US Army Corps
of Engineers®

Remedial Investigation/Feasibility Study

PINECASTLE JEEP RANGE

March 27, 2008

Agenda

- Welcome and Introduction
- Environmental Remediation Process
- Site Characterization
- Remedial Investigation/Feasibility Study
  - Objectives
  - Approach
  - Equipment demonstration
- Rights of Entry
- Opportunity to visit stations and share input

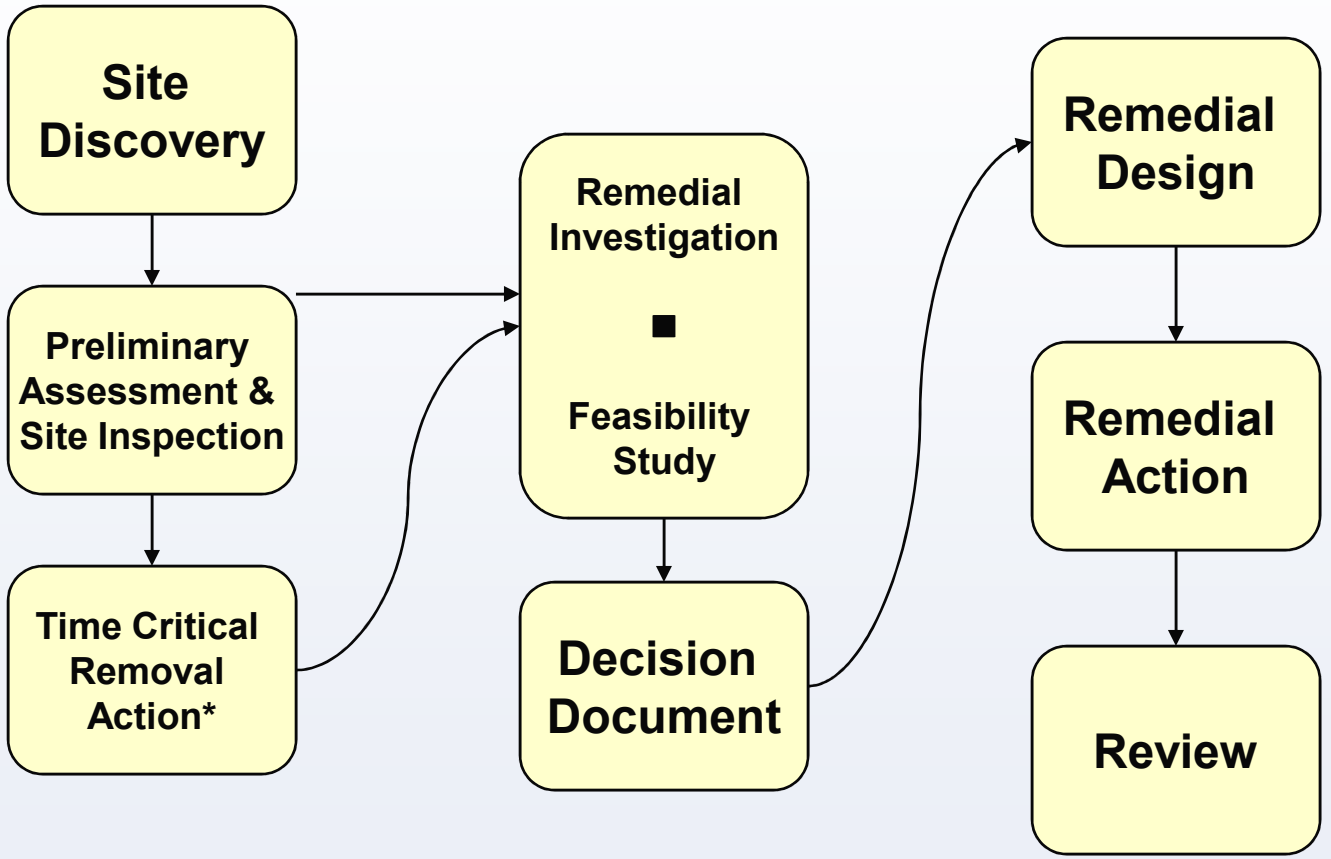
Technical Project Planning Team

- U.S. Army Corps of Engineers
- Florida Department of Environmental Protection
- Orange County
- City of Orlando
- Parsons
- Community

CERCLA Process

- Comprehensive Environmental Response Compensation and Liability Act
  - Act passed by U.S. Congress
  - Establishes the framework to be followed by this project

The CERCLA Process

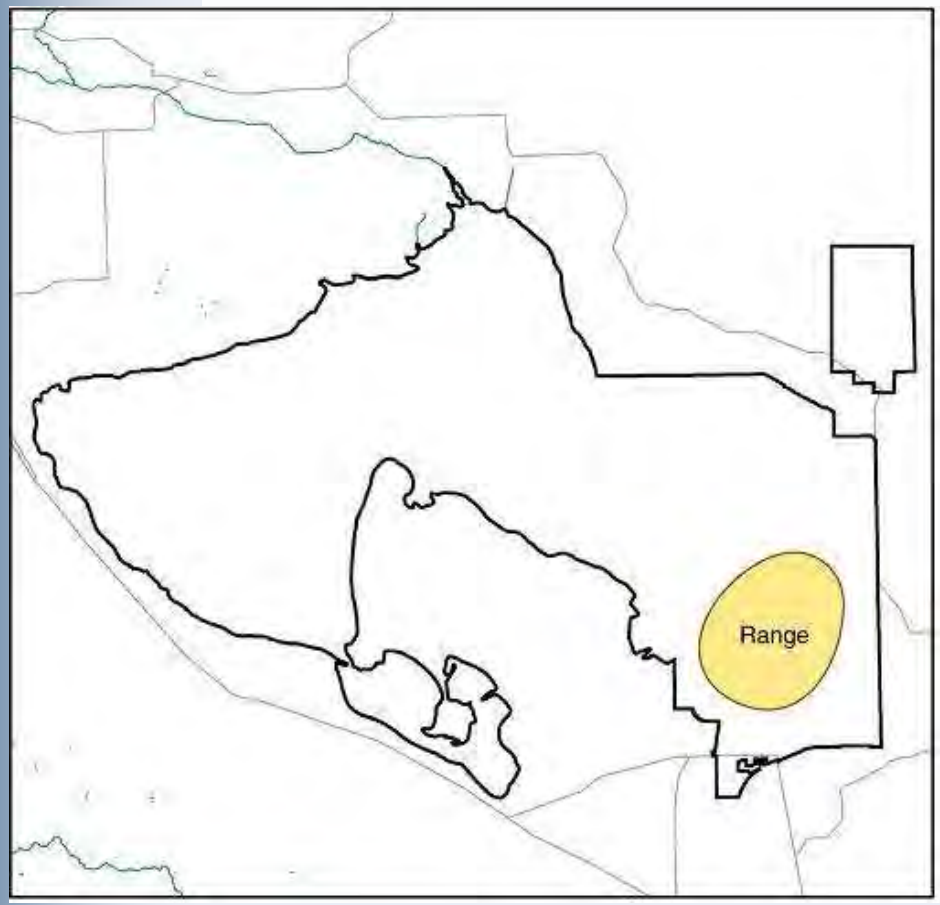


** Less than 6 months planning time*

Public involvement is important throughout this process

Camp Sample

Historical Research



Installation boundary

Roads

Range

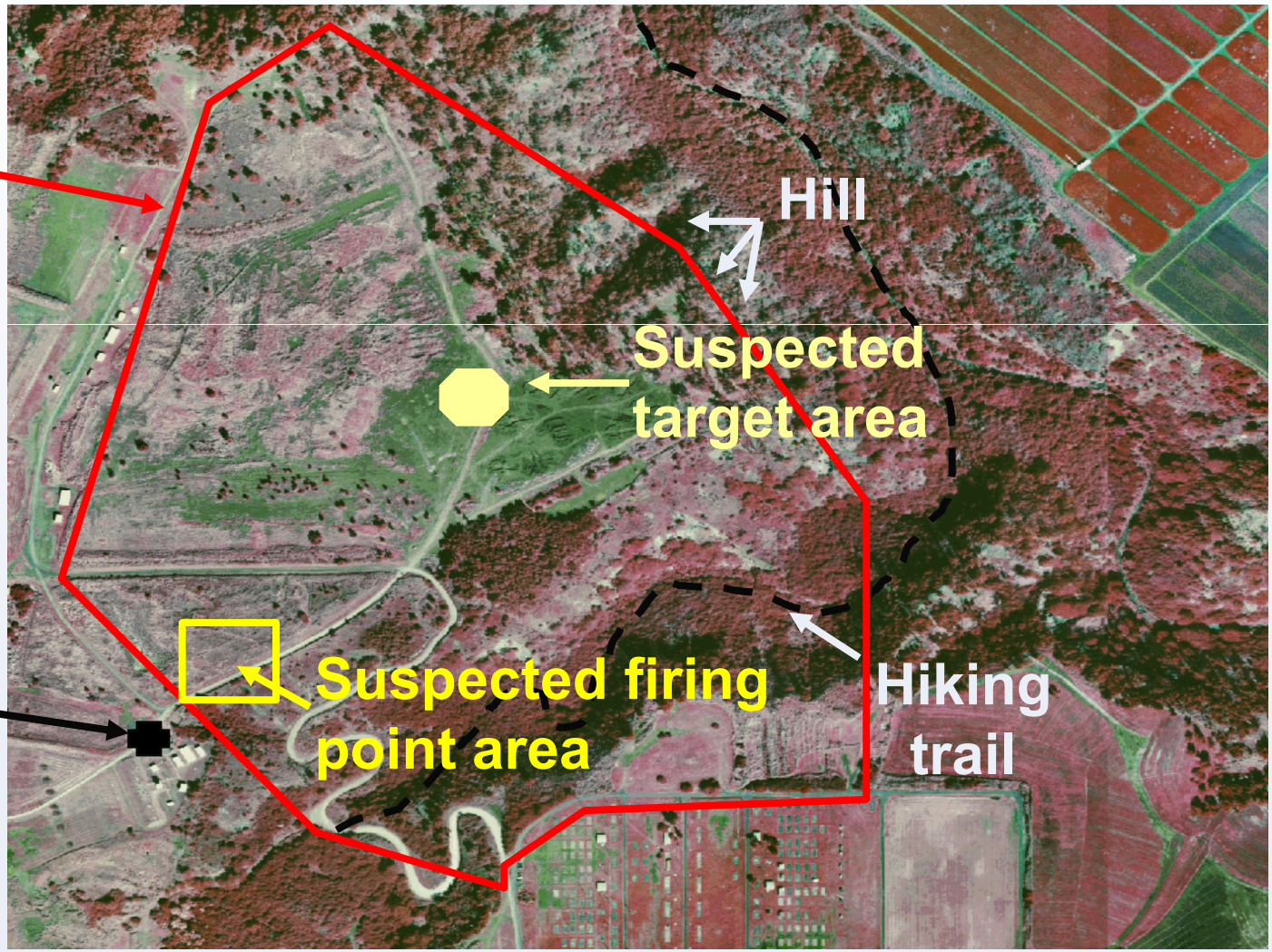
Munitions Used and Time Frame

- 2.36” rockets used for training
- “Camp Sample” used during and after WWII; closed in the 1950’s

Rocket launcher

2.36-inch rocket

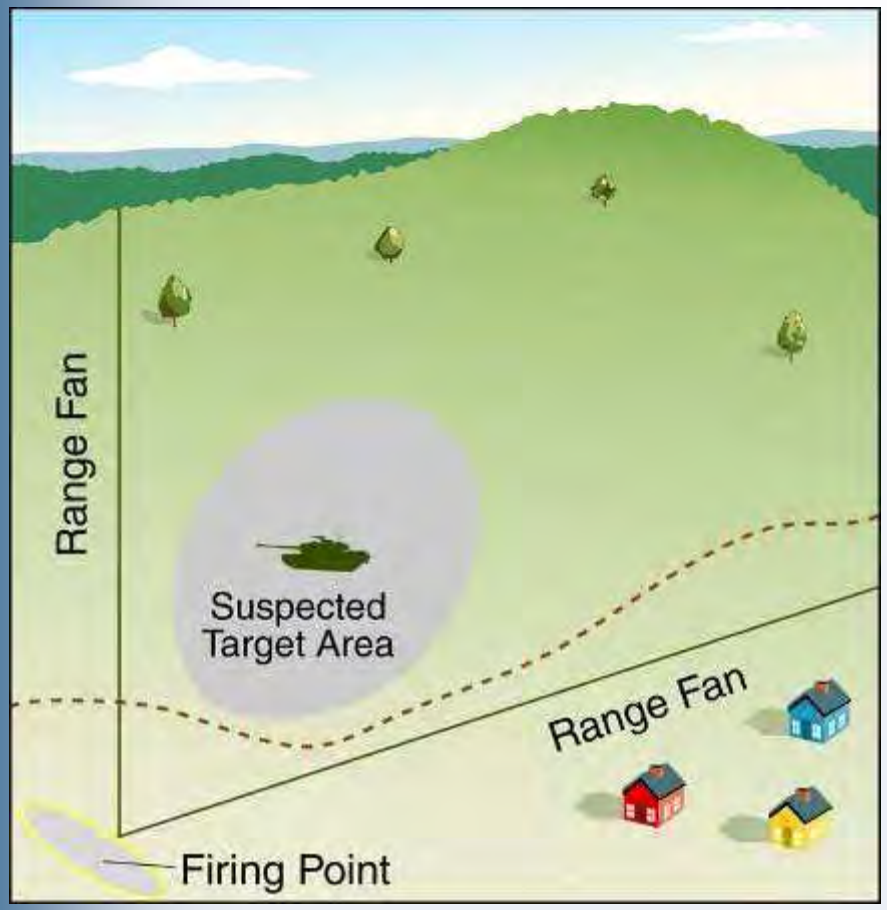
Approximate Boundaries



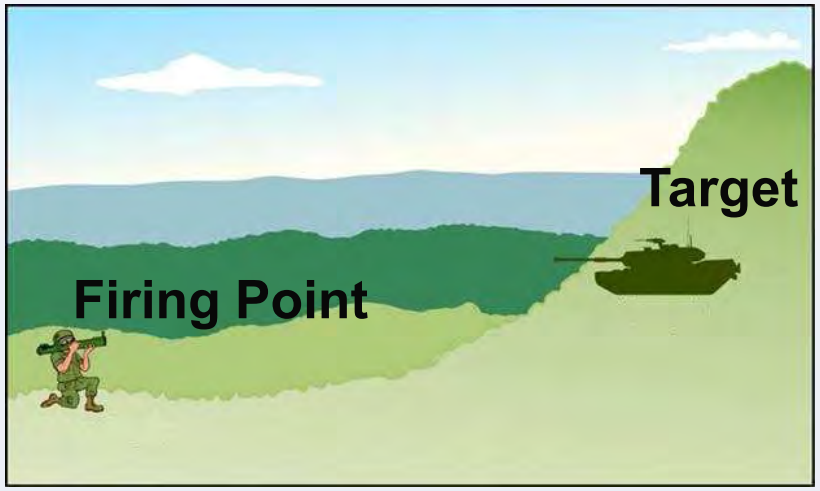
Developing Investigation Objectives

1. What do we need to know?
2. How are we going to find the answers?
3. What resources are available and what is the time frame?

What Do We Know Already?



- Preliminary Conceptual Site Model
- Suspected locations of
  - Firing point
  - Range fan



What Do We Need To Know?

- What are the boundaries of UXO contamination in the target area?
- What are UXO density distributions?
- Are buried or discarded military munitions a concern?
- Are the munitions detectable?
- What are the effects of site characteristics on detection tools?
- Is a Time Critical Removal Action (TCRA) needed?
- What kind of resources ($$) are needed and available?

View of range with hill "backstop"

How Are We Going To Find the Answers?

- Use preliminary Conceptual Site Model (CSM) to determine sampling protocol
- Use geophysical transects and anomaly digging to find target location
- Use small grids to identify anomaly density and distribution
- Data collection supported by Data Quality Objectives (DQOs)
- CSM is updated and reviewed to determine if characterization is complete

What Resources? What Time Frame?

- FUDS funding has been programmed for the investigation and cleanup
- Contracting mechanisms are in place
- Our goal is to complete the investigation and feasibility study in approximately one year
- Time Critical Removal Action (TCRA) will be conducted, if needed

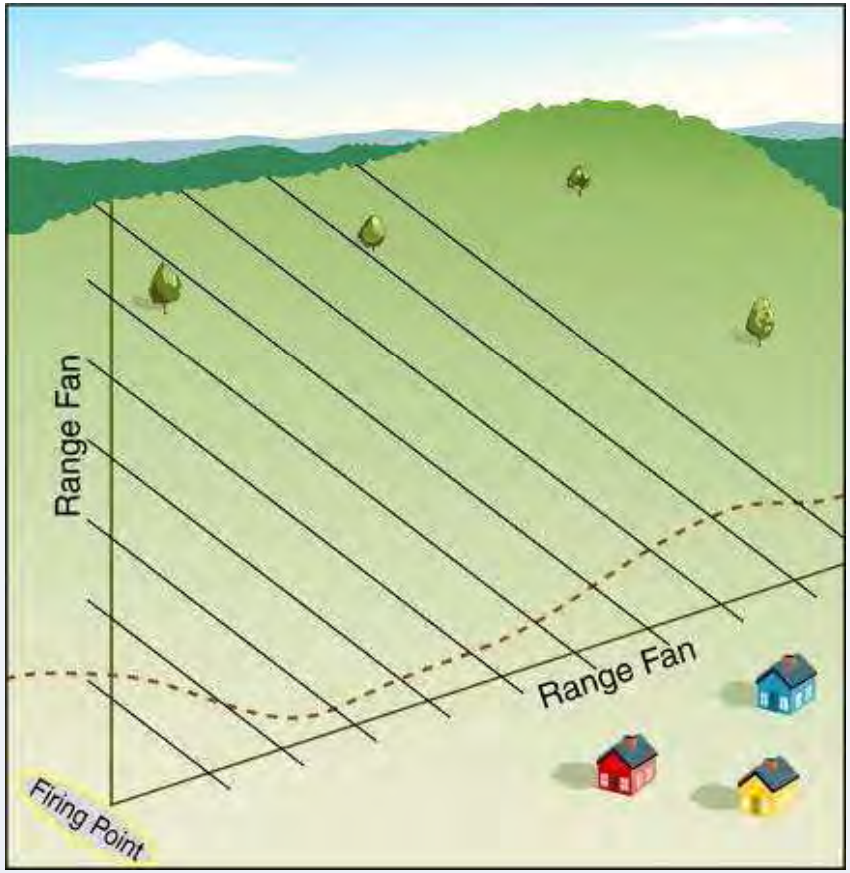
Investigation Process

Data Quality Objectives (DQOs)

- Specify the type and quality of the data needed to support an investigative activity
- Statements that
  - Clarify objectives of the data collection effort
  - Specify how data will be used to support hazard assessment
  - Define most appropriate type, quantity, and quality of data to collect
  - Specify acceptable levels of decision errors

Identify Data Needs for Investigation Design

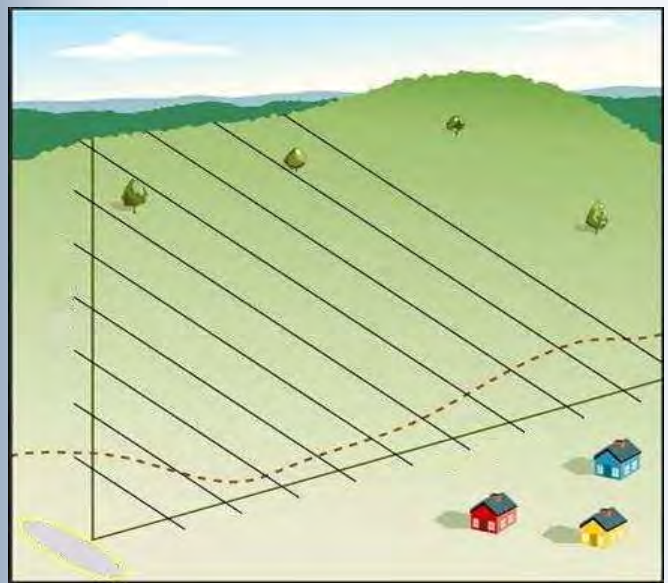
- **Data Need 1: What are the boundaries of UXO contamination in the target area?**
  - Use appropriately spaced geophysical transects to collect information
  - Preliminary DQO: Use transects of 250 feet over the entire range fan to delineate target area



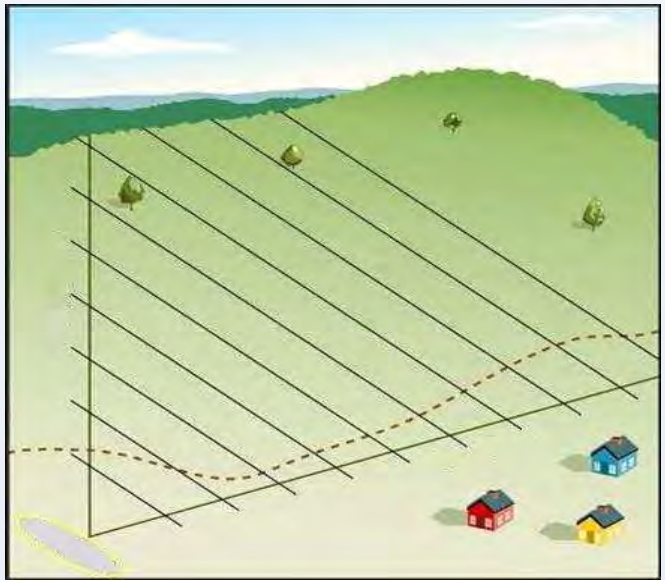
Original investigation transects spaced at 250 feet in range fan

Identify Data Needs for Investigation Design

- Data Need 2: Where is the most likely boundary of the problem area?
  - Increase transect density over suspected target area
  - Preliminary DQO: Use 125 foot transects in suspected target area

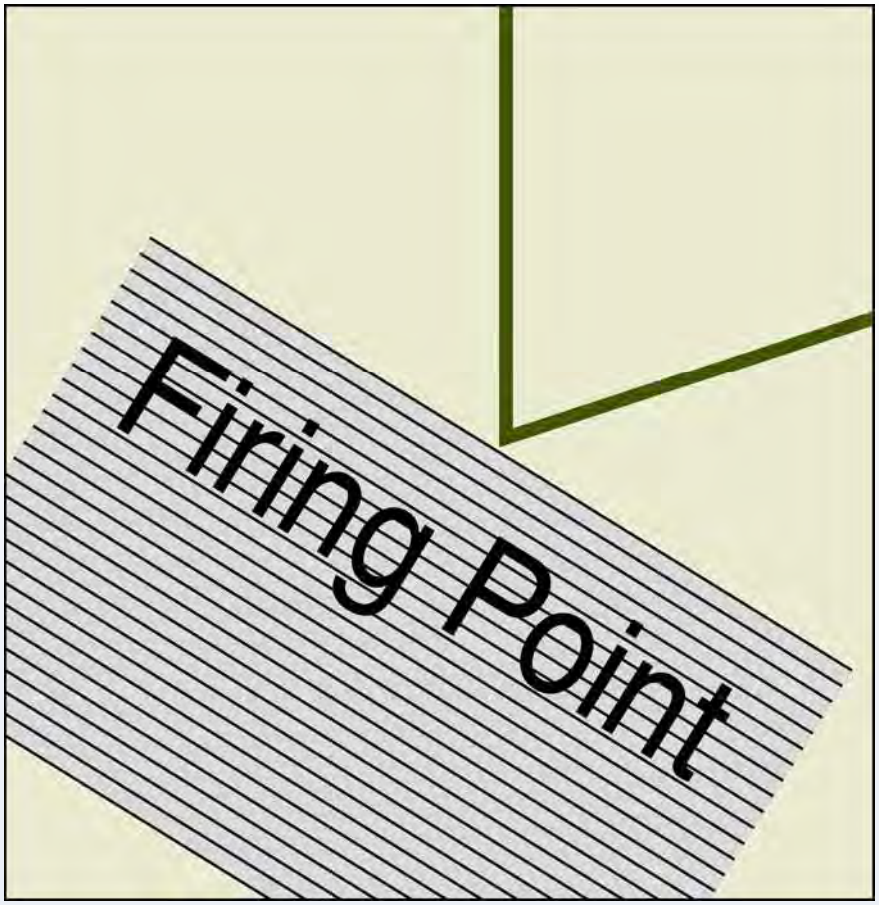


- Data Need 3: What are UXO density distributions?
  - Perform 100% characterization of mini-grids to better define the whole UXO problem, better estimate UXO densities and to estimate the vertical extent of contamination



Identify Data Needs for Investigation Design

- Data Need 4: Are buried or discarded military munitions a concern?
  - Find any large subsurface geophysical anomaly
  - Preliminary data quality objective: 100% digital geophysical mapping of firing point



100% investigation of firing point

Detection Technology Options?

Mag and dig

- Avoids having to remove vegetation
- Easier and cheaper than using digital geophysical methods

Mag and dig survey at Fort Ord, California

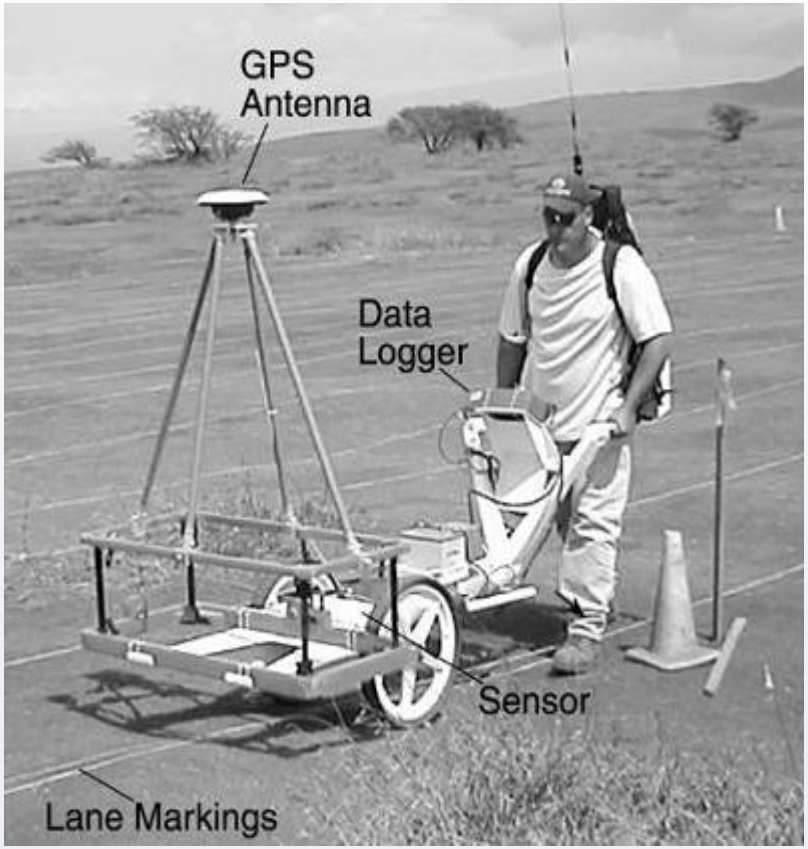
Towed array

Digital geophysical mapping (DGM)

- Sensors generally have a greater ability to locate anomalies and to a greater depth than mag and dig
- Easier to QC than mag and dig because a record is produced

Proposed Detection Technologies

- Digital geophysical mapping (DGM)
  - Map transects in the range fan
  - Conduct 100% mapping of the firing point area where we need complete information
- Mag and dig
  - Detailed density and depth sampling areas (“postage stamps”) in the target area

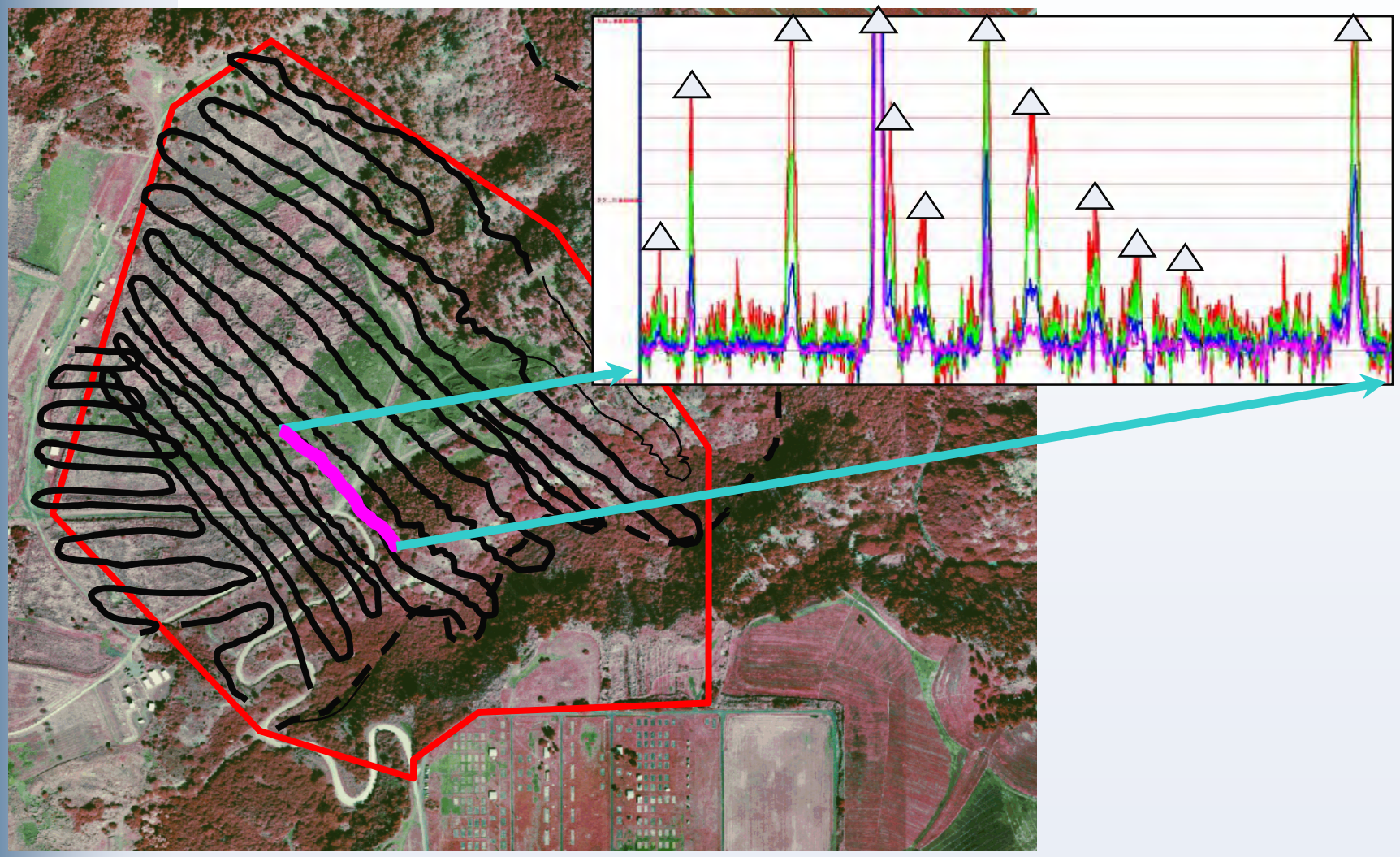


Digital geophysical mapping

Will the Selected Technologies Work?

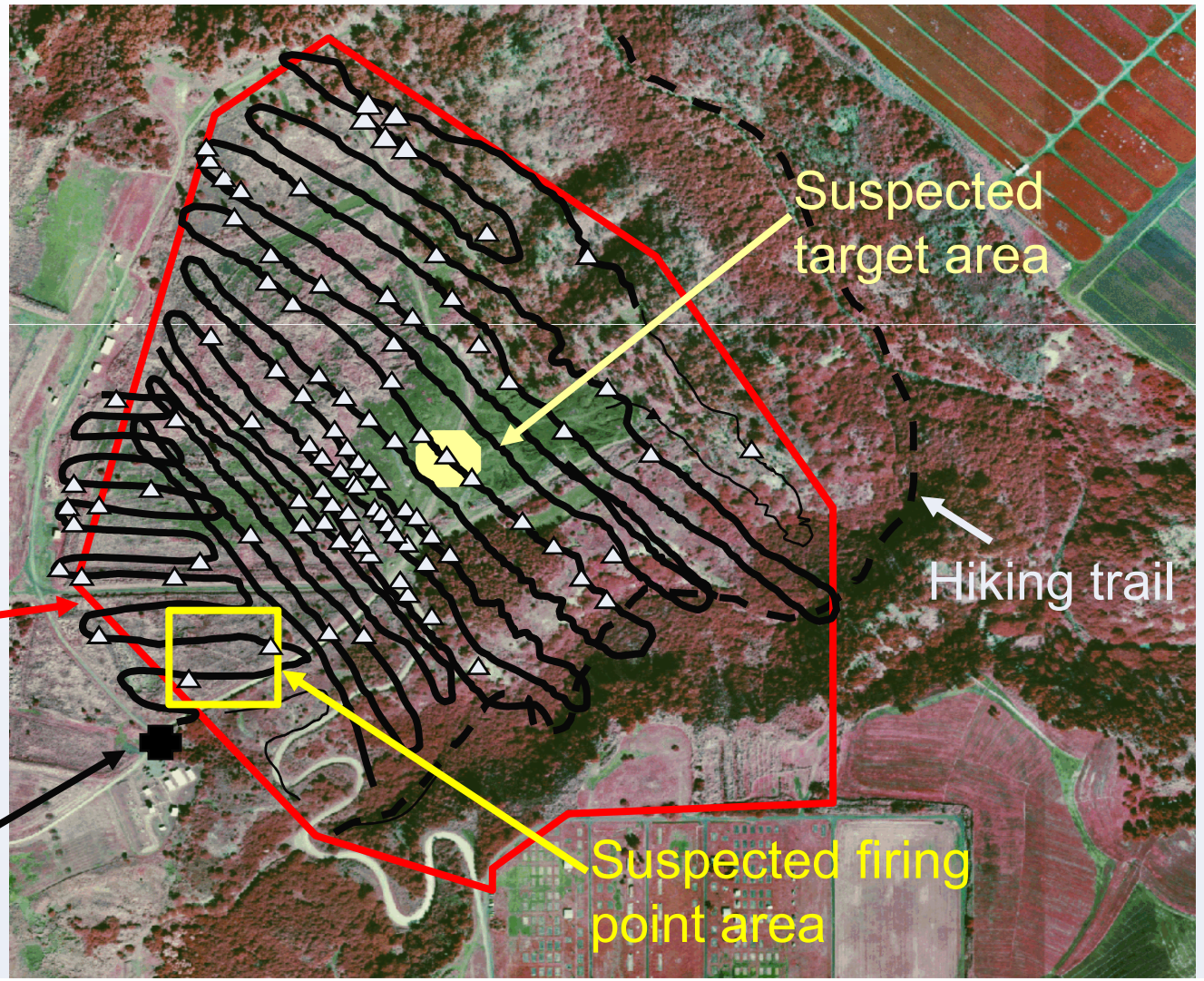
- Geophysical prove-out (GPO) will be conducted at “Camp Sample”
  - Test, evaluate and demonstrate the site-specific capability of our proposed detection technologies
  - Demonstrate that our data quality objectives can be met

What Was Found?



Detected Anomalies

△ = detected anomaly



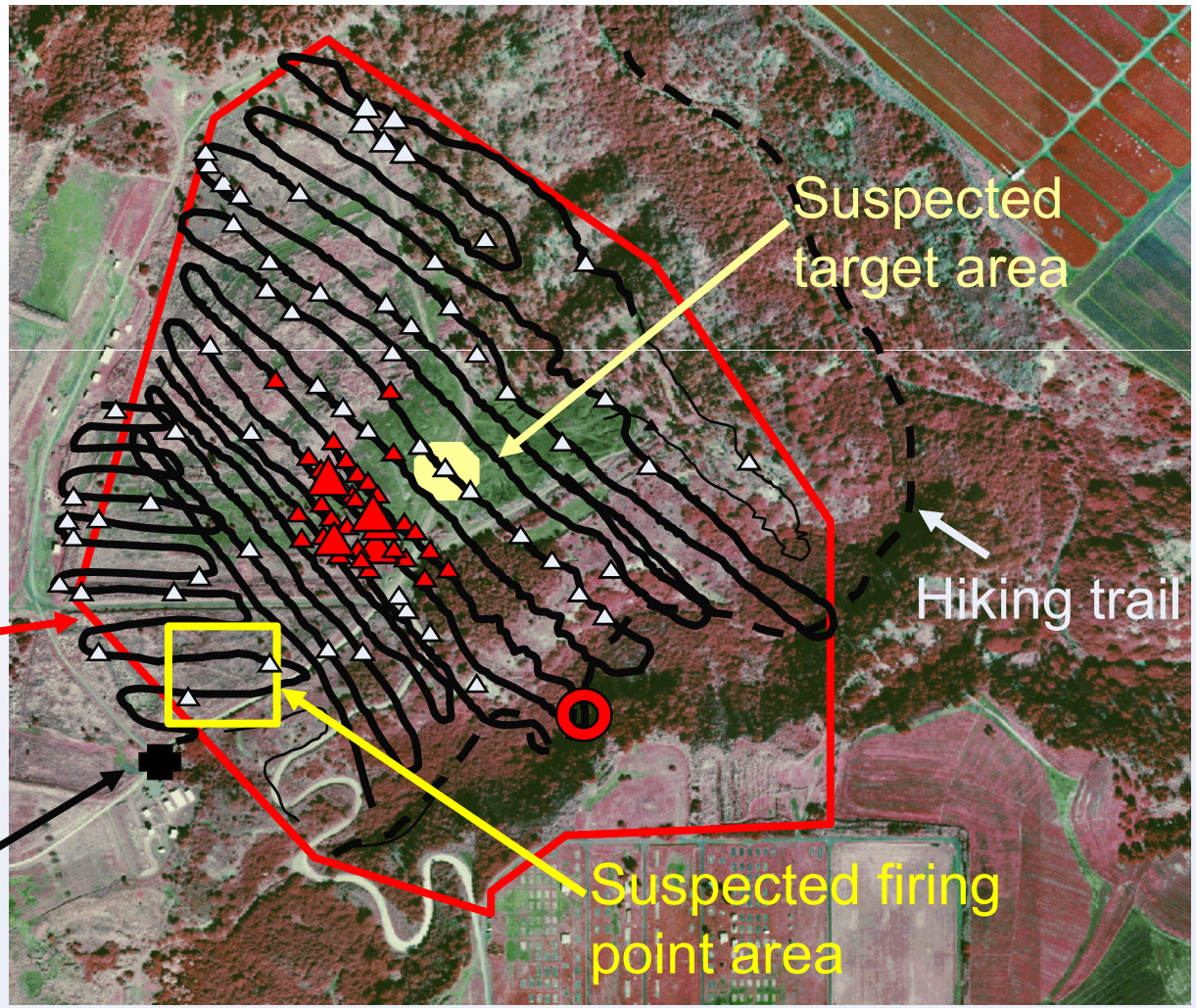
Anomalies Identified

△ = Non-MEC anomaly

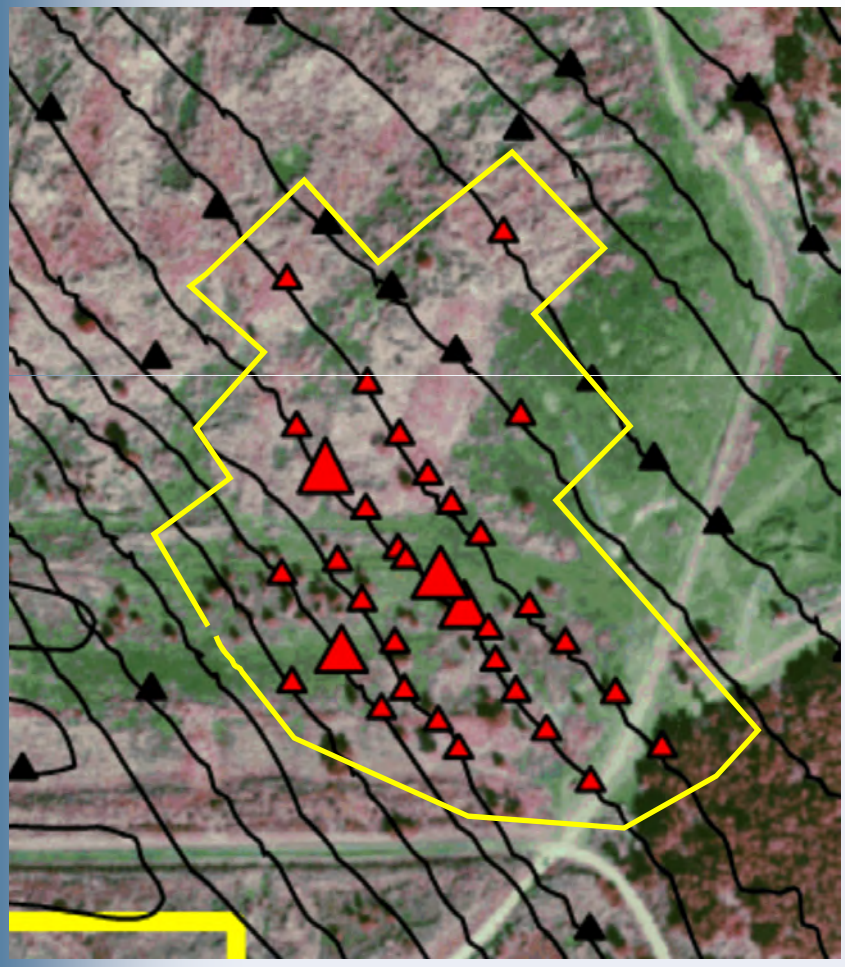
▲ = MEC Frag (2.36" rocket)

▲ = UXO-2.36" rocket

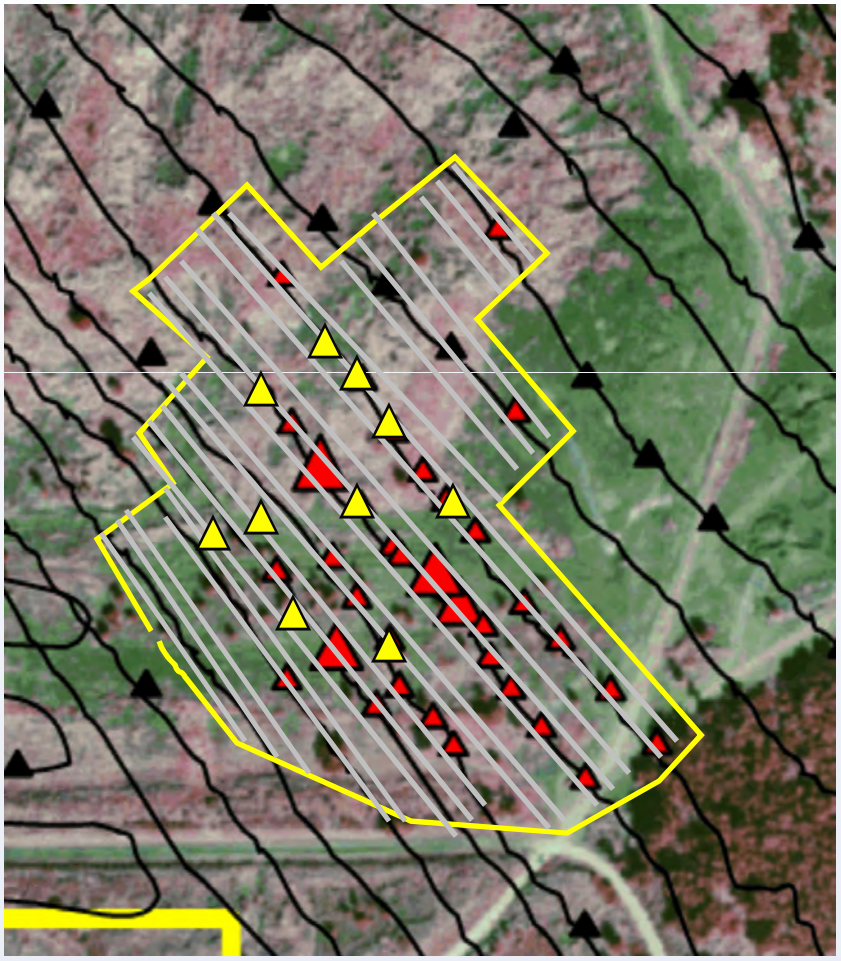
○ = UXO - 81mm mortar



Employing the Decision Rule



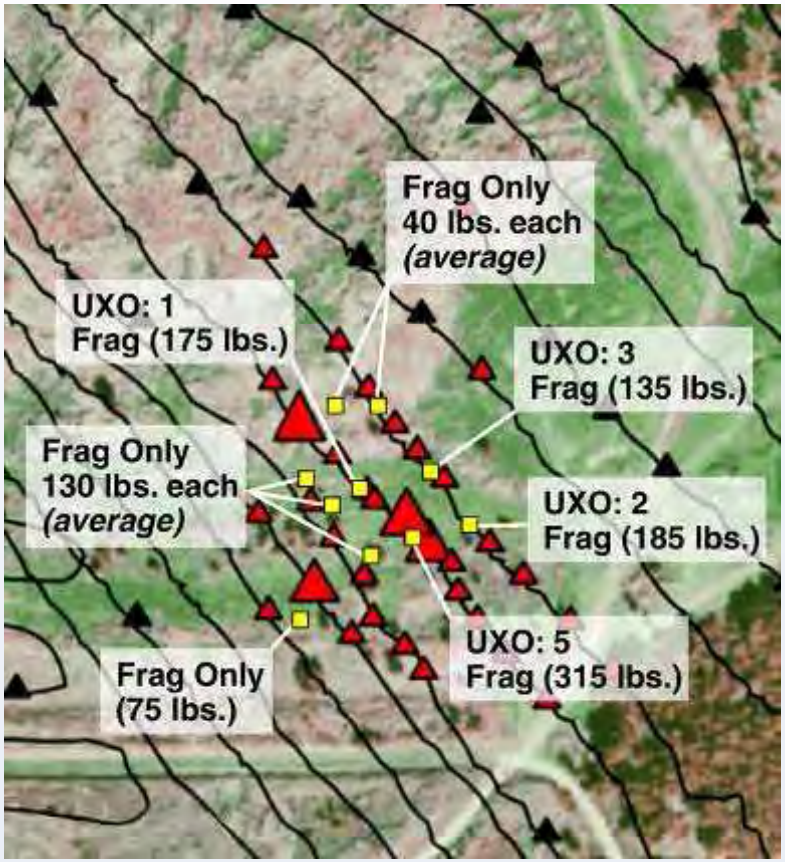
Apply decision rule to this area



Results of adding 125 foot transects added to investigation plan

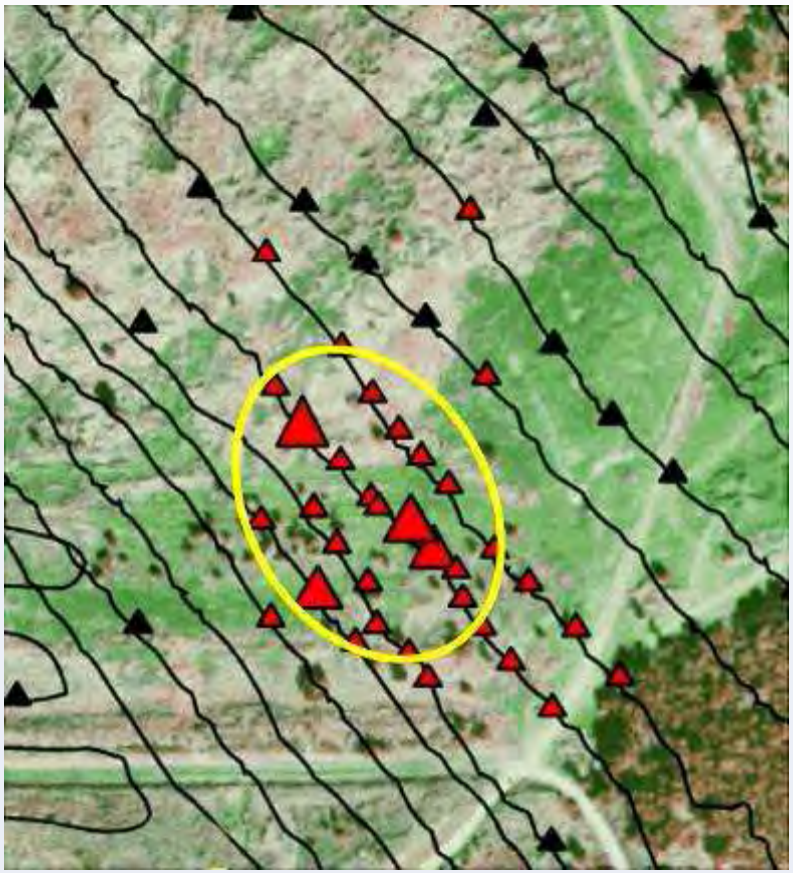
Detailed Sampling Results

- Items detected: 2.36” rockets (HE) and 2.36” rocket frag
- Depth ranges: Surface to one-foot
- UXO density: estimated 4/acre
- Scrap density: estimated 480 anomalies/acre

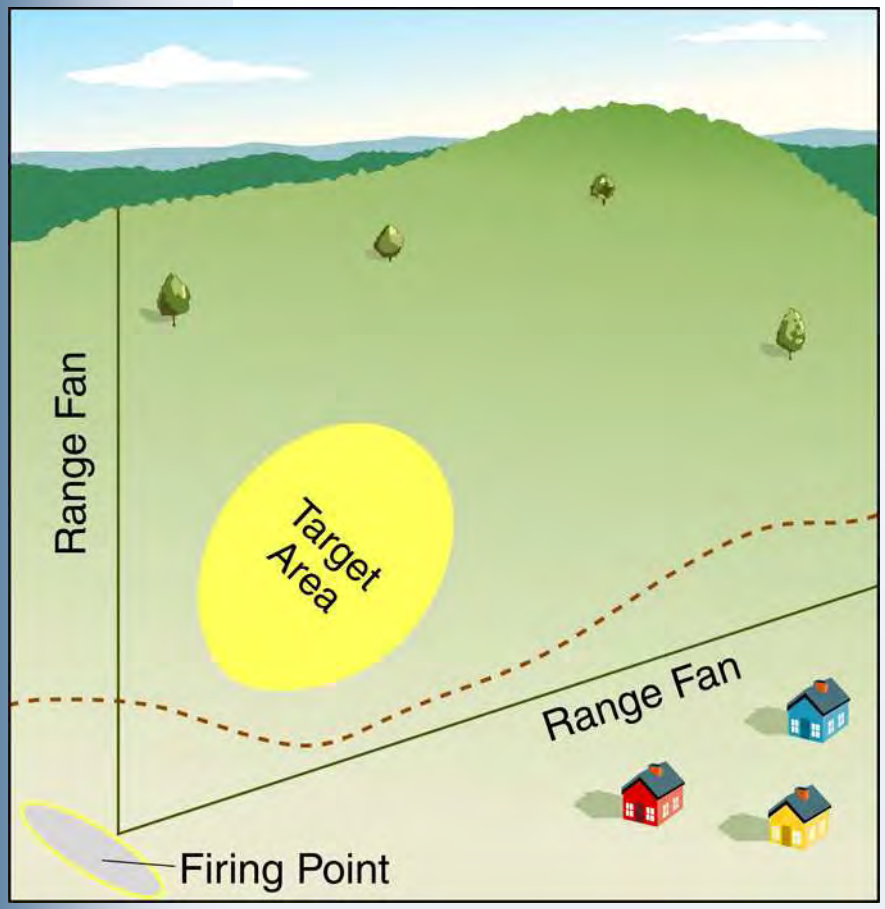


Target Area Delineated – Extent of Contamination

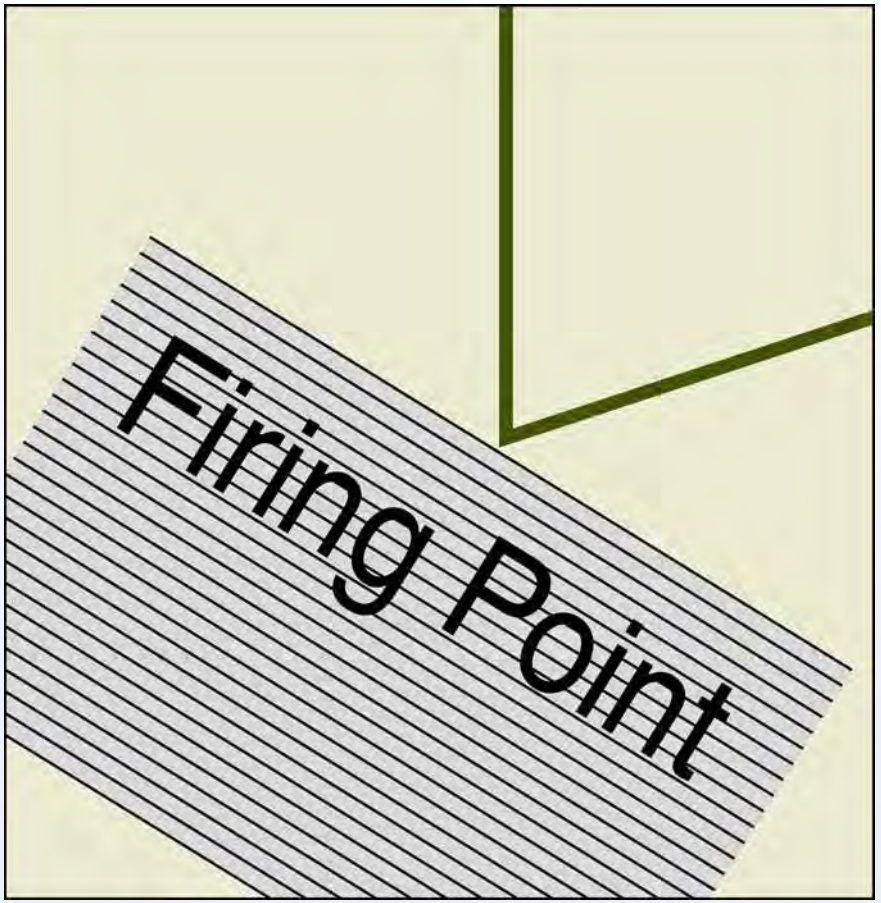
- Estimated target area
  - 17 acres



Firing Point Investigation



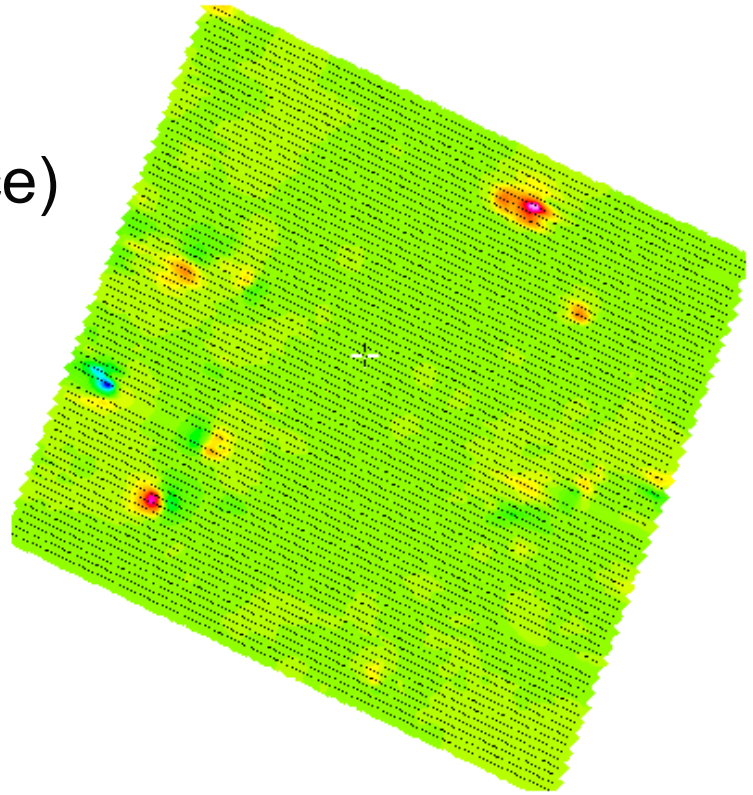
Investigation of range fan complete



100% investigation of firing point to be conducted

Investigation of the Firing Point Results

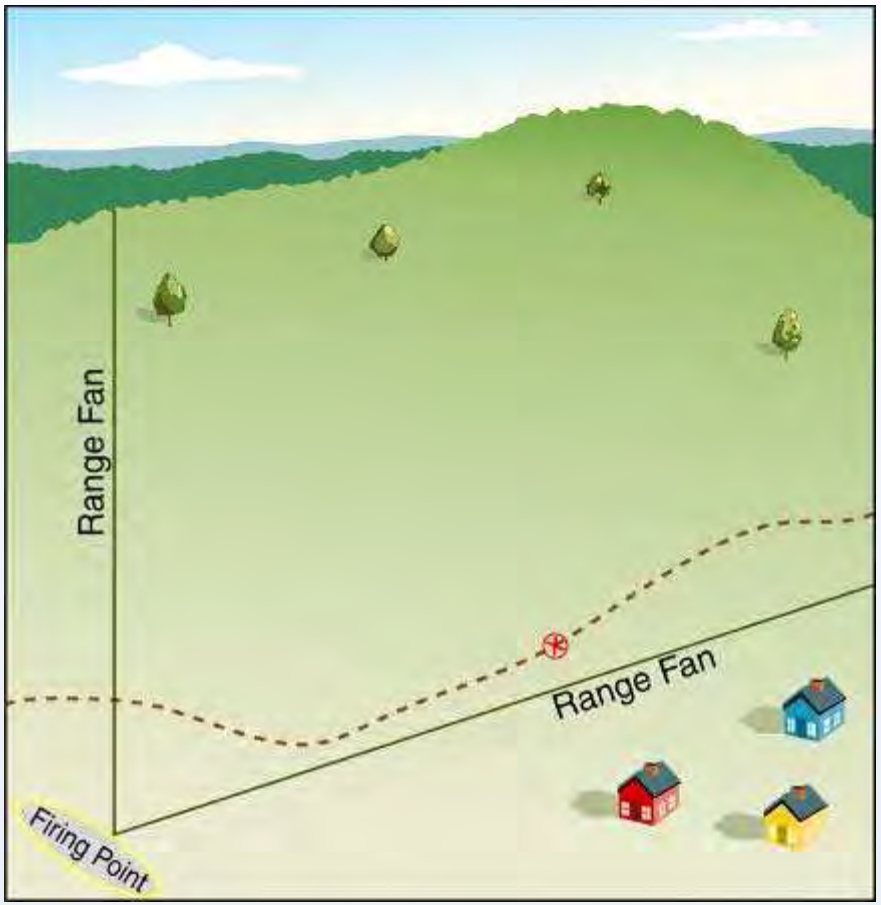
- Anomalies identified during mapping are cultural features (buried tin rations and metal fence)
- No evidence of buried discarded military munitions found



Digital geophysical map of firing point

Additional Investigation Results

- One 81 mm mortar found on the surface near the hiking trail
- Project team will address this issue



Investigation Complete

- Ready to begin feasibility study and site remediation process
- Our example is a simplified example of an investigation of a munitions response site
- Real world sites will typically be more complex
  - More ordnance types
  - Varied terrain
  - Multiple target areas

100-Pound Practice Bomb M38A2

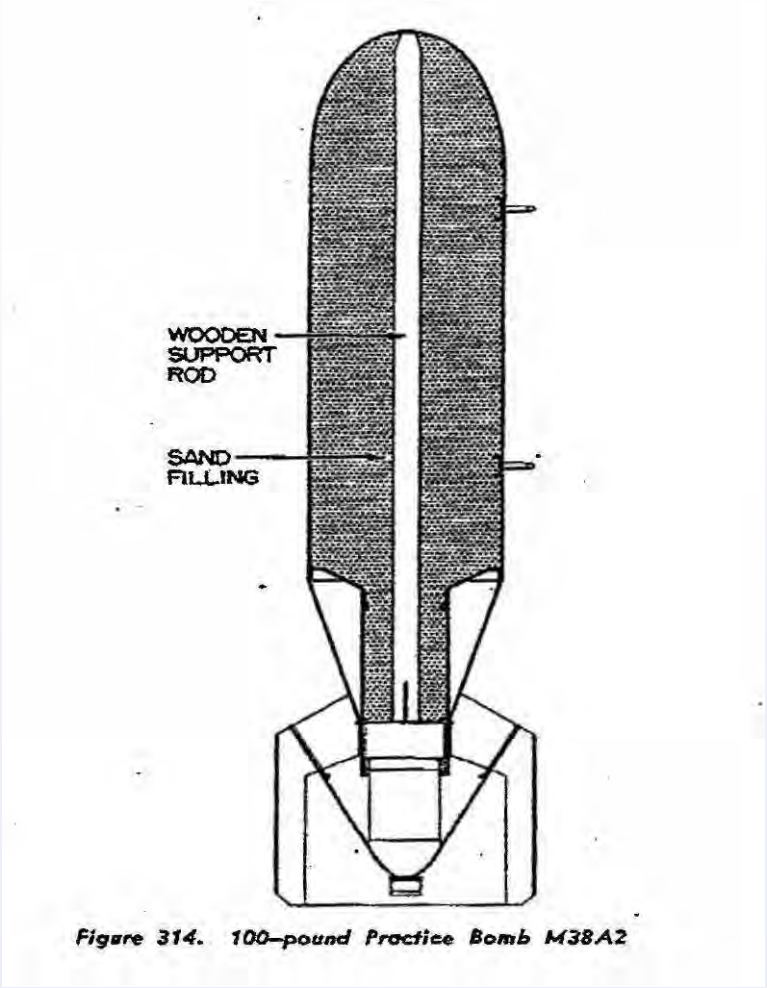


Figure 314. 100-pound Practice Bomb M38A2

20-lb Fragmentation Bomb

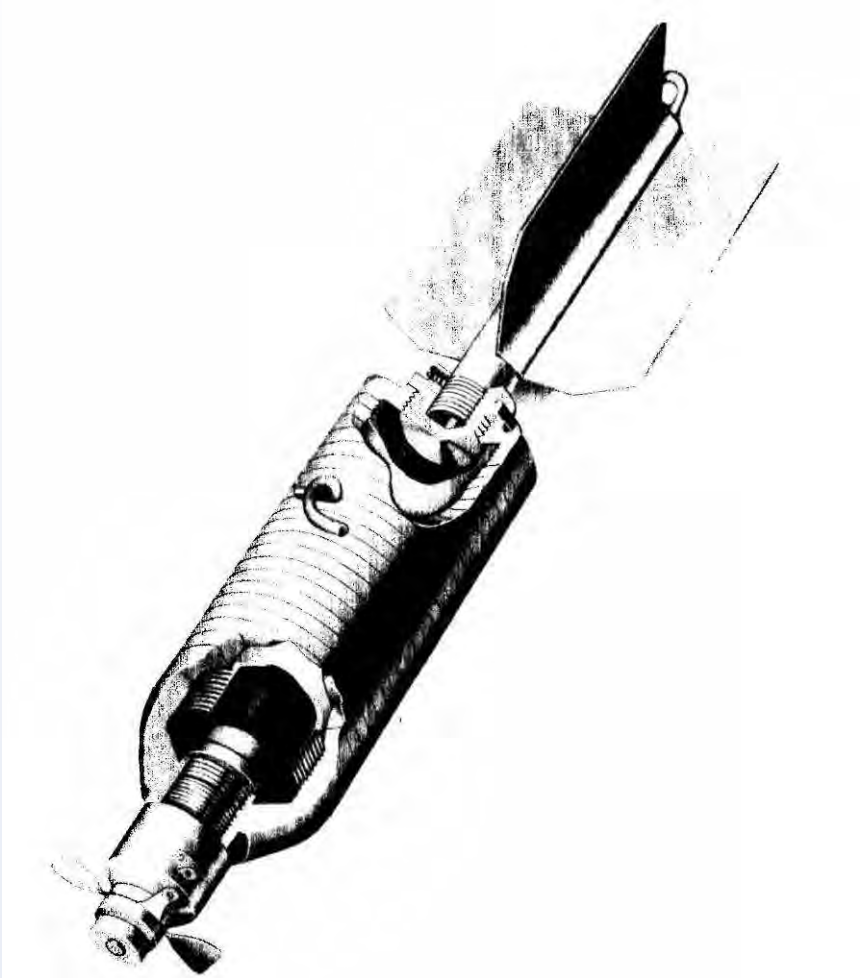
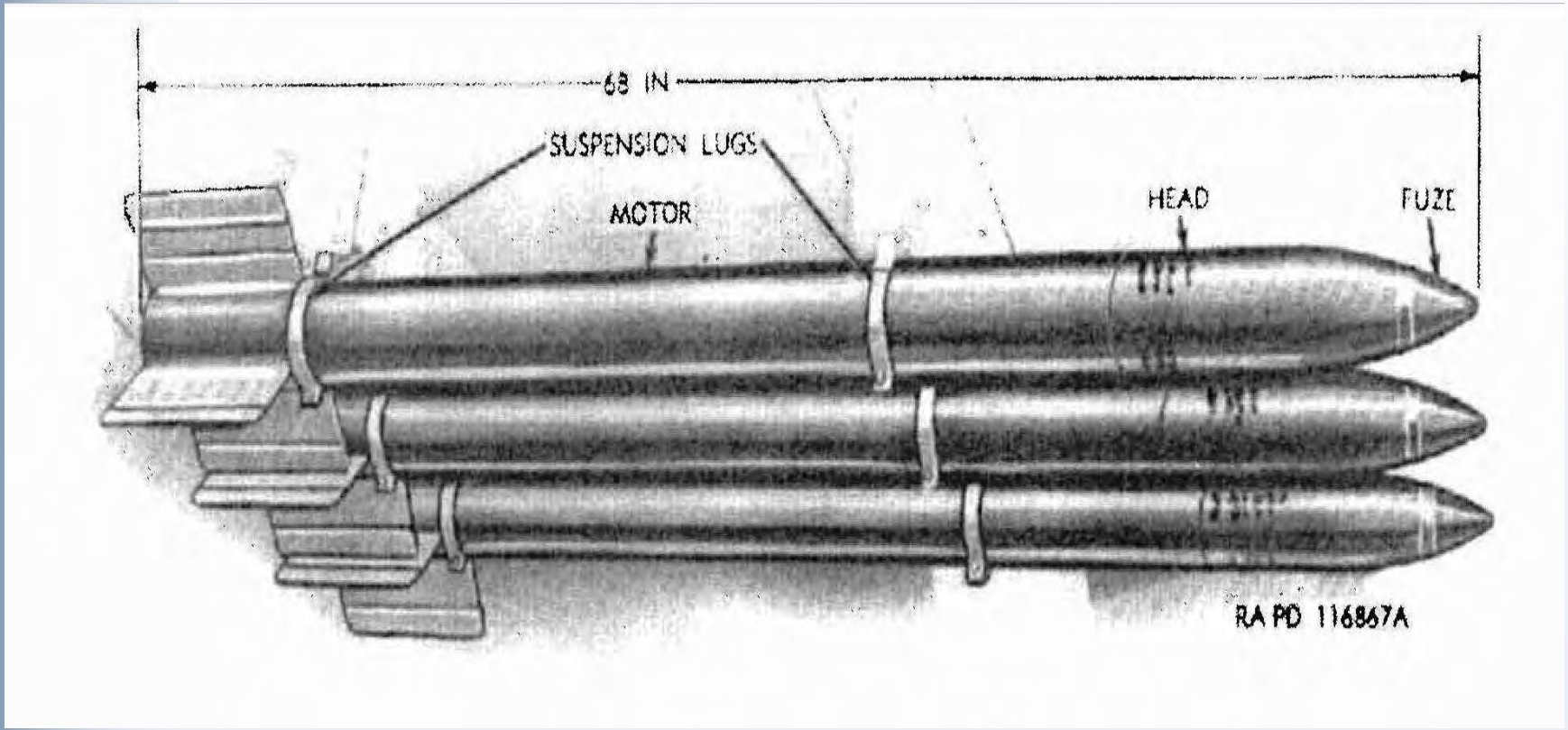


Figure 6.6—20-lb Fragmentation Bomb AN-M41A1, Cutaway View.

Rocket, 5-in (HAVAR), MK6 MOD1



3.5-in and 5.0-in Rocket

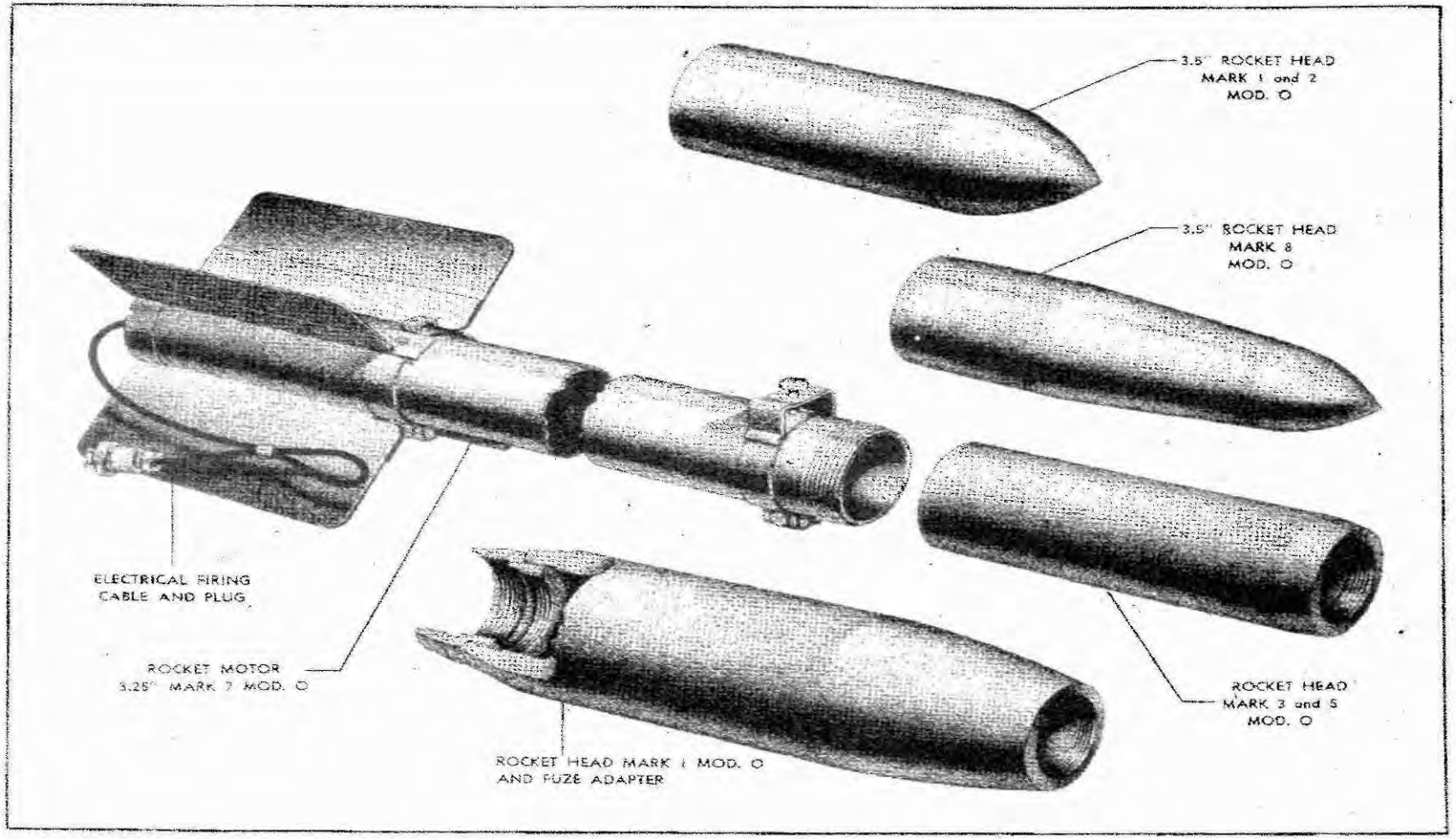


Figure 1.—3.5-inch and 5.0-inch Aircraft Rocket (3.25-inch Motor)

2.36-inch Rockets: HE, AT, M6A1 and Practice M7A1

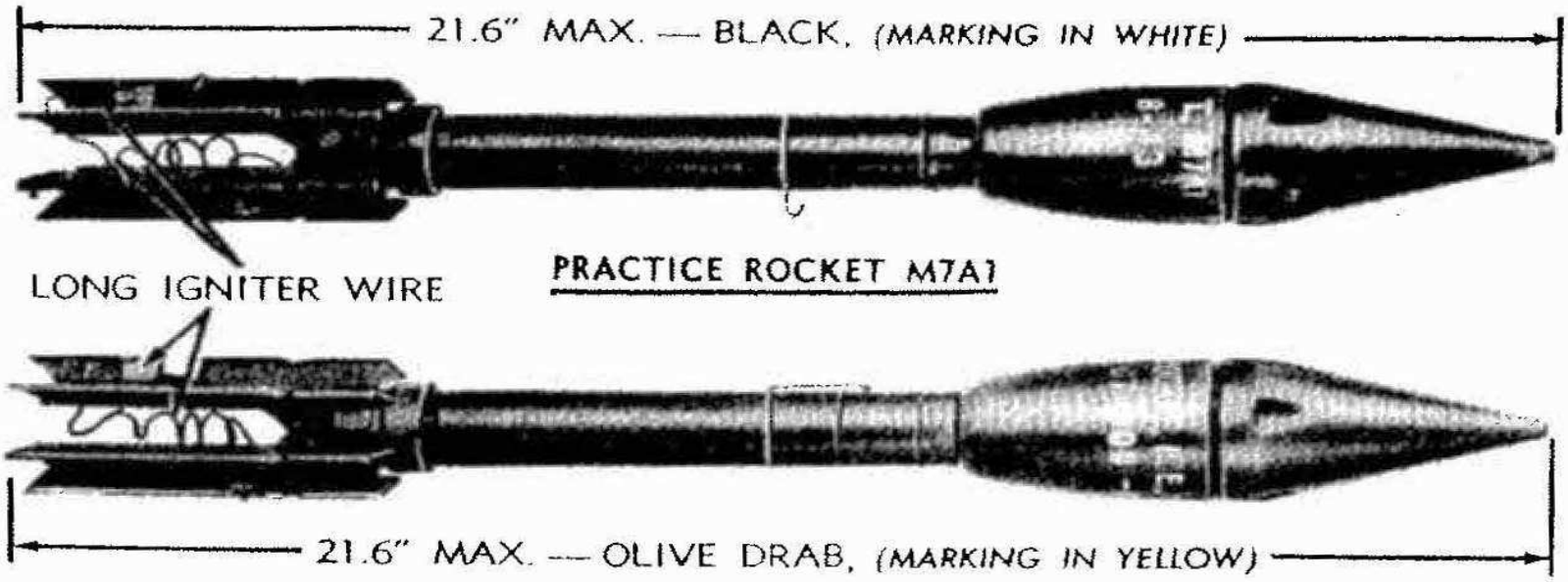


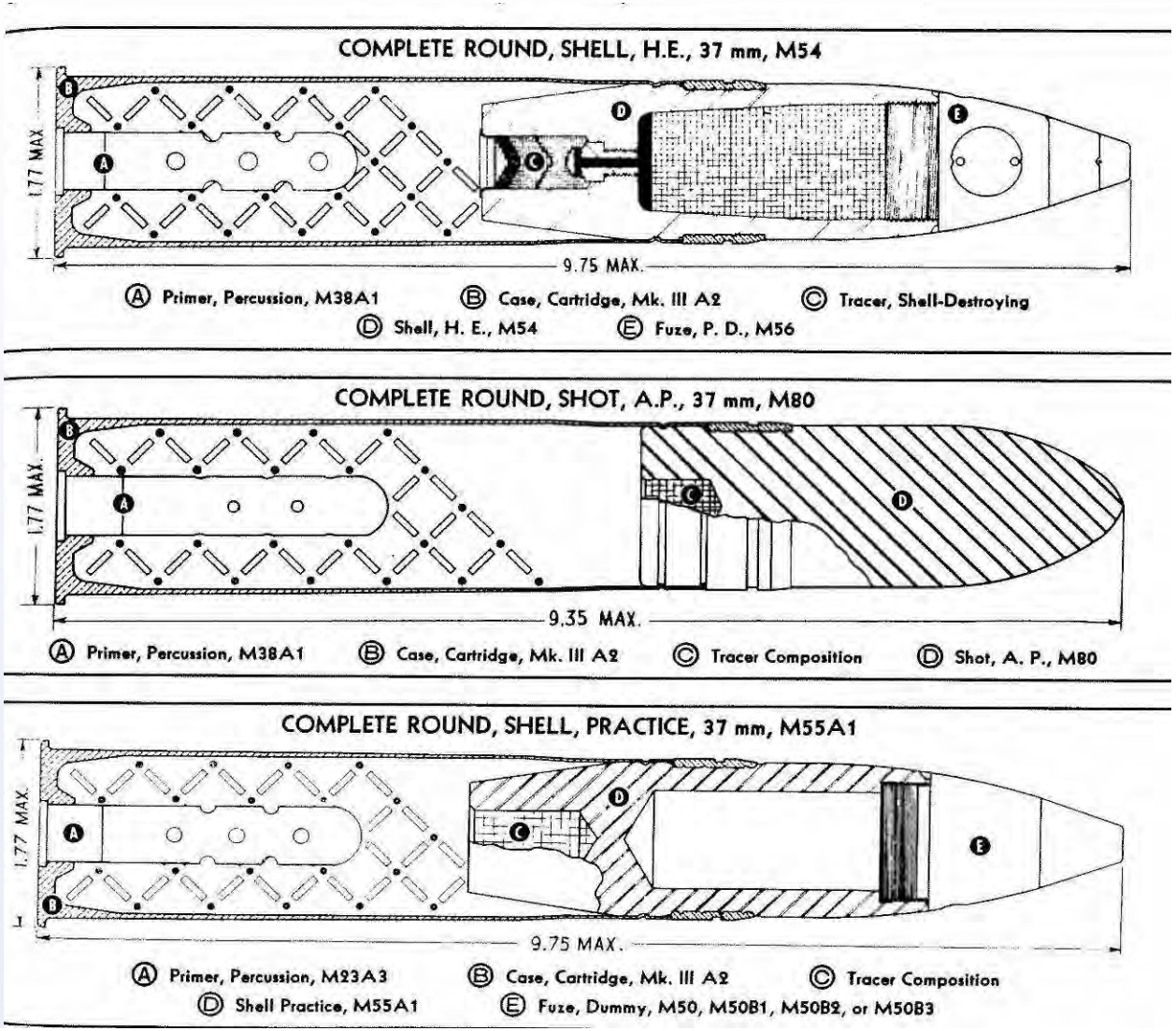
Figure 20 — 2.36-inch Rockets: HE, AT, M6A1 and Practice M7A1

37 MM Projectiles

Shell, High-Explosive, 37 MM, M54-STANDARD

Shot, Armor-Piercing, 37 MM, M80-STANDARD

Shell, Practice, 37 MM, M55A1-STANDARD



Technical Approach

Pinecastle Jeep Range RI/FS

- Purpose of a RI/FS
  - *"To adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives"*

Approach

- To establish the RI/FS approach, we considered:
  - What is known about the site
    - Past & present
  - What are the concerns
    - Munitions and explosives of concern (MEC)
    - Munitions constituents (MC)

What is known

- Historical records
  - Range fans
  - Targets
  - Demonstration areas
  - Munition findings
    - 1948 - present
- Incomplete records
  - May be other range fans, targets, areas

What are the Concerns

- Munitions and explosives of concern (MEC)
  - Unexploded bombs, rockets, mortars, etc. – duds
    - Dangerous if accessible and sufficient energy applied
- Munitions constituents (MC)
  - Explosives residue, metals, other chemicals leaching from partially-exploded munitions; possibly minute amounts from detonations
  - Associated with MEC and some munitions debris
- MEC and munitions debris and MC in borrow material

Investigation Steps

- Step 1: Gather data on metallic anomalies to find MEC
- Step 2: Process data and select anomalies
- Step 3: Mark and excavate anomalies
- Step 4: Collect soil samples from specific areas

MC Approach

- Determine nature and extent of MC
  - Collect and analyze soil samples where MEC and certain munitions debris found
  - Collect more soil samples to better define the extent

MEC Approach

- Determine nature and extent of MEC
  - Collect geophysical data to identify anomalies
    - Digital geophysical mapping
    - “Mag and dig”
  - Dig a number of the anomalies most likely to be MEC, characterize the area
  - If needed
    - Collect more data, dig more locations
    - Step out investigation 200 ft – along range boundary – “follow where it goes”

Digital Geophysical Mapping (DGM)

- Map anomalies using state-of-the-art metal detectors and magnetometers
- Record locations using survey control points or a Global Positioning System (GPS)
- DGM modes
  - Residential areas
  - Undeveloped area, along transects (straight path) and grids (rectangular area)

Digital Geophysical Mapping (DGM)

- Process geophysical data; prepare anomaly maps
- Select anomalies most likely to be MEC
- Use a GPS and a geophysical instrument
- Dig the anomalies; record findings
- Analyze results

Mag and Dig

- Use handheld metal detectors in hard-to-reach areas, closest to buildings, and near metal and “cultural” items
- Detect anomalies based on audio response
- Mark anomalies with flags or dig immediately
- All suspect anomalies dug and sources identified
- Not digging utilities and known cultural items

Anomaly Excavation

- Dig primarily with hand tools
- Establish safety exclusion zones based on known or suspected munitions
- Restore excavated areas to original condition

Destroying MEC

- Use explosives to destroy MEC
- Consolidate munitions to reduce demolitions, when possible
- Move munitions for demolition, if possible
- Take safety measures, e.g., use sandbags for protection
- Public notification for demolitions

Right of Entry – We need your help

- Need written permission from property owners to enter and investigate
  - Cannot investigate without approval
- Complete and sign right-of-entry form
- See Corps representative after presentation
  - See Bertha Miller – station near windows

Dividing the site – Areas A-H

- Divided into eight areas – A through H
- Areas established based on current land use and range locations

Residential Areas

- DGM covers majority
- “Mag and dig” covers rest
- Pavement, buildings, structures, and ponds will not be investigated
- Dig anomalies most likely to be MEC
  - Dig enough anomalies to characterize

Undeveloped Areas

- Geophysical mapping along transects
- Minimize impact to conservation areas
- Dig enough anomalies most likely to be MEC to characterize the area
- Add grids and more transects to better define areas with MEC, where needed

Geophysical Instruments

- Geonics EM61-Mk2 Metal Detector

Geophysical Instruments

- Trimble Real-Time Kinematic (RTK) 5700 Global Positioning System

Geophysical Instruments

- Schonstedt magnetic locator

Soil Sampling

- Materials used for collecting soil samples

How Your Input Will Be Used

- Collect comments from tonight's meeting
- Incorporate into project documents
- Discuss comments at May 6 RAB meeting
- Summary will be placed on Corps website -- **http://www.saj.usace.army.mil/**

This Room	**Area A**	**Odyssey Middle School** **Tivoli Gardens** **Lee Vista Square** **Avon** **Crowntree Lakes**
	Area B	**Vista Lakes Residents Club,** **Warwick** **Newport** **Central Park** **Atonement Lutheran Church property**
	Area C	**Hidden Oaks Elementary School** **Tivoli Villages** **Tivoli Woods** **Fire Station**
	Area D	**Victoria Pines** **Young Pine Apts** **Victoria Landing** **Waterside Estates**
In the far room	**Area E**	**Mockingbird LLC**
	Area F	**Orange County landfill**
	Area G	**Carlsbad LLC**
	Area H	**Beltway Commerce Center**

Practice the 3Rs

- **Recognize** – any suspicious objects found in the area should not be touched.
- **Retreat** – carefully leave the area.
- **Report** – immediately call the police or sheriff and report what was found and its approximate location.

Investigating "Camp Sample"