner - Lakeview Subdivision EM61 data Grid 314



Butner - Lakeview Subdivision EM61 data Grid 315 & 325

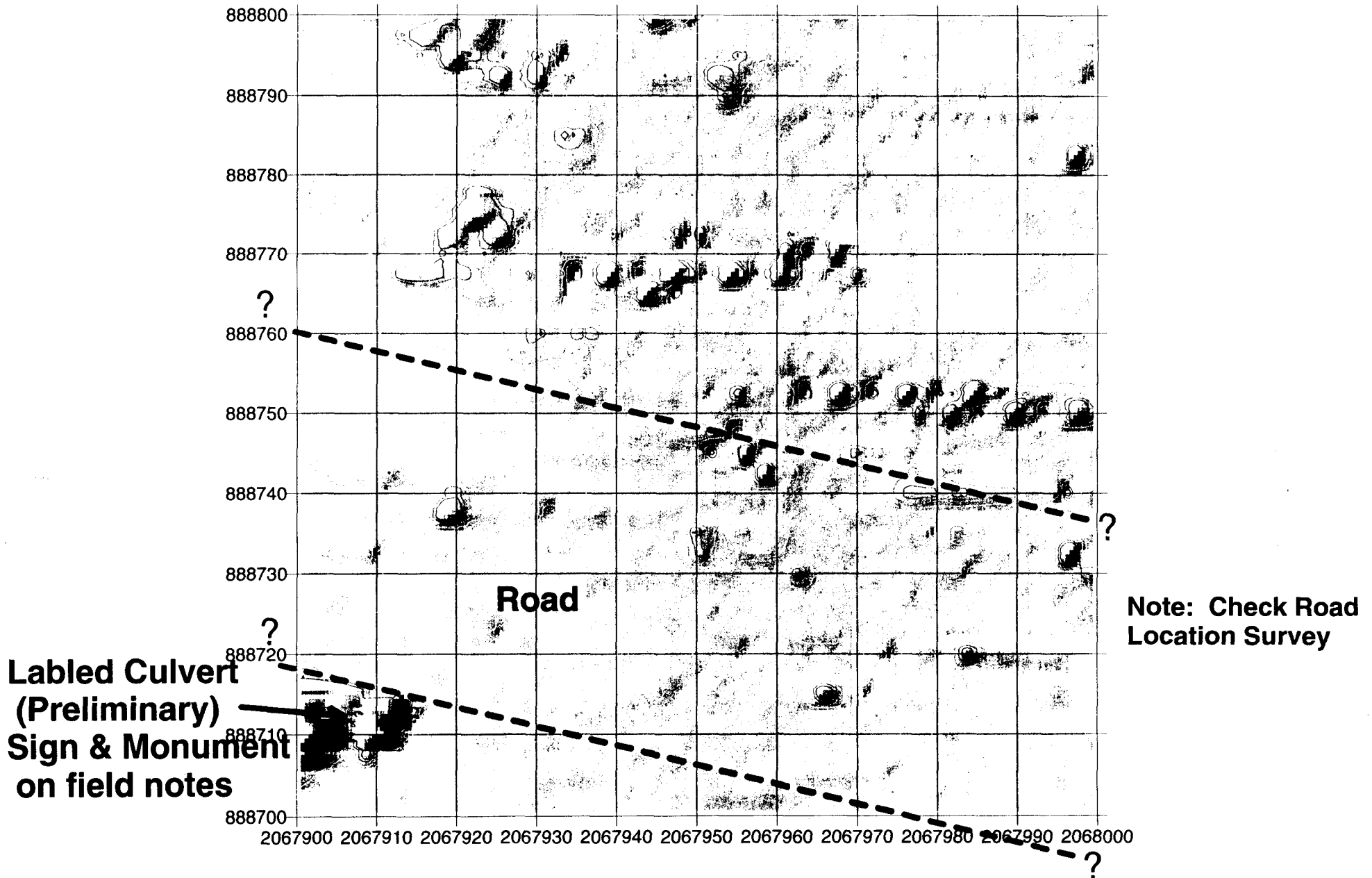


Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

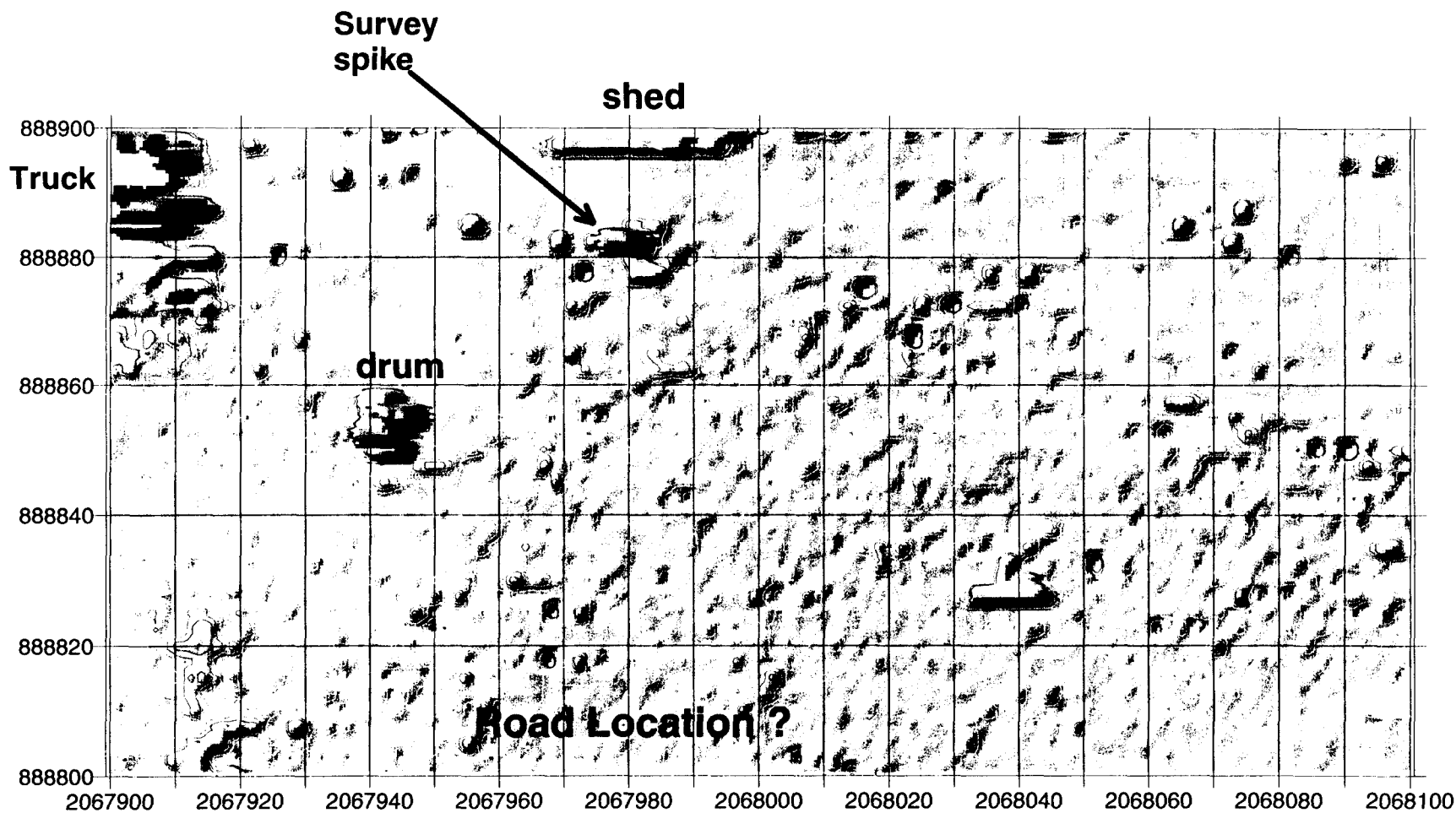
Carsons' Lakeview Grid 316_ 1303_a EM61 Bottom Coil

CEHNC JAD 14 May 03

-20mV to 20mV CI=5mV

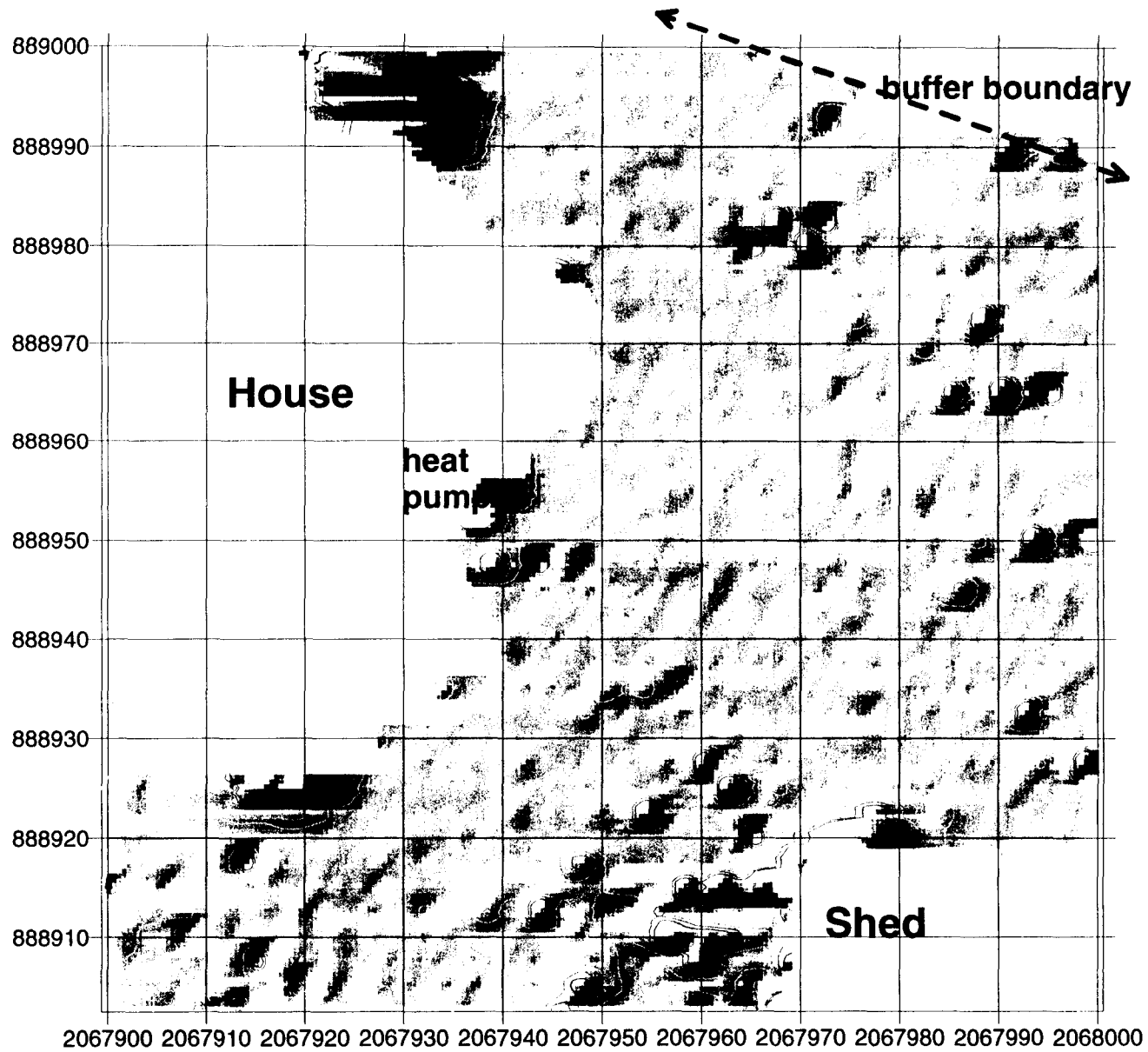


Butner - Lakeview Subdivision EM61 data Grid 317 & 327



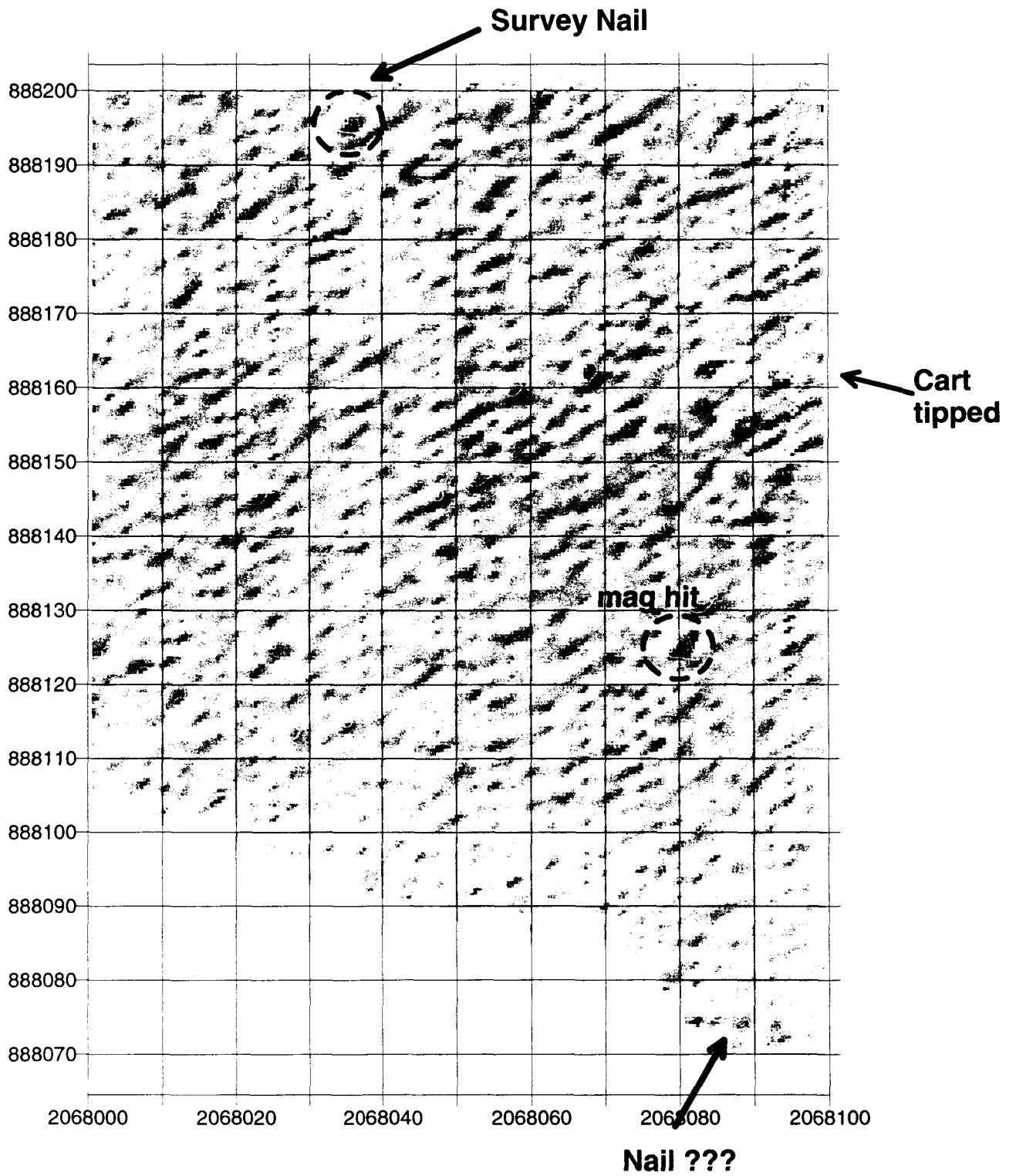
Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+5mV)

Butner - Lakeview Subdivision EM61 data Grid 318



Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

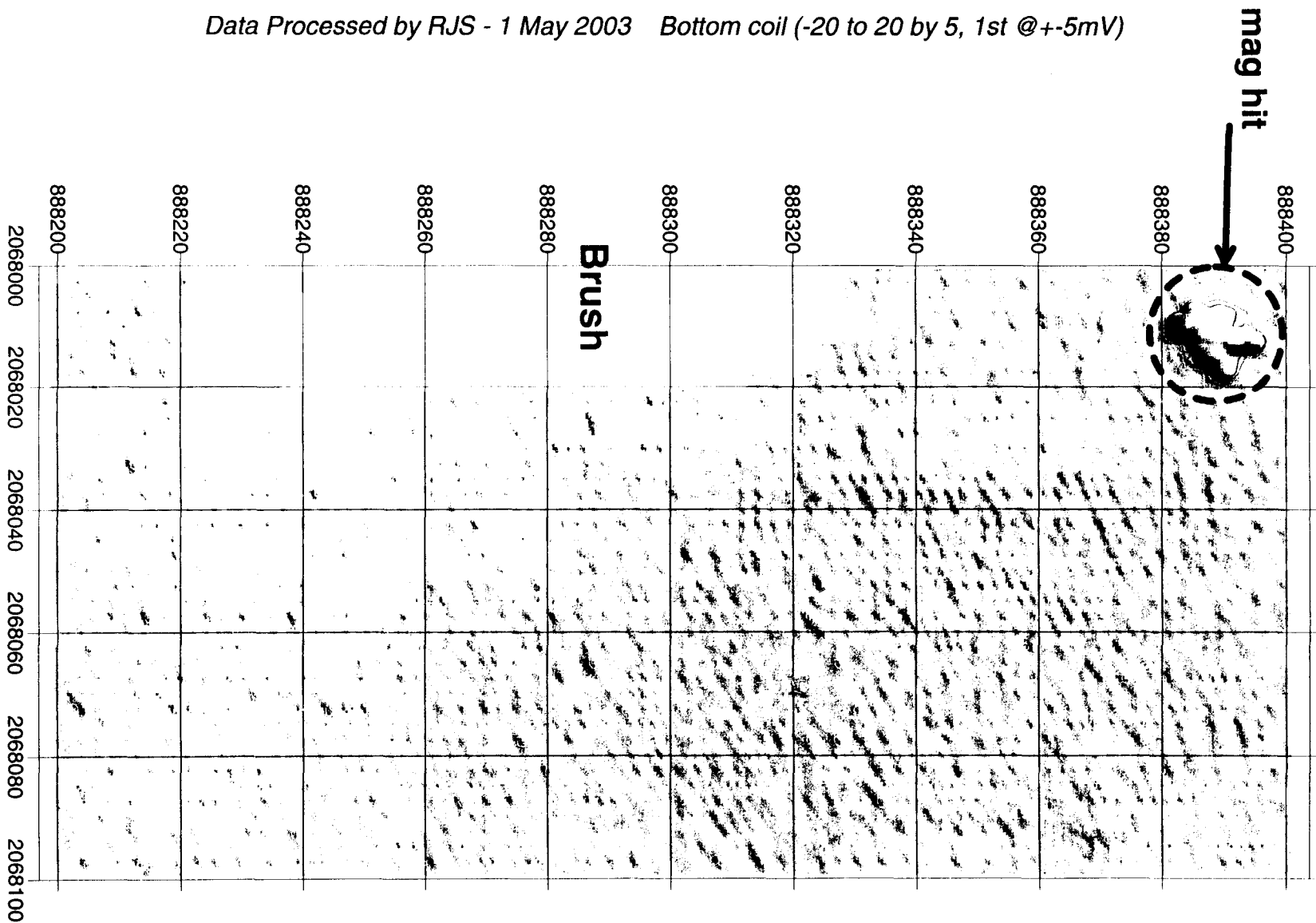
Butner - Lakeview Subdivision EM61 data Grid 320



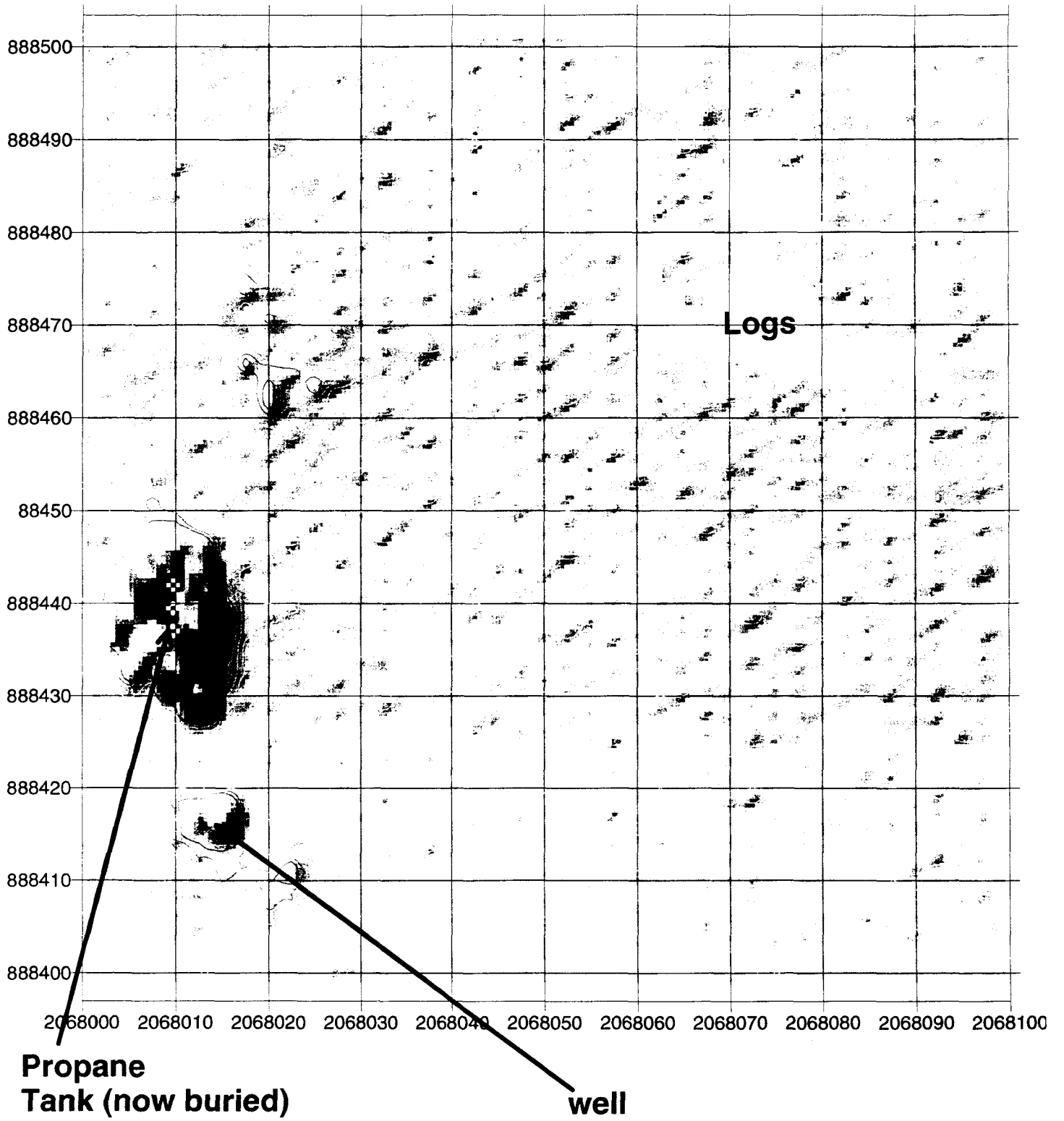
Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

Butner - Lakeview Subdivision EM61 data Grid 321 & 322

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+5mV)

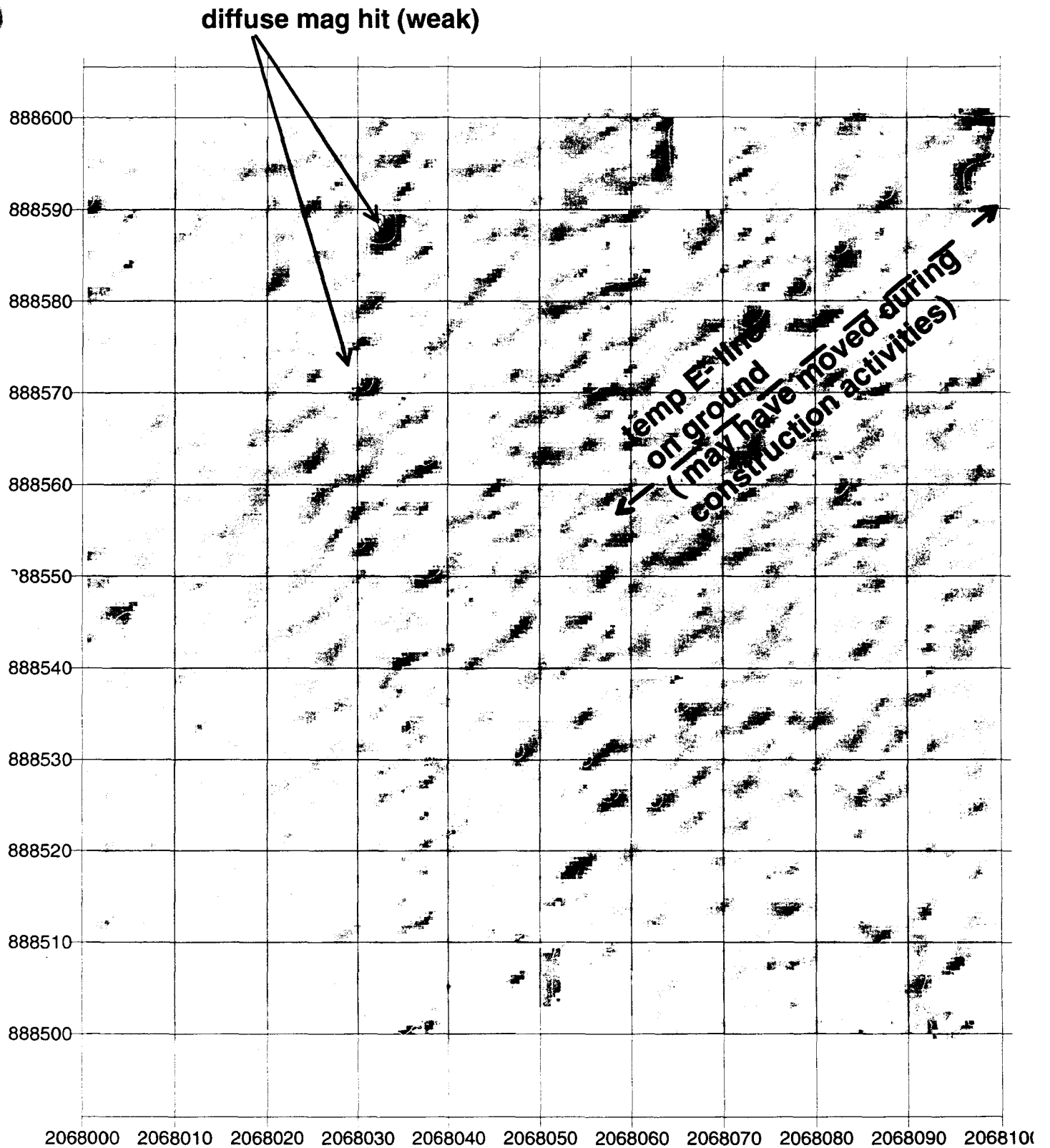


Butner - Lakeview Subdivision EM61 data Grid 323



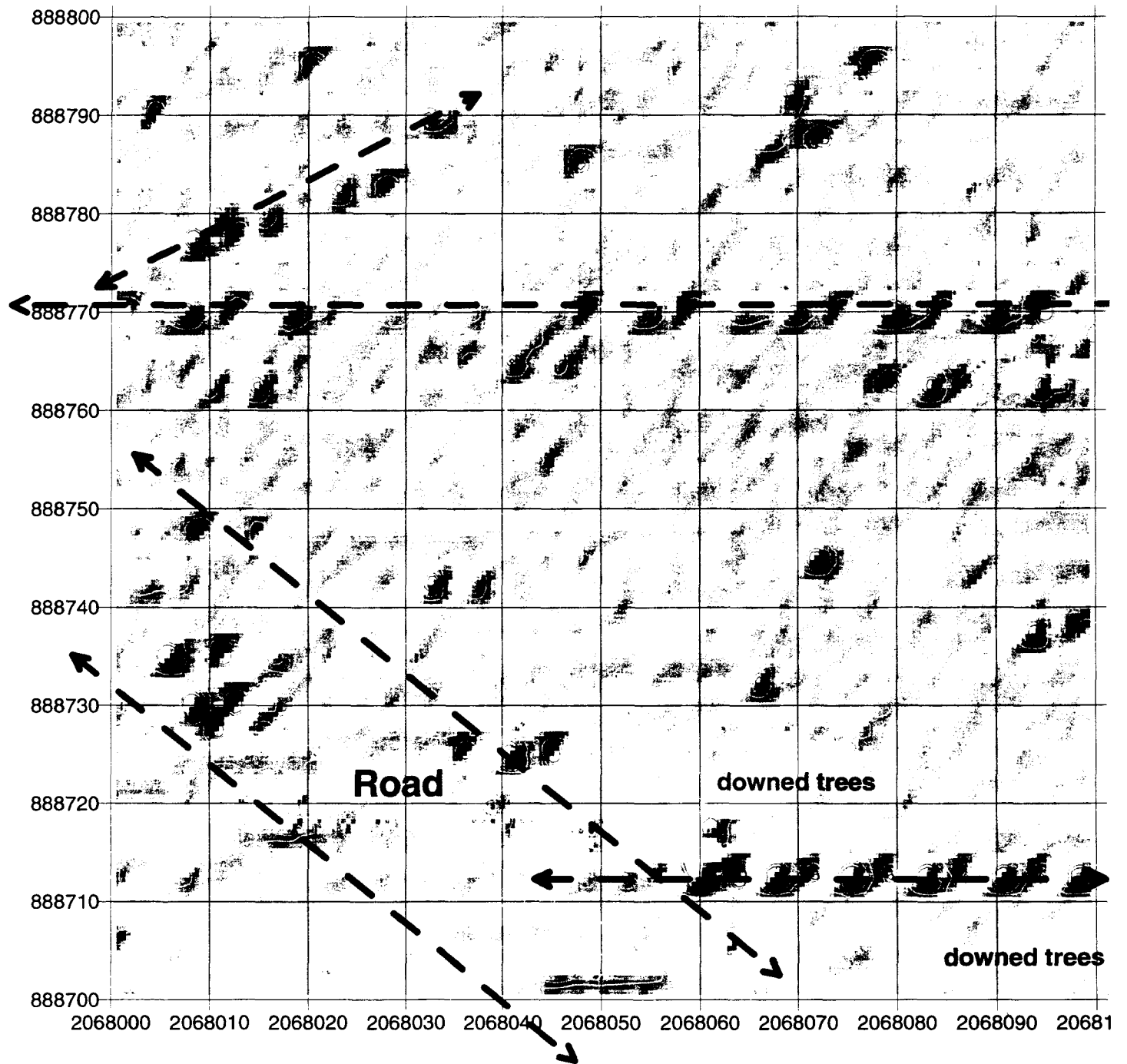
Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

Butner - Lakeview Subdivision EM61 data Grid 324



Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +/-5mV)

Butner - Lakeview Subdivision EM61 data Grid 326



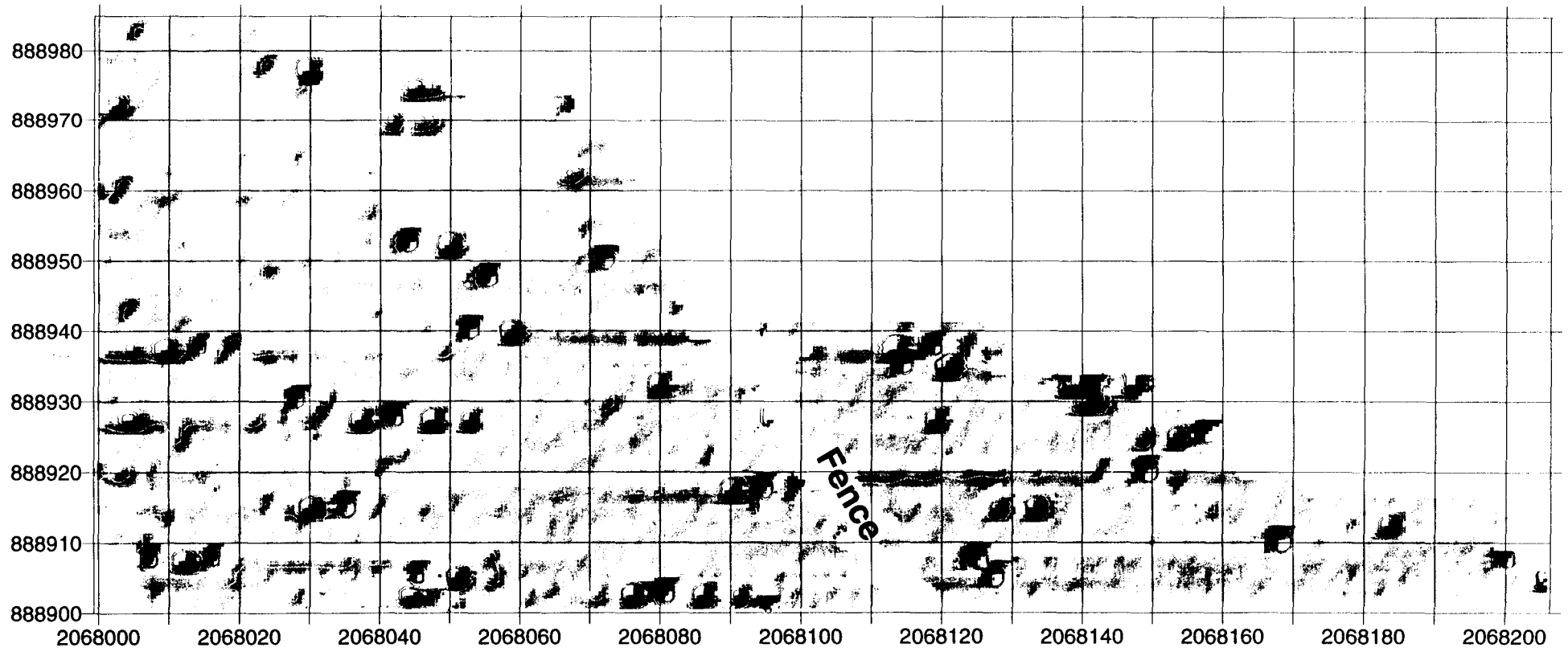
Note - Several linear anomalies (manmade)

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)

Parsons' Lakeview Grid 32E . 339 EM61 Bottom Coil

CEHNC JAD 28 Apr 03

-20mV to 20mV CI=1mV

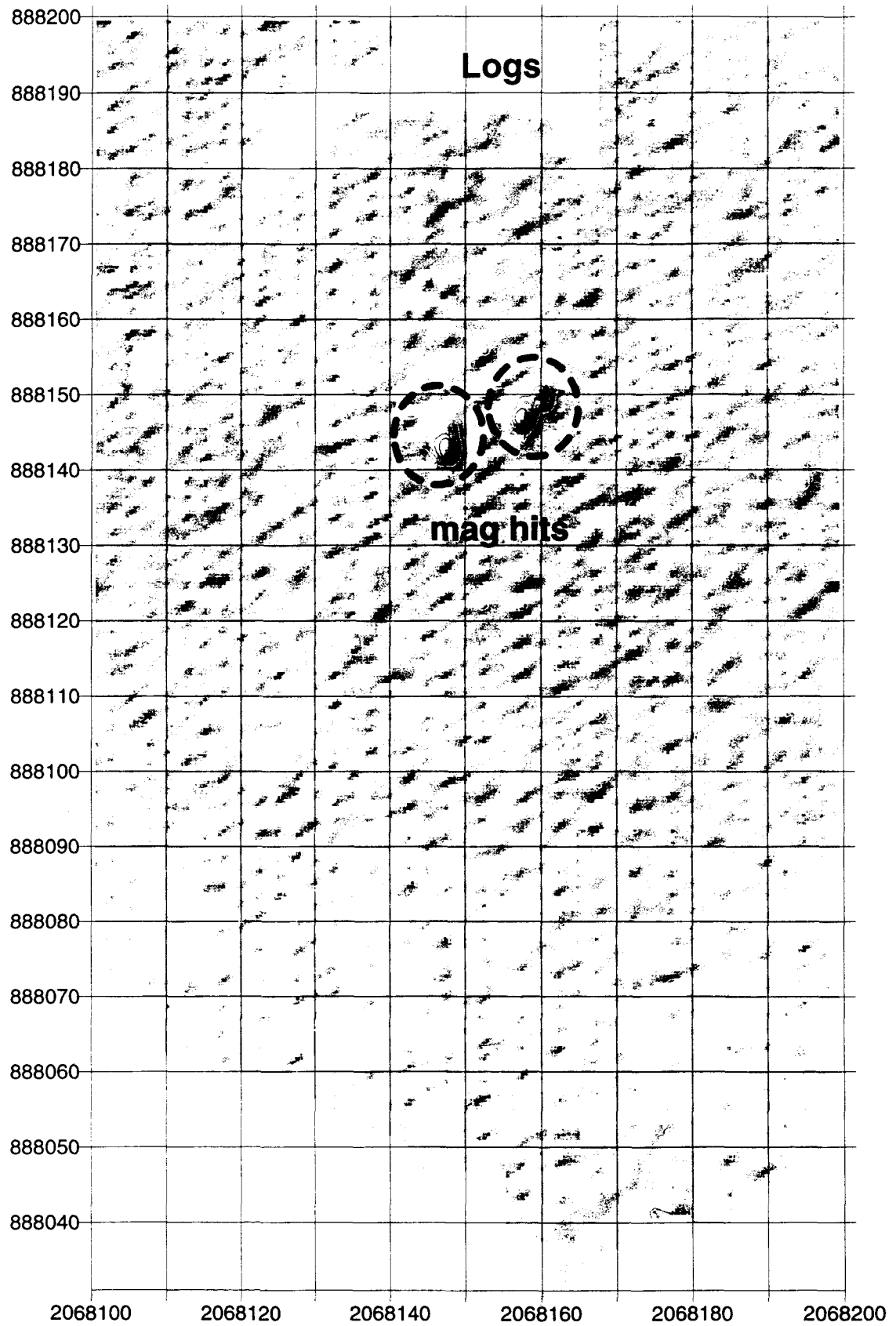


Note - Several Linear anomalies (manmade)

Parsons' Lakeview Grid 330 & 331 EM61 Bottom Coil

CEHNC JAD 28 Apr 03

-20mV to 20mV Cl=5mV

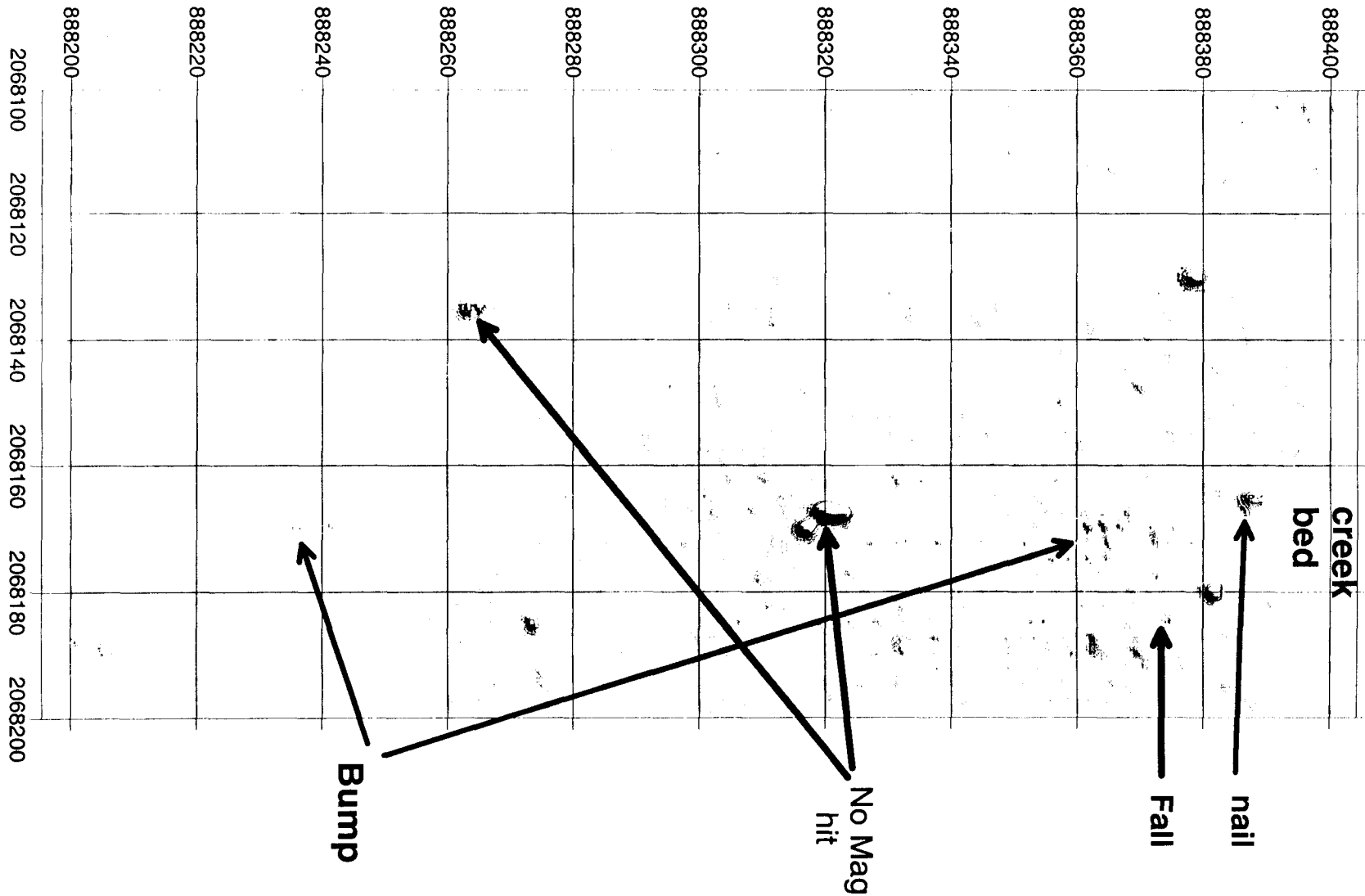


Parsons' Lakeview Grid 332 & 333 EM61 Bottom Coil

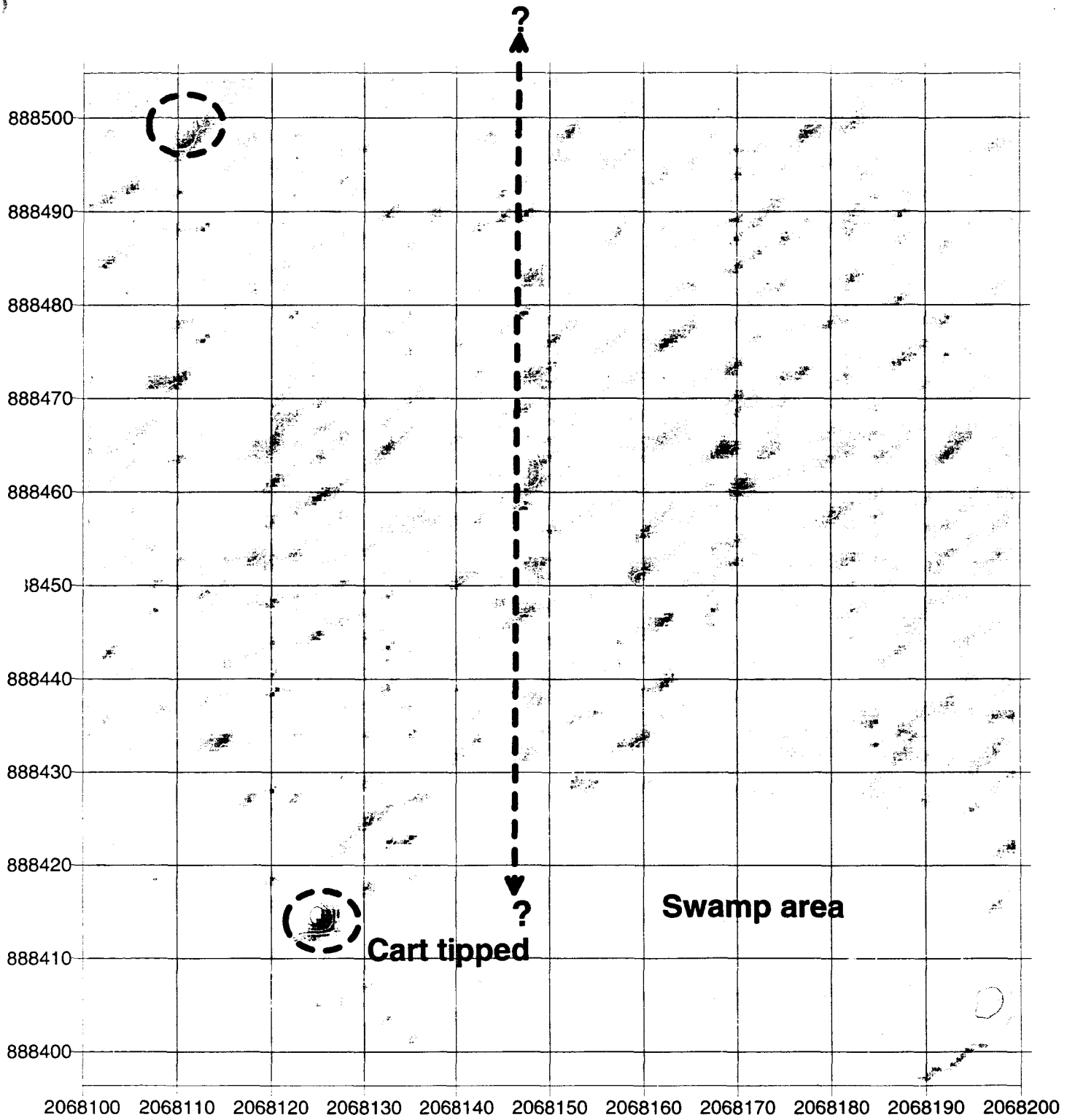
CEHNC JAD 30 Apr 03

-20mV to 20mV CI=5mV

Note: Multiple area's of downed trees (no data)



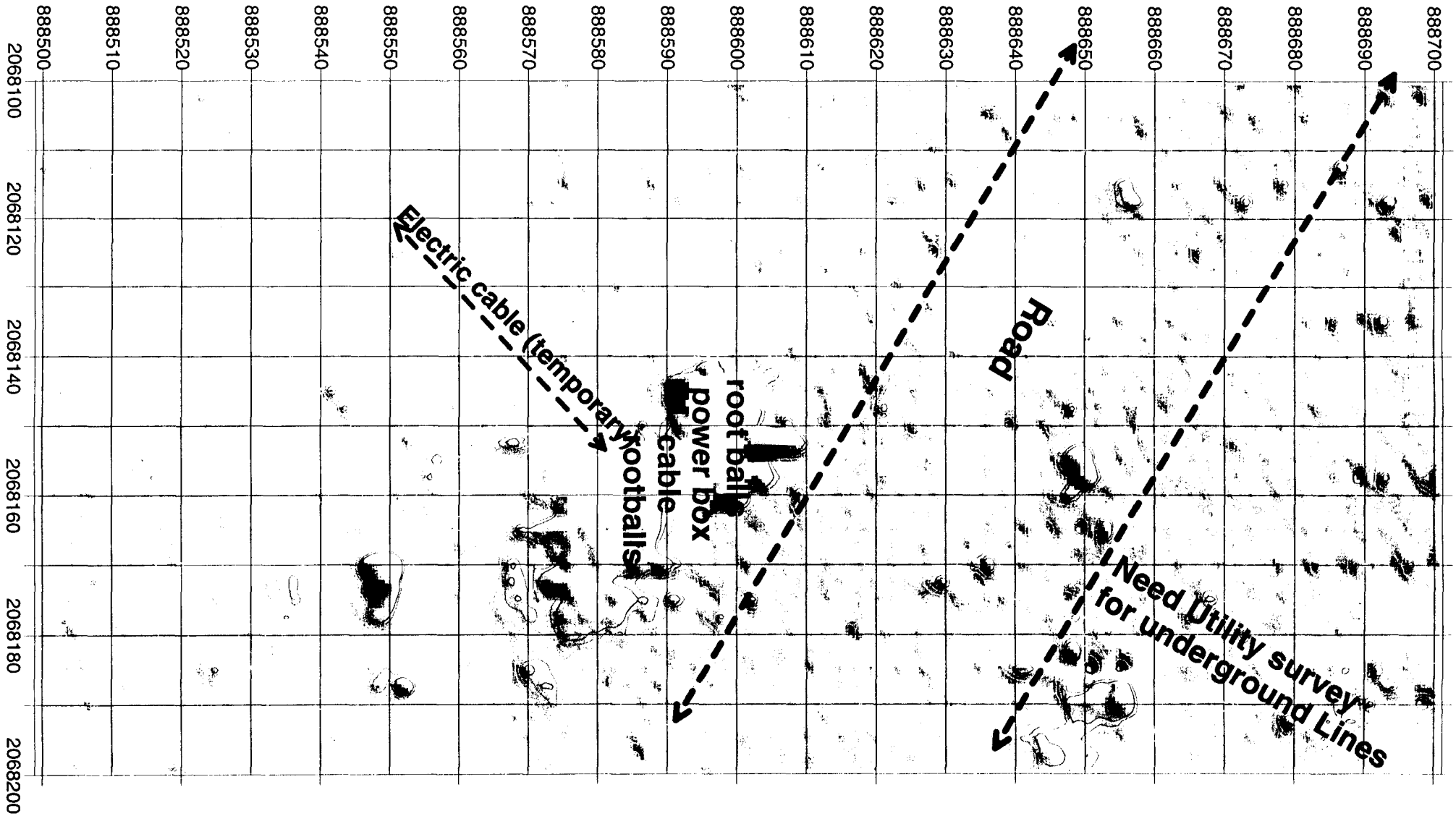
Butner - Lakeview Subdivision EM61 data Grid 334



Parsons' Lakeview Grid 335 & 336 EM61 Bottom Coil

CEHNC JAD 28 Apr 03

-20mV to 20mV Cl=5mV



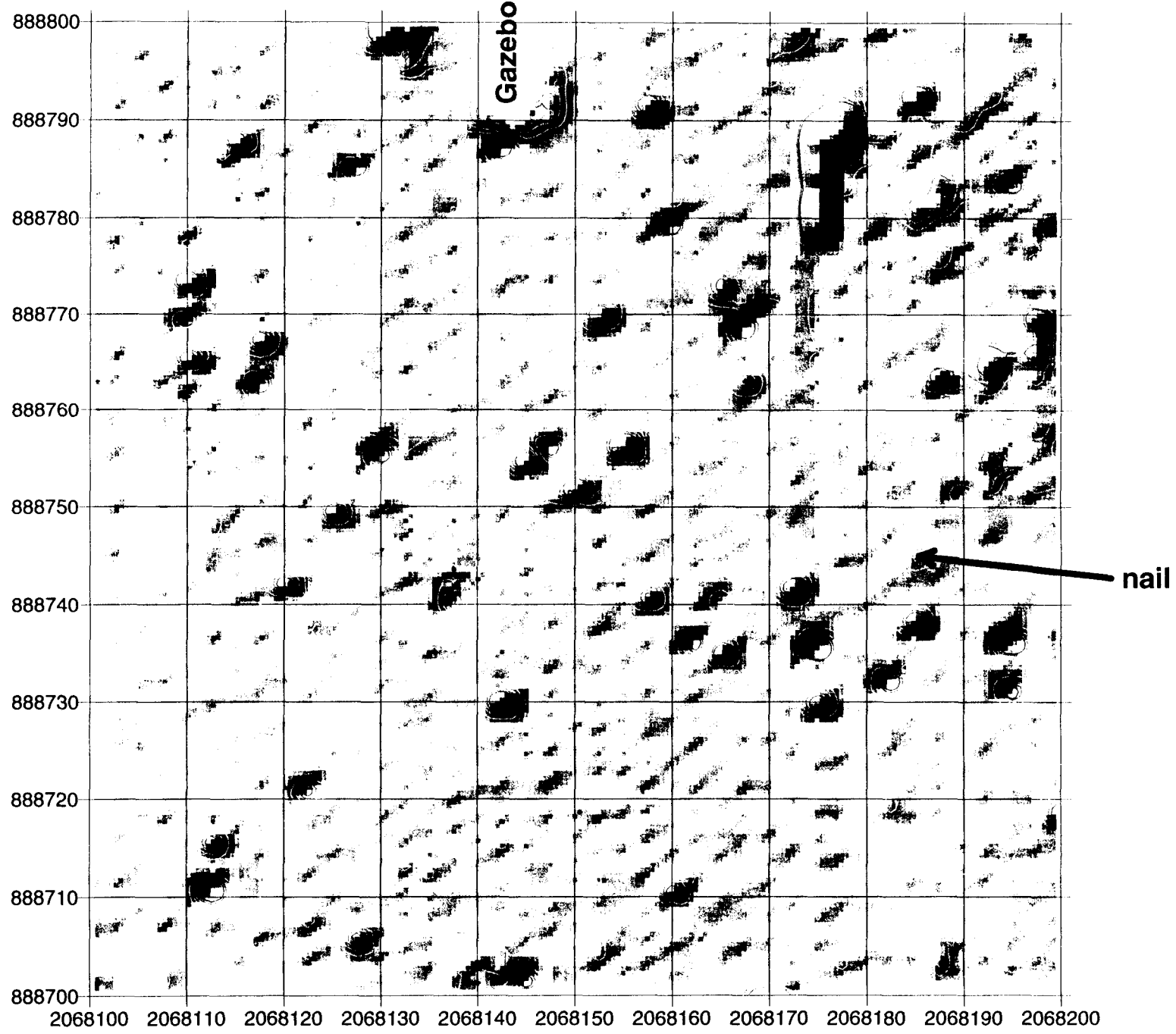
Note : Data gaps are downed trees

Persons' Lakeview Grid 337_ (3303_a EM61 Bottom Coil

CEHNC JAD 28 Apr 03

○ power pole(37'from gazebo)

-20mV to 20mV CI=5mV

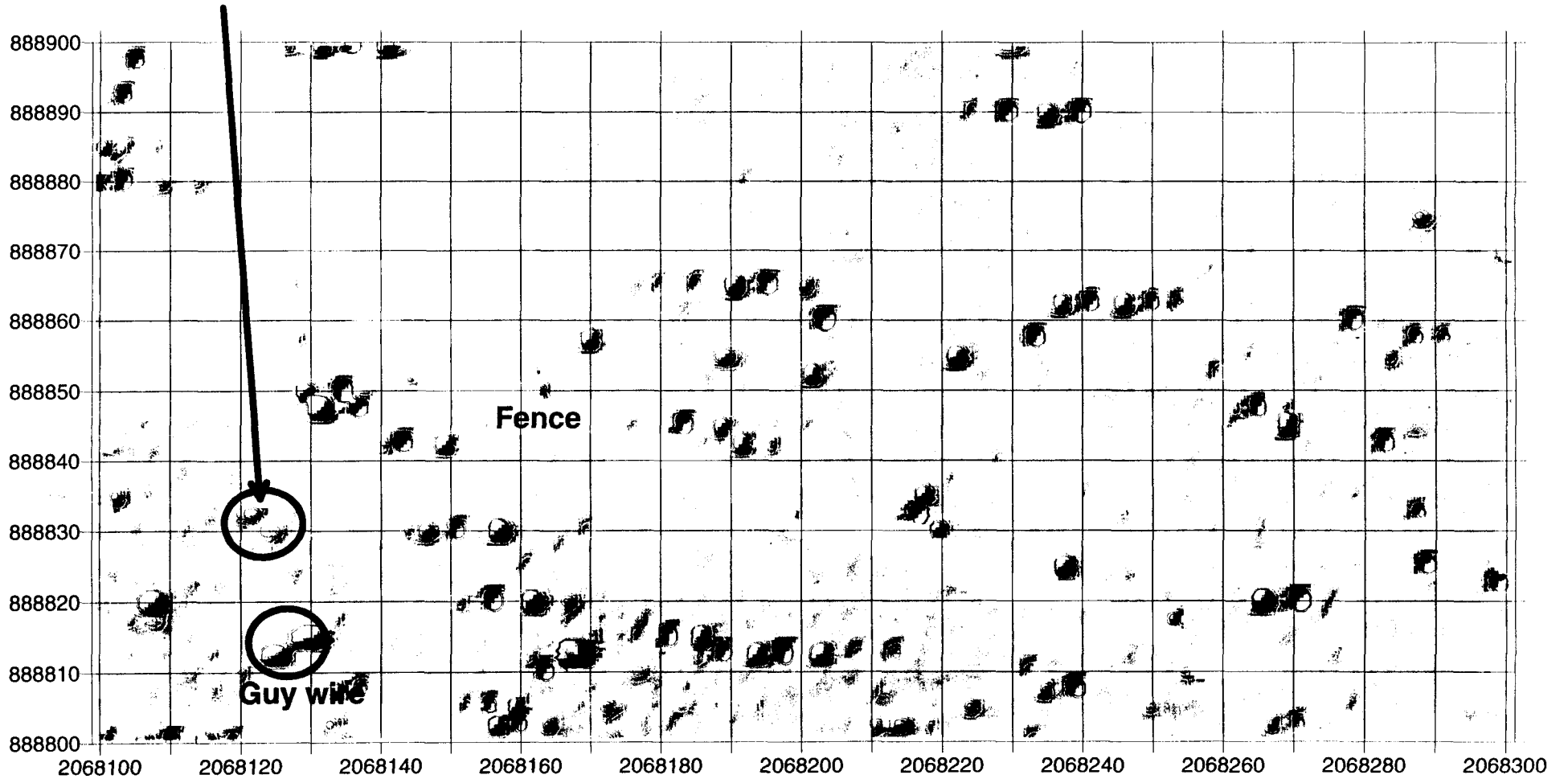


Parsons' Lakeview Grid 338 & 49 EM61 Bottom Coil

CEHNC JAD 28 Apr 03

-20mV to 20mV CI=5mV

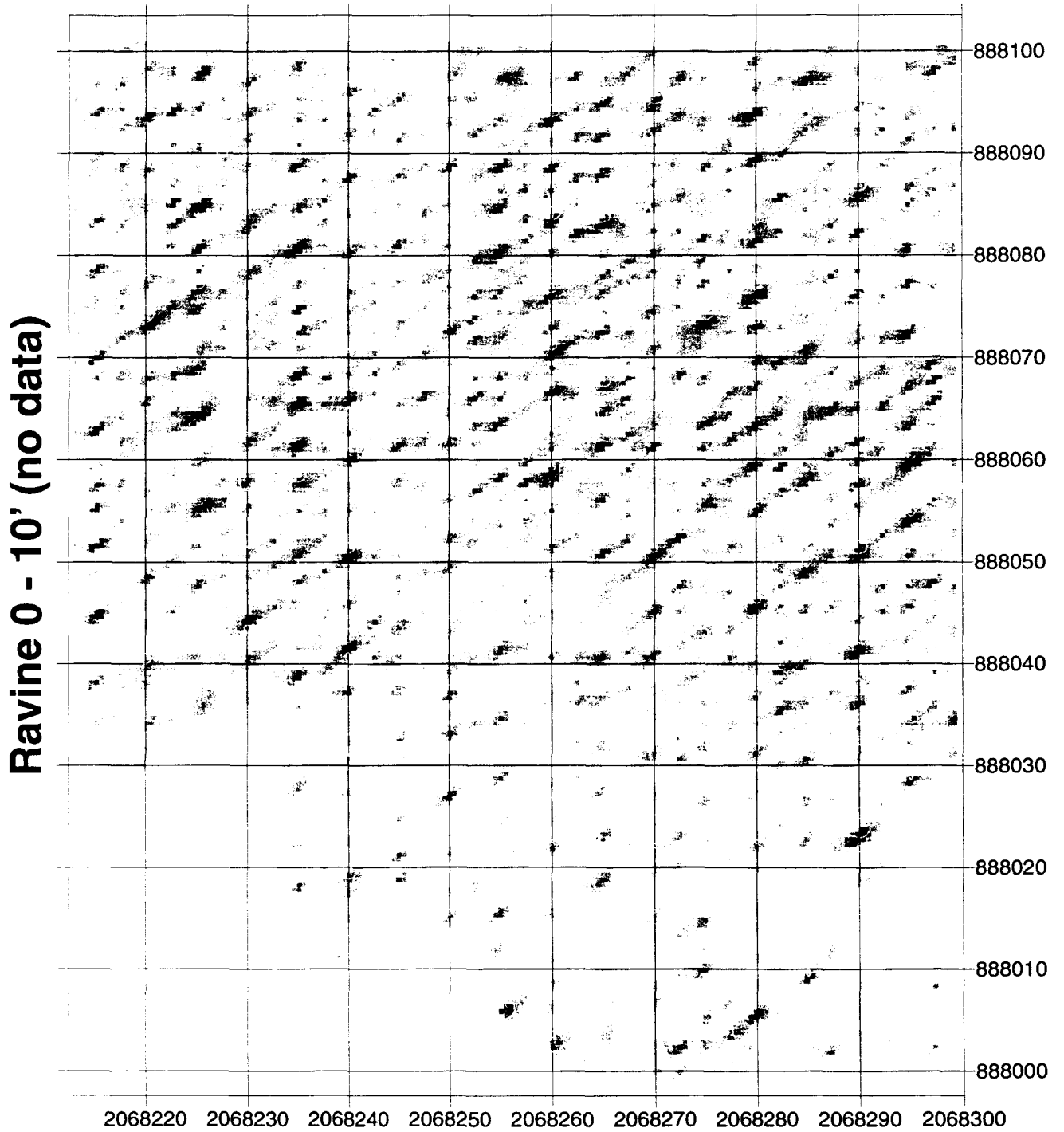
Telephone pole (3 lines into ground)



Parsons' Lakeview Grid 341 EM61 Bottom Coil

CEHNC JAD 01 May 03

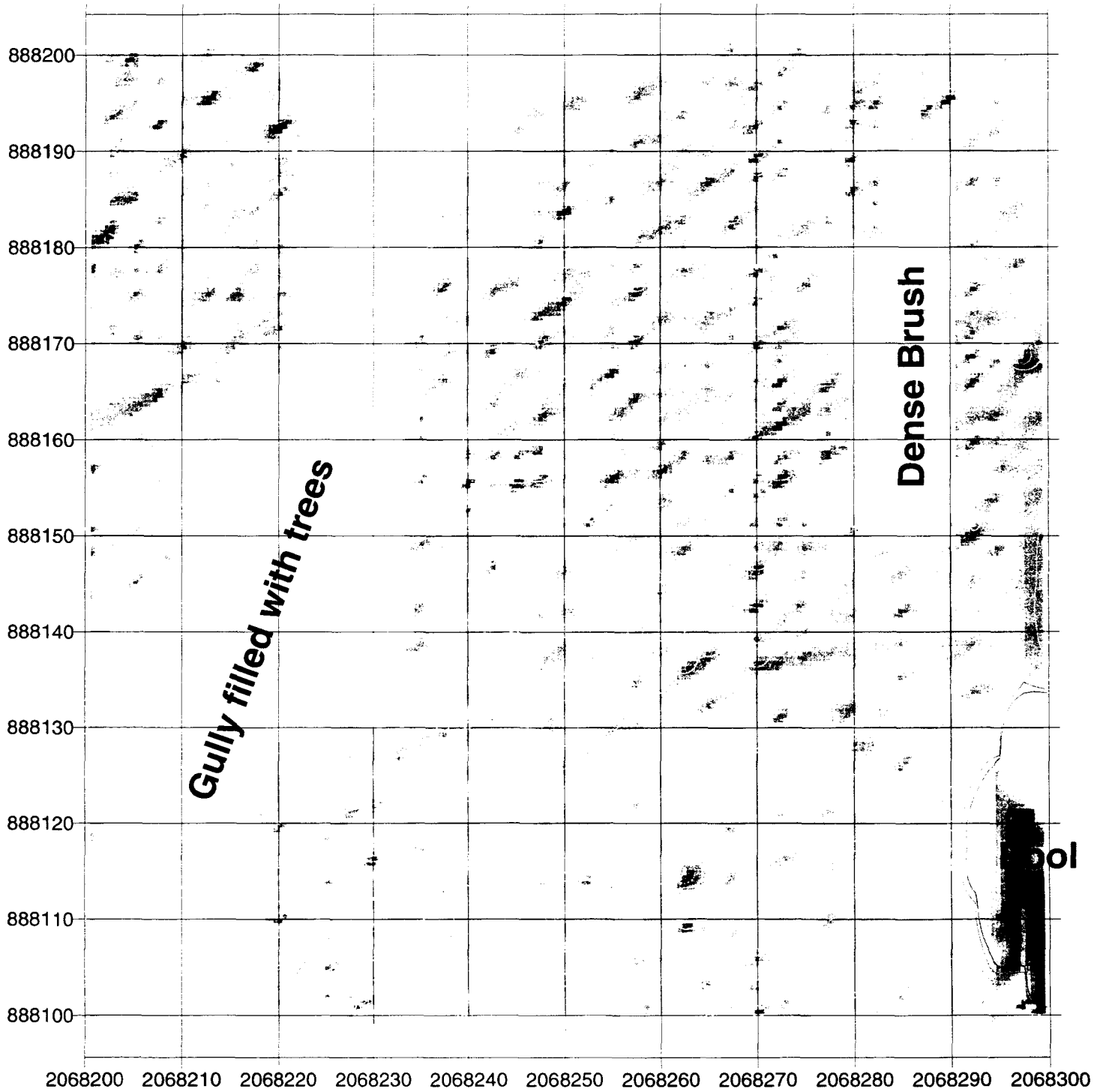
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 342 EM61 Bottom Coil

CEHNC JAD 01 May 03

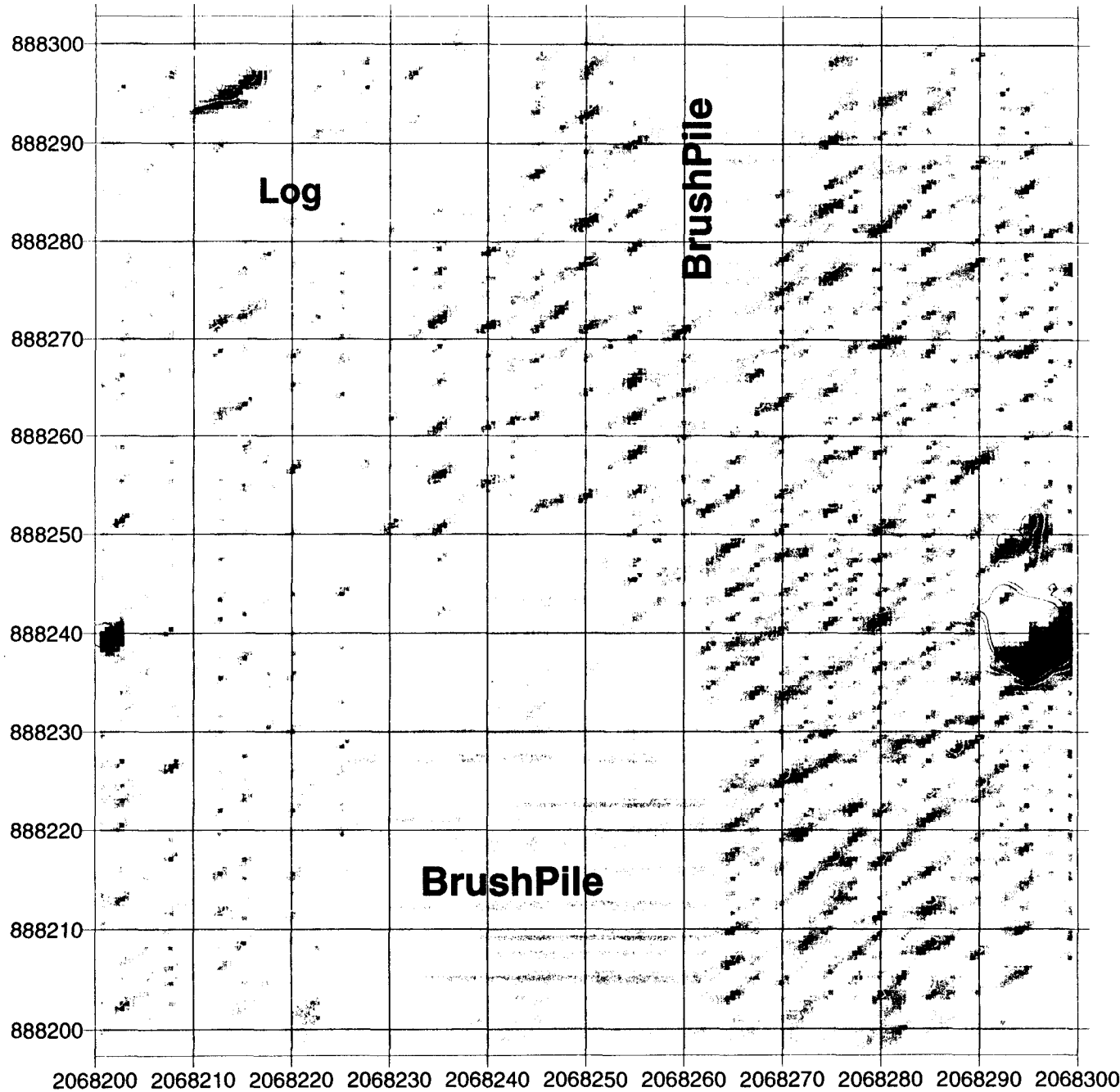
-20mV to 20mV CI=5mV



arsons' Lakeview Grid 343_ .1803_A EM61 Bottom Coil

CEHNC JAD 01 May 03

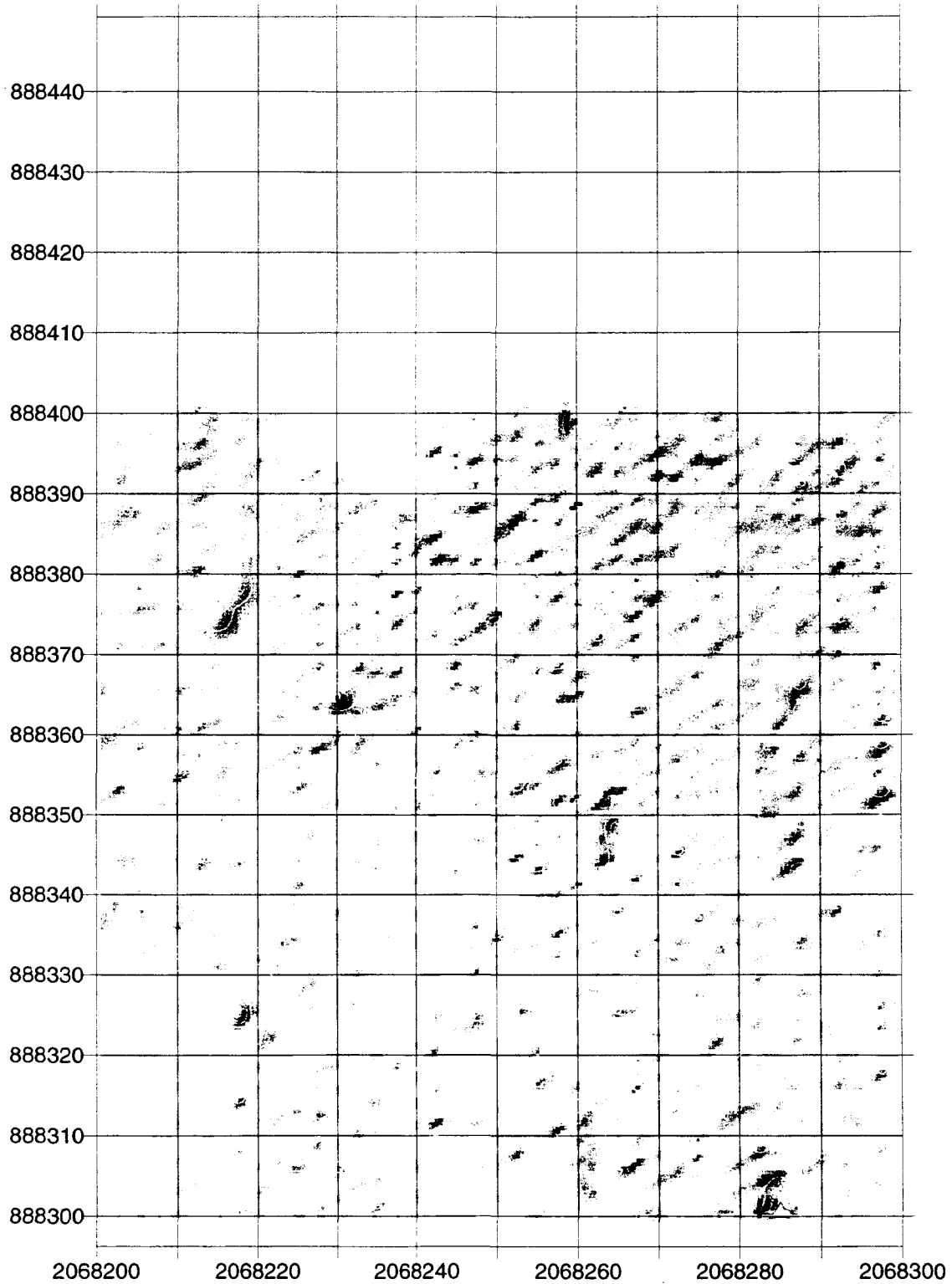
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 344_021803_a EM61 Bottom Coil

CEHNC JAD 01 May 03

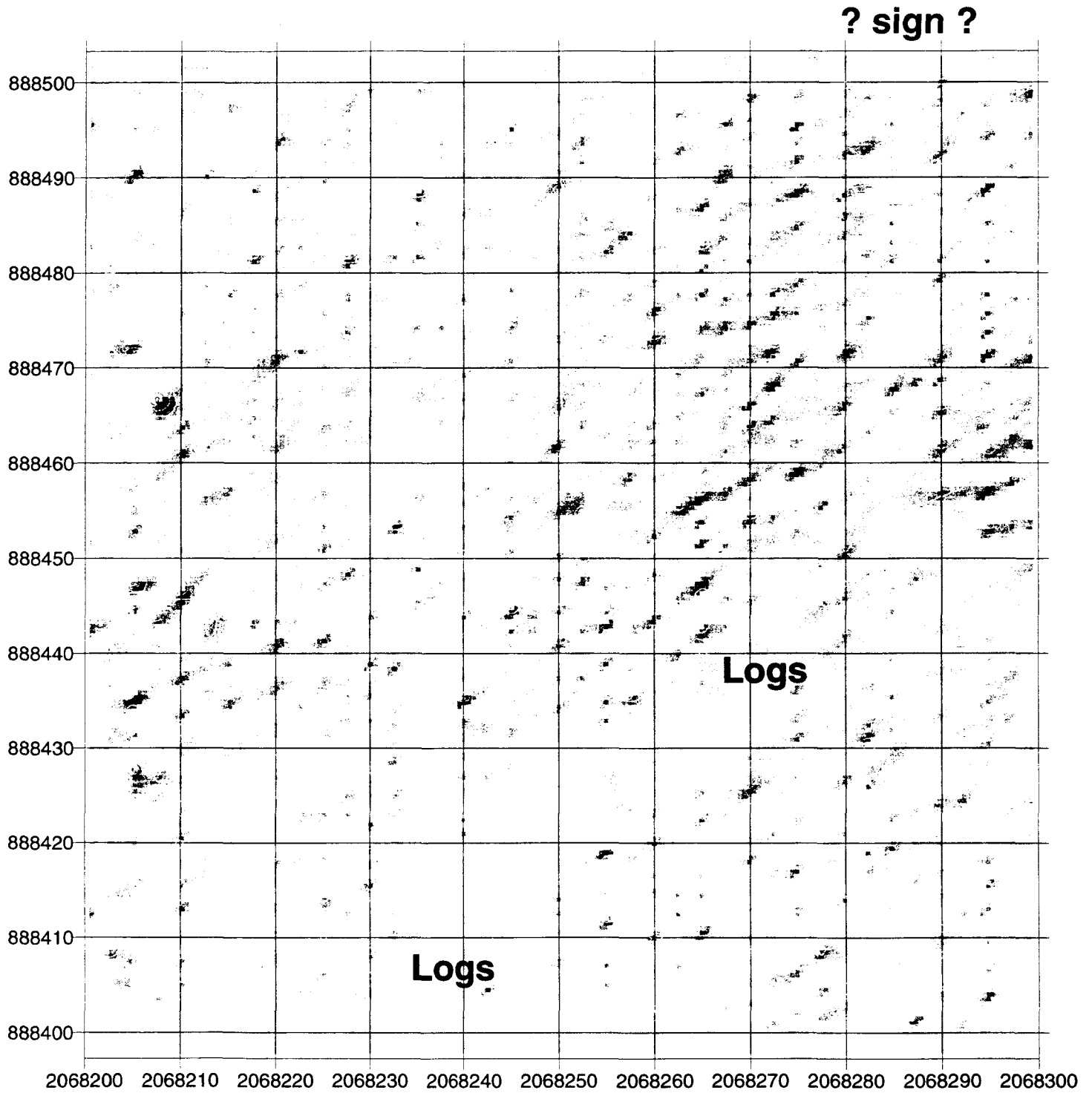
-20mV to 20mV Cl=5mV



Parsons' Lakeview Grid 345_022103_A EM61 Bottom Coil

CEHNC JAD 01 May 03

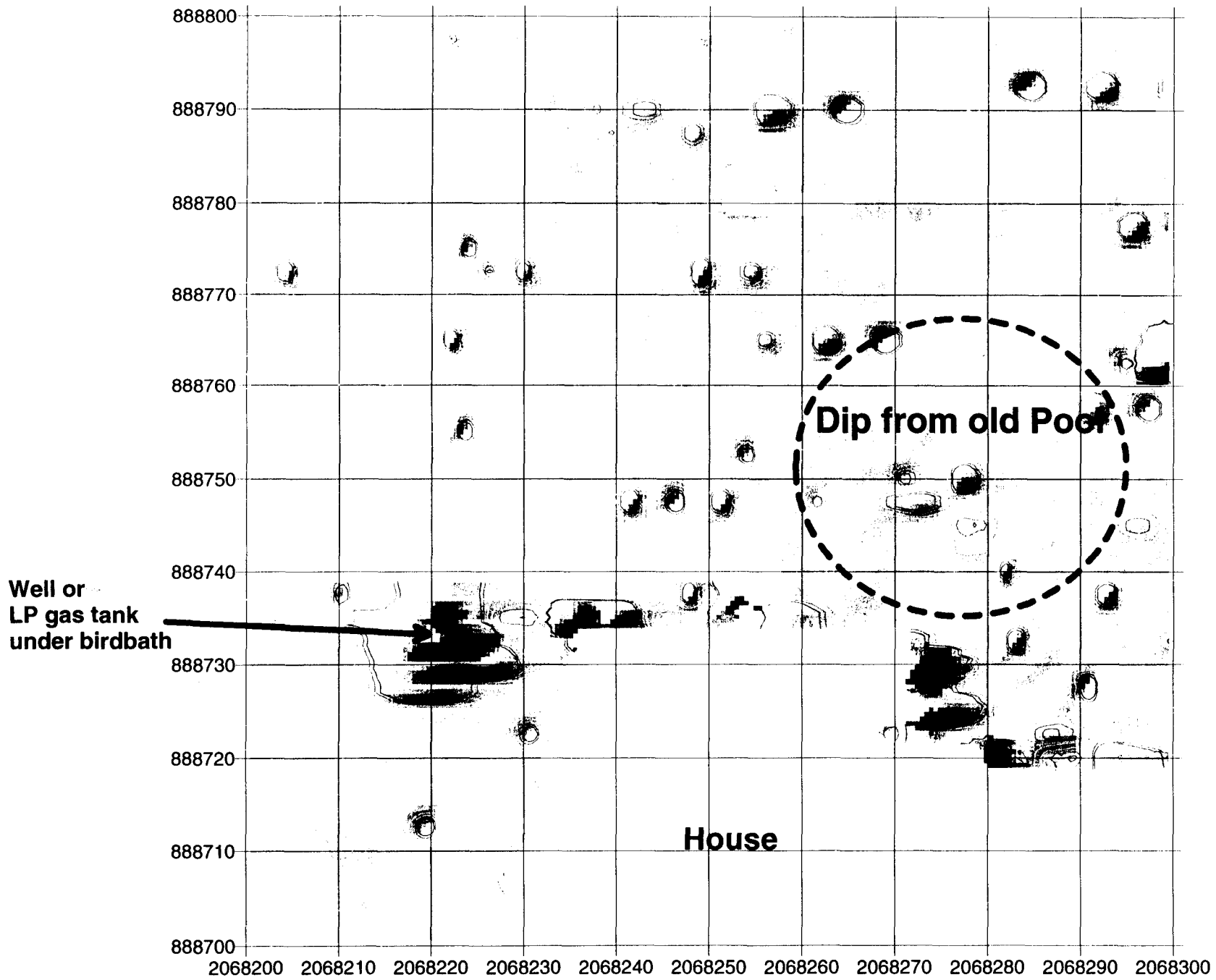
-20mV to 20mV Cl=1mV



Parsons' Lakeview Grid 34
CEHNC JAD 01 May 03

21303_a EM61 Bottom Coil

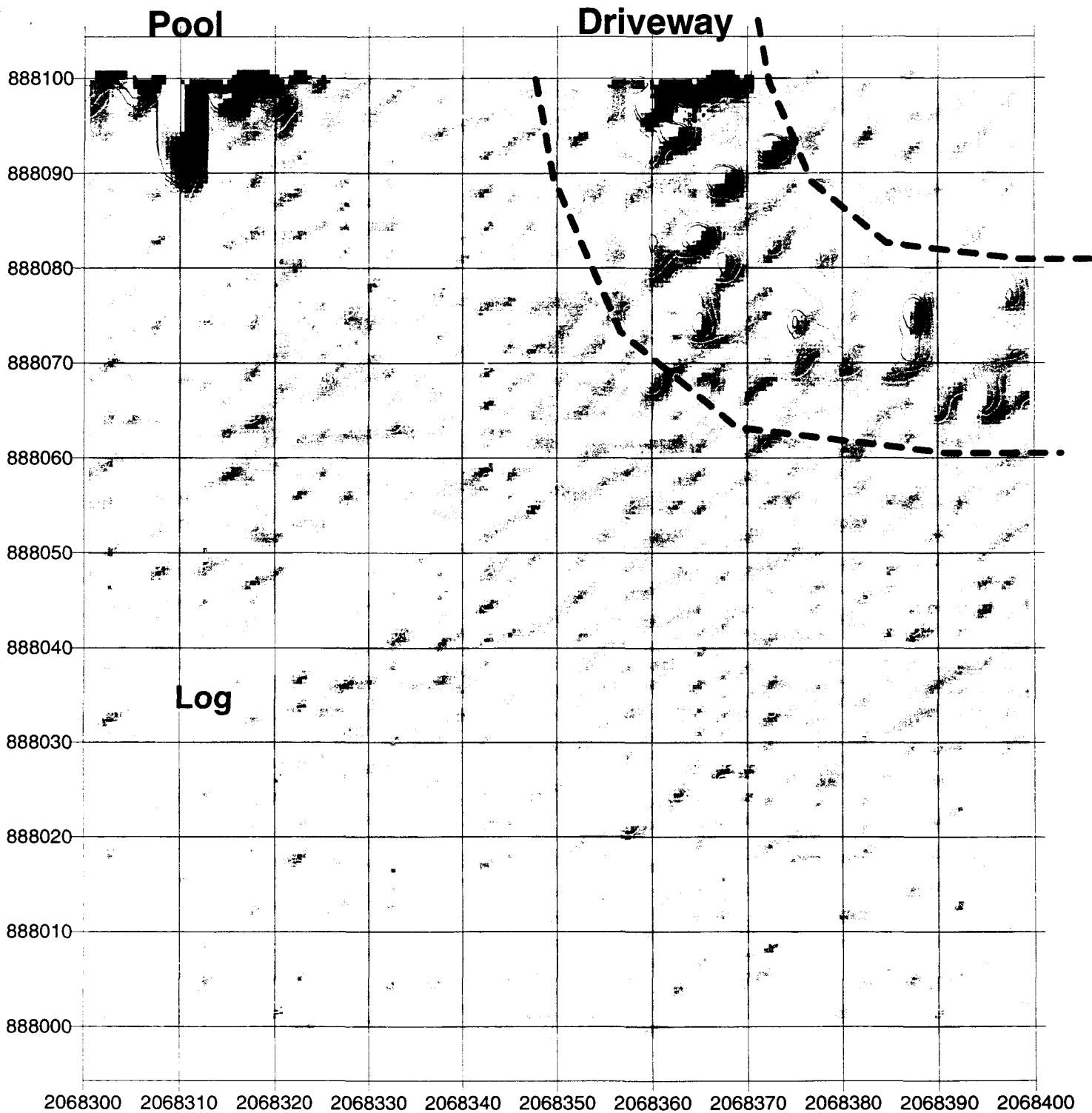
-20mV to 20mV Cl=5mV



Parsons' Lakeview Grid 352_021903_a EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV Cl=5mV

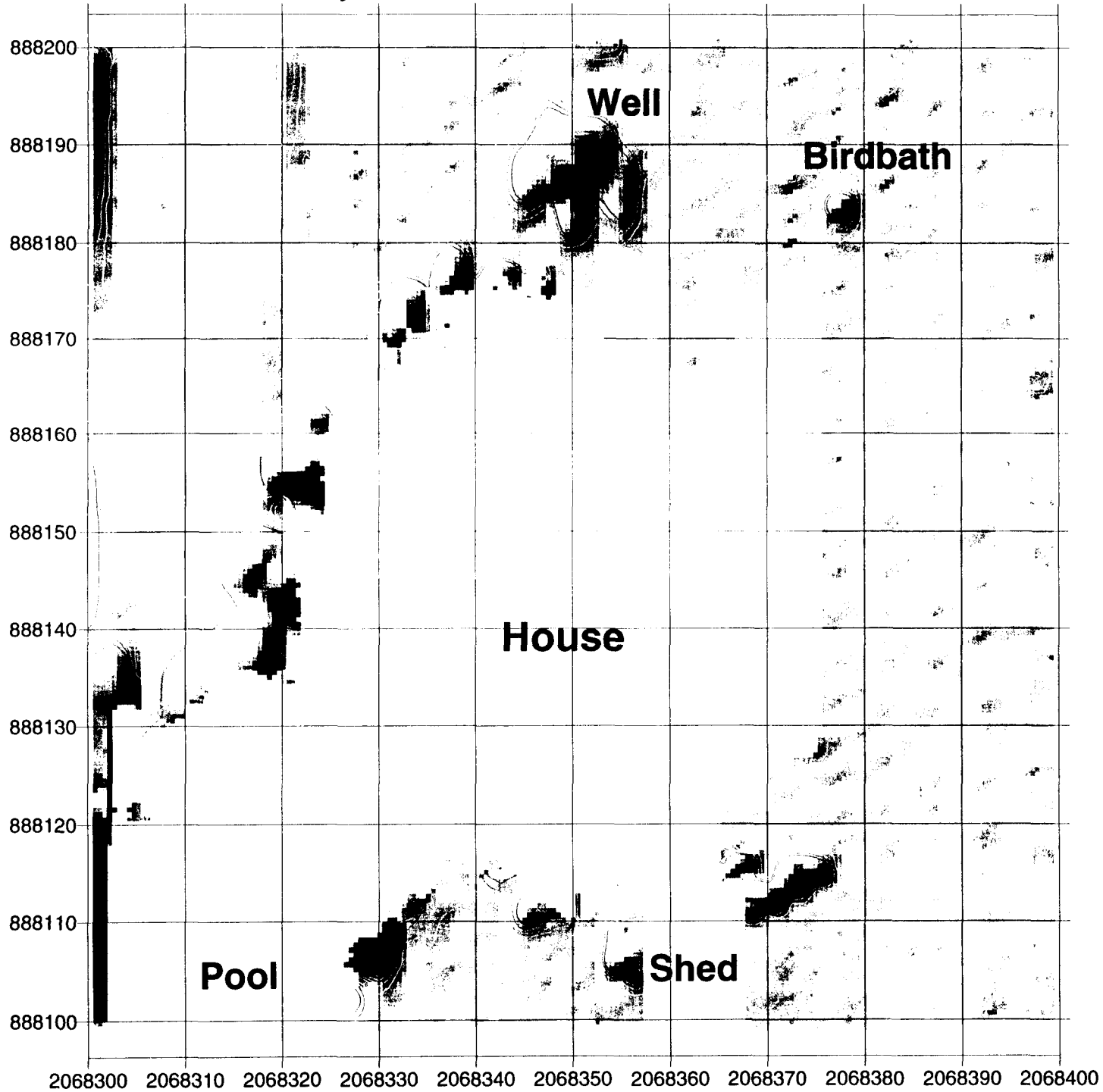


Parsons' Lakeview Grid 353_0219

a EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV





Parsons' Lakeview Grid 354_021

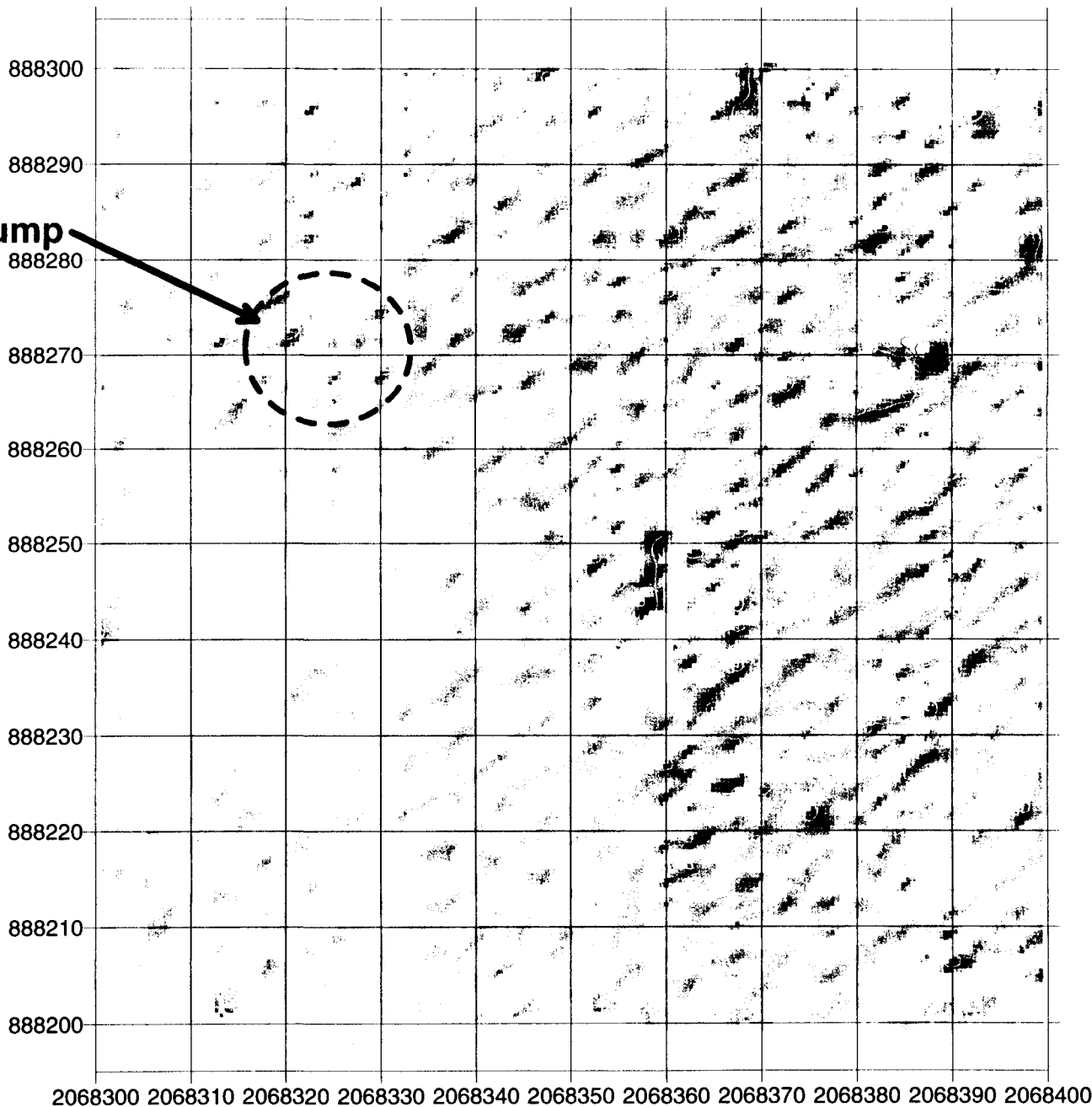
CEHNC JAD 01 May 03

3_a EM61 Bottom Coil

-20mV to 20mV CI=5mV



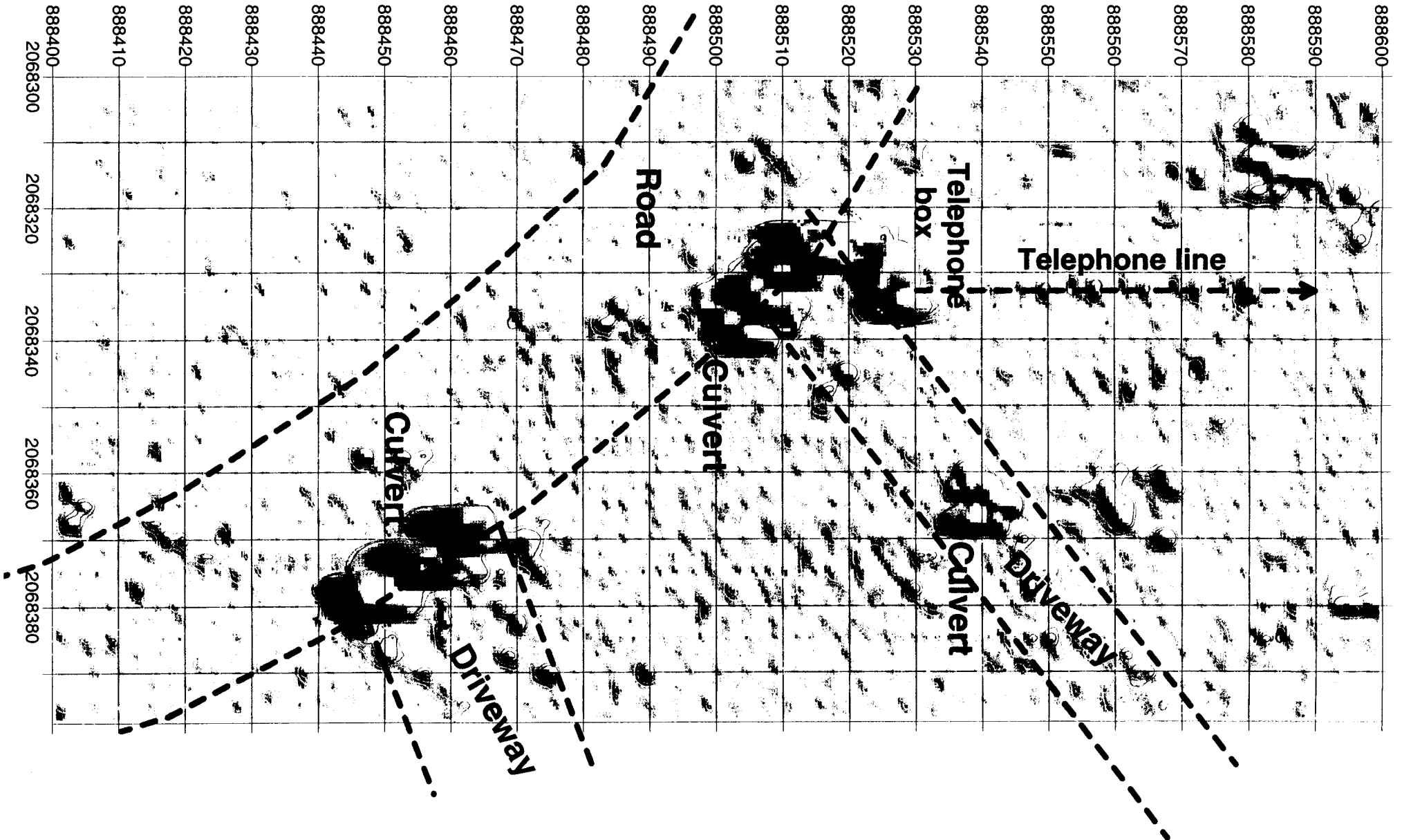
Hit Bump



Parsons' Lakeview Grid 356 & 357 EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV

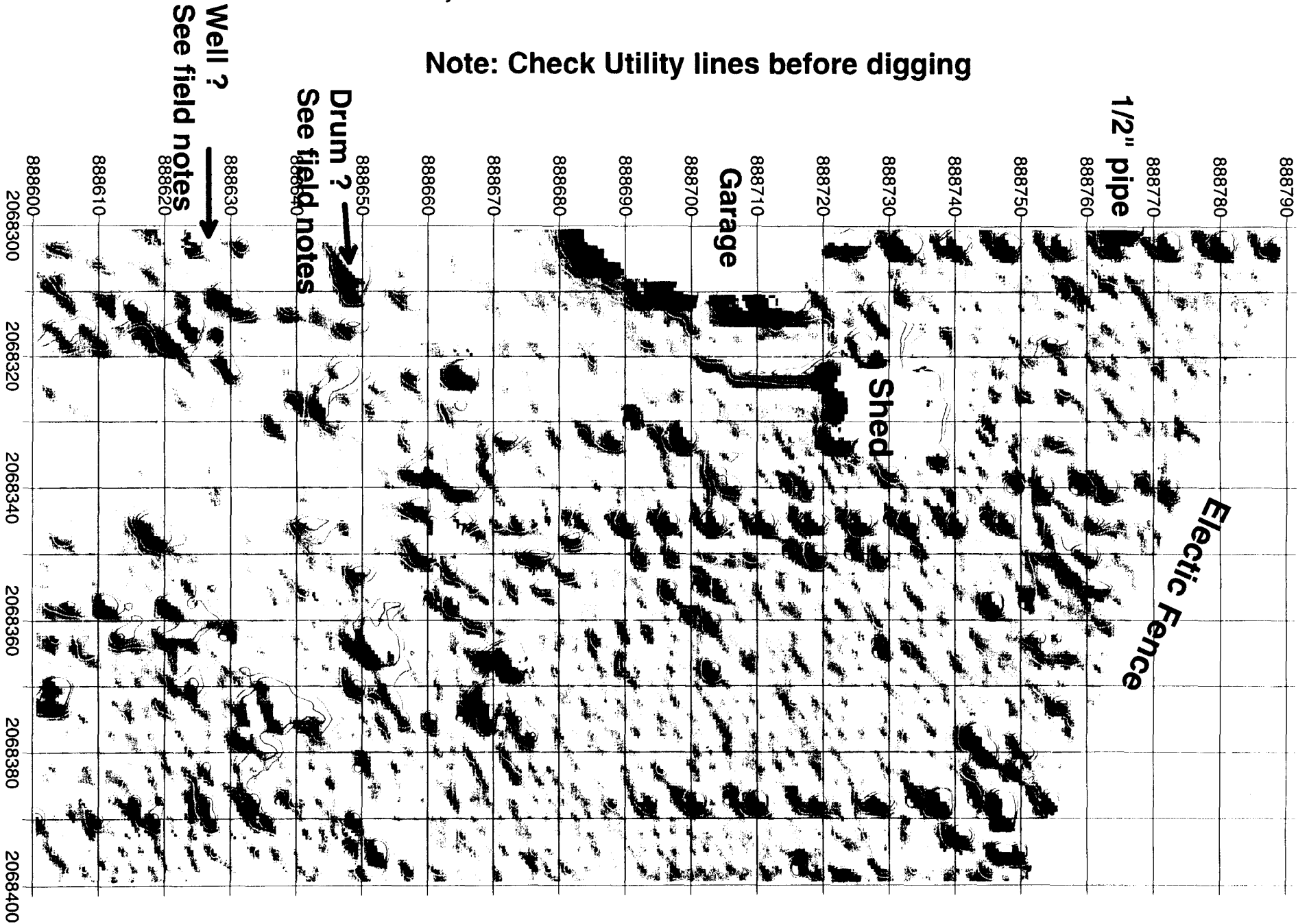


Parsons' Lakeview Grid & 359 EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV

Note: Check Utility lines before digging



1/2" pipe

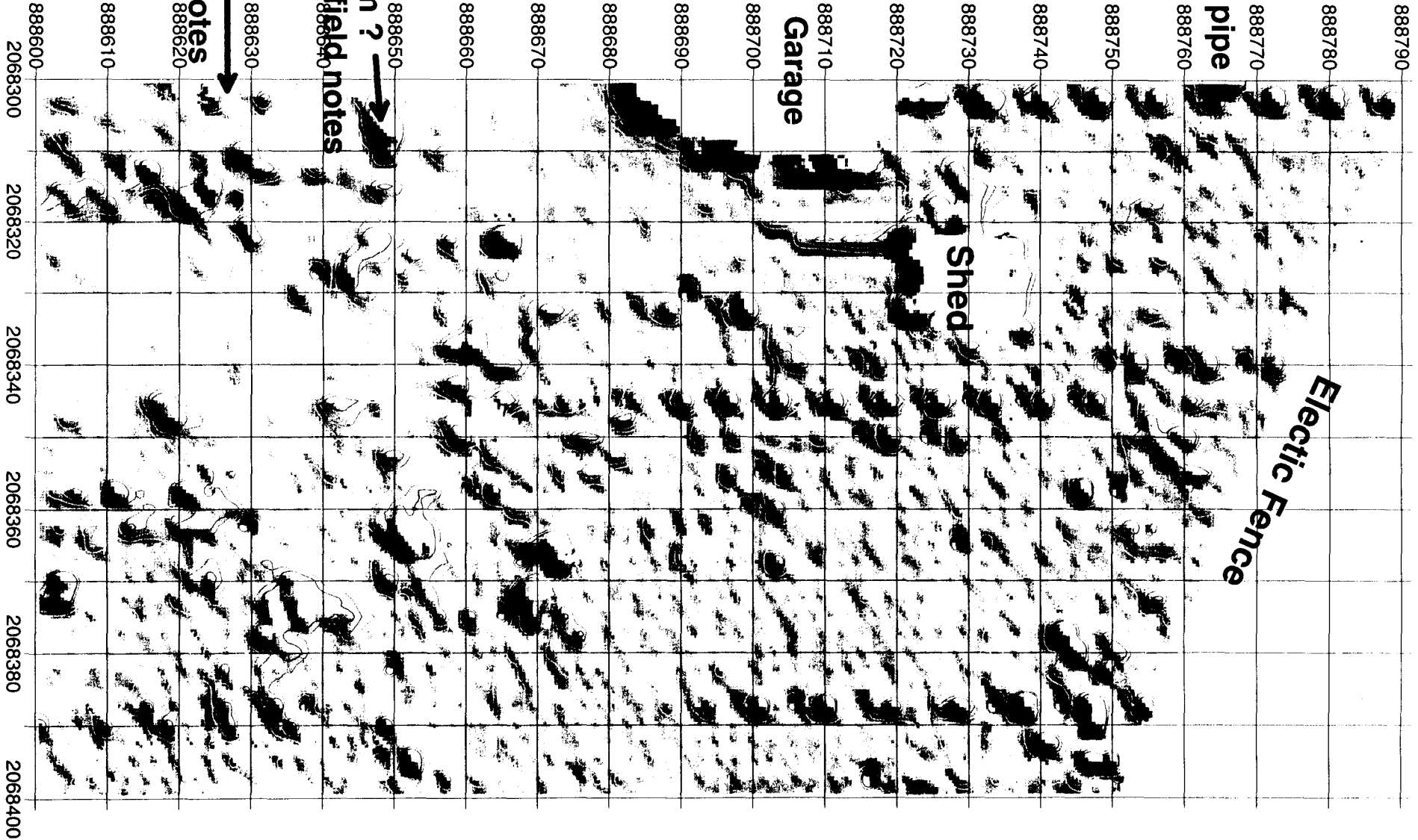
Garage

Shed

Electric Fence

Drum ?
See field notes

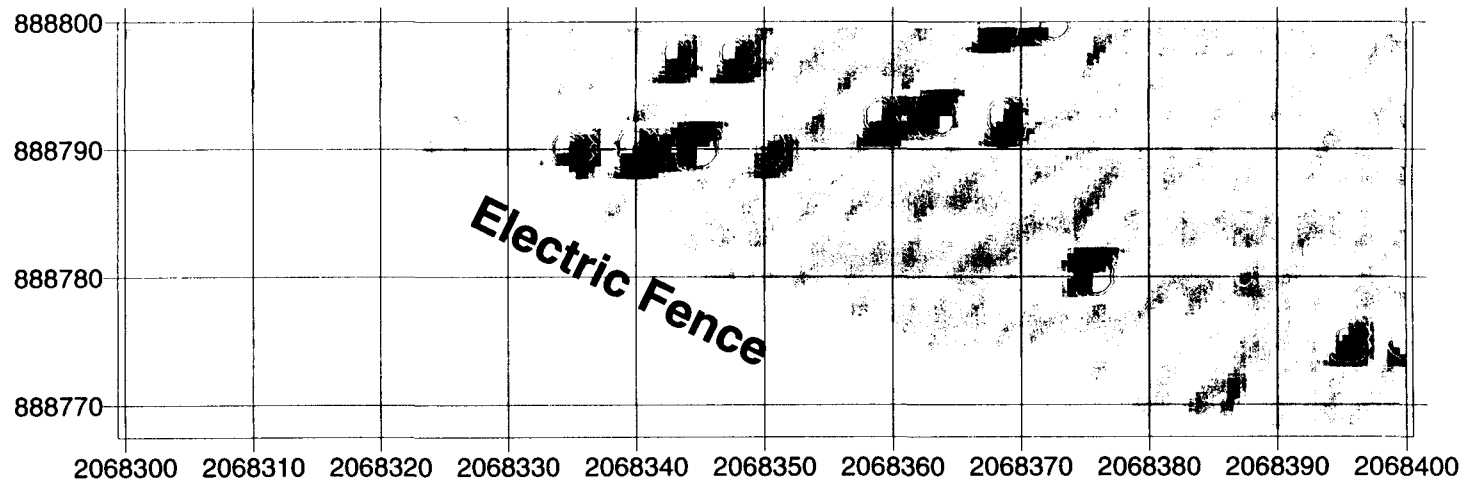
Well ?
See field notes



Parsons' Lakeview Grid 359_021803_a EM61 Bottom Coil

CEHNC JAD 01 May 03

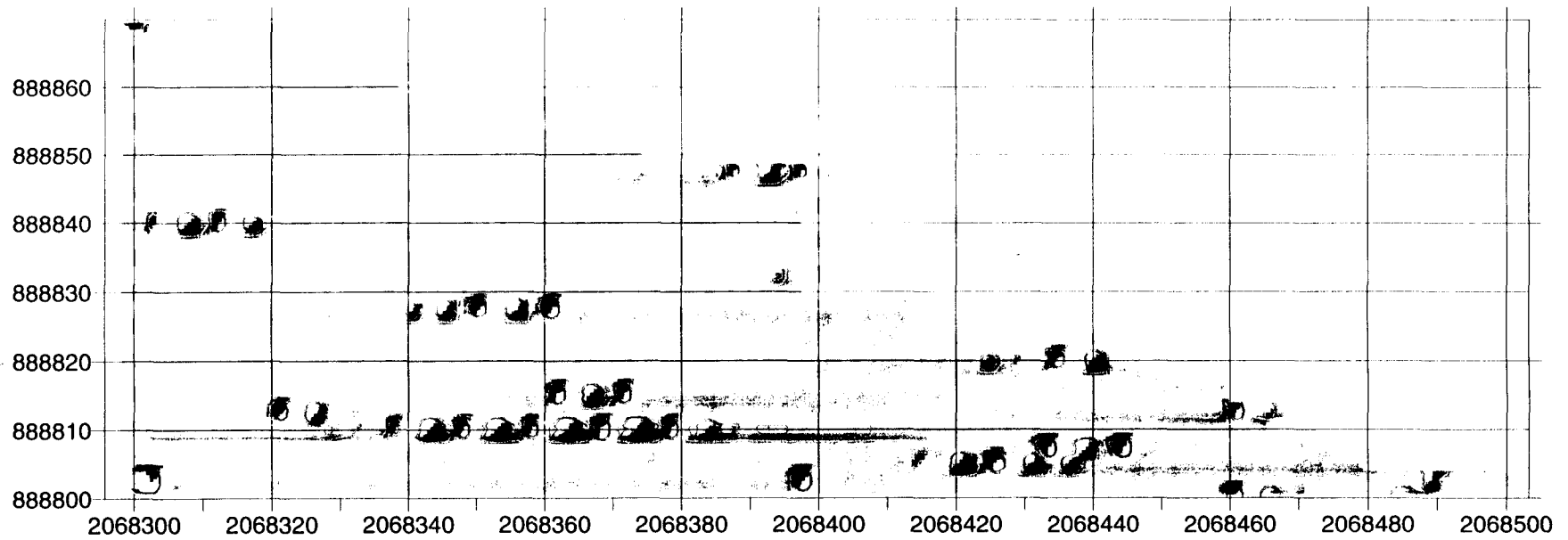
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 360 & 372 EM61 Bottom Coil

CEHNC JAD 01 May 03

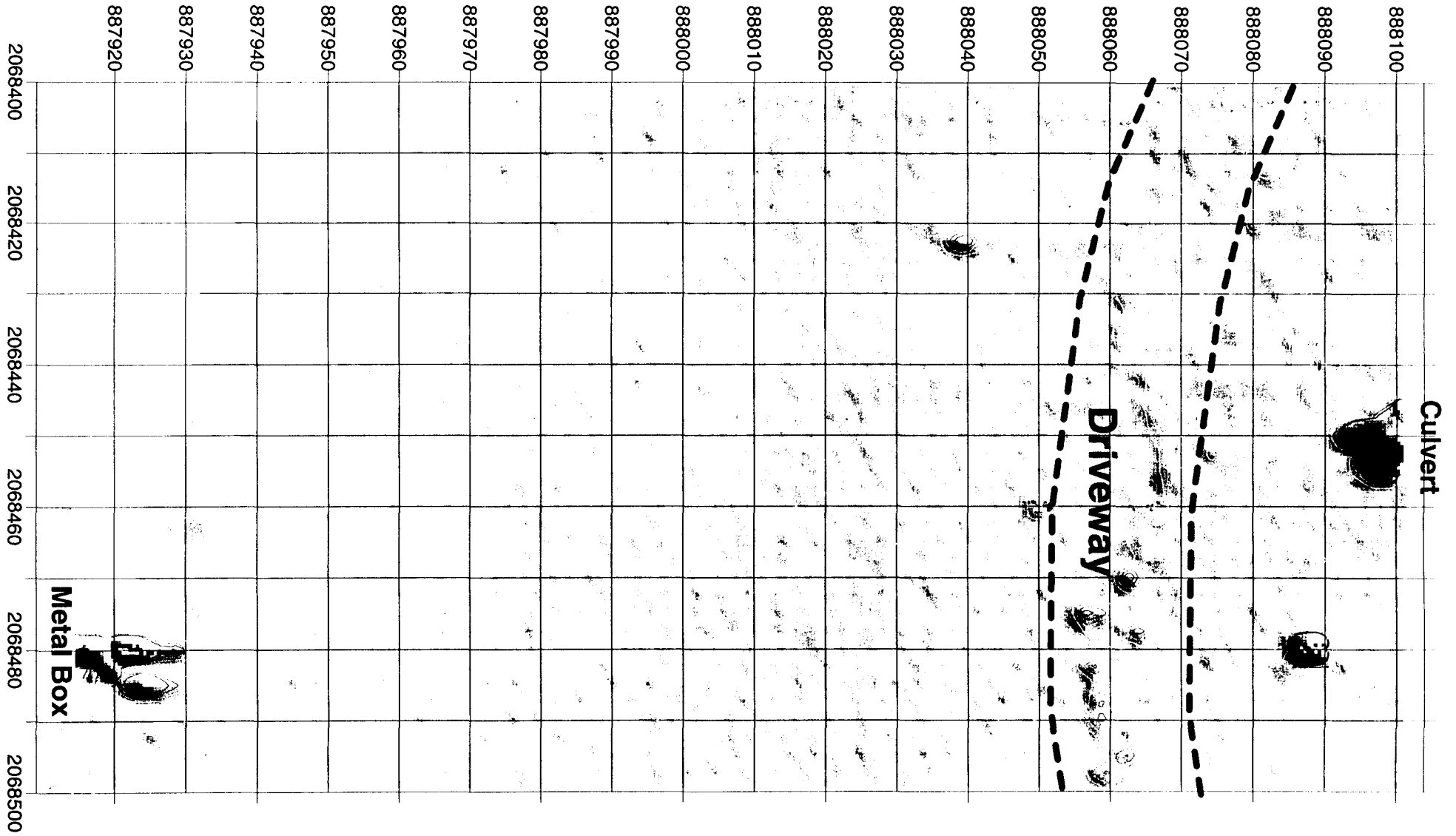
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 362 & 363 EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV

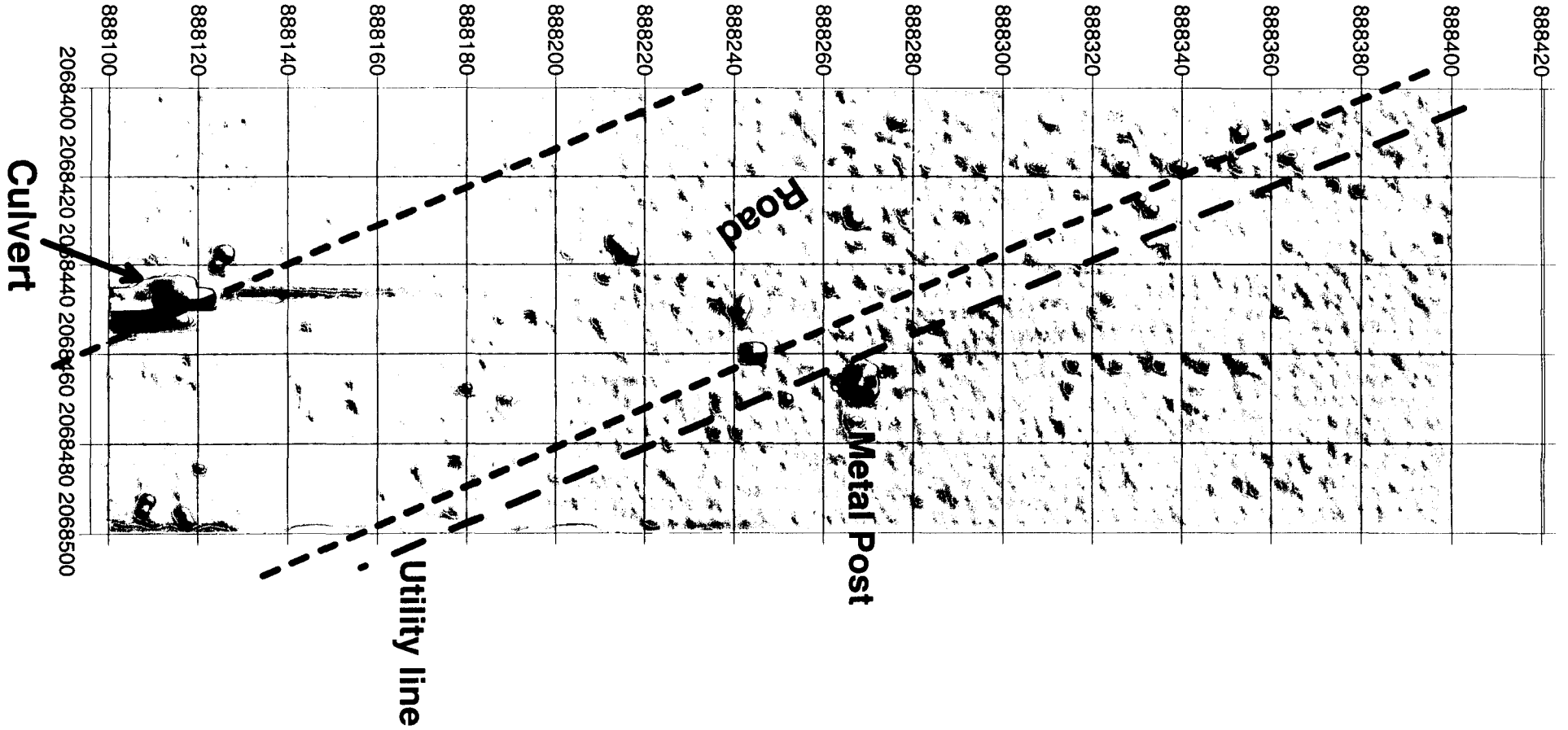


Note: Verify location of Well referenced on field notes, multiple metal pin flags in driveway area.

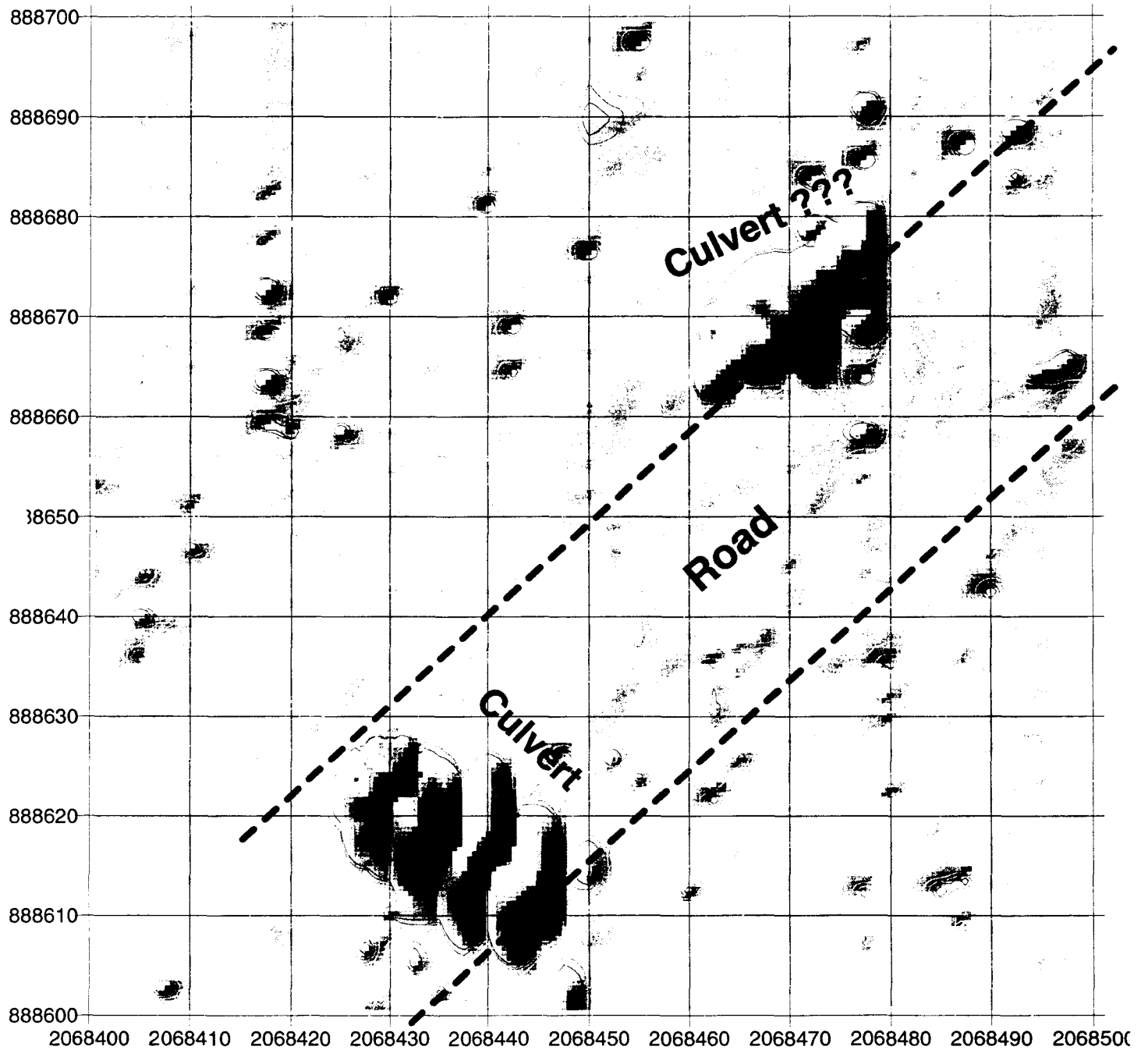
Parsons' Lakeview Grid 365 -367 EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV



Butner - Lakeview Subdivision EM61 data Grid 370

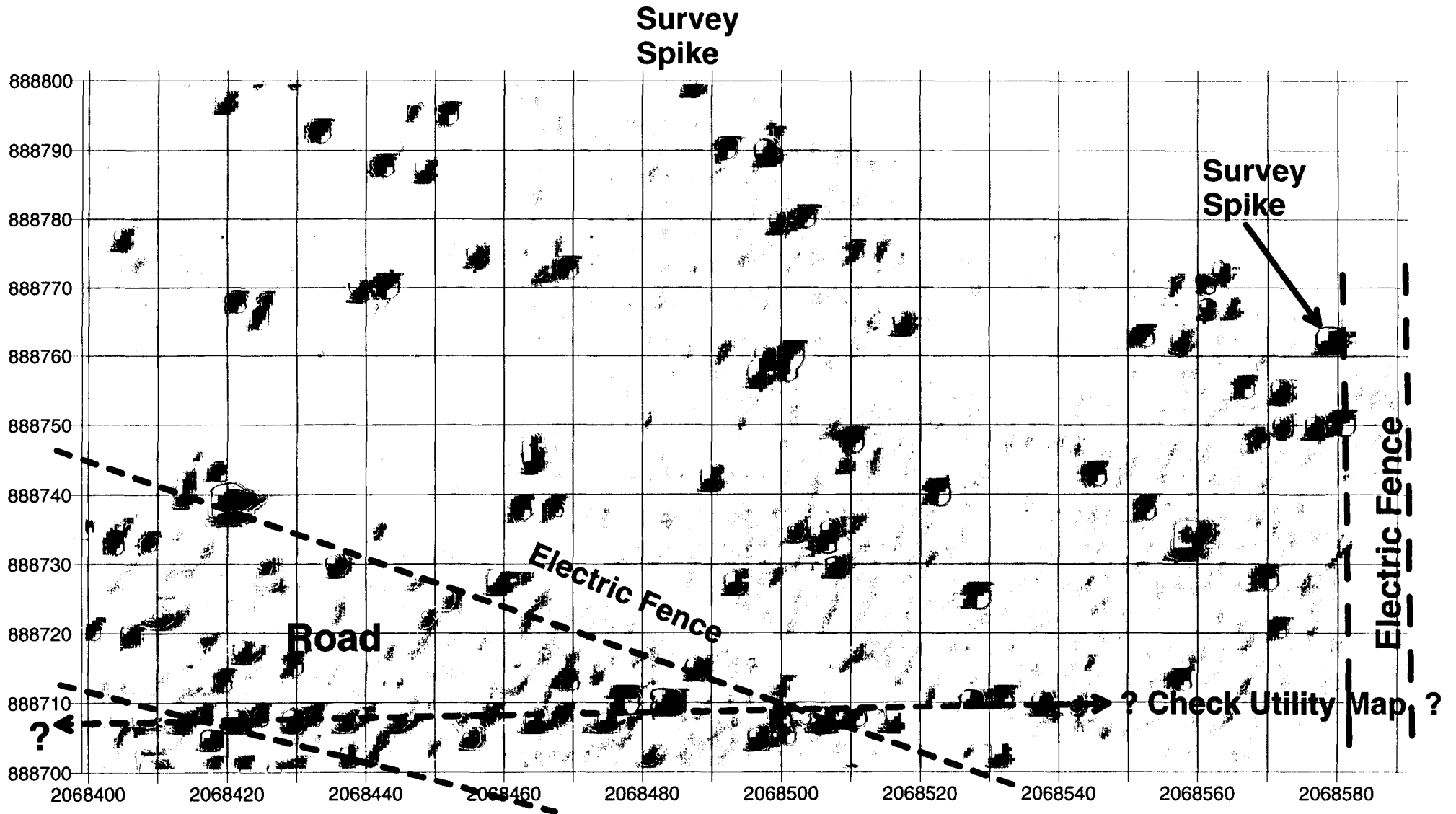


Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+-5mV)

Parsons' Lakeview Grid 371 & 372 EM61 Bottom Coil

CEHNC JAD 01 May 03

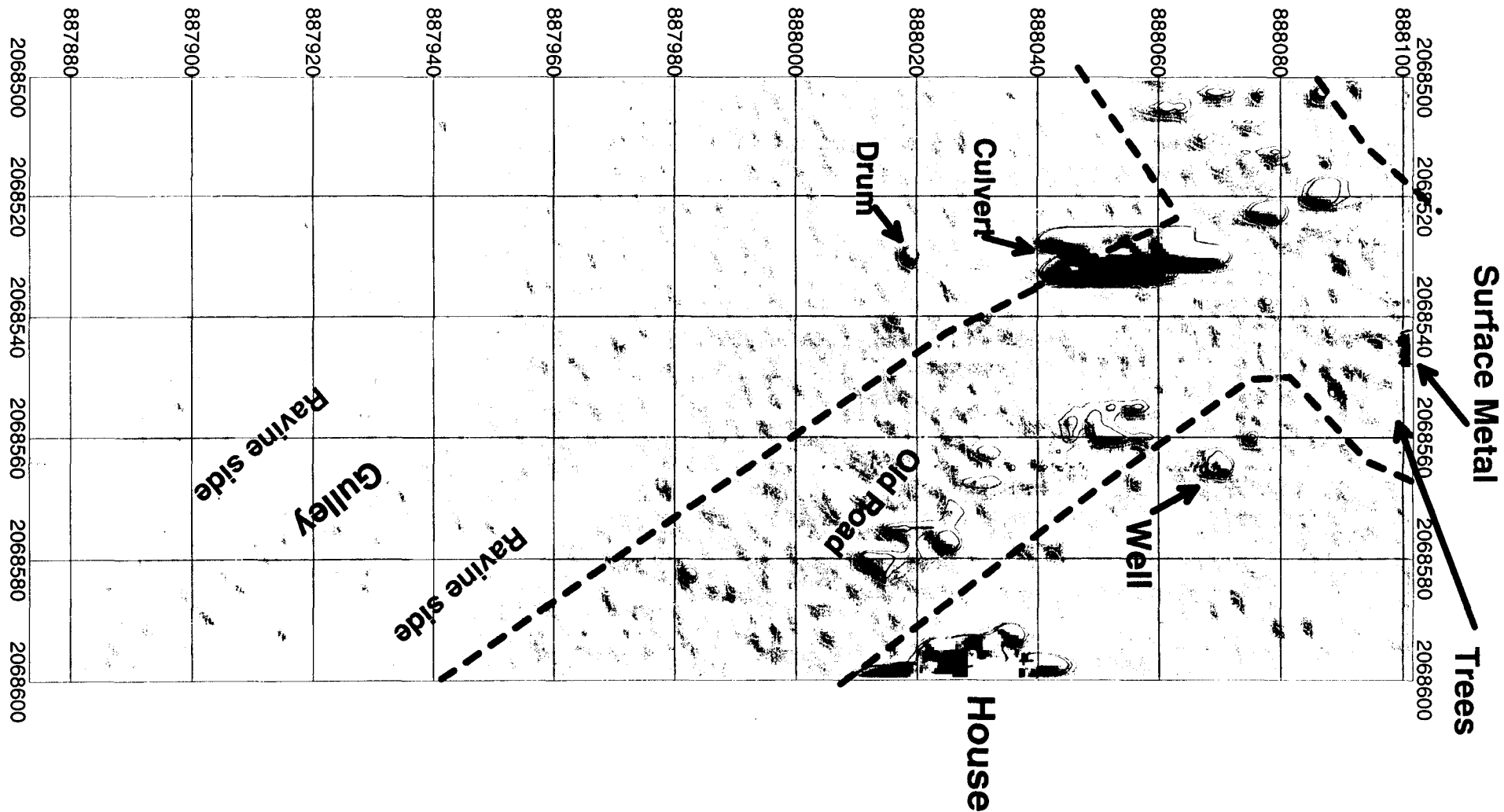
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 374 and 375 EM61 Bottom Coil

CEHNC RJS 01 May 03

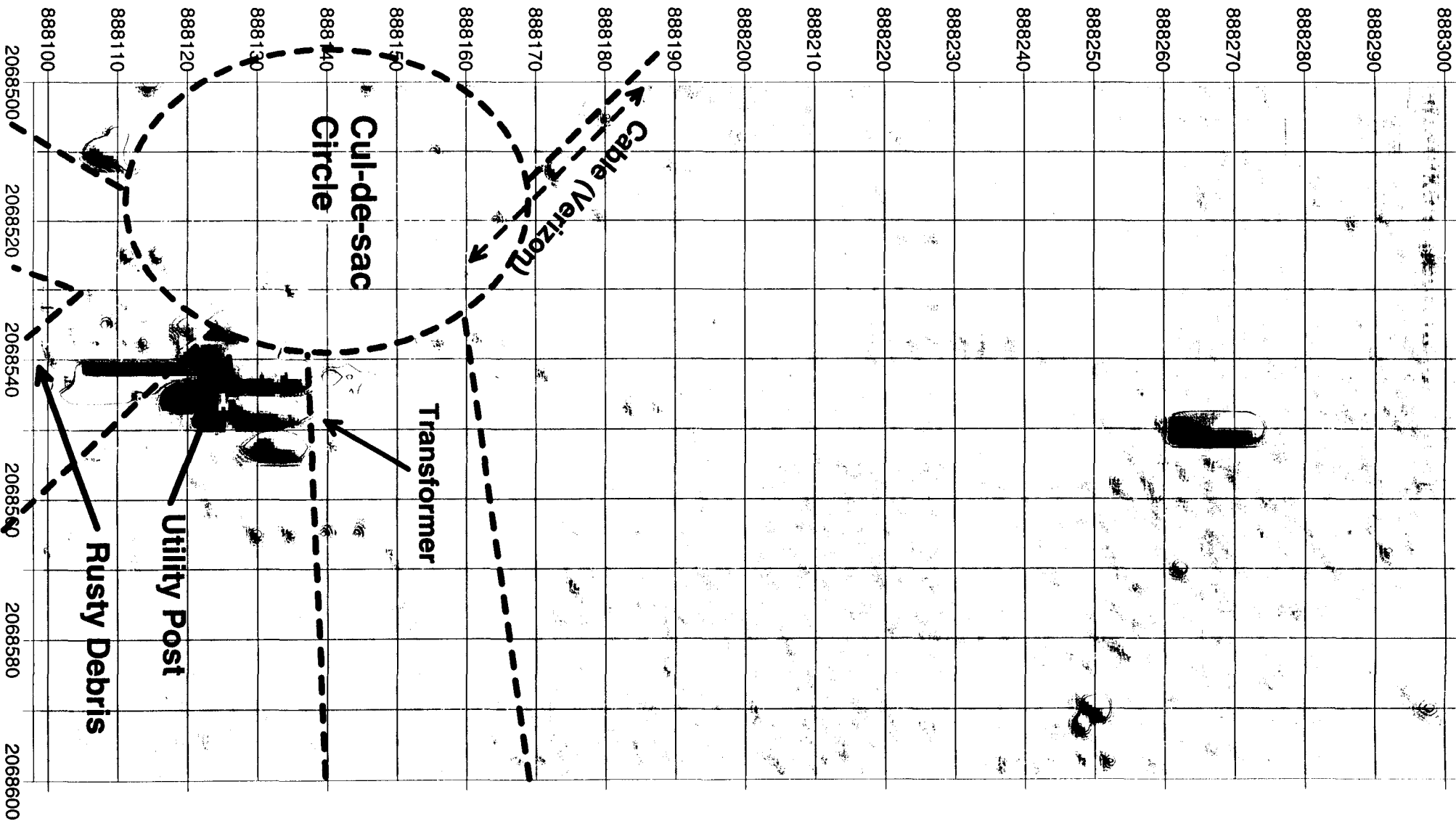
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 37b & 377 EM61 Bottom Coil

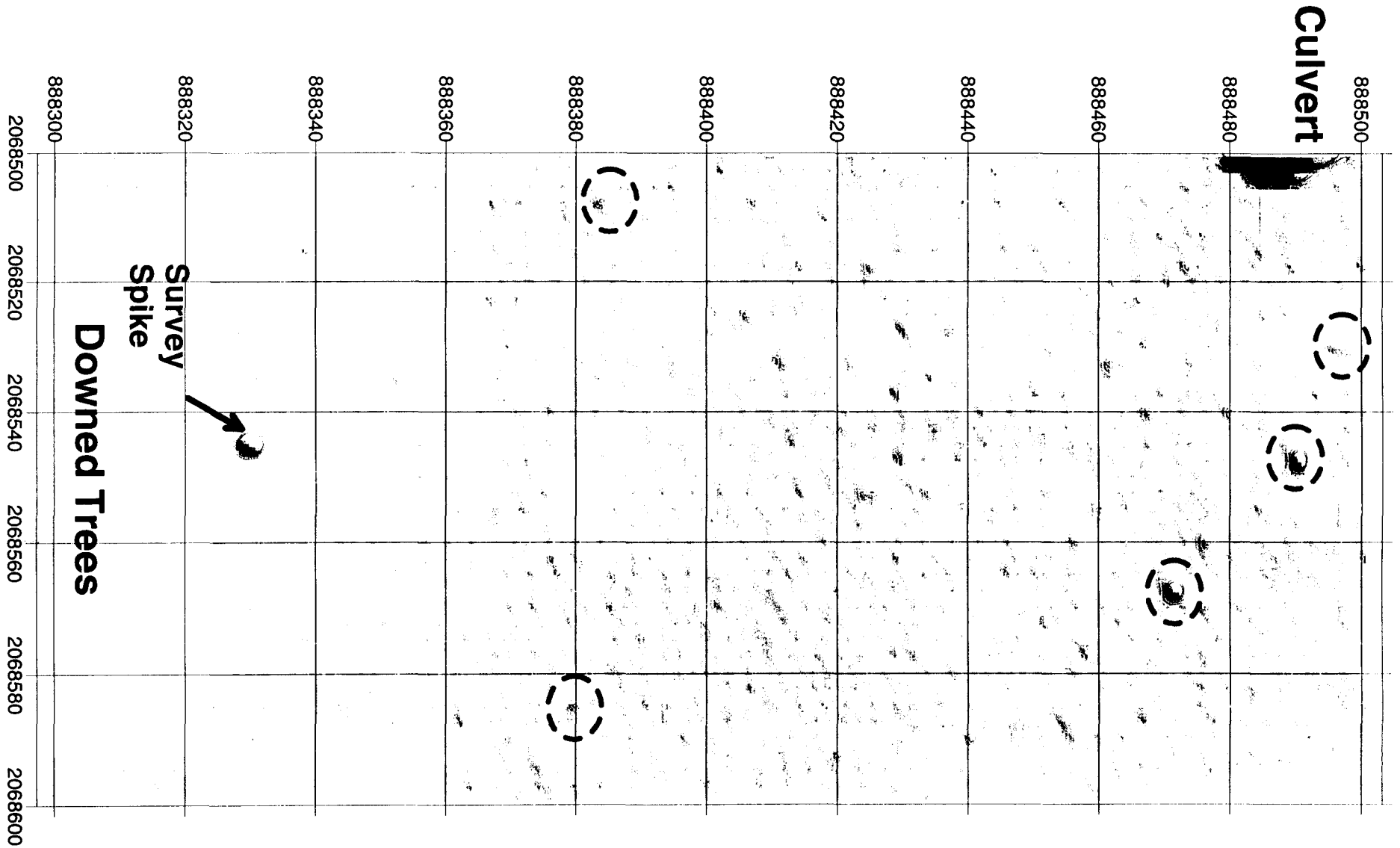
CEHNC JAD 01 May 03

-20mV to 20mV Cl=1mV



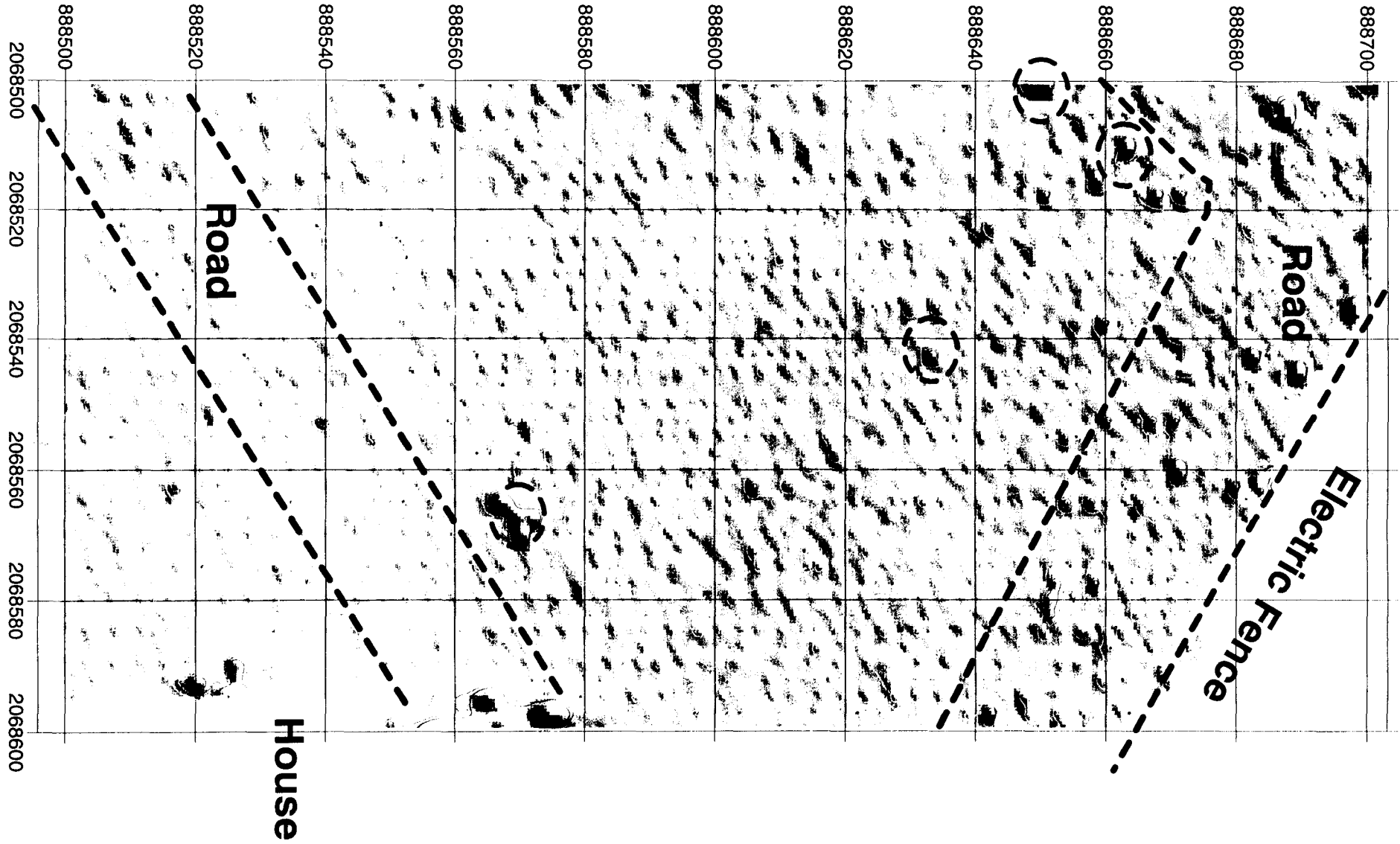
Butner - Lakeview Subdivision EM61 data Grid 378 & 379

Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @+5mV)



Butner - Lakeview Subdivision EM61 data Grids 380 & 381

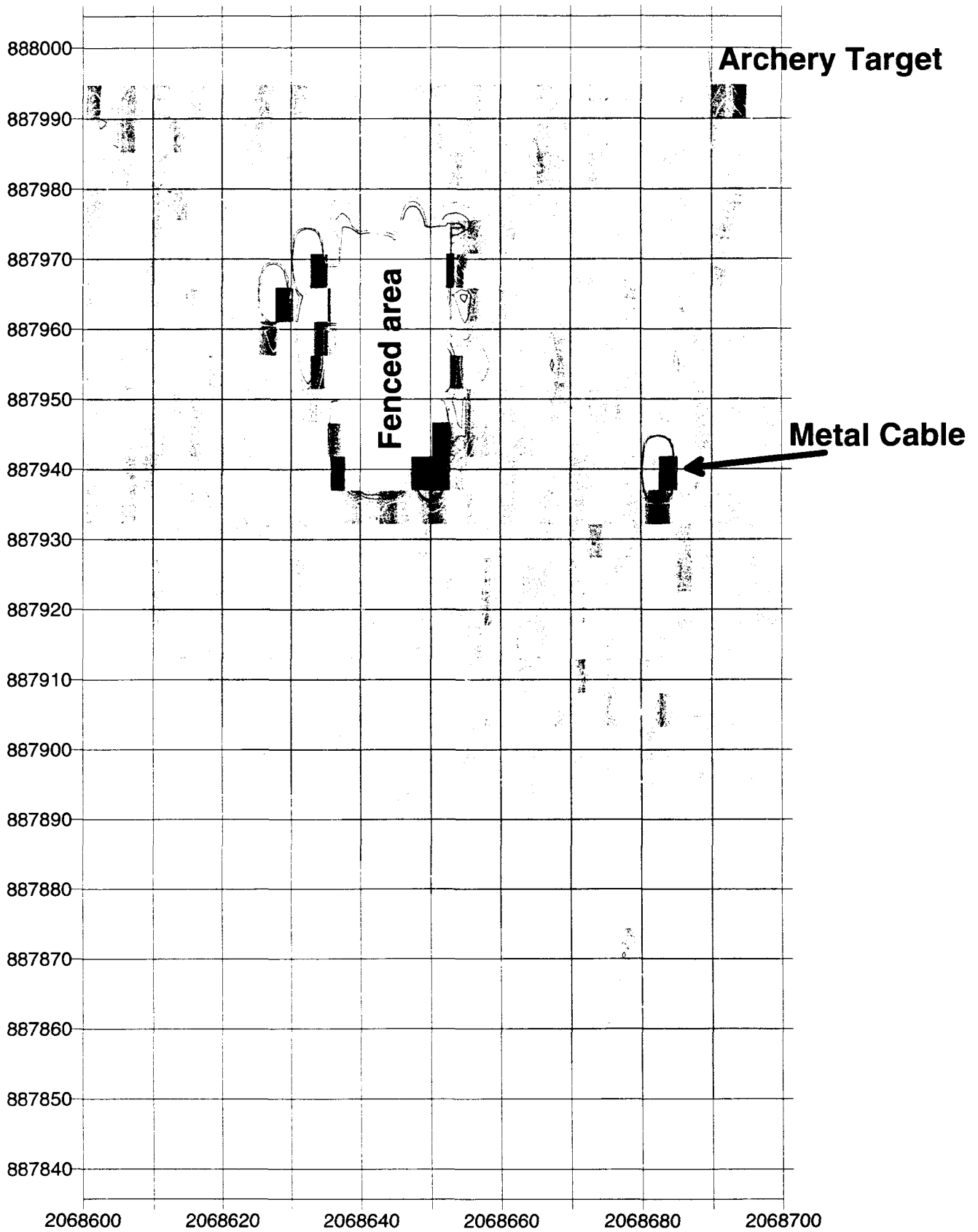
Data Processed by RJS - 1 May 2003 Bottom coil (-20 to 20 by 5, 1st @ +5mV)



Parsons' Lakeview Grid 384 & 384S EM61 Bottom Coil

CEHNC JAD 01 May 03

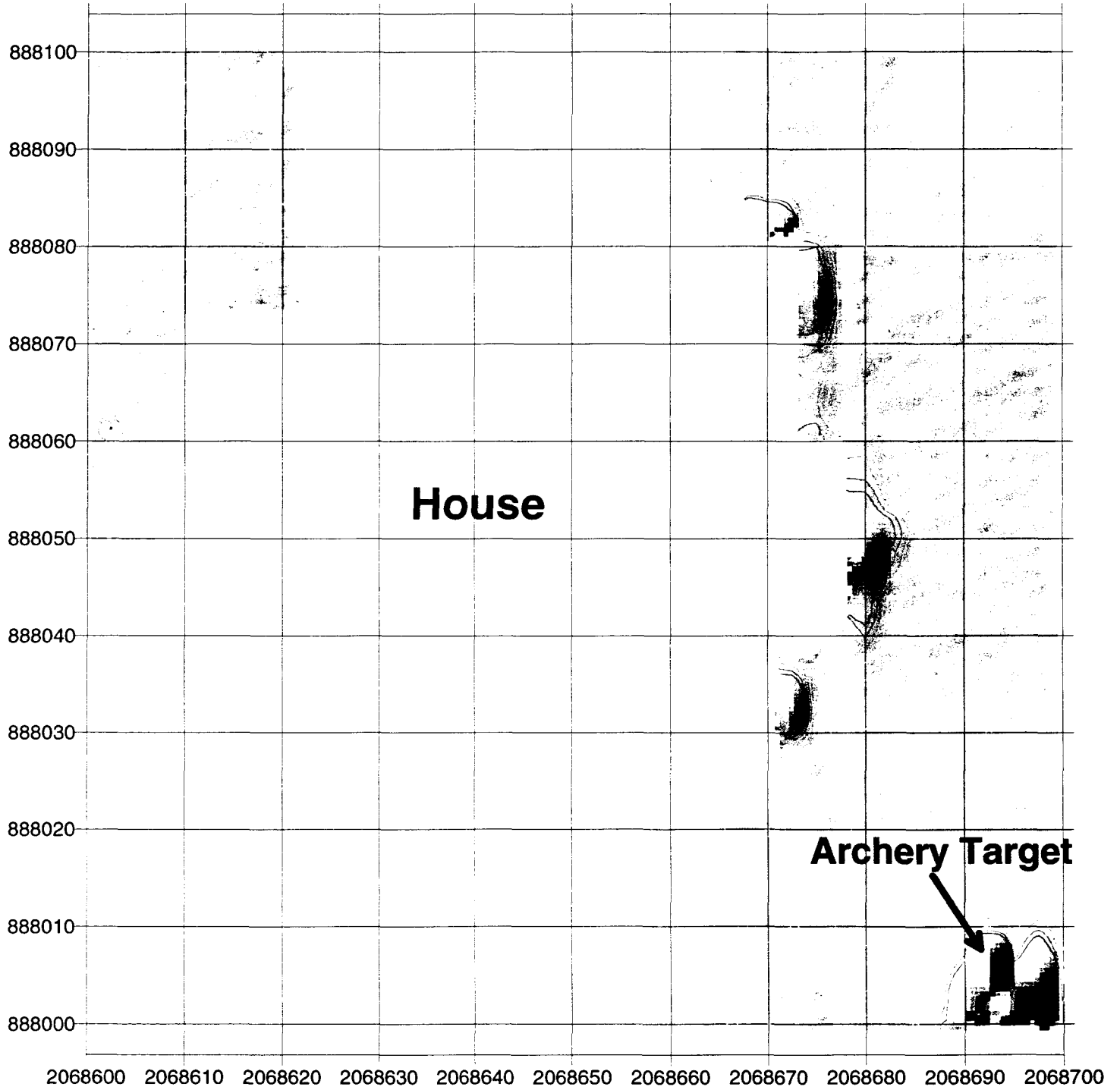
-20mV to 20mV Cl=1mV



Parsons' Lakeview Grid 385_022403_b EM61 Bottom Coil

CEHNC JAD 01 May 03

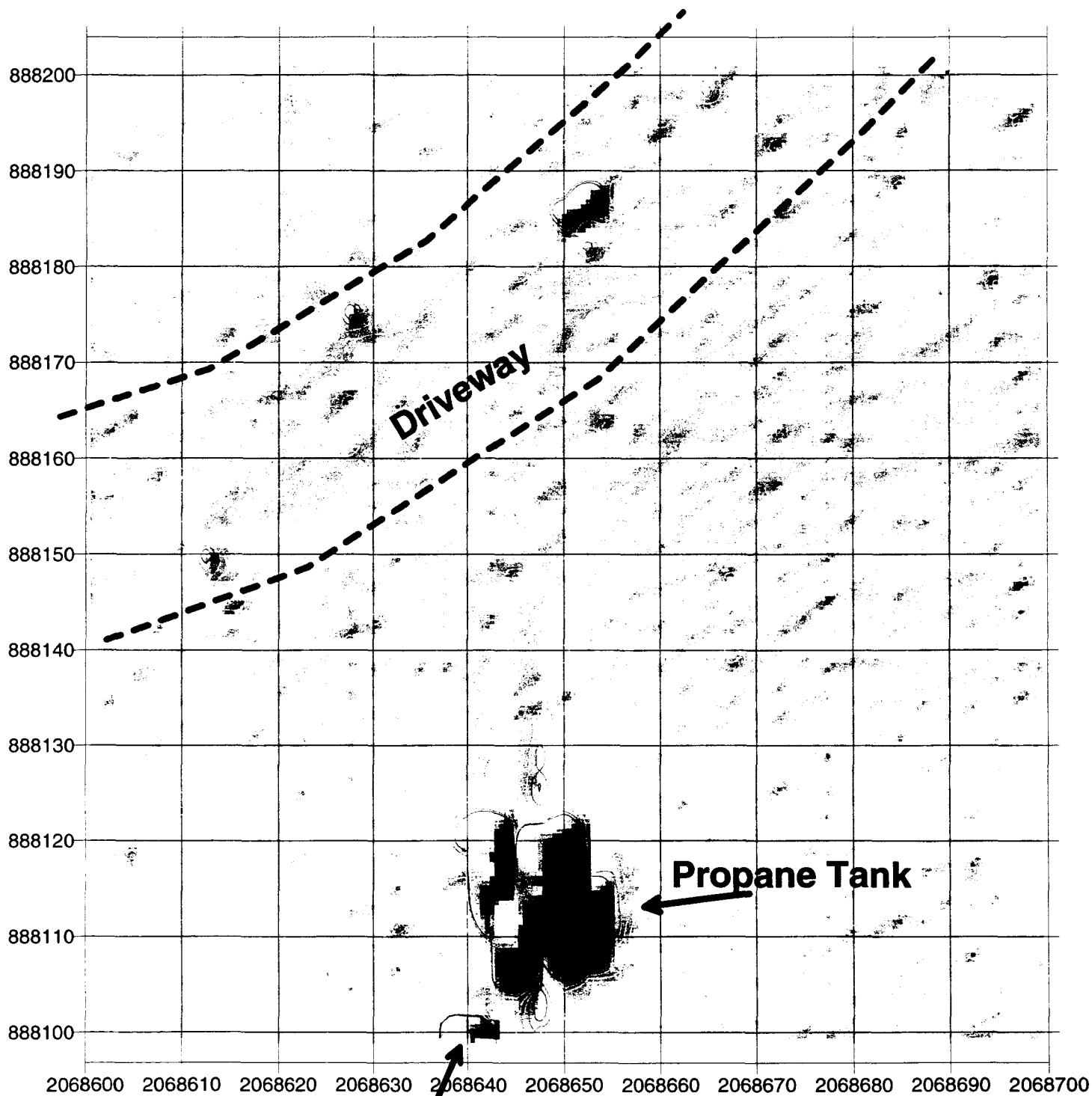
-20mV to 20mV CI=1mV



Parsons' Lakeview Grid 386_021803_b EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV CI=5mV

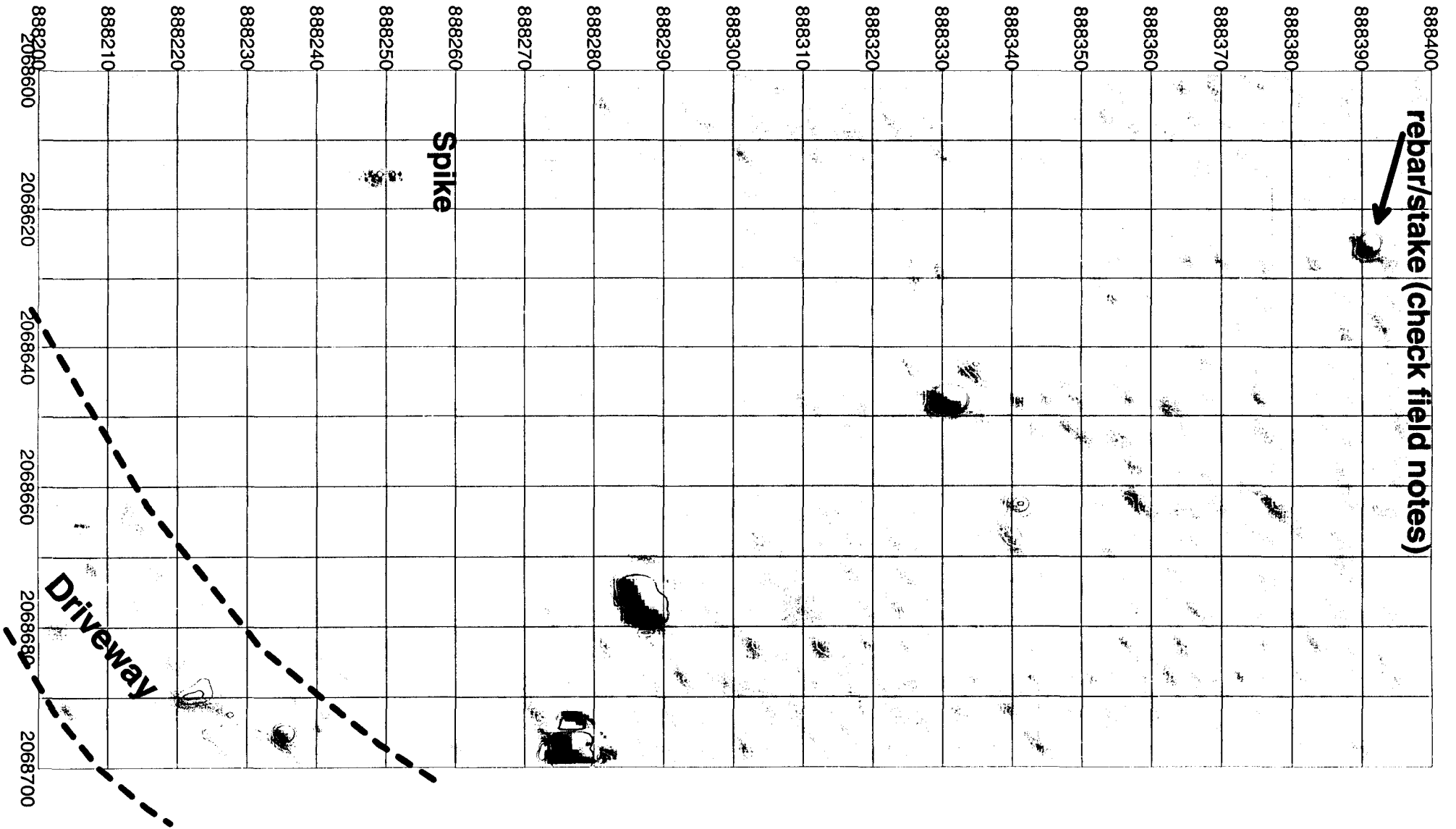


birdfeeder post

Parsons' Lakeview Grid 307 & 388 EM61 Bottom Coil

CEHNC JAD 01 May 03

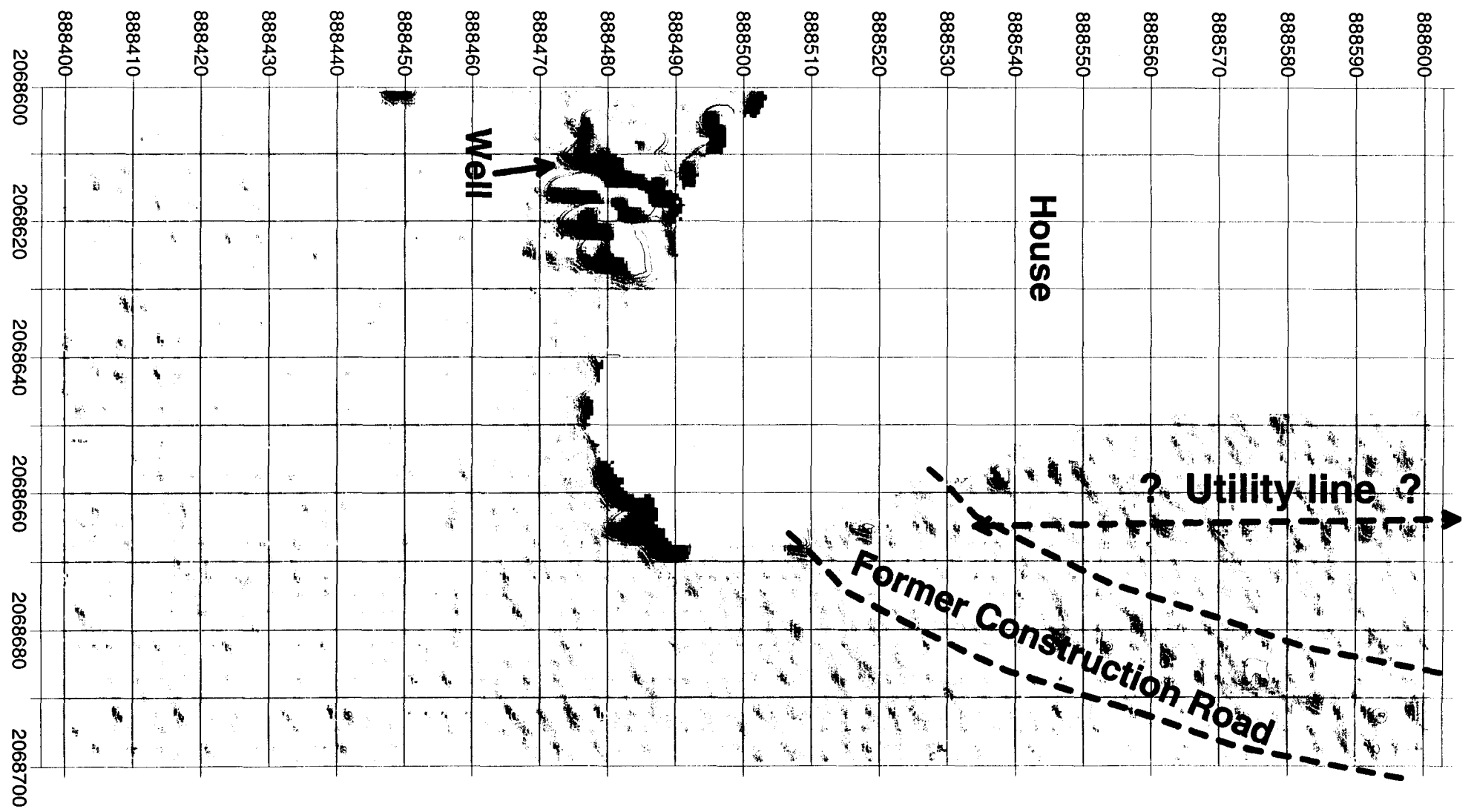
-20mV to 20mV CI=5mV



Parsons' Lakeview Grid 38y & 390 EM61 Bottom Coil

CEHNC JAD 01 May 03

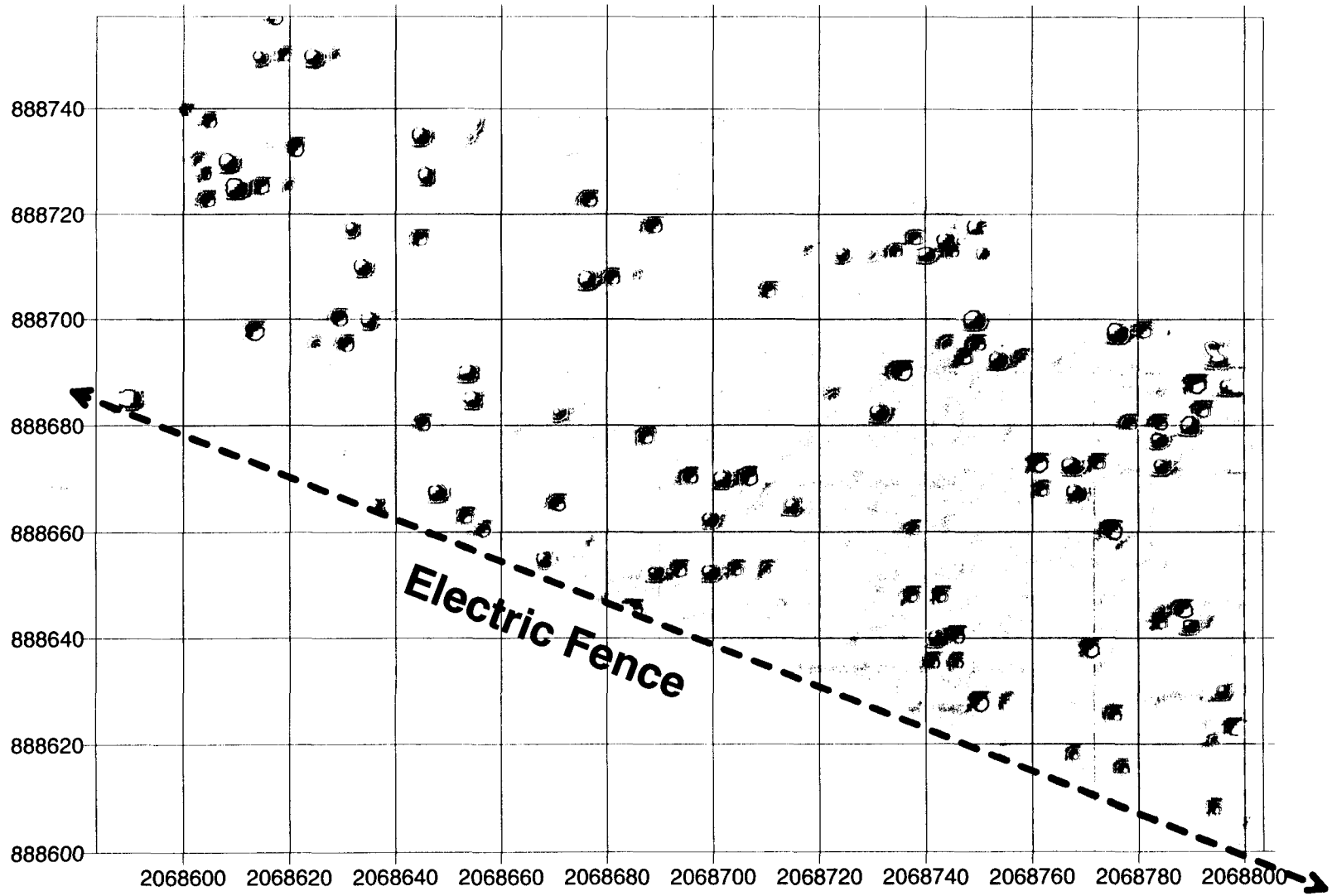
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 391, 392, 401, & 402 EM61 Bottom Coil

CEHNC JAD 01 May 03

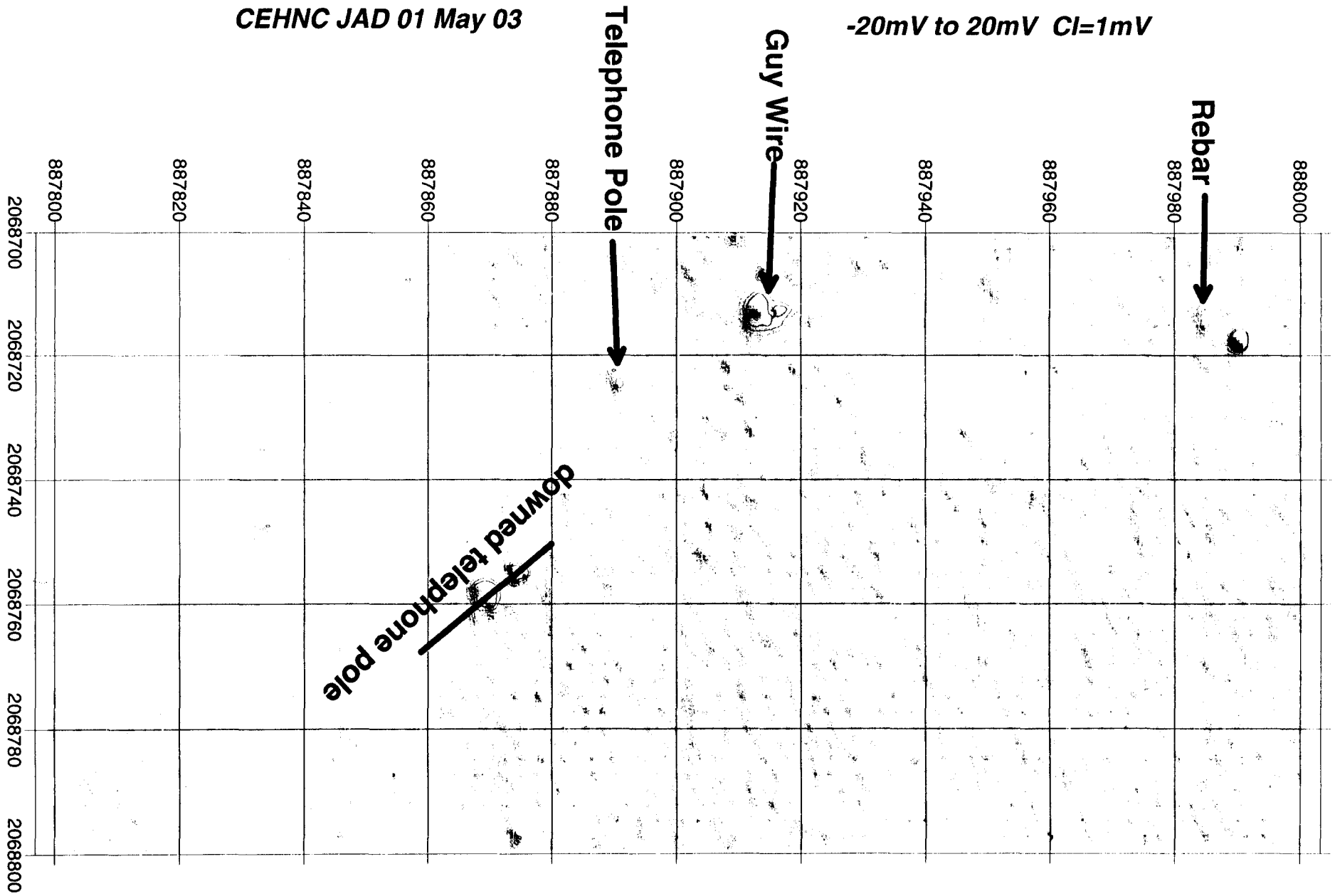
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 394 & 394S EM61 Bottom Coil

CEHNC JAD 01 May 03

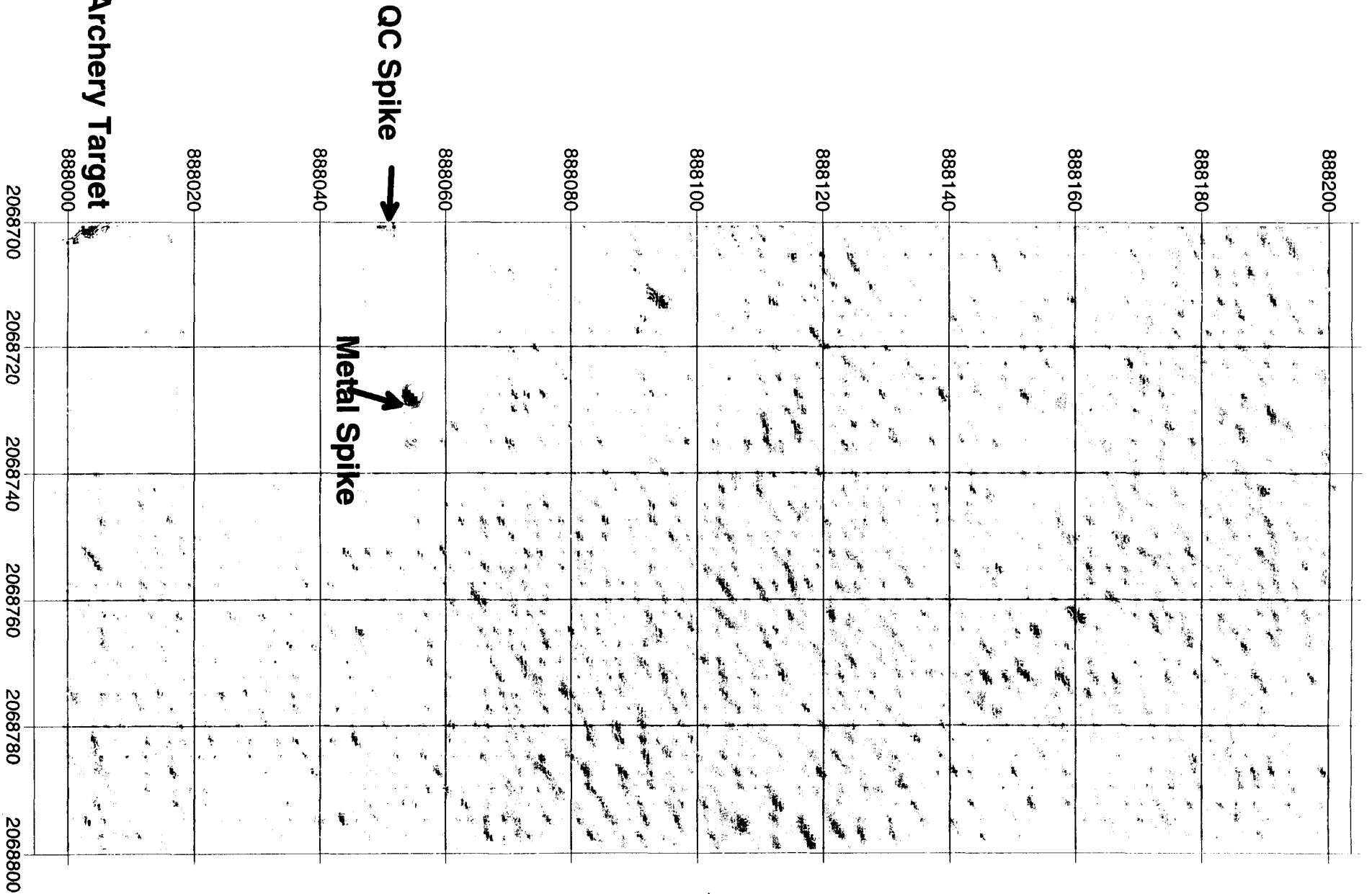
-20mV to 20mV CI=1mV



Parsons' Lakeview Grids 395 & 396 EM61 Bottom Coil

CEHNC JAD 01 May 03

-20mV to 20mV Cl=1mV



Metal Archery Target

QC Spike

Metal Spike

888000

888020

888040

888060

888080

888100

888120

888140

888160

888180

888200

2068700

2068720

2068740

2068760

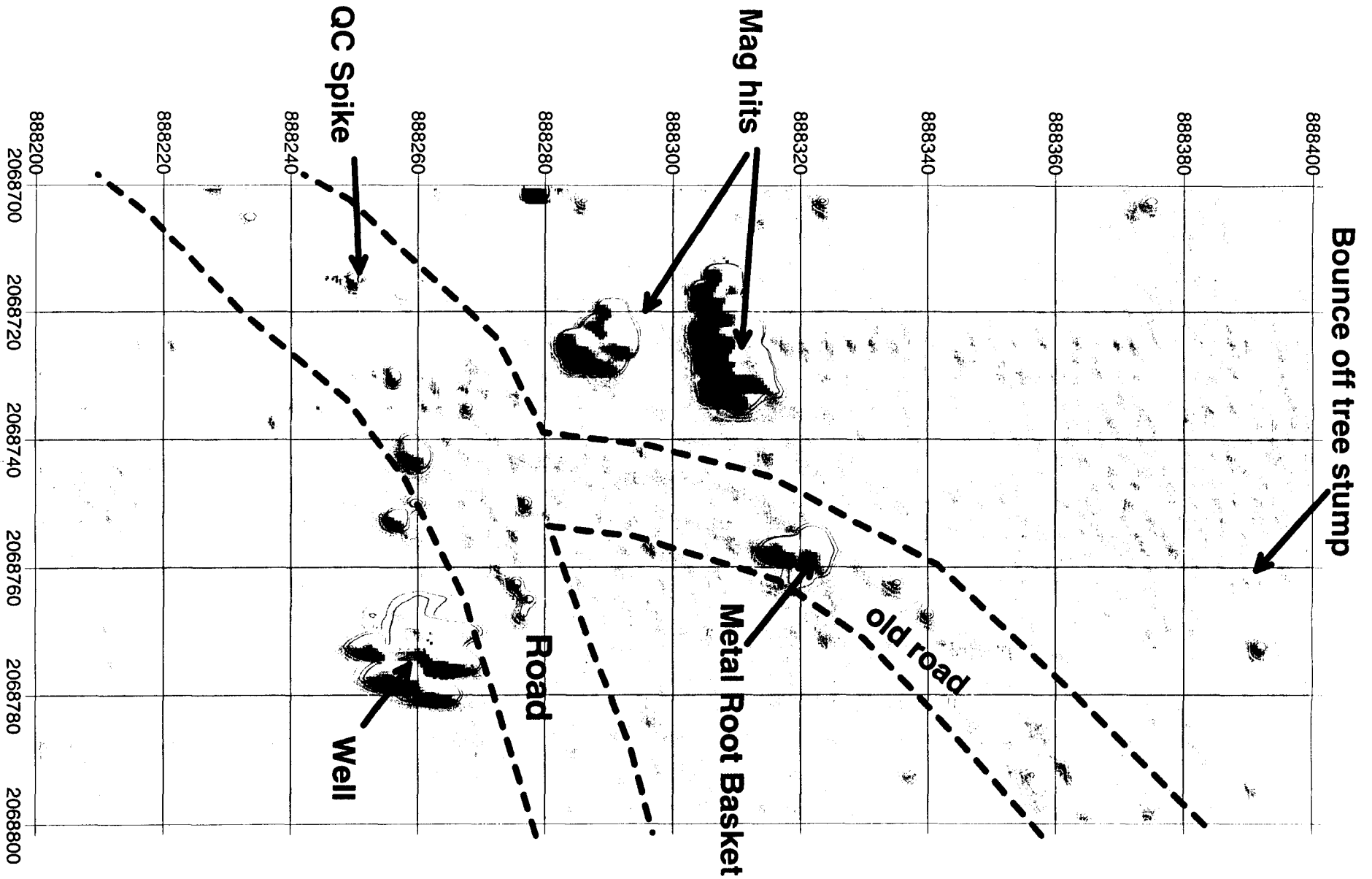
2068780

2068800

Parsons' Lakeview Grids 397 & 398 Bottom Coil

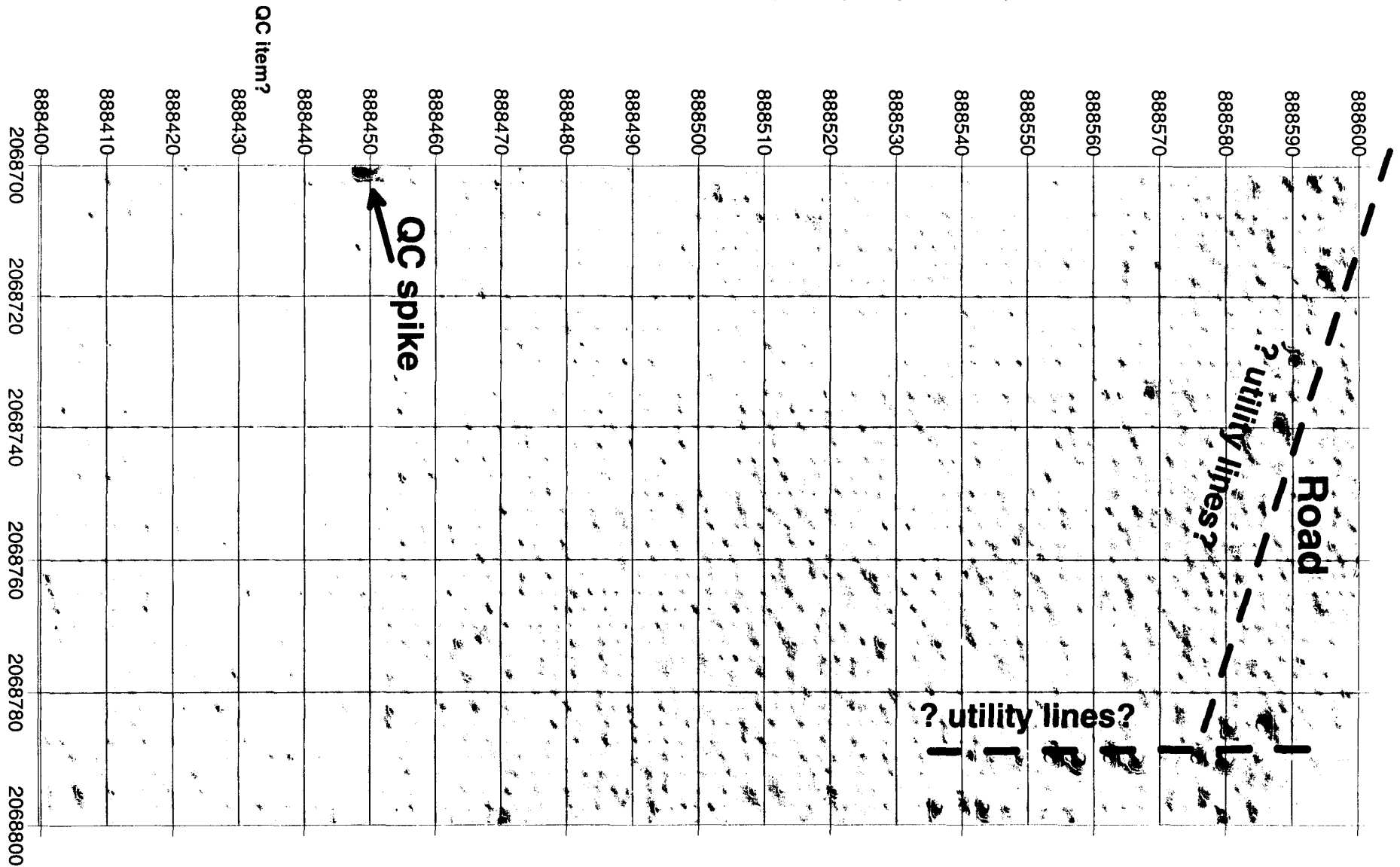
CEHNC JAD 14 May 03

-20mV to 20mV Cl=5mV



Butner-Lakeview Subdivision Grids 399 & 400 EM61 bottom coil

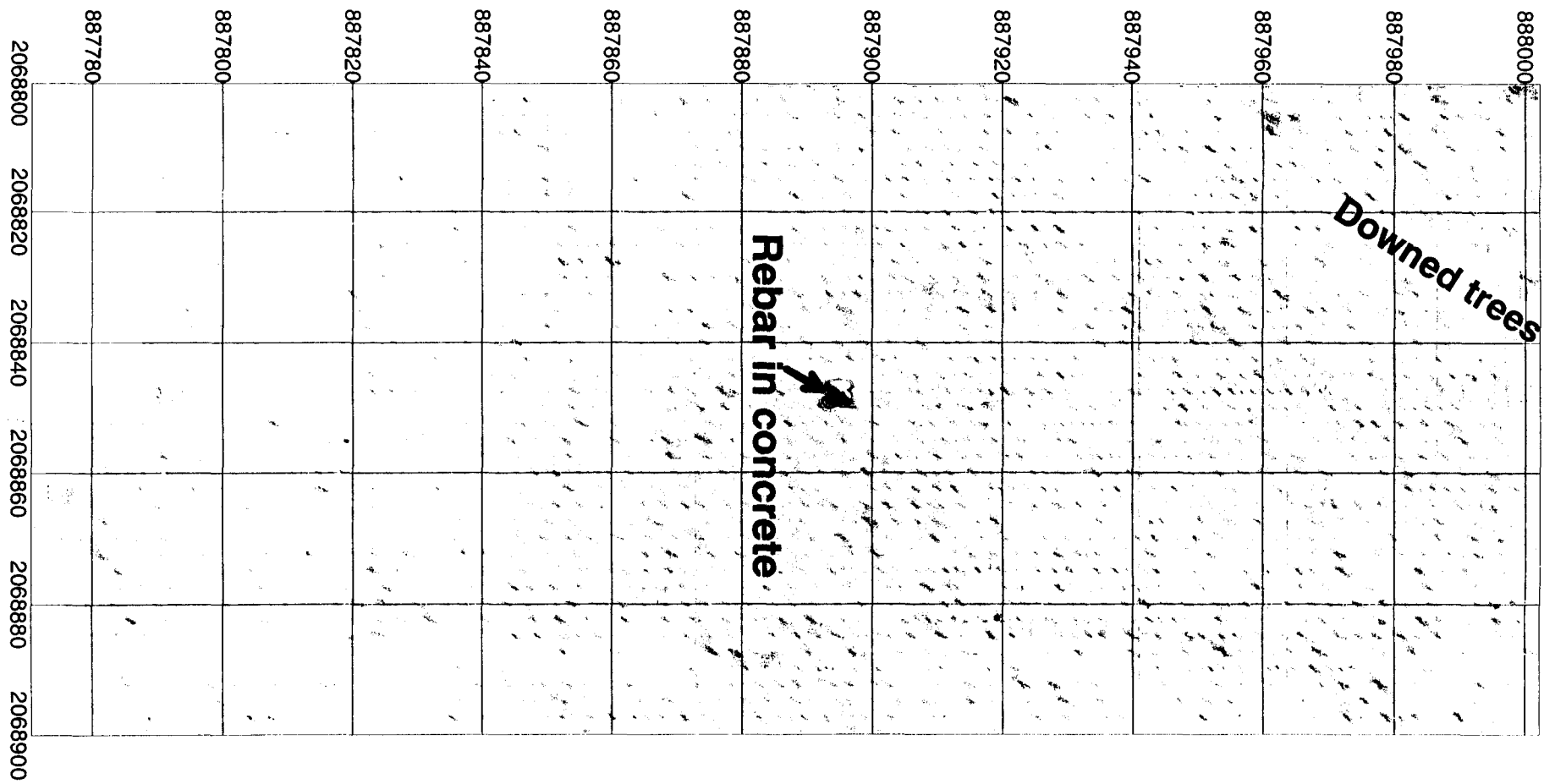
Data Processed by RJS- 1 May 2003 (-5,5 by 5 to 20mV)



Parsons' Lakeview Grids 4u4, 404S & 405 Bottom Coil

CEHNC JAD 14 May 03

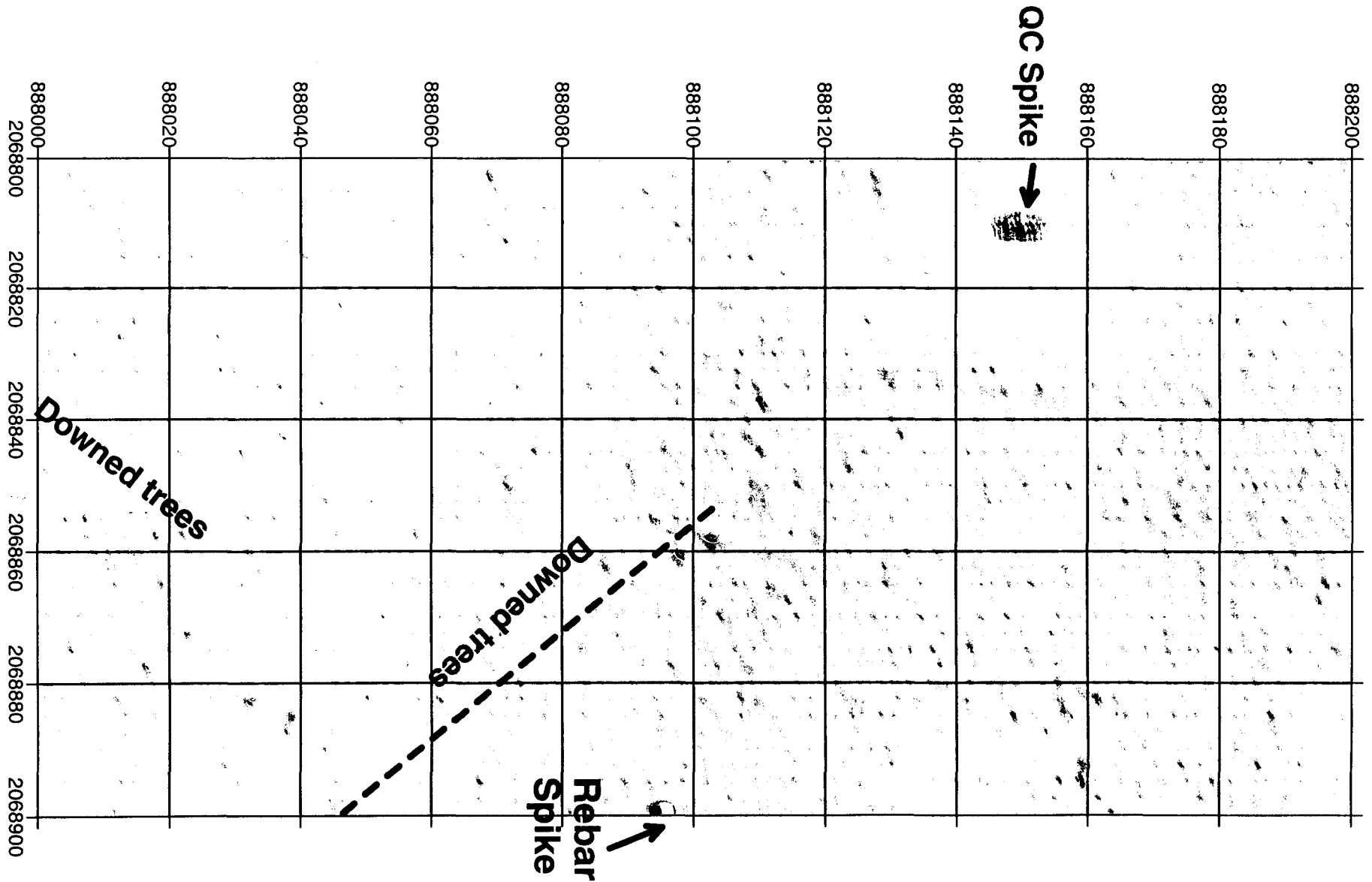
-20mV to 20mV Cl=5mV



Parsons' Lakeview Grids 406 & 407 Bottom Coil

CEHNC JAD 14 May 03

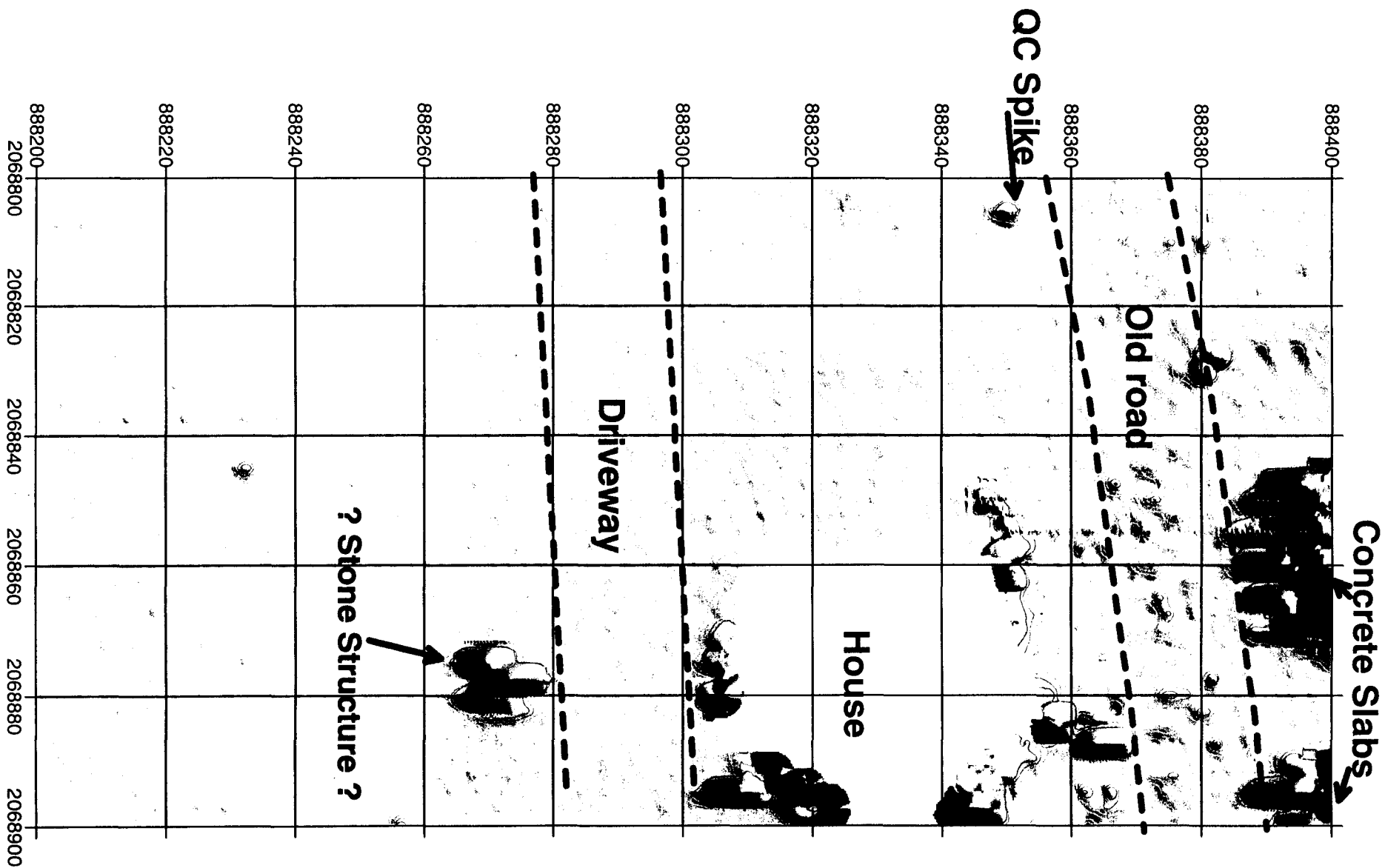
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 408 & 409 Bottom Coil

CEHNC JAD 14 May 03

-20mV to 20mV CI=5mV

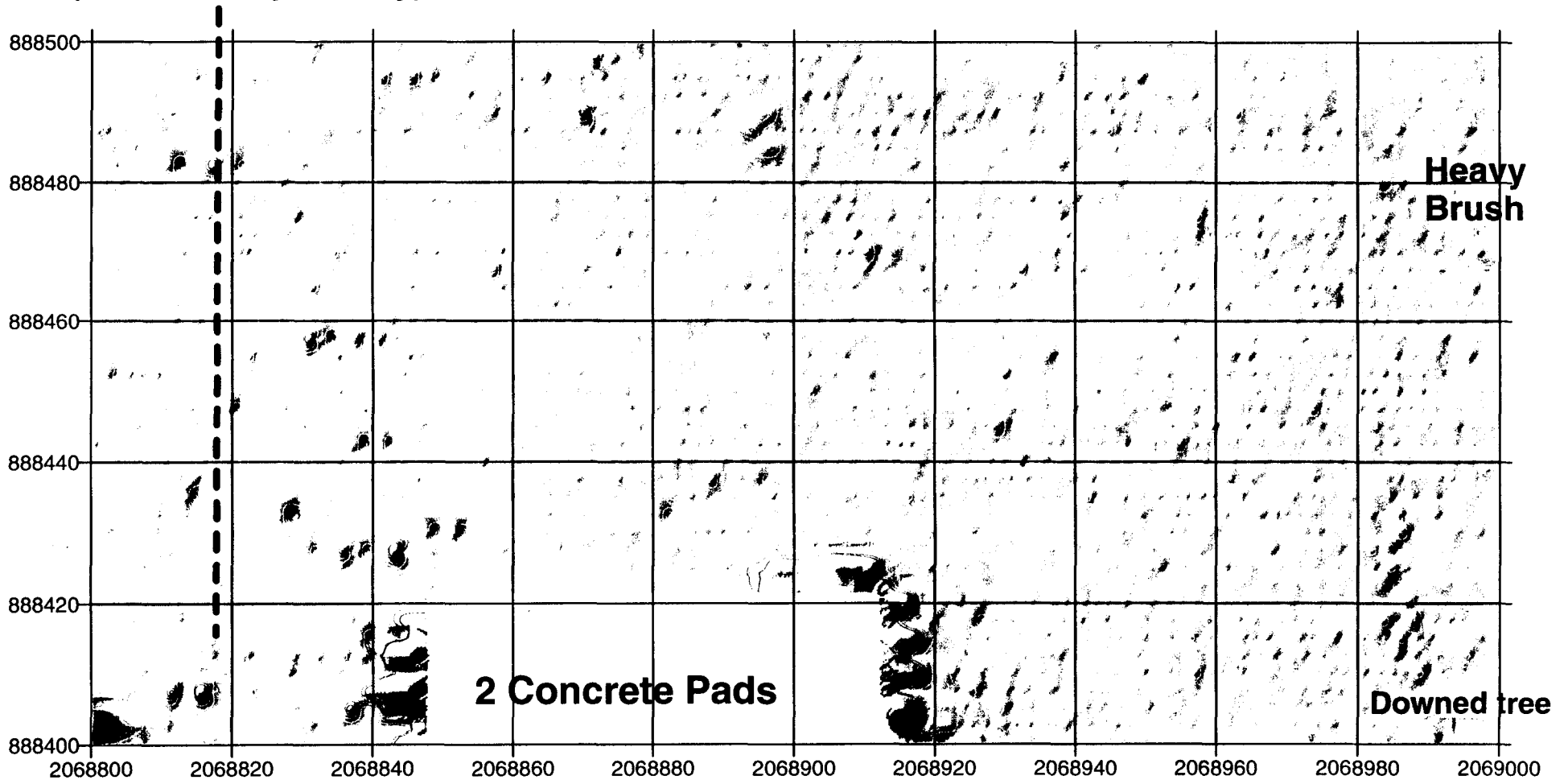


Parsons' Lakeview Grids 410 & 420 Bottom Coil

CEHNC RJS 14 May 03

-20mV to 20mV CI=5mV

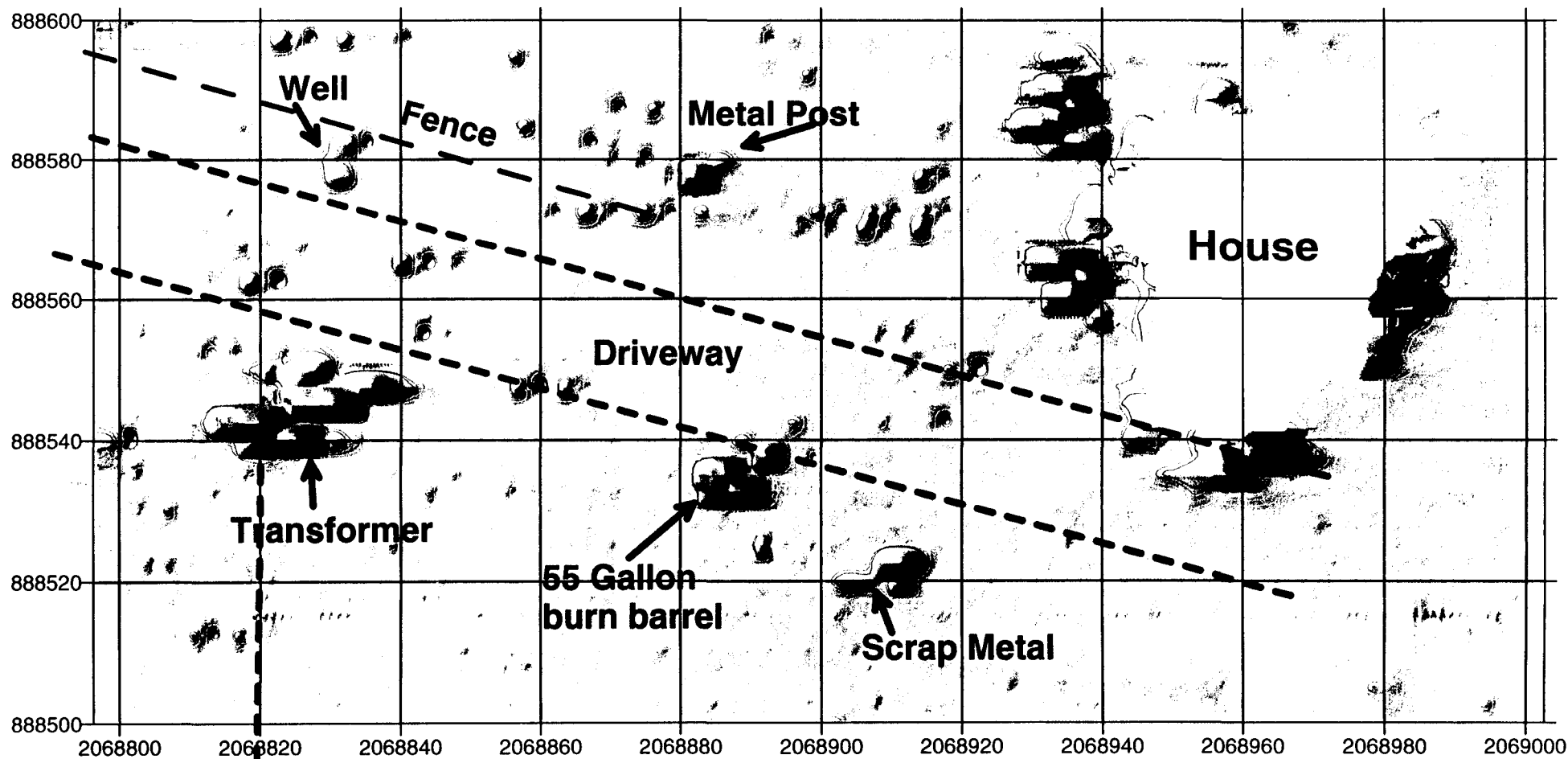
**Underground Electric
(Check Utility Survey)**



Parsons' Lakeview Grids 411 & 421 Bottom Coil

CEHNC RJS 14 May 03

-20mV to 20mV CI=5mV

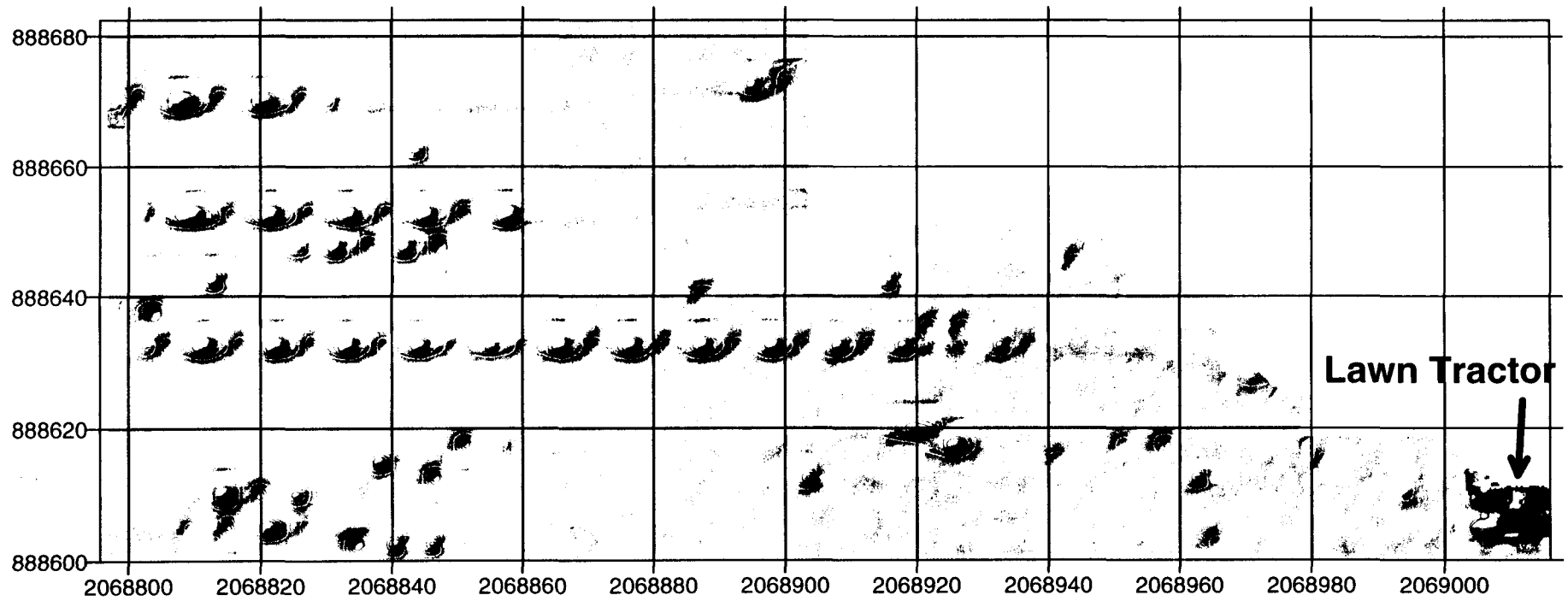


**Underground Electric
(Check Utility Survey)**

Parsons' Lakeview Grids -12 & 422 Bottom Coil

CEHNC RJS 14 May 03

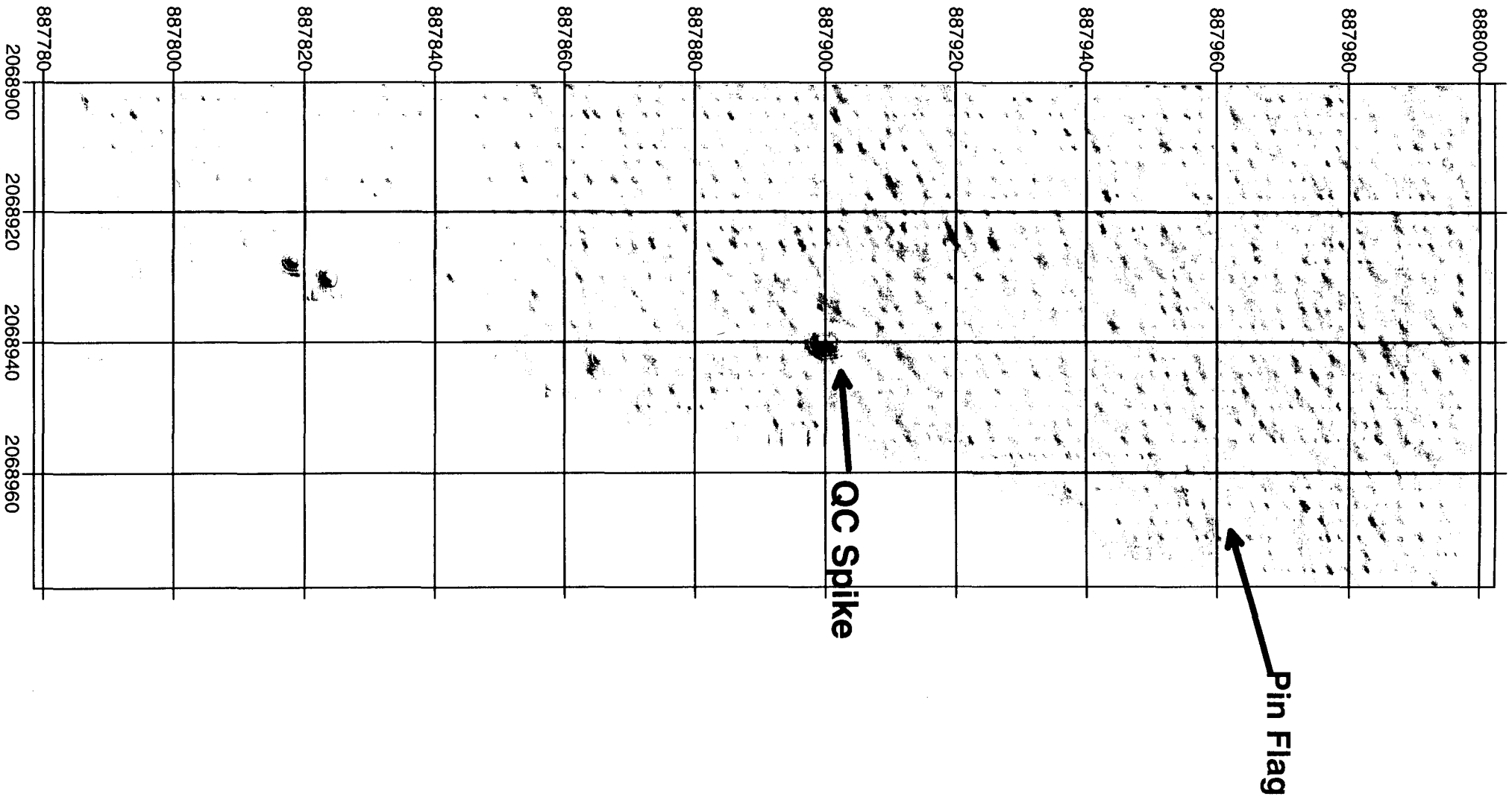
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 414, 414S & 415 EM61 Bottom Coil

CEHNC RJS 14 May 03

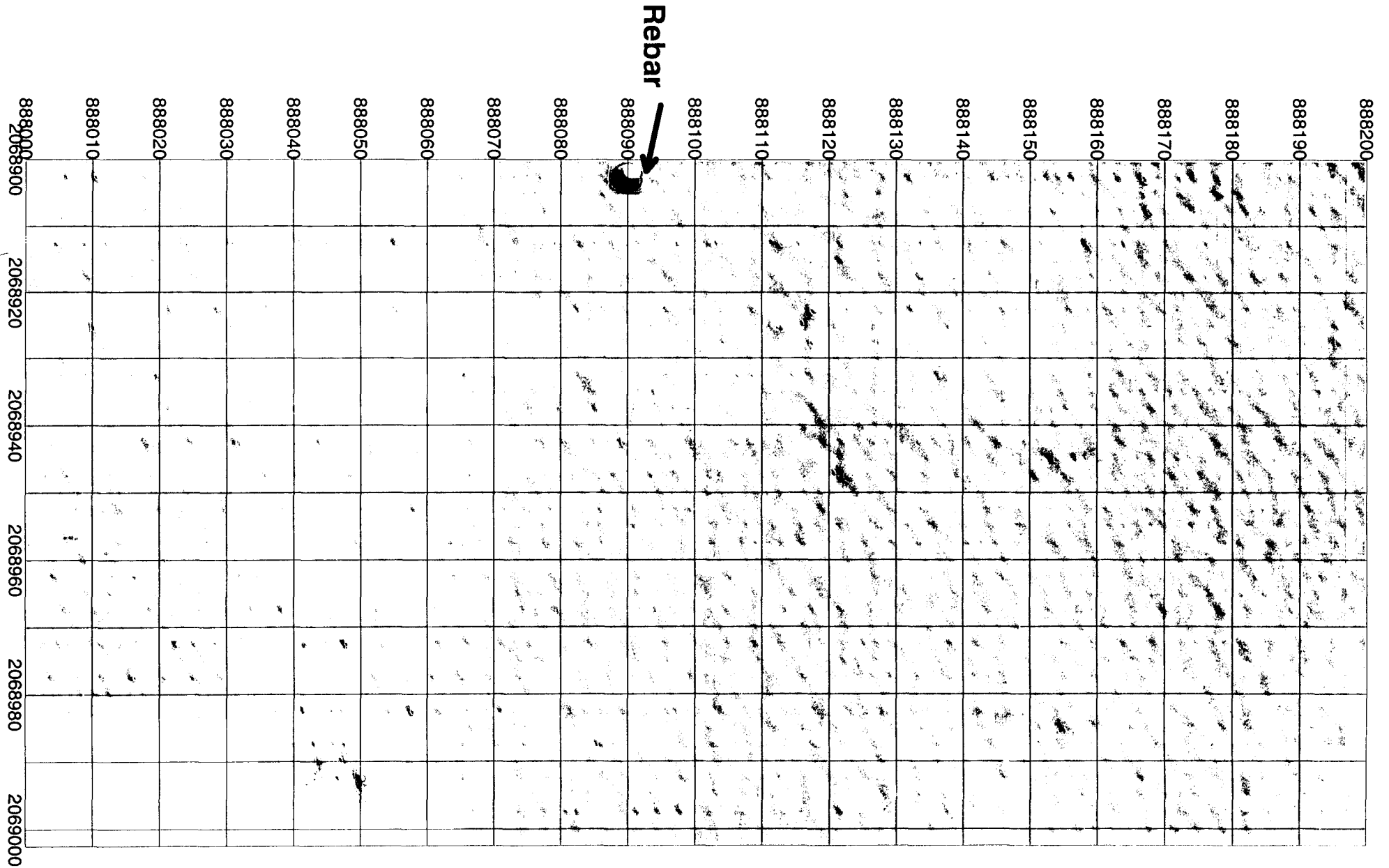
-20mV to 20mV Cl=5mV



Parsons' Lakeview Grids 415 & 417 EM61 Bottom Coil

CEHNC RJS 14 May 03

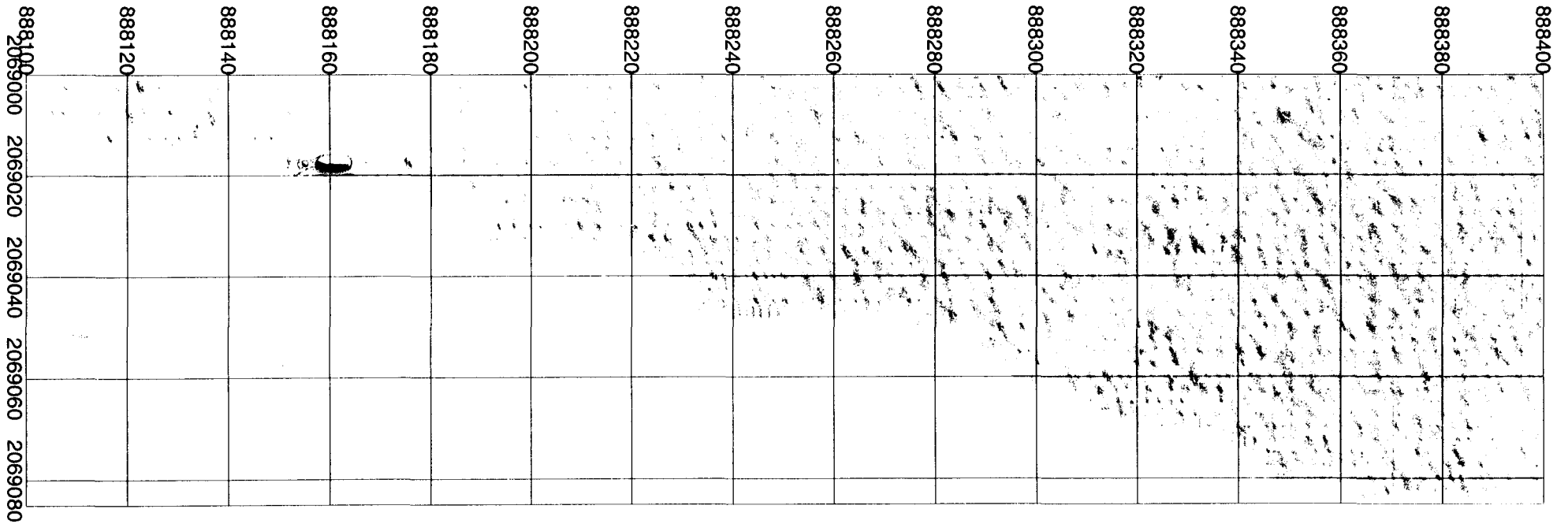
-20mV to 20mV Cl=5mV



Arsons' Lakeview Grids 425, 426 & 427 EM61 Bottom Coil

CEHNC RJS 14 May 03

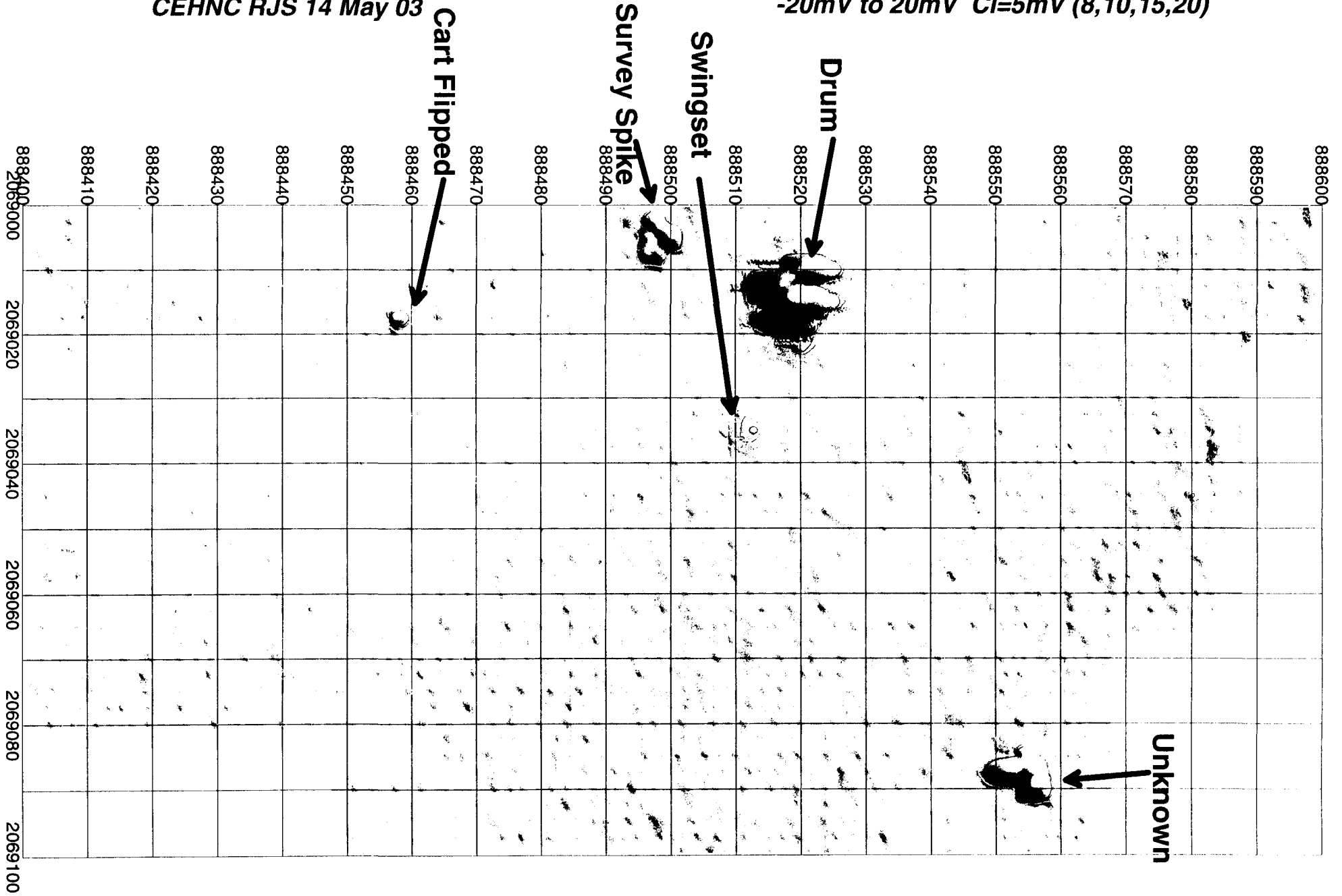
-20mV to 20mV CI=5mV



Parsons' Lakeview Grids 426 & 429 EM61 Bottom Coil

CEHNC RJS 14 May 03

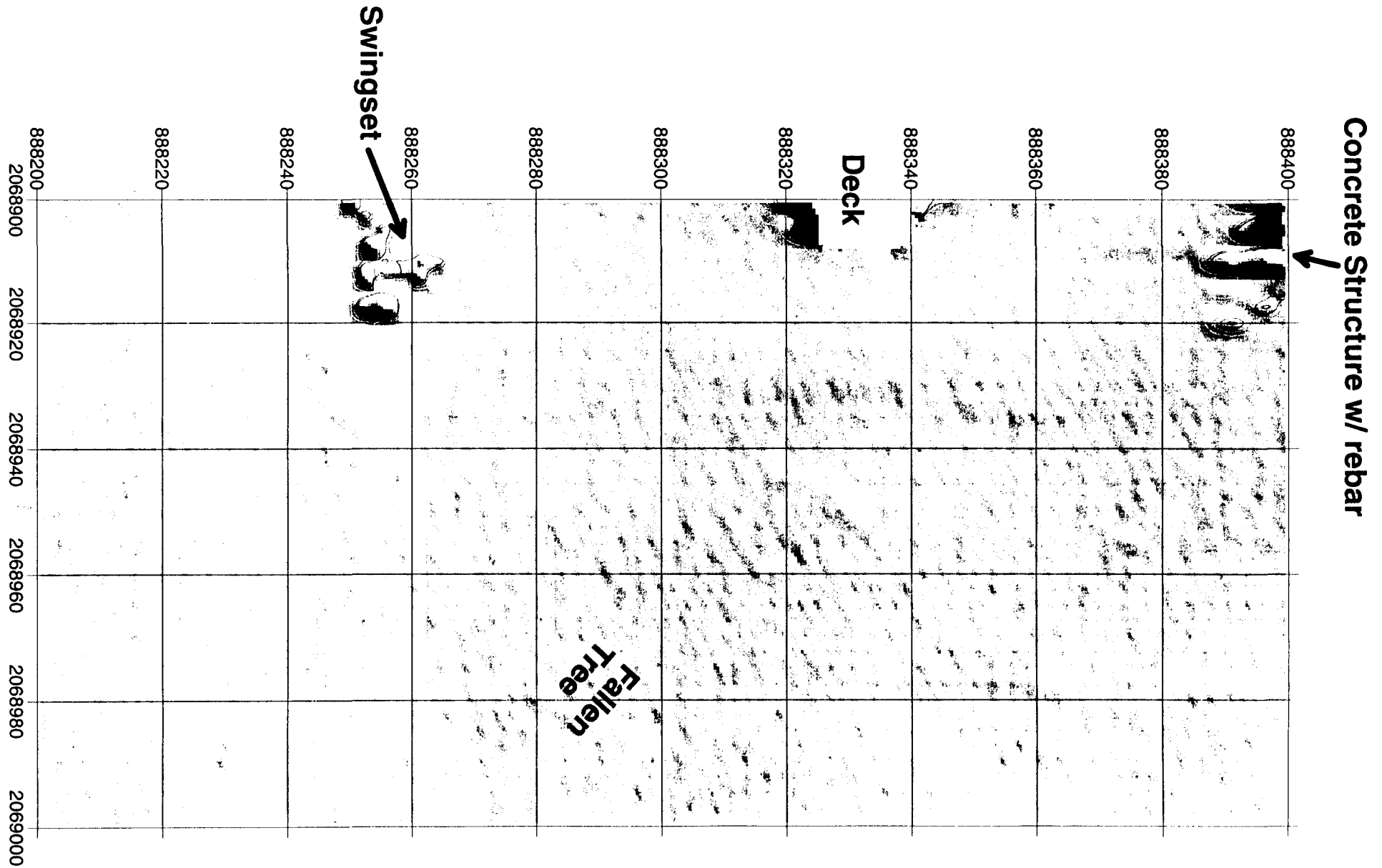
-20mV to 20mV CI=5mV (8,10,15,20)



Grid 403 & 419 EM61 Bottom Channel Capacity Butner Parsons Lakeview Subdivision

CEHNC JAD 13 Feb 03

-20 to 20 mV CI=4 mV



APPENDIX C
ANOMALY DIG SHEET SUMMARY

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 1

Grid ID	Phase I/ Phase II/ M & F	Instrument Used	Grid Location	Total Anomalies Selected	Number of OES Anomalies	Range of OES Depth (inches)	Number of UXO	Description UXO Items	Other Findings	Weight of OES (lbs)	Weight of NOES (lbs)	Number False Positives
<i>Grids from Area 1A</i>												
A1G0200	Phase I	EM61MK2	C-9	10	0	NA	0	NA	All NOES - drain pipe, metal scrap, and hot rocks.	0.00	5.00	0
A1G0201	Phase I	EM61MK2	C-9	28	0	NA	0	NA	All NOES - rod, nail, rake, metal scrap, and hot rock.	0.00	2.00	3
A1G0209	Phase I	EM61MK2	D-9	11	3	1", including UXO	1	Mk II Hand Grenade	UXO - Mk II hand grenade, OES - Two M15 grenades (expended and inert), NOES - nails, wire, and hot rock.	1.50	0.50	0
A1G0210	Phase I	EM61MK2	D-9	6	2	2"	0	2 - MK15 grenades (inert)	OES - Two M15 grenades (expended and inert), NOES - hammerhead, spike, metal scrap.	2.00	6.20	0
A1G0211	Phase I	EM61MK2	D-9	17	1	10"	1	M4 Practice Mine w/ live fuze	UXO - M4 Practice Mine w/ live fuze and spotting charge, NOES - wire, pipe, horse shoe, and hot rock.	1.50	10.00	0
A1G0212	Phase I	EM61MK2	C-9	26	1	0"	0	M15 grenade (inert)	OES - M15 grenade (expended and inert), NOES - plow point, wire, metal scrap, and hot rock.	0.00	7.50	0
<i>Totals for Area 1A</i>				98	7		2			5	31	3
<i>Grids from Former Area 1</i>												
A1G0003	Phase II	EM-61	D-8	1	0	NA	0	NA	All NOES - horse shoe.	0.00	2.00	0
A1G0093	Phase I	EM61MK2										
A1G0094	Phase I	EM61MK2	C-9									
A1G0100	Phase I	EM61MK2	C-9									
A1G0101	Phase I	EM61MK2	C-9	82	0	NA	0	NA	All NOES - nails, wire, scrap metal, and hot rocks.	0.00	6.00	11
A1G0102	Phase I	EM61MK2										
A1G0103	Phase I	EM61MK2										
A1G0105	Phase I	EM61MK2										
A1G0106	Phase I	EM61MK2										
A1G0107	Phase I	EM61MK2										
A1G0108	Phase I	EM61MK2										
A1G0109	Phase I	EM61MK2	C-9	3	0	NA	0	NA		0.00	0.00	3
A1G0110	Phase I	EM61MK2										
A1G0111	Phase I	EM61MK2										
A1G0112	Phase I	EM61MK2	C-9	16	0	NA	0	NA	All NOES - nails, wire, and metal scrap.	0.00	3.30	4
A1G0113	Phase I	EM61MK2	C-9									
A1G0132	Phase I	EM61MK2	C-9	9	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A1G0134	Phase I	EM61MK2	C-9	16	0	NA	0	NA	All NOES - horse shoe, wrench, fence post	0.00	16.00	0
A1G0135	Phase I	EM61MK2	C-9	7	0	NA	0	NA	All NOES - horse shoe, nail, scrap metal, and hot rock.	0.00	6.00	0
A1G0136	Phase I	EM61MK2	C-9	16	0	NA	0	NA	All NOES - horse shoe, plow point, hook, rod, and hot rock.	0.00	12.50	0
A1G0137	Phase I	EM61MK2	C-9									
A1G0139	Phase I	EM61MK2	C-9									
A1G0142	Phase I	EM61MK2	C-9									
A1G0146	Phase I	EM61MK2										
A1G0147	Phase I	EM61MK2	C-2									
A1G0148	Phase I	EM61MK2	C-9									

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 1

Grid ID	Phase I/ Phase II/ M & F	Instrument Used	Grid Location	Total Anomalies Selected	Number of OES Anomalies	Range of OES Depth (inches)	Number of UXO	Description UXO Items	Other Findings	Weight of OES (lbs)	Weight of NOES (lbs)	Number False Positives
A1G0149	Phase I	EM61MK2										
A1G0153	Phase I	EM61MK2	C-9	18	0	NA	0	NA	All NOES - plow point, rebar, scrap metal, and hot dirt.	0.00	13.00	2
A1G0154	Phase I	EM61MK2		10	0	NA	0	NA	All NOES - horse shoe, metal scrap, and hot rocks.	0.00	3.00	2
A1G0155	Phase I	EM61MK2										
A1G0156	Phase I	EM61MK2	C-9									
A1G0158	Phase I	EM61MK2										
A1G0160	Phase I	EM61MK2	C-9									
A1G0161	Phase I	EM61MK2	C-9									
A1G0162	Phase I	EM61MK2	C-9									
A1G0163	Phase I	EM61MK2	C-9									
A1G0202	Phase I	EM61MK2	D-8	1	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A1G0203	Phase I	EM61MK2	D-8	1	0	NA	0	NA	All NOES - metal can lid.	0.00	0.10	0
A1G0204	Phase I	EM61MK2	D-8	2	0	NA	0	NA	All NOES - bolt and nail.	0.00	0.20	0
A1G0205	Phase I	EM61MK2	D-8	7	0	NA	0	NA	All NOES - cans, pipe, and scrap metal.	0.00	2.20	3
A1G0206	Phase I	EM61MK2	D-8	28	0	NA	0	NA	All NOES - nail pit and hot rock.	0.00	2.00	6
A1G140	Phase I	EM61MK2	C-9									
Totals for Former Area 1 (excluding 1A)				217	0		0			0	66	31

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 2

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
	Phase II/	Instrument	Grid	Anomalies	of OES	OES Depth	of	UXO	Other	of OES	of NOES	False
Grid ID	M & F	Used	Location	Investigated	Anomalies	(inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
A2G0001	Phase I	EM61MK2	C/D-8	0	0	NA	0	NA	None	0.00	0.00	0
A2G0003	Phase I	EM61MK2										
A2G0004	Phase I	EM61MK2	C/D-8	13	0	NA	0	NA	NOES- horseshoe, bucket, bolts, license plate, pipe, few hot rocks.	0.00	9.50	2
A2G0006	Phase I	EM61MK2										
A2G0007	Phase I	EM61MK2										
A2G0008	Phase I	EM61MK2										
A2G0009	Phase I	EM61MK2										
A2G0010	Phase I	EM61MK2	C/D-8	41	0	NA	0	NA	NOES- many nails, wire, metal pins. Some hot rocks.	0.00	20.00	0
A2G0011	Phase I	EM61MK2										
A2G0012	Phase I	EM61MK2	C/D-8	11	0	NA	0	NA	NOES- horseshoes, steel strapping, spikes, pipe, nails, minor hot rocks.	0.00	7.00	0
A2G0013	Phase I	EM61MK2	C/D-8	5	0	NA	0	NA	NOES- barbed wire, nails, plow blade, wing nut.	0.00	5.00	0
A2G0014	Phase I	EM61MK2										
A2G0015	Phase I	EM61MK2										
A2G0016	Phase I	EM61MK2	C/D-8	4	0	NA	0	NA	NOES- washer, wire, nails, barbed wire.	0.00	2.00	0
A2G0018	Phase I	EM61MK2	C/D-8	18	0	NA	0	NA	NOES- nails, pins, steel plates, ubolt, pipe, steel cable, barbed wire.	0.00	10.00	0
A2G0021	Phase I	EM61MK2										
A2G0025	Phase I	EM61MK2	C/D-8	7	0	NA	0	NA	NOES- steel cable, barbed wire, nails.	0.00	5.00	0
A2G0026	Phase I	EM61MK2	C/D-8	10	0	NA	0	NA	NOES- nails, barbed wire, rebar, misc - 1 hot rock.	0.00	3.00	1
A2G0027	Phase I	EM61MK2	C/D-8	25	0	NA	0	NA	NOES- nails, barbed wire, hinges, few hot rocks.	0.00	3.00	5
A2G0028	Phase I	EM61MK2										
A2G0031	Phase I	EM61MK2										
A2G0032	Phase I	EM61MK2										
A2G0035	Phase I	EM61MK2										
A2G0036	Phase I	EM61MK2		7	0	NA	0	NA	All NOES - barb wire.	0.00	3.00	0
A2G0038	Phase I	EM61MK2	C/D-8	1	0	NA	0	NA	None	0.00	0.00	1
A2G0039	Phase I	EM61MK2	C/D-8	1	0	NA	0	NA	NOES - nail	0.00	0.10	0
A2G0040	Phase I	EM61MK2	C/D-8	4	0	NA	0	NA	NOES - bolt, grounding rod, misc.	0.00	1.50	0
A2G0045	Phase I	EM61MK2	C/D-8	3	0	NA	0	NA	NOES - 2 hot rocks and a grounding rod	0.00	1.00	0
A2G0046	Phase I	EM61MK2	C/D-8	3	0	NA	0	NA	NOES - hot rocks	0.00	0.00	1
A2G0047	Phase I	EM61MK2	C/D-8	4	0	NA	0	NA	NOES - nails, survey pin, hot rock.	0.00	0.50	1
A2G0049	Phase I	EM61MK2	C/D-8	14	0	NA	0	NA	NOES - nails, hot bricks, hot rocks.	0.00	1.50	1
A2G0050	Phase I	EM61MK2	C/D-8	4	0	NA	0	NA	NOES - rebar, metal misc, hot rocks.	0.00	2.50	0
A2G0051	Phase I	EM61MK2		20	0	NA	0	NA	All NOES - barb wire, metal scrap, and hot rock.	0.00	16.30	1

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 3

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
	Phase I/	Instrument	Grid	Anomalies	of OES	OES Depth	of	UXO	Other	of OES	of NOES	False
Grid ID	M & F	Used	Location	Investigated	Anomalies	(Inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
A3G0001	Phase I	EM61MK2										
A3G0002	Phase I	EM61MK2	C-8	39	0	NA	0	NA	All NOES - Horseshoes, latch, barbed wire, hinge, spring, plow blade, ax head, nails, rebar, chain, iron water barrel, cable, some hot rocks.	0.00	75.00	0
A3G0003	Phase I	EM61MK2										
A3G0007	Phase I	EM61MK2	C-8	31	0	NA	0	NA	All NOES - Rebar, wire, nails, chain, many hot rocks.	0.00	7.00	6
A3G0008	Phase I	EM61MK2	C-8	64	0	NA	0	NA	All NOES - Nails, plow blades, bolts, fence post, wire, steel barrel, chain, steel pins, angle iron, ax head, 5 steel bath tubs, few hot rocks.	0.00	318.00	6
A3G0010	Phase I	EM61MK2										
A3G0011	Phase I	EM61MK2										
A3G0013	Phase I	EM61MK2										
A3G0014	Phase I	EM61MK2										
A3G0015	Phase I	EM61MK2										
A3G0017	Phase I	EM61MK2										
A3G0018	Phase I	EM61MK2										
A3G0019	Phase I	EM61MK2										
A3G0020	Phase I	EM61MK2										
A3G0022	Phase I	EM61MK2										
A3G0023	Phase I	EM61MK2										
A3G0024	Phase I	EM61MK2										
A3G0025	Phase I	EM61MK2										
A3G0026	Phase I	EM61MK2	C-8	12	0	NA	0	NA	All NOES - Wire, bolt, unidentified scrap metal, few hot rocks.	0.00	5.00	0
A3G0027	Phase I	EM61MK2	C-8	23	0	NA	0	NA	All NOES - bucket, chain, bars, wire, banding, leaf spring, some hot rocks.	0.00	23.00	2
A3G0028	Phase I	EM61MK2	C-8	82	0	NA	0	NA	All NOES - mower blade, fence posts, horseshoes, metal brackets, shovel head, ax head, wire, chain, pipes. Several hot rocks.	0.00	91.00	3
A3G0029	Phase I	EM61MK2		64	0	NA	0	NA	All NOES - plow blade, horse shoe, leaf spring, scrap metal, and hot rock.	0.00	41.00	5
A3G0030	Phase I	EM61MK2										
A3G0031	Phase I	EM61MK2										
A3G0032	Phase I	EM61MK2	C-8	53	0	NA	0	NA	All NOES - wire, nails, magnets, bolt, anchor, misc scrap metal, moderate amount of hot rocks/soil.	0.00	25.00	6
A3G0033	Phase I	EM61MK2										
A3G0034	Phase I	EM61MK2										
A3G0035	Phase I	EM61MK2										
A3G0035	Phase I	EM61MK2										
A3G0036	Phase I	EM61MK2	C-8	52	0	NA	0	NA	All NOES - horseshoes, chain, bolts, nuts, wire, ax head, steel banding, nails, pipes. Several hot rocks/soil.	0.00	75.00	1
A3G0037	Phase I	EM61MK2	C-8	110	0	NA	0	NA	All NOES - bolts, horseshoes, nails, staples, plow blades, hinges, steel banding, hatchet. Several hot rocks/soil.	0.00	150.00	2

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 3

A3G0018	Phase I	EM61MK2	C-8	59	0	NA	0	NA	All NOES - wire, nails, magnets, bolt, anchor, misc scrap metal, moderate amount of hot rocks/soil.	0.00	22.00	4
A3G0019	Phase I	EM61MK2	C-8	86	0	NA	0	NA	All NOES - numerous horseshoes, bucket, wires, hinges, bolt, rebar, hook, wire, nails, chain, moderate hot rocks/soil.	0.00	75.00	1
A3G0040	Phase I	EM61MK2	C-8	103	0	NA	0	NA	All NOES - plow blades, many horseshoes, wire, nails, and many other metal scrap. Little to no hot rock/soil.	0.00	100.00	4
A3G0042	Phase I	EM61MK2	C-8	51	0	NA	0	NA	All NOES - nails, chain, numerous unidentified scrap. Little to no hot rock/soil.	0.00	50.00	0

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I			Total	Number	Range of	Number	Description		Weight	Weight	Number
	Phase I/	Instrument	Grid	Anomalies	of OES	OES Depth	of	UXO	Other	of OES	of NOES	False
Grid ID	M & F	Used	Location	Investigated	Anomalies	(Inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
Area 4A Grids												
A4GP1	M&F	Schonstedt	D-4/D-5	30	2	4-6"	0	2.36 Bazooka Rocket (inert)	OES = 2.36" Bazooka Rocket motor and unidentifiable frag. NOES = various unidentifiable scrap metal with numerous hot rocks.	2.25	3.75	0
A4GP2	M&F	Schonstedt	D-4/D-5	30	4	1-4"	0	2.36 Bazooka Rocket (inert)	OES = Two 2.36" Bazooka Rocket motors and unidentifiable frag. NOES = chain, barbed wire, various unidentifiable scrap metal with numerous hot rocks.	9.25	7.50	0
A4GP3	M&F	Schonstedt	D-4/D-5	30	5	0-3"	1	2.36" Bazooka Rocket	UXO/OES - 2.36 Bazooka Rocket BIP, 2 expended rocket motors, 2.36" rocket fins, M9 Rifle Grenade Scrap. NOES = wire, nails, counter weight, misc scrap metal plus many hot rocks.	13.00	8.50	0
A4GP4	M&F	Schonstedt	D-4/D-5	30	2	2"	0	2.36 Bazooka Rocket (inert)	OES = 2.36" Bazooka Rocket motor and unidentifiable frag. NOES = cans, wire, hoe head, banding, metal tube, bed springs, stove parts with numerous hot rocks.	2.25	31.00	0
A4GP5	M&F	Schonstedt	D-4/D-5	30	7	0-3"	0	2.36 Bazooka Rocket (inert)	OES = 3 2.36" Bazooka Rocket motors, fins. NOES = all hot rocks.	10.50	0.00	0
Totals for Area 4A				150	20		1			37	51	0
Area 4B Grids												
A4G1439	Phase II	EM-61	D-4	18	3	6", UXO found at 1	1	2.36" HE rocket	OES - unidentifiable frag (likely from 2.36"). NOES - wire, scrap metal.	1.00	4.00	1
A4G0445	Phase II	EM-61	D-4	6	1	4"	0	NA	OES - unidentifiable frag. NOES - hot rock.	1.50	0.00	1
A4G0446	Phase II	EM-61	D-4	18	0	NA	0	NA	All NOES - wire fence, metal scrap, and hot rock.	0.00	1.50	0
Totals for Area 4B				42	4		1			3	6	2
Area 4C Grids												
A4BLA1	M&F	Schonstedt		30	28	1-8"	0	NA	OES - unidentifiable frag. NOES - wire and scrap metal.	7.50	0.20	0
A4BLA2	M&F	Schonstedt		30	30	1-12"	0	155 mm frag	All OES - 155mm frag and unidentifiable frag.	33.00	0.00	0
A4G0009	Phase II	EM-61	B-3	52	13	2-30"	0	105mm inert smoke round casings	OES - Two 105mm inert smoke projectile casings, HE frag. NOES - wire, nails, rebar, plow blade, scrap metal.	35.00	200.00	0
A4G0017	Phase II	EM-61	B-3	25	13	1-3"	0	NA	OES - unidentifiable frag. NOES - metal scrap, barb wire and hot rock.	5.00	2.00	0
A4G0020	Phase II	EM-61	C-3	28	26	3-8"	1	105mm HE low order, fuze missing	UXO/OES - 105mm HE low order, w/sheared fuze (UXO) BIP. OES - fuzes and frag. NOES - hot rock.	15.00		0
A4G0023	Phase II	EM-61	C-3	41	31	1-12"	0	M51 Fuze (inert)	OES - M51 fuze and unidentifiable frag. NOES - hot rock.	0.00		0
A4G0516	Phase I	EM61MK2	B-3	64	52	1-18"	0	NA	OES - m51 series frag and unidentifiable frag. NOES - metal scrap and hot rock.	86.00	3.50	0
A4G0517	Phase I	EM61MK2	B-3	62	56	2-6"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	42.00	0.00	0
A4G0523	Phase I	EM61MK2	C-4	86	52	1-10"	0	NA	OES - 105mm base plates, 81 mm tail fins, unidentifiable frag. NOES - barb wire, metal scrap, and hot rock.	5.00	1.00	0
A4G0524	Phase I	EM61MK2	B-3	24	12	1-6"	0	M51 fuze (inert)	OES - M51 fuze (inert) and unidentifiable frag. NOES barb wire and hot rock.	30.00	1.00	0
Totals for Area 4C				442	313		1			259	208	0
Area 4D Grids												
A4G0354	Phase II	EM-61	B-5	49	7	0-10"	0	NA	OES - unidentifiable frag. NOES - scrap metal and hot rock.	5.00	30.00	0
A4G0355	Phase II	EM-61	B-5	19	10	2-6"	0	NA	OES - unidentifiable frag. NOES - metal scrap and frag.	8.00	8.00	0

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Used	Location	Anomalies Investigated	of OES Anomalies	OES Depth (inches)	of UXO	UXO Items	Other Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0356	Phase II	EM-61	B-5	19	8	0-6"	0	57mm APT	UXO - 57mm APT. OES - unidentifiable frag. NOES - scrap metal and hot rocks.	6.00	4.00	0
A4G0417	Phase II	EM-61	B-4	4	2	2-3"	0	2 37mm (inert)	OES - Two 37 mm (inert). NOES - metal scrap and hot rock.	2.00	1.00	0
A4G0418	Phase II	EM-61	B-4	8	0	UXO found at 2", no	1	37mm HE		0.00	0.00	1
Totals for Area 4D				99	27		1			21	43	1
Area 4E Grids												
A4G0402	Phase II	EM-61	B-5	10	0	acc, first anomaly di	1	37mm HE		0.00	0.00	0
A4G0408	Phase II	EM-61	A-5	19	0	NA	0	NA	All NOES - wire, scrap metal and hot rock.	0.00	6.00	0
A4G0413	Phase II	EM-61	B-5	5	1	1"	0	NA	OES - unidentifiable frag. NOES - metal scrap and hot rock.	0.20	0.10	1
Totals for Area 4E				34	1		1			0	6	1
Lakeview Subdivision												
A4G1436	Phase II	EM-61	C-7	30	2	2"	1	37mm HE	UXO/OES 37mm HE BIP from anomaly #24, 60mm mortar fins. NOES = leaf spring, nails, chain, stove leg. A few hot rocks.	7.00	22.00	3
A4G1437	Phase II	EM-61	C-7	52	0	NA	0	NA	All NOES - plow blades, nails, banding, chain, wire, nails, misc.	0.00	28.00	0
A4G1438	Phase II	EM-61	C-7	8	0	NA	0	NA	All NOES - horseshoe, large steel loop, unidentifiable scrap metal, few hot rocks.	0.00	13.00	1
Totals for Lakeview Subdivision				90	2		1			7	63	4
Area 4 Proper Grids												
A4G0244	Phase II	EM-61	C-6	33	3	4-7"	0	NA	OES is unidentifiable small frag. NOES is horseshoe, wire, various unidentified scrap metal. A few hot rocks.	1.00	23.00	0
A4G0245	Phase II	EM-61	C-6	4	2	1-2"	0	NA	OES is unidentifiable small frag. NOES is hot rocks.	0.50	0.00	0
A4G0247	Phase II	EM-61	C-6	23	7	1-5"	0	NA	OES - Unidentifiable larger frag. NOES - horse shoes, wire, and hot rocks.	8.00	10.00	1
A4G0249	Phase II	EM-61	C-6	20	11	2-6"	0	57mm, FUZE	57mm AP-T demo for possible HE UXO from Grid 249, anomaly #19. WAS NOT HE. Other Frag - Fuze, various HE frag (unspecified).	14.50	2.00	0
A4G0261	Phase II	EM-61	C-6	30	28	0-8"	0	NA	OES - Unidentifiable HE frag. NOES - Hot Rock and unidentified scrap.	9.50	1.00	0
A4G0262	Phase II	EM-61	C-6	31	19	0-14"	0	NA	OES Frag - Jimmy Walker identified as 155mm Frag. Other NOES scrap metal - a few hot rocks/soil.	18.00	9.00	0
A4G0263	Phase II	EM-61	C-6	34	28	0-10"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap and few hot rocks.	17.50	0.25	0
A4G0283	Phase II	EM-61	C-6	18	8	0-4"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap and few hot rocks.	3.00	3.00	0
A4G0284	Phase II	EM-61	C-6	35	29	1-12"	1	M Series Fuze	UXO/OES M Series Fuze from anomaly #16 determined to be live and was BIP. NOES few hot rocks.	9.00	0.00	0
A4G0285	Phase II	EM-61	C-6	45	43	0-18"	0	NA	OES - Unidentifiable HE frag. NOES - Horseshoes and small scrap.	50.00	1.50	0
A4G0287	Phase II	EM-61	C-6	39	36	1-10"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap and hot rock.	27.00	1.00	0
A4G0288	Phase II	EM-61	C-6	36	31	2-24"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap and few hot rocks.	38.00	1.00	0
A4G0289	Phase II	EM-61	C-6	48	34	1-8"	0	M51 PD FUZE	OES - Lots of 155mm FRAG, M51 PD FUZE. NOES - Bolts, some hot rock and soil, pipe, mule shoes, nails, wire, plow blades, car parts, etc.	51.00	153.00	0

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
	Phase II/	Instrument	Grid	Anomalies	of OES	OES Depth	of	UXO	Other	of OES	of NOES	False
Grid ID	M & F	Used	Location	Investigated	Anomalies	(Inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
A4G0295	Phase II	EM-61	C-6	28	18	1-4"	0	NA	OES - HE Frag - Designated as 155mm where identifiable, a few 'hot rocks'	45.00	5.00	0
A4G0296	Phase II	EM-61	D-6	27	0	NA	0	NA	NOES - Plow blades, horseshoes, spoon, nails, shears, some hot rocks	0.00	50.00	0
A4G0303	Phase II	EM-61	C-6	12	2	3-8"	0	57mm	57mm AP-T (inert), Unidentifiable HE frag, NOES - plow blade, metal strap, wire, few hot rocks	6.00	11.50	1
A4G0305	Phase II	EM-61	C-5	25	20	2-8"	0	M51 PD FUZE	OES - M51 Series Fuze (inert) and unidentifiable HE frag. NOES - Unidentifiable scrap metal and a few hot rocks	9.50	4.00	0
A4G0307	Phase II	EM-61	D-5	5	3	3-8"	0	57mm	57mm AP-T (inert), OES - HE Frag NOES - scrap metal	11.50	2.00	1
A4G0310	Phase II	EM-61	D-5	19	0	NA	0	NA	NOES - Unidentifiable scrap and few hot rocks	0.00	12.50	0
A4G0311	Phase II	EM-61	C-5	14	1	4"	0	37mm	37mm (inert), NOES - Unidentifiable scrap, plow blade, horse shoe, steel rod, steel bar, and few hot rocks	5.00	13.00	0
A4G0312	Phase II	EM-61	C-5	17	5	2-4"	0	M51 PD FUZE	OES - M51 Series Fuze (inert) and unidentifiable HE frag. NOES - Unidentifiable scrap metal and a few hot rocks	8.50	6.00	0
A4G0315	Phase II	EM-61	C-5	10	0	NA	0	NA	NOES - wire, scrap metal, and hot rock.	0.00	0.50	0
A4G0319	Phase II	EM-61	C-5	20	19	3-8"	0	M51 PD FUZE	OES - M51 Series Fuze (inert) and unidentifiable HE frag. NOES - Unidentifiable scrap metal	10.00	3.00	0
A4G0320	Phase II	EM-61	C-5	45	39	1-13"	0	37mm	OES - 2 37mm projectiles (inert), 2 M51 Series Fuzes (inert) and unidentifiable HE frag. NOES - nails, steel hook, scrap, and metal spikes	13.00	5.00	0
A4G0321	Phase II	EM-61	D-5	5	0	NA	0	NA	NOES - bracket from power line and hot rocks.	0.00	2.00	0
A4G0324	Phase II	EM-61	C-6	4	1	6"	0	NA	OES - Unidentifiable HE frag. NOES - few hot rocks.	1.00	0.00	0
A4G0329	Phase II	EM-61	C-5	49	28	1-15"	0	37mm/75mm/105mm frag	OES - Large frag identified as 37mm, 75mm, and 105mm (inert). NOES - plow blades, conduit, wire, sheet metal, and hot rocks	38.00	27.00	0
A4G0332	Phase II	EM-61	D-5	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	1
A4G0333	Phase II	EM-61	C-5	17	15	1-4"	0	NA	OES - 51 series fuze frag and unidentifiable frag. NOES - hot rock	6.50	0.00	0
A4G0340	Phase II	EM-61	D-5	6	0	NA	0	NA	NOES - Unidentifiable scrap metal, barb wire, and few hot rocks	0.00	4.00	0
A4G0342	Phase II	EM-61	C-5	11	5	1-5"	0	57mm AP-T and M51 Fuze (inert)	OES - 57mm AP-T (inert), M51 fuze (inert), and unidentifiable frag. NOES - hot rocks	8.00	0.00	0
A4G0343	Phase II	EM-61	C-5	11	3	2-3"	0	NA	OES - unidentifiable frag. NOES - hot rock	1.00	0.00	0
A4G0344	Phase II	EM-61	C-5	18	5	0-6"	0	57mm	OES - 57mm AP-T projectile (inert) and unidentifiable HE frag. NOES - unidentifiable scrap metal and few hot rocks	10.50	6.00	0
A4G0345	Phase II	EM-61	C-5	16	5	3-8"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap metal and few hot rocks	1.00	0.00	0
A4G0347	M & F	Schunstedt	C-5	30	25	0-4"	0	NA	OES - Unidentifiable HE frag. NOES - metal ball and several hot rocks	25.00	1.25	0
A4G0349	Phase II	EM-61	C-5	11	2	1-3"	0	NA	OES - Unidentifiable HE frag. NOES - plow blade, unidentifiable scrap, and hot rocks	2.10	9.00	0
A4G0361	Phase II	EM-61	C-5	16	12	0-6"	0	0	OES - Unidentifiable HE frag. NOES - few hot rocks and hot soil	3.00	0.00	1
A4G0362	Phase II	EM-61	C-5	16	12	0-12"	0	0	OES - Unidentifiable HE frag. NOES - few hot rocks and plow part	3.50	25.00	0

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Used	Location	Anomalies Investigated	of OES Anomalies	OES Depth (Inches)	of UXO	UXO Items	Other Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0366	Phase II	EM-61	C-5	2	2	Stopped digging after UXO found (6-12")	1	57mm HE	UXO/OES 57mm HE BIP and 57mm AP-T (inert).	14.00	0.00	0
A4G0367	Phase II	EM-61	D-5	7	0	NA	0	NA	NOES - Steel banding, wire, and few hot rocks	0.00	4.00	1
A4G0371	Phase II	EM-61	D-5	11	2	3-4"	0	M51 FUZE	OES - M51 Series Fuze (inert) and unidentifiable frag. NOES - Unidentified scrap, hot soil, and hot rocks	1.50	1.00	0
A4G0378	Phase II	EM-61	C-5	13	8	0-6"	0	57mm	OES - 57mm AP-T projectile (inert) and unidentifiable HE frag. NOES - Hot rocks	8.00	5.00	
A4G0387	Phase II	EM-61	C-5	8	0	NA	0	NA	All NOES - barb wire and hot rock	0.00	0.00	0
A4G0388	Phase II	EM-61	C-5	3	0	NA	0	NA	NOES - few hot rocks	0.00	0.00	0
A4G0391	Phase II	EM-61	C-5	8	2	1-2"	0	105mm Base Plate	OES - 105mm Base Plate and few unidentifiable HE frag. NOES - plow blade, wrench, pipe, and few hot rocks/soil.	5.50	6.00	0
A4G0392	Phase II	EM-61	C-5	37	3	2-6"	0	NA	OES - Unidentifiable HE frag. NOES - plow blade, wrench, pipe, steel bucket, handle, barbed wire, steel banding, nails, steel braces, skillet, steel bar, mule shoe, horse shoe, chain, hinge, hasp, stove parts and a few hot rocks/soil.	0.25	69.00	0
A4G0394	Phase II	EM-61	C-5	5	2	2-3"	0	NA	OES - Unidentifiable HE frag. NOES - Unidentifiable scrap metal and several hot rocks.	0.50	0.25	0
A4G0399	Phase II	EM-61	C-5	5	1	2"	0	NA	OES - Unidentifiable HE frag. NOES - Large cable LIP and several hot rocks.	0.25	5.00	0
A4G0426	Phase II	EM-61	C-4	8	1	3"	0	NA	OES - Unidentifiable HE frag. NOES - Several hot rocks.	0.33	0.00	0
A4G0427	Phase II	EM-61	C-4	7	0	NA	0	NA	NOES - unidentifiable scrap metal, hot rocks.	0.00	4.00	0
A4G0525	Phase I	EM61MK2	Includes 526									
A4G0526	Phase I	EM61MK2	C-5	66	11	0-12"	1	105mm HE	UXO - 105mm HE low order (UXO), OES - 57mm AP-T projectile (inert), 37mm projectile (inert), M series Fuze, and unidentifiable HE frag. NOES - Leaf spring, steel bars, nails, spikes, bolts, and some hot rocks/soil.	36.00	36.00	1
A4G0528	Phase I	EM61MK2	Includes 527	88	23	2-11"	0	NA	OES - 37mm practice (inert), fuze frag, and unidentifiable frag. NOES - banding, red brick, wire, fence post, and hot rock.	7.00	22.00	0
A4G0529	M&F	Schonstedt		30	1	3"	0	57mm AP-T (inert)	OES - 57mm AP-T (inert). Noes - electrical box, metal scrap, and hot rock.	12.00	2.00	0
A4G0530	M&F	Schonstedt		30	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	0.50	0
A4G0531	M&F	Schonstedt		30	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0532	Phase I	EM61MK2	C-6	48	32	1-4"	0	57mm, M51 FUZE, 37mm Frag	OES - 57mm AP-T (inert) M51 Series Fuze (inert) 37mm fragments, and unidentifiable frag. NOES - unidentifiable scrap metal, and few hot rocks	24.00	0.00	0
A4G0650	Phase I	EM61MK2	Includes 651	28	4	3-10"	0	57 mm (inert)	OES - 57 mm AP-T and unidentifiable HE fragments. NOES - horseshoe, hook, ax head, nail, and hot rock.			0
A4G0652	Phase I	EM61MK2	Includes 653	11	1	5"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	1.00	0.00	3
A4G0655	Phase I	EM61MK2	Includes 654	36	18	2-6"	0	NA	OES - 81 mm mortar (inert), 7-80 mm mortar (inert), 81mm tail boom. NOES - wire, horse shoe, and hot rocks.	15.00	5.00	0

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Used	Location	Anomalies Investigated	of OES Anomalies	OES Depth (inches)	of UXO	UXO Items	Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0658	Phase I	EM61MK2	D-6	34	1	5"	0	NA	OES - 1 small unspecified frag - could be misID. NOES - Numerous plow blades, a horseshoe, tools, several hot rocks/soil.	0.00	45.00	0
A4G0659	Phase I	EM61MK2										
A4G0668	Phase I	EM61MK2	D-5	20	1	24"	0	57mm	OES - 57mm AP-T projectile (inert). NOES - Unidentifiable scrap metal.	8.00	15.00	1
A4G0669	Phase I	EM61MK2	D-5	3	1	8"	0	NA	OES - 1 piece of HE fragment NOES - unidentifiable scrap metal and hot rock	0.10	0.25	0
A4G0030	Phase II	EM-61	C-3	34	26	3-12"	0	NA	OES - fuze and unidentifiable frag. NOES - metal scrap and hot rock	18.50	3.50	0
A4G0038	Phase II	EM-61	C-3	17	17	3-14"	0	M51 PD FUZE	OES - M51 PD Fuze, Unidentifiable HE frag. NOES - None.	12.00	0.00	0
A4G0039	Phase II	EM-61	C-3	44	38	1-24"	0	NA	OES - Lots of unidentifiable HE frag. NOES - Several hot rocks and 1 scrap metal.	25.50	0.50	0
A4G0040	Phase II	EM-61	C-3	26	11	0-6"	0	NA	OES - Lots of unidentifiable HE frag. NOES - Several hot rocks. Also SEED ITEM B-2	5.50	2.00	2
A4G0041	Phase II	EM-61	C-3	37	26	2-12"	0	37mm (inert)	OES - 37mm projectile (inert), Fuze, Lots of unidentifiable HE frag. NOES - Several hot rocks and unidentified scrap metal. Also SEED ITEM B-1	10.00	2.50	0
A4G0043	Phase II	EM-61	C-3	10	10	3-12"	0	M51 Fuze (inert)	OES - M51 Fuze (inert), Lots of unidentifiable HE frag. NOES - None	4.50	0.00	0
A4G0044	Phase II	EM-61	C-3	13	7	4.8"	0	NA	OES - Unidentifiable HE frag. NOES - Several hot rocks.	1.75	0.00	0
A4G0069	Phase II	EM-61	C-3	20	3	4.6"	0	NA	OES - unidentifiable frag. NOES - Seed Item B-3, metal scrap, and hot rock.	0.75	9.00	0
A4G0070	Phase II	EM-61	C-2/C-3	16	11	2-16"	0	NA	OES - unidentifiable frag. NOES - hot rock	5.00	4.00	1
A4G0071	Phase II	EM-61	C-3		14	2-30" (UXO=30")	1	155mm Shrapnel	UXO/OES - 155mm Shrapnel w/sheared fuze and black powder expelling charge for lead balls (UXO) BIP, 155mm Base Plate, misc unidentified fragments. NOES = metal rake head and several hot rocks.	82.00	5.00	0
A4G0079	Phase II	EM-61	C-2	22	19	3-8"	0	NA	OES - unidentifiable frag. NOES - Seed Item B-4, and hot rock.	6.00	0.00	1
A4G0093	Phase II	EM-61	C-2	9	5	3.4"	1	2.36" HE rocket	UXO/OES unfuzed 2.36" Bazooka Round from anomaly #4 - confirmed HE post BIP. OES - unidentifiable frag. NOES - hot rock.	0.75	0.25	1
A4G0094	Phase II	EM-61	C-2	10	1	7"	0	NA	OES - half of 37mm shell. NOES - scrap metal and hot rock.	11.00	2.00	2
A4G0095	Phase II	EM-61	C-2	34	2	1-6"	0	NA	OES - unidentifiable frag. NOES - plow blades, nails, scrap metal, and hot rocks.	7.00	21.00	2
A4G0096	Phase II	EM-61	C-2	15	8	2.8"	0	NA	OES - unidentifiable frag. NOES - barb wire, plow blade, and hot rock.	1.00	6.00	2
A4G0097	Phase II	EM-61	C-2	9	2	2-5"	0	NA	OES - unidentifiable frag. NOES - plow blade and hot rocks.	10.00	1.00	0
A4G0161	Phase I	EM61MK2	C-2	13	3	2-10"	0	NA	OES - unidentifiable frag. NOES - wire, nail, and hot rock.	0.50	0.10	4
A4G0165	Phase I	EM61MK2	C-2	23	9	3.8"	0	NA	OES - unidentifiable HE frag. NOES - metal scrap and hot rock.	1.50		0
A4G0166	Phase I	EM61MK2	C-2	14	1	6"	0	NA	OES - unidentifiable HE frag. NOES - scrap metal and hot rocks.	0.20		0
A4G0167	Phase I	EM61MK2	C-2	8	4	2-3"	0	NA	OES - unidentifiable frag. NOES - wire and metal scrap.	1.00	1.20	0
A4G0001	Phase I	EM61MK2	A-5	7	0	NA	0	NA	All NOES - pipe, scrap metal, and hot rock.	0.00	4.00	4
A4G0003	Phase I	EM61MK2	A-5	20	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	1.00	0
A4G0007	Phase I	EM61MK2	A-5	21	0	NA	0	NA	All NOES - nail, chain, plow point, metal scrap, and hot rock.	0.00	8.20	0

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4

Grid ID	Phase I/	Instrument	Grid	Total	Number	Range of	Number	Description	Other	Weight	Weight	Number	
	Phase IV			Anomalies	of OES	of	UXO	UXO		Other	of OES	of NOES	False
	M & F			Used	Location	Investigated	Anomalies	(inches)		UXO	Items	Findings	(lbs)
A4G0008	Phase I	EM61MK2	A-5	9	0	NA	0	NA	All NOES - wrench, nail, metal scrap, and hot rock.	0.00	1.30	4	
A4G0012	Phase II	EM-61	B-3	21	11	3-6"	0	NA	OES - Unidentifiable HE frag. NOES - hot rock.	4.00	0.00	0	
A4G0013	M&F	Schonstedt	C-3	30	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0	
A4G0014	Phase II	EM-61	C-3	59	32	1-4"	0	37mm (inert)	OES - 37mm projectile TP (inert) and unidentifiable HE frag. NOES - mule shoe and hot rock.			1	
A4G0018	Phase II	EM-61	B-3	27	18	4-8"	0	NA	OES - Unidentifiable HE frag. NOES - scrap metal and hot rocks	6.00	2.00	1	
A4G0002	Phase I	EM61MK2	A-5	7	0	NA	0	NA	All NOES - scrap metal and hot rock	0.00	0.50	0	
A4G0022	Phase II	EM-61	B-3						No anomalies present.				
A4G0027	Phase I	EM61MK2	D-3	19	1	2"	0	2.36" rocket inert	OES - 2.36" rocket (inert). NOES - Plow point, survey marker, and hot rocks.	2.00	2.00	5	
A4G0033	Phase II	EM-61	B-3	1	0	NA	0	NA	All NOES - Hot rock (Note: qc spike dug)	0.00	0.00	0	
A4G0034	Phase II	EM-61	B-3	14	0	NA	0	NA	All NOES - wire, rods, and nails.	0.00	0.00	0	
A4G0035	Phase II	EM-61	B-3	1	0	NA	0	NA	All NOES - Hot rock	0.00	0.00	0	
A4G0048	Phase II	EM-61	B-3	6	0	NA	0	NA	All NOES - nail and Seed Item B-9	0.00	1.00	2	
A4G0049	Phase II	EM-61	B-3	5	0	NA	0	NA	All NOES - scrap metal, wire, and hot rocks	0.00	3.00	0	
A4G0050	Phase II	EM-61	B-3	10	1	4"	0	NA	OES - Unidentifiable. NOES - plow point, scrap metal, and hot rock.	0.00		0	
A4G0051	Phase II	EM-61	B-3	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0	
A4G0058	Phase II	EM-61	D-3	11	0	NA	0	NA	All NOES - Barb wire, scrap metal, and hot rock.	0.00	2.00	0	
A4G0059	Phase II	EM-61	D-3	3	0	NA	0	NA	All NOES - Scrap metal and hot rock. Note: qc spike dug as false positive.	0.00	1.00	0	
A4G0060	Phase II	EM-61	D-3	1	0	NA	0	NA	All NOES - hot rock	0.00	0.00	0	
A4G0061	Phase II	EM-61	D-3	7	0	NA	0	NA	All NOES - hot rock	0.00	0.00	0	
A4G0065	Phase II	EM-61	D-3	2	0	NA	0	NA	All NOES - hot rock	0.00	0.00	0	
A4G0066	Phase II	EM-61	D-2	3	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	0.10	0	
A4G0075	Phase II	EM-61	B-3	18	0	NA	0	NA	All NOES - scrap metal, can, hot rock, and Seed Item B-6.	0.00		2	
A4G0082	Phase II	EM-61	C-2						No anomalies present.				
A4G0084	Phase II	EM-61	D-2	3	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0	
A4G0085	Phase II	EM-61	D-2	5	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	1	
A4G0086	Phase II	EM-61	D-2	13	0	NA	0	NA	All NOES - cable, scrap metal, and hot rock.	0.00	57.00	0	
A4G0100	Phase I	EM61MK2	A-5	12	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	2.50	6	
A4G0101	Phase I	EM61MK2	C-8	19	0	NA	0	NA	All NOES - nails, metal scrap, and hot rock.	0.00		0	
A4G0102	Phase I	EM61MK2	C-8	11	0	NA	0	NA	All NOES - horse shoe, plow point, wire, and hot rock.	0.00		0	
A4G0103				3	0	NA	0	NA	All NOES - spike, metal scrap, and hot rock.	0.00	2.00	0	
A4G0104	Phase I	EM61MK2	C-8	21	0	NA	0	NA	All NOES - bolts, screwdriver, plowpoint, scrap metal, and hot rocks.	0.00	0.00	3	
A4G0105	Phase I	EM61MK2	C-8	12	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0	
A4G0106	Phase I	EM61MK2	C-8	10	0.00	NA	0	NA	All NOES - Latch hook, wrench, and horse shoe.	0		0	
A4G0107	Phase I	EM61MK2	C-8	6	0.00	NA	0	NA	All NOES - washer, bolt, and hot rock	0		0	
A4G0108	Phase I	EM61MK2	C-7	4	0	NA	0	NA	All NOES - shipping clip, wire, and metal spike.	0.00	1.00	0	
A4G0109	Phase I	EM61MK2	C-7	8	0	NA	0	NA	All NOES - Horse shoe, bolt, wrench, metal scrap, and hot rock.	0.00		0	
A4G0111	Phase I	EM61MK2	C-7	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0	

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4**

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Used	Location	Anomalies Investigated	of OES Anomalies	OES Depth (inches)	of UXO	UXO Items	Other Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0113	Phase I	EM61MK2	C-7	3	0	NA	0	NA	All NOES - plow point, horse shoe, and metal scrap.	0.00	2.00	0
A4G0114	Phase I	EM61MK2	C-7	9	0	NA	0	NA	All NOES - spring, pipe, scrap metal, and hot rock.	0.00		0
A4G0115	Phase II	EM-61	C-2	3	2	1-12"	0	NA	OES - rocket motor (inert) and unidentifiable frag. NOES - hot rock.	1.50	0.00	0
A4G0120	Phase II	EM-61	B-2	0					No anomalies present.			
A4G0121	Phase II	EM-61	B-2	4	0	NA	0	NA	All NOES - horse shoes, plow points, and bolts.	0.00	9.00	0
A4G0124	Phase I	EM61MK2	C-7	5	2	6"	0	NA	OES - unidentified scrap. NOES - scrap metal and hot rock.	0.50	1.50	0
A4G0126	Phase I	EM61MK2	C-8	11	1	2"	0	NA	OES - unidentified scrap. NOES - scrap metal.	15.00	0.25	0
A4G0127	Phase I	EM61MK2	C-8	13	5	2-6"	0	NA	OES - unidentified scrap. NOES - scrap metal and hot rocks.	1.00	1.50	1
A4G0128	Phase I	EM61MK2	C-8	5	0	NA	0	NA	All NOES - metal scrap.	0.00	3.00	0
A4G0130	Phase I	EM61MK2	C-7	22	0	NA	0	NA	All NOES - Fuze clip, plow point, metal scrap, and hot rock.			0
A4G0131	Phase I	EM61MK2	C-7	8	0	NA	0	NA	All NOES - nail, spring, fence post, metal scrap, and hot rock.	0.00		0
A4G0132	Phase I	EM61MK2	C-7	12	0	NA	0	NA	All NOES - plow point, spring, horse shoe, metal scrap, and hot rock.	0.00		0
A4G0133	Phase I	EM61MK2	C-7	15	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	0.10	0
A4G0134	Phase I	EM61MK2	C-7	4	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0135	Phase I	EM61MK2	C-7	15	3	1-2"	0	81mm practice mortar (inert)	OES - 81mm practice mortar (inert) and unidentified HE frag. NOES - scrap metal and hot rock.	19.00	6.00	0
A4G0137	Phase I	EM61MK2	D-7	35	0	NA	0	NA	All NOES - plow point, cutting blade, horse shoes, scrap metal, and hot rock.	0.00		4
A4G0138	Phase I	EM61MK2	D-7	13	0	NA	0	NA	All NOES - ax head, horse shoe, plow point, metal scrap, and hot rock.	0.00		0
A4G0141	Phase II	EM-61	C-2	3	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0142	Phase II	EM-61	C-2	4	0	NA	0	NA	All NOES - wire, fence post, and scrap metal.	0.00	2.00	1
A4G0143	Phase I	EM61MK2	D-7	10	0	NA	0	NA	All NOES - scrap metal	0.00		3
A4G0144	Phase I	EM61MK2	D-7	3	3	1-3"	0	NA	OES - unidentified HE frag.	0.50	0.00	0
A4G0145	Phase I	EM61MK2	D-7	12	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00		3
A4G0147	Phase I	EM61MK2	C-2	4	1	6"	0	NA	OES - unidentifiable frag. NOES - wire, scrap, and hot rock.	2.00	3.00	0
A4G0148	Phase I	EM61MK2	C-2	6	0	NA	0	NA	NOES - air fitting and hot rocks.	0.00	0.50	0
A4G0149	Phase I	EM61MK2	C-1	34	0	NA	0	NA	All NOES - plow point, hand crank, scrap metal, and hot rock.	0.00		1
A4G0150	Phase I	EM61MK2	C-1	26	0	NA	0	NA	All NOES - plow point, metal scrap and hot rocks.	0.00	5.00	2
A4G0151	Phase I	EM61MK2	C-1									
A4G0152	Phase I	EM61MK2	C-1	17	0	NA	0	NA	All NOES - pliers, bolts, metal scrap, and hot rocks.	0.00		1
A4G0153	Phase II	EM-61	C-2	2	1	2"	0	NA	OES - unidentifiable frag. NOES - horse shoe.	0.20	1.00	0
A4G0154	Phase I	EM61MK2	C-1	17	2	4-5"	0	NA	OES - Two 60mm mortar fin assemblies. NOES - hook, metal scrap, and hot rocks.	0.00		1
A4G0155	Phase I	EM61MK2	C-1	10	0	NA	0	NA	All NOES - spring, horse shoe, metal scrap, and hot rocks.	0.00		1
A4G0156	Phase I	EM61MK2	C-1	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0157	Phase I	EM61MK2	C-1	11	0	NA	0	NA	All NOES - nail, can, and hot rocks.	0.00		0
A4G0158	Phase I	EM61MK2	C-1	7	0	NA	0	NA	All NOES - plow point, wire, and hot rock.	0.00	1.50	0
A4G0163	Phase II	EM-61	C-2	1	1	3"	0	NA	OES - unidentifiable frag.	0.30	0.00	0
A4G0163	Phase I	EM61MK2	C-2	1	1	3"	0	NA	OES - unidentifiable frag.	0.00	0.20	0

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Instrument	Grid Location	Anomalies Investigated	of OES Anomalies	OES Depth (Inches)	of UXO Items	UXO Items	Other Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0164	Phase II	EM-61	C-2	3	3	3-6"	0	NA	OES - unidentifiable frag	1.00	0.00	0
A4G0171	Phase I	EM61MK2	B-4	63	0	NA	0	NA	All NOES - horse shoe, plow blade, chain, metal scrap, and hot rocks.	0.00	0.00	1
A4G0173	Phase I	EM61MK2	C-7	4	0	NA	0	NA	All NOES - horse shoe, wrench, and metal scrap.	0.00	0.00	0
A4G0174	Phase I	EM61MK2	C-7	3	0	NA	0	NA	All NOES - plow point and scrap metal.	0.00	0.00	0
A4G0175	Phase I	EM61MK2	C-7	9	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	1.50	2
A4G0176	Phase II	EM-61	C-2	3	3	2-3"	0	NA	OES - unidentifiable frag.	1.10	0.00	0
A4G0177	Phase II	EM-61	C-2	5	1	4"	0	NA	OES - unidentifiable frag. NOES - Seed Item 5B, wrench, plow blade, and hot rocks.	0.20	5.00	0
A4G0178	Phase II	EM-61	C-2	3	0	NA	0	NA	All NOES - wire and plow blade.	0.00	3.00	0
A4G0182	Phase II	EM-61	D-2	4	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0184	Phase II	EM-61	C-2	2	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0186	Phase II	EM-61	D-2						No anomalies present.			
A4G0187	Phase II	EM-61	D-2	1	0	NA	0	NA	All NOES - scrap metal.	0.00	0.50	0
A4G0188	Phase II	EM-61	C-2	6	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	2
A4G0189	Phase II	EM-61	C-2	13	0	NA	0	NA	All NOES - wire and scrap metal.	0.00	1.00	3
A4G0190	Phase I	EM61MK2	D-3	4	1	2"	0	2.36" rocket (inert)	OES - 2.36" rocket (inert), NOES - plow point and metal scrap.	1.50	2.50	0
A4G0191	Phase I	EM61MK2	D-3	18	3	0-3"	0	NA	OES - unidentifiable HE frag. NOES - metal scrap and hot rock.	7.00	8.00	1
A4G0192	Phase I	EM61MK2	D-3	14	0	NA	0	NA	All NOES - wire, lid, bar, scrap metal, and hot rock.	0.00	0.00	0
A4G0193	Phase I	EM61MK2	D-3	4	0	NA	0	NA	All NOES - hot rocks	0.00	0.00	0
A4G0194	Phase I	EM61MK2	E-3	6	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	1.00	1
A4G0195	Phase I	EM61MK2	E-3	4	0	NA	0	NA	All NOES - scrap metal	0.00	4.00	0
A4G0196	Phase II	EM-61	C-2	9	0	NA	0	NA	All NOES - shipping clip for fuze and hot rocks	0.00	0.10	0
A4G0197	Phase I	EM61MK2		32	8	1-8"	0	NA	OES - unidentifiable frag. NOES - metal scrap and hot rock.	2.00	1.00	1
A4G0198	Phase I	EM61MK2		21	5	0-4"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	1.50	0.00	0
A4G0199	Phase II	EM-61	C-2	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0200	Phase II	EM-61	C-2	1	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	1
A4G0201	Phase II	EM-61	C-2	1	1	NA	0	NA	All NOES - 50 cal. shell.	0.00	0.05	0
A4G0202	Phase I	EM61MK2	D-3	5	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	0.10	2
A4G0203	Phase II	EM-61	C-2	1	0	NA	0	NA		0.00	0.00	1
A4G0204	Phase II	EM-61	C-2	4	0	NA	0	NA	All NOES - wrench, lid, bed spring.	0.00	3.00	0
A4G0205	Phase II	EM-61	C-2	2	0	NA	0	NA	All NOES - plow blade and scrap.	0.00	3.00	0
A4G0206	Phase II	EM-61	B-2	0					No anomalies present.	0.00	2.00	0
A4G0210	Phase II	EM-61	C-2	0					No anomalies present.			
A4G0211	Phase II	EM-61	C-2	1	0	NA	0	NA	All NOES - hot rock	0.00	0.00	0
A4G0212	Phase II	EM-61	C-1	15	0	NA	0	NA	All NOES - plow point, horse shoe, and hot rocks.	0.00	6.00	7
A4G0213	Phase II	EM-61	C/D-1	7	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	2.00	0
A4G0215	Phase II	EM-61	C-1	55	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	22.00	0
A4G0222	Phase II	EM-61		6	0	NA	0	NA	All NOES - banding and hot rocks.	0.00	1.00	0
A4G0223	Phase II	EM-61	D-8	30	0	NA	0	NA	All NOES - plow point, nail, metal scrap, and hot rock.	0.00	3.00	4
A4G0224	Phase II	EM-61	D-7	11	0	NA	0	NA	All NOES - plow point, barb wire, and metal scrap.	0.00	3.00	9

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4

	Phase I/			Total	Number	Range of	Number	Description		Weight	Weight	Number
Grid ID	M & F	Instrument	Grid Location	Anomalies Investigated	of OES Anomalies	OES Depth (inches)	of UXO	UXO Rems	Other Findings	of OES (lbs)	of NOES (lbs)	False Positives
A4G0226	Phase II	EM-61	C-7	8	0	NA	0	NA	All NOES - metal scrap and hot rocks.	0.00	0.50	0
A4G0227	Phase II	EM-61	C-7	5	0	NA	0	NA	All NOES - pipe and scrap wire.	0.00	8.50	1
A4G0229	Phase II	EM-61	B-7	25	0	NA	0	NA	All NOES - nail, barb wire, trash pit, junk, metal scrap, and hot rock.	0.00	10.00	0
A4G0231	Phase II	EM-61	C-7	37	0	NA	0	NA	All NOES - barb wire, nail, rod, metal scrap, and hot rocks.	0.00	1.25	0
A4G0232	M&F	Schonstedt	C-7	30	0	NA	0	NA	All NOES - wire and hot rock. Mag/Flag grid.	0.00	2.00	0
A4G0233	Phase II	EM-61	C-7	2	0	NA	0	NA	All NOES - horse shoe and hot rock.	0.00	2.00	0
A4G0234	Phase II	EM-61	D-7	2	0	NA	0	NA	All NOES - scrap metal.	0.00	2.50	0
A4G0235	Phase II	EM-61	D-7	4	0	NA	0	NA	All NOES - barb wire and scrap metal.	0.00	5.50	1
A4G0236	Phase II	EM-61	C-7	1	0	NA	0	NA	All NOES - scrap metal.	0.00	2.00	0
A4G0237	Phase II	EM-61	C-7	13	0	NA	0	NA	Various unidentifiable scrap metal. One hot rock.	0.00	13.00	3
A4G0238	Phase II	EM-61	C-7	14	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	0.30	0
A4G0239	Phase II	EM-61	C-7	5	0	NA	0	NA	All NOES - horse shoe, hinge, ax head, and hot rocks.	0.00	5.00	0
A4G0240	Phase II	EM-61	C-7	10	0	NA	0	NA	All NOES - knife, latch, springs, wire, and hot rocks.	0.00	6.00	0
A4G0241	M & F	Schonstedt	C-7	30	0	NA	0	NA	All NOES - steel plate, can, metal scrap, and hot rock.			
A4G0243	Phase II	EM-61	D-6	2	0	NA	0	NA	All NOES - horse shoe and hot rock.	0.00	2.00	2
A4G0246	Phase II	EM-61	C-6									
A4G0251	Phase I	EM61MK2	C-4	8	4	2-4"	0	NA	OES - heavy case frag. NOES - rebar, sheet metal, and hot rocks.	3.50	4.00	0
A4G0252	Phase I	EM61MK2										
A4G0258	Phase I	EM61MK2	B-2	55	1	4"	0	NA	OES - 37mm frag. NOES - scrap metal and hot rocks.	0.25	4.00	0
A4G0259	Phase I	EM61MK2	B-2	33	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	6.00	0
A4G0265	Phase I	EM61MK2	A-4	3	0	NA	0	NA	All NOES - hot rocks.			
A4G0266	Phase I	EM61MK2	A-4/B-4	9	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	10.00	2
A4G0267	Phase I	EM61MK2	B-4	9	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	1.75	2
A4G0268	Phase I	EM61MK2	B-4	11	1	8"	0	NA	OES - mortar lin. NOES - metal scrap and hot rock.	1.00	2.00	2
A4G0271	Phase I	EM61MK2	B-4	15	2	3-6"	0	NA	OES - unidentifiable frag. NOES - metal scrap and hot rock.	2.00	13.00	2
A4G0278	Phase I	EM61MK2	D-1	3	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0279	Phase I	EM61MK2	D-1	7	0	NA	0	NA	NOES - hot rocks	0.00	0.00	3
A4G0280	Phase I	EM61MK2	D-1	7	0	NA	0	NA	All NOES - wire and hot rock.	0.00	0.50	1
A4G0281	Phase I	EM61MK2	D-1	8	0	NA	0	NA	All NOES - cable and hot rock.	0.00	2.00	0
A4G0286	Phase II	EM-61	C-6	43	34	1-4"	0	M51 PD FUZE	OES - M51 PD FUZE. NOES - Unidentifiable scrap, barb wire, and low hot rocks.	18.00	2.50	0
A4G0290	Phase I	EM61MK2		14	5	3-4"	0	NA	OES - unidentifiable frag. NOES - metal scrap and hot rock.	4.50	4.20	0
A4G0292	Phase I	EM61MK2	C-4	24	14	1-5"	0	NA	OES - unidentifiable frag. NOES - hot rock.	6.00	0.00	0
A4G0293	Phase I	EM61MK2	C-4	23	4	2-3"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	5.00	0.00	3
A4G0294	Phase I	EM61MK2	C-4	36	4	2-3"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	1.50	0.00	0
A4G0297	Phase I	EM61MK2	C4	20	4	2-8"	0	M58 base fuze (inert)	OES - heavy case frag and M58 base fuze (inert). NOES - nail, can, bar, and hot rocks.	2.00	2.00	2
A4G0298	Phase I	EM61MK2	C4	11	2	4-6"	0	NA	OES - heavy case frag. NOES - hot rocks.	1.00	0.00	0
A4G0300	Phase I	EM61MK2	D-3	14	7	2-4"	0	NA	OES - unidentifiable frag. NOES - scrap metal and hot rock.	1.00	4.00	1

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4

Phase I/	Phase II/	Instrument	Grid	Total	Number	Range of	Number	Description	Weight	Weight	Number	
M & F	M & F	Used	Location	Anomalies	of OES	OES Depth	of	UXO	of OES	of NOES	False	
Grid ID	M & F	Instrument	Location	Investigated	Anomalies	(Inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
A4G0313	Phase I	EM61MK2		0					No anomalies present.			
A4G0314	Phase II	EM-61	C-5									
A4G0323	Phase II	EM-61	D-5	6	0	NA	0	NA	NOES - Barb wire and few hot rocks	0.00	0.50	0
A4G0337	Phase II	EM-61	D-5	2	0	NA	0	NA	NOES - Few hot rocks	0.00	0.00	0
A4G0338	Phase II	EM-61	D-5	4	0	NA	0	NA	NOES - Few hot rocks	0.00	0.00	0
A4G0339	Phase II	EM-61	D-5	3	0	NA	0	NA	NOES - Unidentifiable scrap metal and few hot rocks	0.00	2.00	0
A4G0348	Phase II	EM-61	C-5	41	13	2-12"	0	2 M51 PD Fuzes (inert)	OES - Two M51 PD Fuzes (inert) and unidentifiable frag. NOES - rod, wire, handle, plowblade, horse shoe, and hot rocks.	16.50	45.00	0
A4G0351	Phase II	EM-61	B-5	8	0	NA	0	NA	All NOES - metal scrap and hot rocks.	0.00	5.00	0
A4G0352	Phase II	EM-61	B-5	3	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0376	Phase I	EM61MK2										
A4G0377	Phase I	EM61MK2										
A4G0398	Phase II	EM-61	D-5	5	0	NA	0	NA	NOES - Unidentifiable scrap, plow blade, few hot rocks	0.00	6.00	0
A4G0401	Phase II	EM-61	B-5	5	0	NA	0	NA	All NOES - scrap metal and hot rocks.	0.00	4.20	0
A4G0409	Phase II	EM-61	A-5	1	0	NA	0	NA	All NOES - plow point.	0.00	4.00	0
A4G0422	Phase II	EM-61	C-4	5	1	3"	0	NA	OES - unidentifiable scrap. NOES - metal scrap.	1.00	4.00	0
A4G0425	M&F	Schonstedt	C-4	30	0	NA	0	NA	NOES - can, small unidentifiable scrap metal, many hot rocks	0.00	1.00	0
A4G0433	Phase II	EM-61	C-4	4	0	NA	0	NA	NOES - unidentifiable scrap metal, hot rocks.	0.00	1.00	0
A4G0438	Phase II	EM-61	C-4	22	0	NA	0	NA	All NOES - metal scrap.	0.00	14.00	0
A4G0439	Phase II	EM-61	C-4	26	2	3-4"	0	37mm luze (inert)	OES - 37mm luze (inert) and unidentifiable frag. NOES - metal scrap and hot rock.	2.50	19.00	1
A4G0440	Phase II	EM-61	C-4	4	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	0.60	1
A4G0441	Phase II	EM-61	C-4	4	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	1
A4G0443	Phase II	EM-61	D-4	4	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	0.50	0
A4G0444	Phase II	EM-61	D-4	4	0	NA	0	NA	All NOES - plow point and hot rock.	2.00	0.00	0
A4G0447	Phase II	EM-61	C-4	3	2	3-4"	0	NA	OES - unidentifiable frag.	0.50	0.00	1
A4G0450	M&F	Schonstedt	C-4	30	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0451	Phase II	EM-61	D-4	3	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0452	Phase II	EM-61	D-4	3	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0453	Phase II	EM-61	C-4	10	4	1-5"	0	NA	OES - heavy case frag. NOES - hot rocks.	2.00	0.00	0
A4G0456	Phase II	EM-61	C-4	11	3	2-6"	0	NA	OES - unidentifiable frag. NOES - hot rocks.	2.00	0.00	1
A4G0461	M & F	Schonstedt		30	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A4G0463	Phase II	EM-61	B-4	1	0	NA	0	NA	All NOES - scrap	0.00	0.50	0
A4G0465	Phase II	EM-61	B-4	1	0	NA	0	NA	All NOES - metal scrap.	0.00	0.50	0
A4G0469	Phase II	EM-61	B-4	7	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	3.00	0
A4G0472	Phase II	EM-61	B-4	2	0	NA	0	NA	All NOES - metal scrap.	0.00	1.00	0
A4G0474	Phase II	EM-61	B-4	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0477	Phase II	EM-61	B-4	5	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G0478	Phase II	EM-61	B-4	6	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	2.00	0
A4G0480	Phase II	EM-61	B-4	2	0	NA	0	NA	All NOES - rod and hot soil.	0.00	1.00	0

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 4

Grid ID	Phase I/ M & F	Instrument	Grid Location	Total	Number	Range of	Number	Description	Other	Weight	Weight	Number
	Anomalies			of OES	OES Depth	of	UXO	of OES		of NOES	False	
				Investigated	Anomalies	(Inches)	UXO	Items	Findings	(lbs)	(lbs)	Positives
A4G0481	Phase II	EM-61	B-4	4	0	NA	0	NA	All NOES - horse shoe and hot rock.	0.00	2.00	1
A4G0482	Phase II	EM-61	A-4	29	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	14.00	0
A4G0483	Phase II	EM-61	B-4	6	0	NA	0	NA	All NOES - Seed Item B-8, nail, plow blade, and hot rock.	0.00	5.00	0
A4G0484	Phase II	EM-61	B-4	5	0	NA	0	NA	All NOES - pipe, horse shoe, cable.	0.00	5.00	2
A4G0486	Phase II	EM-61	B-4	12	0	NA	0	NA	All NOES - Seed Item B-10, barb wire, and hot soil.	0.00	1.00	6
A4G0487	Phase II	EM-61	B-4	12	2	1-8"	0	NA	OES - unidentifiable frag. NOES - mule shoe, wire, nails, and hot soil.	0.50	2.00	0
A4G0511	Phase I	EM61MK2										
A4G0512	Phase I	EM61MK2	C-3	47	15	2-6"	0	NA	OES - unidentifiable frag. NOES - can and hot rock		0.00	0
A4G0513	Phase I	EM61MK2	C-4	7	4	5"	0	NA	OES - heavy case frag. NOES - horse shoe and hot rocks.		2.00	0
A4G0514	Phase I	EM61MK2										
A4G0520	Phase I	EM61MK2	C-4	23	7	1-5"	0	37mm practice (inert)	OES - 37 mm practice (inert) and heavy case frag. NOES - hot rock	8.00	0.00	0
A4G0521	Phase I	EM61MK2	C-4	17	4	2-3"	0	NA	OES - unidentifiable frag. NOES - hot rock	5.00	0.00	0
A4G0522	Phase I	EM61MK2	C-4	18	6	1-2"	0	NA	OES - heavy case frag. NOES - hot rocks.	0.00	0.00	0
A4G0534	Phase I	EM61MK2										
A4G0535	Phase I	EM61MK2	D-5	13	0	NA	0	NA	NOES - Horse shoe, axe head, metal bar, and hot rocks	0.00	6.50	0
A4G0536	Phase I	EM61MK2	D-5	2	0	NA	0	NA	NOES - 12 gauge cartridge and hot rocks	0.00	0.10	0
A4G0644	Phase I	EM61MK2	C-2	8	0	NA	0	NA	All NOES - horse shoe, feeder, plow blade, and hot rocks	0.00	10.00	1
A4G0670	Phase I	EM61MK2	C-2	15	2	2"	0	NA	OES - unidentifiable frag. NOES - 50 cal. AP, plow blade, metal scrap, and hot rock.	0.25	3.00	1
A4G0672	Phase I	EM61MK2	C-2	6	0	NA	0	NA	NOES - nails and hot rock.	0.00	0.00	0
A4G0673	Phase I	EM61MK2	C-2	7	2	3-12"	0	NA	OES - unidentifiable frag. NOES - spring, pipe, metal scrap, and hot rock.	0.25	2.00	0
A4G0674	Phase I	EM61MK2	C-2	5	0	NA	0	NA	All NOES - spring, plow blade, and hot rock	0.00	2.00	0
A4G0700	Phase I	EM61MK2	C-6	55	29	1-10"	0	M51 FUZE	OES - M51 Series Fuze (inert) and unidentifiable frag. NOES - horse shoe and hot dirt and hot rocks	14.50	0.50	0
A4G0800	Phase I	EM61MK2	C-2	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
A4G1445	Phase II	EM-61	??	3	0	NA	0	NA	All NOES - hot rocks	0.00	0.00	0
A4T0257	Phase I	EM61MK2		52	0	NA	0	NA	All NOES - bolts, metal scrap, and hot rock.	0.00	0.20	0
A4T0259	Phase I	EM61MK2	D-3	57	0	NA	0	NA	All NOES - barb wire, shot gun shells, plow blades, cable, metal scrap, and hot rocks.			
Totals for Area 4 Proper Grids				4137	1118		5			960	1154	149

**APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 5**

Grid ID	Phase I/ Phase II/ M & F	Instrument Used	Grid Location	Total	Number	Range of	Number	Description	Weight of OES (lbs)	Weight	Number	
	Anomalies Selected			of OES Anomalies	OES Depth (inches)	of UXO	UXO Items	Other Findings		of NOES (lbs)	False Positives	
ASG0001	Phase II	EM-61	C-11	7	0	NA	0	NA	All NOES - nail and plow point.	0.00	4.10	3
ASG0002	Phase II	EM-61	C-11	0	0				No anomalies present.			
ASG0006	Phase II	EM-61	B-9	24	0	NA	0	NA	All NOES - wire, rebar, scrap metal, and hot rock.	0.00	19.50	0
ASG0009	Phase II	EM-61	C-9	4	0	NA	0	NA	All NOES - horseshoes and chain.	0.00	4.00	0
ASG0010	Phase II	EM-61	C-8	16	0	NA	0	NA	All NOES - trash pit, metal scrap, and hot rock.	0.00	16.00	0
ASG0012	Phase II	EM-61	C-8	4	0	NA	0	NA	All NOES - 2 horseshoes, piece of scrap metal, 1 hot rock.	0.00	3.00	0
ASG0016	Phase II	EM-61	C-8	41	0	NA	0	NA	All NOES - metal scrap and hot rock.	0.00	18.00	0
ASG0018	Phase II	EM-61	B-8	9	1	0"	0	Plate to M4 anti-tank mine	OES - Spider plate to a M15 anti-tank mine. NOES - scrap metal and hot rock.	1.00	3.50	3
ASG0019	Phase II	EM-61	B-8	1	0	NA	0	NA	FP - identified as stump, which induced instrument response.	0.00	0.00	1
ASG0020	Phase II	EM-61	B-8	0	0				No anomalies present.			
ASG0021	Phase II	EM-61	B-8	45	0	NA	0	NA	All NOES - horse shoe, hinges, handles, scrap metal, and hot rock.	0.00	23.00	0
ASG0023	Phase II	EM-61	B-8	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
ASG0024	Phase II	EM-61	B-8	3	0	NA	0	NA	All NOES - Hot rock.	0.00	0.00	1
ASG0025	Phase II	EM-61	B-8	9	0	NA	0	NA	All NOES - plow point, rod, and hot rock.	0.00	5.50	4
ASG0026	Phase II	EM-61	B-7	0 - qc spike was selected to be dug	0	NA	0	NA	QC spike location was determined to be hot rock.	0.00	0.00	0
ASG0028	M&F	Schonstedt	B-7	30	0	NA	0	NA	All NOES - plow point, horse shoe, scrap metal and hot rock.	0.00	11.00	0
ASG0029	Phase II	EM-61	B-7	8	0	NA	0	NA	All NOES - sprinkler parts and hot rocks.	0.00	1.00	1
ASG0031	Phase II	EM-61	B-7	15	0	NA	0	NA	All NOES - plow point, rod, buckle, cultivator tine, and metal scrap.	0.00	20.00	0
ASG0032	Phase II	EM-61	A-7	6	0	NA	0	NA	All NOES - horse shoe, bolt, metal scrap, and hot rock.	0.00	3.50	0
ASG0033	Phase II	EM-61	B-7	2	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	1
ASG0034	Phase II	EM-61	B-7	1	0	NA	0	NA	All NOES - hot rock.	0.00	0.00	0
ASG0035	Phase II	EM-61	B-7	8	0	NA	0	NA	All NOES - wire and unidentifiable scrap metal.	0.00	1.00	4
ASG0039	Phase II	EM-61	A-7	8	0	NA	0	NA	All NOES - door hook, horse shoe, and hot rock.	0.00	3.00	0
ASG0040	Phase II	EM-61	A-7	32	0	NA	0	NA	All NOES - wire, nails, misc unidentifiable scrap metal, steel rods.	0.00	34.00	0
ASG0046	Phase II	EM-61	E-8	6	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	2
ASG0051	M&F	Schonstedt	D-8	30	0	NA	0	NA	All NOES - barb wire, scrap metal, and hot rock.	0.00	1.00	0
ASG0052	Phase II	EM-61	D-7	0	0				Note: No anomalies selected to be dug.			
ASG0053	Phase II	EM-61	D-7	36	0	NA	0	NA	All NOES - trash pit, metal scrap, and hot rocks.	0.00	27.00	0
ASG0054	Phase II	EM-61	B-10	2	0	NA	0	NA	All NOES - metal spike	0.00	0.25	1
ASG0115	Phase I	EM61MK2	C-10	1	0	NA	0	NA	All NOES - pipe.	0.00	1.00	0
ASG0116	Phase I	EM61MK2	C-10	2	0	NA	0	NA	All NOES - bolt and hot rock.	0.00	0.05	0

APPENDIX C
SUMMARY OF THE INTRUSIVE INVESTIGATION
AREA 5

A5G0117	Phase I	EM61MK2	C-10	4	0	NA	0	NA	All NOES - plow point, horse shoe, bolt, and hot rock.	0.00	5.00	0
A5G0118	Phase I	EM61MK2	C-10	8	0	NA	0	NA	All NOES - plow point, pipe, nut, and metal scrap.	0.00	12.00	0
A5G0119	Phase I	EM61MK2	C-10	6	0	NA	0	NA	All NOES - pipe, bolt, scrap metal, and hot rock.	0.00	3.00	0
A5G0120	Phase I	EM61MK2	C-10	0	0				No anomalies present.			
A5G0122	Phase I	EM61MK2	C-10	5	0	NA	0	NA	All NOES - plow point and horse shoe.	0.00	4.50	3
A5G0139	Phase I	EM61MK2	D-8	9	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	3
A5G0140	Phase I	EM61MK2	D-8	5	0	NA	0	NA	All NOES - hot rocks.	0.00	0.00	0
A5G0141	Phase I	EM61MK2	D-8	8	0	NA	0	NA	All NOES - wire, hooks, and scrap metal.	0.00	0.00	0
A5G0142	Phase I	EM61MK2	D-8	5	0	NA	0	NA	All NOES - horse shoe, and hot rock.	0.00	2.00	0
A5T0008	Phase I	EM61MK2	C-8	110	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	30.00	16
A5T0010	Phase I	EM61MK2	C-8	63	0	NA	0	NA	All NOES - scrap metal and hot rock.	0.00	5.00	15
A5T0030	Phase I	EM61MK2	B-7	60	0	NA	0	NA	All NOES - Unidentifiable scrap metal, pipe, fence posts plus numerous hot rocks/hot soil.	0.00	34.00	3
A5T0032	Phase I	EM61MK2	B-7	56	0	NA	0	NA	All NOES - Unidentifiable scrap metal and wire plus numerous hot rocks/hot soil.	0.00	7.75	10
A5T0033	Phase I	EM61MK2	B-8	30	0	NA	0	NA	All NOES - Unidentifiable scrap metal plus numerous hot rocks.	0.00	15.50	2
A5T0034	Phase I	EM61MK2	B-8	29	0	NA	0	NA	All NOES - bolt, brace, plow point, metal scrap, and spring.	0.00	8.00	0
Totals for Area 5 Grids				750			0			1	326	73

APPENDIX D
SCRAP CERTIFICATION FOR DISPOSAL

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DOC IDENT	RI FROM	SI	FSF	MIN	ART	UNIT OF MEAS	QUANTITY	DOCUMENT NUMBER	SERIAL	SUPPLEMENTARY ADDRESS	FUND	INST. DIVISION	PROJECT	PRY. CTRY	REQD DEL DATE	AC-DC	RI	LIGHT PRICE	DOLLARS	CTS																																																											
SHIPPED FROM USA ENVIRONMENTAL INC PARSONS ENGINEERING 939 ROBERTS CHAPEL RD CAMP BUTNER NC 919 620-8832							SHIP TO SWARTZ AND SONS INC 217 S. HOLMAN ST DURHAM NC 27701 919 682-0429							MARK FOR PROJECT CAMP BUTNER 2000-501 NC							TOTAL PRICE DOLLARS CTS																																																										
WAREHOUSE LOCATION				TYPE OF CARGO	UNIT PACK	UNIT WEIGHT	UNIT CUBE	UFC	N UFC	FREIGHT RATE	DOCUMENT DATE	MAT CONC	QUANTITY																																																																		
SUBSTITUTE DATA IF EN ORIGINALY REQUESTED							FREIGHT CLASSIFICATION NOMENCLATURE																																																																								
							ITEM NOMENCLATURE																																																																								
							DE. SCRAP (FERROUS)																																																																								
SELECTED BY AND DATE				TYPE OF CONTAINERS		TOTAL WEIGHT		RECEIVED BY AND DATE	INSPECTED BY AND DATE																																																																						
				5 GAL PLASTIC BUCKETS		95 LB																																																																									
PACKED BY AND DATE				NO OF CONTAINERS		TOTAL CUBE		WAREHOUSED BY AND DATE				WAREHOUSE LOCATION																																																																			
				2																																																																											
REMARKS																																																																															
FIRST DESTINATION ADDRESS							DATE SHIPPED																																																																								
TRANSPORTATION CHARGEABLE TO													RECEIVER'S SIGNATURE (AND DATE)							RECEIVER'S DOCUMENT NUMBER																																																											

DD Form 1342-1, JUL 87
 PREVIOUS EDITION MAY BE USED
 DOD SINGLE LINE ITEM RELEASE/RECEIPT DOCUMENT

I certify 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

Certified: Printed Name: ROBERT M. DAVISON Signature: RMD Date: 8-27-02

Verified: Printed Name: KERRY A. SWEENEY Signature: KAS Date: 8-27-02

ORIG

Parsons ES

919-557-9704

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DOC IDENT		FR FROM		M M S		STOCK NUMBER		QUANTITY		DOCUMENT NUMBER		SUPPLEMENTARY ADDRESS		FUND		DISTR BUTION		PROJ ECT		REC'D DATE		ADVCE		IN		DOLLARS		CTS																																																			
SHIPPED FROM USA ENVIRONMENTAL INC PARSON ENGINEERING 939 ROBERTS CHAPEL RD CP BUTNER NC A 919 620 8832										SHIP TO SWARTZ AND SONS INC 217 S. HOLMAN ST DURHAM NC 27701 B 919 682-0429										MADE FOR CAMP BUTNER, NC 2040-208 C										TOTAL PRICE DOLLARS		CTS																																															
WAREHOUSE LOCATION				TYPE OF CARGO		UNIT PACK		UNIT WEIGHT		UNIT PRICE		UNIT PRICE		FREIGHT RATE		DOCUMENT RATE		MAT COMB		QUANTITY																																																											
SUBSTITUTE DATA IF/WH ORIGINALY REQUESTED										PREVINT CLASSIFICATION NOMENCLATURE																																																																					
										ITEM NOMENCLATURE NON OE SCRAP 2 350# OE SCRAP 1 150#																																																																					
SELECTED BY AND DATE				TYPE OF CONTAINERS				TOTAL WEIGHT				RECEIVED BY AND DATE				INSPECTED BY AND DATE																																																															
				55 GAL FIBERBOARD DRUMS				500 LB																																																																							
PACKED BY AND DATE				NO OF CONTAINERS				TOTAL CURE				WAREHOUSED BY AND DATE				WAREHOUSE LOCATION																																																															
				3																																																																											
REMARKS																																																																															
FIRST DESTINATION ADDRESS										DATE SHIPPED																																																																					
TRANSPORTATION CHARGEABLE TO										RECEIVER'S SIGNATURE (AND DATE)										RECEIVER'S DOCUMENT NUMBER																																																											

DD Form 1349-1 JUL 87
S/N 0102-LF-013-7500

PREVIOUS EDITION MAY BE USED

DOD SINGLE LINE ITEM RELEASE/RECEIPT DOCUMENT

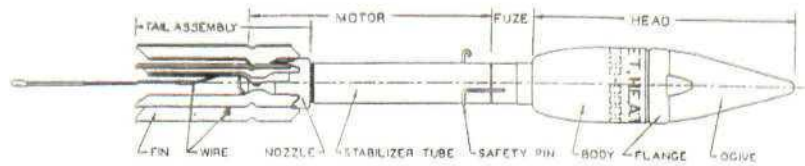
I certify that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature

Certified: Printed Name: KERRY SINGER Signature: [Signature] Date: 9-4-02

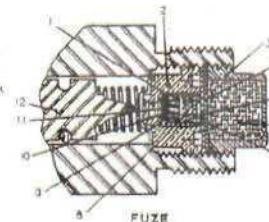
Verified: Printed Name: R. M. DAVISON Signature: [Signature] Date: 9-4-02

APPENDIX E
ORDNANCE ITEMS DESCRIPTION

Rocket, 2.36 inch HEAT, M6A1



- 1- DETONATOR CUP
- 2- DETONATOR HOLDER
- 3- BOOSTER CUP
- 4- DISK
- 5- DETONATOR-HOLDER RETAINING DISK
- 6- BOOSTER CHARGE
- 7- COLORED DETONATOR CLOSING DISK
- 8- DETONATOR PELLETT
- 9- INTERMEDIATE DETONATOR CHARGE
- 10- UPPER DETONATOR CHARGE
- 11- DETONATOR DISK
- 12- FIRING PIN



ROCKET, H.E., AT, M6A1
LOT 0000-0000, 0-00

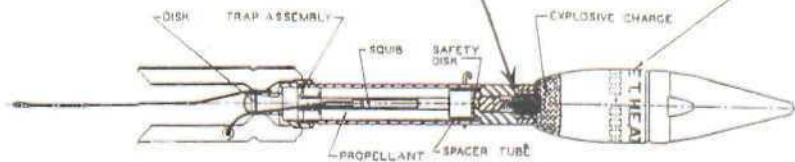
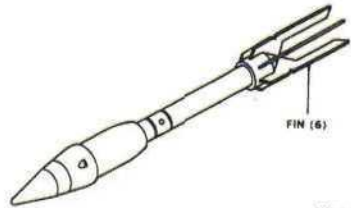
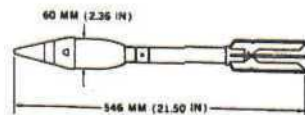


FIGURE 5. - ROCKET, H.E., AT, 2.36", M6A1



3774 (3-51)



Use :

Pill boxes, tanks, and armored vehicles are prime targets. The rocket can also be used in a stationary emplacement for demolition or as an antitank mine or booby trap. The rocket can penetrate three inches of homogeneous steel armor plate at all ranges and at angles of impact as low as 30 degrees, employing the shaped charge explosive.

Rocket, 2.36 inch HEAT, M6A1 (Con't.)

Description :

The M6 rocket consists of three principal parts: the high explosive head, the stabilizer tube, and the fin assembly.

The head consists of metal parts which are similar in function to the parts of the AT grenade head. These parts are the ogive and the body. The bursting charge is similar, both in that it is a "hollow" or a "shaped charge," and also in its composition which is mainly 50/50 pentolite with a 10/90 pentolite booster surround. The stabilizer tube consists of two principal parts: the fuze body, which threads into the union and contains the fuze mechanism, and the powder tube to which the fuze body is permanently joined, and which contains the propellant charge.

The fuze is similar in all its components to that of the AT grenade. It is, however, of heavier construction, as is the entire rocket, and contains heavier booster and detonator charges. The parts of the fuze are a spring restrained striker; a detonator of priming mixture, lead azide, and tetryl; and a booster of tetryl. The striker is held in the unarmed position prior to loading into the launcher, by a safety pin which engages an annular groove in the striker as it passes through opposed holes in the fuze body. The safety pin clips to the stabilizer tube and must be removed prior to firing of the rocket.

The powder tube or remainder of the stabilizer tube in this case serves as a housing for the propellant powder and an electric safety match or squib. The electric safety match with an igniting charge of black powder is located at the upper end of the powder tube. Two contact wires pass down through the powder tube and out through the nozzle portion of the fin assembly. The fin assembly consists of three parts: the nozzle, which is a venturi tube; the trap, which is a spider ring closing the nozzle opening above the venturi and holding the propellant powder in place; and finally, the fins themselves.

- Dimensions
 - Length, complete - 21.5 inches
 - Length, head - 8.6 inches
 - Length, body - 4.11 inches
 - Length, ogive
 - M6A1 (cone shaped) - 4.5 inches
 - M6A3 (hemispherical) - 4.56 inches
 - Length, motor tube - 6.32 inches
 - Diameter, body - 2.23 inches
 - Diameter, ogive - 2.25 inches
- Weights
 - Complete - 3.5 lbs

Rocket, 2.36 inch HEAT, M6A1 (Con't.)

Markings :

Olive drab with yellow markings.

Operation :

The safety pin is removed and the rocket inserted into the rear opening of the launcher. It is held in place by a safety catch. Firing is accomplished by establishing an electric circuit between rocket and launcher. This causes ignition of the electric safety match, the black powder ignites, and the propellant powder gases issue through the nozzle, the venturi serving to increase their velocity. This back blast serves to propel the rocket forward. There is no recoil and back blast should not affect the firer since the powder is designed to be completely burned within the launcher.

On impact with the target the striker, due to inertia, drives forward overcoming its restraining spring. It strikes and causes detonation of a detonator of priming mixture, lead azide, and tetryl, which in turn carries detonation of a tetryl booster, a 10/90 pentolite booster surround, and a 50/50 pentolite bursting charge.

Hazardous Components :

- Igniter - Black powder
- Propellant - Ballistite, 5 sticks (61.5 grams)
- Filler - 50/50 Pentolite with 10/90 Pentolite surround, 0.5 lbs

Possible Fuzes :

Fuze, Rocket, BD, M400

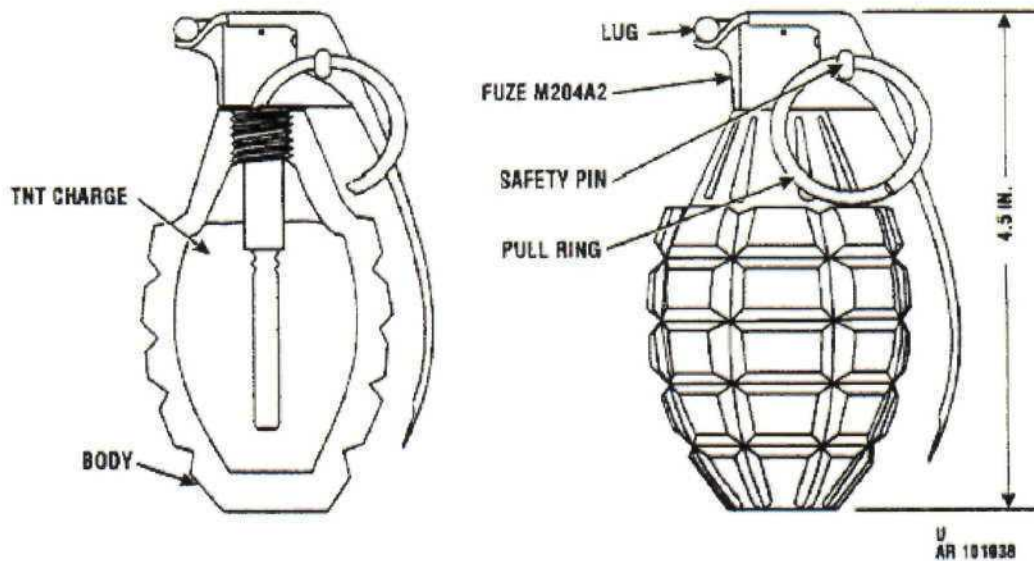
Fuze, Rocket, BD, M401

Differences Between Models :

The 2.36 inch A/T Rockets M6A1 and M6A3 are identical except for difference in the ogive and the tail assembly. In other respects the two rockets are similar, consisting of a hollow ogive crimped onto the body, a body union fitting into the base of the body with internal threads to receive the motor, and a fuze which is located in the forward end of the motor tube. The M6A1 has a conical ogive, whereas the M6A3 has a hemispherical ogive which gives better penetration by forming a stronger stand-off piece for the shaped-charge effect of the explosive. M6A4 is like the M6A3, except that it is lighter -- being made of high-strength alloys -- and also uses the Bore Safe Fuze M400. The M6A5 uses the Bore Safe Fuze M401 and has a larger propellant grain, which eliminates the safety disk.

Source: **ORDATA Online** (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
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Grenade, Hand, Fragmentation, Mk 2



Use :

The Mk 2 fragmentation hand grenade is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projections of fragments.

Description :

The Mk 2 grenade is pineapple shaped with deep serrations of its body. These serrations delineate fragmentation of the body when the grenade explodes. No safety clip is authorized for use with this grenade. The grenade body is of cast iron and contains a high-explosive filler.



Grenade fuzes M204A1 and M204A2 are pyrotechnic delay-detonating fuzes. They differ only in body construction. The body contains a primer and a pyrotechnic delay column. Assembled to the body are a striker, striker spring, safety lever, safety pin with pull ring, and detonator assembly. The split end of the safety pin has an angular spread or diamond crimp.

- Dimensions
 - Length, with fuze - 4.5 inches
 - Diameter - 2.25 inches
- Weights
 - Complete - 1.31 lbs

Grenade, Hand, Fragmentation, Mk 2 (Con't.)

Markings :

Olive drab, or olive drab with yellow band around top of fuze well. World War I era grenades were painted battleship gray.

Operation :

Removal of the safety pin permits release of the safety lever. When the safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its axis and strikes the percussion primer. The primer emits a small, intense spit of flame, igniting the delay element. The delay element burns for 4 to 5 seconds, then sets off the detonator. The detonator explodes, thus initiating the explosive charge. The explosive charge explodes, rupturing the body and projecting fragments.

Hazardous Components :

- Filler - Flaked or granular TNT, 2 ounces
- Primer - M42
- Detonator - Lead azide, lead styphnate, and RDX

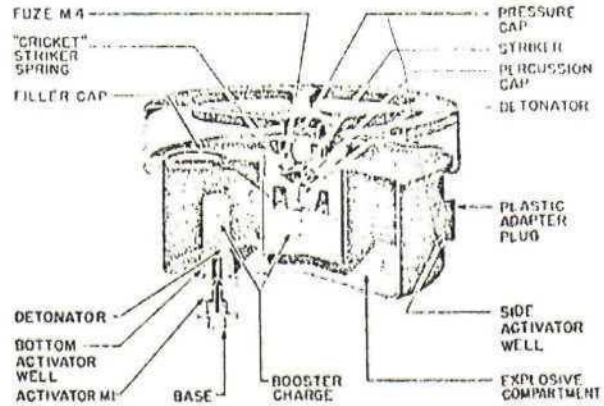
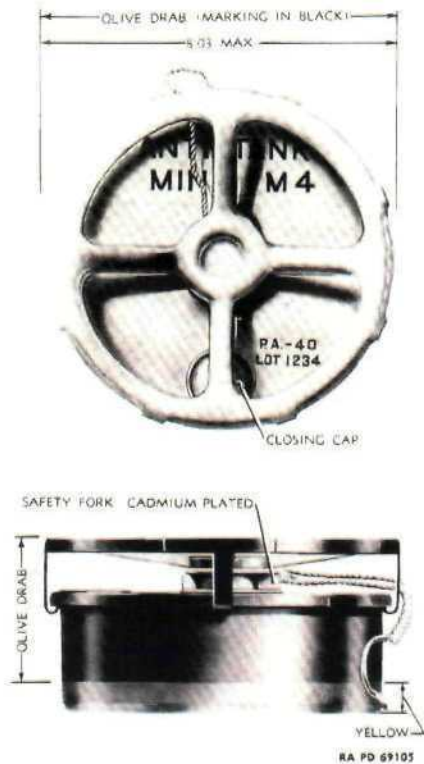
Possible Fuzes :

Fuze, Grenade, M204A1

Fuze, Grenade, M204A2

Source: [dudbusters.com](http://www.dudbusters.com) (<http://www.dudbusters.com/library/online.htm>)

LandMine, AT, M4



Use :

These are pressure-actuated, high-explosive (blast), antitank (AT) mines.

Description :

The metallic Anti Tank Mine M4 is identical to the M1A1 type except for the booster, the fuze, and the activator wells.

- Dimensions
 - Length – Not available
- Weights
 - Complete – Not available

Markings :

H.E. types are painted a lusterless olive drab with yellow base and black stencil. The H.E. fuze has a yellow striker head.

Operation :

No information on functioning available.

Possible Fuzes :

No information on fuzing.

- Sources: (1) [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)
 (2) [ORDATA Online \(http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1\)](http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1)
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Grenade, Rifle, M9/M9A1

Use :

The M9 is an earlier model of the M9A1 HEAT rifle grenade designed primarily for use against tanks and other armored or resistant targets.

Description :

The M9 weighed about 1.3 pounds, contained a shaped charge similar to the bazooka AT rocket, could penetrate 3 to 4 inches of armor, and had a maximum effective range of 250 yards (probable effectiveness about 100 yards).

- Dimensions
 - Length – 11.24 inches
 - Diameter – 2.25 inches
- Weights
 - Complete - 1.3 lbs

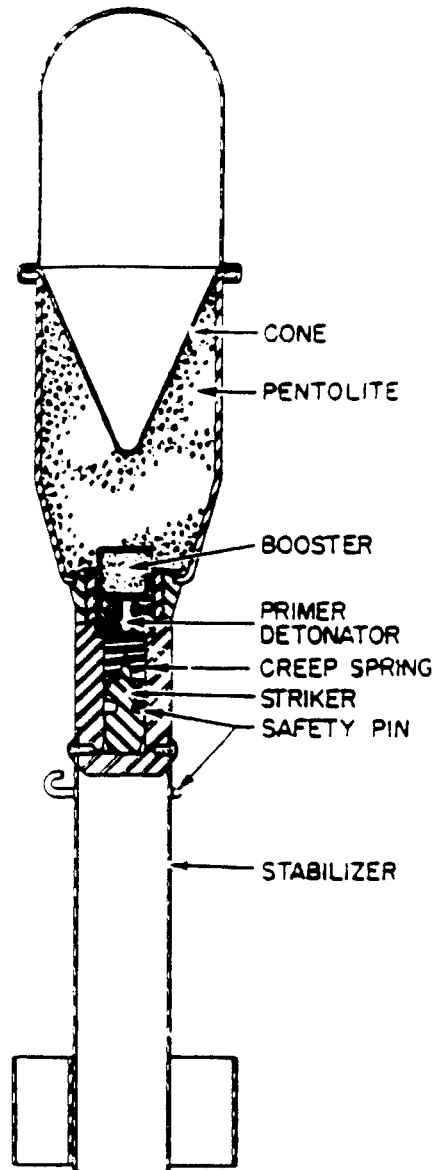
Markings :

The M9 has the same tail assembly as the M9A1, but the head is acorn shaped and is equipped with a point detonating fuze. It is slightly less sensitive than the M9A1. The safety pin of the M9 is located in the base of the grenade body instead of in the stabilizer tube. Its pull ring is secured to the body with adhesive tape. Olive drab in color.

Operation :

The grenade is fired from a rifle by means of a special launcher attachment. A special cartridge is used for propulsion. The grenade must be placed on the launcher before the safety pin is withdrawn. The safety pin is removed before firing. When the grenade is fired, set-back holds the striker away from the detonator. On impact, the striker overcomes the creep spring and hits the detonator.

Gases produced when the hand-loaded grenade cartridge is fired launch the grenade. For most of the designed rifle grenades, however, the thrust was not great enough to lift them to the desired altitude or propel them with enough force. Therefore, a propelling charge, ignited by flame from the fired cartridge, was assembled in the base of some of the rifle grenades to provide the additional boost. At the same time, the flame from the propelling charge would ignite the black powder of any time train for a time delay fuze, if needed. Fuzes were standard in signal and illumination pyrotechnic rifle grenades.



Grenade, Rifle, M9/M9A1 (Con't.)

Because of the heavy recoil generated by the grenade cartridge, the rifle (or carbine) was fired by firmly planting the butt on the ground, turned sideways to avoid damaging the stock.

Possible Fuzes :

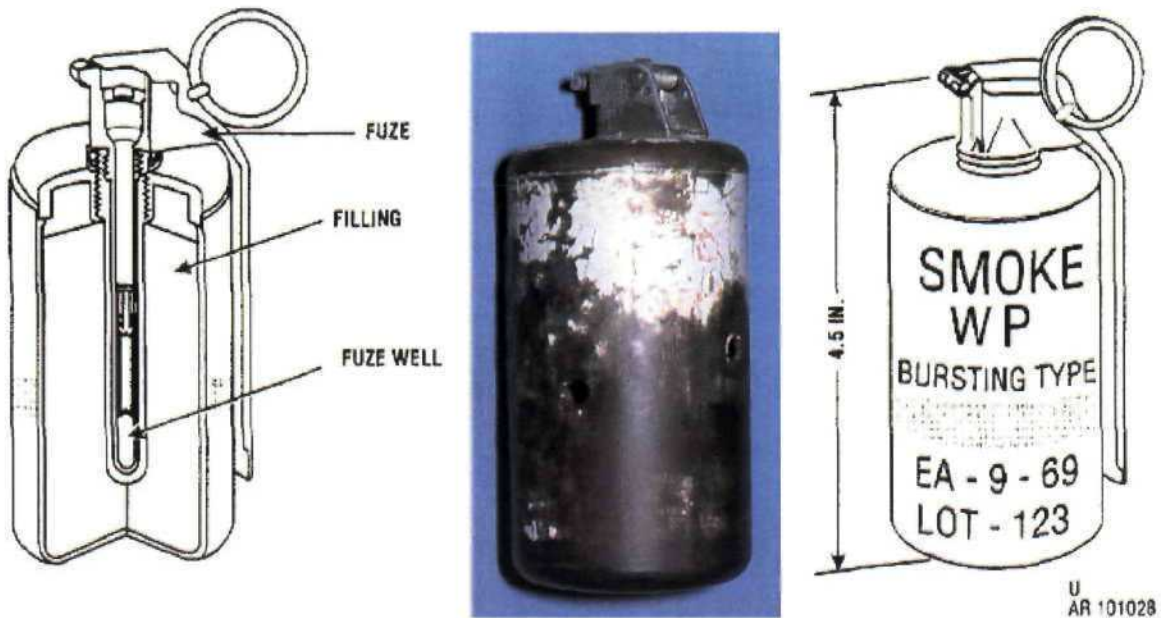
Impact fuzing

Hazardous Components :

- Filler – TNT 4 ounces

Source: **U.S. Army Technical Publications OP 1664**

Grenade, Hand, Smoke, WP, M15



Use :

WP smoke hand grenade M15 is a bursting type grenade used for signaling, screening and incendiary purposes.

Description :

The grenade body is of sheet steel and is cylindrical in shape. The body has a fuze well liner and is filled with WP.

The screening effect of the smoke is limited because WP burns with such intense heat, the smoke tends to rise rapidly. Pieces of WP will burn for about 60 seconds, igniting any flammable substance contacted. The hand grenade M206A1 and M206A2 pyrotechnic delay-detonating fuzes. They differ only body construction. The body contains a primer and pyrotechnic delay column. Assembled to the body are striker, striker spring, safety lever, safety pin with pull ring, and a detonator assembly. The split end of safety pin has an angular spread or a diamond crimp.

Safety clips are not required with these grenades.

- Dimensions
 - Length - 4.5 inches
 - Diameter - 2.37 inches
- Weights
 - Complete - 1.94 lbs

Grenade, Hand, Smoke, WP, M15 (Con't.)

Markings :

Gray with yellow band and yellow markings. The fuze is olive drab with black markings.

Operation :

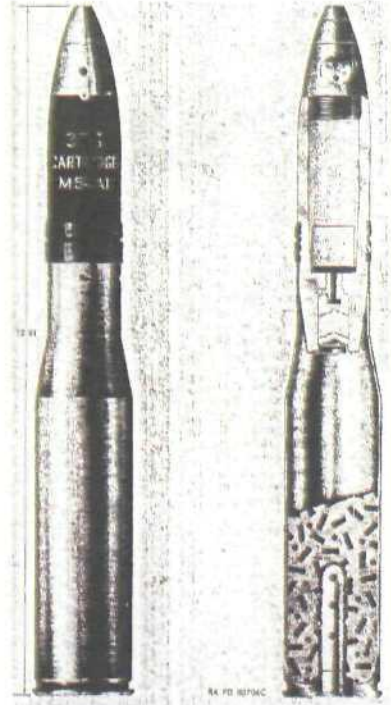
Removal of the safety pin permits release of the safety lever. When safety lever is released, it is forced away from the grenade body by a striker acting under the force of a striker spring. The striker rotates on its axis and strikes the percussion primer. The primer emits small, intense spit of flame, igniting the delay element. The delay element burns for 4 to 5 seconds, then sets off the detonator. The detonator explodes rupturing the body and exposing the WP filler to air. The WP will burn approximately 60 seconds.

Hazardous Components :

- Filler - White Phosphorous, 15 oz.

Source: dudbusters.com (<http://www.dudbusters.com/library/online.htm>)

Projectile, 37 mm, HE, M54



Use :

Used in 37 mm Antiaircraft Automatic Gun M1A2. This cartridge is used for firing against aircraft, hence is fitted with a supersensitive type of superquick fuze.

Description :

The M54 is assembled with the cartridge case M17 which is stab crimped to the projectile. The projectile consists of a relatively thin-walled body, a tetryl or composition A-3 bursting charge, PD fuze M56, and a shell-destroying tracer. The nose is threaded to receive the fuze. The "boattailed" base is bored (and counterbored) and threaded to receive the relay igniting charge assembly. The tracer assembly, consisting of an igniter charge and a tracer charge, is pressed into the counterbore.



- Dimensions
 - Length, complete - 12.81 inches, 325.4 mm
 - Length, fuzed projectile - 5.89 inches
 - Length, cartridge case - 8.75 inches
 - Width, rotating band - 0.74 inches
- Weights
 - Complete - 2.62 lbs, 1.2 kg

Projectile, 37 mm, HE, M54 (Con't.)

Markings :

Olive drab with yellow markings. Older projectiles had yellow bodies.

Operation :

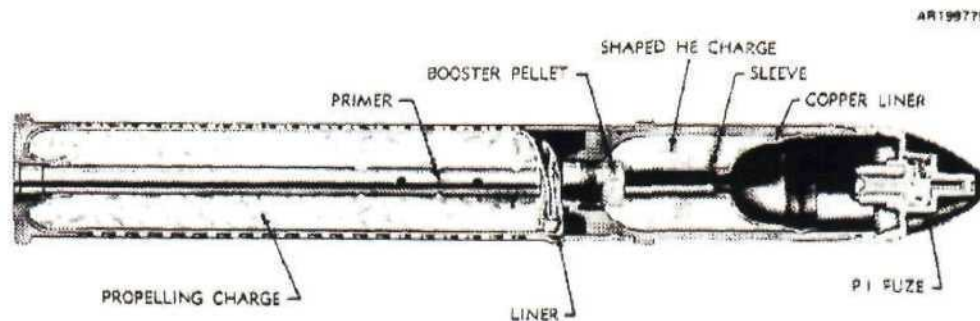
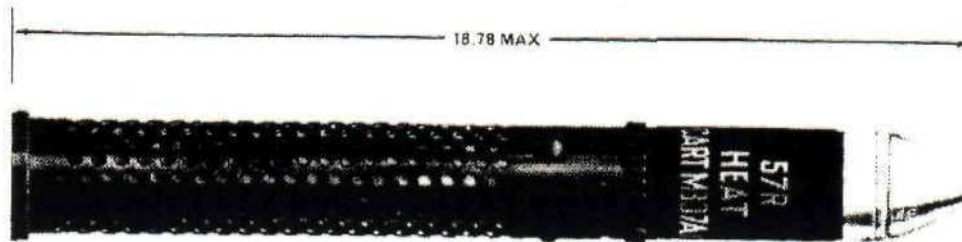
When the cartridge is fired, the burning propellant initiates the igniter charge which, in turn, ignites the tracer charge. The tracer burns with a visible trace for about 8 seconds, equivalent to a range of about 3,500 yards. As the tracer burns out, the relay igniting charge is ignited and causes the bursting charge to detonate if prior functioning has not been caused by fuze impact.

Hazardous Components :

- Propellant - FNH, 0.38 lbs
- Primer - M23A2
- Tracer - Self destroying
- Filler
 - Tetryl, 0.1 lbs
 - Composition A-3, 0.1 lbs

Source: [dudbusters.com](http://www.dudbusters.com) (<http://www.dudbusters.com/library/online.htm>)

Projectile, 57 mm, HEAT, M307A1 and M307



Use :

This cartridge is employed against armored targets and used with 57 mm Rifles M18 and M18A1.

Description :

HEAT Cartridge M307A1 includes a perforated metal cartridge case containing a plastic liner and a percussion primer and is crimped to the projectile just behind the pre-engraved rotating band of the projectile. The projectile forward cap is threaded to receive a point detonating fuze. A hemispherical copper liner crimped to the interior of the projectile forms a shaped charge to the rear and space forward to provide the standoff necessary for penetration. A steel sleeve brazed to the neck of the copper liner provides a passage from the fuze to a booster pellet in the base of the projectile. The booster pellet extends into the high explosive charge.



Projectile, 57 mm, HEAT, M307A1 and M307 (Con't.)

- Dimensions
 - Length - 18.78 inches
- Weights
 - Complete - 5.43 lbs

Markings :

Olive drab with yellow markings.

Operation :

The primer ignites the propellant when struck by the weapon firing pin, and the burning propellant generates gases to propel the projectile through the barrel. Recoil is eliminated because the design of the cartridge case permits controlled release of some gas pressure through apertures in the rifle breech block. The rotating band engages the barrel rifling to spin the projectile. The fuze functions upon impact and fires through the steel sleeve to the booster pellet. Detonation of the explosive charge collapses the copper liner and creates a focused, high velocity shock wave containing a jet of metal particles that penetrates the interior of the target.

Hazardous Components :

- Cartridge case - M30A1, M30A1B1
- Propellant - M10
- Primer - M60, M60A1
- Booster - Integral (Tetryl)
- Filler - Composition B or 50/50 Pentolite, 0.4 lb

Possible Fuzes :

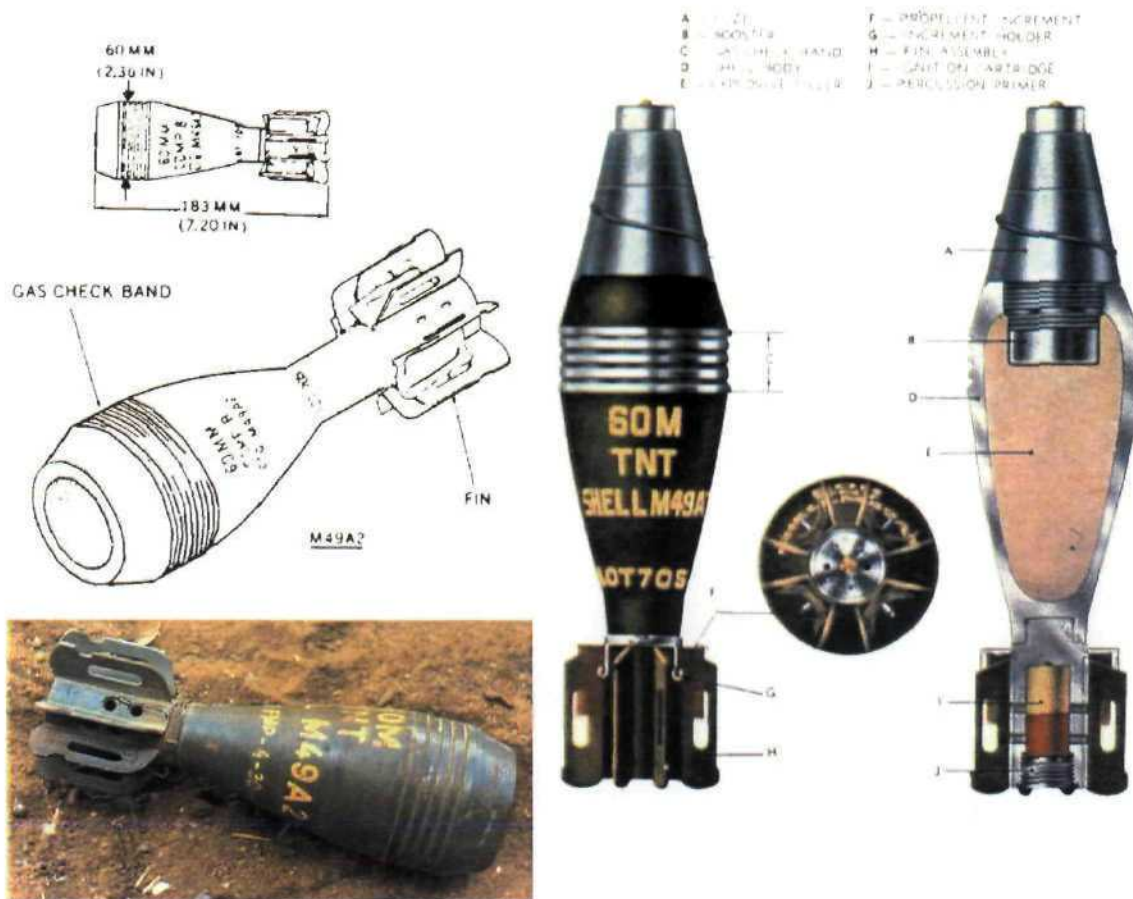
Fuze, Projectile, Point Initiating, M90

Differences Between Models :

M307 uses a paper lined Cartridge M30 and Percussion Primer M46.

Source: [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)

Mortar, 60 mm, HE, M49A2



Description :

These are fin stabilized, mortar fired, high explosive projectiles. The projectiles are painted olive drab with yellow identification markings.

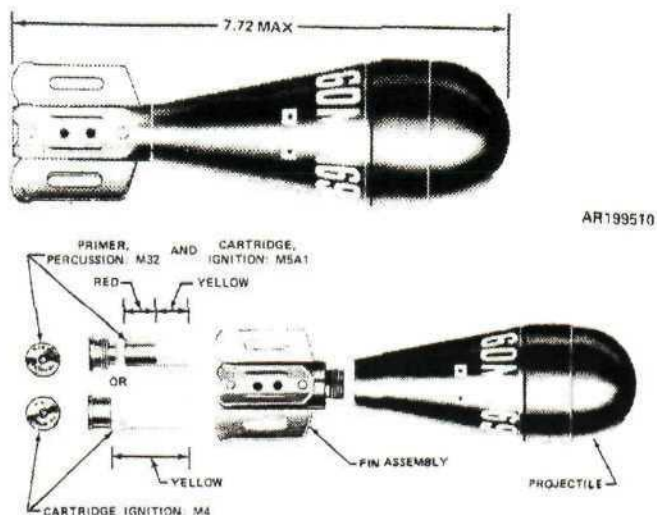
- Dimensions
 - Length – 183.00 mm
 - Diameter – 60.00 mm
 - Weight – 1.41 kg

Hazardous Components :

- Explosive Filler – Composition B, 190.00 g

Source: ORDATA Online (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
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Mortar, 60 mm, Training, M69



Use :

This cartridge is used for training in the loading and firing of 60mm mortars M2 and M19.

Description :

Unlike other mortar ammunition, the components of this round are issued separately. This facilitates replacement of damaged, worn, or expended parts. The complete round consists of an inert projectile, a fin assembly, an ignition cartridge, and a percussion primer. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly.

- Dimensions
 - Length, complete - 7.72 inches
- Weights
 - Complete - 4.43 lbs

Markings :

Black or blue with white markings.

Operation :

When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The primer detonates the ignition cartridge. Since this round is fired only at Charge 0, the gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. Since the cartridge is inert, there is no detonation upon impact and the cartridge may be recovered for reuse.

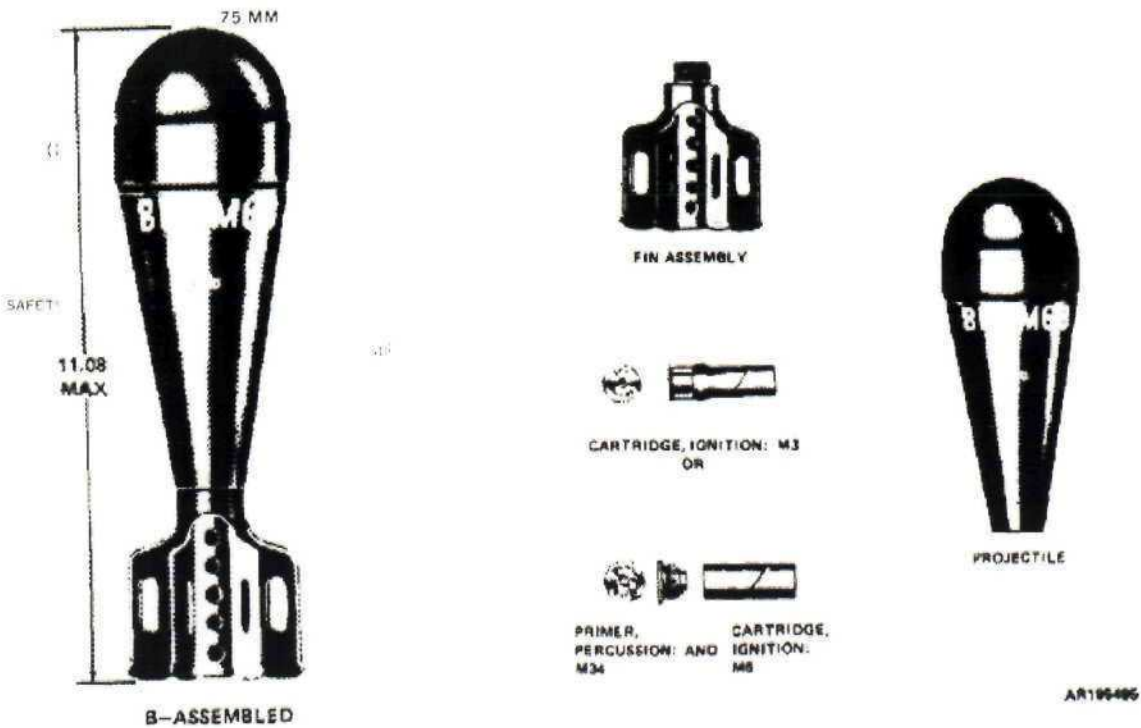
Mortar, 60 mm Training, M69 (Con't.)

Hazardous Components :

- Ignition cartridge - M4, M5A1
- Propellant - None
- Primer - M32

Sources: ⁽¹⁾ **dudbusters.com** (<http://www.dudbusters.com/library/online.htm>)
⁽²⁾ **ORDATA Online** (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
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Mortar, 81 mm, Training, M68



Use :

This cartridge is used for training in the loading and firing of the 81mm mortar.

Description :

Unlike other mortar ammunition, the components of this round are issued separately to facilitate replacement of damaged, worn, or expended parts. The complete round consists of an inert projectile, a fin assembly, and an ignition cartridge. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly.



- Dimensions
 - Length, complete - 11.08 inches
- Weights
 - Complete - 10.79 lbs

Mortar, 81 mm, Training, M68 (Con't.)

Markings :

Black with white markings. Items of later manufacture are bronze, or not painted.

Operation :

When the cartridge is loaded it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The primer ignites the ignition cartridge. Since this round is fired only at Charge 0, the gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. Since the projectile is inert, there is no detonation upon impact, and the cartridge may be recovered for reuse.

Hazardous Components :

- Ignition cartridge - M3, M6
- Propellant charge - None
- Primer - M34 percussion
- Filler - Inert

Possible Fuzes :

No information on fuzing.

Source: [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)

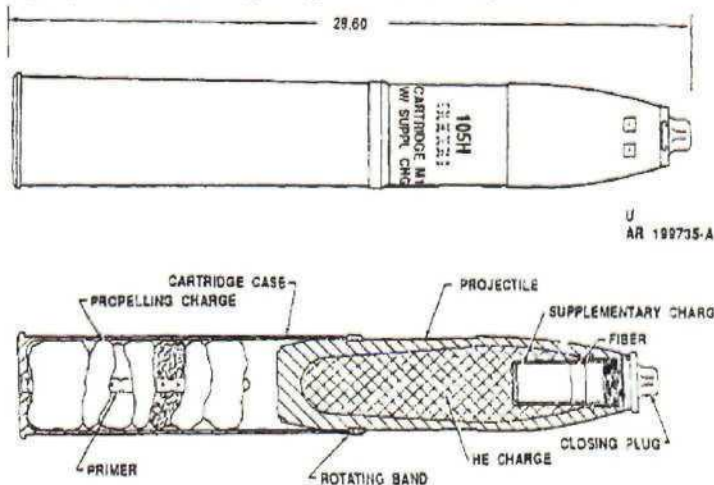
Projectile, 105 mm HE, M1

Use :

The projectile contains high explosive and is used for fragmentation, blast, and mining in support of ground troops and armored columns.

Description :

The projectile consists of a hollow steel forging with a boat tail base, a streamlined ogive, and gilding metal rotating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. The high explosive (HE) filler within the projectile may be either cast TNT or Composition B. A fuze cavity is either drilled or formed in the filler at the nose end of the projectile. This cavity may be either shallow or deep. A cavity liner, to preclude dusting of HE during transportation and handling, is seated in the cavity and expanded into the lower projectile fuze threads. A supplementary charge is placed in the fuze cavity of projectiles having deep cavities. Projectiles with shallow cavities or deep cavities con-



taining a supplementary charge use only short intrusion fuzes, PD, or MT. Those with deep cavities will accept the long intrusion proximity fuze after removing the

supplementary charge. Projectiles may be shipped with a PD or MTSQ fuze or with a closing plug. When shipped with a closing plug, a chip board spacer is assembled between the supplementary charge and plug to limit movement of the former during transportation and handling.

The cartridge case contains a percussion primer assembly and seven individually bagged and numbered propelling charge increments. The base of the cartridge case is drilled and the primer assembly is pressed into the base. The percussion primer assembly consists of a percussion ignition element and a perforated flash tube containing black powder. The seven numbered increment bags are tied together, in numerical order, with acrylic cord. These are assembled into the cartridge case, around the primer flash tube, with Increment 1 at the base of the cartridge case and Increment 7 toward the mouth of the cartridge case.

Projectile, 105 mm HE, M1 (Con't.)

- Dimensions
 - Length, with closing plug - 28.6 inches, 726.44 mm
- Weights
 - Complete - 39.92 lbs, 18.15 kg

Markings :

Olive drab with yellow markings.

Operation :

If the projectile is unfuzed, the closing plug is removed and a fuze assembled to the projectile prior to adjusting the charge and loading the cartridge into the weapon. Impact of the weapon firing pin results in the initiation of the percussion primer which, in turn, ignites the black powder in the flash tube. The flash tube provides for uniform ignition of the propelling charge producing a rapid expansion of the propellant gas which propels the projectile out of the weapon tube. Engagement of the projectile rotating band with the rifling of the weapon tube imparts spin to the projectile providing inflight stability. Projectile functioning is dependent upon the fuze used and may function on impact (instantaneous or delay), function above ground either at a predetermined height based upon time of flight or function in proximity with the target area. Fuze function detonates the HE projectile filler resulting in projectile fragmentation and blast.

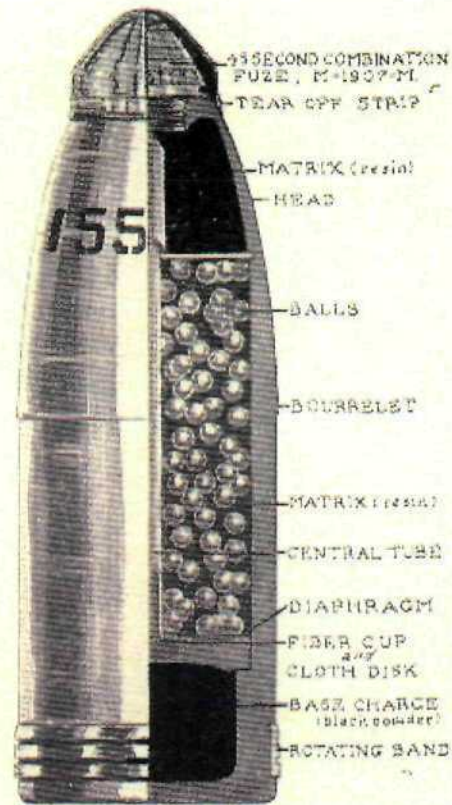
Hazardous Components :

- Fillers
 - Composition B
 - Deep cavity - 5.08 lbs, 2.31 kg
 - Normal cavity - 4.60 lbs, 2.09 kg
 - TNT
 - Deep cavity - 4.80 lbs, 2.18 kg
 - Normal cavity - 4.25 lbs, 1.93 kg
- Cartridge case - M14 Brass, M14B1, M14B3, M14B4 Steel
- Propellant - M1, 2.83 lbs, 1.29 kg
- Primer - M28A2, M28B2

Sources: ⁽¹⁾ [dudbusters.com \(http://www.dudbusters.com/library/online.htm\)](http://www.dudbusters.com/library/online.htm)

⁽²⁾ ORDATA Online (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
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Projectile, 155 mm, Shrapnel, Mk 1



Shrapnel, Mk. 1 for 155mm gun.

Use :

The 155mm shrapnel projectile was used in pre-World War II and was regarded as the most efficient type of ammunition against troops in the open. The 155mm shrapnel packed a lethal load of 800 lead balls each about a half inch in diameter in addition to an explosive charge to scatter the shot as well as fragments of the shell casing.

Description :

Each projectile was practically a shotgun which was fired, by means of the time fuze, ideally at the height which would produce the maximum effect on the enemy. At the moment of burst, the bullets shot forward with increased velocity, normally without fracturing the case. The result was a cone of bullets which swept an area generally much larger than the area made dangerous by the burst of a high explosive shell of the same caliber. The effective area at a range of 4,000 yards was about 35 yards wide and 50 yards long. In addition, some balls with equally effective velocity were scattered less densely over a zone roughly twice as wide and several times as long. The height of burst had to be adjusted by observation of the smoke puff produced at the moment of explosion, and by proper changes in the setting of the time fuze.

- Dimensions
 - Length, with fuze – 18.82 inches
 - Diameter – 5.95 inches
- Weights
 - Complete – 95 lbs

Projectile, 155 mm, Shrapnel, Mk 1 (Con't.)

Markings :

Projectile, except rotating bands, painted red with black stenciling: "155 G (or H)."

Operation :

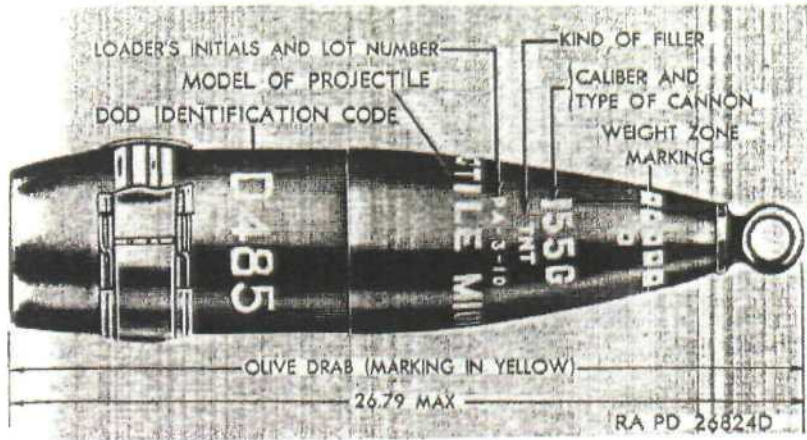
The height of burst had to be adjusted by observation of the smoke puff produced at the moment of explosion, and by proper changes in the setting of the time fuze.

Hazardous Components :

- Filler – 800 lead spheres
- Propellant – 26.2 lbs. of non-hygrosopic powder
- Igniter – 9 ounces of black powder sewed to bottom of base charge (propellant)

Source: U.S. Army Center of Military History Online (<http://www.army.mil/cmh-pg/faq/shrapnel.htm>)

Projectile, 155 mm HE, M101



Use :

This is an Army, spin stabilized, gun fired, high explosive (HE) projectile.

Description :

The projectile is painted olive drab with yellow markings.

- Dimensions
 - Length - 605.00 mm
- Weights
 - Complete - 44.00 kg

Markings :

Yellow

Hazardous Components:

Filler - TNT

Source: ORDATA Online (<http://www.maic.jmu.edu/ordata/search.asp?SearchMode=1>)
NAVEODTECHDIV, ATTN: Code 602, 2008 Stump Neck Road, Indian Head, MD, USA,
20640-5070

APPENDIX F
INSTITUTIONAL ANALYSIS REPORT

Institutional Analysis Report Former Camp Butner

Durham, Granville, and Person Counties, North Carolina

Prepared for:
U.S. Army Engineering and Support Center, Huntsville
Huntsville, Alabama

Prepared by:

Parsons
Atlanta, Georgia

July 2004

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SECTION 1

INTRODUCTION

1.1 INTRODUCTION

This Institutional Analysis Report was prepared by Parsons for the U.S. Army Engineering and Support Center, Huntsville (USAESCH), under contract number DACA87-95-D-0018. The report is prepared to support the institutional control alternative plans for actions that are included in the former Camp Butner Engineering Evaluation/Cost Analysis (EE/CA). Local and state authorities that will support and exert long-term institutional controls recommended for the former Camp Butner are presented. Each institutional control alternative is described, and the level or degree of support required for each is described.

1.2 INSTITUTIONAL CONTROLS

Institutional controls rely on the existing powers and authorities of government agencies to protect the public at large from ordnance and explosives (OE) risks. Instead of direct removal of the OE from the site, these plans rely on behavior modification and access control strategies to reduce or eliminate OE risk. This analysis documents which government agencies have jurisdiction over the former Camp Butner and assesses their capability and willingness to assert control that would protect the public at large from explosives hazards. This report also documents the mission of the government, corporate, or private landholders of lands containing ordnance to protect citizens from safety hazards under the law.

1.3 STUDY APPROACH

Parsons has prepared this detailed analysis of institutional control alternatives in accordance with guidance developed by the USAESCH. This analysis supports the development of institutional control alternative plans of action known as institutional control strategies. If these strategies are to be successful, the cooperation of local and state authorities and private interests is required. Representatives of local, state and federal government agencies with jurisdiction over the former Camp Butner have been interviewed as to their concern and capability to exercise institutional controls over the property. Other stakeholders have also been identified and interviewed to determine their commitment, interest, and involvement in institutional controls. This study includes outlines of these interviews, discussion of potential control strategies, and recommendations for specific control strategies.

1.4 STUDY OVERVIEW

1.4.1 This study outlines which agencies have jurisdiction over the former Camp Butner and assesses their capabilities and willingness to support and enforce short and long-term institutional control measures. This report is structured as follows:

1.4.2 Section 2.0: summarizes the site background, the institutional control methodology, and interviews with agencies that have site jurisdiction and/or react with current and future land users.

1.4.3 Section 3.0: describes the potential institutional control alternatives. The effectiveness, feasibility, and cost of each alternative is discussed, and management execution, and support roles are defined.

1.4.4 Section 4.0: presents the final institutional control recommendations to reduce the risk of exposure to ordnance.

SECTION 2

DESCRIPTION OF THE SITE AND EXISTING INSTITUTIONAL FRAMEWORK

2.1 SITE BACKGROUND

The former Camp Butner (the Camp) is located in Durham, Granville, and Person Counties, in north central North Carolina. The property is located 15 miles northeast of the City of Durham, North Carolina and is adjacent to Stem, North Carolina. The site consist of all areas previously under the Department of Defense control when the Camp was active from 1942 until 1947.

2.1.1 Site Description

2.1.1.1 The former Camp includes approximately 40,385 acres of land area. The approximate boundary of the Camp is defined by Range Road that, although contiguous, now has multiple names and County designations. The northern and eastern boundary follows County Road 1126. County Road 1728 (continuation of County Road 1126 into Person County) defines the western boundary and continues southward onto Cassam Road. The southern boundary roughly follows Interstate 85. For the purposes of this study, the Camp has been divided into six areas, described below.

2.1.1.2 **Area 1: Cantonment Area and Vicinity.** Area 1 is located in the southeast corner of the former Camp. This area contains the town of Butner North Carolina, and two State hospitals, the John Umstead Hospital, and the Murdock Center. Residential areas and several schools, Butner-Stem Elementary and Middle, are located within the Town of Butner, NC. The remaining portion of the area is wooded. Area 1 is located within Granville County, however it is under the jurisdiction of the State of North Carolina.

2.1.1.3 **Area 2: Ammunition Storage Area and Dump.** Area 2 is a square-shaped area that lies on the southern boundary of Area 4. The area is wooded and located on property controlled by the State of North Carolina Wildlife Resources Commission. A road leading to Holt Reservoir dissects the Area 2. There are no residential homes within the area. Area 2 is located within Granville County, however the property is under the jurisdiction of the State of North Carolina.

2.1.1.4 **Area 3: Grenade Training Ranges.** Area 3 is a square-shaped property located within Area 5. The area is composed of pasture land owned by Umstead Farm, a North Carolina State University Dairy Research farm. Area 3 is located within Granville County, however the property is under the jurisdiction of the State of North Carolina.

2.1.1.5 **Area 4: Ammunition Training Ranges and Impact Areas.** Area 4 composes the northern portion of the former Camp. The majority of the area is in private ownership and is utilized for agricultural purposes. Most tracts in Area 4 are in excess of 200 acres. A large portion of the land is undeveloped and forested. Private residences are located across the area. Timber harvesting is a common practice throughout the area. Approximately 75% of Area 4 is located in Granville County, the remaining portion is located within Person County.

2.1.1.6 **Area 5: Remaining land.** Area 5 composes the southern portion of the site. The majority of the property within the area is under public ownership. Tenants within the area include Umstead Farm, a North Carolina State University Dairy Research farm, Butner Beef Cattle Field Lab, a North Carolina State University Beef Cattle Feed Research farm, four Federal prisons operated by the United States Department of Justice, Federal Bureau of Prisons, and land under the stewardship of the North Carolina Wildlife Resources Commission. Most of this area (95%) is located within Granville County, the remaining portion is located in Durham County. This property is under the jurisdiction of the State of North Carolina.

2.1.1.7 **Area 6: National Guard Training Center.** Area 6 is located in the west central portion of the former Camp. The land is owned by the State of North Carolina National Guard (NCNG) and is utilized as a training center. Approximately 50% of the NCNG property is located within Durham County, and accounts for the majority of the former Camp within the County. The remaining portion of the property is located in Granville County.

Table 2.1 Camp Butner Land Use

Area of Interest (per Final Workplan)	Size (acres)	Current Owner	Current Land Use	Zoning / Future Land Use
1	3,300	Town of Butner	Residential, Institutional	Residential, Institutional
2	7	State of North Carolina	State Forest	State Forest
3	5	State of North Carolina	Agriculture, Forestry	Agriculture, Forestry
4	21,950	Various private land owners	Residential, Forestry, Agriculture	Residential, Forestry, Agriculture
5	10,372	State of North Carolina	Agriculture, Institutional	Agriculture, Institutional
6	4,750	State of North Carolina	NCNG Training Center	NCNG Training Center

2.1.2 Site History

2.1.2.1 The Camp Butner Training Center was established in 1942 and used primarily as a training and cantonment facility. The Camp was first established for the training of infantry divisions and miscellaneous artillery and engineering units. Approximately 15 training ammunition ranges were present. One range encompassed approximately 23,000 acres and was used for live-fire ammunition training. Other ranges included a grenade range, a 1000-inch range, a gas chamber, and flame-thrower training pad. The ordinance used at the Camp included rockets, mortars, grenades, artillery rounds ranging from .22-caliber through 240mm, and various initiating and priming materials used as obstacles and mine field clearing devices. An ammunition storage area was also located on the Camp.

2.1.2.2 In, addition to infantry training, the site was the location of one of the Army's largest general and convalescent hospitals and the War Department's Army Redeployment Center. The Camp was designed to house up to 40,000 troops. Prisoners of War were housed at the Camp in September 1943.

2.1.2.3 On January 31, 1947 the War Department declared Camp Butner excess. At the time, the Federal government was negotiating with the State of North Carolina for a lease on the hospital. On November 3, 1947, the State purchased the hospital and 1,600 acres of the former cantonment area to be used for various projects and agricultural development. The North Carolina National Guard was given 4,750 acres of the former camp for training purposes. Much of the remaining land was sold back to the original owners; however, covenants were placed in the property deeds restricting the use of the land to surface use only.

2.1.2.4 During March 1990, the U.S. Army Corps of Engineers (USACE) conducted a field inspection and archive search to determine the status of the former Camp Butner. Historical inspections reports of restricted areas and dedudding reports were reviewed and numerous interviews were conducted. Findings of the inspection and archive search indicate that ordnance had been found within the former ranges. Fort Bragg explosive ordnance disposal (EOD) has been the responding team. Other findings indicated the largest round used at the Camp was a 155mm projectile, three tear gas chambers existed at the facility and Lighting Lake may have a military trash dump beneath it. Interviews with personnel from the Federal Correctional Institute indicated no reports of ordnance having been found on their facility. A final ownership map of the Camp was obtained showing dedudding operations as of April 6, 1950.

2.1.3 Environmental Setting and Ecology

2.1.3.1 The Camp is located within the Durham Sub-basin. The predominate bedrock formation is Arkosic Sandstone. The sandstone is tan in color, medium to very coarse grained, and contains mica. The sandstone is Triassic Age and is an acidic bedrock material. The site lies within the White Store-Creedmoor soil association and is characterized by gently sloping to moderately steep, moderately well drained (sandy loam) soils with a subsoil of firm clay.

2.1.3.2 The region is characterized by rolling topography with rounded hills and long, low ridges. The undeveloped hills are covered with hardwoods and various pines. The understory is predominantly dogwood, poison ivy, Christmas fern, and Japanese honeysuckle. Lake Butner (the source of potable water for the City of Butner; a.k.a. Holt Reservoir) and adjacent Lightning Lake are located on the south end of the Camp. The Camp also contains several streams and tributaries.

2.1.3.3 The area is subjected to warm, humid summers and mild winters. The lowest mean temperature of 28 °F occurs in January and the highest mean temperature of 90 °F in July. The annual average rainfall is approximately 47 inches with an average monthly rainfall between 3 to 4 inches.

2.1.3.4 The Federal and State agencies identified the following information concerning threatened and endangered species:

- The USFWS lists the bald eagle (*Haliaeetus leucocephalus*) as endangered in Durham and Granville Counties. The dwarf wedgemussel (*Alasmidonta heterodon*) is also listed as endangered by the USFWS in Granville County. There are no federally listed threatened or endangered species in Person County.
- The North Carolina Natural Heritage Program lists the bald eagle (*Haliaeetus leucocephalus*) as endangered in Durham County. The triangle floater (*Alasmidonta undulata*), Atlantic pigtoe (*Fusconaia masoni*), yellow lampmussel (*Lampsilis cariosa*), green floater (*Lasmigona subviridis*), and squawfoot (*Strophitus undulates*) are listed as threatened or endangered in Durham, Granville, and Person Counties. Granville County also lists the dwarf wedgemussel (*Alasmidonta heterodon*), brook floater (*Alasmidonta varicosa*), and the yellow lance (*Elliptio lanceolata*) as threatened or endangered.

2.1.4 Archeological / Historical Resources

2.1.4.1 Camp Butner has been subjected to at least one previous cultural resources survey. In December 1994, Greiner, Inc., of Raleigh, North Carolina (Klein and Brown 1995) conducted an archaeological survey of nine historic farm sites on Camp Butner that had been previously identified by NCNG. This survey indicated that all nine of the resources were potentially eligible for inclusion on the National Register of Historic Places (NRHP). The sites were recorded and assigned state site numbers (31DH619 through 31DH624, 31GV204 through 31GV206). During the survey, two additional historic sites were identified but not assigned site numbers, as they required additional survey work. It was not stated in the report if artifacts were collected. All nine of these sites, as well as the two sites that were not assigned state site numbers, are subject to Federal laws and regulations governing their evaluation and preservation, if necessary. World War II era structures were also noted during the archaeological survey at Camp Butner; however, there is no record of an architectural survey conducted for the facility.

2.2 METHODOLOGY

2.2.1 Response Strategies

2.2.1.1 There are three general categories of response strategies to ordnance remaining on sites formerly used for training and firing practice. These included:

- Removal,
- Access Control, and,
- Behavior Modification.

2.2.1.2 Ideally, identification and removal of all ordnance would always be preferred but this goal is neither technically or financially feasible. Therefore, strategies must be defined to alert the population within and around the site that will be potentially affected by the presence of ordnance and protect them as much as possible from ordnance accidents. These strategies, Access Control and Behavior Modification, may be utilized in conjunction with a removal action or in the absence of a removal action, depending on a variety of evaluation parameters.

2.2.1.3 Access control and behavior modification are defined as institutional control response strategies or institutional controls. These strategies require local cooperation, responsible land-use control, and/or police powers for enforcement. These strategies are inherently non-federal and require a high level of community involvement. Institutions, defined as local and state governmental agencies and other organizations that can assist, are the vital elements needed to implement any of the recommended institutional controls. Assessment and development of institutional controls, like all response plans, starts with data collection, including obtaining responses to the following questions:

- What institutions hold control over the site?
- What authority do they have?
- Do they have specific responsibility in land-use control and/or public safety?
- What capabilities do they have?
- What resources do they have?
- Are they willing to play a role?

2.2.2 Analysis Methodology

The methodology used to analyze potential institutional control strategies for reducing the ordnance-related risk at the former Camp included the review of the government institutions and non-government entities that have some form of jurisdiction or ownership of the properties within the site. Once jurisdictions and ownership were determined, representatives of these entities were contacted and interviewed. The procedure is defined below:

- Based on knowledge of the area, discussions with USACE, and preliminary telephone calls to the various institutions, a list of organizations and major landowners was outlined.
- Onsite and telephone interviews were conducted with representatives of institutions that have jurisdiction. The governmental agencies exercising control over the land are the State of North Carolina, North Carolina State University, Durham, Granville and Person Counties, and the Town of Butner, NC. Various state, county, and city departments were contacted individually with the intent to determine the degree of jurisdiction and to assess the capability and willingness to assert control over the land containing ordnance hazards.
- Basic data was collected on forms provided by USACE.
- An Institutional Summary was produced for each institution selected for review.

2.3 SCOPE OF WORK/SELECTION CRITERIA

2.3.1 Interview Selection

Actual interviews were conducted on June 25th thru 29th, 2001. Follow-up phone interviews and additional information requests were made in the weeks that followed to finalize the recommendations in the report. A set of criteria was utilized in the selection of agencies to be interviewed. These organizations and agencies should:

- Have jurisdiction as a public agency.
- Have primary concern for ordnance hazards because of ownership or use.
- Have technical capability for access control and/or behavior modification strategies.
- Provide a variety of sources (i.e., print, and visual) that would provide complete coverage/contact with users.
- Repeat the same or different strategy at a later date.
- Have authority to assist in implementation of institutional controls.
- Have responsibility for land-use control and/or public safety.
- Have capacity to conduct public information and education activities.
- Expressed an ability and willingness to assist.

2.3.2 Interview Categories

After identifying a list of agencies, individuals representing these agencies and groups were contacted and interviews scheduled. During the interview process, additional organizations and individuals that were relevant to the institutional control process were identified, and interviews were held with these additional contacts. The interview process is summarized in Section 2.4.

2.4 INTERVIEW SUMMARY

2.4.1 Interview Questions

Fifteen topic areas concerning the interviewee and the organization were represented. The following information was requested:

- Name and Title of Respondent.
- Name and Address of Organization.
- Type and Purpose of Organization.
- Basis for Creation of Organization.
- Jurisdictional Level of Organization.
- Power and/or Authority of Organization.
- Geographic Area Served by Organization.
- Organization's Concern for Public Safety and Related Land Management.
- Organization's Activities.
- Organization's Work Categories and Subjects.
- Organization's Contacts.
- Organization's Regulations for Public Safety
- Organization's Stake in Property.
- Organization's Jurisdiction over Other Organizations.
- Timeframe for Future Development by the Organization.
- Miscellaneous Interview Information.

2.4.2 Interview Results

The request for information identified above was included on a survey form presented to the interviewees. The responses to the returned survey questionnaire are summarized in this section. Appendix B includes the completed survey forms. These forms were filled out by the interviewees. Key interviews included:

Durham County

Durham County Sheriff Department

Name: Wes Crabtree

Title: Chief Deputy Sheriff

Address: P.O. Box 170, Durham, NC 27710

Type of Organization: Local Government

Purpose of Organization: Law Enforcement

Basis for Creation of Organization: State Law

Jurisdictional Level of Organization: Durham County

Power and/or Authorities: Enforce laws and make contracts

Granville County

Granville County Fire Department

Name: Douglas P. Logan

Title: Emergency Management Coordinator

Address: P.O. Box 598, Oxford NC 27565

Date: June 28, 2001

Type of Organization: Local Government

Purpose of Organization: Emergency and Disaster preparedness response, recovery and mitigation

Basis for Creation of Organization: State Law, local law

Jurisdictional Level of Organization: Granville County

Power and/or Authorities: Enforce laws and receive gifts

Granville County Sheriff Department

Name: Davis T. Smith

Title: Sheriff

Address: 143 Williamsboro Street, Oxford, NC 27565

Date: June 15, 2001

Type of Organization: Local Government

Purpose of Organization: Serve and protect citizens, Serve criminal and civil papers, Enforce laws of North Carolina

Basis for Creation of Organization: Local law

Jurisdictional Level of Organization: Granville County

Power and/or Authorities: Enforce laws

Granville County Development Services County Planning Division

Name: Scott Phillips

Title: Planning Director

Address: P.O. Box 877, 122 Williamsboro Street, Oxford NC 27565

Date: June 28, 2001

Type of Organization: Local Government

Purpose of Organization: Regulate building construction and land use

Basis for Creation of Organization: State Law, local law

Jurisdictional Level of Organization: Granville County

Power and/or Authorities: Land use controls, enforce laws

Granville County Assessors Office

Name: Danny Fautte

Title: Tax Administrator

Address: P.O. Box 219, Oxford NC 27565

Date: June 28, 2001

Type of Organization: Local Government

Purpose of Organization: To assess and collect taxes

Basis for Creation of Organization: Local Law
Jurisdictional Level of Organization: Granville County
Power and/or Authorities: Taxing power

Granville County School System

Name: Ernest Thompson
Title: Assistant Superintendent Granville County Schools
Address: Delacroix Street, Oxford, NC 27565
Date: June 27, 2001 (via fax)
Type of Organization: State Government
Purpose of Organization: NA
Basis for Creation of Organization: State Law and local law
Jurisdictional Level of Organization: Granville County
Power and/or Authorities: NA

Person County

Person County Planning and Zoning Department

Name: Paula Murphy
Title: Planning Director
Address: 20A Court Street, Roxboro, NC 27573-5597
Date: June 26, 2001
Type of Organization: Local Government
Purpose of Organization: To administer zoning ordinance, subdivision ordinance
Basis for Creation of Organization: NA
Jurisdictional Level of Organization: Person County
Power and Authorities: Land use control.

Person County Assessors Office

Name: Russell Jones
Title: Tax Administrator
Address: P.O. Box 1116, Roxboro, NC 27573
Date: June 27, 2001
Type of Organization: Local Government
Purpose of Organization: Property tax
Basis for Creation of organization: State Law
Jurisdictional level of Organization: Person County
Power and Authorities: Taxing power

Person County School System

Name: Brenda Long
Title: Community Schools Coordinator
Address: 304 South Morgan Street, Roxboro, NC 27573
Date: June 27, 2001
Type of Organization: School System
Purpose of Organization: Education

Basis for Creation of organization: Federal Law, State law
Jurisdictional Level of Organization: Person County
Power and Authorities: Schools/Education

Person County School System

Name: Leon Hamlin
Title: Administrative Assistant
Address: 304 South Morgan Street, Roxboro, NC 27573
Date: June 27, 2001
Type of Organization: School System
Purpose of Organization: Education
Basis for Creation of Organization: Federal Law, State Law
Jurisdictional Level of Organization: Person County
Power and Authorities: Schools/Education.

Town of Butner

Butner, North Carolina

Name: Thomas McGee
Title: Town Manager
Address: 205C West E Street, Butner, NC 27509
Date: June 28,2001
Type of Organization: State Government
Purpose of Organization: Operate the Town of Butner for the State of North Carolina
Basis for Creation of Organization: State Law
Jurisdictional Level of Organization: Town of Butner
Power and Authorities: Make contracts, sell bonds, land use control, enforce laws, zoning

Butner, North Carolina

Name: Rufus Sales
Title: Public Safety Director
Address: 611 Central Avenue, Butner, NC 27509
Date: June 26,2001
Type of Organization: State Government
Purpose of Organization: Provide police and fire protection
Basis for Creation of Organization: State Law
Jurisdictional Level of Organization: Granville and Durham Counties
Power and Authorities: Enfore laws

North Carolina Department of Health and Human Services, Murdoch Center

Name: Scott Elliott
Title: Business Manager
Address: 1600 East C Street, Butner, NC 27509
Date: June 26,2001

Type of Organization: State Government
Purpose of Organization: Residential and habilitative service for adults with mental retardation
Basis for Creation of Organization: State Law
Jurisdictional Level of Organization: State of North Carolina
Power and Authorities: Make rules, purchase property, make contracts, receive gifts

North Carolina Department of Agriculture and Consumer Services, Umstead Farm

Name: Reid Evans
Title: Superintendent
Address: 2652 Old 75, Butner NC 27509
Date: June 25,2001
Type of Organization: State Government
Purpose of Organization: Agricultural Research
Basis for Creation of Organization: State Law
Jurisdictional Level of Organization: State of North Carolina
Power and Authorities: Make rules, purchase property, make contracts, receive gifts

North Carolina Department of Agriculture and Consumer Services, Butner Beef Cattle Field Lab.

Name: Dean Askew
Title: Superintendent
Address: 8800 Cassam Road, Bahama NC 27503
Date: June 27,2001
Type of Organization: State Government
Purpose of Organization: Feed research for beef cattle
Basis for Creation of Organization: North Carolina State University
Jurisdictional Level of Organization: State of North Carolina. Granville County, Durham County
Power and Authorities: Land use controls

North Carolina Department of Health and Human Services, John Umstead Hospital

Name: Al Judd
Title: Hospital Engineer
Address: Butner, NC 27509
Date: June 26,2001
Type of Organization: State Government, State Psychiatric Hospital
Purpose of Organization: Treat people with mental illness
Basis for Creation of Organization: State Law
Jurisdictional Level of Organization: State of North Carolina
Power and Authorities: Make policy

SECTION 3

INSTITUTIONAL CONTROL ALTERNATIVES

3.1 INTRODUCTION

3.1.1 Risks related to ordnance hazards may be managed through conventional removals, access controls, public awareness programs, or a combination of these strategies. Ordnance hazards are associated with the following three causative factors:

- Presence of Ordnance,
- Access to Ordnance, and
- Behavior with Ordnance.

3.1.2 If there is no presence of ordnance on the site, then there is no possibility of an ordnance-related accident. If ordnance exists on-site, but access is restricted, then there will be no accident. Even if ordnance exists on-site and people have access to the ordnance, if their behavior is appropriate, then it is unlikely that an accident would occur. An accident requires all three events or circumstances to be present. An accident will not happen if any one of the causative factors is missing. Each factor provides the basis for a separate accident prevention strategy. The presence of ordnance can be modified by removal; access to ordnance can be modified by prevention; and behavior can be modified by information and education. Access control and behavior modification through public awareness are defined as institutional controls.

3.1.3 Discussions of the alternatives and recommendations presented in this Institutional Analysis report are based on the assumption that informing and educating the public of the potential risks associated with the ordnance remaining on the former Camp Butner will reduce the possibility of injury. However, it is also understood that public awareness may incite a reverse reaction from a small segment of the population that may view the dangerous handling of ordnance as an adventure. This possibility is accepted and it is understood that there will always be some portion of the populace who refuse to heed warnings or follow directions.

3.2 PHYSICAL REMOVAL

Although physical removal is a means of reducing risk, it is not an institutional control alternative and will not be detailed in this report. Physical removal, including its effectiveness, implementability and cost are detailed in the EE/CA, which may be viewed at www.projecthost.com.

3.2.1 Removal and Human Behavior

There are many instances where removal of surface or subsurface ordnance is the appropriate and recommended alternative for reduction of the risk associated with ordnance hazards. The removal produces a condition where there is less ordnance on site. If human behavior is the same before and after the removal, then the risk is substantially reduced. However, if the removal results in a behavior that is less cautious or less prepared than the behavior prior to removal, then a situation exists where risk may even be intensified. Therefore, it is recommended that any removal action be augmented by institutional controls that include behavior modification strategies such as public education and information programs.

3.2.2 Removal Responsibility

Contracted removal actions to reduce the risk of exposure to ordnance will be coordinated through the Army Corps of Engineers (USACE). This agency will be responsible for preparation and negotiation of scopes of services, fees, and schedules, and for retaining organizations skilled in the removal of ordnance. Also, the USACE will be responsible for coordinating public information to local government and the public at large concerning the removal activities being performed. Day-to-day operations are executed and managed by the contractor in accordance with a Work Plan and Health and Safety Plans. These are prepared by the contractor and are approved by the USACE prior to the start of work.

3.3 ACCESS CONTROL

Access controls limit the use of properties which may contain ordnance. This can be accomplished by implementing various restrictions or dedicating the property to limited allowable uses. The target strategy is to remove the human element from the chain of events that could lead to an accident. Access control can be facilitated in the form of signage, fencing, land-use restrictions, and/or regulatory control.

3.3.1 Signage

Posting of signage is completed to inform people that entry is prohibited or that activities within the property are restricted in some manner. Defiance of these restrictions may be subject to disciplinary legal action. The use of signage is based upon the concept of respect for property rights. Trespass laws are the key element of enforcement together with cooperation between landholders, law enforcement, and the general public. These laws are encouraged by other elements of the plan. The link between not trespassing and explosive safety must be made. Signs informing the public of potential dangers could be created and posted around the area to prevent or discourage entry or discourage physical contact with ordnance. Signage is only effective if the signs are well placed and maintained.

3.3.2 Fencing

As with signage, fencing is one element of a plan that is dependent upon the concept of respect for property rights. Trespass laws are the key element of enforcement. They

are dependent upon cooperation between landholders, law enforcement, and the general public. As with signage, the plan must include other elements that reinforce the link between not trespassing and explosive safety. Fences provide a physical barrier to inadvertent entry. Therefore, it may be easier to enforce trespass restrictions if fencing is present.

3.3.3 Land Use Restrictions and Regulatory Control

Land use restrictions and regulatory controls provide the access control that can be exercised over areas where ordnance is present. Through these controls, local governments can dictate the type of development that will occur on a site, and the methods in which that development occurs. Higher development intensities result in increased access to the area, which increases the potential for ordnance-related accidents.

3.3.4 Effectiveness

3.3.4.1 Signs and Fencing

3.3.4.1.1 Signs and fencing are not considered effective institutional controls. They are valid for use only in reducing the risk of exposure to potential accidents involving ordnance through restraint and provision of information based on the concept of property rights. However, fencing does not keep out those who are determined to enter the property. The posting of signs along the perimeter and within the interior of the property provides “on the spot” warnings of the potential presence of ordnance and the hazards of physical contact. Signs however, become convenient targets for vandalism and must be regularly maintained to be effective. Because of the large area encompassed by the site and the thousands of individual ownerships indicated in approved development plans, the posting of signs would be of little value.

3.3.4.1.3 Fencing is presently used in the former Camp. In Area 4, fencing is used as a means of containing livestock and to mark property boundaries. In Area 5, fencing is used to contain livestock, restrict access to the North Carolina State University Dairy Research farm and Beef Cattle Feed Research farm, and to control access around properties operated by the Federal Bureau of Prisons. “No Trespassing” signs exist along the perimeter of the NCNG and NCSU property. No other warning signs were seen during the site inspection. Signs and fencing do not exist that directly address ordnance hazards. The large number of private properties concentrated in Area 4 do not have standard fencing around each property. The placement of fencing to restrict access for all of the private properties would be cost prohibitive and difficult to implement. Because of the large area encompassed by the site and the thousands of individual ownerships, the posting of signs would be of little value.

3.3.4.2 Land Use Restrictions and Regulatory Control

3.3.4.2.1 The former Camp is under the jurisdiction of Granville, and Person Counties, the Town of Butner, North Carolina, and the State of North Carolina. The lands comprising the former Camp are regulated by NCNG, and each land use and zoning plan of the respective jurisdiction. Presently, all lands under the jurisdiction of the NCNG and the Town of Butner, NC are zoned for military, institutional or residential

use. Lands residing in Granville County have an agricultural zoning of R-40. Lands in Person County have a zoning code of rural conservation. Both of these zoning codes have few restrictions for development. There are no existing regulations specifically responding to the concern for ordnance hazards on the former Camp property.

3.3.4.2.2 The existing planning and zoning restrictions and its permitting process are valuable institutional control tools. Zoning regulations dictate the type of uses that can occur within the site and therefore the extent of the public's access to the properties. It is reasonable to recommend that the future land uses and existing zoning be revised to prohibit certain development types and to negotiate or restructure current developments. Since the majority of the land is expected to remain zoned for rural or agricultural use, limiting a further increase in density provides considerable control over the number of users of the land and less ordnance-related risks.

3.3.5 Implementation

3.3.5.1 The installation of fencing and signage to limit access to the former Camp is not feasible because of the size of the site and the vast number of private properties.

3.3.5.2 Land use restrictions or rezoning to limit public use and reduce access to the land is recommended for areas of high ordnance and explosive risk currently slated for residential development. For lands already developed, rezoning is not recommended. Much of these lands have been developed for residential, forestry and agricultural uses that provide some access to the general public. However, although some minor expansion is foreseen, land use is expected to remain the same at the former Camp.

3.3.6 Cost

If fencing and signage are implemented for access control, USACE will coordinate with individual property owners and provide the initial funds for implementation. Maintenance and replacement costs in subsequent years may be provided by USACE or become the responsibility of local government.

3.3.7 Management, Execution, and Support Roles

There would be no additional management, execution or support roles required.

3.4 PUBLIC AWARENESS PROGRAMS

Behavior modification is dependent upon the awareness and personal responsibility of the site user. If the ordnance exists and there is open access to it, there is no risk if the behavior is appropriate. For behavior to be appropriate, one must understand the situation and voluntarily react in a responsible manner. The power of the federal government is limited in any situation where local enforcement is available. Therefore, the local authorities must be convinced that the risks are sufficient to warrant their participation. The concept of behavior modification through public awareness extends to agencies that have jurisdiction over the site. The governing jurisdictions have a major responsibility to notify all current and future property owners of the potential for ordnance hazards at the former Camp. Raising public awareness for the hazards that

exist within the former Camp can be facilitated in a variety of ways. Modification of behavior through public awareness is essentially an education/information process. Various techniques considered as institutional controls are listed below.

- **Land Use Controls** – Land use restrictions that limit the use of the land based on acceptable behavior of users;
- **Notice** – Notifications during tax bill distribution, deed restrictions, property transfers, and permitting;
- **General Printed Media** - Including brochures, fact sheets and news articles;
- **Visual and Audio Media** - Including videotapes and announcement in local television programs;
- **Education Classes** - Including ordnance identification, safety presentations to various audiences, and preparation of packages for administrators and public officials;
- **Exhibits/displays**;
- **Internet Website**; and
- **Ad hoc Committees**.

3.4.1 Land Use Controls

Behavior modification can be facilitated through land use controls. The planning offices have the authority to restrict uses of property in the public interest. These land use controls are the most direct and effective tools for behavior modification because they require a level of performance in order for certain development actions to occur. Currently, there is no notification of potential hazards on this site by County zoning, planning or tax officials who provide land use approvals for new development.

3.4.2 Notice

Appropriate notice can exert a strong influence on individual behavior. When notice of ordnance hazards is given, it can affect the expectations of potential users. Appropriate uses can be sought, and the land may still be used for economic gain. However, the hazard must be considered in the design and use of any site improvements or activities. Notices can be placed on a property as described in the following sections.

3.4.2.1 Deed Notifications/Restrictions

3.4.2.1.1 In many areas of the country, land purchased by the War Department or the DOD for military use was later transferred to public or private ownership. Because the subject land was utilized for ordnance manufacture, testing, or troop training activities that would potentially have unexploded ordnance, restrictions indicating this potential hazard was included in the property deeds.

3.4.2.1.2 Properties within the Camp were used as a training center during WWII. Parts of the training center were used as target areas for aerial bombing training. Notice

of the land use was conveyed to the first property owners, and covenants were placed in the property deeds restricting the use of the land to surface use only.

3.4.2.2 Notification During Property Transfers

Property owners have a responsibility to protect themselves and the public from dangers associated with their property. This should extend to informing buyers of all or portions of the property about the possibility of ordnance hazards. There are no records that would indicate that successive purchasers of land within the Camp have received any notification concerning the potential presence of ordnance, unless viewed in the property deed.

3.4.2.3 Notification During Permitting

3.4.2.3.1 Typically, controls are in place to protect property owners and their neighbors through permits for certain developments to be carried out. Permit approvals generally ensure that proper notice is given, reasonable plans are prepared, and the land is developed for an appropriate use.

3.4.2.3.2 Portions of the site are zoned by each jurisdiction in accordance with their planning and zoning ordinances to allow for conforming uses. The counties also have a building permit process that requires application for and receipt of a building permit for all construction, whether for new buildings or additions to existing buildings. Property owners and/or contractors are required to submit applications for new zoning, development, and construction activities to be approved. This application and review process can include notification to the property owner or contractor as to the potential of ordnance hazards of a property, and can include a requirement for landowners to inform end users (lessees and tenants) of the properties on the potential hazards of ordnance.

3.4.2.3.3 During permitting, property owners and/or contractors should review the Comprehensive or Master Plan for each jurisdiction. These plans should advise the applicants of the historical use on the site, and provide land use maps which depict the locations of past activities where the potential for ordnance hazards may exist.

3.4.2.4 Notification by Tax Bill

All property owners within the jurisdictions receive annual tax bills. Notification to the property owner of the potential for ordnance hazards on his/her property can be included as an insert to the tax bills of all property owners within the site.

3.4.3 Effectiveness

3.4.3.1 Land Use Controls

The use of planning and zoning controls to limit development is considered very effective for the undeveloped areas in the former Camp.

3.4.3.2 Notice

3.4.3.2.1 **Deed Notifications/Restrictions** - In 1947 when the Camp Butner Training Center was declared surplus, the land was turned over to the original property owners. At that time, covenants were placed in the property deeds restricting the use of the land to surface use only. It is recommended that the covenants remain in place and continue to exist during property transfer. Therefore, the addition of deed restrictions/notifications would be ineffective.

3.4.3.2.2 **Notification During Property Transfers** - There are no records to indicate that there has been notification of the possibility of ordnance hazards during property transfers, unless viewed in the property deed. The USACE could file a document describing the past history of the site. This document could include a statement indicating where a potential for ordnance is present. The document would be filed in the county's Registrar of Deeds Office under the name of all individuals who currently own property within the former Camp. When title searches are conducted pending the sale of property, information on the history of the property and the potential for ordnance would be obtained. This is an effective approach of informing individuals about the potential existence of ordnance before purchasing the property.

3.4.3.2.3 **Notification During Permitting** - Currently, the counties provide standard application forms and brochures that explain the procedures involved in the zoning and building permit processes. The application for rezoning and/or building permits on properties within the site could include an affidavit to be provided to property owners. A signed affidavit would attest to the property owner's knowledge of the potential for unexploded ordnance on their property. This process assures the jurisdiction that the applicant has been informed that unexploded ordnance may be located on his/her property.

3.4.3.2.4 **Notification by Tax Bill** - The insertion of notification of the potential for ordnance in all tax bills sent to property owners is a very effective means of public education. This approach would inform landowners of the potential for ordnance on their property on an annual basis.

3.4.4 Implementation

3.4.4.1 Notification During the Permitting Process

3.4.4.1.1 According to the standard permit application process of the jurisdictions, when an applicant applies for a rezoning or a building permit request, information about the possibility of ordnance hazards could be given to them. The property owners would be required to sign an affidavit to confirm that they have been provided the information and have understood. No certificates of occupancy related to areas within the site would be approved unless accompanied by the signed affidavit.

3.4.4.1.2 The county planning office or official website provides an explanation of the zoning, development, and building permit review and approval procedures. A one-page information document could be included in these explanations that would describe

how to recognize ordnance, and what procedures should be followed if ordnance is found on site.

3.4.4.1.3 In order to effectively implement the notification of property owners through the rezoning and building permit procedures, the county GIS system should include information to identify land located within the former Camp. Each parcel within the site would be marked/identified as such. Target zones and safety zones should be separately indicated. When a parcel number is input by a clerk for a zoning application or building permit application, the property would be recognized. The clerk would then provide the applicant the affidavit and the information on ordnance recognition.

3.4.4.2 Notification During Property Transfer

The Registrar of Deeds Office in each jurisdiction maintains all information concerning the registry of property deeds. By filing a document describing the past history of the former Camp, potential purchasers of properties within the Camp would be notified of the potential of ordnance. The document would be filed under all current owners names. When title searches were being conducted pending the sales of properties, information on the site history would be obtained.

3.4.4.3 Notification by Tax Bill

The Tax Assessor's Office in each jurisdiction is responsible for sending out tax bills. The tax statements may include a statement such as: "This property is located within the boundaries of the former Camp Butner Training Center and may contain unexploded ordnance. If ordnance or unidentified material is found, do not touch. Call the County Police Department immediately."

3.4.5 Cost

3.4.5.1 The proposed affidavit and information sheet can be prepared by the USACE and provided at no charge to the County. The cost for the initial documents would be approximately \$500.00 to the USACE. They would then be photocopied as needed and included as a part of the existing zoning and building permit information packets.

3.4.5.2 The proposed affidavit and information sheets would be distributed to individuals applying for zoning or building permits on parcels of land located within the site. The cost of updating the computer system to include the capability of identifying these parcels should be borne by the County government. The cost to document all properties by legal description, input this information into the county system, and train county employees to call up and provide the information is estimated to be between approximately \$10,000 and \$15,000. This is generally a component of existing county geographic information systems.

3.4.5.3 The identification capability installed in the computer system could also be utilized to add information concerning the potential presence of ordnance to the tax bill for properties within the former Camp. Those owners within the area would receive a tax

bill that would include the information about the potential presence of ordnance discussed above.

3.4.5.4 Information obtained from the county computer system would provide a listing of current property owners within the former Camp target and safety zones. Minimal additional funding would be required to draw up a document for filing with the registrar's office. The cost is estimated to be approximately \$2,500 to \$5,000.

3.4.6 Management, Execution, and Support Roles

Each county can implement the above recommendations through their normal staff procedures, with assistance from the USACE.

3.5 PRINTED MEDIA AWARENESS PROGRAM

Ordnance awareness, acknowledgement of the risk involved, and reinforcement of the message are key in minimizing the risk of ordnance hazards. Another avenue to facilitate this awareness and understanding is through printed media, in the form of new or updated brochures, fact sheets, newspaper articles, and other information packages. The opportunity to disseminate information through the printed media is readily available and can be easily facilitated. Through the use of printed media, property owners and residents from within and outside the region can be informed about the existence of ordnance hazards within the former Camp.

3.5.1 Brochures/Fact Sheets

Brochures and fact sheets describing the history of the former Camp and explanation of ordnance hazards can be produced or updated. Text and graphics can be used to describe how to identify ordnance, warnings to avoid physical contact in any way, instructions for dealing with ordnance if encountered, including how to report ordnance sightings. These printed materials could be produced or updated by the USACE, but should also include local sponsorship and ownership. They can be distributed as follows:

- Provided by mail to all property owners within the site;
- Provided by mail to all businesses within the site;
- Enclosed in tax or power bills;
- Enclosed as flyer in local newspaper;
- Provided through schools to all students in the region; and
- Provided to all professional and civic/community groups.

3.5.2 Newspaper Articles/Interviews

Newspaper articles and interviews provide another means of informing the public about the potential presence of ordnance. Articles can be supplied as press releases from

the USACE. Interviews with the USACE, with local residents, and other institutions can be included on an ongoing basis. Continued regular coverage should result in better information and understanding of the actual existence and hazards of ordnance. Interviews with people who lived in the former Camp areas, or who were involved in training at the Camp, would add interest to these articles.

3.5.3 Information Packages for Public Officials

Some county officials are aware of the potential ordnance hazards on the site. However, they should be provided with more detailed information on the concept of institutional controls and on the extent of ordnance hazards. An information package produced by USACE, including maps defining primary areas of concern, would be valuable for public officials. The maps would include boundaries of potential areas of concern, an abstract of studies completed to date, a brief history of the range, types of and potential danger posed by ordnance, and relevant contact information.

3.5.4 Effectiveness

3.5.4.1 Production and dissemination of brochures/fact sheets, newspaper articles and interviews, and the production and distribution of information packages for public officials are considered to be very effective institutional controls.

3.5.4.2 Newspaper articles can be very informative, and can be presented in a positive manner. This kind of participation by local press can effectively reduce the risk of improper handling of ordnance. The distribution of the existing fact sheet has also been proven to be an effective way to educate the public, and can also be viewed at www.projecthost.com. The updated fact sheet should be mailed to all property owners, distributed to county officials, placed on the project website, and be made available throughout the community.

3.5.4.3 Ongoing exposure to information about ordnance hazards should result in a more receptive public. The dissemination of printed media should be targeted to include new residents, visitors, or others not currently aware of the potential ordnance hazards. The addition, reinforcement, and augmentation of current knowledge will be helpful in keeping constant awareness of ordnance risk.

3.5.5 Implementation

3.5.5.1 The existing fact sheet includes enough information for a press release about the EE/CA that is being conducted. This press release can be prepared by the USACE and presented to the local newspapers. When a new fact sheet is prepared to describe the findings of the EE/CA and the proposed plans for removal and institutional controls, another press release should be prepared by the USACE for the local newspapers.

3.5.5.2 It is recommended that the existing fact sheet be mailed to all property owners and residents within the former Camp. The names and addresses of all owners have been compiled for the EE/CA Study and are available from the USACE.

3.5.5.3 The existing fact sheet should later be updated by the USACE when more information on the presence of ordnance, plans for removal, and plans for institutional controls are defined. The new fact sheet can be designed in the same format as the existing fact sheet. The USACE will provide the funding and production of the new fact sheet. Information packages to local officials could also be prepared and funded by the USACE. Each jurisdiction would be responsible for the distribution of this information.

3.5.6 Cost

3.5.6.1 Brochures/Fact Sheets

The estimated cost to produce an original professional quality, multi-color, one page fact sheet on an 8 ½ inch x 11 inch format suitable as a mailer or handout is approximately \$5,000.00. The fact sheet would be prepared to include primarily graphics with minimal text description to provide information about the presence of ordnance, plans for removal and institutional controls; plus information on the identification, handling, and reporting of ordnance. The cost to print and distribute the fact sheet will depend on the number of copies to be distributed. Assuming that 7,500 fact sheets are to be printed and mailed (at a \$1.50 each), and 5,000 fact sheets are to be printed and distributed by local institutions (\$1.00 each), the total cost for design and preparation of the brochure (printing 12,500 copies and mailing 7,500 copies) would be \$21,250. Revision of the fact sheet is anticipated to be done once.

3.5.6.2 Newspaper Articles/Interviews

There would be no foreseen cost for this type of public education.

3.5.6.3 Information Packages for Public Officials

The existing fact sheet and proposed fact sheet would be utilized together with abstracts of additional information on ordnance cleanup, mapping, and proposed removal, and institutional analysis plans can be provided to local officials. The production cost for these information packages is already included in the production cost of the fact sheets.

3.5.7 Management, Execution, and Support Roles

Revision, production, and distribution of fact sheets can be executed directly by the USACE or through a contractor with experience in the production of printed media for public education. Distribution can be facilitated by mailing directly to all property owners and residents within the site. Distribution of news releases and distribution of information to government officials will also be done by the USACE. Although most distribution will be done directly by the USACE, other media distribution to community groups would necessitate coordination with local government offices.

3.6 VISUAL AND AUDIO MEDIA AWARENESS PROGRAM

Aside from printed media, audio and visual media, such as educational videos, segments on local television stations, radio news and talk shows are available avenues to facilitate awareness and understanding of ordnance hazards. The opportunity to

disseminate information through visual and audio media is readily available and can be easily facilitated.

3.6.1 Videotapes

Professional quality videos that contain information similar to what is included in the printed materials can be produced by the USACE and could include interviews with local citizens, business owners, county and elected officials. Videotapes can be produced as part of the classroom education as discussed in Section 3.7. Copies of the videotapes should be provided to local libraries, government offices, schools and museums.

3.6.2 Television

3.6.2.1 The local public information television station could provide excellent local access of programs since they already provide local information reporting and programming. Public service programs could be presented on how to identify and deal with ordnance. Local contact information on handling ordnance and emergencies can be provided. It is suggested that the television programs include interviews with USACE personnel, local residents, and others who have knowledge of the history of the former Camp. A sample video from the Southwest proving Ground was prepared by USACE and can be viewed to evaluate the potential for a similar program in Butner, North Carolina.

3.6.2.2 To be most effective, the length of the television program would be approximately 30 minutes. A shorter version (5 to 7 minutes) could be produced for smaller group instruction.

3.6.3 Radio

Local radio stations in Butner and Creedmor, North Carolina include WDCG, WFXC, and WDNC. These and other radio stations are a potential medium to publicize the ordnance situation within the site, the EE/CA, removal plans, and institutional controls. Talks shows or news reports are both possible formats for the radio programs. Programs could be repeated as more information about the former Camp and the incidence of ordnance becomes available.

3.6.4 Effectiveness

3.6.4.1 The provision of information using visual media would be an effective method of modifying behavior and educating the public. Production and dissemination of videotapes and presentation of the message over local television are considered effective institutional controls. However, the message must be reinforced. Regular re-broadcasts of the original television presentation is recommended. Periodic updates of the videotapes is also recommended to ensure the accuracy and timeliness of the information presented. Additional footage and editing of the original videotapes may be required every 2 to 3 years.

3.6.4.2 The use of local radio programming will also be a very effective means of informing and educating the public on ordnance issues. Local television stations include:

WTVD 11 (ABC affiliate), WRAL 5 (CBS affiliate), WXII 12 (NBC affiliate), and WRAZ FOX 50 (FOX affiliate).

3.6.5 Implementation

With USACE providing the funding and producing the videotapes and fact sheets, local television and radio stations would readily agree to assist in distribution of the information. Educational channels such as UNC TV and local public radio station, WUNC would be options to provide free airtime for public service announcements.

3.6.6 Cost

The estimated cost to produce a professional quality 30-minute videotape for television broadcast and a 5- to 7-minute videotape for distribution to the local institutions and the community is approximately \$25,000. The estimated cost to copy and distribute videotapes to various institutions and to television stations would depend on the number of copies needed. Assuming 50 copies of videotapes are required, at \$4.50 each, not including postage the cost would be approximately \$225. The estimated total cost to implement visual media programs would be \$26,000. To reinforce the message, annual costs are estimated at \$2,000 per year.

3.6.7 Management, Execution, and Support Roles

USACE will be responsible for the production of the videotapes. This can be executed directly by USACE or through a contract professional with experience in the production of public information and education programs. Support from the local television stations and other organizations and institutions will be needed for broadcast of the videotapes and to make them readily available to the public.

3.7 CLASSROOM EDUCATION AWARENESS PROGRAMS

Public awareness can be facilitated through the classroom. The student needs to understand the nature of ordnance hazards and be able to properly identify and avoid ordnance if encountered. By asking students to share information with parents, the network of information will be amplified. A properly educated public is more likely to make correct decisions related to the safe and proper precautions of found ordnance. Classroom education can be offered in two major categories:

- Ordnance Identification, and
- Ordnance Safety.

3.7.1 Ordnance Identification

Because access to different parts of the site cannot be fully controlled, it may be necessary to have public training in ordnance identification. The basic message should be to not touch anything that looks like ordnance, shrapnel, or any other unidentified material. Ordnance identification classes may be conducted through assistance from Durham, Granville and Person County Public School Systems, Butner Schools, all private schools, and community colleges.

3.7.2 Ordnance Safety

The affected public should be educated about the potential dangers associated with ordnance and should understand the safety procedures to follow if they encounter any suspected ordnance item. Safety presentations should be made as a part of the ordnance identification classes.

3.7.3 Effectiveness

Providing education through the classroom would be a very effective method of modifying behavior. However, to be fully effective over a period of time, the message must be reinforced. Ordnance identification classes should be conducted on a regular basis and ordnance safety should be incorporated as a regular part of the current classes.

3.7.4 Implementation

Providing classroom education should be easily implementable. Local institutions would likely agree to participate and support the program with the funding and the educational information package provided by the USACE. Professionals and experts in the field and could be provided by the USACE to conduct ordnance identification and safety lectures.

3.7.5 Cost

The ordnance presentations to local schools would be sponsored by the USACE with no cost to the city and county school systems or private schools. The cost for travel and presentation materials (other than the videos) for a USACE employee to make presentations to local schools for one week is \$5,000.00. Costs for ongoing biannual presentations are estimated at \$3,000.00.

3.7.6 Management, Execution, and Support Roles

To facilitate the classroom education alternative, the USACE must first contact all institutions that are willing to assist in the ordnance safety education process and make information available to them.

3.8 EXHIBITS/DISPLAYS

Placing exhibits/displays in museums or other areas where the public will be exposed to educational information is method of generating and preserving general awareness and educating the public on the possible risk associated with the ordnance on the former Camp property.

3.8.1 Effectiveness

The presentation of information through exhibits/displays is not considered an effective approach to modifying the public's behavior concerning the presence of ordnance. Any exhibits that are used should be directed and coordinated through the local school system, or through the Granville County Museum in Oxford, NC. The cost

of producing, maintaining, and updating displays and exhibits is significantly higher than the potential positive effect this method may have.

3.8.2 Implementation

The implementation of exhibits and mobile displays is not recommended.

3.8.3 Cost

The implementation of exhibits and mobile displays is not recommended.

3.8.4 Management, Execution, and Support Roles

The implementation of exhibits and mobile displays is not recommended.

3.9 INTERNET WEBSITE AWARENESS PROGRAM

The creation of a website on the Internet or the update and use of existing websites could be used in raising and preserving general awareness and educating the public about the presence of ordnance on the site. Currently, a website exists at www.projecthost.com for the former Camp Butner and other UXO projects in which Parsons is involved. The website is designed and updated by Parsons to include the history of the Camp, a background on ordnance finds and cleanup, maps, and other project related documents.

3.9.1 Effectiveness

3.9.1.1 The website is very effective in terms of presenting substantial and updated information about ordnance hazards on the site. The website provides unlimited and unrestricted access to most documents for those individuals that are willing and have the capacity to access the website.

3.9.1.2 If the USACE decides to enhance website awareness, it would be necessary to update the website as additional studies are implemented pertaining to the presence of ordnance. The existence of the website could be presented in the fact sheet to be prepared, and in television and radio coverage discussed above. The website could also include historical perspectives, local residents associated with the site, current and future land uses, ordnance identification and safety procedures.

3.9.2 Implementation

Creation and maintenance of the Camp Butner ordnance awareness website is currently completed by the USACE and Parsons. An additional website could be created and maintained by the USACE and each jurisdiction, State of North Carolina, or jointly linked. Information to be included in the website will be provided by the USACE studies and other information sources.

3.9.3 Cost

The cost to design a website varies from \$50.00 to \$150 per hour. Assuming that the design would require 100 hours at \$100.00 per hour (including review, revisions, and placing the site on the web), the total cost would be \$10,000.00.

3.9.4 Management, Execution, and Support Roles

To create a website, USACE should coordinate with local advertising professionals who could be contracted to prepare the website and establish it on the Internet. The website could provide links to other important government agencies relevant to ordnance handling and identification. Similarly, local government and community organizations could also include a link to the Camp Butner EE/CA website.

3.10 AD HOC COMMITTEE AWARENESS PROGRAM

Creation of an ad hoc committee comprised of community leaders and a representative from the USACE would serve as a mechanism for implementing the recommendations of the EE/CA. This committee would serve as the primary proponent for public awareness of the ordnance issue. It would work to ensure the successful implementation of each of the recommended institutional control awareness programs. The committee would be responsible for analyzing the effectiveness of the different programs on a regular basis and recommending changes as necessary to bring the message to the largest sector of the public.

3.10.1 Effectiveness

The ad hoc committee would be very effective in providing a proponent for public awareness. This group would provide a direct and flexible administration over information dissemination programs. With the committee's regular evaluation, more effective alternatives could be enhanced and less effective ones could be discontinued. This type of committee is most effective for ensuring the implementation of institutional control programs.

3.10.2 Implementation

The USACE should invite officials from Durham, Granville and Person Counties, the Town of Butner, NCNG and the State of North Carolina to jointly appoint members to the partnership. Community leaders, including students, veterans, and agency representatives should be contacted and invited to join the committee.

3.10.3 Cost

Joining the ad hoc committee would be by invitation and serving would be voluntary. The members will not be compensated for their time. To implement ad hoc committees as a mechanism for information dissemination, it would cost approximately \$2,000 for the first year and \$1,000 for each subsequent year. The costs include retaining the services of a stenographer to record meeting minutes, overhead administrative costs, and other miscellaneous expenses.

3.10.4 Management, Execution, and Support Roles

The USACE must contact and invite community leaders to join the committee. Meeting rooms and a stenographer must be secured. It is suggested that a minimum of two meetings be conducted the first year and at least one meeting per year thereafter.

3.11 REVERSE 911 SYSTEM

Reverse 911 is an interactive community notification system which can be used to quickly contact citizens in every specific geographic area to communicate urgent information. The installation of a reverse 911 computer system could be used in notifying the public about ordnance issues which arise within their community. The county should assume responsibility for the reverse 911 system to address potential site accidents as well as natural and policing issues.

3.11.1 Effectiveness

The reverse 911 system would be a very effective form of notification for the citizens of Durham, Granville and Person Counties. The system would enable each county's emergency communications center to send a recorded message to hundreds of homes in the event of an ordnance related emergency.

3.11.2 Implementation

The purchase and installation of a reverse 911 system could be accomplished through funding received through grants and other sources.

3.11.3 Cost

The cost of a basic eight line system is \$25,000.

3.12 OTHER METHODS OF BEHAVIOR MODIFICATION THROUGH PUBLIC AWARENESS

3.12.1 This institutional analysis report includes the most common, appropriate, and effective institutional control alternatives that are recommended.

3.12.2 These recommended institutional control alternatives are the best recommended practices for public awareness. Technological advances that will result in the creation of new opportunities to improve the information/education process are anticipated. Local conditions not addressed in the report, or future conditions, may warrant a change of outreach techniques.

SECTION 4

SUMMARY AND RECOMMENDATIONS

4.1 INTRODUCTION

4.1.1 This section summarizes the list of recommended institutional control alternatives that could be implemented to promote public awareness of potential ordnance hazards. These alternatives have been proposed as a result of discussions with the USACE and with local county officials; property owners and citizens; Parsons' professional experience with institutional analysis; and an overall knowledge of the site and conditions. The recommendations are considered to be appropriate methods for reducing the risk of ordnance hazard to the public. They are intended to be an effective complement to the removal activities discussed in the EE/CA.

4.1.2 The recommended alternatives are presented to inform and educate all property owners within the former Camp Butner property. The recommended alternatives should also inform and educate the surrounding community about the potential of ordnance on the site, and lay the groundwork for complementary land use, and citizen safety.

4.2 RECOMMENDED ALTERNATIVES

All of the institutional control alternatives presented and discussed in Chapter 3 are substantially effective and are feasible for implementation. However, those recommended below have been selected because they provide the approach to influence through the education process, the largest number of people and a target audience of children ages 5-18. Special emphasis should be placed upon targeting children ages 5-18, since these individuals are more apt to explore off-limit areas. Historically, past accidents on former sites have been to children. The following discussion includes the rationale for selection of the preferred alternatives. Table 4-1 summarizes these recommendations.

4.2.1 Notification During Permitting

4.2.1.1 The existing permitting procedures for zoning and building permits provide an excellent means to inform property owners regarding the potential presence of ordnance on their property. Currently, each county provides standard application forms and brochures that outline and explain the procedures involved in the zoning and building permit processes. The application for rezoning and/or building permits on properties within the former range area could include an affidavit stating that the owner has been informed that ordnance may be present on their property. No applications within the former Camp areas would be accepted unless accompanied by the signed affidavit. This

process would assure each jurisdiction that the applicant has been informed about the unexploded ordnance that may be located on his/her property. This notification procedure will occur early in the permit process and no later than the issuance of certificates of occupancy.

4.2.1.2 The existing brochures that provides an explanation of the permit review and approval procedures could include a one-page information document that describes ordnance hazards. The document may include information on how to recognize ordnance, and what procedures should be followed if ordnance is found on the site.

4.2.1.3 The proposed affidavit and information sheet can be prepared by the USACE and provided at no charge to the County. The county should agree to include the disclosure form in land development permitting. The cost for the initial documents would be approximately \$500.00, and be photocopied as needed by the counties and included in the rezoning, building permit or utility permit application/information packet.

4.2.1.4 The proposed affidavit and information sheet would be distributed only to individuals applying for zoning, building permits, and utility permits on parcels of land located within the former Camp. Each jurisdiction's computer system should have the capability of identifying these parcels via GIS capabilities in planning and zoning departments. The cost to document all properties by legal description, input this information into the county system, and train employees to use and provide the information is estimated to be between approximately \$10,000 and \$15,000.

4.2.2 Notification During Property Transfer

The filing of a disclosure document with the Registrar of Deeds Office provides an excellent means of informing the potential property owners about the potential for ordnance to exist within the former Camp. The document would be filed under the names of all current owners of property within target and safety zones. When title searches are carried out pending the sale of property, information on the properties' history and the potential of ordnance would be made known.

4.2.3 Notification on Tax Bills

The insertion of notification of the potential for ordnance in all tax bills sent to property owners within the site is a very effective means of public education. The counties currently send tax forms through their tax offices; hence, very minimal addition to staffing will be required. This approach will inform property owners on a yearly basis of the potential for ordnance on their property. The similar software discussed in Section 3.4.4.1 for notification during permitting can also be utilized to identify the property owners and send ordnance warnings via tax bills. Additional expense to the county would be minimal.

4.2.4 Brochure/Fact Sheet

4.2.4.1 The existing fact sheet should be distributed to all property owners within the site. The names and addresses of all property owners have already been collected and

are in digital format. The USACE or County could distribute the existing brochure to all property owners at a cost of less than \$1,000.

4.2.4.2 Later in the EE/CA process, this existing fact sheet should be updated when additional details are available on the amount and location of ordnance, plans for removal, and institutional controls. The cost to prepare, print, and distribute the revised fact sheet is \$10,000.

4.2.5 Newspaper Articles/Interviews

Positive newspaper articles that discuss the existence of ordnance, the potential danger, and how that danger can be minimized through education will serve as a very effective tool for educating the public at no cost to Horry County or the USACE.

4.2.6 Information Packages to Public Officials

The existing fact sheet and all proposed updates should be provided to public officials in Horry County. Local public officials will be invited to the public presentations of the EE/CA. These presentations will provide the officials with information they require. Copies of the EE/CA will also be made available to these individuals. The information packets should be updated to reflect current land use and zoning decisions.

4.2.7 Visual and Audio Media

4.2.7.1 Two visual media programs, a 30-minute television special and a 5 to 7 minute videotape for television, classroom, and community groups are recommended. Through television and classrooms, these programs could reach a majority of the people in the region. The estimated cost of preparation of the two visual media programs and making adequate copies available is \$26,000. The estimated annual cost to maintain the videos and update them every 3 years averages \$2,000 per year. The target audience should be youth aged 10 to 18.

4.2.7.2 The use of local radio programming is also recommended to inform and educate the public about the history, current status, and future information concerning the presence of ordnance on the former range property. Local talk shows can be tapped to provide effective venues to have updates and discussions on ordnance safety. The existing and future fact sheets should be made available to the radio stations. Public service announcements on targeted, youth oriented radio stations are recommended, similar to no-smoking campaigns.

4.2.8 Classroom Education

Short presentations and courses in local schools and the community college are also recommended strategies to disseminate information. The 5 to 7 minute visual media video prepared for community groups can be used in the school presentations that are to be facilitated by the USACE. No additional expenses should be necessary for the schools. The USACE would have expenses of approximately \$1,500 for the first year and \$1,000 annually for future years.

4.2.9 Ad Hoc Committee

This committee of community leaders and other interested citizens will oversee the process for educating the public about the existence and potential danger of ordnance. It would be the responsibility of this committee to see that the other recommendations for public education are instituted and maintained. The cost to organize and maintain the committee is estimated at \$2,000 for the first year with an ongoing annual cost of \$1,000.

4.2.10 Reverse 911 System

Investigate the use of a reverse 911 system with the county emergency management agency to address potential evacuations. This can be a joint police, fire, and EMS function with various federal, state, and local dollars to purchase the system.

4.2.11 Land Use Restrictions and Regulatory Control

It is recommended that planning and zoning officials revise their respective county comprehensive or master plan and zoning to reflect knowledge associated with the Camp. The development patterns and approvals of new zoning on the ranges fail to provide notice of safety issues related to unexploded ordnance potential. Planning changes should be installed as "Smart Growth" or compact development techniques that minimize construction on target or safety zones. Where development does occur in target or safety zones, land use density for residential should be low, or should be designated as green space (i.e. conservation subdivisions).

4.2.13 Internet Website

A website or an updated website on the Internet provides information that should be advertised if the creation of a website is desirable. It would be inexpensive to create and would reach a broad cross section of the region.

4.3 PHASING OF ALTERNATIVES

4.3.1 Existing institutional systems that readily allow for public information programs are the zoning, development and building permitting process, and the tax billing process. These two methods are the most important institutional controls because they ensure direct notification of property owners about the issue of ordnance hazards. Each jurisdiction would have to help establish the computer support that enables the city and county officials to identify the properties within the Site.

4.3.2 The most immediate action that can be taken is the distribution of the existing fact sheet to all property owners, newspaper, local access television, and local access radio. This fact sheet has been distributed previously at meetings about the former Camp. There has been no effort to date to distribute the fact sheet more widely.

4.3.3 Newspaper coverage of ordnance and ordnance safety provides information on a community and regional level with no additional funding requirement. The preparation of the two visual media presentations to use on television, in schools, and civic groups will be a good investment because they can be re-used in future information programs

and can reach a large diverse population that may not be accustomed to attending civic meetings. The ad-hoc committee is a must if the other controls are to be instituted and maintained.

4.3.4 It is recommended that the USACE form public/private partnership to implement the recommendations presented above. This partnership would be responsible for analyzing the effectiveness and appropriateness of the different recommendations with regards to the surrounding community.

4.4 ALTERNATIVES NOT RECOMMENDED

The following institutional controls are not as effective in informing a substantial part of the population and are not recommended.

4.4.1 Signs and Fencing

Existing private property within the site is fenced by the property owners. No additional fencing is recommended to be placed by the government because fencing the entire area would be economically and physically prohibitive and provide little control over access. Because of the large area encompassed by the site and thousands of individual property owners, the posting of signs would be of little value.

4.4.2 Deed Notification/Restriction

Currently, covenants exist on property deeds restricting land use on the former Camp to surface use only. It is recommended that these notifications and restrictions remain in place and continue to exist during property transfer.

4.4.3 Exhibit/Display

Although educational, the preparation of a mobile exhibit/display will require a high degree of maintenance and relocation and will not reach as many individuals as that of other media presentations. This technique can be included if USACE staff identifies key target neighborhoods within the overall site that require formal attention.

4.5 COST

The actual cost to implement the previous institutional control measures might be less than estimated cost because a large part of the necessary system needed for implementation is already in place and funded. The new costs envisioned include the following:

Institutional Control	Initial Cost	Annual Cost
Permitting, Property Transfer and Land Use Update	\$15,500	\$5,000
Distribute Existing Fact Sheet	\$1,000	None
Prepare and Distribute Updated Fact Sheet	\$21,250	Minimal
Prepare & Distribute Videos	\$26,000	None
Classroom Education	\$5,000	\$3,000
Ad hoc Committee	\$2,000	\$1,000
Internet Website	\$10,000	Minimal
*Reverse 911	\$25,000 (*Shared Cost)	None
Tax Bill	Minimal	Minimal
Newspaper Articles/Interviews	Minimal	Minimal
TOTAL	\$80,750	\$10,500

4.6 MANAGEMENT, EXECUTION AND SUPPORT ROLES

4.6.1 To implement the recommended institutional control alternatives, the USACE must first establish a steering committee with local government officials, area stakeholders, chambers of commerce and schools. The recommended approach for the USACE is as follows:

1. Provide assistance in organizing the ad hoc committee.
2. Distribute the existing fact sheet.
3. Prepare and distribute information packages.
4. Continue to update and publicize the existing Camp Butner project website www.projecthost.com.
5. Encourage county planning and zoning departments to prepare GIS/computer system to identify properties within the former Camp, relative to the target and safety zones.
6. Prepare affidavit and inserts to existing zoning and building permit application packages.
7. Include fact sheet inserts in tax form/packages.
8. Prepare educational videotapes.

9. Conduct signage study with the counties and provide recommendations for the comprehensive plan in each jurisdiction.
10. Prepare press releases for local media.
11. Encourage counties to investigate Reverse 911 system for neighborhoods and businesses.
12. Encourage ongoing public/private partnerships for monitoring these issues.

4.6.2 The USACE will provide the basic information and assistance required to organize the institutional controls. The success of these measures however, require more than the effort of the USACE. Local commitment and support will also be necessary. Local assistance will be needed primarily from the jurisdictions. Support from many other local institutions will also be needed to enforce the institutional controls.

Table 4.1 Summary of Institutional Control Alternatives

Alternative	Effectiveness	Implementation	Initial Cost	Annual Cost
Access Control				
Fencing	Not Effective	Not recommended	ND	ND
Signage	Uncertain Effectiveness	Recommended study	ND	ND
Land Use Restrictions & Regulatory Control	Very Effective	Changes recommended		
Notice				
Deed Notification	Very Effective	Not recommended	ND	ND
At Property Transfer & At Permitting	Very Effective	Recommended**	\$15,500	\$5,000
Tax Bills	Effective	Recommended	Minimal	Minimal
Reverse 911	Effective	Recommended	Shared Cost	None
Printed Media				
Distribute existing fact sheet	Effective	Recommended	\$1,000	None
Brochures/Fact Sheets	Effective	Recommended	\$21,250	None
Newspaper Articles	Effective	Recommended	None	None
Information Packages to Officials	Somewhat Effective	Recommended distribution of fact sheet only	Included in production costs for the brochures/fact sheets	None
Visual Media				
Videotapes	Effective	Recommended	\$26,000	None
Television	Effective	Recommended		
Classroom Education	Effective	Recommended	\$5,000	\$3,000
Exhibits/Displays	Somewhat effective, but high maintenance	Not recommended	ND	ND
Internet Website	Somewhat effective.	Recommended	\$10,000	Minimal
Ad hoc Committee	Effective means of ensuring implementation of other alternatives	Recommended	\$2,000	\$1,000

ND = Not Determined

**Notice can be completed through building and subdivision development permitting.

Appendix A
Institutional Data Survey Forms

Appendix A Institutional Data Survey Form

All persons contacted at meetings, by telephone, and by mail were provided with the Former Camp Butner Survey Form included on the following pages. Some of the forms were completed by the individual interviewed and returned. Others were completed by Parsons utilizing the information provided during the interview.

Completed Institutional Data Survey Forms

PARSONS ENGINEERING SCIENCE, INC.

A UNIT OF PARSONS INFRASTRUCTURE & TECHNOLOGY GROUP

EXAMPLE SURVEY LETTER

5390 Triangle Parkway • Suite 100 • Norcross, Georgia 30092 • (770) 446-4900 • Fax: (770) 446-4910

June 7, 2001

Ms. Paula Murphy
Person County Planning & Zoning Department
20-A Court St.
Roxboro, NC 27573

Subject: Former Camp Butner Training Center
Butner, North Carolina
Institutional Analysis

Dear Ms. Murphy:

Parsons Engineering Science, Inc. is contracted by the Department of the Army, Huntsville Division, Corps of Engineers, to provide engineering services at the former Camp Butner Training Center, North Carolina. The enclosed survey will assist in the development of an Institutional Analysis Report, which supports alternative plans to reduce risks associated with ordnance removal action. Parsons has requested participation in the survey from government agencies in Durham, Granville, and Person counties, as well as the town of Butner.

Representatives from Parsons will in the Camp Butner area to conduct interviews regarding the enclosed survey June 25-29, 2001. Please contact me at (678) 969-2411 if you have any questions. Thank you for your participation in this survey.

Sincerely,



Leigh Ann Valletti

Associate Environmental Scientist

PARSONS ENGINEERING SCIENCE, INC.

cc: Don Silkebakken P.E.
Project Manager

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Paula Murphy

Title: Planning Director

2. Name and address of organization: Person County Planning and Zoning

20A Court Street Roxboro, NC 27573

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
To Administer Zoning Ordinance. Subdivision Ordinance

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input checked="" type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

8. What geographic area(s) is (are) served by the organization?

Person County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other _____

12. What organizations do you regularly contact during the course of work?

Department of Transportation, Building Inspections, Health Department

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Scott Phillips

Title: Director, Granville County Development Services

2. Name and address of organization: P.O. Box 1189, 122 Williamsboro Street
Oxford, NC 27565

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Requisite building construction and land use

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input checked="" type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input checked="" type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|---------------------------------------|--------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input checked="" type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input type="checkbox"/> Make Contracts | <input checked="" type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |

8. What geographic area(s) is (are) served by the organization?

Granville County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|---------------------------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input checked="" type="checkbox"/> Enforcement |
| <input type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input checked="" type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input checked="" type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|------------------------------------------------------------------------------|---------------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input checked="" type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input checked="" type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

North Carolina Department of Insurance

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|---------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Federal laws/regulations | <input type="checkbox"/> Agency rules/policies |
| <input checked="" type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Rufus Sales

Title: Public Safety Director

2. Name and address of organization: Butner Public Safety

611 Central Ave. Butner, NC 27509

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Provide police and fire protection

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input checked="" type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input checked="" type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|---------------------------------------|--------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input type="checkbox"/> Make Contracts | <input checked="" type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |

8. What geographic area(s) is (are) served by the organization?

Butner Community

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|-------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input checked="" type="checkbox"/> Enforcement |
| <input type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

Many

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|--------------------------------------------------------------|------------------------------------------------------------|
| <input checked="" type="checkbox"/> Federal laws/regulations | <input checked="" type="checkbox"/> Agency rules/policies |
| <input checked="" type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: David T. Smith

Title: Sheriff

2. Name and address of organization: Granville County Sheriff Department

143 Williamsboro Street Oxford, NC 27565

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?

Serve and protect citizens, serve criminal and civil papers, enforce laws of N.C.

5. What is the basis for the creation of your organization?

- | | |
|------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Federal Law | <input type="checkbox"/> Public Charter |
| <input checked="" type="checkbox"/> State Law | <input type="checkbox"/> Special Act |
| <input checked="" type="checkbox"/> Local Law | <input type="checkbox"/> Private Charter |
| <input type="checkbox"/> Other (specify below) | |

6. What is the jurisdictional level of the organization?

- | | | |
|--------------------------------------------------|------------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> National | <input type="checkbox"/> Person County | <input type="checkbox"/> Other (specify below) |
| <input type="checkbox"/> State of North Carolina | <input checked="" type="checkbox"/> Granville County | |
| <input type="checkbox"/> City of Butner | <input type="checkbox"/> Durham County | |

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

8. What geographic area(s) is (are) served by the organization?

County and county property within the city

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other _____

12. What organizations do you regularly contact during the course of work?

Clerk of Court, Magistrate, other L.E. agencies, 911 center

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Ernest Thompson

Title: Assistant Superintendent

2. Name and address of organization: Granville County Schools

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input checked="" type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input checked="" type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|---------------------------------------|--------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input type="checkbox"/> Make Contracts | <input type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input checked="" type="checkbox"/> Other (specify below) |
-

8. What geographic area(s) is (are) served by the organization?

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|-------------------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Enforcement |
| <input type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input checked="" type="checkbox"/> Public education |
| <input type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|------------------------------------------------------------------------------|----------------------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input checked="" type="checkbox"/> Recreational use of water/land resources | <input checked="" type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|--------------------------------------------------------------|-------------------------------------------------|
| <input checked="" type="checkbox"/> Federal laws/regulations | <input type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

- a. _____
- b. _____
- c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: T. Dean Askew

Title: Superintendent

2. Name and address of organization: Butner Beef Cattlefield Lab

8800 Cassam Road Bahama, NC 27503

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Field Research with Beef Cattle

5. What is the basis for the creation of your organization?

- | | |
|-----------------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Federal Law | <input type="checkbox"/> Public Charter |
| <input type="checkbox"/> State Law | <input type="checkbox"/> Special Act |
| <input type="checkbox"/> Local Law | <input type="checkbox"/> Private Charter |
| <input checked="" type="checkbox"/> Other (specify below) | |

NCSU

6. What is the jurisdictional level of the organization?

- | | | |
|-------------------------------------------------------------|------------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> National | <input type="checkbox"/> Person County | <input type="checkbox"/> Other (specify below) |
| <input checked="" type="checkbox"/> State of North Carolina | <input checked="" type="checkbox"/> Granville County | |
| <input type="checkbox"/> City of Butner | <input checked="" type="checkbox"/> Durham County | |

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

8. What geographic area(s) is (are) served by the organization?

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other _____

12. What organizations do you regularly contact during the course of work?

_____ NCSU _____

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Wes Crabtree

Title: Chief Deputy

2. Name and address of organization: Durham County Sheriff's Office

P.O. Box 170 Durham, NC

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Law Enforcement

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input checked="" type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|---------------------------------------|----------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input checked="" type="checkbox"/> Make Contracts | <input checked="" type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |

8. What geographic area(s) is (are) served by the organization?

Durham County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|----------------------------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input checked="" type="checkbox"/> Finance | <input checked="" type="checkbox"/> Enforcement |
| <input checked="" type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|---------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Federal laws/regulations | <input checked="" type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Scott Elliott

Title: Business Officer

2. Name and address of organization: Murdoch Center

1600 East C Street Butner, NC 27509

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Residential and habilitative services for adults with mental retardation

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input checked="" type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|------------------------------------------------|-------------------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input checked="" type="checkbox"/> Purchase Property | <input checked="" type="checkbox"/> Receive Gifts |
| <input checked="" type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input checked="" type="checkbox"/> Make Contracts | <input type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |
-

8. What geographic area(s) is (are) served by the organization?

North Central DD Region

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|------------------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Enforcement |
| <input checked="" type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input checked="" type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input checked="" type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|---------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Federal laws/regulations | <input type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Reid Evans

Title: Superintendent

2. Name and address of organization: Umstead Farm Unit, NCOATCS

2652 Old 75 Butner, NC 27509

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Agricultural Research (Dairy)

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input checked="" type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

8. What geographic area(s) is (are) served by the organization?

18 research stations serve the State of North Carolina

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other _____

12. What organizations do you regularly contact during the course of work?

Wildlife Commission

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Danny Faucelte

Title: Tax Administration

2. Name and address of organization: Granville County

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
To assess and collect tax

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input checked="" type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input checked="" type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|--------------------------------------------------|--------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input type="checkbox"/> Make Contracts | <input type="checkbox"/> Enforce laws |
| <input checked="" type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |

8. What geographic area(s) is (are) served by the organization?

Granville County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|-------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Enforcement |
| <input type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <input type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input checked="" type="checkbox"/> Other <u>Assessment and Collection of Taxes</u> |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

NCAAO – NCTCA – NCDR - IOG

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|---------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Federal laws/regulations | <input type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Russell Jones

Title: Tax Administrator

2. Name and address of organization: Person County Tax

P. O. Box 1116 Roxboro, NC 27573

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Property Tax

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input checked="" type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|--------------------------------------------------|--------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input type="checkbox"/> Make Contracts | <input type="checkbox"/> Enforce laws |
| <input checked="" type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |
-

8. What geographic area(s) is (are) served by the organization?

Person County Roxboro

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|-------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input checked="" type="checkbox"/> Finance | <input type="checkbox"/> Enforcement |
| <input type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|---------------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> Federal laws/regulations | <input type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Al Judd

Title: Hospital Engineer

2. Name and address of organization: John Umstead Hospital NC DHHS

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

State Psychiatric Hospital

4. What is the overall purpose of this organization?

Treat people with mental illness

5. What is the basis for the creation of your organization?

- | | |
|------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Federal Law | <input type="checkbox"/> Public Charter |
| <input checked="" type="checkbox"/> State Law | <input type="checkbox"/> Special Act |
| <input type="checkbox"/> Local Law | <input type="checkbox"/> Private Charter |
| <input type="checkbox"/> Other (specify below) | |

6. What is the jurisdictional level of the organization?

- | | | |
|-------------------------------------------------------------|-------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> National | <input type="checkbox"/> Person County | <input type="checkbox"/> Other (specify below) |
| <input checked="" type="checkbox"/> State of North Carolina | <input type="checkbox"/> Granville County | |
| <input type="checkbox"/> City of Butner | <input type="checkbox"/> Durham County | |

7. What powers and/or authorities does your organization exercise?

- | | | |
|-------------------------------------------------|----------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input type="checkbox"/> Land Use Control |
| <input checked="" type="checkbox"/> Make Policy | <input checked="" type="checkbox"/> Make Contracts | <input type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |
-

8. What geographic area(s) is (are) served by the organization?

North Central NC

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|------------------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> Regulation | <input type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Enforcement |
| <input checked="" type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input checked="" type="checkbox"/> Maintenance of existing facilities | <input type="checkbox"/> Legislative involvement |
| <input type="checkbox"/> Planning new facilities | <input type="checkbox"/> Public education |
| <input checked="" type="checkbox"/> Engineering and/or construction | <input type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------|
| <input checked="" type="checkbox"/> Public safety | <input type="checkbox"/> Control of land use |
| <input type="checkbox"/> Recreational use of water/land resources | <input type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

NC DHHS, State Construction Office

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|--------------------------------------------------------------|------------------------------------------------------------|
| <input checked="" type="checkbox"/> Federal laws/regulations | <input checked="" type="checkbox"/> Agency rules/policies |
| <input checked="" type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

- a. _____
- b. _____
- c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Douglas P. Logan

Title: Emergency Management Coordinator

2. Name and address of organization: Granville County Emergency Management

P.O. Box 598 Oxford, NC 27565

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Emergency and Disaster Preparedness, Response, Recovery and Mitigation

5. What is the basis for the creation of your organization?

- | | |
|------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Federal Law | <input type="checkbox"/> Public Charter |
| <input checked="" type="checkbox"/> State Law | <input type="checkbox"/> Special Act |
| <input checked="" type="checkbox"/> Local Law | <input type="checkbox"/> Private Charter |
| <input type="checkbox"/> Other (specify below) | |

6. What is the jurisdictional level of the organization?

- | | | |
|--------------------------------------------------|------------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> National | <input type="checkbox"/> Person County | <input type="checkbox"/> Other (specify below) |
| <input type="checkbox"/> State of North Carolina | <input checked="" type="checkbox"/> Granville County | |
| <input type="checkbox"/> City of Butner | <input type="checkbox"/> Durham County | |

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

8. What geographic area(s) is (are) served by the organization?

All areas within Granville County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other _____

12. What organizations do you regularly contact during the course of work?

Multiple agencies (public and private sector)

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Brenda Long/Leon Hamlin

Title: Community Schools Coordinator/Administrative Assistant

2. Name and address of organization: Person County Schools

304 S. Morgan Street, Room 25 Roxboro, NC 27573

3. Type of organization (check one)

- | | | |
|---------------------------------------------|------------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input checked="" type="checkbox"/> Other (specify below) |

School System

4. What is the overall purpose of this organization?

Education

5. What is the basis for the creation of your organization?

- | | |
|-------------------------------------------------|------------------------------------------|
| <input checked="" type="checkbox"/> Federal Law | <input type="checkbox"/> Public Charter |
| <input checked="" type="checkbox"/> State Law | <input type="checkbox"/> Special Act |
| <input type="checkbox"/> Local Law | <input type="checkbox"/> Private Charter |
| <input type="checkbox"/> Other (specify below) | |

6. What is the jurisdictional level of the organization?

- | | | |
|--------------------------------------------------|---------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> National | <input checked="" type="checkbox"/> Person County | <input type="checkbox"/> Other (specify below) |
| <input type="checkbox"/> State of North Carolina | <input type="checkbox"/> Granville County | |
| <input type="checkbox"/> City of Butner | <input type="checkbox"/> Durham County | |

7. What powers and/or authorities does your organization exercise?

- Make Laws
- Make Rules
- Make Policy
- Taxing Power
- Purchase Property
- Condemn Land
- Make Contracts
- Sell Bonds
- Receive Gifts
- Land Use Control
- Enforce laws
- Other (specify below)

Schools/Education

8. What geographic area(s) is (are) served by the organization?

Person County

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes
- No

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- Regulation
- Finance
- Operation of existing facilities
- Maintenance of existing facilities
- Planning new facilities
- Engineering and/or construction
- Advisory
- Enforcement
- Basic research
- Legislative involvement
- Public education
- Resource use

11. Which of the following subjects are important to the work of your organization?

- Public safety
- Recreational use of water/land resources
- Conservation of wildlife
- Management of resources related to water
- Control of land use
- Environmental preservation
- Other Educational Issues

12. What organizations do you regularly contact during the course of work?

State Department of Public Instruction

13. What specific regulations/rules dealing with public safety/management does your organization use?

- Federal laws/regulations
- Other sources
- Agency rules/policies
- State laws/regulations

14. Does your organization have jurisdiction over other organizations?

- Yes
- No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

Former Camp Butner Training Center Institutional Analysis

The purpose of this inquiry is to determine the organizations that will have ownership, jurisdiction, or other impact on the proposed reuse of the former Camp Butner Training Center. This information will be utilized in the preparation of recommendations for institutional controls for the proposed reuse. Not all of the questions may apply to you and your organization.

Your participation in this interview is appreciated.

1. Name of Respondent: Thomas N. McGee

Title: Town Manager -- Butner, NC

2. Name and address of organization: 205-C West East Street

Butner, NC 27509

3. Type of organization (check one)

- | | | |
|------------------------------------------------------|------------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Private Business | <input type="checkbox"/> Special District | Special Interest Group |
| <input type="checkbox"/> Federal Government | <input type="checkbox"/> Civic or Service Org. | <input type="checkbox"/> Environmental |
| <input checked="" type="checkbox"/> State Government | <input type="checkbox"/> Professional Society | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Local Government | | <input type="checkbox"/> Other (specify below) |

4. What is the overall purpose of this organization?
Operate the town of Butner for the State of North Carolina

5. What is the basis for the creation of your organization?

<input type="checkbox"/> Federal Law	<input type="checkbox"/> Public Charter
<input checked="" type="checkbox"/> State Law	<input checked="" type="checkbox"/> Special Act
<input type="checkbox"/> Local Law	<input type="checkbox"/> Private Charter
<input type="checkbox"/> Other (specify below)	

6. What is the jurisdictional level of the organization?

<input type="checkbox"/> National	<input type="checkbox"/> Person County	<input type="checkbox"/> Other (specify below)
<input type="checkbox"/> State of North Carolina	<input type="checkbox"/> Granville County	
<input checked="" type="checkbox"/> City of Butner	<input type="checkbox"/> Durham County	

7. What powers and/or authorities does your organization exercise?

- | | | |
|---------------------------------------|----------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> Make Laws | <input type="checkbox"/> Purchase Property | <input type="checkbox"/> Receive Gifts |
| <input type="checkbox"/> Make Rules | <input type="checkbox"/> Condemn Land | <input checked="" type="checkbox"/> Land Use Control |
| <input type="checkbox"/> Make Policy | <input checked="" type="checkbox"/> Make Contracts | <input checked="" type="checkbox"/> Enforce laws |
| <input type="checkbox"/> Taxing Power | <input checked="" type="checkbox"/> Sell Bonds | <input type="checkbox"/> Other (specify below) |

8. What geographic area(s) is (are) served by the organization?

+/- 18,000 acres owned by State of NC

9. Does your organization have a concern or responsibility for public safety and related land management?

- Yes No Not for public safety – we do manage land
 NC Dept. Crime Control and Public Safety resp. for police and fire

10. Which of the following categories of work best describe your organization's activities (more than one may be checked)?

- | | |
|------------------------------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Regulation | <input checked="" type="checkbox"/> Advisory |
| <input type="checkbox"/> Finance | <input checked="" type="checkbox"/> Enforcement |
| <input checked="" type="checkbox"/> Operation of existing facilities | <input type="checkbox"/> Basic research |
| <input checked="" type="checkbox"/> Maintenance of existing facilities | <input checked="" type="checkbox"/> Legislative involvement |
| <input checked="" type="checkbox"/> Planning new facilities | <input checked="" type="checkbox"/> Public education |
| <input checked="" type="checkbox"/> Engineering and/or construction | <input checked="" type="checkbox"/> Resource use |

11. Which of the following subjects are important to the work of your organization?

- | | |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> Public safety | <input checked="" type="checkbox"/> Control of land use |
| <input checked="" type="checkbox"/> Recreational use of water/land resources | <input checked="" type="checkbox"/> Environmental preservation |
| <input type="checkbox"/> Conservation of wildlife | <input checked="" type="checkbox"/> Other <u>Operation of Utilities</u> |
| <input checked="" type="checkbox"/> Management of resources related to water | |

12. What organizations do you regularly contact during the course of work?

Too many to list

13. What specific regulations/rules dealing with public safety/management does your organization use?

- | | |
|--------------------------------------------------------------|------------------------------------------------------------|
| <input checked="" type="checkbox"/> Federal laws/regulations | <input checked="" type="checkbox"/> Agency rules/policies |
| <input type="checkbox"/> Other sources | <input checked="" type="checkbox"/> State laws/regulations |

14. Does your organization have jurisdiction over other organizations?

- Yes No

15. If the answer to question 14 is yes, please list these organizations.

a. _____

b. _____

c. _____

16. Other Information:

APPENDIX G
RECOMMENDATION COST SUMMARY TABLES

**Area 1A
Detailed Subsurface Removal Cost Estimate¹¹**

Site	Recommended Cleanup Action	Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 1A	Subsurface Clearance	1	20	Moderate/Level	1.20	Moderate	\$3,000.00	\$11,500.00	\$276,000.00	\$60,000.00	\$0.00	\$336,000.00
											<u>A-E Field Oversight</u>¹⁵	\$33,120.00
											<u>A-E Project Management</u>¹⁶	\$22,080.00
											<u>Land Survey Costs</u>¹⁷	\$10,000.00
											<u>Subtotal</u>	\$341,200.00
											<u>Costs Contracting & Oversight</u>¹⁸	\$51,180.00
											<u>Evacuation Compensation</u>¹⁹	\$17,000.00
											<u>10% Contingency</u>	\$39,238.00
											<u>Total Cost Estimate</u>	\$448,618.00
											<u>Approximate Cost per acre</u>	\$22,430.90

Notes:

- ¹¹ The costing is based on the assumption that the subsurface clearance will be implemented independently at the site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.
- ¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on using "Mag and Flag" technique similar to applied during Lakeview Time Critical Removal. The number of anomalies requiring investigation is estimated to be between 100 – 300 per acre based on the EE/CA data. A multiplier of 1.2 was used to account for site specific vegetation and terrain conditions.
- ¹³ Brush cutting costs based on the moderate vegetation density and is obtained from the Cost Estimating Guide
- ¹⁴ Site Specific Institutional Controls measures are not planned for this site.
- ¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.
- ¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.
- ¹⁷ Land survey costs are lump sum and include marking site boundaries and establishing a contiguous 100' by 100' grid network throughout the 20 acre site.
- ¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.
- ¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day. For Area1A - Estimated 10 residential dwellings for 5 four-day weeks = 20 days. $(\$55 \times 20 \times 10) + (10 \times 2 \times 20 \times \$15) = \$17,000$.

Site	Recommended Cleanup Action	Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ²	Existing Brush Density	Brush Removal Cost/Acre ³	Ordnance Removal Cost/Acre ³	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ⁴	Net Cost
Area 4A	Surface Clearance	NA	34	Moderate/Level	1.20	Medium Density	\$1,700.00	\$2,200.00	\$89,760.00	\$57,800.00	\$0.00	\$147,560.00
<u>A-E Field Oversight⁵</u> \$10,771.20 <u>A-E Project Management⁶</u> \$7,180.80 <u>Land Survey Costs⁷</u> \$17,000.00 <u>Subtotal</u> \$182,512.00 <u>Costs Contracting & Oversight⁸</u> \$27,376.80 <u>Evacuation Compensation⁹</u> \$3,060.00 <u>10% Contingency</u> \$20,988.88 <u>Total Cost Estimate</u> \$233,937.68 <u>Approximate Cost per acre</u> \$6,880.52												

Notes:

¹ The costing is based on the assumption that the surface clearance will be implemented independently at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted surface clearance only. The number of surface anomalies requiring investigation is estimated to be 50+ per acre based on the EE/CA data. A multiplier of 1.2 was used to account for moderate vegetation and relatively flat terrain.

³ Brush cutting costs based on the moderate vegetation density and is obtained from the Cost Estimating Guide

⁴ Site Specific Institutional Controls measures are not planned for this site.

⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

⁶ A-E Project Management estimated at 8% of ordnance removal costs.

⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a contiguous 500' by 500' grid network throughout the 34 acre site.

⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day. For Area 4A - Estimated 3 residential dwellings for 3 four-day weeks = 12 days. $(\$55 \times 12 \times 3) + (12 \times 2 \times 3 \times \$15) = \$3,060$.

Area 4A
Detailed Subsurface Cost Estimate¹¹

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4A	Subsurface Clearance	1-2	34	Moderate/Level	1.20	Medium Density	\$2,100.00	\$8,600.00	\$350,880.00	\$71,400.00	\$0.00	\$422,280.00
											<u>A-E Field Oversight</u> ¹⁵	\$42,105.60
											<u>A-E Project Management</u> ¹⁶	\$28,070.40
											<u>Land Survey Costs</u> ¹⁷	\$21,000.00
											<u>Subtotal</u>	\$513,456.00
											<u>Costs Contracting & Oversight</u> ¹⁸	\$77,018.40
											<u>Evacuation Compensation</u> ¹⁹	\$5,100.00
											<u>10% Contingency</u>	\$59,047.44
											<u>Total Cost Estimate</u>	\$654,621.84
											<u>Approximate Cost per acre</u>	\$19,253.58

Notes:

¹¹ The costing is based on the assumption that the subsurface clearance will be implemented independently at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on manual digital geophysical mapping (DGM).

The number of anomalies requiring investigation after DGM is estimated to be 25-75 per acre based on the EE/CA data.

A multiplier of 1.2 was used to account for vegetation and terrain.

¹³ Brush cutting costs based on the moderate vegetation density and is obtained from the Cost Estimating Guide

¹⁴ Site Specific Institutional Controls measures are not planned for this site.

¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.

¹⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a contiguous 100' by 100' grid network throughout the 34 acre site.

¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated.

Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day.

For Area 4A - Estimated 3 residential dwellings for 5 four-day weeks = 20 days. $(\$55 \times 20 \times 3) + (20 \times 2 \times 3 \times \$15) = \$5,100$.

Area 4B
Detailed Subsurface Cost Estimate¹¹

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4B	Subsurface Clearance	1-2	10	Open/Level	1.00	Light Density	\$250.00	\$12,200.00	\$122,000.00	\$2,500.00	\$0.00	\$124,500.00
											<u>A-E Field Oversight</u>¹⁵	\$14,640.00
											<u>A-E Project Management</u>¹⁶	\$9,760.00
											<u>Land Survey Costs</u>¹⁷	\$8,000.00
											<u>Subtotal</u>	\$156,900.00
											<u>Costs Contracting & Oversight</u>¹⁸	\$23,535.00
											<u>Evacuation Compensation</u>¹⁹	\$680.00
											<u>10% Contingency</u>	\$18,043.50
											<u>Total Cost Estimate</u>	\$199,158.50
											<u>Approximate Cost per acre</u>	\$19,915.85

Notes:

¹¹ The costing is based on the assumption that the subsurface clearance will be implemented individually at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on manual digital geophysical mapping (DGM). The number of anomalies requiring investigation after DGM is estimated to be 25-75 per acre based on the EE/CA data and land use (plow parts and other farm equipment). A multiplier of 1.0 was used to account for vegetation and terrain.

¹³ Brush cutting costs based on the vegetation density and is obtained from the Cost Estimating Guide

¹⁴ Site Specific Institutional Controls measures are not planned for this site.

¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.

¹⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a 100' by 100' grid system within the site for clearance.

¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated.

Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day.

For Area 4B - Estimated 1 residential dwelling for 2 four-day weeks = 8 days. $(\$55 \times 8 \times 1) + (8 \times 2 \times 1 \times \$15) = \$680$.

Area 4C
Detailed Subsurface Cost Estimate¹¹

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4C	Subsurface Clearance	2+	16	Open/Level	1.00	Light Density	\$500.00	\$13,000.00	\$208,000.00	\$8,000.00	\$0.00	\$216,000.00
											<u>A-E Field Oversight</u> ¹⁵	\$24,960.00
											<u>A-E Project Management</u> ¹⁶	\$16,640.00
											<u>Land Survey Costs</u> ¹⁷	\$15,000.00
											<u>Subtotal</u>	\$272,600.00
											<u>Costs Contracting & Oversight</u> ¹⁸	\$40,890.00
											<u>Evacuation Compensation</u> ¹⁹	\$8,160.00
											<u>10% Contingency</u>	\$31,349.00
											<u>Total Cost Estimate</u>	\$352,999.00
											<u>Approximate Cost per acre</u>	\$22,062.44

Notes:

- ¹¹ The costing is based on the assumption that the clearance will be implemented individually at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.
- ¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on manual digital geophysical mapping (DGM). The number of anomalies requiring investigation after DGM is estimated to be >75 per acre based on the EE/CA data, proximity to former target, and cultural residential debris. A multiplier of 1.0 was used to account for vegetation and terrain.
- ¹³ Brush cutting costs based on the vegetation density at each site and they are obtained from USAESC-Huntsville Cost Estimating Guide
- ¹⁴ Site Specific Institutional Controls measures are not planned for this site.
- ¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.
- ¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.
- ¹⁷ Land survey costs are lump sum and it will include marking residential site boundaries and establishing a 100' by 100' grid system within the residential subsites for clearance.
- ¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.
- ¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day. For Area 4C - Estimated 8 residential dwellings for 3 four-day weeks = 12 days. $(\$55 \times 12 \times 8) + (12 \times 2 \times 8 \times \$15) = \$8,160$.

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4D	Subsurface Clearance	2 Feet	317	Light/Moderate	1.20	Light Density	\$250.00	\$12,500.00	\$4,755,000.00	\$79,250.00	\$0.00	\$4,834,250.00
<u>A-E Field Oversight</u>¹⁵ \$570,600.00 <u>A-E Project Management</u>¹⁶ \$380,400.00 <u>Land Survey Costs</u>¹⁷ \$180,000.00 <u>Subtotal</u> \$5,965,250.00 <u>Costs Contracting & Oversight</u>¹⁸ \$894,787.50 <u>Evacuation Compensation</u>¹⁹ \$16,320.00 <u>10% Contingency</u> \$686,003.75 <u>Total Cost Estimate</u> \$7,562,361.25 <u>Approximate Cost per acre</u> \$23,856.03												

Notes:

¹¹ The costing is based on the assumption that the subsurface clearance will be implemented independently at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted subsurface clearance - Mag and Dig. The number of anomalies requiring investigation is estimated to be 100-300 per acre based on the EE/CA data.

A multiplier of 1.2 was used to account for light vegetation and rough terrain. Only agriculturally-used portion of site (estimated at 317 acres) would be cleared.

¹³ Brush cutting costs based on the light vegetation density (agricultural use fields) and is obtained from the Cost Estimating Guide.

¹⁴ Site Specific Institutional Controls measures are not planned for this site.

¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.

¹⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a contiguous 100' by 100' grid network throughout the 1837 acre site.

¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day.

For Area 4D - Estimated 8 residential dwellings for 6 four-day weeks = 24 days. $(\$55 \times 24 \times 8) + (24 \times 2 \times 8 \times \$15) = \$16,320$.

Area 4
Detailed Surface Cost Estimate

Site	Recommended Cleanup Action	Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4	Surface Clearance	NA	21139	Moderate/Moderate	1.25	Medium Density	\$750.00	\$2,200.00	\$58,132,250.00	\$15,854,250.00	\$0.00	\$73,986,500.00
											<u>A-E Field Oversight</u>¹⁵	\$6,975,870.00
											<u>A-E Project Management</u>¹⁶	\$4,650,580.00
											<u>Land Survey Costs</u>¹⁷	\$3,000,000.00
											<u>Subtotal</u>	\$88,612,950.00
											<u>Costs Contracting & Oversight</u>¹⁸	\$13,291,942.50
											<u>Evacuation Compensation</u>¹⁹	\$1,377,000.00
											<u>10% Contingency</u>	\$10,190,489.25
											<u>Total Cost Estimate</u>	\$113,472,381.75
											<u>Approximate Cost per acre</u>	\$5,367.92

Notes:

- ¹¹ The costing is based on the assumption that the surface clearance will be implemented independently at this site.
- ¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted surface clearance only. The number of surface anomalies requiring investigation is estimated to be 50+ per acre based on the EE/CA data. A multiplier of 1.25 was used to account for moderate vegetation and terrain.
- ¹³ Brush cutting costs based on the moderate vegetation density and is obtained from the Cost Estimating Guide. Mechanized equipment would be utilized to reduce per acre cost. Portion of site is agricultural use and/or logged. Surface clearance would not require clearance level as would be needed for subsurface clearance.
- ¹⁴ Site Specific Institutional Controls measures are not planned for this site.
- ¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.
- ¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.
- ¹⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a contiguous 500' by 500' grid network throughout the 21,000 acre site.
- ¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.
- ¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day. For Area 4 - Estimated 225 residential dwellings (on average and not same throughout) for 12 four-day weeks = 2700 days. $(\$55 \times 2700 \times 6) + (2700 \times 2 \times 6 \times \$15) = \$1,377,000$.

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹⁴	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Area 4	Subsurface Clearance	2 Feet	21139	Moderate/Moderate	1.50	Medium Density	\$1,500.00	\$9,800.00	\$310,743,300.00	\$31,708,500.00	\$0.00	\$342,451,800.00
<u>A-E Field Oversight</u> ¹⁵ \$37,289,196.00 <u>A-E Project Management</u> ¹⁶ \$24,859,464.00 <u>Land Survey Costs</u> ¹⁷ \$3,000,000.00 <u>Subtotal</u> \$407,600,460.00 <u>Costs Contracting & Oversight</u> ¹⁸ \$61,140,069.00 <u>Evacuation Compensation</u> ¹⁹ \$3,000,000.00 <u>10% Contingency</u> \$46,874,052.90 <u>Total Cost Estimate</u> \$518,614,581.90 <u>Approximate Cost per acre</u> \$24,533.54												

Notes:

¹¹ The costing is based on the assumption that the subsurface clearance will be implemented independently at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted subsurface - Mag and Dig. clearance only. The number of anomalies requiring investigation is estimated to be > 300 per acre based on the EE/CA data.

A multiplier of 1.5 was used to account for moderate vegetation and rough terrain.

¹³ Brush cutting costs based on the moderate vegetation density and is obtained from the Cost Estimating Guide. Mechanized equipment would be utilized to reduce per acre cost. Portion of site is agricultural use and/or logged. Subsurface clearance would require clearance level over and above that needed for surface clearance only.

¹⁴ Site Specific Institutional Controls measures are not planned for this site.

¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.

¹⁷ Land survey costs are lump sum and it will include marking site boundaries and establishing a contiguous 100' by 100' grid network throughout the 1837 acre site.

¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated.

Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day.

For Area 4 - Estimated 225 residential dwellings (on average and not same throughout) for 12 four-day weeks = 2700 days. $(\$55 \times 2700 \times 6) + (2700 \times 2 \times 6 \times \$15) = \$1,377,000$.

**Lakeview Subdivision
Detailed Subsurface Cost Estimate¹¹**

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Lakeview Subdivision	Subsurface Clearance	2	26	Moderate/Level	1.20	Light	\$400.00	\$7,185.00	\$224,172.00	\$10,400.00	\$0.00	\$234,572.00
											<u>A-E Field Oversight</u>¹⁵	\$26,900.64
											<u>A-E Project Management</u>¹⁶	\$17,933.76
											<u>Land Survey Costs</u>¹⁷	\$5,000.00
											<u>Subtotal</u>	\$284,406.40
											<u>Costs Contracting & Oversight</u>¹⁸	\$42,660.96
											<u>Evacuation Compensation</u>¹⁹	\$13,600.00
											<u>10% Contingency</u>	\$32,706.74
											<u>Total Cost Estimate</u>	\$373,374.10
											<u>Approximate Cost per acre</u>	\$14,360.54

Notes:

¹¹ The costing is based on the assumption that the subsurface clearance will be implemented individually at this site. The costs may be less if the clearance is contracted and implemented concurrently with other sites.

¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted subsurface clearance - Mag and Dig. The number of anomalies requiring investigation is estimated to be 25-75 per acre based on the EE/CA data and the USAESCH TCRA DGM interpretation.

A multiplier of 1.2 was used to account for moderate vegetation and rough terrain.

Assumes worst-case that all 26 acres require subsurface investigation. Application of iterative approach as specified in Appendix B is planned.

Based on review of DGM survey map: Estimated 1500 total anomalies for reacquisition and further subsurface investigation.

Since the residential dwellings are in proximity to an active public road (Roberts Chapel), costs associated with local police guarding of MSD included here. Assume 12 days x 2 guards x 10 hours/day x \$20/hour = \$4800.

¹³ Brush cutting costs are minimal for the Lakeview Subdivision as most of the necessary vegetation removal was completed during the TCRA.

¹⁴ Site Specific Institutional Controls measures are not planned for this site.

¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.

¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.

¹⁷ Land survey costs are lump sum and would be limited only to re-establishing grids previously set during the TCRA.

¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.

¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated.

Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day.

For Lakeview - Estimated 10 residential dwellings for 4 four-day weeks = 16 days. (\$55 x 16 x 10) + (10 x 2 x 16 x \$15) = \$13,600.

Residential Footprint Removal Costs

Site	Recommended Cleanup Action	Estimated Depth of Clearance (ft)	Area of Clearance (Acres)	Existing Vegetation (V) / Terrain (T)	V/T Modifier ¹²	Existing Brush Density	Brush Removal Cost/Acre ¹³	Ordnance Removal Cost/Acre ¹²	Total Ordnance Removal Cost	Total Brush Removal Cost	Institutional Control Costs ¹⁴	Net Cost
Residential Footprint	Subsurface Clearance	Up to 4	2	Moderate/Level	1.00	Light	\$400.00	\$9,600.00	\$19,200.00	\$800.00	\$0.00	\$20,000.00
<u>A-E Field Oversight</u>¹⁵ \$2,304.00 <u>A-E Project Management</u>¹⁶ \$1,536.00 <u>Land Survey Costs</u>¹⁷ \$1,200.00 <u>Subtotal</u> \$25,040.00 <u>Costs Contracting & Oversight</u>¹⁸ \$3,756.00 <u>Evacuation Compensation</u>¹⁹ \$690.00 <u>10% Contingency</u> \$2,879.60 <u>Total Cost Estimate</u> \$32,365.60 <u>Approximate Cost per acre</u> \$16,182.80												

Notes:

- ¹¹ The costing is based on the assumption that the 2-acre subsurface clearance will be implemented at each residence within the subsector concurrently.
- ¹² Cost for OE Removal is based on the USAESCH Cost Estimating Guide, professional judgment, and actual costs from other similar sites. Cost is based on magnetometer-assisted subsurface clearance - Mag and Dig. The number of anomalies requiring investigation is estimated to be 400 per acre based on the EE/CA data, the USAESCH TCRA DGM interpretation, and likely cultural building debris contamination. A multiplier of 1.0 was used to account for anticipated low vegetation removal and level residential terrain. Since most residential dwellings will be in proximity to an active public road, costs associated with local police guarding of MSD included here. Assume 3 days x 2 guards x 10 hours/day x \$20/hour = \$1200.
- ¹³ Brush cutting costs are assumed relatively low since the clearance area is the primary residential footprint.
- ¹⁴ Site Specific Institutional Controls measures are not planned for the individual residential dwellings.
- ¹⁵ A-E Field Oversight estimated at 12% of total ordnance removal costs. Includes documentation and reporting.
- ¹⁶ A-E Project Management estimated at 8% of ordnance removal costs.
- ¹⁷ Land survey costs are lump sum and would be limited only to establishing grids and boundary of residential footprint.
- ¹⁸ Costs for Contracting and Oversight are estimated at 15% of the subtotal cost.
- ¹⁹ Evacuation costs based on the estimated number of residential dwellings within the anticipated minimum separation distance (MSD) for the site-specific munition anticipated. Evacuation anticipated between 7AM and 5PM. Assumes 2 residents per household average and reimbursement of \$55 for lodging and \$15 per person per day. Estimated 2 residential dwellings for 3 days per action, as locations are generally isolated. $(\$55 \times 2 \times 3) + (2 \times 4 \times 3 \times \$15) = \$690$.

APPENDIX H
KEY PROJECT CORRESPONDENCE
&
PROJECT-RELATED NEWSPAPER ARTICLES



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE ALABAMA 35807-4301

REPLY TO
ATTENTION OF

22 March 2001

A-E Contracts Division

SUBJECT: Limited Notice to proceed with field investigations for the Former Camp Butner, NC, Contract DACA87-95-D-0018 T.O. 0067.

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Mr. Silkebakken,

You are authorized to proceed with survey tasks only and to mobilize 5 people only to the Former Camp Butner. No geophysical mapping is authorized at this time. Mr. Bob Selfridge is still reviewing proveout data and will not be finished until early next week. At that time you will be given authorization to mobilize the rest of your employees to start the geophysical mapping of the site.


If you believe certain comments included herein constitute a change to your contract that has not been negotiated and agreed to, then do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553.

Sincerely,

LYNDA BONDS
CONTRACTING OFFICER

C.F.
Commander,
U.S. Army Engineer District, Wilmington,
ATTN: CESAW-TS-PE (John Baden)
PO Box 1890, Wilmington NC 28402-1890



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

27 March 2001

A-E Contracts Division

SUBJECT: Notice to proceed with field investigations for the Former Camp Butner, NC, Contract DACA87-95-D-0018 T.O. 0067.

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Mr. Silkebakken,

Your revised work plan dated February 2001 has been back checked and found to be acceptable. The data collected from your field prove out the week of 12 March 2001 has been analyzed and is also found to be acceptable. You are authorized to proceed with full field mobilization to perform site characterization at the former Camp Butner. You may proceed on 1 April 2001. Be sure to keep a corrected copy of the work plan and your copies of the rights of entry on site with you. Further more you are directed to notify the Huntsville Project Manager of in writing of the date you plan to do intrusive operations so that a Huntsville Safety employee can be present.

If you believe certain comments included herein constitute a change to your contract that has not been negotiated and agreed to, then do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553.

Sincerely



CHUN S. TUCKER
Contracting Officer

January 16, 2002

TO
DON SILKEBAKKEN

US Army Engineering & Support Center
ATTN: CEHNC-OE-DC, Roland Belew
4820 University Square
Huntsville, AL 35816-1822
256-895-1553

Subject: Proposed Phase I Geophysical Anomaly Ranking Methodology and Anomaly Selection Strategy
Engineering Evaluation/Cost Analysis
Former Camp Butner, North Carolina
Contract DACA87-95-D-0018, Delivery Order 0067

Dear Mr. Belew:

Parsons ES conducted the Phase I geophysical survey (approximately 100 acres) in support of the Camp Butner EE/CA between March 26, 2001 and July 13, 2001 using the EM-61 MK2 geophysical survey instrument. This letter is intended to document the project team concurrence of the Phase I Camp Butner Anomaly Ranking Methodology and associated Anomaly Selection Strategy as presented by Parsons ES in Huntsville on January 10 and 11, 2002. The process outlined below is intended to be a blueprint for the selection of the anomalies for intrusive investigation at the site. The ranking process developed for this project, and presented during the project review meeting of 10 January, 2002, was accepted without modification by all team members. This ranking process was applied to the population of 10,743 anomalies detected in the Phase I geophysical data, and resulted in the following breakdown of anomalies by rank:

- Rank 1 Anomalies: 3,893 total
- Rank 2 Anomalies: 3,624 total
- Rank 3 Anomalies: 2,268 total
- Rank 4 Anomalies: 958 total

The anomalies were then categorized by area and area-specific anomaly selection criteria were formulated by the project team. The area specific selection criteria considered both the anomaly rank and the type or types of UXO targets that are anticipated in each area. The area-specific selection criteria are summarized below. The attached spreadsheet summarizes the specific anomalies in each category (or subcategory) by site. From these lists the Parsons ES lead geophysicist will identify the proposed selections to USAESCH for final approval prior to commencement of intrusive activities. USAESCH will add discretionary QA selections for inclusion to the list.

For the purposes of the anomaly selection process, an anomaly response was considered distinguishable above background if it was 1.5 times greater than the upper background threshold as determined by the interpreting geophysicist. By definition, Rank 4 are of known sources.

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Mr. Roland Belew

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(utilities, corner spikes, QC spikes, surface fences, etc) and were excluded from further consideration. In the event a UXO item is encountered, intrusive investigation of the grid will immediately cease, the remaining anomalies identified for intrusive investigation will be banked, and the grid will be considered contaminated.

Area 1 – Cantonment Area and Vicinity

Suspected or potential UXO: Mostly small arms but 2.36-rocket found near water tower.

Anomaly Selection Criteria:

- Rank 1 anomalies: 100%
- Rank 2 anomalies with above-background responses on channels 1 through 3 or 1 through 4: 50%
- Rank 2 anomalies with above-background responses on channel 1 or channels 1 and 2: 10%
- Rank 2 anomalies with no channels distinguishable above background: 10%
- Rank 3 anomalies with above-background responses on channels 1 through 3 or 1 through 4: 50%
- Rank 3 anomalies with above-background responses on channel 1 or channels 1 and 2: 10%
- Rank 3 anomalies with no channels distinguishable above background: 10%
- Rank 3 anomalies with anomalous responses: 10%

Area 2 – Ammunition Storage Area & Dump

Suspected or potential UXO: 20mm-155mm HE Projectiles, 60mm-240mm mortars, 2.36-rockets.

Anomaly Selection Criteria:

- Rank 1 anomalies: 100%
- Rank 2 anomalies with above-background responses on channels 1 through 3 or 1 through 4: 25%
- Rank 2 anomalies with above-background responses on channel 1 or channels 1 and 2: 10%
- Rank 2 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with above-background responses on channels 1 through 3 or 1 through 4: 25%
- Rank 3 anomalies with above-background responses on channel 1 or channels 1 and 2: 10%
- Rank 3 anomalies with no channels distinguishable above background: 10%
- Rank 3 anomalies with anomalous responses: 10%

Mr. Roland Belew

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Area 3 – Grenade Training Ranges

Suspected or potential UXO: MKII Hand Grenades

Anomaly Selection Criteria:

- Rank 1 anomalies: 100%
- Rank 2 anomalies with above-background responses on channels 1 and 2, 1 through 3 or 1 through 4: 100%
- Rank 2 anomalies with above-background responses on channel 1 only: 10%
- Rank 2 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with above-background responses on channels 1 and 2, 1 through 3 or 1 through 4: 100%
- Rank 3 anomalies with above-background responses on channel 1 only: 10%
- Rank 3 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with anomalous responses: 10%

Area 4 – Ammunition Training Ranges & Impact Areas

Suspected or potential UXO: 20mm-155mm HE Projectiles, 60mm-240mm mortars, 2.36-rockets.

Anomaly Selection Criteria:

- Rank 1 anomalies: 100%
- Rank 2 anomalies with above-background responses on channels 1 and 2, 1 through 3 or 1 through 4: 100%
- Rank 2 anomalies with above-background responses on channel 1 only: 10%
- Rank 2 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with above-background responses on channels 1 and 2, 1 through 3 or 1 through 4: 100%
- Rank 3 anomalies with above-background responses on channel 1 only: 10%
- Rank 3 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with anomalous responses: 10%

Area 5 – Remaining Land

Suspected or potential UXO: None suspected but 20mm-155mm HE Projectiles, 60mm-240mm mortars, 2.36-rockets are all potential.

Anomaly Selection Criteria:

- Rank 1 anomalies: 100%
- Rank 2 anomalies with above-background responses on channels 1 and 2, 1 through 3 or 1 through 4: 25%
- Rank 2 anomalies with above-background responses on channel 1 only: 10%
- Rank 2 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with above-background responses on channels 1 through 3 or 1 through 4: 25%
- Rank 3 anomalies with above-background responses on channel 1 or channels 1 and 2: 10%
- Rank 3 anomalies with no channels distinguishable above background: 25%
- Rank 3 anomalies with anomalous responses: 10%


Mr. Roland Belew
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When less than 100% of a given group of anomalies is to be investigated, the selection will be made on a case-by-case basis for each grid or transect, and will be performed by one of the project geophysicists and based on professional judgment.

If you have any questions regarding this letter or need additional information, please contact me at (678) 969-2384 or (404) 606-0346 (cell).

Sincerely,


PARSONS ENGINEERING SCIENCE, INC.




Don Silkebakken, P.E.
Project Manager

cc: Andrew Schwartz/Laura Kelley (Parsons)
Bob Selfridge/Dan Plugge/Kevin Healy (USAESCH)
Project File (738001)

Concurrence:



Bob Selfridge (USAESCH Sr. Geophysicist)



Dan Plugge (USAESCH Project Geophysicist)

~~

Kevin Healy (USAESCH TM)~~



Roland Belew (USAESCH PM) 5/14/02



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

26 February 2002

Design Center for
Ordnance and Explosives Team

SUBJECT: Authorization to remobilize to complete
geophysical mapping at the Former Camp Butner, North
Carolina, Contract DACA87-00-D-0038 Task Order 0019.

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

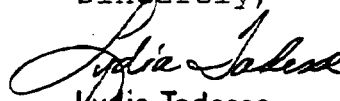
Mr. Silkebakken,

You are authorized to remobilize to the site to complete geophysical mapping started last year. This mapping was not completed due to depletion of funds. New funds could not be added to Contract DACA87-95-d-0018, Task Order 0067 so a new task order under the subject contract was issued. You are not authorized to perform any intrusive investigations, only to collect geophysical mapping data. This data will be analyzed by Huntsville Center and then you will be given authorization to re-mobilize later in the year after selection of anomalies to dig has been completed. You are directed to notify Mr. Roland Belew when you plan to start actual fieldwork.

If you believe certain comments included herein constitute a change to your contract, do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

If you have any questions, please contact
Mr. Roland Belew at commercial (256) 895-1553.

Sincerely,



Lydia Tadesse
Contracting Officer

Copy Furnished:
Commander, U.S. Army Engineer District, Wilmington,
ATTN: CESAW-TS-PE (John Baden), P.O. Box 1890,
Wilmington NC 28402-1890



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P O BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

July 10, 2002

Design Center for Ordnance
and Explosives Directorate

SUBJECT: Mag and Dig Characterization change to Work Plan
for the Former Camp Butner, North Carolina, Contract DACA87-
95-D-0018 Task Order 0067

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Dear Mr. Silkebakken:

This letter is in reference to your email dated July 1, 2002, in which you request to make a change in field operations to modify the geophysical mapping operations to include mag and flag and dig technology. You submitted in this email what you call Standard Operating Procedures for Analog Detection and Removal Actions. This is not the correct procedure for a change in field operating procedures. You must revise the existing work plan to reflect the proposed changes. The revised work plan will then be reviewed and approved for the change. The revised document should identify the revision date on the cover, include a cover letter stating what changes were made and an errata sheet showing what pages in the document were changed. You left 2 copies of the work plan in Mr. Belew's office on July 9, 2002. These copies had the original approval date of February 2001 on the cover and your original cover letter dated March 6, 2001, however, they had maps in them dated July 2002, but with no text changes referring to the proposed mag and flag and dig changes.

You are directed to provide 2 complete revised copies of the work plan to me as soon as possible. The revision must include an explanation for the revision as well as a means of pointing out and easily finding the changes in the revised document. The footer of every page that was changed must reflect the current date of the revision as well as the front cover.

You may proceed with intrusive investigations for those areas that were geophysically mapped under phase 1 and phase 2 field efforts, but you may not proceed with mag and flag characterization until you receive notification from me that you are authorized to do so. You may proceed to the site no earlier than July 28, 2002 for non-mag and dig work. After the mag and flag work plan changes are approved, I will issue you another letter authorizing you to proceed with that portion of the work.

If you believe certain comments included herein constitute a change to your contract that has not been negotiated and agreed to, then do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553 or via cellular phone at (256) 426-3717.

Sincerely,



Lydia Tadesse

Contracting Officer

Copy Furnished:

Commander,

U.S. Army Engineer District, Wilmington, ATTN: CESAW-TS-PE
(Mr. John Baden), P.O. Box 1890, Wilmington, North Carolina
28402-1890



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

July 15, 2002

Design Center for Ordnance
and Explosives Directorate (200-1c)

SUBJECT: Authorization for Mobilization to the Former Camp
Butner, North Carolina, Contract DACA87-95-D-0018 Task Order 0067

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Mr. Silkebakken,

You are authorized to mobilize two people to the former Camp
Butner on 23 July 2002 to perform logistics in advance of the
main crew mobilizing on 28 July.

If you believe certain comments included herein constitute a
change to your contract that has not been negotiated and agreed
to, then do not proceed with performance. Instead, formally
notify me of the basis of your position and await instructions.
I may (1) confirm that it is a change, direct the mode of further
performance, and plan for its funding; (2) countermand the
alleged change; or (3) notify you that no change is considered to
have occurred. Proceeding with performance without first
notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at
commercial (256) 895-1553 or via cellular phone at (256) 426-
3717.

Sincerely,

EDNA SHERIDAN
CONTRACTING OFFICER

Copy Furnished:
Commander, U.S. Army Engineer District, Wilmington, ATTN: CESAW-
TS-PE (John Baden), P.O. Box 1890,
Wilmington North Carolina 28402-1890



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

July 31, 2002

Design Center for Ordnance
and Explosives Directorate

SUBJECT: Approval to use Mag, Flag, and Dig Intrusive
on 35 acres at the Former Camp Butner, North Carolina,
Contract DACA87-00-D-0038 Task Order 0019

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

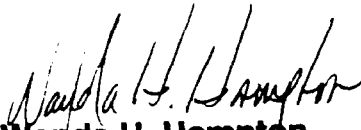
Dear Mr. Silkebakken:

Your revisions to Mr. Jim Walker's comments are acceptable. Your revisions to the work plan inserts are acceptable. You may proceed with mag and flag operations at this site.

If you believe certain comments included herein constitute a change to your contract that has not been negotiated and agreed to, then do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553 or via cellular phone at (256) 426-3717.

Sincerely,


Wanda H. Hampton
Contracting Officer

JOB NO.	741291 01
FILE DESIGNATION	
CALL DATE	08 19/02
TIME OF CALL	11:30 AM

INTERVIEW MEMO

INTERVIEWEE:	Bill and Bradley Jones	Local Resident(s)	PHONE NO: 919-693-7949
	(Name)	(Affiliation)	*919-405-9751 (Pager)
 INTERVIEWER(S):	Don Silkebakken John Baden	Parsons PM CESAW PM	PHONE NO: 678-969-2384
	(Name)	(Company)	

Summary of Events Prior to Discussion

John Baden of CESAW had been trying to interview Mr Bill Jones for some time and he was never in. He travels and works long hours and Mr. Baden had spoken to others in his family but not Mr. Jones. Others had told Mr. Baden that Mr. Jones knew a lot about the historical Camp Butner operation as he lived along range road (at his current residence) when he was a child.

Summary of Discussion

Mr. Baden and Mr. Silkebakken drove out to Mr. Jones' house in hopes of finding him home. He lives on the corner of old NC 75 (parallels East Range Road) and Enon Road in a house circa 1880. Mr. Jones has a number of shop buildings located adjacent to his house and we located him working in one building and he agreed to talk to us.

I showed Mr. Jones a set of topo maps of the site which included firing fan, proposed grid, and other information. He detailed very specifically memories from his childhood as well as ordnance-related findings over the years. He provided his phone number and invited us back at any time to discuss further. He also introduced us to his younger brother Bradley who later took us on a tour of their property and pointed out things we had discussed. The items below summarize the discussions::

- Bill stated when he was a boy he often observed night firing from his house. He observed the heavy artillery, mostly 155mm, originating not from the northern firing fans as we have been led to believe but from what remains the National Guard property. Thus firing north generally at the Mock German Village. He said the 155mm rounds make a whistling sound distinctive from the 105mm rounds and he was sure that much of the firing was with 155mm. He said there was a fair amount of night fire and could see the illumination rounds very well from his house. His house was just outside the range road and was thus spared from demolition and government seizure for Camp Butner. He stated his father had a pass to go on the Camp anytime there was no live fire and he often went as well. Although young at the time he was adamant regarding the direction of fire based on where his home is located and where he observed firing. The Jones family owns upwards of 2000 acres north of Enon and east of Moriah. They owned much of the property before the Camp was established and were able to get it back and then some as a result of his father's connections.
- Upon looking at the maps, Bill stated to his knowledge the large firing point at the northern site extreme (pointed due south) was not used for 155mm firing.

PHONE CALL MEMO

Page 2
August 29, 2002

- The large firing fan (with firing point along East Range Road) Bill stated was used for 2.36-inch bazooka training and stated numerous rockets had been found historically several thousand feet or so west of this point.
- Bill and Bradley both spoke of an old well that exists on their property that was filled up with 2.36 rockets many years ago. Bradley drove us to the location which is near one of his relative's homes. He pointed to a location and said it was within 30 feet of the spot. He said we were welcome to investigate it further with our equipment. If we are interested we need to let him know when so he can alert his relatives we are coming. **NEED TO FOLLOW UP ON THIS - JOHN.**
- Bill confirmed the location of the Mock German Village on Moriah and that it was a target for heavy artillery firing (from now NCNG). Bill pointed on the map to a large area (totally undeveloped) where they have historically found many 155mm rounds during road grading and logging of their property. He commented on a 155mm placed on a rock by loggers a couple of years ago. Coincidentally, an intact 155mm round was found in that area on a rock several days later and detonated by Ft. Bragg EOD.
- Bradley drove John and I throughout much of the Jones' property and pointed out areas where craters were located and where his family has found ordnance or ordnance debris. This information was documented on the field office site maps.
- Bradley drove us to a location where two suspect howitzer firing points were located just south of the old Jone's house. These concrete structures have been the source of recent local debate as to what they were. Some believe they had something to do with an adjacent cemetery (on the opposite side of the road). Both Bill and Bradley believe the structures held howitzers based on the angled shape and apparent track marks. If this is true, no historical firing fans are shown originating from this area. Further, the firing points would actually be outside of the Camp Butner boundary.



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

August 13, 2002

Design Center for Ordnance
and Explosives Directorate (200-1c)

SUBJECT: Government QA Dig List for the Former Camp Butner, North
Carolina, Contract DACA87-00-D-0039 T.O. 0019

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Mr. Silkebakken,

Your proposed dig sheets for the entire site (except the 35 acres to be sampled using mag and dig technology) have been reviewed. Huntsville Center geophysicists have also prepared for you a list of anomalies you are to also dig as part of our quality assurance process. The government selected digs are attached here.


Government comments on Quality Control (QC) concerns on some of the above digs were addressed by Mr. Greg Vann on 1 August 2002. The government concerns are related to an apparent lack of QC by Parsons Engineering during data analysis. These concerns will be addressed in another letter no later than 19 August 2002 by Mr. Bob Selfridge.

If you believe certain comments included herein constitute a change to your contract that has not been negotiated and agreed to, then do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

- 2 -

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553 or via cellular phone at (256) 426-3717.

Sincerely,


Lydia Tadesse
Contracting Officer

Copy Furnished:
Commander, U.S. Army Engineer District, Wilmington,
ATTN: CESAW-TS-PE (Mr. John Baden), P.O. Box 1890, Wilmington
North Carolina 28402-1890



August 14, 2002

US Army Engineering & Support Center
ATTN: CEHNC-CT-E, Lydia Tadesse
4820 University Square
Huntsville, AL 35816-1822

Subject: Contract DACA87-00-D-0038. Delivery Order 0019
Request to Use Open Front Barricades
Former Camp Butner Site, near Durham, North Carolina

Dear Ms. Tadesse:

Parsons Infrastructure & Technology Group, Inc. (Parsons) is currently conducting intrusive fieldwork for EE/CA investigation at the former Camp Butner site near Durham, North Carolina. In order to reduce the amount of evacuations required to ensure the appropriate minimum separation distances (MSD) for each area, Parsons' requests approval to use open front barricades (OFBs) where feasible. The OFBs ("Bud Lights") were constructed in accordance with USAESCH specifications and are currently stored at the site location. Appendix E of the approved project Work Plan includes the signed documentation and requirements for use and resulting modification of the MSD for this engineering control per Ms. Michelle Crull. The OFBs will not be used in areas where the most probable munition (MPM) is larger than the maximum rating for the OFB or where other more efficient means of conducting the investigation are available.

Written documentation of approval is required per approved Work Plan sections 5.1.9.4, 7.2.5, and 7.8.6.4. If you have any questions regarding this letter or need additional information, please contact me at (678) 969-2384 or (404) 606-0346 (cell).

Sincerely,

Parsons Infrastructure & Technology Group, Inc.

Don Silkebakken, P.E.
Project Manager

*Received 02
16 Aug
Roland Belew*

cc: Roland Belew (CEHNC-OE-DC)
Ken Stockwell, (Parsons)
Project File (741291)

*concern with above
request but not for
less than the
200ft restriction limit.
w/ls*

8/16/02
Lydia Tadesse
Lydia Tadesse 8/16/02
Contracting Officer

August 16, 2002

US Army Engineering & Support Center
ATTN: CEHNC-CT-E, Lydia Tadesse
4820 University Square
Huntsville, AL 35816-1822
256-895-1169

Subject: Contract DACA87-00-D-0038, Delivery Order 0019
Request for Re-Evaluation of Approved MSD
Former Camp Butner Site, Butner, North Carolina

Dear Ms. Tadesse:

Parsons is currently conducting intrusive field investigations in support of the EE/CA investigation at the former Camp Butner site near Durham, North Carolina. The Final EE/CA Work Plan was approved on 27 March 2001 under contract DACA87-95-D-0018, DO 0067 and intrusive fieldwork was initiated on July 29, 2002.

Investigation of Area 3 - Grenade Training Ranges has progressed for two days and yielded only numerous non-OE scrap to include bolts, plow parts, horse shoes, etc. No ordnance scrap of any kind has been recovered. The current Minimum Separation Distance (MSD) approved for this area is based on a Most Probable Munition (MPM) MKII hand grenade with MSD equal to 650 feet (see Work Plan map Figure 2.4). Area 3 encompasses 5 acres of mostly undeveloped pastureland. However, several moderately traveled roads are partially within the MSD. Parsons believes a reduction to the MSD is justified and requests approval to employ the one hazardous fragment per 600 square feet criteria for a this MPM (until such time as unexploded ordnance is encountered) thus reducing the MSD to 400 feet. This will alleviate some road guard and evacuation requirements. The on-site USAESCI Safety Officer, Jimmy Walker, concurs with the request and can substantiate the findings.

If you have any questions regarding this letter or need additional information, please contact me at (678) 969-2384 or (404) 606-0346 (cell).

Sincerely,

Concur Roland Belaw 8/16/02
Parsons Infrastructure & Technology Group, Inc.

Don Silkebakken, P.E.
Project Manager

cc: Roland Belaw (CEHNC-OE-DC)
Wayne Galloway (CEHNC-OE-S)
Ken Stockwell, (Parsons)
Project File (741291)

CEHNC-OE-S (200-1c)

19 August 2002

MEMORANDUM FOR CEHNC-OE-DC (Roland Belew)

SUBJECT: Minimum Separation Distance, Contract Number DACA 87-95-D-0018, Delivery Order 0067, Area 3, Camp Butner, Durham, NC

1. References:


a. CEHNC-OE-CX, Interim Guidance Document 00-01, 2 March 2000.

b. Memo, Parsons Infrastructure & Technology Group, Inc, 16 August 2002.


2. Your request to reduce the Minimum Separation Distance (MSD) for intrusive work at Area 3, Camp Butner, Durham, NC, is approved. You may use the 1/600 MSD for the MK II HE Hand Grenade. The 1/600 distance is 400 feet.

3. This reduced distance is based on the MK II HE Hand Grenade having the greatest 1/600 distance for the known munitions located. No UXO are anticipated in this area. Should UXO or any live munition be located, all intrusive work shall stop, this office notified, and this approval reevaluated.

4. Questions regarding this matter should be directed to Mr. Greg Parsons, OE Safety Group, at 256-895-1589.


WAYNE H. GALLOWAY
Chief, Safety Group
for Ordnance and Explosives Directorate

CF:
OE-DC Read
OE Read
OE-S Read
ED File/Read

 Parsons/jc/1589/1/600-Former Camp Butner

Minimum Separation Distances
Former Camp Butner
Mk II Grenade
12 October, 2000

REQUESTED BY: Roland Belew
PREPARED BY: Sherene Rizvi

This form shows calculated distances only. It does not constitute approval. Concurrence of CEHNC-OE-S is required to determine the applicable distance for a specific site.

In accordance with (IAW) OE Center of Expertise Interim Guidance Document 00-01, use of the range to no more than 1 hazardous fragment/600 sq ft as the minimum separation distance for accidental detonations requires written justification, a risk analysis, calculation of this distance by CEHNC-ED-CS-S, and concurrence of CEHNC-OE-S.

CALCULATIONS FOR UNINTENTIONAL DETONATIONS

Maximum Fragment Range = 650 ft
Range to No More Than 1 Hazardous Fragment/600 sq ft = 400 ft
Range to 0.9 psi Overpressure = 27 ft

IAW OE Center of Expertise Interim Guidance Document 00-01, the minimum separation distance for intentional detonations may not be less than the default distance provided in DoD 6055.9-STD or the maximum fragment range or the K328 overpressure distance.

CALCULATIONS FOR INTENTIONAL DETONATIONS

Maximum Fragment Range = 650 ft
K328 Overpressure Range = 174 ft

The primary fragmentation characteristics used in the calculation of the values listed above were computed IAW CEHNC-ED-CS-S-98-1. The maximum fragment range was calculated using the maximum weight fragment and the initial velocity from these characteristics in the computer software TRAJ. The range to no more than 1 hazardous fragment/600 sq ft was calculated IAW CEHNC-ED-CS-S-98-2.

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = 12 in. with 6" standoff between munition and sandbags
Sandbag Throw Distance = 25 ft
Minimum Separation Distance = 200 ft

**Minimum Separation Distances
Former Camp Butner
Mk II Grenade
12 October, 2000**

The required sandbag thickness and the sandbag throw distance were calculated IAW CEHNC-ED-CS-S-98-7. The minimum separation distance is based on the largest of the sandbag throw distance or 200 ft or the K328 distance for the total NEW (munition plus donor charge). A copy of HNC-ED-CS-S-98-7, "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions" must be available on site. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report.

MINIMUM SEPARATION DISTANCES WHILE USING MOFB DURING INTRUSIVE ACTIVITIES

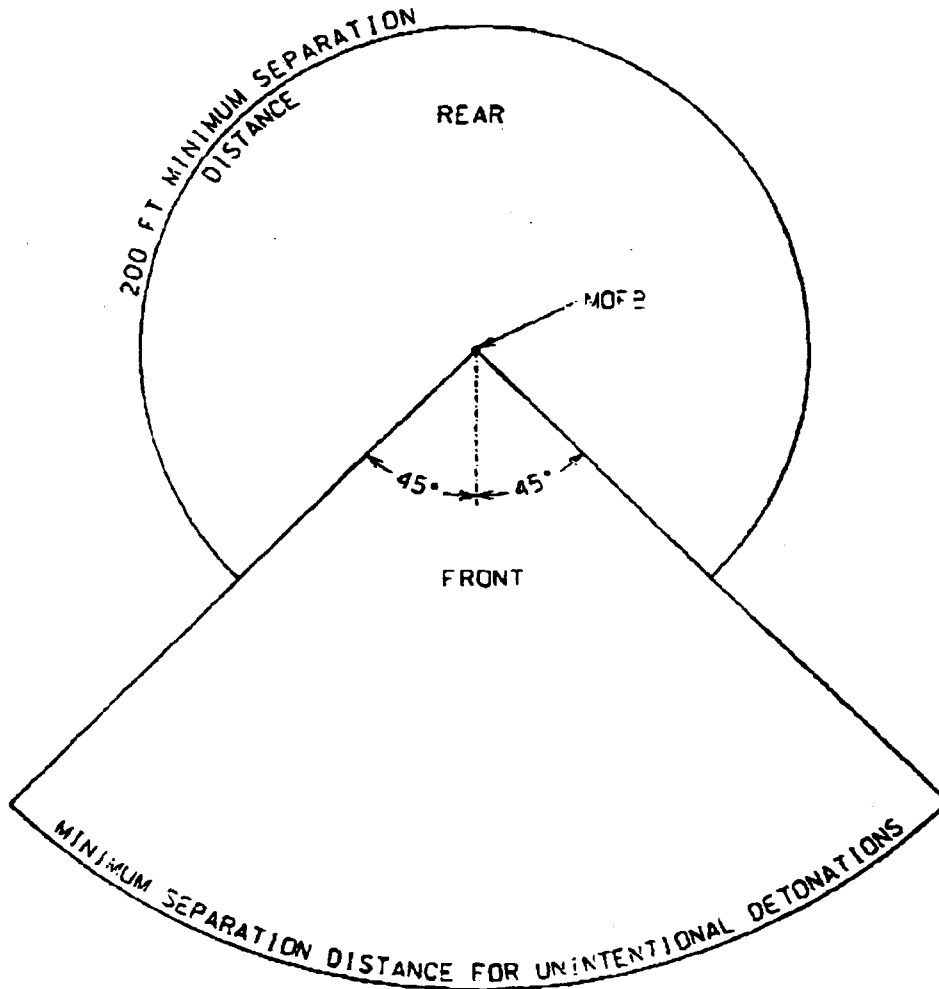
Design of the Miniature Open Front Barricade (MOFB) is in accordance with HNC-ED-CS-S-98-8, "Miniature Open Front Barricade". This document was approved by the DDESB. This report may be downloaded from the USAESCH homepage at <http://www.hnd.usace.army.mil/oew/tech/AnalyticalTools/analindx.htm>. The first time you access the site you will have to register. You will be notified by e-mail when your login and password have been activated. You must have a login and password to download the report. DDESB has placed certain restrictions on the approved usage of the MOFB. These are listed in the approval letter in the front of the report.

Thickness of Aluminum Required to Prevent Perforation = 1.00 in

The MOFB is designed to defeat fragments to the rear and sides of the MOFB in the case of an accidental/unintentional detonation during intrusive activities. The fragment distances to the front of the MOFB are the same as the fragment distances without the MOFB (see figure). The MOFB is not designed to reduce the effects of blast overpressure. The MOFB may not be used for intentional detonations. The minimum separation distances to the rear and sides of the MOFB must be maintained based on the expected throw distance of the MOFB itself.

Minimum Separation Distance to sides and rear = 200 ft
Minimum Separation Distance to front = 650 ft
K50 distance = 27 ft

Minimum Separation Distances
Former Camp Butner
Mk II Grenade
12 October, 2000



MINIMUM SEPARATION DISTANCE FOR UNINTENTIONAL DETONATIONS
USING MINIATURE OPEN FRONT BARRICADE DURING INTRUSIVE ACTIVITIES

SIGNATURES:

Shirley M. Rizzo 10/12/00
Subject Matter Expert

William H. Rhee Jr. 12 Oct 00
CEHNC-ED-CS S Branch Chief



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

August 16, 2002

Design Center for Ordnance
and Explosives Directorate

SUBJECT: Approval of workplan modifications at the Former Camp
Butner, North Carolina, Contract DACA87-00-D-0038 T.O. 0019

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

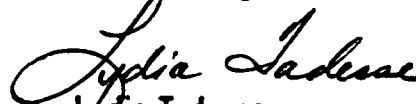
Dear Mr. Silkebakken,

Your corrections to your 31 July 2002 work plan revisions
have been reviewed and are acceptable as attached. You may
proceed with your work based on these revisions.

If you believe certain comments included herein constitute a
change to your contract that has not been negotiated and agreed
to, then do not proceed with performance. Instead, formally
notify me of the basis of your position and await instructions.
I may (1) confirm that it is a change, direct the mode of further
performance, and plan for its funding; (2) countermand the
alleged change; or (3) notify you that no change is considered to
have occurred. Proceeding with performance without first
notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at
commercial (256) 895-1553 or via cellular phone at (256) 426-
3717.

Sincerely,


Lydia Tadesse
Contracting Officer

Enclosure

Copy Furnished:

Commander, U.S. Army Engineer District, Wilmington, ATTN: CESAW-
TS-PE (Mr. John Baden), P.O. Box 1890, Wilmington North Carolina
28402-1890



Record of Changes/Revisions

Page Number	Paragraph #	Change	Reason for Change	Date
viii	NA	Add Appendix M reference to TOC	Addition of Appendix M to document.	7/9/02
Appendix M	New	SOP for Mag and Flag/Mag and Dig Survey	Adverse terrain and vegetation in some areas.	7/9/02
3-12	3.11.2.2	30 anomalies per acre to 75 anomalies per acre	Project modification	7/9/02
4-5	Table 4.2	For Area 4 and 5 added Mag and Flag to Type of Survey.	Adverse terrain and vegetation in some areas.	7/9/02
4-6	4.2.2.6	Added reference to new Appendix M	Revision of field procedure	7/9/02
4-8	4.3.2.3	Added reference to new Appendix M	Revision of field procedure	7/9/02
6-12	6.6.4.1.4	Added reference to new Appendix M	Revision of field procedure	7/9/02
6-14	6.6.8.1	Added reference to new Appendix M	Revision of field procedure	7/9/02
7-1	7.2.2	Added reference to new Appendix M	Revision of field procedure	7/9/02
Figures 6.1-6.8	NA	Figures Updated	Figures updated to show actual grid locations	7/9/02
Global	Global	HFA to USA	Change in UXO Subcontractor	7/9/02

Parsons

Parsons Infrastructure & Technology Group, Inc.
5390 Trangle Parkway • Suite 100 • Norcross, Georgia 30093 • (770) 446-4900 • Fax: (770) 446-4910 • www.parsons.com

October 17, 2002

US Army Engineering & Support Center
ATTN: CEHNC-CT-E, Lydia Tadesse
4820 University Square
Huntsville, AL 35816-1822
256-895-1169

Subject: Contract DACA87-00-D-0038, Delivery Order 0019
Request to Maintain Explosives Onsite
Former Camp Butner Site, near Durham, North Carolina

Dear Ms. Tadesse:

Parsons Infrastructure & Technology Group, Inc. (Parsons) is temporarily demobilizing from the EE/CA investigation at the former Camp Butner site near Durham, North Carolina on July 29, 2002 today (October 17, 2002). Remobilization for the Time Critical Removal Action is planned for January 2003 and will utilize the same explosive magazines and storage area. Parsons request approval to maintain explosives at the current approved magazine storage location located within the North Carolina National Guard Base property.

We have coordinated with the NCNG POC at the headquarters location, less than 2 miles from the magazine storage area, and they have agreed to perform daily inspections (Monday thru Friday) in accordance with the approved project Work Plan of the magazines, locks, and seals to identify any attempts of unauthorized access in accordance with ATF procedures. They have also agreed to perform the necessary documentation of this activity as part of their regular inspections of their storage areas.

Approval of this procedure will save the government money associated with reshipment and purchase of new explosives during the remobilization.

Please advise if this request is approved this afternoon or otherwise we will dispose of the explosives onsite as part of today's demobilization effort.

If you have any questions regarding this letter or need additional information, please contact me at (678) 969-2384 or (404) 606-0346 (cell).

*Concur with above request
LLB 10/17/02*

Lydia Tadesse
Lydia Tadesse 10/17/02
Contracting Officer

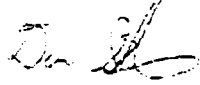
{

Parsons

Ms Tadesse
Page 2
October 17, 2002

Sincerely,

Parsons Infrastructure & Technology Group, Inc.



~~Dan Saxebacken, P.E.~~
Project Manager

cc: Roland Belew (CEHNC-OE-DC)
Wayne Galloway



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

December 6, 2002

Design Center for Ordnance
and Explosives Directorate

SUBJECT: Approval of Sampling Recommendations for the Former Camp
Butner, NC, Contract DACA87-00-D-0038 T.O. 0019.

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Mr. Silkebakken,

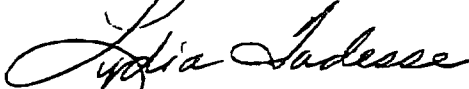
This letter is in reply to the Teleconference meeting conducted 4 November 2002 regarding field sampling on the subject task order. Parsons Engineering has recommended that no further sampling be done and presented the reasons why. The minutes of that conference call are enclosures 1 and 2. The Parsons presentation is enclosure 2. Your recommendation was presented to Ms. Shanon Crabb who is on contract with the U.S. Army Engineering and Support Center Huntsville. Ms. Crabb concurs with your recommendation that the area investigated exceeds the minimum area required to satisfy the statistical requirements of UXO Calculator. Therefore your request not to collect additional field data is approved.

If you believe certain comments included herein constitute a change to your contract, do not proceed with performance. Instead, formally notify me of the basis of your position and await instructions. I may (1) confirm that it is a change, direct the mode of further performance, and plan for its funding; (2) countermand the alleged change; or (3) notify you that no change is considered to have occurred. Proceeding with performance without first notifying me of your position will be at your own risk.

- 2 -

If you have any questions, please contact Mr. Roland Belew at commercial (256) 895-1553.

Sincerely,


Lydia Tadesse
Contracting Officer

2 Enclosures

Copy Furnished:

Commander, U.S. Army Engineer District, Wilmington, ATTN: CESAW-
TS-PE (Mr. John Baden), P.O. Box 1890, Wilmington NC 28402-1890



DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

March 13, 2003

Design Center for Ordnance
and Explosives Directorate

SUBJECT: Delivery of Blast Containment Structures to the
Wilmington Corps of Engineers Resident office in Falls Lake N.C.
on the Former Camp Butner, NC, Contract DACA87-00-D-0038 T.O.
0023.

Mr. Don Silkebakken
Parsons Engineering Science, Inc.
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

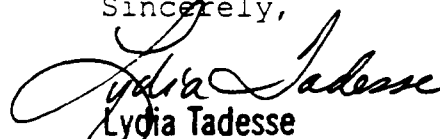
Dear Mr. Silkebakken,

This letter is to confirm that you were asked to move the
blast containment structures to the Wilmington Corps of Engineers
Resident Engineers warehouse after completion of your ordnance
removal at Lake View Subdivision. The units will remain there
and be available for future ordnance removals at former Camp
Butner.

If you believe certain comments included herein constitute a
change to your contract, do not proceed with performance. In-
stead, formally notify me of the basis of your position and await
instructions. I may (1) confirm that it is a change, direct the
mode of further performance, and plan for its funding; (2) coun-
termand the alleged change; or (3) notify you that no change is
considered to have occurred. Proceeding with performance without
first notifying me of your position will be at your own risk.

If you have any questions, please contact Mr. Roland Belew at
commercial (256) 895-1553.

Sincerely,


Lydia Tadesse
Contracting Officer

PROJECT-RELATED NEWSPAPER ARTICLES

GOVERNMENT ANALYZING RISKS | TOWN AWAITS WORD

Residents upset in Butner over old ordnance

Locals say tales are common of people finding shells while hunting or planting gardens

BY HUNTER LEWIS
Special to the Daily Record

BUTNER Durham police officers Kimberly and Danny Cash thought they had bought their dream home six years ago — that is, until their 9-year-old son picked up a live bazooka round while raking leaves in their front yard in November.

Since then, the Cashes have found three more shells or pieces of them, including a live 12 mm high explosive shell uncovered and safely detonated Wednesday by the U.S. Army Corps of Engineers.

"This is my dream home that just turned into a disaster," said Kimberly Cash, clutching her 2-year-old son, Taylor, on Thursday.

The Cashes' finds are not uncommon around Butner. Stories abound in this town of 5,000 of people stumbling across old bullets and shells, some as big as 125 mm, while plowing their fields or hunting in the forests in this part of southern Granville County.

The Army built a 40,000-acre base here in the 1940s to house and train 40,000 soldiers for World War II. Along with barracks, an Army hospital and a perimeter of wire dunes were a grenade range and 15 antiaircraft training ranges. And the Caliber house — unknown even to them when they bought it — sits just outside the target area for one of those old ranges.

The Cashes won't let their six children walk in the woods or play on their playground anymore.

"We can't let them feed the chickens or the dogs because we don't know what's under the ground," she said. "It's going to take someone to do to make this an issue. I don't feel safe living here."

Since the spring of 2006, Parsons Inc., an engineering firm hired by the Corps, has studied and surveyed the 40,000 acres of the former Camp Porter to determine how contaminated the land is with unexploded ordnance.

By January, Corps and Parsons officials say, they will have a detailed document, called an engineering evaluation report, that will explain the dangers and cost to clean up hundreds of shells and shrapnel.

To sample the area, Parsons workers mark several 100-by-100 foot grids. Then with handheld Global Positioning Systems and an industrial-strength metal detector, workers scan the grid. Since Aug.



Taylor Cash, now 10, spends a live bazooka round in the yard of the home he shares with his parents and five siblings in November. The Cash family recently had parts of their yard checked after another round was found and detonated (where the sand is on the right edge of the photo).

Please see SPHELLS | B3

SHELLS

FROM PAGE B1

S, they have found more than 1,000 pounds of horseshoes, plow blades and nails — and at least 200 fragments, fuses or entire shells of explosive devices.

Loggers found a live 155 mm shell Thursday in the woods north of the Cashes' home. The 37 mm shell found Wednesday inside one of these grids sat 11 yards from the Cashes' front door.

Corps officials assure the family and the other people living on old Camp Burner property that their land will be rid of at least 95 percent of explosives once the cleanup is finished.

But Cash and her neighbors in the 13-acre Lakeview Estates subdivision want their property cleaned up now.

"I don't want to live here, and I don't want to go home," Cash said. "My family could be sleeping on top of 80 mm shells."

Roman and Frances Vos moved next door to the Cashes in 1997. They said they bought their home for the "quiet and serenity."

"When we bought the property, [the fact that this was once an ammunition range] was not disclosed to us," Roman Vos said. "If I had known, we would have passed."

The Voses have hired a lawyer to uncover why there was no disclosure of the munitions.

Frances Vos, a retired Unstead Hospital nurse, said she was tired of "old-timers in the area saying, '[the munitions] have always been there.'"

"Sometimes in America, people



THE HERALD-SUN | KEVIN SPURFFORD

Kimberly Cash demonstrates where the head of a bazooka round would have been on an old round that her sons found detonated in their yard in Butner.

say, 'Oh, it's always been that way,' " she said. "But when a kid gets blown up, they say, 'Now we have a problem.'"

In 1983, two 8-year-old boys in San Diego died when a 37 mm shell they brought home and tinkered with exploded. And a 9-year-old child blew off an arm two years ago when he picked up a live shell. The San Diego incident spurred legislative action, and in the late 1980s, a federal program was created to start cleaning up areas around old military training grounds.

John Baden and Roland Belew, officials with the Corps who have worked on several cleanup projects nationwide, assured the Cashes and the Voses at a meeting Thursday night that they will focus their immediate attention

on the Lakeview neighborhood.

"I'm sympathetic," Belew said. "We're here to help, and we will do so as fast as we can."

Baden and Belew could not set a timetable for how long the immediate roundup of surface ordnance would take. Their first hurdle is securing money from the federal government to fund the cleanup. No small feat, they said, because there is little money to be found.

But Kimberly Cash urged them to hurry.

"If it was your children, would you let them stay in my house?" she asked.

Corps officials urge people who discover ordnance to stay away from it and call local authorities.

On the Net: www.parsons.com
www.projecthoop.com

**Camp Butler 2.36 inch shoulder fired
Anti tank UXO – This policeman mowed
Over it with his riding mower, then his
9 year old son picked it up and dumped it on
Porch. Ft Bragg EOD came and demo'd it in
Back yard. March 2002.**



MONDAY
SEPTEMBER 2, 2002

The Herald-Sun

DURHAM

SECTION B

OBITUARIES B2
SCHOOLS B4
MOVIES B5
COMICS B6

Ron Landfried, day editor
419-6630; rlandfried@heraldsun.com
Mark Schultz, night editor
419-6646; mschultz@heraldsun.com

WWW.HERALDSUN.COM

As a new school year gets under way, the feds comment on drug testing and counseling for students | B4

After recent slayings at look at the culture su

HOLIDAY CLOSINGS:
LABOR DAY

Students hear dangers of debt

Attorney general

This time around, Banks said
return on Sunday. For complete details, see DT

Old shells raise new legal questions

Live ordnance on WWII firing range creates problems for new homeowners in Butner

BY HUNTER LEWIS

hlewis@heraldsun.com 419-6651

BUTNER — Live shells turning up in a housing subdivision built on an old Army artillery range raise questions about who's to blame.

"This is a unique legal situation," said Dan Flebotte, a Durham attorney representing Kimberly and Danny Cash, who live in Lakeview Estates.

In November, the Cashes' 9-year-old son picked up a live bazooka round while raking leaves in their front yard. Since then, three more shells or pieces of them have been found there, including a live 37 mm high-explosive shell uncovered and safely detonated two weeks ago by the Army Corps of Engineers.

The latter find is part of an extensive survey by Parsons Inc., an engineering firm hired by the Corps. Parsons was hired to determine how many shells remain and how much danger

they pose to residents of the site of the former Camp Butner. Such discoveries have been relatively common since the Army training camp closed more than 50 years ago.

"We're looking into the responsibility of the U.S. government, of prior owners' disclosure and of the effective scope of title insurance that frequently insures [homeowners] from environmental issues," Flebotte said.

Flebotte cautions that it's too early to tell who is legally responsible for what could be scores of remaining explosives.

"But it's a very serious situation," he said.

As a real estate lawyer with 25 years of experience including 7,500 property transactions, Flebotte says he had never previously heard of a dispute over abandoned munitions on U.S. residential property.

In land issues, North Carolina is known as a caveat emptor, or "buyer

beware" state. That puts the onus on the buyer to uncover defects or to hire a home inspector to ensure a house is free of problems such as a leaky roof or faulty furnace.

When the Army pulled out of Butner in 1950 and sold the land, the deed mentioned unexploded shells. Over time, as the land was parceled out and sold, the original deed was not consulted, Flebotte said.

"As a real estate lawyer, we're only required to do a title search 40 years back," he said. "Any lawyer involved in [Lakeview Estates] would go back 40 years and not see there are live bombs. Enough time passes where things are not seen."

The Cashes bought their modular home from Jim Willette in 1996. They and neighbors Roman and Frances Vos say Willette never disclosed that the 13-acre subdivision was once the target area of one of eight artillery ranges.

Willette would not discuss the matter, and his lawyer, Tom Burnette of Oxford, could not be reached for comment.

please see SHELLS | B3

STREET SMARTS

Lanes will be open for trip home

Street Smarts is your

County offices
Fernald
with the National Farm
Ministry.
d pickle harvester Mamer
ake through an inter
old about his experi
at one of Mount Olive's
uppliers.
said that he worked for
four weeks picking cucum-
ad tobacco. He told his boss
had a pain in his side and
to be taken to a hospital but
fused, Chai said.
said that I was probably
and I should just take some
"Chai said.
Chai took a taxi to the hos-
e next day, he had to have
for appendicitis. He was
vo weeks later and told
re was no money to pay
so told of other abuses he
l from his boss while
on the farm.
ould threaten us, and he
me to our trailers with
and say he could kill us
wouldn't take anything
m him," Chai said. "He
ways threaten us, and I
yy why. We were work-
m."
id he became involved
Farm Labor Organizing
ich helped him
a. r workers recoup
ke students at Sunday's
ng to the organization.
roup with members on
tudents Against Sweat-
participated.



ASSOCIATED PRESS

rior, said none of the families hit by
ted history of domestic turmoil.

...of the families was
even on the news screen. None
had any reported history of
domestic turmoil.

"We need to come up with some
kind of program or something to
get rid of the myth" that soldiers
don't need help like other people,
Black says.

Andrea Floyd's mother, Peggy
Flitcraft, says she's not surprised
that domestic problems are kept
hushed up.

"These are superhumans, you
have to remember," she says.
"They don't have to have help—
supposedly."

Flitcraft, who is now caring for
her three orphaned grandchild-
ren at Alliance, Ohio, says it's
"like an unspoken rule that you
do not exhibit any inability to be
in control of every aspect of your
life."

She feels equally sad for her
son-in-law. "He was overtrained
and underhelped," she said
through sobs.

One soldier's wife, Janice Bur-
ton, says she's tired of seeing the

my business and
...ers
"They take care of their sol-
diers. They take care of their
family."

"That may be part of the prob-
lem, says Black.

"They're very good at taking
care of the problems and helping
out families," says Black. "But
there are some problems that
they may not have the training to
know that they need to be han-
dled by somebody else."

The team sent to investigate
the problem at Bragg may offer
some recommendations, but
Haney, the 20-year veteran, says
it's all just window dressing if
some fundamental changes
aren't made.

"I don't believe they're going
to do a blessed thing other than go
through the motions," he says.
"They'll go overboard with it for
six months, and there'll be
mandatory classes for every
returning special operations sol-
dier on not killing your wife."

"I mean, it's just the military
way of doing things."

EDITOR'S NOTE: Allen G. Breed is the
AP's Southeast regional writer, based
in Raleigh, N.C.

BOWLES MOST FORMIDABLE DEMO-
cratic primary opponents, for-
mer state House speaker Dan
Blue and N.C. Secretary of State
Elaine Marshall.

"This guy really has substan-
tial experience in Washington,"
said Townsend Ludington, a
UNC professor who in January
wrote Bowles a check for \$300,
the most he's ever given to a
candidate.

Dole, a former U.S. Cabinet

utor for this elec... has been
political science professor
Robert Keohane, who has
donated \$7,000, including sev-
eral donations to Emily's List,
according to PoliticalMoney-
Line. Keohane is the husband
of Duke President Nan Keo-
hane.

Dole, a Duke graduate, has
received the most support of the
Senate candidates: five dona-
tions totaling \$4,000.

SHELLS

FROM PAGE B1

ment.

In an earlier interview, Roman
Vos said he would not have
bought his home if he had
known about the shells. The
Voses also have hired a lawyer.

"I'm concerned about the
value of our property," Vos said.
"It was never disclosed what
we're sitting on top of. If we
were to sell, our conscience
would not allow us to not reveal
what we are sitting on."

Meanwhile, the Corps of Engi-

neers is seeking federal money
for a comprehensive cleanup of
the shells.

But Kimberly Cash said she
doesn't want to jeopardize the
safety of her six children any
longer.

"We're actively looking for
another place to stay, but we
can't find a place to rent while
paying mortgage," she said.
"This is turning into some-
thing very big, and it's not
getting the attention it needs.
I'm a little person in a little
house with a big family."

"We didn't grow up here, but I
don't think people comprehend
what the situation is."

Agencies such as the Durham
Center will no longer provide
direct assistance. Instead, they
will contract out private men-
tal health services, much like
the way private managed care
works.

More stringent eligibility cri-
teria will mean fewer people
will receive services. The state
is targeting people with severe
and persistent mental illness-
es. In Durham, about 7,300 peo-
ple currently receive services.
About 2,800, or less than half,
would be eligible for services
in the new system.

Local money could fund ser-
vices the state doesn't require
but which county residents
consider essential.

DEBT

FROM PAGE B1

since 2000. About 83 percent of
all undergraduate students own
at least one card.

By the end of their freshman
year, students have accumu-
lated an average \$1,500 cred-
it card balance, Cooper said.
By the junior year, that num-
ber rises to \$2,700, and by
graduation it increases to
\$3,200.

Added to student loans, the
debt burden can be onerous.
On average, graduates leave
school with combined loan and
credit card debt of \$20,402,
Nellie Mae notes.

Cooper stressed that stu-

card interest rates and annual
and late fees, as well as card
limits.

In an informal survey, Cooper
asked how many students in
the audience had a credit card.
Most raised their hands. When
he asked how many of them
knew their card's interest
rate, most hands went down.

"Some credit card interest
rates are up to 18 or 19 per-
cent," he said.

Students should try to find
cards that don't charge a
monthly or annual fee and
don't add fees for late pay-
ments, Cooper advised.

NCCU sophomore Cherese
Mitchell said she has three
credit cards that she prompt-
ly pays off every month. The
credit limits are \$200 or less.

credit card] for emergency
reasons," she said. "I'm pretty
responsible when I use them."

Credit cards can be good for
building credit or handling
emergencies, Cooper said, but
students should limit them-
selves to one card and pay it
off before the payment date to
avoid interest charges.

Mitchell and Banks, who
both attended the session led
by Cooper, said they gained a
lot of useful information.

The most important message
Mitchell got was to seek finan-
cial counseling if necessary.

"Whenever you need help, talk
to someone about your credit
card problems," she said.

Other tips from the Attorney
General's Office:

■ Shop around for cards that

fees, not the ones that hand
out the coolest gifts.

■ Compare interest rates and
read the fine print to know
how they can change.

■ Don't fall for the tease.
Some cards offer a low intro-
ductory rate, which then can
rise steeply.

■ Select cards that provide
grace periods to avoid paying
more interest. Also remember
that nearly all cards charge
interest on cash advances,
with no grace period.

■ Tell your credit company
you don't want them to sell
your personal information to
other businesses, to protect
your privacy and reduce addi-
tional offers.

■ Pay off the full balance on
your card every month if pos-
sible.

Old explosives, new jitters in Butner

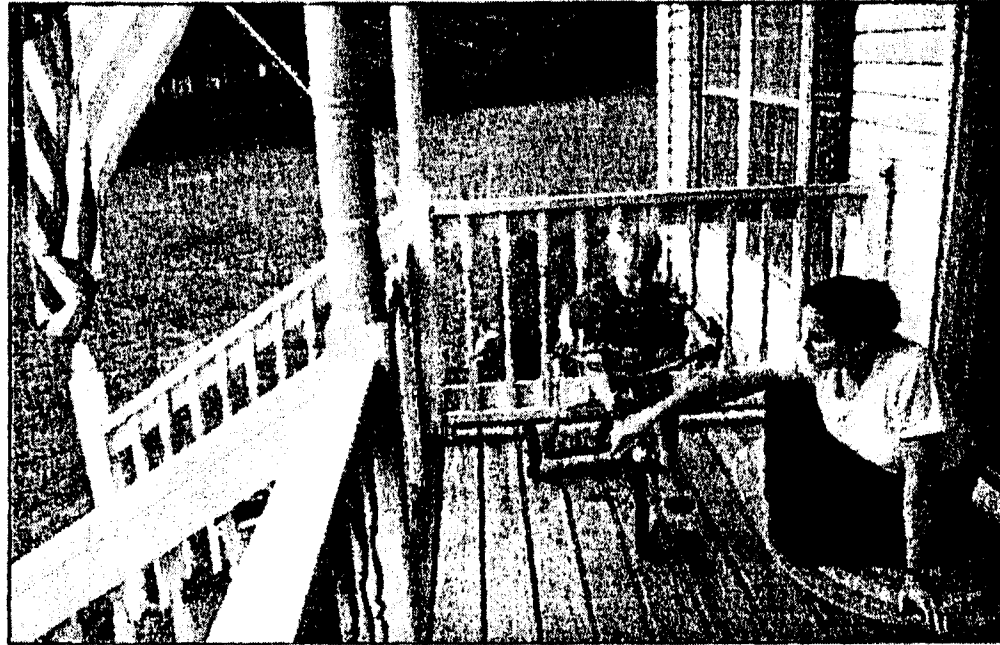
Former Army post can't bury its past

BY RICHARD STRADLING
STAFF WRITER

BUTNER - Nearly 60 years ago, Army soldiers preparing to fight World War II fired a 37 mm shell over the Camp Butner artillery range, where it landed in the soft earth. Two weeks ago, contractors for the Army came back to detonate the shell under a pile of sandbags about 35 feet from Kimberly and Danny Cash's house.

The shell is one of five pieces of live ammunition that the Army Corps of Engineers has found since it began searching the old artillery range last month. The corps is sampling a fraction of the 40,000-plus acres that were part of Camp Butner to determine whether anything the Army left behind poses a danger to people who live there now.

People have been turning up bullets and rusted fragments of



Kimberly Cash watches her son Justin as he plays on the front porch of the family home. The yard is now off-limits.

STAFF PHOTO BY SHER STONEMAN

grenades and shells in their woods, fields and yards since the Army closed Camp Butner in 1947 and sold more than half the land back to its original owners.

But now the tree-lined country roads of the old camp are attracting a new wave of residents

from the Triangle who might not know about the camp's past. The population of the Butner area has grown about 40 percent to about 14,000 since 1990, and dozens of new homes peek out from the woods. The Cashes worry that it's just a matter of time before a

new homeowner or backhoe operator hits a live round like the one found in their yard.

The Cashes, both Durham police officers, said they bought their house on two acres in 1998 because they wanted to give their children room to run. They said they had no inkling the land could have been part of an artillery range until Taylor Cash, 9, raked up an intact bazooka round last fall. Then, in May, Danny Cash uncovered a portion of a bazooka shell just behind the house.

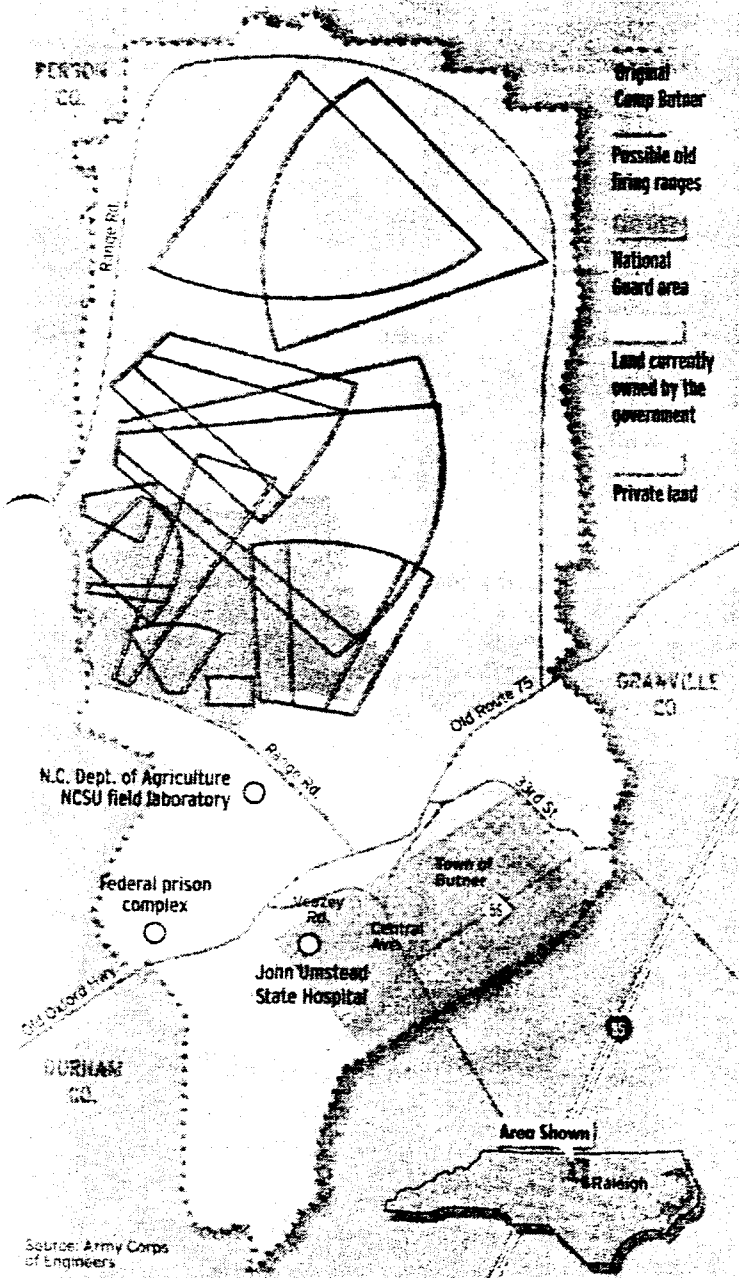
Now the couple confine the six children, ages 5 months to 11 years, to the porch or the concrete driveway, afraid to let them use their trampoline, swing set or the white gazebo where the Cashes were married. Rejuvenated by recent rains, the unmowed grass is nearly knee high.

"We're really considering leaving the property, walking away," Kimberly Cash said. "I will never feel safe in this house again."

SEE BUTNER, PAGE 14A

FORMER CAMP BUTNER

Established in 1942, Camp Butner covered 40,384 acres. Most of the land went back to private use after the base was closed in 1947. The Army Corps of Engineers is concentrating its search for explosives and other debris on the old artillery ranges, except for the N.C. Army National Guard training area.



WOODY VONDRACE / The News & Observer

BUTNER

CONTINUED FROM PAGE 1A

She fears a repeat of what happened in San Diego in 1983, when a tank shell on a former Army training range exploded in a subdivision, killing two 8-year-old boys. That incident helped prompt the Army to begin assessing what might be buried at more than 250 former military properties.

Last month, contractors hired by the corps began combing Butner using magnets and a global positioning system to search for what they call anomalies, "objects you wouldn't expect to see in the ground," said corps spokeswoman Penny Schmitt. The search, which will continue through November, covers the federal prison complex, John Umstead Hospital and various other state institutions, but excludes the 4,750-acre N.C. Army National Guard training camp.

The corps will report its findings next July, along with a recommendation of whether the Army should do more to clean up the area and an estimate of what it might cost. So far, in addition to the shell next to the Cash house, the corps has found and detonated 57 mm, 105 mm and 2.36-inch shells, Schmitt said.

Clarence Riley isn't surprised. In 1949, Riley earned 90 cents an hour on a crew of civilians that helped the Army clear shells and debris from the old Butner artillery ranges. He remembers coming across a shell that was 3 feet long and as big around as a five-gallon bucket.

"When they blew that one, you could hear it for five or six miles," said Riley, 73, who still lives on the family farm outside the former camp. "We got a right good ways back from that."

Riley said the crew inevitably left explosives behind, because they cleared only what they could see.

"We weren't going to rake all that ground to see what was under the leaves or the vines," he said. "There's still some spots up there that I would hesitate to go in."

The Army has spent about \$2.3 million on the Butner study so far, the final cost depends on how much the engineers uncover. The Army doesn't have money for cleanup, though, which is why the Cashes remain in limbo.

When the Army sold Butner



Kimberly Cash holds the nonexplosive portion of shell her husband found.

STAFF PHOTO BY SHER STONEMAN

back to its original owners, it placed covenants on the deeds restricting use of the land to the surface only, according to a 1993 corps report. Over the years, any mention of the artillery range and what might lie in the soil was dropped from many deeds, Schmitt said.

Some residents are ambivalent about the Army's legacy. Claude Campbell has lived inside the boundaries of the old camp for eight years but had not thought much about it until recent news accounts of the corps study. He recently moved into a new house along a stretch of Range Road that is lined by new homes and signs advertising land for sale.

"I guess it doesn't concern me," said Campbell, who runs the electronic systems at the federal prison. "I don't know if they did any bombing down this way."

But B.J. Elmore thinks it's a miracle no one has been killed on the range.

Elmore, who works for Xerox in Research Triangle Park, has lived off Range Road for 9½ years and keeps two exploded mortar rounds on her bookshelf. They look like rusted pipes with fins and one end "peeled back almost like a banana," she said. She stubbed her toe on one and hit the other with a lawn mower.

"We know it's here," she said. "We take a chance every time we dig a hole in the ground to put a fence post in. You never know."

Staff writer Richard Stradling can be reached at 829-4739 or rstradli@newsobserver.com.

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78 °F Sunny

TODAY: High 92°F; Low 58°F. Partly sunny; windy, hot.

TOMORROW: High 80°F; Low 52°F. Mostly sunny and nice.

STOCKS

DOW	8,720.72	118.11
NASDAQ	1,343.29	23.20
S&P 500	922.42	12.84

UPDATED 12:10 Eastern

MORE STORIES

- Triangle, world remember
- Bowles, Dole look to Nov. 5
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- More election news

More live rounds found near Butner

Associated Press

BUTNER – Kimberly and Danny Cash had no idea when they bought their house here that it rested on the edge of a World War II-era target range.

Then, while the two Durham police officers were raking leaves in their front yard last November, their 9-year-old son discovered a live bazooka shell.

Since then, the Cashes have found three more shells or pieces of them, including a live 37 mm high-explosive shell uncovered and safely detonated Wednesday by the U.S. Army Corps of Engineers. "This is my dream home that just turned into a disaster," Kimberly Cash said.

Stories abound in this town of 5,000 of people stumbling across old bullets and shells, some as big as 155 mm, while plowing their fields or hunting in the forests in this part of southern Granville County.

The Army built a 40,000-acre base in Butner in the 1940s to house and train 40,000 soldiers for World War II. Along with barracks, an Army hospital and a prisoner-of-war camp were a grenade range and 15 ammunition training ranges.

And the Cashes' home – unbeknownst to them when they bought it – sits just outside the target zone for one of those old ranges. They won't let their six children walk in the woods or play on their playground anymore.

"We can't let them feed the chickens or the dogs, because we don't know what's under the ground," she said. "It's going to take someone to die to make this an issue. I don't feel safe being here."

Roman and Frances Vos moved next door to the Cashes in 1997. They said they bought their home for the "quiet and serenity."

Vos has hired a lawyer to determine why there was no disclosure about the munitions.

"When we bought the property, the fact that this was once an ammunition range was not disclosed to us," Roman Vos said. "If I had of known, we would have passed."

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Since the spring of 2000, Parsons Inc., an engineering firm hired by the Corps, has studied and surveyed the 40,000 acres of the former Camp Butner to determine how contaminated the land is with ordnance and explosives.

By January, Corps and Parsons officials say, they will have a detailed document, called an engineering evaluation/cost analysis, that will explain the dangers and cost to clean up hundreds of shells and casings.

To sample the area, Parsons workers mark several 100-by-100-foot grids. Then with handheld Global Positioning Systems and an industrial-strength metal detector, workers scan the grid. Since Aug. 5, they have found more than 1,000 pounds of horseshoes, plow blades and nails – and at least 200 fragments, fuses or entire shells of explosive devices.

Loggers found a live 155 mm shell Thursday in the woods north of the Cashes' home. The 37 mm shell found Wednesday inside one of these grids sat 11 yards from the Cashes' front door.

Corps officials assure the family and the other people living on old Camp Butner property that their land will be rid of at least 95 percent of explosives once the cleanup is finished. They held a public hearing Thursday night to discuss the ordnance problem.

Kimberly Cash and her neighbors want quick action.

"If it was your children, would you let them stay in my house?" she asked.

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More live rounds found near Butner

Associated Press

BUTNER -- Kimberly and Danny Cash had no idea when they bought their house here that it rested on the edge of a World War II era target area.

Then, while the two Durham police officers were raking leaves in their front yard last November, their 9-year-old son discovered a live bazooka shell.

Since then, the Cashes have found three more shells or pieces of them, including a live 37 mm high explosive shell uncovered and safely detonated Wednesday by the U.S. Army Corps of Engineers. "This is my dream home that just turned into a disaster," Kimberly Cash said.

<http://www.news-observer.com/front/story/1666491p-1688285c.html>

Brunswick County

Nourishment Program Helps Tourism, Turtles **By Don Bordner**

Last fall's beach nourishment projects attracted both vacationers and sea turtles to the South Brunswick County beaches, according to members of the Brunswick Beaches Consortium (BBC). The state recently reported area rentals and tourism held their own this summer, which the consortium credits much to nourishment projects. Preliminary sea turtle nesting reports indicate a significant increase in nesting activities along the South Brunswick County beaches, according to consortium members. While members smiled at the positive news, they buckled down to prepare for upcoming beach nourishment projects and Coastal Resource Commission (CRC) appointments at their monthly meeting Aug. 15. Glenn McIntosh of U.S. Army Corps of Engineers updated consortium members on the status of the Wilmington Harbor Project and provided a brief outline of claims for more funds for additional work required during the project by dredging company Bean-Stuyvesant.

<http://www.brunswickbeacon.com/headline%20web%20page/brunsko.html>

granville

October rains fill lakes, hamper harvests in Person, Granville

After months of dry days and parched crops, Mother Nature has lent the region a wet October hand, ending short-term drought and making harvesting a muddy chore.

North Carolinians join Washington march against war

WASHINGTON -- The North Carolina flag stood out in a sea of posters, banners and signs in a crowd of more than 100,000 people who gathered at the Mall in Washington on Saturday to protest the war against Iraq and President Bush's preemptive strike doctrine.

Pharmacy to open South Granville facility

CREEDMOOR -- The Professional Pharmacy of Oxford has announced plans to join the South Granville Medical Center in Creedmoor. The pharmacy, an Oxford mainstay, will lease about 2,000 square feet and offer a complete prescription service and health care products for its first satellite location.

Creedmoor in crossfire from hunters, land owners

CREEDMOOR -- When the leaves begin to fall, complaints about trespassing deer hunters begin to rise. The first volley was fired at the Creedmoor Town Commissioner's meeting earlier this week when two residents pleaded with the commissioners to help stop hunters with dogs from trespassing on their property. The landowners say the dogs and hunters endanger their families and farm animals.

Jobless rate dips in most counties

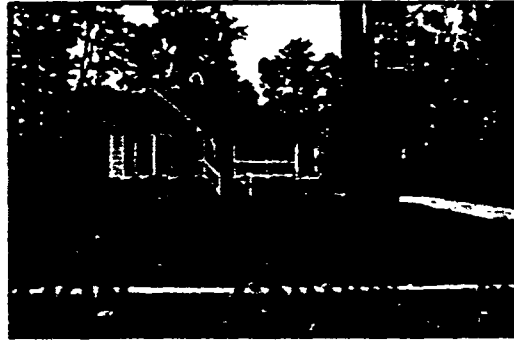
DURHAM -- The unemployment rate decreased in 90 North Carolina counties in September, including Durham, Granville, Orange and Person, the N.C. Employment Security Commission reported Friday.

Area colleges will show off biotech work at State Fair

RALEIGH -- Representatives from area colleges will be at the North Carolina State Fair through Sunday to showcase training their schools can provide for those interested in the growing field of biotechnology.

Granville native tells county history

DURHAM -- All brawn and no brains? With a buzz haircut and broad shoulders, Lewis Bowling, a professor of physical education at



The Herald-Sun/Kevin Seifert

Caution tape surrounds the Cash's home at 653 Lakeview Drive in Butner while their lawn begins to overgrow on Thursday. The Cash family abandoned the home for their safety as munitions left from the days of Camp Butner continue to be discovered in their yard.

Butner residents warned of World War II ordnance

BUTNER -- Having found 12 unexploded artillery shells around Butner during the past few months, the U.S. Army Corps of Engineers warns residents and visitors to the area not to search and dig for the World War II ordnance.

Creedmoor board approves zoning change

CREEDMOOR -- Building near Creedmoor's streams and Lake Rogers just got tougher. On Tuesday night, The Creedmoor Commissioners approved new zoning ordinances for new development. The change widens natural buffers -- a designated space of vegetation -- to extend out 100 feet from the town's stream banks. The change was made to bring the town's zoning laws up to snuff with the state's Division of Water Quality regulations.

Granville panel OKs half-cent sales-tax hike

OXFORD -- Granville County's residents and visitors will pay a half-cent more in sales tax beginning Dec. 1. The Granville County Commissioners approved the tax increase Monday night on the heels of a quiet public hearing.

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CREEDMOOR -- Creedmoor officials have softened the city's water restrictions after last week's heavy rains filled Lake Rogers to the brim. Under mandatory water conservation measures since the summer, the city will move back to voluntary conservation with the exception of watering lawns, plants and gardens.

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By Hunter Lewis : The Herald-Sun
hlewis@heraldsun.com
Oct 24, 2002 : 10:10 pm ET

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Ranging in size from 155 mm shells shot from long cannons to shells shot from bazookas, the ordnance dates back to 1942, when the Army built Camp Butner, a training facility for 40,000 troops.

Until recently, Danny and Kimberly Cash lived in the target area of one of 15 artillery ranges. They have found at least five shells or pieces of them, including a live 37 mm high-explosive shell uncovered and safely detonated by the Corps in August.

But last month, after "sleepless nights and constant stress," they walked out of their home, packed their six kids into the their Chevrolet Suburban and moved to an apartment in Creedmoor.

The Cashes, who are Durham police officers, left behind a mortgage and what they thought was their dream home. Safety was more important than "financial ruin," Kimberly Cash said.

Their grass has grown shin-high. Yellow caution tape surrounds their property. Posted signs warn not to trespass.

On a recent visit back to her home in Lakewood Estates, a small subdivision south of Stem, Cash saw tire tracks and dug-up dirt in her front yard.

"We moved our children and ourselves to a safe location, but this does not protect the ignorant, complacent or stupid," Kimberly Cash said, speaking of "treasure hunters" with metal detectors and shovels.

In November, an engineering firm contracted by the Corps will survey the 26-acre tract in what is called a Time Critical Removal Action. During the three-month, \$685,000 process, engineers will explore the area around the Cashes' neighborhood with metal detecting equipment and Global Positioning devices. If they detect metal objects, the engineers will mark and remove anything down to six inches deep.

The project stems from a \$2 million spot survey over the 45,000-acre area where the engineers tested small plots of land and identified the 26-acre tract for further study.

"The earlier survey turned up enough explosive material in the [Lakeview] area that justified a removal," said Corps spokeswoman Penny Schmitt. "[Engineers] really didn't need to wait any further."

But the Corps wants locals and visitors to refrain from looking for the ordnance.

"If you detect something, there is an overwhelming temptation to see," she said. "Digging can be extremely dangerous."

Of the five families living off Lakeview Drive, the Cashes are the only ones to move. But next-door-neighbor Frances Vos said that doesn't mean she is not concerned.

"I'm concerned not only what we're living on, but the future," she said. "The new subdivisions going up. The logging. Wake up. I really fear sometime, somewhere there is going to be a death. I really do."

Vos referred to two San Diego boys killed in 1983 when they fiddled with an old shell found where a base once stood.

But for many who live in this bucolic part of southern Granville County, the old shells are just as much a part of the landscape as the thick oaks and rolling hills. Stories abound in this area of residents stumbling across old bullets and shells while plowing their fields or hunting.

Edward Eakes, 46, and Billy "Red" Wayne, 40, grew up down the road from Lakeview Estates long before Roberts Chapel Road was paved and before the hills were dotted with homes. Eakes, who rents a small white home just south of Lake Holt and the Cashes' neighborhood, said the engineers marked a few spots in the woods behind his land last week where ordnance may be buried.

But the shells don't bother him.

"I like it here," Eakes said. "The bombs ... don't bother me a bit. You got to worry more about people shooting you while you're pumping gas. These bombs ain't going to bother you unless you dig them up."

Wayne agreed.

"Ain't no telling what you'll find out here," he added. "It's been here for years and years."

It is this mindset that bothers Vos.

"A lot of this stuff is just swept under the carpet," she said. "The people have a mindset of 'it's always been here, nobody's got killed.' I want to scream to the state of North Carolina, 'Hey, in Granville County and parts of Person County there is live ammo. They have dumped piles of ammo in this area.'"



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Granville native tells county history

DURHAM -- All brawn and no brains? With a buzz haircut and broad shoulders, Lewis Bowling, a professor of physical education at N.C. Central University, doesn't buy into the tired stereotype. In July, Arcadia Publishing released Bowling's "Images of America: Granville County," a 128-page pictorial retrospective of life in Granville County.



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Granville residents beware of vandals

October 11 • OXFORD -- Authorities were still on the lookout Friday night for two men who invaded the mobile home of a Vance County sheriff's deputy, beat his wife and set the home on fire.

US 501 in Person on DOT list

October 10 • ROXBORO -- Person and Granville County officials put their highway wish lists on the table for the Department of Transportation this week, but Granville leaders may not be

Butner residents warned of World War II ordnance

By Hunter Lewis : The Herald-Sun

lewis@heraldsun.com

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Dangerous pieces of history in the ground

Updated: 10/26/2002 3:23:02 PM

By: News 14 Carolina Web Staff

Treasure hunters in Butner should think twice before pulling anything out of the ground.

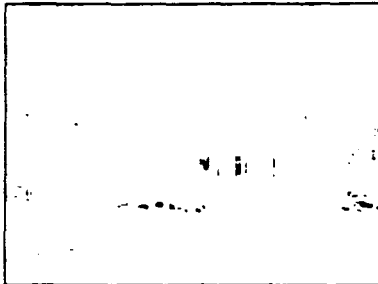
In recent months, 12 unexploded World War II artillery shells have surfaced around the town once known as Camp Butner, an Army training facility.

Caution tape and 'No Trespassing' signs now surround at least one home on Lakeview Drive whose owners have opted to pack up their kids and move out for safety's sake. "We're all concerned," said Lakeview resident Roman Voss. "This whole area was part of the military firing range. They found live ammo over there, I've found a couple of pieces of ammo in my yard, and I understand another neighbor over here, former neighbor, has picked all kinds of stuff out of their yard."

Despite the danger, the Army Corps of Engineers said people have been searching for shells with metal detectors and shovels and they're concerned someone could be killed.

An engineering firm along side the Army Corps of Engineers will begin removing the shells.

"They're supposed to start clearing the property, get all of this brush out of here, and then do a six inch, metal detector type search and pull out anything they find, any old metal, nails and of course any ordinance and if they find anything significant they might be back after the first of the year and do a more thorough search," Voss said.



The people who lived in this house moved when live shells were found around their property.

About 23 acres of land make up the residential area around the Lakeview subdivision in Butner.

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Army to comb Butner land

By RICHARD STRADLING, Staff Writer

BUTNER -- The Army will soon send a cleanup crew into a small Butner subdivision where two live rounds of ammunition dating back to World War II have turned up in the last year.

Army contractors will go through the 16-acre Lakeview subdivision and the surrounding 10 acres inch by inch, investigating every piece of metal in the top half-foot of soil. The subdivision was built on land used as an Army artillery range during the war and returned to private use in 1947.

Residents of the six-home subdivision are anxious about what might be under their lawns. Lakeview residents Danny and Kimberly Cash and their six children have already moved to an apartment in Creedmoor after the Army found a live 37 mm shell buried in their yard in August.

"We're not real sure when they get in here what they're going to find," said Frances Vos, who lives next door to the Cashes. "This is a hot spot."

In August, U.S. Army Corps of Engineers contractors began surveying what was once Camp Butner, a 40,384-acre Army training camp from 1942 to 1947. The Army wants to know if debris left on the camp's artillery ranges 55 years ago poses any danger today. It has found 16 live rounds so far.

The Corps plans to report its findings next summer but decided that the Lakeview subdivision couldn't wait because the two live rounds were so close to people's homes, spokeswoman Penny Schmitt said. In addition to the shell the Army found, 9-year-old Taylor Cash raked up an intact bazooka round last fall.

"It was apparent we needed to go right ahead and clear that area," Schmitt said.

People have been finding bullets and rusted pieces of artillery shells on Camp Butner land for decades. But a new wave of residents from the Triangle, attracted by the area's forests and fields, are learning of the camp's legacy for the first time as they build or buy new homes.

The state and federal governments still use much of the Butner land for a federal prison complex, an N.C. Army National Guard training camp and other institutions.

But the Army sold more than half of it back to its original owners. It placed covenants on the deeds restricting the land to "surface use only," according to a 1993 Corps report, but many of those covenants were dropped over the years as property changed hands, Schmitt said.

The Army suspended its search of Butner on Oct. 17 because of a lack of money but should resume after Congress passes a new federal budget. The Army has \$300,000 to start cleaning up the Lakeview subdivision but needs \$385,000 more to complete the work, Schmitt said.

Army contractors will begin early next month by clearing brush over the 26-acre area and methodically going over the ground with sophisticated metal detectors. After mapping the area, they'll begin removing metal objects, probably in January, and will likely continue through April if money is available.

Don and Mary Ann Moore have lived in Lakeview for 3 1/2 years and would like to stay after the Army cleanup is complete. They love the tranquility but aren't sure it's worth the risk.

"When we were planning the house, you could literally hear the sound of bat wings at twilight. That is how quiet it is here," Don Moore said. "To imagine that if you took a stroll through the woods you could blow yourself up is disturbing."

The Cashes, both Durham police officers, said they moved out in part because Army representatives clearly were nervous about walking in their yard.

"If they weren't comfortable being there, I wasn't going to keep my children there," said Kimberly Cash, whose children range from 7 months to 13 years.

Army officials told the Cashes that they will remove the vast majority of debris from their yard, but they will not get it all. Kimberly Cash said she expects they eventually will sell the house -- to someone who doesn't mind the mess.

"I don't think I, in good conscience, can go back," Cash said. "My kids are more important than that to me."

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[BACK]

Corps Warns Of Dangers Of Exploring

by David Rogers
News Editor

The US Army Corps of Engineers is warning people to refrain from amateur efforts to detect and find unexploded ordnance at the former site of Camp Butner.

"We are aware that quite a few people are exploring with metal detectors, either on their own property or in other areas," said Colonel Ray Alexander, Commander of the Wilmington District.

"We are extremely concerned that this could lead to a death or a serious injury." Metal detectors by themselves won't set off buried unexploded ordnance, Col. Alexander said, but striking a shell, hand grenade or bazooka round with a digging implement could

"The 37 mm rounds are particularly sensitive," he said. "Hitting one with a shovel could be fatal."

Since the summer, the Corps has found 12 unexploded artillery shells dating back to World War II. Residents of Lakeview Estates, a subdivision off of Roberts Chapel Road, have discovered that the area in which their homes are located is a prime location for finding unexploded ordnance.

The area in which they live was used as part of firing ranges for soldiers at Camp Butner during World War II.

Camp Butner was established in 1942 as a 40,384-acre training and housing facility for World War II troops. The training grounds included approximately 15 firing ranges, a grenade range, a 1000-inch range, a gas chamber and a flame-tower training pad.

The site was also home to

one of the Army's largest general and convalescent hospitals and the War Department's Redeployment Center.

In 1947, the War Department closed Camp Butner and the land was sold to public and private interests. The general hospital was acquired by the state and named the John Umstead Hospital.

The North Carolina National Guard was given 4,750 acres of the Camp to be used for training. Some of the land was developed into residential property and farming. Some is North Carolina state land.

Over the past few months, awareness of the potential for unexploded ordnance in the area has been heightened as the US Army Corps of Engineers conducted an Engineering Evaluation on the site.

About a dozen explosive objects were found during the investigation, some of them on residential property.

"We understand that people are very concerned about the potential for explosive objects on their property.

"As the father of teenagers, I also know that young people can be curious and might want to investigate," Col. Alexander said.

"We ask that people take the right steps if they happen to find anything that looks suspicious, but we also ask that people not dig for possible ordnance. We don't want to see anyone hurt or killed."

Steps To Take

What should you do if you find a suspicious object?

- Don't touch or attempt to move the object
- Call your local law en-

forcement office. They know how to identify ordnance and who to contact.

- Don't dig for objects you have 'seen' with a metal detector.

"We appreciate property owners' willingness to work with us during the Engineering Evaluation, and we want to make sure that they and any visitors to the former Camp Butner site stay safe," Col. Alexander said.

Based on findings to date during the Engineering Evaluation/Cost Analysis conducted by the Corps, the 26-acre area near Range Road which encompasses the Lakeview Estates

subdivision has been identified for a Time Critical Removal Action (TCRA). Property owners in this area have been notified according to the Corps.

During this action, the entire 26 acres will be surveyed, and any objects found to a depth of 6 inches below the surface will be investigated and if necessary removed.

The survey portion of the TCRA will end in November 2002, and the investigation portion will begin in January 2003.

Other actions may be recommended later based on more complete findings of the Engineering Evaluation.

Penny Schmatt of the US Army Corps of Engineers is the contact person for anyone having questions about the removal project. She can be reached at 919-251-4626.

Home No Longer Safe

The home of Danny and Kimberly Cash of Lakeview Estates is located in the target area of one of the Camp Butner artillery ranges.

The subdivision in which they live is slated to be included in the Time Critical

The Cash's nine-year-old son, Taylor, found a bazooka round while raking leaves in the family's yard last November.

Since that time, the family has found three more shells or pieces of them, including a live 37 mm high-explosive shell uncovered and safely detonated by the Corps on August 21.

After the discovery of the 37 mm shell in August, Kimberly Cash says that she no longer felt it was safe for her family to stay in the house.

"We had a lot of sleepless nights from worrying as we were under constant stress," she said. In the first days of September, the family decided that the risk was worth it and moved to an apartment in Creedmoor.

Though the move has put the family in a financial bind, the couple says that safety for themselves and their children was more important than money.

Kimberly Cash maintains that she is disappointed with the response that she has received from the Corps for pleas for help in dealing with the situation.

"I have never been able to get a straight answer from the Corps officials, whether prudent people should stay on property or leave," she stated.

"I asked them if they would they stay in house or leave, and if they would they let their children play in yard. They never would answer me," she said.

Cash also says that the Corps has "given her the go-around" when she has requested a letter from the Corps stating that it is not safe for the family to live in the house.

"I've asserted that I

BSMS Honor Roll

(continued from page 3b)

Of Dangers Of Exploring For Ordnance

enforcement office. They know how to identify ordnance and who to contact.

- To get digging for objects you have "seen" with a metal detector.

"We appreciate property owners' willingness to work with us during the Engineering Evaluation, and we want to make sure that they and any visitors to the former Camp Butler site stay safe," Col. Alexander said.

Based on findings to date during the Engineering Evaluation Cost Analysis conducted by the Corps, the 26-acre area near Range road which encompasses the Lakeview Estates subdivision has been identified for a Time Critical Removal Action (TCRA). Property owners in this area have been notified according to the Corps.

During this action, the entire 26 acres will be surveyed, and any objects found to a depth of 6 inches below the surface will be investigated and if necessary removed.

The survey portion of the TCRA will end in November 2002, and the investigation portion will begin in January 2003.

Other actions may be recommended later based on more complete findings of the engineering evaluation.

Penny Schmatt of the U.S. Army Corps of Engineers is responsible for anyone who has questions about the TCRA. She can be reached at 919-275-1492.

Home No Longer Safe
 Kimberly Cash and her husband, Taylor, have been told that their home is no longer safe to live in.

The Cash's nine year old son Taylor found a live bazooka round while raking leaves in the family's yard last November.

Since that time, the family has found three more shells or pieces of them, including a live 37 mm high-explosive shell uncovered and safely detonated by the Corps on August 21.

After the discovery of the 37 mm shell in August, Kimberly Cash says that she no longer felt it was safe for her family to stay in the house.

"We had a lot of sleepless nights from worrying and were under constant stress," she said. In the first days of September, the family decided that the risk wasn't worth it and moved to an apartment in Creedmoor.

Though the move has put the family in a financial bind, the couple says that safety for themselves and their six children was more important than money.

Kimberly Cash maintains that she is disappointed with the response that she has received from the Corps for her pleas for help in dealing with the situation.

"I have never been able to get a straight answer from the Corps' officials on whether prudent people should stay on property like ours or leave," she stated.

"I asked them if they were me, would they stay in my house or leave, and I asked them, would they let their children play in my yard. They never would answer me," she said.

Cash also says that the Corps has "given her the fair deal" when she has requested a letter from them stating that it is not safe for the family to live in their home.

our bank justification to freeze our mortgage until the situation is settled.

"As it is, we are paying a mortgage as well as apartment rent and also paying double light bills, etc. We will not be able to continue to do that for very long," she added.

Cash says she is also concerned about "treasure hunters" going on the family's property and being hurt or killed by exploding ordnance.

"People are digging in our yard," she said. "We went home recently and there were tire tracks in our yard and dug up dirt. That is just ignorance," she exclaimed.

Cash says that many part-time residents of the area don't appear to take the threat of the old ordnance exploding very seriously.

"I know of people who use this old ordnance for doorstops and bookends," said Cash. "I really am afraid that is going to take someone dying to focus everyone's attention on this problem."

Even though the Corps says that the Time Critical Removal for the Lakeview Estates area will begin in November, Cash says that Parsons, the company on the Corps' contract, actually do the surveys and

Family, Friends Day
 The Synama Grove Baptist Church, 3100 Tar River Road, Oxford, N.C. will host a Family and Friends Day on Sunday, November 17, 2002, 11:00 a.m.

The Pastor, Rev. LaVonn Timberlake, will deliver the message, "I'm not a hero."

Service will be held following the service. The pastor is conducting a

retreat as well as a prayer breakfast on November 17, 2002, 8:00 a.m. to 11:00 a.m.

Cash also says that the Corps will not be paying for the family's temporary housing.

"I am not sure how long that will last," she said.

Cash says that she is not sure how long the Corps will be paying for the family's temporary housing. She says that she is not sure how long the Corps will be paying for the family's temporary housing.

Some family members are feeling that the Corps is not doing enough to deal with the situation. They are feeling that the Corps is not doing enough to deal with the situation.

Cash says she is not sure how long the Corps will be paying for the family's temporary housing. She says that she is not sure how long the Corps will be paying for the family's temporary housing.

Neighbor Council
 Community meeting 20

The meeting will be held on November 17, 2002, 7:00 p.m. to 9:00 p.m. at the Synama Grove Baptist Church, 3100 Tar River Road, Oxford, N.C.

...the state had
...the former
...site stay safe,"
...Alexander said
...based on findings to date
...during the Engineering
...Evaluation/Cost Analysis
...conducted by the Corps, the
...26-acre area near Range
...road which encompasses the
...Lakeview Estates
...subdivision has been
...identified for a Time Critical
...Removal Action (TCRA).
...Property owners in this area
...have been notified according
...to the Corps.

...the summer, the
...found 12 unex-
...artillery shells dating
...to World War II.
...Residents of Lakeview
...Estates, a subdivision off of
...Robert Chapel Road, have
...discovered that the area in
...which their homes are
...located is a prime location for
...finding unexploded
...ordnance.

The area in which they
...live was used as part of firing
...ranges for soldiers at Camp
...Butner during World War II.

Camp Butner was estab-
...lished in 1942 as a 40,384-
...acre training and housing
...facility for World War II
...troops. The training grounds
...included approximately 15
...firing ranges, a grenade
...range, a 1000 inch range, a
...gas chamber and a flame-
...thrower training pad.

The site was also home to

...Some of the
...developed into
...residential property and
...brining home is North
...Carolina State land.

Over the past few months,
...awareness of the potential
...for unexploded ordnance in
...the area has been heightened
...as the US Army Corps of
...Engineers conducted an
...Engineering Evaluation on
...the site.

About a dozen explosive
...objects were found during
...the investigation, some of
...them on residential property.

"We understand that peo-
...ple are very concerned about
...the potential for explosive ob-
...jects on their property.

"As the father of
...teenagers, I also know that
...young people can be curious
...and might want to investi-
...gate," Col Alexander said.

"We ask that people take
...the right steps if they happen
...to find anything that looks
...suspicious, but we also ask
...that people not dig for
...possible ordnance. We don't
...want to see anyone hurt or
...killed."

Steps To Take

What should you do if you
...find a suspicious object?

- Don't touch or attempt to
...move the object
- Call your local law en-

to make sure that they and
...the former
...Camp Butner site stay safe,"
...Alexander said
...based on findings to date
...during the Engineering
...Evaluation/Cost Analysis
...conducted by the Corps, the
...26-acre area near Range
...road which encompasses the
...Lakeview Estates
...subdivision has been
...identified for a Time Critical
...Removal Action (TCRA).
...Property owners in this area
...have been notified according
...to the Corps.

During this action, the en-
...tire 26 acres will be sur-
...veyed, and any objects found
...to a depth of 6 inches below
...the surface will be
...investigated and if necessary
...removed.

The survey portion of the
...TCRA will end in November
...2002, and the investigation
...portion will begin in January
...2003.

Other actions may be rec-
...ommended later based on
...more complete findings of
...the Engineering Evaluation.

Penny Schmitt of the U.S.
...Army Corps of Engineers is
...the contact person for anyone
...having questions about the
...removal project. She can be
...reached at (910) 251-4626.

Home No Longer Safe

The home of Danny and
...Kimberly Cash of Lakeview
...Estates is located in the
...target area of one of the
...Camp Butner artillery
...ranges.

The subdivision in which
...they live is slated to be in-
...cluded in the Time Critical
...Removal Action scheduled to

be conducted by the Corps on
...August 21.

After the discovery of the
...37 mm shell in August,
...Kimberly Cash says that she
...no longer felt it was safe for
...her family to stay in the
...house.

"We had a lot of sleepless
...nights from worrying and
...were under constant stress,"
...she said. In the first days of
...September, the family
...decided that the risk wasn't
...worth it and moved to an
...apartment in Creedmoor.

Though the move has put
...the family in a financial bind,
...the couple says that safety
...for themselves and their six
...children was more important
...than money.

Kimberly Cash maintains
...that she is disappointed with
...the response that she has re-
...ceived from the Corps for her
...pleas for help in dealing with
...the situation.

"I have never been able to
...get a straight answer from
...the Corps officials on
...whether prudent people
...should stay on property like
...ours or leave," she stated.

"I asked them if they were
...me would they stay in my
...house or leave, and I asked
...them would they let their
...children play in my yard.
...They never would answer
...me," she said.

Cash also says that the
...Corps has "given her the run
...around" when she has re-
...quested a letter from them
...stating that it is not safe for
...the family to live in their
...house.

"I've asked them over and
...over again for a letter and

Cash says she is also con-
...cerned about "treasure
...hunters" going on the
...family's property and being
...hurt or killed by exploding
...ordnance.

"People are digging in our
...yard," she said. "We went
...home recently and there
...were tire tracks in our yard
...and dug up dirt. That is just
...ignorance!" she exclaimed.

Cash says that many old
...time residents of the area
...don't appear to take the
...threat of the old ordnance ex-
...ploding very seriously.

"I know of people who use
...this old ordnance for
...doorstops and bookends,"
...said Cash. "I really am afraid
...that is going to take some-
...one dying to focus everyone's
...attention on this problem."

Even though the Corps
...says that the Time Critical
...Removal for the Lakeview
...Estates area will begin in
...November, Cash says that
...Parsons, the company who
...the Corps contracts to
...actually do the surveys and

Family, Friends Day

The Synana Grove Baptist
...Church, 3166 Tar River
...Road, Oxford, NC will ob-
...serve Family and Friend-
...Day on Sunday, November
...17, 2002, 11:00 a.m.

The Pastor, Rev. Linwood
...Timberlake, will deliver the
...message. Dinner will be
...served following the service.

The public is cordially
...invited.

Curl's Cori

(continued from page 10)

attendance at all of the meet-
...ings. The matter will be discussed

forty-
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...Me
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...Comm
...Loren

BSMS Honor Roll

(continued from page 10)

- Eighth Grade "A/B" Honor Roll
 Ashley Keith, Brittain
 Keith, Courtney, Kay, Tami

THE DAILY GAZE

Monday
November 25, 2002

The Independent Voice of the Capital Region

10 CENT
SCHENECTADY, N.Y.

... said.
Church bells rang Sunday, but

... church, a few hymns and
... sang hymns and prayed. Is-
... Israeli forces allowed about 15

The scene reminded the Rev.
Ibrahim Faltas of an even more

See PRIEST, Page A5

Group warns of unexploded bombs in U.S.

By MIGUEL BUSTILLO
Los Angeles Times

The federal government has un-
derstated the scale of the safety
problem posed by old bombs and
chemical and biological weapons
buried at former military sites
throughout the United States,
according to documents disclosed
by a group that airs accusations
from whistle-blowing bureaucrats.

In one of the documents, a pri-
vate briefing paper for the U.S. En-
vironmental Protection Agency's
new enforcement director, John

"The source [of the documents] is someone in a
position to provide it."

Jeff Ruch

Public Employees for Environmental Responsibility

Suarez, EPA officials stated that
finding and removing the leftover
weapons "has the potential to be
the largest environmental cleanup
program ever to be implemented
in the United States." The more
than 16,000 military installations
containing unexploded ordnance
cover an area larger than Florida,
the briefing paper stated.

Yet many of the sites have al-
ready been converted to civilian
uses despite the presence of
bombs, and the Department of De-
fense has been taking "ill-advised
shortcuts to limit costs" on many
cleanups, according to the paper,
which was leaked along with other
related documents by an EPA offi-
cial to Public Employees for Envi-

ronmental Responsibility, a Wash-
ington-based group that shields
whistle-blowers and publicizes
their claims.

The group planned to release all
of the documents today. They in-
clude an early draft of an EPA sur-
vey on the unexploded munitions
problem that contained critical
conclusions omitted from the final
official draft, which was released
two years ago.

"The source" of the documents
"is someone in a position to pro-
vide it," said Jeff Ruch, executive
director of Public Employees for

See GROUP, Page A7

"For too many generations,
they have pacified and accom-
modated themselves to the most
extreme, fanatical, violent ele-
ments of Islam, and those ele-
ments have now turned on us
and the rest of the world."

Added McCain, "The Saudi
royal family has been engaged
in a Faustian bargain for years to
keep themselves in power."

Still, none of the lawmakers
knew whether the princess had

See LAWMAKERS, Page A1

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Horoscope.....A10	Your Money.....B8

High pressure will bring
partly sunny skies to northern
areas of the Northeast, while a
weak area of low pressure will
be moving just south of the
region generating cloudiness
and the chance of a few isolated
rain and snow showers that will
taper into the overnight.
Arctic cold will sort into the
region following the storm's
departure.

The storm system's cold front
will extend southward and to
the southern Plains, and will
bring scattered showers to the
lower Mississippi Valley and the
lower Plains. A weak area of low
pressure crossing the upper

National Forecast

National cities

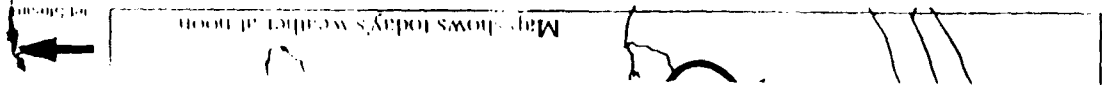
city	41	10	01R
Albuquerque	47	30	city
Anchorage	39	30	city
Atlanta	62	42	ch
Atlantic City	55	42	ch
Baltimore	55	42	ch
Boston	47	36	city
Chicago	33	20	ch
Cincinnati	40	27	city
Dallas-Ft Worth	45	34	city
Denver	34	10	city
Detroit	36	23	snow
Hartford	43	33	city

who formed
the television
food show
"The Nat'l
chick" oppor-
tunity to be
a good to
build more
a national airport
in London
The government wants to
to bring new highways
to the third world
to bring the third world
to the thousands of people in
the third world area
The Associated Press

ALL LIGHT CHR TRE 20% OFF

GREENBUSH - RT. 9 WILT

Map shows today's weather at noon



Group warns of bombs on U.S. bases

Continued from Page A1

Environmental Responsibility. He described his organization as an "information laundromat" that protects conscientious public servants from retribution.

Among the documents is an EPA survey of closed military bases in 2000 that found that more than half of the sites polled — including Fort Ord on California's Monterey Peninsula — either had located chemical or biological weapons or suspected that they were present.

Fort Ord previously reported that it had found such weapons on site and, along with two other California sites — the Salton Sea Test Base in Imperial County and Mare Island Naval Shipyard in Vallejo — reported the

presence of unexploded munitions.

Military officials are conducting cleanups of all three California sites.

The EPA survey found that the military often had used open burning and detonation techniques to get rid of munitions without proper environmental permits, and had failed to erect fencing or warning signs at half of the old sites still containing munitions, even though many are close to housing, parks and other civilian locations.

Most of those findings were either modified or omitted from the final EPA report, which was later made public, a comparison shows. Public Employees for Environmental Responsibility said its source at the EPA con-

tends that the omissions were made under pressure from the Department of Defense, which had paid for the survey. Defense officials in Washington did not respond to requests for comment.

In addition to the findings on chemical and biological weapons, the survey originally criticized methods that the Department of Defense has been using to determine how to clean up sites. It concluded that the Department of Defense has relied too heavily on statistical sampling to determine the likely presence of bombs.

The EPA draft said the Department of Defense also should have been examining historical records and conducting more visual inspections of the old firing ranges.

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NEWS UPDATE

Project to clean up old ordnance at WWII military camp near Butner

1-6-03

News & Record

Posted 5:42 p.m.

BUTNER (AP) -- A \$600,000 project to clean up old ammunition at the site of a World War II military camp near Butner is scheduled to begin Tuesday.

The U.S. Army Corps of Engineers announced Monday that the project, expected to run through mid-February, will include a survey of 26 acres and a clean-up where items are found.

Previous surveys of the land found unexploded shells and bullets left from training exercises in the 1940s.

Initial evaluation of the land was conducted last spring and summer and numerous objects were found at Lake View Subdivision.

Ground will be cleared to a depth of six inches and families living near the area where work is conducted will be housed in motels if necessary, said corps spokeswoman Penny Schmitt.

She said the contractor will scan land with a sophisticated metal detector that can detect anything from "bazooka rounds to tractor parts, nails and horse shoes."

Camp Butner was established in 1942 as a 40,384-acre training and housing facility for World War II troops. The training grounds included some 15 firing ranges and a grenade range as well as a hospital for returning troops.

The camp was closed in 1947 and land was sold to the state and private interests. Some 4,750 acres were given to the North Carolina National Guard and other parts were used for residential development and farming.

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"Because some explosive objects were found in people's yards very close to homes, the risk to this neighborhood justifies this clearance action," said Col. Ray Alexander, commander of the corps' Wilmington district.

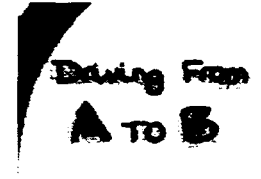
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The Charlotte Observer

Posted on Mon, Jan. 06, 2003

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Project starting to clean up old ordnance

Associated Press

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"Because some explosive objects were found in people's yards very close to homes, the risk to this



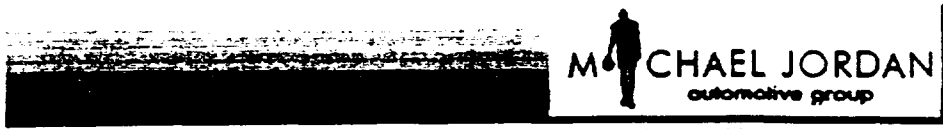
NEWS COLUMNISTS

Updated Monday,
January 27, 2003

- » Tommy Tomlinson
- » Don Hudson
- » Danye Romine Powell
- » Dr. Traffic
- » Gerry Hostetler
- » Gaston: Dave Balty
- » York: Dan Huntley

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Corps clearing ammo in 26-acre Butner area

By Hunter Lewis : The Herald-Sun
hlewis@heraldsun.com
Jan 7, 2003 : 11:37 pm ET

BUTNER -- The U.S. Army Corps of Engineers began digging Tuesday in a rural neighborhood labeled "high risk" after workers and residents found two unexploded artillery shells and several pieces of exploded shells.

The 26-acre area, including Lakeview Estates, a subdivision of six homes near Lake Butner, sits in what was the line of fire of an old World War II artillery range. The firing range was one of 15 that existed in the 1940s, when the 40,000-acre Camp Butner housed and trained about 40,000 U.S. Army troops for combat.

The \$600,000, five-week survey and dig off Lakeview Drive follows a spot survey the corps did last spring and summer on the old Army installation. The investigation revealed about 12 explosive objects, including some in the subdivision.

Engineers began focusing on Lakeview Drive in late 2001 when 9-year-old Taylor Cash picked up an exploded bazooka shell and placed it on his family's porch.

In August 2002, the corps found and detonated a live 37 mm round in the Cashes' front yard. Also in August, loggers found a live 155 mm shell in the woods north of the Cashes' home.

"When we find two [unexploded] items, yes, we consider that risk high," said John Belew, project manager with the corps. "There's no way that you cannot say there's a risk there if you find two live items in a person's yard."

Fearful of what may lie beneath their home and in their yard, Kimberly and Danny Cash moved their six children to a Creedmoor apartment in the fall.

"You want to go to sleep feeling like you'll be there and wake up in the morning," said Kimberly Cash, a Durham police officer.

In what is called a Time Critical Removal Action, engineers will clear brush and use heavy-duty metal detectors to locate old shells in the neighborhood down to 6 inches below the surface. If an unexploded shell is found, the corps will alert residents and move them to a hotel. Engineers will then uncover the shell -- which may range in size from a shell shot from a bazooka to one shot from a long cannon -- and detonate it beneath wood and a pile of sandbags.

No shells were detonated Tuesday, but Butner Public Safety officers stopped traffic outside of the subdivision for 15 minutes so workers could dig near Robert's Chapel Road, Belew said.

If the current survey reveals evidence of widespread contamination of explosives, the corps will continue with a deeper dig, Belew said, though he "doubts seriously that [the corps] will need to."

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The discovery of the old shells raises legal questions as to who is responsible, if anyone, for disclosing what some call contaminated land. When the Army pulled out of Butner in 1950 and sold the land, the deed mentioned unexploded shells. But over time, as the land was parceled out and sold, the original deed was not consulted.

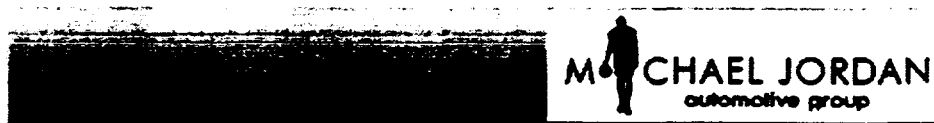
On Dec. 10, 1983, two 8-year-old San Diego boys were killed when they found an abandoned, World War II-era mortar round and detonated it against a rock. In 1989, the families of the two dead boys received a total of \$6.3 million in settlements with San Diego County, city and the developers and builder of the community where the boys died.

Officials have repeatedly warned locals not to dig or search for old shells. People who find a suspicious object should not touch or try to move it. Instead, they should report it to their local law enforcement agency.

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Corps clearing ammo in 26-acre Butner area

BY HUNTER LEWIS

hewis@heraldsun.com; 419-6651

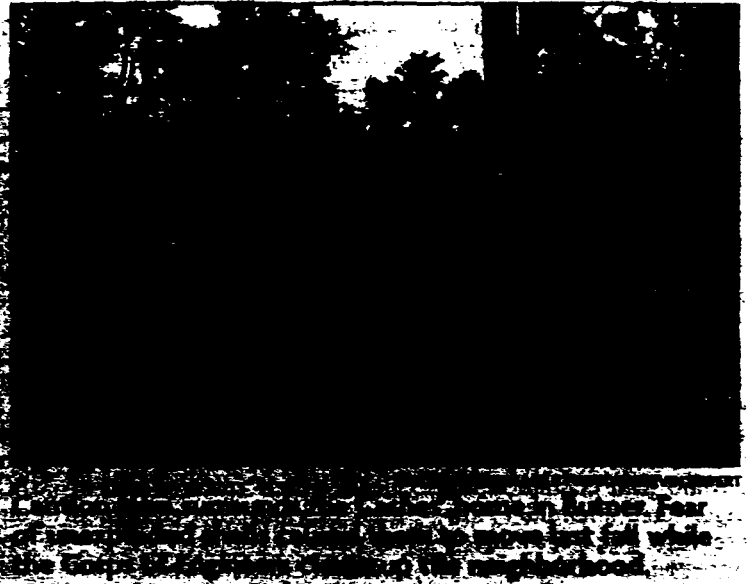
BUTNER — The U.S. Army Corps of Engineers began digging Tuesday in a rural neighborhood labeled "high risk" after workers and residents found two unexploded artillery shells and several pieces of exploded shells.

The 26-acre area, including Lakeview Estates, a subdivision of an Army housing project, sits in what was the line of fire of an old World War II artillery range. The firing range was one of 15 that existed in the 1940s when the 40,000-acre Camp Butner housing and trained about 40,000 U.S. Army troops for combat.

The \$600,000, five-week survey and dig off Lakeview Drive follows a spot survey the corps did last spring and summer on the old Army installation. The investigation revealed about 12 explosive objects, including some in the subdivision.

Engineers began digging off Lakeview Drive in late July when 9-year-old Taylor, who picked up an exploded bazooka shell and placed it on his front porch.

In August 2002, the corps found and destroyed a live 155 mm shell in the subdivision's yard. In August 2003, workers found a live 155 mm shell in the woods north of the Camp Butner housing project. **please see BUTNER 1A3**



BUTNER

FROM PAGE A1

home.

"When we find two [unexploded] items, yes, we consider that risk high," said John Belew, project manager with the corps.

"There's no way that you cannot say there's a risk there if you find two live items in a person's yard."

Fearful of what may lie beneath their homes and in their yard, Kimberly and Danny Cash moved their six children to a Creedmoor apartment in the fall.

"You want to get to sleep feeling like you'll be there and wake up in the morning," said Kimberly Cash, a Durham police officer.

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No shells were detonated Tuesday, but Butner Public Safety officers stopped traffic outside of the subdivision for 15 minutes so workers could dig near Robert's Chapel Road, Belew said.

If the current survey reveals evidence of widespread contamination of explosives, the corps will continue with a larger dig. Belew said, though he is not seriously that [the corps] will need to."

The discovery of the old shells raises legal questions as to who is responsible for cleaning up the closing what some call contaminated land. When the Army pulled out of Butner in 1950 and sold the land, the deal included unexploded shells, but not any, as the land was parceled out and sold, the original deal was not consulted.

On Dec. 10, 1963, two 9-year-old San Diego boys were killed when they found an unexploded World War II-era mortar shell in their yard. The boys' families received a total of \$6.3 million in settlements with San Diego County, city and the developers and builder of the community where the boys died.

Officials have repeatedly warned residents to report any suspicious objects they find and to leave them alone. Instead, they should report it to their local law enforcement agency.

On Tuesday, the Corps survey effort is www.projecthoop.com

THE HERALD-SUN

1-8-03

DURHAM, NC

David Rogers
News Editor

The US Army Corps of Engineers began work to survey and clear unexploded ordnance from property at Lake View Subdivision near Butner on January 7, 2003.

Previous surveys of the area found unexploded ordnance remaining from training exercises conducted in the 1940's. The current clearance action will continue until mid-February 2003.

Since the summer, the Corps has found 12 unexploded artillery shells dating back to World War II. Residents of Lakeview Estates, a subdivision off of Roberts Chapel Road, have discovered that the area in which their homes are located is a prime location for finding unexploded ordnance.

The area in which they live was used as part of firing ranges for soldiers at Camp Butner during World War II.

The approximately 26 acres to be cleared were surveyed earlier as part of an Engineering Evaluation of the Camp Butner area conducted last spring and summer.

During that evaluation, the number of objects found in that subdivision led the Corps to recommend that a removal action be taken in the neighborhood.

During the clearance action, the ground will be cleared to a depth of six inches. Residents will be accommodated away from the area if it is necessary to remove potentially explosive objects.

"The Department of Defense policy on unexploded ordnance is that we use our limited resources to address the highest risks first," said Wilmington District Commander Col. Ray Alexander.

"Because some explosive objects were found in people's yards very close to homes, the risk to this neighborhood justifies this clearance action. The effort will cost more than \$600,000.

Camp Butner was established in 1942 as a 40,384-acre training and housing facility for World War II troops. The training grounds included approximately 15 firing ranges, a grenade range, a 1000-inch range, a gas chamber and a flame-thrower training pad.

The site was also home to one of the Army's largest general and convalescent hospitals and the War Department's Redeployment Center.

In 1947, the War Department closed Camp Butner and the land was sold to public and private interests. The general hospital was acquired by the state and named the John Umstead Hospital.

The North Carolina National Guard was given 4,750 acres of the Camp to be used for training. Some of the land was developed into residential property and farming. Some is North Carolina state land.

Over the past few months, awareness of the potential for unexploded ordnance in the area has been heightened as the US Army Corps of Engineers conducted an Engineering Evaluation on the site.

About a dozen explosive objects were found during the investigation, some of them on residential property.

The US Army Corps of Engineers is warning people to refrain from amateur efforts to detect and find unexploded ordnance at the former site of Camp Butner.

"We are aware that quite a few people are exploring with metal detectors, either on their own property or in other areas," Alexander.

"We are extremely concerned that this could lead to a death or a serious injury." Metal detectors by themselves won't set off buried unexploded ordnance, Col. Alexander said, but striking a shell, hand grenade or bazooka round with a digging implement could.

"The 37 mm rounds are particularly sensitive," he

Ordnance Clearance Starts At Lakeview

The Butner-Creedmoor News
COMMUNITY NEWS
1-09-03

said " hitting one with a shovel could be fatal."

"We understand that people are very concerned about the potential for explosive objects on their property.

As the father of teenagers, I also know that young people can be curious and might want to investigate," Col. Alexander said.

"We ask that people take the right steps if they happen to find anything that looks suspicious, but we also ask that people not dig for possible ordnance. We don't want to see anyone hurt or killed!"

Steps To Take

What should you do if you find a suspicious object?

- Don't touch or attempt to move the object.
- Call your local law enforcement office. They know how to identify ordnance and who to contact.
- Don't dig for objects you have 'seen' with a metal detector.

"We appreciate property owners' willingness to work with us during the Engineering Evaluation, and we want to make sure that they and any visitors to the former Camp Butner site stay safe," Col. Alexander said.

Based on findings to date during the Engineering Evaluation/Cost Analysis conducted by the Corps, the 26-acre area near Range road which encompasses the Lakeview Estates subdivision was identified for a Time Critical Removal Action (TCRA). Property owners in this area have been notified according to the Corps.

During this action, the entire 26 acres was surveyed, and any objects found to a depth of 6 inches below the surface will be investigated and if necessary removed.

The survey portion of the TCRA ended in November 2002, and the investigation portion will

begin on January 7.

Other actions may be recommended later based on more complete findings of the Engineering Evaluation.

Penny Schmitt of the U.S. Army Corps of Engineers is the contact person for anyone having questions about the removal project. She can be reached at (910-251-4626.

Home No Longer Safe

The home of Danny and Kimberly Cash of Lakeview Estates is located in the target area of one of the Camp Butner artillery ranges.

The Cash's nine year old son Taylor found a live bazooka round while raking leaves in the family's yard in November, 2001.

Since that time, the family has found three more shells or pieces of them, including a live 37 mm high-explosive shell uncovered and safely detonated by the Corps on August 21, 2002.

After the discovery of the 37 mm shell in August, Kimberly Cash says that she no longer felt it was safe for her family to stay in the house.

"We had a lot of sleepless nights from worrying and were under constant stress," she said. In the first days of September, the family decided that the risk wasn't worth it and moved to an apartment in Creedmoor.

Though the move has put the family in a financial bind, the couple says that safety for themselves and their six children was more important than money.

In a prior article, Kimberly Cash maintained that she has been disappointed with the response that she has received from the Corps for her pleas for help in dealing with the situation.

"I have never been able to get a straight answer from the Corps officials on whether prudent people should stay on property like

ours or leave," she stated.

"I asked them if they were me, would they stay in my house or leave, and I asked them would they let their children play in my yard. They never would answer me," she said.

Cash said in the article that she was concerned about "treasure hunters" going on the family's property and being hurt or killed by exploding ordnance.

"People are digging in our yard," she said. "We went home recently and there were tire tracks in our yard and dug up dirt. That is just ignorance!" she exclaimed.

Cash says that many old time residents of the area don't appear to take the threat of the old ordnance exploding very seriously.

"I know of people who use this old ordnance for

doorstops and bookends," said Cash. "I really am afraid that is going to take someone dying to focus everyone's attention on this problem."

Some Lakeview residents, including the Cashes and Roman Vos, say that they were not told before purchasing their property that it was part of a former army range. Both families have hired an attorney seeking to find out why they were not informed and to see if any other action can be taken to rectify their situation.

Cash also stated that she was concerned about other subdivisions going up in the area around Lakeview Estates and said, "I really fear that sooner or later there is going to be a death—it shouldn't take someone getting killed to do something about this."

Ordnance Clearance Starts At Lakeview

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Corps clearing ammo in 26-acre Butner area

By Hunter Lewis, The Herald-Sun
January 7, 2003 11:37 pm

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Officials have repeatedly warned locals not to dig or search for old shells. People who find a suspicious object should not touch or try to move it. Instead, they should report it to their local law enforcement agency.

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Ammunition Cleanup Project Begins In Butner

POSTED: 1:28 p.m. EST January 8, 2003

BUTNER, N.C. -- The U.S. Army Corps of Engineers has begun a \$600,000 project to clean up old ammunition at the site of a World War II military camp near here.

The project, which began Tuesday and is expected to run through mid-February, will include a survey of 26 acres and a clean-up of the items, according to the corps.

Previous surveys of the land found unexploded shells and bullets left after training exercises in the 1940s.

Public safety officers stopped traffic outside the Lakeview Estates subdivision for about 15 minutes Tuesday so workers could dig, said Roland Belew, project manager with the corps.

Engineers were clearing brush and using metal detectors to locate shells to a depth of 6 inches below the surface. No shells were detonated Tuesday, Belew said.

If an unexploded shell is found, the corps will alert residents and move them to a hotel. Engineers will then uncover the shell and detonate it beneath wood and a pile of sandbags.

If the survey reveals evidence of widespread contamination of explosives, the corps will continue with a deeper dig, Belew said, although he indicated it was unlikely.

Engineers began focusing on the subdivision in late 2001 when 9-year-old Taylor Cash picked up an unexploded bazooka shell and placed it on his family's porch.

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he corps found and detonated in August a live 37 mm round in the Cash's front yard. Loggers also found a live 5 mm shell that month in the woods north of the home.

"When we find two unexploded items, yes, we consider that risk high," Belew said. "There's no way that you cannot say there's a risk there if you find two live items in a person's yard."

Kimberly and Danny Cash moved Taylor and their five other children to a Creedmoor apartment in the fall.

"You want to go to sleep feeling like you'll be there and wake up in the morning," Kimberly Cash said.

Camp Butner was established in 1942 as a 40,384-acre training and housing facility for World War II troops. The training grounds included some 15 firing ranges and a grenade range as well as a hospital for returning troops.

The camp was closed in 1947 and land was sold to the state and private interests. About 4,750 acres were given to the North Carolina National Guard and other parts were used for residential development and farming.

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INDEPENDENT



Blasts from the Past

Aging bombs in Butner's backyard – and newly leaked EPA documents – ignite concerns about unexploded ordnance.

BY JON ELLISTON

Danny and Kimberly Cash thought they had found an ideal spot to settle and raise their six children. When they said their wedding vows at a gazebo outside their new home in 1997, it was, for both of them, a second try at marriage, and it seemed just the place to start a new life: The Cashes were the first occupants of Lakeview Estates, a modest but scenic subdivision a few miles north of Butner. "We moved out there to keep our kids kind of isolated from what we do in our profession," Kimberly explains; both she and Danny are Durham police officers. "We pound the streets in Durham, so we didn't want to live there, too."

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COVER FEATURE For a time, the home in the country seemed to fit the bill.

There was room for the kids to roam around fields, forests and waterways, to grow up safely away from the bustle of the Bull City. But then, in 1999, there came a subtle warning sign of potential problems when two three-foot wide sinkholes opened up on their property. The Cashes asked around, but no one offered an alarming explanation, so they paid the holes little mind.

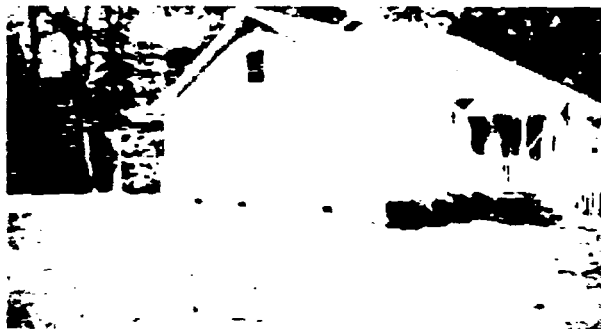




Photo By Jon Elliston

Last August, Army contractors found a live bazooka round in the Cash family's yard and detonated it in place after covering it with sandbags.

"It really was our dream house," Kimberly says, "a foundation for our family." All that changed on the afternoon of Nov. 11, 2001, when her son Taylor hollered, "Look what I found!"

Taylor, then eight, had been raking leaves on the edge of the yard when he heard his rake scrape metal, and picked up something he'd never seen before. He was scurrying with it toward the house when his 10-year-old brother, James, yelled a warning. Taylor dropped the item on the grass, a few feet from the concrete driveway.

The metal object, the Cashes would soon learn from the military, was exactly what it looked like: A live bazooka round, with part of its fins and all of its payload intact. Local authorities called Fort Bragg, which promptly dispatched a bomb squad. When the soldiers arrived, they donned protective gear, wrapped the round in a Kevlar blanket, carried it to their vehicle and drove off at a crawl to the nearby National Guard post. There, they used explosives to detonate the round.

Back at the Cash house, the questions came in waves. Danny and Kimberly fired off e-mails to the Defense Department, she says, asking: "Is this an isolated event? Should we be concerned? Can you come out here and have a look at our site? What should we do?" When answers were not forthcoming, the Cashes went into investigative mode, and started devoting their rare spare moments to finding the truth about Butner's thinly buried secret: unexploded ordnance (or UXO, in military shorthand).

Around Butner, this was anything but an isolated incident. The bazooka round in the yard, the Cashes learned, was one of thousands of pieces of UXO that are believed to lie on and beneath the surface of their community. That's because the family's homestead sat on part of the Army's former Camp Butner, a 40,000-acre, World War II-era training facility that hosted 15 munitions ranges in its heyday. Sixty years ago, infantry units pounded the soil here to prepare for fighting the Nazis. To practice urban warfare, the Army even built a mock German village, the bullet-ridden and cratered remains of which still sit just off a public road north of Butner.

explosive remnants in the Carolina countryside. The affected land straddles portions of Durham, Person and Granville counties, in a traditionally rural area that is one of the next frontiers of Triangle growth. Today, subdivisions are sprouting on the former bomb ranges.

"The bombs were there before we were there, but we were never told any of this information," Kimberly Cash says. "We didn't know the history." Now that they do know, the Cashes aren't sticking around to witness further discoveries. In October 2002, after additional munitions turned up in their neighborhood--including several more on their property--they decided to move.

"The stress level was way too high," she says. Suddenly their own yard was an off-limits danger zone, and "every time the kids would jump in the house, I was now nervous." Though they still have to make the mortgage payments, leaving Lakeview Estates seemed like the only thing to do. The family relocated to an apartment complex in Creedmoor, but they're still preoccupied by their bout with bombs, and still asking questions. Who, they wonder, is responsible for their plight? More directly, who, if anyone, is liable?

It's taken awhile to try to find out, but recently the Cashes, along with three of their former neighbors, hired a Raleigh law firm, Abrams & Abrams, to look into potential litigation. Margaret Abrams, a partner at the firm, declined to discuss the matter, citing the firm's policy of not commenting on pending cases. Her clients say the attorneys have told them they have legitimate and actionable legal grievances--though not, perhaps, against the government.

The Army Corps of Engineers, which is responsible for cleaning up former military sites, is currently conducting a multimillion dollar spot survey of the 26,000 acres that are most likely to contain UXO, and recently oversaw an ordnance cleanup, down to 6 inches beneath the surface, on 26 acres in and around Lakeview Estates. During the cleanup they discovered and disposed of six additional explosive rounds.

But still the military has accepted no culpability in the matter. Corps officials note that the Army, which transferred most of its land back to private hands after the war, in most cases did so only after adding deed restrictions that forbade digging and developing. On many properties, however, farmers and developers ignored the restrictions, and over the years, as the lands were sold and re-sold to new owners, the warnings were dropped from replacement deeds. To complicate matters further, some at-risk areas--including the lots at Lakeview Estates--never

carried the usual restrictions, despite the fact that they were littered with ordnance. (The property that is now Lakeview, it appears, sat just next to, but not directly on, a target range.)

The Cashes and some of their former neighbors think that the man who sold them their land, Jim Willett, of Willett Investments, should shoulder some blame. They say that Willett, who lives next door to Lakeview Estates on a 50-acre plot his family has owned for decades, kept information about the ordnance hazards to himself, though they believe he'd known about them for years.

Not so, says Willett, though he qualifies his denial a bit. "I've never seen a bomb," Willett told *The Independent* in a telephone interview last week. "When the fields were cleared for pastures for cows and horses, you'd occasionally come across some ordnance, some real decayed bazooka or something of that nature. But they [the Army] come out here and found some and they took care of it, they exploded them. They come out and cleaned it up completely, and gave us a clean bill of health." Besides, Willett says, "We purchased the land just like any other land, with a clean deed and a clean title. I was unaware that there was any ordnance, any more than what's on my property."

The recent furor at Lakeview is much ado about nothing, Willett says, expressing a view that is not uncommon in a community where scattered munitions--duds and live ones--have been a fact of life for decades. "There is no risk," he says flatly. "I don't know that anybody's ever been killed, I don't know of anyone who's ever been hurt. I guess the biggest hazard we have out here is deer. I hit one last night."

Miraculously, there has been only one injury, and no deaths, reported from the many mishaps with Camp Butner's leftover ordnance. But the lurking risks remain real, here and at hundreds of other retired ranges, as civilians increasingly find themselves on former military lands that were not sufficiently cleared. The scenario can be deadly: In 1983, two eight-year-old boys in San Diego found a 37-mm shell in their subdivision--which, like Lakeview Estates, was built on a World War II artillery range--and as they played with it, the shell exploded, killing both boys.

The Cashes have several news reports about the incident in their files. Reading them, they're reminded of how close the family came to experiencing a similar tragedy. In addition to the shell Taylor raked up, in August 2002, Army contractors found another shell of the same type while searching Lakeview Estates. It was located three inches beneath the surface of the Cashes' yard, 30 feet from their front door. Like the one in San Diego that proved fatal, and like the one Taylor discovered, the round was still live.

A 'sleeping giant'

Due in large part to cases like that of the Cash family, a long-unnoticed homeland security threat with leftover ordnance is finally getting some attention. Similar problems have been encountered in dozens of states, and the number of danger sites suggests that civilian sprawl and former bomb ranges will remain a troublesome mix for the foreseeable future. The Defense Department has issued rough estimates that there are already some 1,500 former defense sites in the United States that require cleanup of dangerous materials, and that ordnance could linger at some 16 million acres of old training grounds.



Photo By Jan Elliston

UXO refugees: Danny and Kimberly Cash, and their six children, abandoned their home when bombs turned up in their yard. Taylor Cash (kneeling, at right) discovered the first one while raking leaves.

"UXO contamination is the sleeping giant of the military cleanup program," says Lenny Siegel, director of the Center for Public Environmental Oversight, a California-based research group that serves as a clearinghouse for military pollution information. "It's basically been a local story," he says, but one that is unfolding in hundreds of localities across the country. "Very rarely does someone try to put it together nationally."

Siegel and other experts say there is a new groundswell of concern brewing around the issue, however, as concerned individuals and interest groups, and even some government agencies, are taking steps to raise national awareness. Last November, the issue received a rare spate of media coverage when Public Employees for Environmental Responsibility, a Washington, D.C., nonprofit that supports government whistleblowers, released scathing Environmental Protection Agency documents about the Pentagon's mishandling of the UXO

threat. Among them was an internal briefing paper, prepared in the summer of 2002, which warned the EPA's enforcement director that "cleanup of UXO on military ranges has the potential to be the largest environmental cleanup program ever to be implemented in the United States."

The document cited the military's "failure ... to comply with existing regulations" concerning ordnance cleanup. Further, it decried the "disturbing trend for the [military] services and the Corps of Engineers to limit their responses or take ill-advised short-cuts to limit costs." Another document, from April 2000, described an EPA survey of 206 former ranges, reporting that the ranges "pose potentially significant threats to human health and the environment." Many of the dangerous sites, the document noted, are now occupied and trafficked by civilians: "Although most ranges are in rural or remote areas, or are near small towns, there are residences in close proximity to most of the ranges. In addition, 33 percent are on or near surface water, wetlands, or floodplains, thus potentially exposing ecological receptors and making cleanup more difficult. UXO has been found at most of the ranges in this survey, and at 50 percent of the ranges the presence of chemical or biological weapons is known or suspected."

Following up on the publicity of the leaked documents, Sen. Jon S. Corzine (D-N.J.), one of Congress' leading voices on ordnance cleanup issues, pressed for the Senate Committee on the Environment and Public Works to hold hearings to assess the threat. "It is the government's responsibility to examine the status of these cleanups and to ensure that they proceed quickly and safely," he said. "There is no excuse for taking shortcuts when it comes to protecting the health and safety of Americans from hazardous environmental risks."

Hearings would help, but what is most desperately needed, cleanup advocates say, is definitive data on the scope of the problem. As the EPA's assessments noted, official estimates have thus far been hazy, because, despite years of prodding by Congress, the Defense Department has yet to produce an inventory of its former training sites. Hard numbers should finally become available this spring, as the Pentagon is slated to complete a long-delayed, comprehensive listing of the places where training left explosives behind.

That inventory, more than anything else, could convince politicians and their constituencies of the size and severity of the problem at hand. So says Jeff Swanson, a UXO expert for the Interstate Technology Research Council, which trains and consults state and federal employees involved in military cleanup projects. "If there's a watershed now," Swanson says, referring to

the recent wave of interest in ordnance contamination. "the flood is going to be when this listing comes out, and local communities find out, first of all, that they're living next to problem sites that they didn't know about, and second, that there is not sufficient planning or resources to clean them up and make them safe."

More worry than cleanup

After it has identified all the risk areas, the Defense Department will face the gargantuan task of picking priority cleanup sites and funding years of survey and clearance operations. Based on its track record so far, the military has given ordnance cleanup advocates little hope that the process will be quick or thorough. But despite its shortcomings in assessing the problem, the Defense Department has begun to take some concrete, if incomplete, steps toward addressing it.

The department's budget for "UXO response" in fiscal year 2003 is \$252 million. While most of that will go to current survey and cleanup efforts like the one near Butner, roughly \$20 million will be spent on research and development of munitions detection and cleanup technologies, which have been found lacking during many recent cleanups. Among the more promising approaches introduced in recent years is aerial detection of buried ordnance. Helicopter-mounted metal-detection gear, for example, was developed to assist cleanups of huge training ranges in Alaska. And several Pentagon-funded research projects are looking for ways to track and mitigate groundwater contamination on and near former ranges--a worry above and beyond the threat of the old bombs exploding. There's even a "green munitions" campaign underway to develop non-toxic ammunition and training ordnance.

The advancement of such technologies, however, has done little to stem the worries in communities like Butner, where the slow flow of cleanup funds has left many residents angry. A key problem, say experts from both inside and outside the government, is that the Corps of Engineers' cleanup budget falls far short of its needs.

"If you talk to the Army, they say it's going to take them between 70 and 200 years to address the [UXO] problem at formerly used defense sites," Siegel says. "It's totally inadequate. By the time you deal with the high-priority sites, there's hardly any other money around to address the other sites. It's not the fault of the Corps people in the field, or the Corps people at headquarters, who say there's not enough money. It's people at the Defense Department and Congress who won't put enough in to do the job."

renny Schmitt, spokesperson for the U.S. Army Corps of Engineers branch in Wilmington, which is overseeing the work at the former Camp Butner, makes a very similar case when asked why it's taken so long to begin the partial cleanup there. "The principal factor in how fast we can work is funding," she says. "We can only get work done when we have money. There are something more than a thousand sites nationwide that need to be addressed, and we have spent more than \$3 million at this site. There's competition for those funds, and the funding is scarce."

Frankie Vos, a retired nurse who lives in Lakeview Estates on property adjoining the Cashes' with her husband and her elderly parents, says she thinks the government's skimping is putting her family at risk. "They're putting a price on our safety," she says. "You're talking about people's lives, people out here who have children and don't even know about this. What's a life worth?"

Denying the danger

The history of the Camp Butner site suggests that military policies and budgets aren't the only reasons the former training grounds make for uneasy living grounds. Local civilians, as well, have played a role in overlooking, downplaying, and sometimes even denying the danger.

As it abandoned its training areas after the war, the military claimed it had done its best to clean up explosives. "Dedudding operations have recently been completed on the ranges at Camp Butner," the Army Corps of Engineers announced in an April 1950 press release. "Tons of practice missiles were gathered and disposed of and several thousand high explosives duds were destroyed in place. The duds were comprised of hand grenades, rifle grenades, rockets and Howitzer shells up to 240 millimeter. Any one of the duds could have caused serious injury or tragedy to the persons disturbing it." The release hinted that the bombs could long grace the Butner landscape. Thousands of acres were being sold back to private citizens, but with a major caveat: "There are several areas that will be disposed of with a restriction placed on them against sub-surface use. These areas received a heavy concentration of fire of high explosive shells and there is a great possibility of unexploded duds remaining underground."

In many cases, the warnings and restrictions went ignored. Throughout the 1950s and '60s, as farmers plowed into former range areas, several tractor blades were damaged when they struck and ignited buried bombs. Hikers and hunters came across hundreds of explosives, and many handled the items. One farmer later said that he'd chucked more than 70 rounds into a pile, without incident. There was a close call in the summer of 1958, when someone took a pile of scrap metal that included a mortar

yard melted the pile down, the shell exploded, sending flaming debris over neighboring buildings. No one was hurt, according to local news reports.

It wasn't until the 1970s that reports surfaced of an UXO casualty at Butner, and details of the incident are few. In 1976, a former game warden told the *Durham Morning Herald* about a hunter from Chatham County who had found a shell near Butner a few years before. The hunter, who is not named in the newspaper article, reportedly took the shell home, where it exploded, injuring his arm.

The prospect of such accidents kept the Camp Butner ranges on the military's radar long after World War II. Army demolition teams from Fort Bragg made annual visits until the late 1960s, and their reports indicate that they disposed of an average of 13 live explosives each year. But that, it appears, was more of a scattershot effort than a comprehensive plan for removing the old bombs, for many remained. So common were the UXO findings, potentially lethal items came to seem benign. People even displayed shell remnants on their mantelpieces and used them as doorstops, as though they were some kind of bizarre local folk art.



Courtesy Of Army Corps of Engineers

This Army photo shows the variety of munitions found on Camp Butner's former training ranges.

But the problem, while submerged in the local consciousness, keeps rearing its head. The 1983 deaths of the two boys in San Diego was a reminder of the genuine dangers. Shortly after that, the Defense Department began surveying selected sites thought to harbor similar risks. An April 1990 Corps of Engineers report on Butner affirmed that "ordnance is a major problem," and that former target zones rife with munitions "are not fenced or marked

as dangerous areas.

Today, the dangers on a given property can be hard to gauge, given that many homeowners are living on contaminated lands with "clean" deeds, which had been prepared by title lawyers and insurers as the properties changed ownership over the years. And even many of those who are aware of the problem tend to minimize the dangers. That's understandable, says Frankie Vos, because discussion of buried bombs can hurt property values. Nonetheless, she thinks such people are making the wrong calculus. "Anybody dealing with real estate in this area is going to more than likely shrug it off," she says. "It's all about the dollar bill. I know some of the old-timers in the community will say, 'Well, it's always been here.' And I get so sick of hearing that, because it shouldn't be here. It shouldn't be anywhere."

Lives on hold

The Corps of Engineers' work at Butner is far from complete. At present, the Corps' contractor, Atlanta-based Parsons Engineering Science, is winding up work on an evaluation, using 200 statistical sampling plots, of more than 20,000 acres that may contain ordnance. In the 26 acres at Lakeview Estates, they're scanning the land again, this time using gear that should detect any suspect objects buried as low as four feet. To do similar in-depth surveys and cleanups elsewhere, the Corps will have to request and be granted additional Defense Department funds, a process that can take years.

Meanwhile, some residents living at nearby trouble spots say they're not getting the help they need to determine if their land is safe. Amy and Wyatt Blalock, a married couple in their thirties, bought a house a few miles north of Lakeview in January 2000. At the time, they say, they'd heard nothing about ordnance problems in the area, from the person who sold them the property or anyone else. Then, on Sept. 18, 2002, Wyatt was stepping out of his truck in the driveway when he turned his ankle on a cylindrical brass object. It turned out to be a detonator for a training round.

"So I got my brother-in-law's metal detector, because I wanted to sweep the yard," he says. "And within the first five minutes, I found a 155 mm shell, about two feet from the corner from one of our barns. It was 35 feet from our back door, and it was in the basketball court where [the previous owners'] kids were dribbling balls on top of it." The Army informed the Blalocks that the item was a white phosphorous shell, and strongly advised against looking for additional ordnance.

Despite such clear and present dangers, the Blalocks say, Corps

the government will fund a cleanup of the site, given the budget constraints. "Now this is putting our whole life on hold," Wyatt says. "We had a lot of plans for the house and the land, and we don't want to proceed with that, if the place is not safe to live. And we were basically told that it's not safe to plant a flower garden."

"We're stuck," Amy adds. "We can't leave. I could not even look at myself in the mirror if I were to sell this house without disclosing it, like it was done to us."

"We sympathize," says Penny Schmitt, the Corps spokesperson in Wilmington, about complaints the Army is doing too little, too late. "This is something that really gets at people's sense of their security in their own homes. We can't do everything that people wish we could do, and we understand very much their wishes, but we have to work within the limitations of the resources that we have."

Lenny Siegel says that even as public awareness of the problem rises, the funding shortages that have plagued UXO cleanup efforts may well continue. "The Defense Department is of two minds," he says. "There are people on the inside who recognize the problem and really would like to see funding not only for the cleanup but for the research. And then there are people who want to use the money for other things. And particularly whenever it looks like we're going to war, it's easier to get money to create more problems than to solve them."

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Backyard Bombs Cause Granville County Couple To Tread Lightly

BUTNER, N.C. -- A Granville County couple made a terrifying discovery this week when they stumbled across a bomb in their backyard.

The bomb was found near an area where explosives have been found before. But the discovery had W.C. and Amy Blaylock feeling like hostages in their own home.

They've been forced to live a cautious lifestyle, they said, in which they never know where to put their feet.

Over time, the Blaylocks have realized that their sprawling 10-acre estate is a virtual mine field. Since 2000, the Army has found eight live shells on the land where Camp Butner used to sit.

The most recent discovery is a foot-long munition, believed to be left over from training exercises performed during World War II.

W.C. Blaylock stepped right on it Thursday night.

"I landed on what felt like a turnip," he said. "But then I looked down, and, knowing what I know about this area, I just got away."

Said Amy Blaylock: "He could have been killed."

The Blaylocks also found a bomb last September that created a hole in the ground just 30 feet from their kitchen.

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In the 18 months they've lived here, they've also found bullet shells and weapons casings.

The Army has told the Blaylocks to watch where they step and to call emergency officials if they find anything that appears dangerous.

Saturday, the Army Corps of Engineers will come out to the Blaylock residence and remove the explosive from their property.

"We want them to clean it up," Amy Blaylock said. "We want it in writing that it's going to be safe, that our kids will be safe."

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Granville County Families Wary Of 'Hot Zone' Of Former Army Training Ground

Unexploded Army Munitions Discovered In Residents' Yards

BUTNER, N.C. -- Bombs from a different era have a Granville County family fearing each step may be their last -- after another family left their home due to the potential danger.



Unexploded artillery shells and other Army munitions have been found in Granville County yards

Many families in the area live on land that used to be a World War II-era Army training ground. Now they're finding some of the leftover explosives.

W.C. and Amy Blaylock bought

a home in January 2002. Then they discovered they could be surrounded by unexploded Army munitions from a time when their land was part of Camp Butner.

"We were told we were in a hot zone," Amy said. "A heavy artillery range is what the Army Corps of Engineers told us that we lived in."

W.C. stepped on a 150-millimeter high explosive in the woods near his home last week. Saturday,

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an army explosives team removed it.

Six months ago, the Blaylocks found a similar shell next to their shed.

The Blaylocks live 10 miles from the Lakeview subdivision, where another family found two live shells last summer.

"Living here, we feel we are in imminent danger," Danny Cash said at the time.

The Army Corps of Engineers committed to searching the Cash's subdivision for more ordnance. But Kim and Danny Cash and their six children left, anyway, for safety's sake. They now rent an apartment in Creedmoor.

The Cashes are planning to sue those who sold them the land, as well as Government entities that kept them in the dark about the potential danger on the property. They're fighting for themselves and others like the Blaylocks, who are waking up to the same horror.

"We fully intend to stay here," W.C. Blaylock said, "and we expect something to be done about the problem in the ground."

The Army Corps of Engineers has funding to search for ordnance in the Lakeview Estates subdivision. But they have no plans to search the land where the Blaylocks live.

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- **September 6, 2002:** [Butner Family Fears For Safety; Unexploded Shells Found In Neighborhood](#)

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Army Corps of Engineers expands war munitions search in two locations

BY HUNTER LEWIS
hlewis@heraldsun.com; 419-6651
Jun 28, 2003 : 8:47 pm ET

BUTNER -- The U.S. Army Corps of Engineers expanded its search for World War II-era munitions last week in a subdivision where at least eight live shells have been found, and on a Rougemont couple's property about eight miles away, where two additional live shells were found.

Corps official Roland Belew said the team surveyed two acres of Norma Reilly's property in Butner's Lakeview Estates and about three acres of Wyatt and Amy Blaylock's 10-acre property in Rougemont.

The Corps won't know for sure whether more shells or other metal objects, such as old plows or horseshoes, are embedded in the soil, however, unless it decides to dig for them, he said.

Engineers used sophisticated metal-detecting equipment to probe six inches below the surface and pinpointed any buried metal with global-positioning devices. The Corps performed similar surveys in the 26-acre Lakeview Estates in January and March.

Belew said the Corps will use the surveys to develop a plan of action, called a draft engineering evaluation and cost analysis, by late September that will explain the extent of the ground contamination around Butner and what the Corps intends to do about it. The plan could involve a multimillion-dollar cleanup and a program to educate the public about the dangers of old shells.

In the 1940s, soldiers fired thousands of shells on 15 munitions ranges in the area near where Granville, Durham and Person counties meet. The 40,000-acre base, Camp Butner, housed and trained some 40,000 U.S. Army troops for combat in World War II.

Lakeview Estates sits on the edge of a 37 mm munitions range. The Blaylocks' land was once a mock German village pounded by 105 mm and 155 mm shells.

When the Army turned the land back over to the state and private residents in 1947, it

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disclosed the leftover shells in the deed. But over time, as the land was parceled out and sold to private homeowners, that deed was not consulted.)

Roman and Francis Vos moved into the modest subdivision in 1997, and they knew nothing about the shells until their neighbor's 8-year-old son picked up a live bazooka round in 2001 while raking leaves in his yard.

"When we purchased this land, there was no disclosure of [shells]," said Francis Vos, 56. "Are the new homeowners being told about this when they're coming in?"

Vos said she put up a sign outside the subdivision in December that read: "Beware, Live Bombs." Someone took the sign down by the next morning, she said. Vos said local real estate agents and developers feared mention of the explosives would drive down property values and hurt the county's tax base.

"It's amazing to me that the county, the state, that nobody I know of is saying, 'Look, we've got to put a stop to this,' " she said. "It's all about the money, money, money."

Durham police officers Kimberly and Danny Cash, whose son Taylor found the live bazooka shell, moved their six children to a Creedmoor apartment in fall 2002 after the Corps found two more live shells in their yard.

Kimberly Cash said her family received at least one angry phone call a day from residents who told her to stop making a big deal of the ground contamination. Some teachers at Butner-Stem Elementary School even asked her why she continued to pursue the issue, she said.

"These are well-educated people who are turning their backs," Cash said.

Members of the Cash family, afraid for their safety, have since moved to northern Orange County, where they are renting a home while still paying the mortgage on their Lakeview Drive house.

About a mile from Lakeview Drive, several new houses and cleared lots boast "for sale" signs.

Mike Arrington owns 190 acres where some of the new homes sit. He bought the land last year and said his father farmed the land for 30 years and never found any old shells.

"I'm not concerned," he said. "I haven't heard of anyone finding anything except for about a mile away.

"Right now, I don't see a necessity to disclose it," he continued. "Everybody sees the newspaper. I didn't feel that by not mentioning that I'm being deceitful in any manner."

Uncle's sloppy habits

By BARRY SAUNDERS, Staff Writer

To Don Moore, buying a house in the bucolic Lakeview Estates subdivision in Butner took him a step closer to heaven.

Unfortunately for him and the handful of other Lakeview Estates residents, they now fear that every step they take could literally land them in heaven -- if they perchance step on or somehow detonate one of the unexploded bombs the Army left in the area when it was a training site during World War II.

Moore, an Air Force veteran and outdoorsman who thinks nothing of sitting for hours in a tree to get a good shot at a deer with his bow and arrow, moved to Butner from upstate New York.

"This is where I want to be," he said while sitting on his back porch, a placid lake visible a couple of hundred yards away. "It's a rural, tranquil area.

"It's so quiet at night that you can hear bats' wings flapping. ... This is heaven. But heaven has become tainted."

The taint affixed itself to Moore's heaven when a neighbor's 9-year-old son, while raking the front yard, raked up a 37 mm mortar round.

The Army Corps of Engineers started a search for munitions in the area soon thereafter. Moore said he and the neighbors whose child found the mortar, Danny and Kimberly Cash, were not satisfied with the corps' proposed cost-benefit analysis -- "They were going to weight the cost of searching for explosives against the cost of someone actually being blown up," he said.

The Cashes and their six children moved away, but they continue to pay the mortgage on a house in which they're afraid to live. The corps has expanded its munitions search, which should allow residents to sleep -- and walk -- better.

When the Army was running Camp Butner during World War II, soldiers launched thousands of rounds of ammunition into the local woods and fields. In recent years, at least eight live rounds have been found near people's houses, and the Army has agreed to survey the area to help figure out what to do next.

Aware of the area's history and of the possibility that live rounds were just beneath my feet, I approached Moore's house like Tiny Tim: tiptoeing through the tulips.

"Am I bitter?" Moore asked, repeating my question.

"Yes. This was supposed to be the last spot we were ever going to live. ... They found a blasting cap in my driveway. Now, we're on a powder keg," Moore said.

There's one thing about Moore's situation that I envy, but it's not enough to make me want to change places with him or his neighbors. He said, in essence, that he fears an explosion every time he mows his lawn, which was neatly trimmed.

Perhaps I can use that excuse -- a fear of going "Kablooey" -- the next time my persnickety neighbors stick a note in my door asking me to mow my lawn.

Picking up after yourself when you're done is one of the first things your parents teach you.

Too bad our u -- Uncle Sam -- didn't get the message. If he had, Moore and his neighbors wouldn't be tiptoeing through the tulips every time they venture outside.

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