



# EPA's Federal Facilities Restoration and Reuse Office



FEDERAL FACILITIES  
RESTORATION AND  
REUSE OFFICE

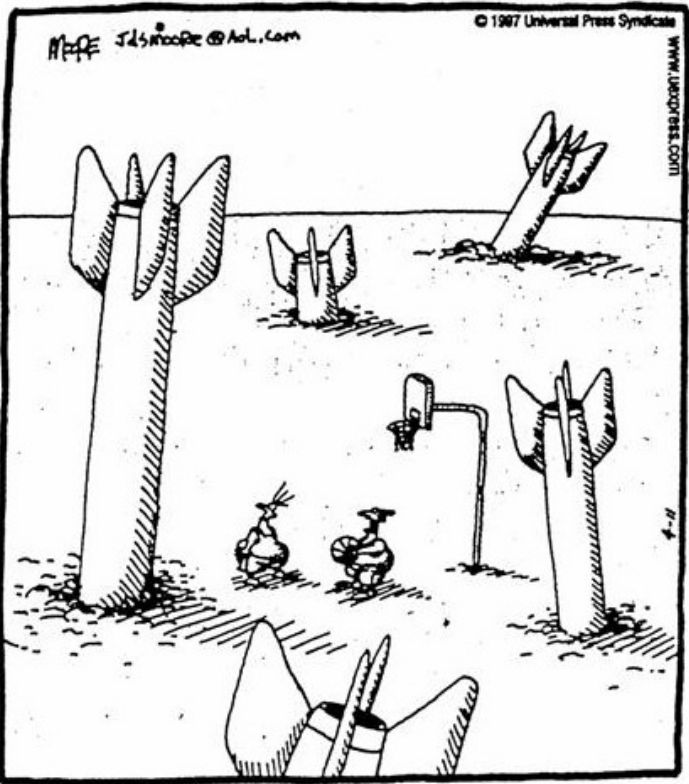
## Federal Remediation Technologies Roundtable

### *UXO Wide Area Assessment Technologies*

**6 December 2006**



# IN THE BLEACHERS



"Maybe we shouldn't play here."



# The Problem?

- DoD Munitions Response Program
  - more than 3300 munitions response sites
  - in excess of 15 million acres
  - \$8 - \$35 billion to clean up
  - >75 years to complete



# UXO Technologies

- ***Detection*** – finding discrete metal objects
- ***Discrimination*** – is it UXO or not?
- Current research - SERDP/ESTCP



# Detection

- How do you find it?
- All highly-successful munitions detectors currently use one of the two following sensor types:
  - Electromagnetic Induction
  - Magnetometry



# Detection Platforms

- Hand-held
- Man-portable
- Wide Area Assessment tools
  - Vehicle-towed arrays
  - Airborne
  - Underwater

# ESTCP Wide Area Assessment Pilot Project

- Defense Science Board Recommendations
- Evaluate wide area assessment (WAA) to improve the current practice of UXO cleanup
  - delineate target areas,
  - eliminate uncontaminated land from the inventory
  - collect quality data to: enhance planning, prioritization and support future contracting
- Advisory Group – EPA, States, FLM, DoD services





# WAA General Approach

- Three sites (originally)
  - About 5000 acres at each
    - Well known target areas
    - Suspected target areas
    - Presumed clear areas
- Layered Technology approach
  - Well characterized individual technologies
    - High altitude airborne to detect ordnance features
    - Low altitude airborne magnetics
    - Ground-based magnetic and EMI transect sampling
  - Explore processes to combine for different site characteristics or objectives
- Extensive Validation



# WAA Layered Concept



## **“High Airborne”**

1,000's acres per day

## **Ordnance-Related Features**

Orthophotography

LiDAR

(SAR/HSI)



## **“Low Airborne”**

100's acres per day

## **Ordnance Detection**

MAG

## **Ground Systems**

10's acres per day

## **Statistically Guided Transects**

## **Ordnance Detection & Characterization**

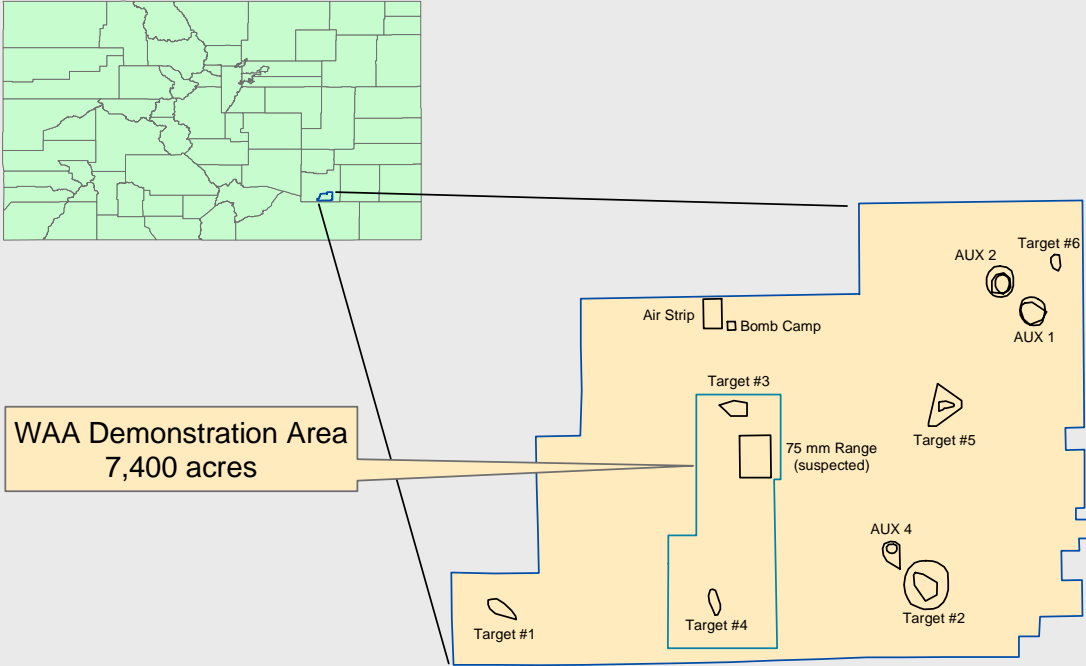


MAG and EMI

# WAA Pilot Program



# Pueblo Precision Bombing Range #2



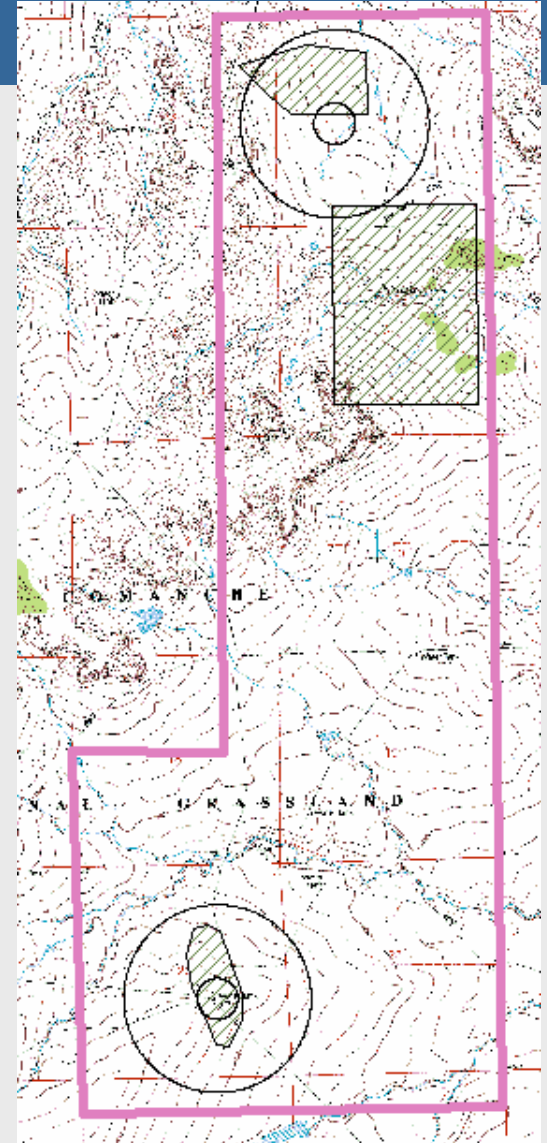
Pueblo Precision Bombing Range #2

FFID: CO89799F058600  
FUDS Site: B08CO071501



# Pueblo PBR 2

- Initial Information
  - Two known bomb targets
    - Aiming circles visible in aerial photography
    - Locations known
    - Boundaries and characteristics uncertain
  - Suspected 75 mm target
  - No other areas of interest identified in the ASR

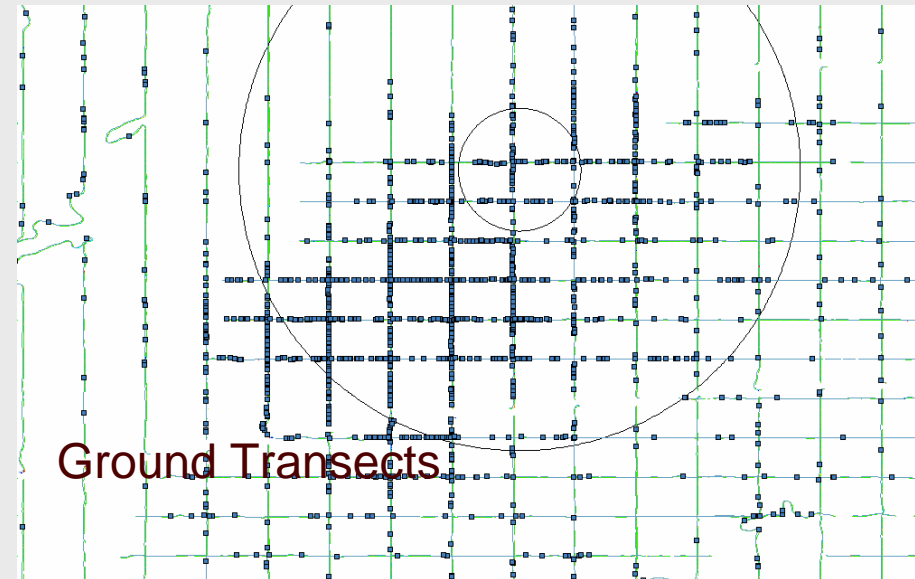
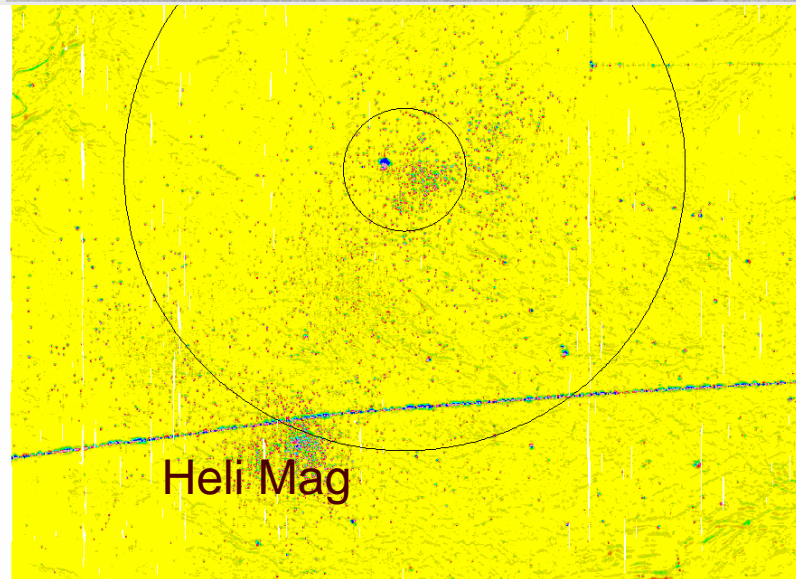
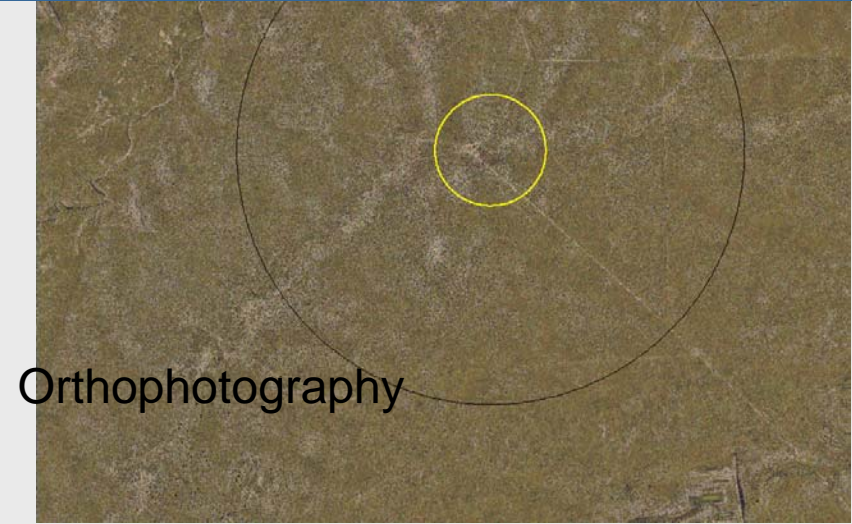
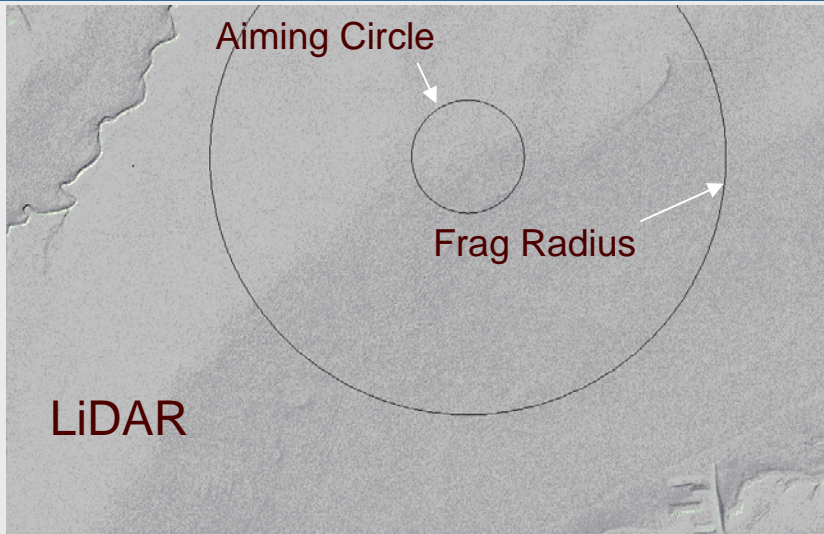


# Pueblo PBR 2

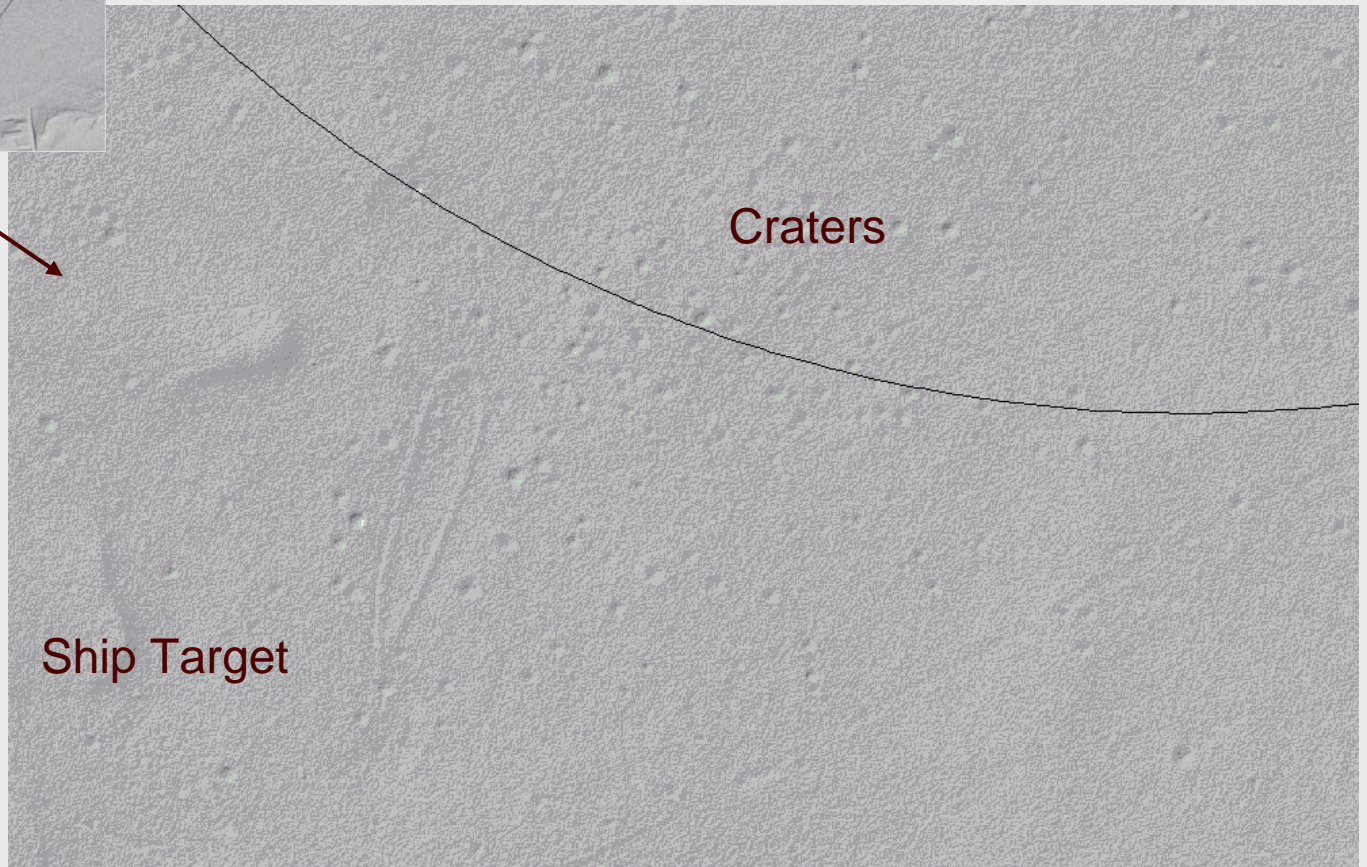
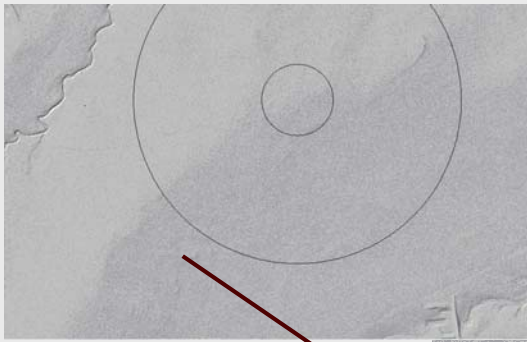
## Pueblo – BT4 Better Characterizing a Known Target Area



# PBR BT4 Data

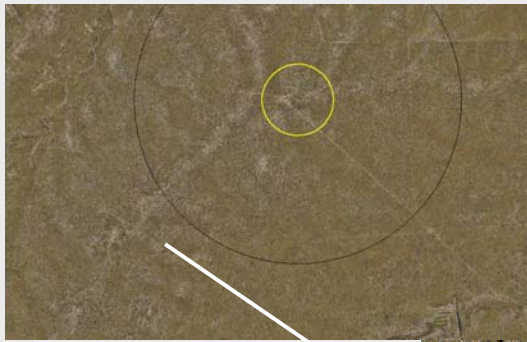


# Pueblo BT4 SW Corner LIDAR

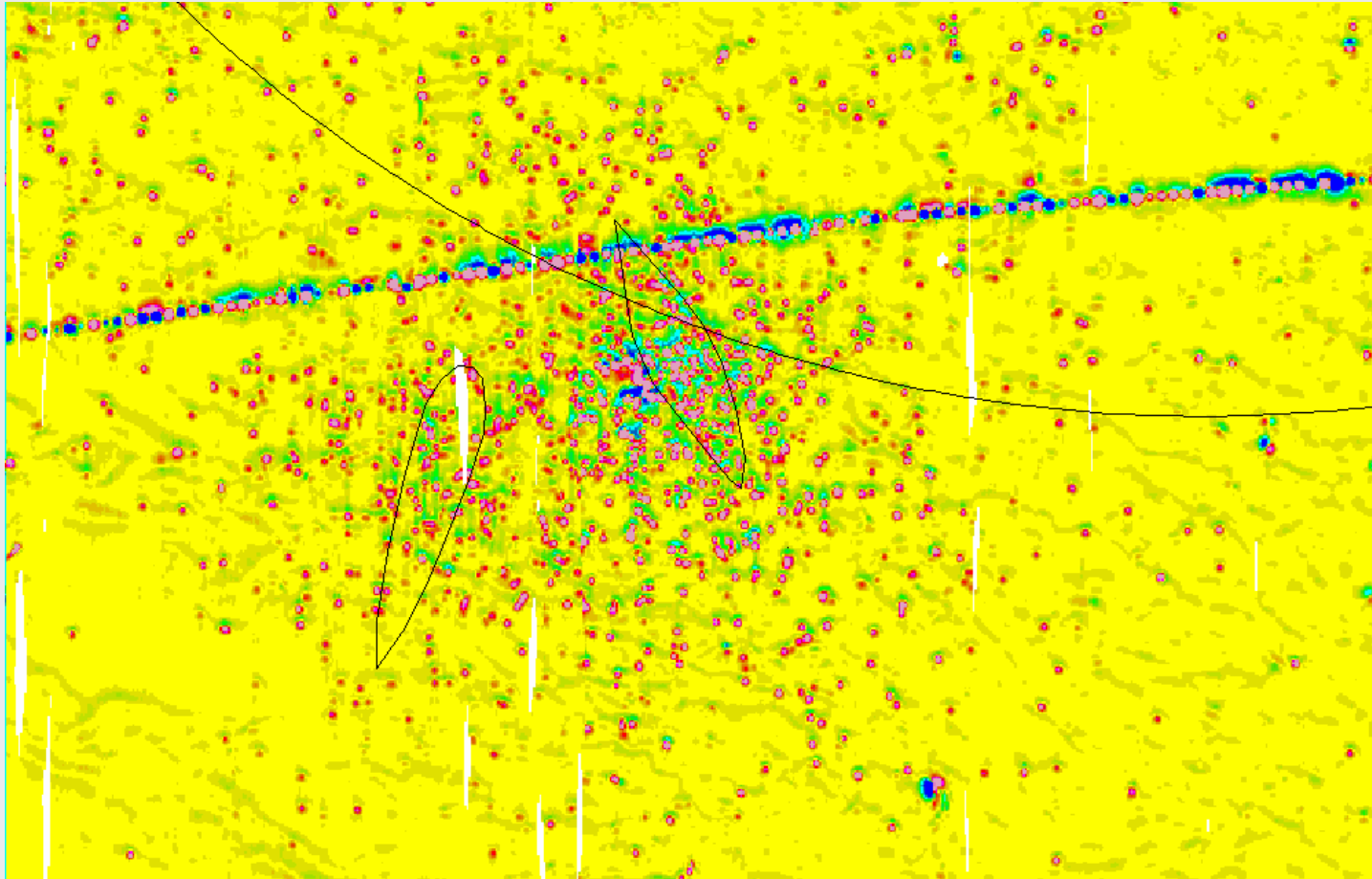




# PBR BT4 SW Corner Ortho



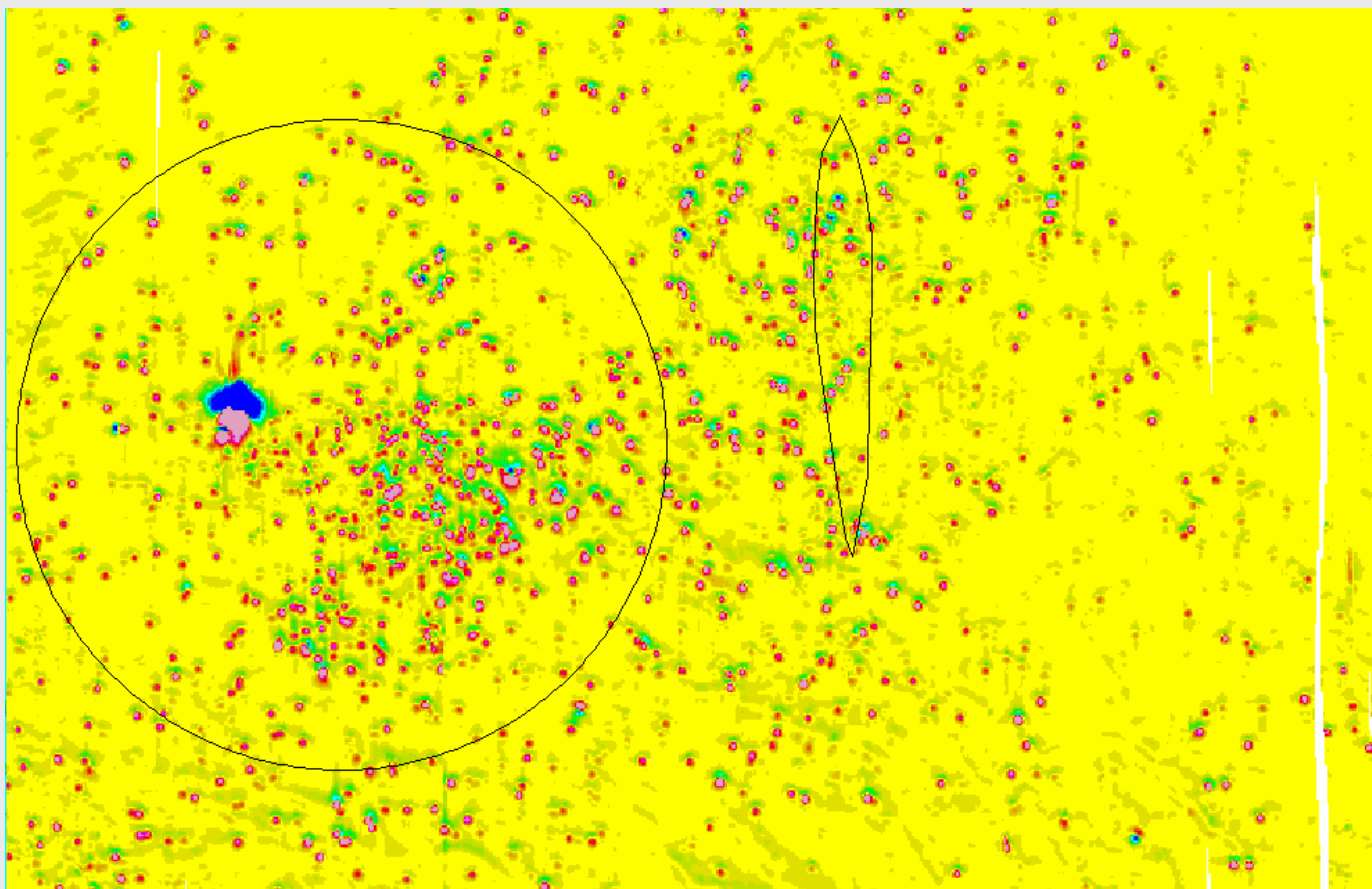
# Pueblo BT4 SW Corner Helicopter Mag



# Pueblo BT 4 Aiming Circle LIDAR



# Pueblo BT4 Aiming Circle Helo Mag

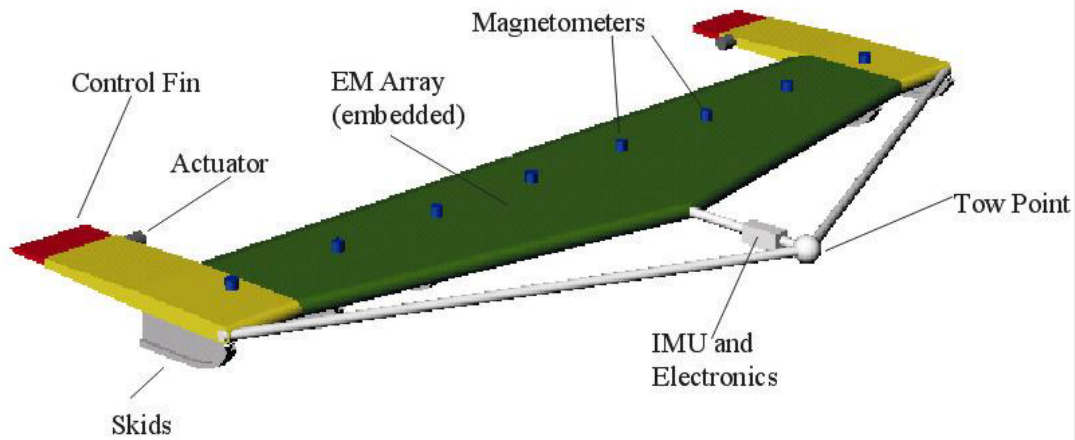


# New sites for WAA Pilots

- More challenging sites:
  - Camp Beale
  - Toussaint River
  - Spring Valley
  - Looking for more sites



# Underwater



# Advisory Group

- What conclusions can be supported about difference parcels within the sites?
  - Found a target – EASY
  - Characterizing contamination – DEFINING DATA NEEDS
  - All data shows no munitions present – HARD (NFA)





# Questions?

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<http://www.epa.gov/fedfac/documents/munitions.htm>

