

# **WIDE-AREA ASSESSMENT UPDATE**

FLBGR wide-area assessment (WAA) getting national attention

- ESTCP contract to expand upon WAA capabilities
- Conference on Sustainable Range Management (Jan 2004)
- 2004 UXO/Countermines Forum (March 2004)

DSB UXO Task Force recommendations to Congress (November 2003) included: **“Institute a national area assessment of the identified 10 million acres”** suspected of having munitions contamination

- Comprehensive 5-year evaluation to determine which areas are contaminated (\$200M per year)
- Contaminated land prioritized for cleanup; remaining land put back into productive use

**FLBGR is the only site where the application of the “wide area assessment” concept recommended by the DSB has ever been done**

# Wide Area Assessment of UXO Sites Using a New Airborne Multi-Sensor Approach



Jerry Hodgson, US Army Corps, Omaha District



USACE, Omaha  
District

Sky, Sky Research, Inc.  
Meggan Pickner, Sky Research, Inc.  
Jeff Swanson, CDPHE  
Tracie White, Shaw E&I



CDPHE

SKY RESEARCH, INC.



 Shaw<sup>™</sup> Shaw Environmental, Inc.

# Project Team

## Executing Agency

- U.S. Army Corps of Engineers, Omaha District
  - Sky Research – data acquisition, processing, analysis, integration and management.
  - Shaw E&I – site support

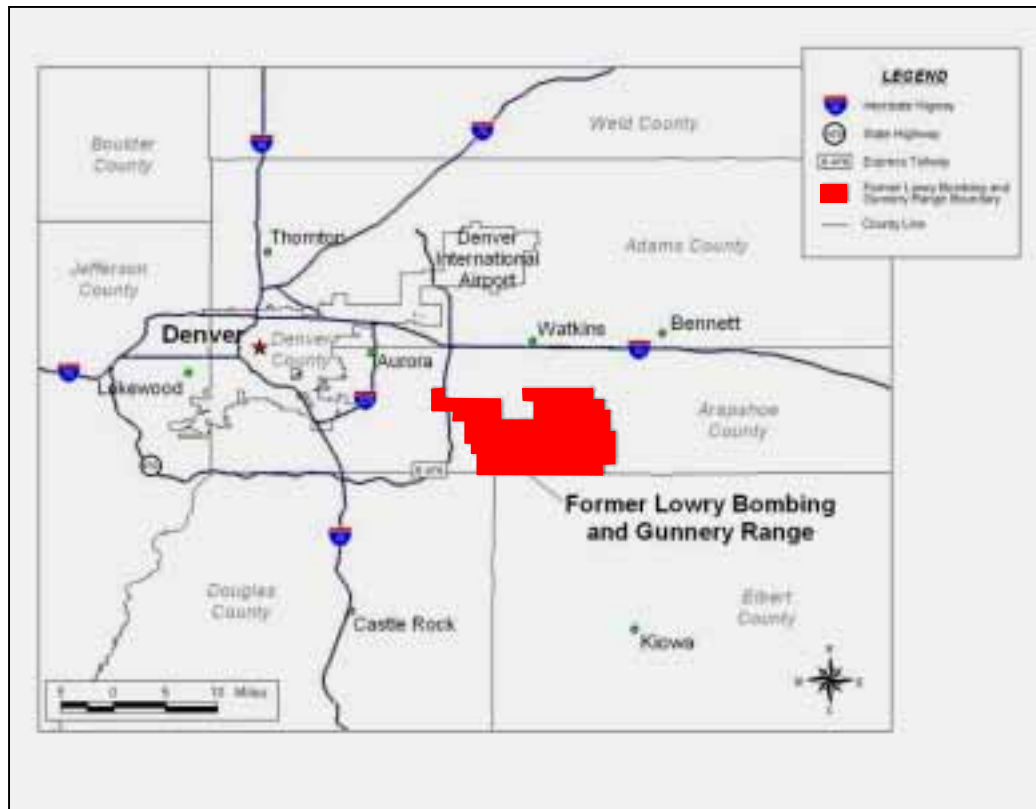
## Regulatory Agencies

- Colorado Department of Public Health and Environment (Lead)
- U.S. Environmental Protection Agency
- Former Lowry Bombing and Gunnery Range (FLBGR) Restoration Advisory Board

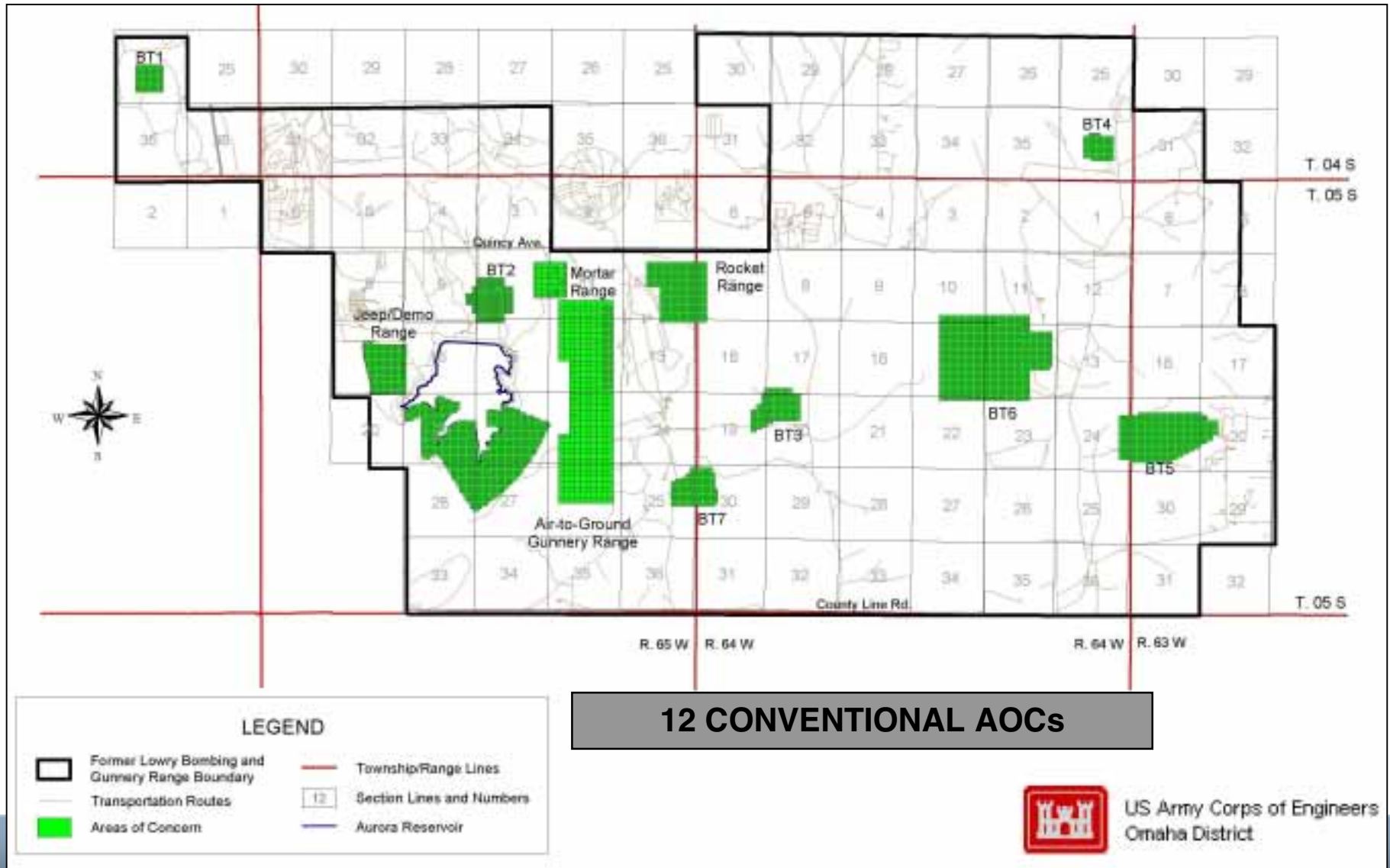
# FLBGR Site Location

## FLBGR

- 10 miles from Denver
- 59,000 acres (~100 sq miles)



# FLBGR Areas of Concern



US Army Corps of Engineers  
Omaha District

# FLBGR Site History

- 1942-1963: Inert and live bombing and range exercises
- 1965: Majority of range sold or transferred to non-federal entities
- 1991: Designated a Formerly Used Defense Site (FUDS)

- Land Use

Scattered residential

Recreational

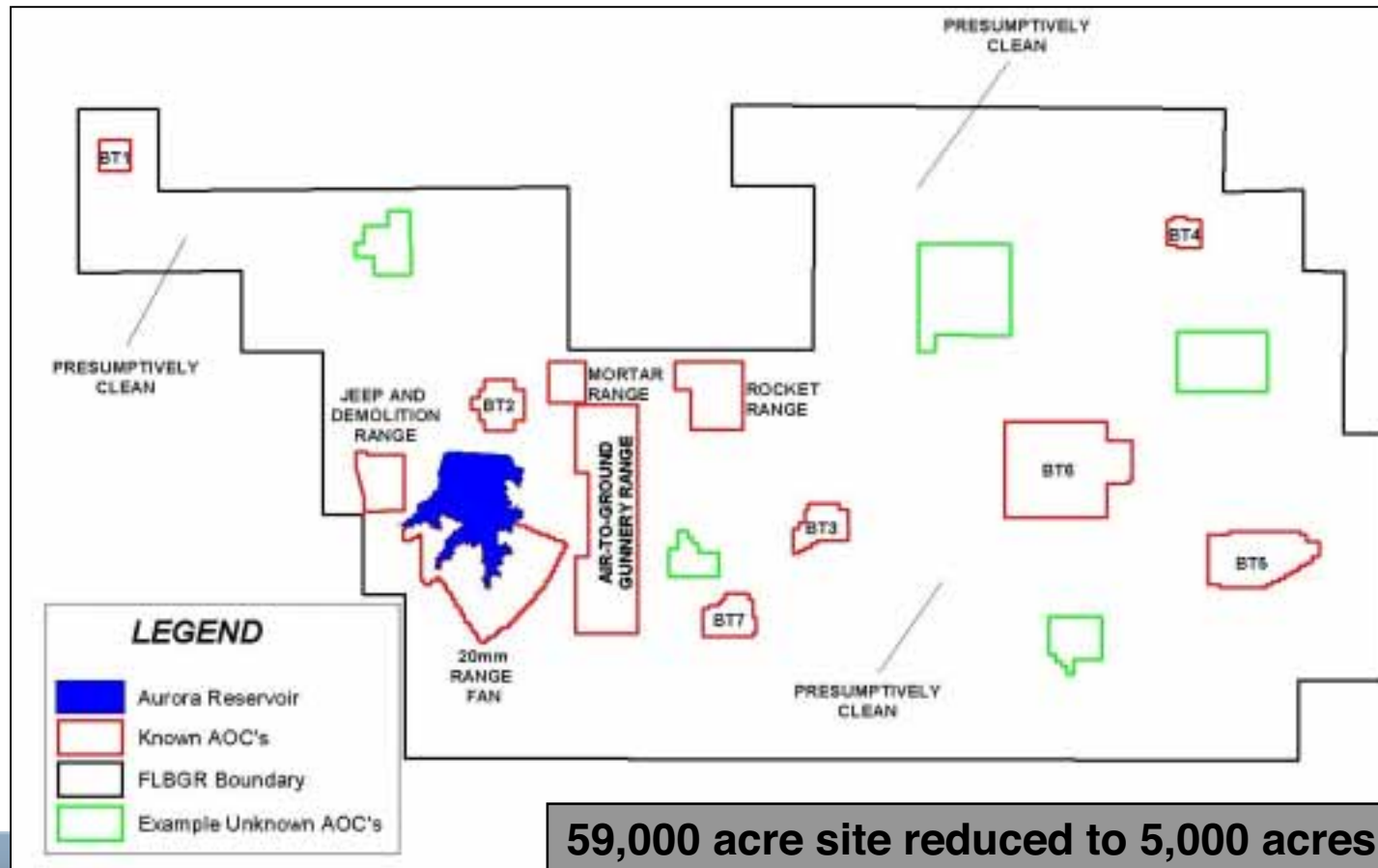
Farming and ranching

High density residential and commercial development ongoing

# Wide Area Assessment

## Purpose

- Focus resources to known Areas of Concern (AOC)
- Determine presumptively clean areas
- Provide 100% characterization of site - agreed upon by project stakeholders



**59,000 acre site reduced to 5,000 acres - plus AOC identified by Wide Area Assessment**

# Wide Area Assessment

**OBJECTIVE:** Locate unknown AOC

**HOW:** Utilize airborne technologies to locate surface features associated with military munitions usage

Clusters of metal objects, and/or

Clusters of craters, and/or

Other topographic features, i.e. firing circles or rings

**NOTE:**

Subsurface detection is not an objective

Locating onesies and twosies is not an objective

# Wide Area Assessment Technologies

- Synthetic Aperture Radar (SAR)
- Hyperspectral Imaging (HSI)
- Light Detection and Ranging (LiDAR)
- High Resolution Color Orthophotography (Orthos)
- Enterprise Geographic Information Systems (EGIS)

# Wide Area Assessment Process

- Data Acquisition
  - SAR
  - HSI
  - LiDAR
  - Orthos
- Data processing, analysis, integration, field calibration and target modeling
- Identify areas of interest (AOI) and presumptively clean areas
- Develop AOI maps
- Perform field verifications
- Delineate AOC and define presumptively clean areas
- EGIS utilized to manage, store and archive data

# Data Acquisition-Synthetic Aperture Radar



## Synthetic Aperture Radar PENRAD 5 - SRI



Frequency	200 – 400MHz
Resolution	< 1m
Swath Width	2Km
Digitizer	500Ms/s 8 bit
Positioning	DGPS Ashtech Z-12
Depression	30-60 degrees
Polarization	VV&HH (HV possible)
Average Power	10W
Peak Power	10 MW for 5ns

# Data Acquisition-Hyperspectral Imagery



## Hyperspectral Imager Casi II - ITRES Research



Field of View	37.8° across-track/0.077° along track
Spectral Range	545nm between 400 and 1000nm
Spectral Samples	288 at 1.9nm intervals
Spectral Resolution	2.2nm FWHM at 650
Aperture	F/2.8 to F/11.0
Dynamic Range	4096:1 (12 bits)
Noise Floor	1.0 DN
Signal to Noise Ratio	420:1 peak
Calibration Accuracy	470 – 800 nm +/-2% absolute 430 – 870 nm +/-5% absolute
Data Throughput	840 Kbytes at 1 Mbyte/second

# Data Acquisition-LiDAR

## Airborne Laser Terrain Mapper ALTM 1225 - Optech

- Collected at 1 m spot spacing providing 1 ft contour intervals.
- A high-resolution digital elevation model (DEM) provides accurate orthorectification for color photography.
- Provides an accurate DEM for any future terrain model needs, including aerial mapping, planning and development.

Operating Altitude:	100 m to 3,000 m
Elevation Accuracy:	15 cm – elevation dependent
Horizontal Accuracy:	Better than 1/2000 x altitude
Range Accuracy:	2-3 cm, single shot
Range Resolution:	1 cm
Measurement Rate:	5,000 to 33,000 elevations per second
Scan Angle:	0 to $\pm 20^\circ$
Swath Width:	Variable from 0 to $\pm 0.68$ x altitude
Data Storage:	Variable up to 12 hrs (hard drive or 8-mm digital data tape)
Video Output:	NTSC or PAL
Weight:	80 kg typical
Power:	35 Amps @ 28 VDC typical

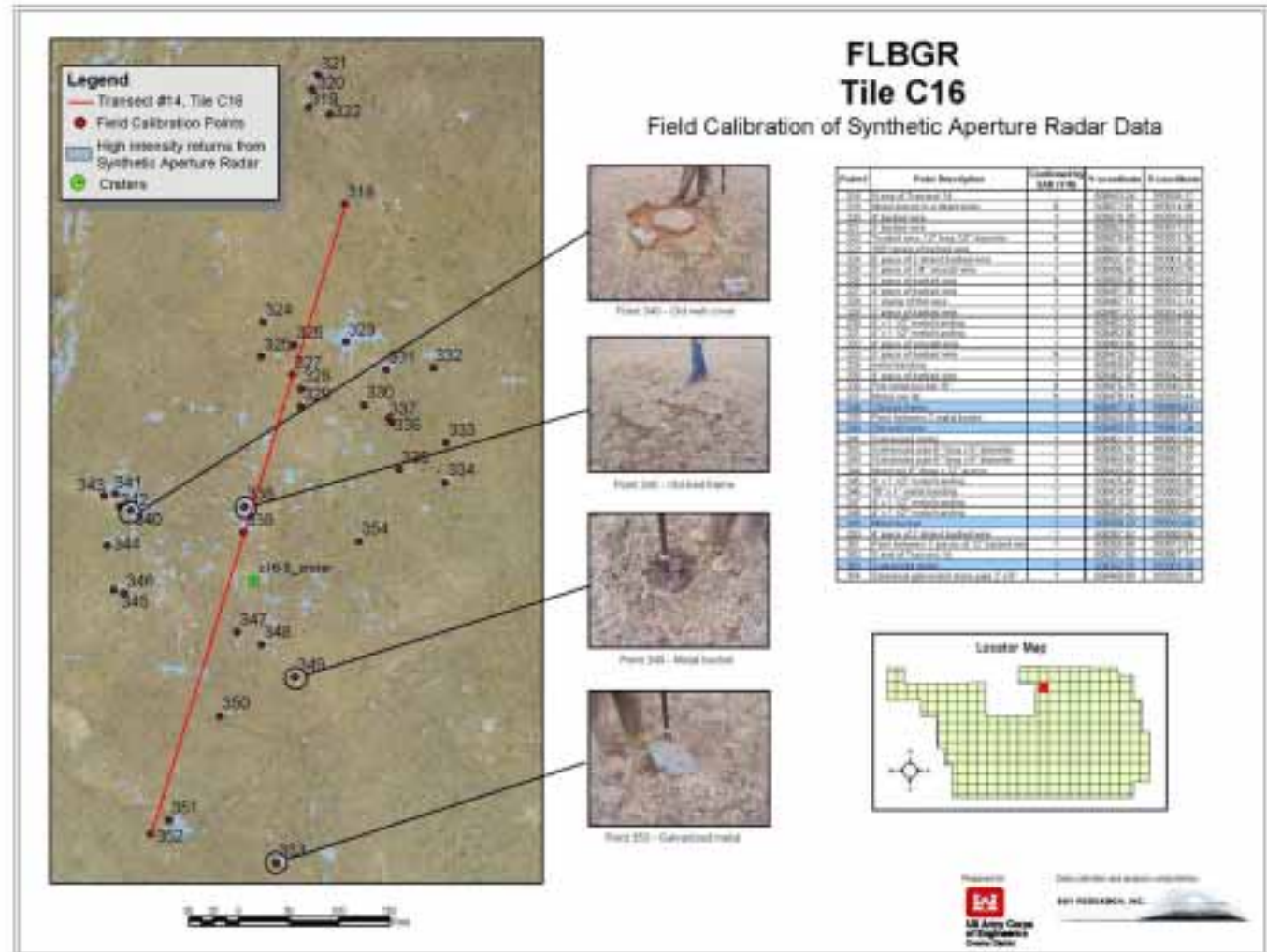
# Data Acquisition-Orthophotography

## Jena (Zeiss) LMK 3015 color aerial photography camera

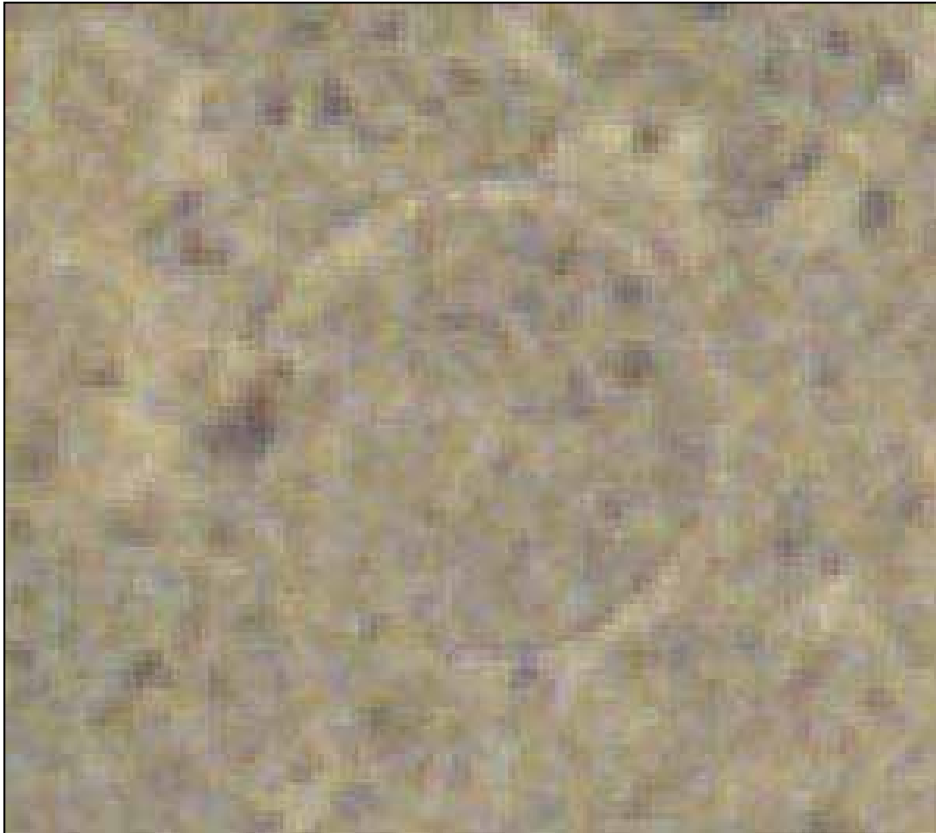
Lens Type:	Jena Lamegon P/E, 6" focal length
Focal length:	152.418 cm
Contour Interval:	N/A (Contours not collected -- altitude and photo scale could support ASPRS Class 1 Accuracies for 4' interval contours, rmse of 1.3 feet.
Operating Altitude:	Target of 7,500 Above Ground Level (See Table 4. for specific flight altitudes)
Elevation Accuracy:	N/A (Elevations not collected -- photography will support ASPRS Class 1 Accuracies for 4' contour intervals, rmse of 1.3 feet.
Horizontal Accuracy:	ASPRS Class 1 Accuracies, 1:2400 final map scale, rmse 2.0 feet.
Scan Angle:	6" focal length
Swath Width:	Stereo Coverage (60% forward lap, 30% side lap),
Scanner:	Ortho imagery scanned with Wehrli RM-2 photogrammetric 12 micron RGB scanner.

# Field Calibration

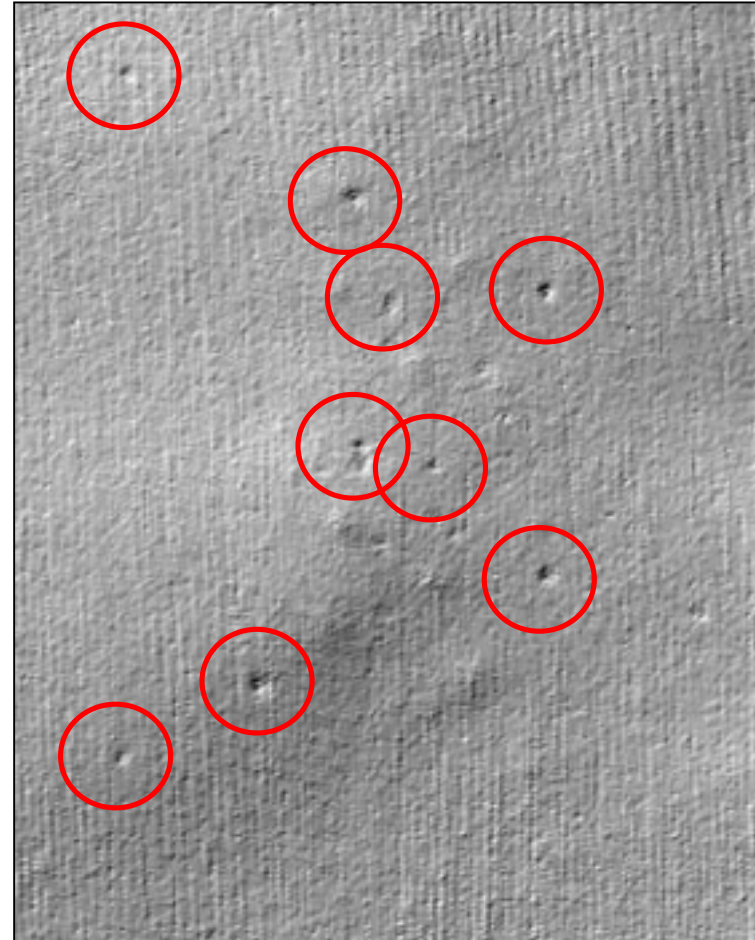
- Performed throughout process
- Comprehensive groundtruth process
- Utilized to enhance data interpretation



# LiDAR and Orthophotography

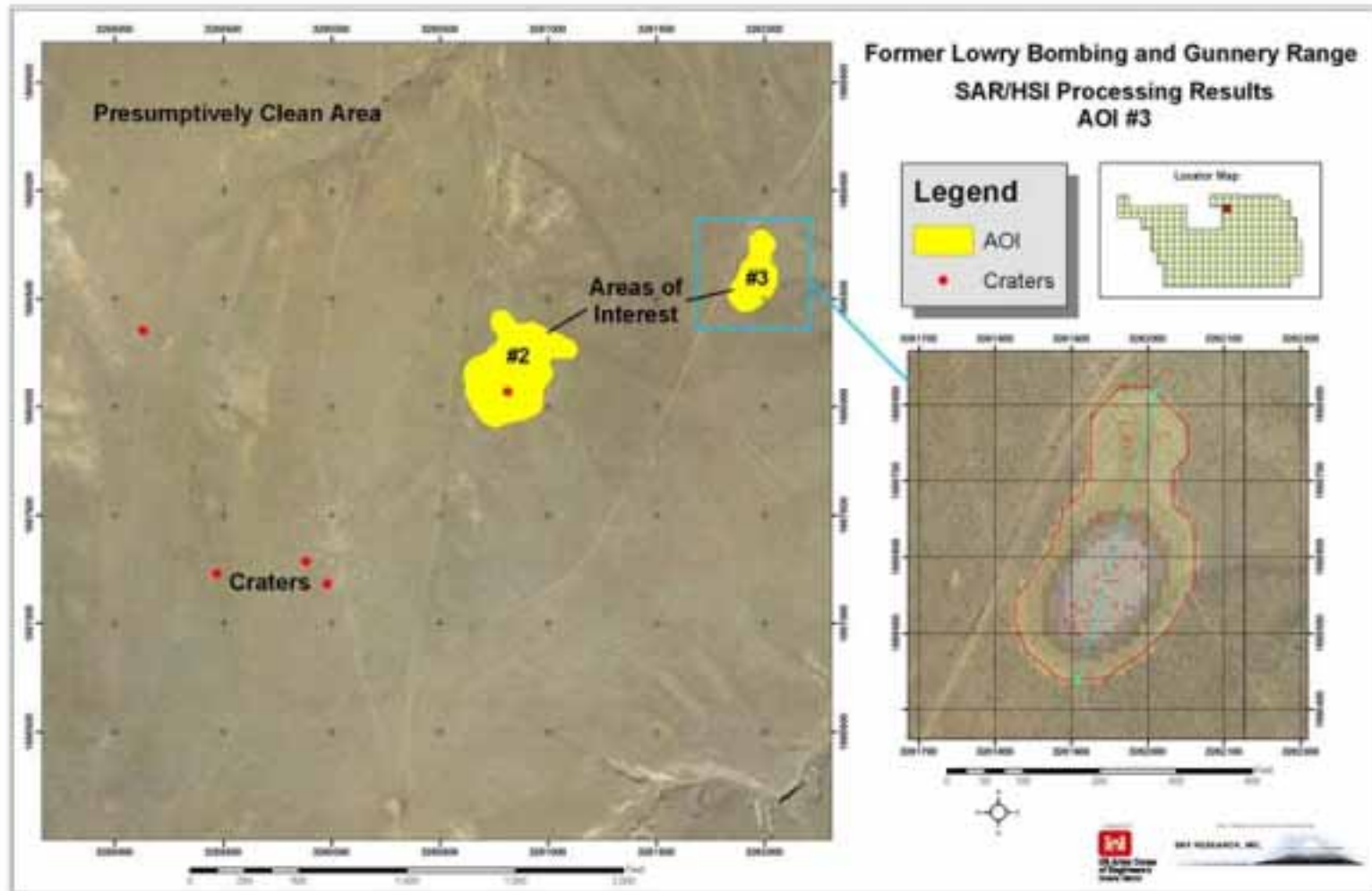


**Orthophoto identifying circle of bricks**



**LiDAR Imagery identifying bomb craters**

# AOI Map



# Field Verifications

- Utilized to determine if AOIs are:

AOCs...or

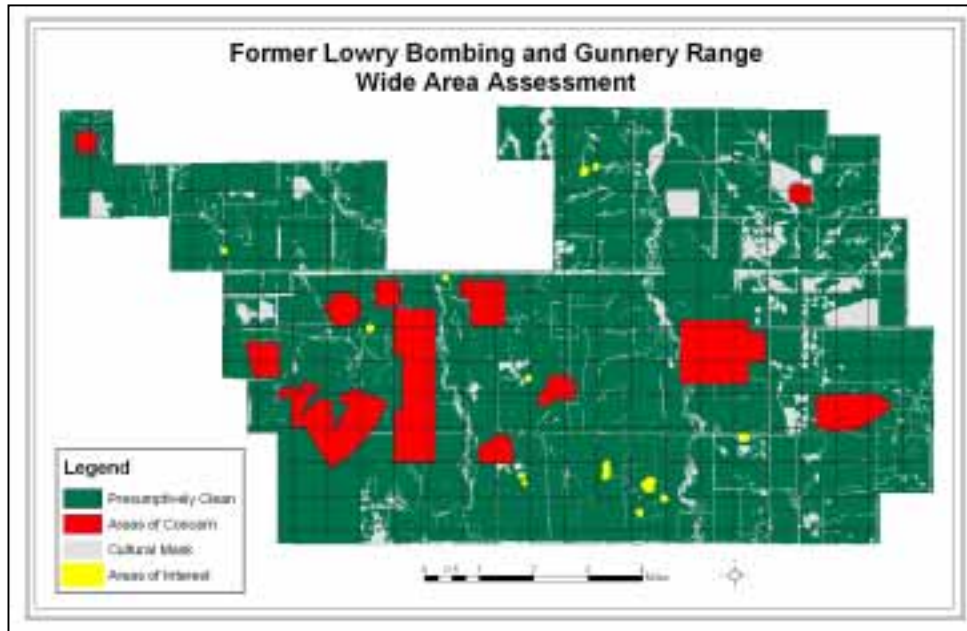
Presumptively clean

- Quality Control was also performed in presumptively clean areas by field verifying randomly selected areas.

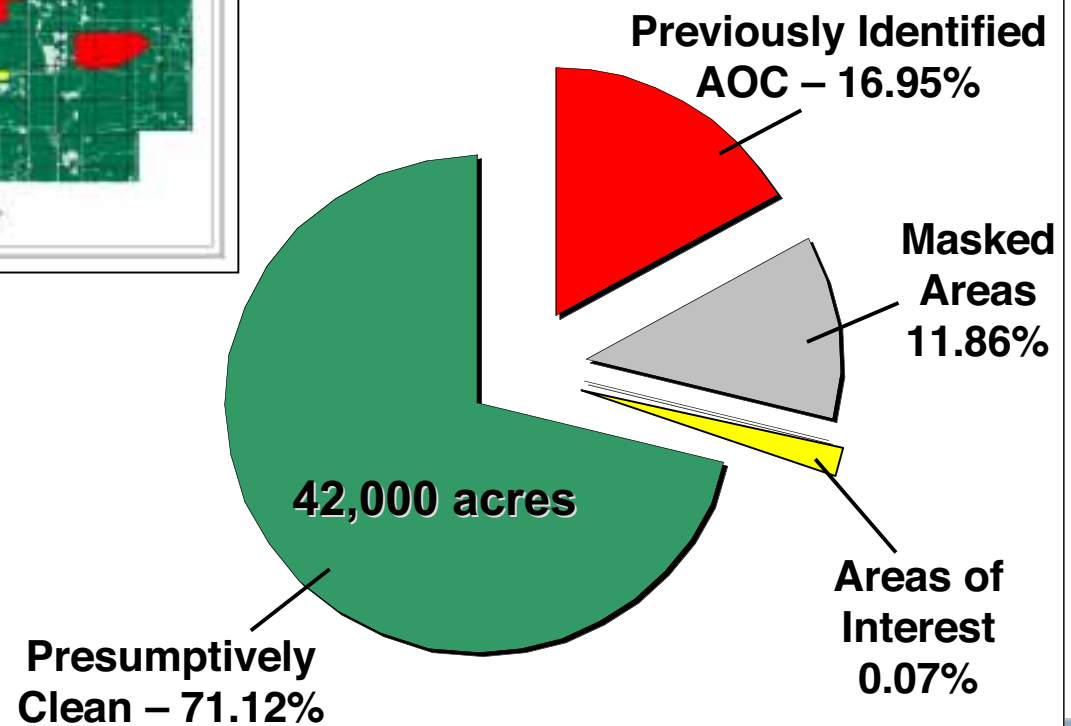
- Ultimate goal is:

**“TWO MEN IN A TRUCK”**

# Benefits of WAA at FLBGR



Site Area: 59,000 acres  
(~100 sq mi)



# ***WIDE-AREA ASSESSMENT UPDATE - Summary***

Field verifications and final report remaining

- AOs require formal field verifications (Summer 2004)
- Most AOs have been informally verified
- Entire project team will participate in verifications, including TAPP (on behalf of RAB)

# ***FIXED PRICE REMEDIATION w/INSURANCE (FPRI) - PILOT PROJECT***

FLBGR selected by the Army to execute FPRI pilot project

- First military munitions FPRI project for Army
- Up to \$5M set-aside for pilot project
- FLBGR annual funding will not be impacted
- Corps of Engineers Huntsville Center will select contractor
- Omaha District will execute pilot project
- CDPHE will continue regulatory oversight
- FLBGR Restoration Advisory Board involvement is not anticipated to change

# ***FPRI PILOT PROJECT – Goals***

The goal of the FPRI contracting mechanism is to achieve regulatory closeout of a site at a fixed price to the government

Regulatory closeout is defined as

“All removal responses are complete and no subsequent responses are required for that project based on the action memorandum or decision document”

FPRI contracts utilize

- Site-specific performance-based work statements
- Fixed price task orders
- Insurance policy (for up to 2 times the amount of the task order) to cover all known and unknown conditions at the site for work within the scope of the task order

# ***FPRI PILOT PROJECT – Objectives***

The objective of the pilot project is to evaluate the applicability of the FPRI contracting tool for military munitions response projects

- Can regulatory closure be obtained
- Is it cost effective
- Does it accelerate the clean-up schedule
- Can adequate safety and current quality standards be met
- How should FPRI be implemented, for example...

Scoping

Corps/Regulators/Public roles and responsibilities

Safety oversight

Quality assurance

Reporting

# ***FPRI PILOT PROJECT – FLBGR Team Goals***

Perform fair, comprehensive evaluation of FPRI

Perform evaluation as a team

- Corps of Engineers
- CDPHE/EPA
- RAB/Public

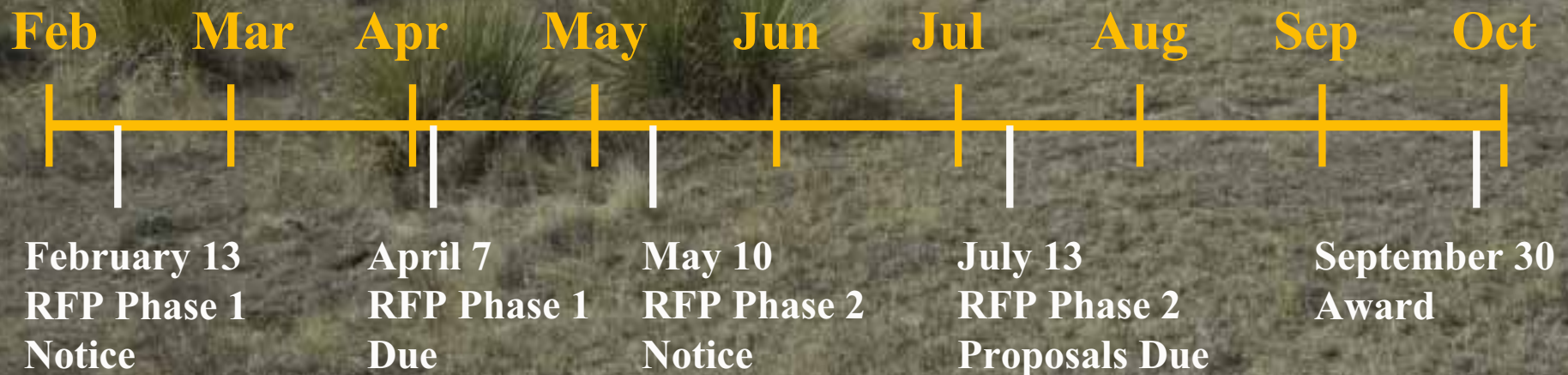
Report results so that FPRI can be utilized effectively at other military munitions response sites

# ***FPRI PILOT PROJECT - Schedule***

Multiple Award Remediation Contract (MARC) to be awarded by September 30, 2004

- Request for Proposal (RFP) Phase 1 – contractors qualify to provide proposals during Phase 2
- RFP Phase 2 – Select 3 contractors for MARC and 1 for FLBGR pilot project

Approximate timeline for award:



# ***FPRI PILOT PROJECT – AOC Selection***

**Draft AOC evaluation performed by Omaha Corps of Engineers and reviewed by:**

- **Other Corps elements (District, Division, Huntsville Center)**
- **CDPHE**
- **TAPP contractor**

**Best candidate site, based on the evaluation, is Bombing Target #5**

# ***FPRI PILOT PROJECT – AOC Selection***

Criteria used in AOC evaluation include:

- Estimated cost to complete less than \$5M
- Stand alone site (no potential to overlap with other AOCs)
- No previous military munitions removals performed at the site
- RAB priority – pick highest priority site possible, based on current RAB project prioritization
- Land Use/Ownership – pick site with highest potential for near term development/public use
- Characterization – pick site with highest level of characterization

# ***FPRI PILOT PROJECT – AOC Selection***

## **Results**

- **BT#1 – no removals planned**
- **BT#2 – previous removal actions/overlap concerns**
- **BT#3 – Titan missile silo**
- **BT#4 – viable site**
- **BT#5 – viable site**
- **BT#6 – previous removal actions**
- **BT#7 – viable site**
- **Rocket Range – previous removal actions**
- **20mm Range Fan – previous removal actions**
- **Mortar Range – overlap concerns**
- **Air-to-Ground Gunnery Range – overlap concerns**
- **Jeep/Demolition Range – previous removal actions**

# ***FPRI PILOT PROJECT – AOC Selection***

AOC	CTC	Stand Alone	Previous MMR	RAB Priority	Land Use	Characterization Rank
Bombing Target #4	\$1.30M	Yes	No	#8	Private	3
Bombing Target #5	\$4.97M	Yes	No	#6	Private	1
Bombing Target #7	\$2.65M	Yes	No	#11	SLB	2

# ***FPRI PILOT PROJECT – AOC Selection***

**Bombing Target #5 is recommended based on the following**

- **Highest priority**
- **Privately owned**
- **Best characterized**
- **Cost-to-complete**
- **CDPHE preference**

**Discussion?**

# ***THE END***

Your next RAB meeting is scheduled for May 19, 2004 at the Aurora Library (6:00 – 8:30pm)

