Meeting Minutes

April 28, 2011

Project: Former Camp Butner Restoration Advisory Board (RAB)

Date: April 28 2011, 6:30 – 8:00 pm

Place: Soldier's Memorial Sports Arena
24th and D Street
Butner, NC 27509

Attendees:

RAB Members: Art Shacter (State Representative), North Carolina Department of Environment and Natural Resources (NCDENR); Vicky Cates, Town of Butner (Co-Chair, Community Representative); Barry Baker, Granville County Planning; Scott Strickland, Butner Public Safety; Doug Logan, Granville County EM.

Other Attendees: Raymond Livermore, USACE Wilmington; Marti Morgan, NCDENR; Richard Veazey, Citizen of Granville County; Herb Nelson, Environmental Security Technology Certification Program (ESTCP); Harry Coleman, Butner-Creedmoor News; (see Attachment 1) for attendance roster.

Prepared By: Raymond Livermore

Topic: RAB Meeting 17

Introduction

Minutes from the October 28, 2010 meeting were approved.

Work Update

Ray Livermore, USACE briefed the RAB on removal action work conducted since the previous RAB meeting in October 2010 (see Attachment 2). The work procedures and results for summarized. Recovered Munitions and Explosives of Concern (MEC) items during this period included one item (MK II High Explosive hand grenade) discovered at Area 4C. Board members were briefed that the removal action activities recommended by the Engineering Evaluation/Cost Analysis (EE/CA) were completed in December 2010. Ray indicated the institutional controls recommended by the EE/CA have been implemented and include:

- Establishment of the RAB
- Public education (DVD, brochures, activity workbook, building permit notification, and UXO information sign installation)

With the exception of three residences at Area 4E (property owners refused to sign right of entry forms), all EE/CA recommended clearance activities have been completed. Figures were shown illustrating the property/land which clearance activities were conducted and where MEC items were discovered. Art Shacter stated there were several property owners who wanted their property cleared. However, due to the refusal of adjacent property owners to evacuate or cooperate with clearance of these properties could not be accomplished. Further discussion regarding this issue concluded that it would be beneficial to provide the activity workbook created for public education to these property owners who have children. Past distribution of these activity workbooks within the local schools program was discussed. Doug Logan indicated the RAB members had provided this information to the schools, which agreed to reproduce the workbooks on an as needed basis. Finally, removal action statistics were provided during the update and Ray discussed the next phase of work for Camp Butner, which is the Remedial Investigation and Feasibility Study (RI/FS). Ray stated the Corps is currently working on developing the Scope of Work (SOW) for the RI/FS and is hoping to award the RI/FS contract in August 2011. Ray indicated funding constraints may require the RI/FS to be funded and completed in areas of approximately 5,000 acres in order to address funding limitations. Discussion took place on which property would be most likely to sign the ROE for the RI/FS and it was concluded Ray would provide the map he is working on for the Corps RI/FS planning to the RAB to solicit their feedback.

Environmental Security Technology Certification Program (ESTCP)

Herb Nelson gave a briefing of the classification pilot study conducted by ESTCP (see Attachment 3). The briefing stressed that three quarters of the funding executed for unexploded ordnance (UXO) cleanup activities is spent in excavation of non-hazardous scrap. The objective of the pilot study was to continue evaluation of classification process to efficiently determine hazardous from non-hazardous items prior to excavation. Two sensors, Metal Mapper and TEMTADS, were used for the pilot study to produce data which was used for the classification exercise. Funding limitations and the number of anomalies identified during the initial study required the reduction of the study area from 10 to 4.5 acres. The study area was seeded with inert munitions items in order to develop a reasonable confidence level in the classification process. Herb discussed the difficulty in differentiating UXO and non-hazardous items and illustrated this fact with several pictures of UXO and non-hazardous items excavated during the study. Herb showed a table which illustrated how the anomalies were ranked and placed into categories which classified whether the items were considered UXO or non-hazardous items prior to excavation. Herb discussed the receiver operator characteristic (ROC) curve and stressed the goal for the curve is to go straight up for UXO prediction, which indicates the analysts were accurate in their determination of whether the anomaly was UXO or non-hazardous. The results for one of the developers of the classification method was nearly perfect with the TEMTADS data as the analysts correctly predicted approximately 90% debris. The other analysts were not as efficient but did identify half of the debris and all of the UXO. The goal of the next demonstration is to train the production analysts to become more efficient in the classification process using these new sensors.

Ordnance Discovery Update

No new ordnance was discovered since the last RAB meeting.

Public Questions

Questions from the public were addressed during the work update.

Closing/Action Items

Ray indicated there may not be any field work or activity to report by the next regular scheduled RAB Meeting in October 2011. It was concluded Ray would provide an update in October 2011. In addition, the next RAB meeting would be tentatively scheduled in January 2012 based on feedback from the RAB on updates provided by Ray.

Ray will provide a PDF of the activity workbook and a list of property owners who wanted their property cleared (but did not due to neighbor refusal) to Vicky Cates to distribute as needed.

Ray will provide the working figure for potential areas for the RI/FS to the RAB for feedback.

Doug Logan will check on the local schools which were provided the public education materials.

At 8:00 p.m., Ms. Cates moved to adjourn and her motion was carried unanimously.

ATTACHMENT 1

CAMP BUTNER FORMERLY USED DEFENSE SITE
RESTORATION ADVISORY BOARD MEETING
ATTENDANCE SHEET
APRIL 28, 2011

NAME	EMAIL ADDRESS	ORGANIZATION
RAY LIVERMORE	RAYMOND.R.LIVERMORE@USACE.ARMY.MIL	USACE, WILMINGTON
ART SHACTER	Arthur.Shacter@ncdenr.gov	NCDENR
marti morgan	martha.morgan@ncdenr.gov	NC DENR
Vicky Cates	Vicky.Cates@va.gov	
Herb Nelson	herbert.nelson@osd.mil	ESTCP
Barry Baker	barry.baker@granvillecounty.org	Granville County
Scott Strickland	SStrickland@nccrimecontrol.org	Butner Public Safety
Richard L Veazey	rjveazey@AOL.com	Granville County citizen
Harry Colonna	BCNews@Mindspring.com	The Butner-Creedmoor News
Doug Logan	doug.logan@granvillecounty.org	GRANVILLE COUNTY EMERG. MGT.

ATTACHMENT 2

CAMP BUTNER RESTORATION ADVISORY BOARD MEETING

Raymond Livermore

Environmental Engineer

U.S. Army Corps of Engineers

April 28, 2011

Definitions

- MEC – Munitions & Explosives of Concern
  - UXO – Unexploded Ordnance
  - DMM – Discarded Military Munitions
  - MC – Munitions Constituents
- MD – Munitions Debris
- MSD – Minimum Separation Distance
- HE – High Explosive

Removal Procedures

- Measure 2-acre envelope around residences
- Lay out grids and lanes
- Clear vegetation and surface clutter
- Evacuation
- Mag/dig
- Dispose of MEC/MD

Removal Action Update

- All EE/CA removal action clearance activities completed in December 2010
- Work completed since October 2010
  - Complex 2, Unit 7 (10) - Completed November 22, 2010
  - Complex 2, Unit 8 (10) - Completed November 17, 2010
  - Complex 1, Unit 13 (10) - Completed November 22, 2010
  - Complex 1, Unit 14 (10) - Completed December 1, 2010
  - Area 4C (2) - Completed December 14, 2010

Removal Action Results (Since October 2010)

Unit	MEC Items Discovered	MD Reported (Pounds)
Range Complex 2 (Unit 7)	5-81mm Mortars *	180
Range Complex 2 (Unit 8)	0	78
Range Complex 1 (Unit 13)	1-155mm HE Projectile *	202
Range Complex 1 (Unit 14)	0	50
Area 4C	1-MKII HE Hand Grenade	1209

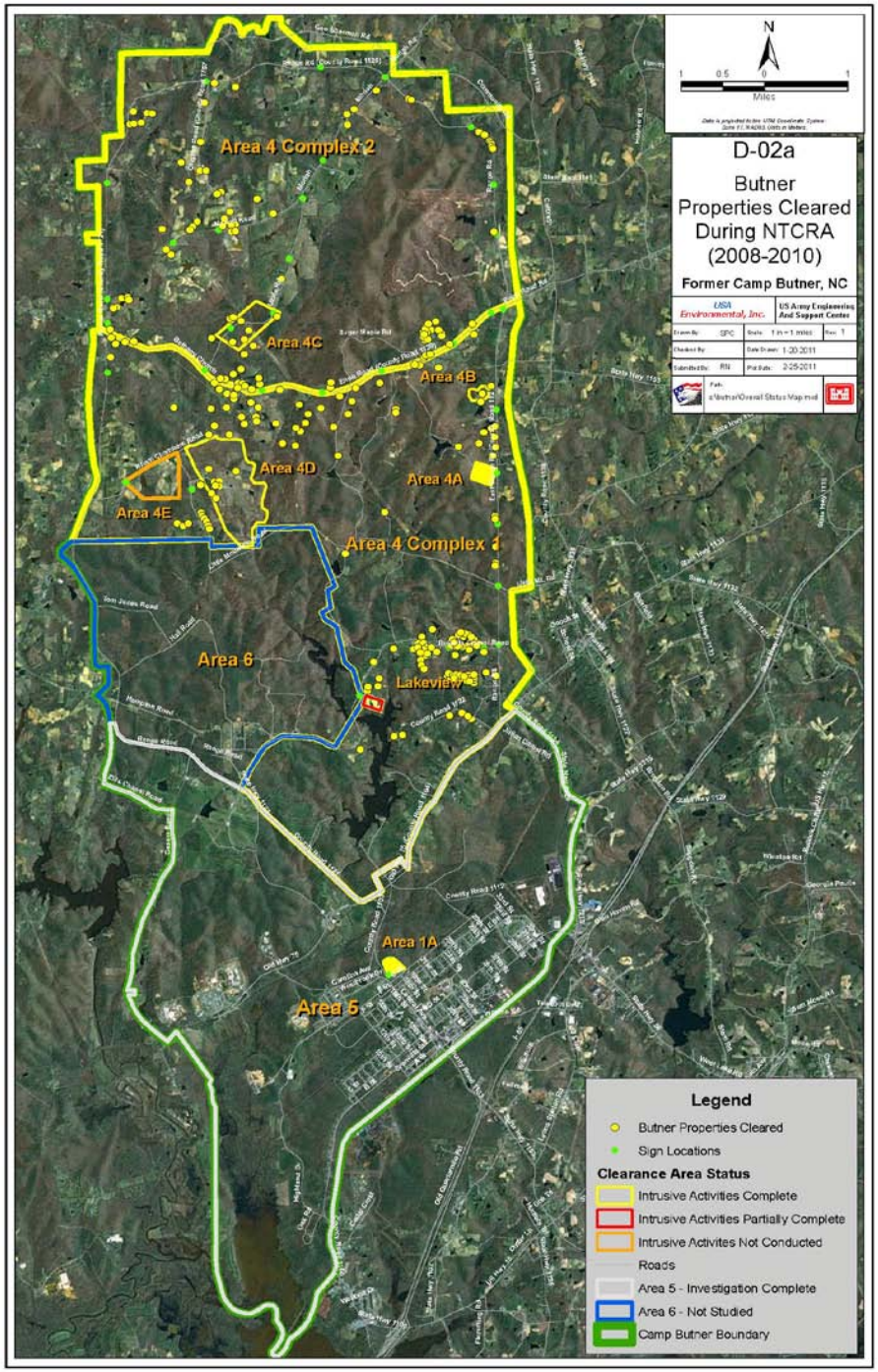
* Reported at October 2010 RAB Meeting

UXO Discovered

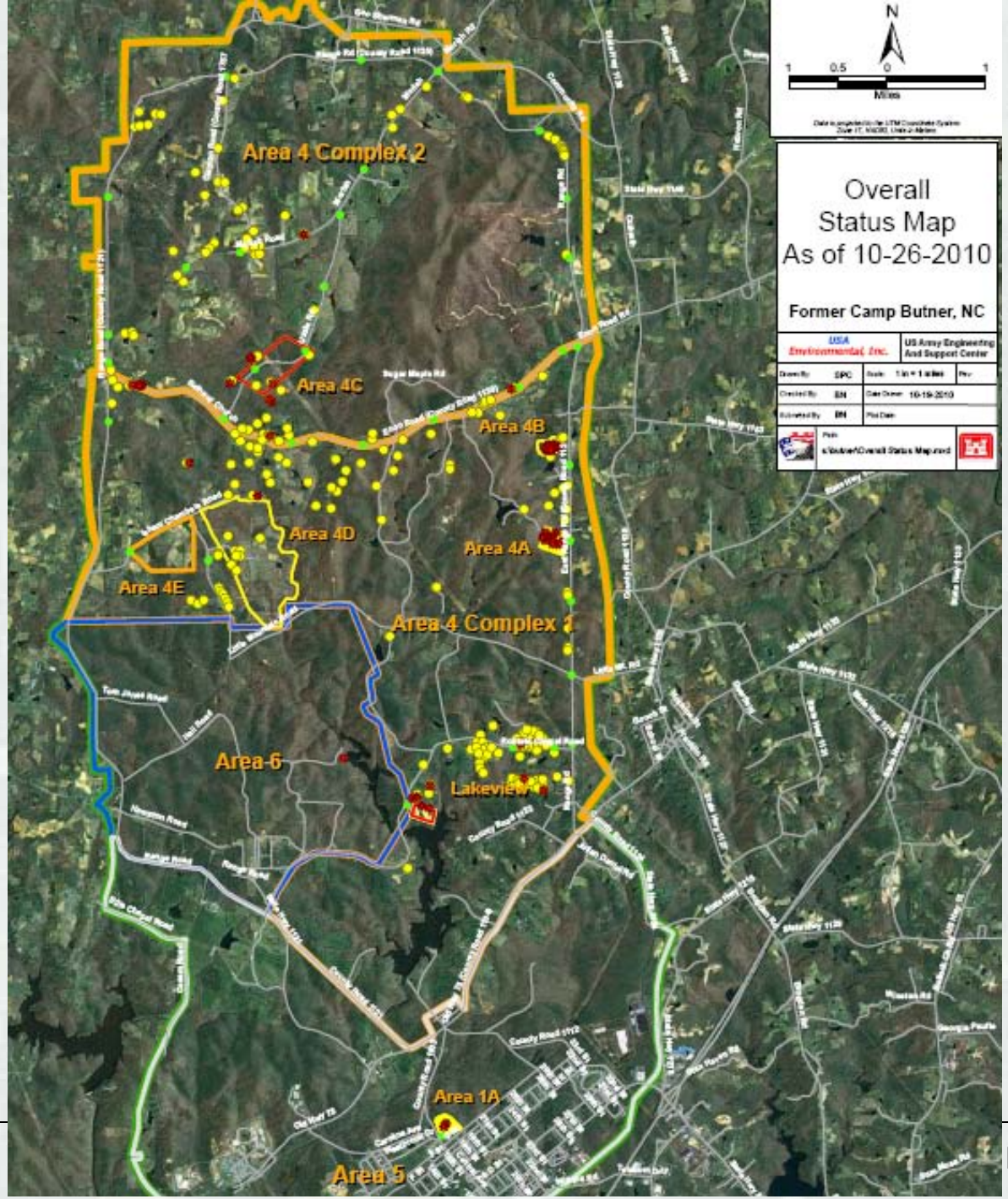
- MKII HE Hand Grenade (with pin intact)
(4578 Uzzle Road)

EE/CA RA Recommendations

- Site-Wide Institutional Controls implementation.
- Clearance to Depth:
  - Area 1A, Flamethrower Range (20 acres)
  - Area 4A, Bazooka Range/2.36-inch Rocket Range (34 acres)
  - Area 4B, Bazooka Range/2.36-inch Rocket Range (Lawn and Garden only - 10 acres)
  - Area 4C, Heavy Artillery Impact Area (2 acre clearance around each residential structure – total 16 acres)
  - Lakeview Subdivision (26 acres)
  - Area 4D (2 acre clearance around each residential structure – total 12 acres)
  - Area 4E (2 acre clearance around each residential structure – total 6 acres)
  - Area 4 Proper – 2 acre clearance around each residential structure – total 450 acres)



BUILDING STRONG®


Area 4 Complex 2
Area 4C
Area 4B
Area 4D
Area 4A
Area 4E
Area 4 Complex 1
Area-6
Lakeview
Area 1A
Area 5
N
1 0.5 0 1
Miles
Overall
Status Map
As of 10-26-2010
Former Camp Butner, NC
USA Environmental, Inc.
US Army Engineering And Support Center

UXO Information Sign

- 35 signs installed throughout Granville, Person, and Durham counties in August 2008.
- Greater frequency of installation in known areas of interest.
- Five signs were replaced in December 2010 due to vandalism.

EE/CA Removal Action Clearance Statistics

- Anomalies investigated: 502,683
- MD: over 15,785 Lbs
- MEC items: 146

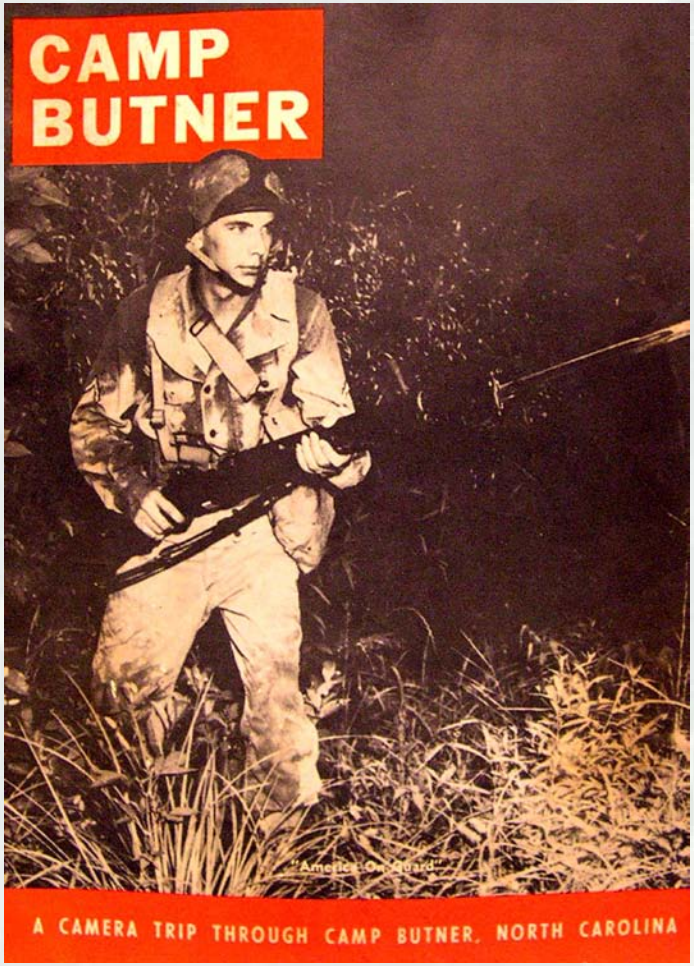
Removal Action Achievements

- Establishment of RAB
  - Local community members (Priority setting & Public Education)
  - Butner Public Safety Day
- Implementation of institutional controls
  - DVD
  - Brochure
  - Activity workbook
  - UXO Information Sign
- Non-Time Critical Removal Action
  - Clearance of Areas of Interest
  - Employment of local resident by USAE (ROEs & Evacuations)
  - Acquisition of plus-up funding from HQ and prior-year funds

Next Phase

- Remedial Investigation (RI) is the next phase.
  - 2011: Internal planning/Contract scoping & award
  - 2012: Work plan preparation and possible field work
- Funding Constraints
  - FUDS Program is typically underfunded
  - Camp Bunter has large range complexes (RC 1- 10K acres, RC2 – 6K acres)
  - Looking at funding by options for smaller areas (~ 5K acres or less)

Questions

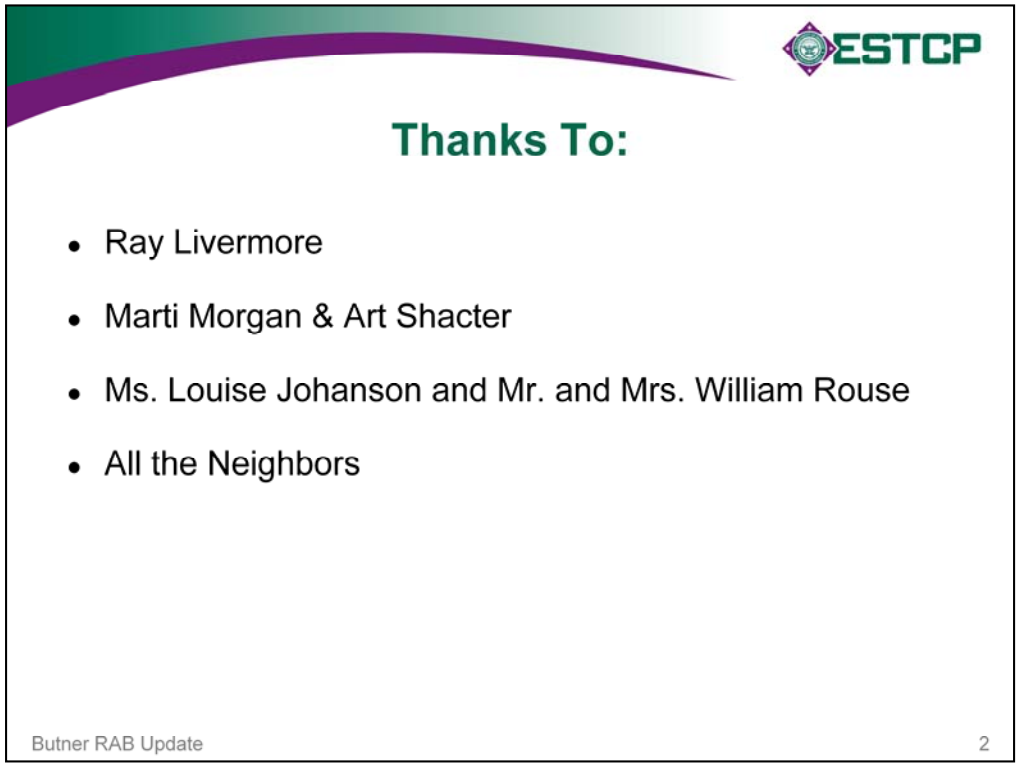


http://www.saw.usace.army.mil/campbutner/index.htm

ATTACHMENT 3

Update on the Butner Classification Demonstration

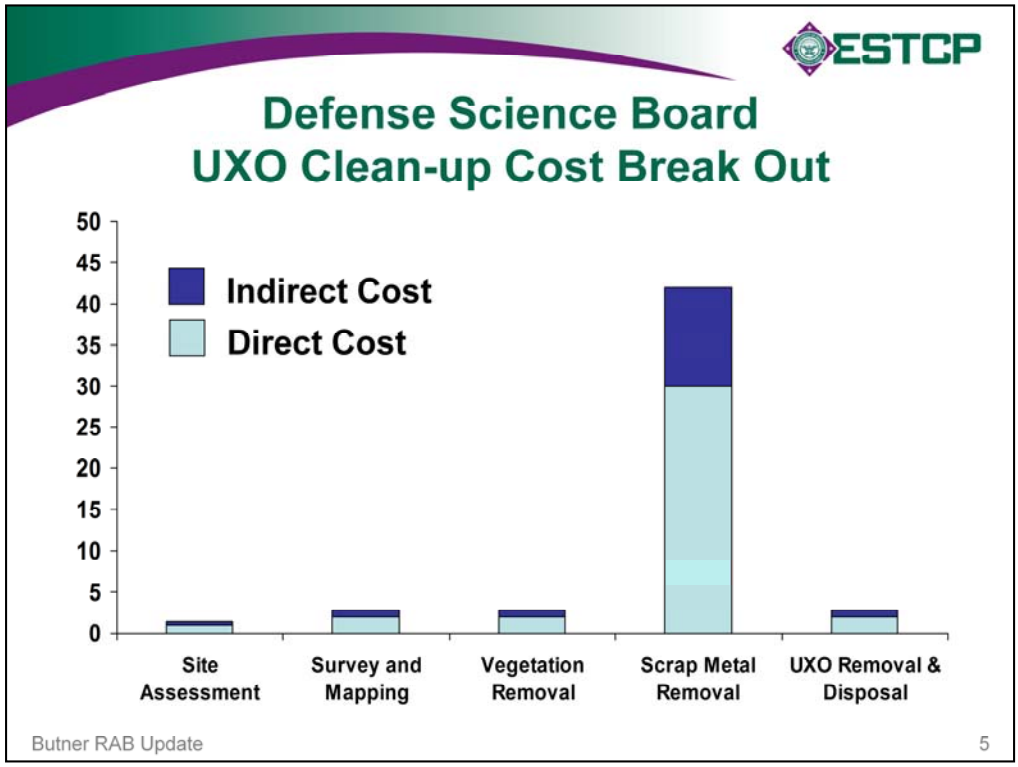
Herb Nelson
Program Manager for Munitions Response
SERDP & ESTCP



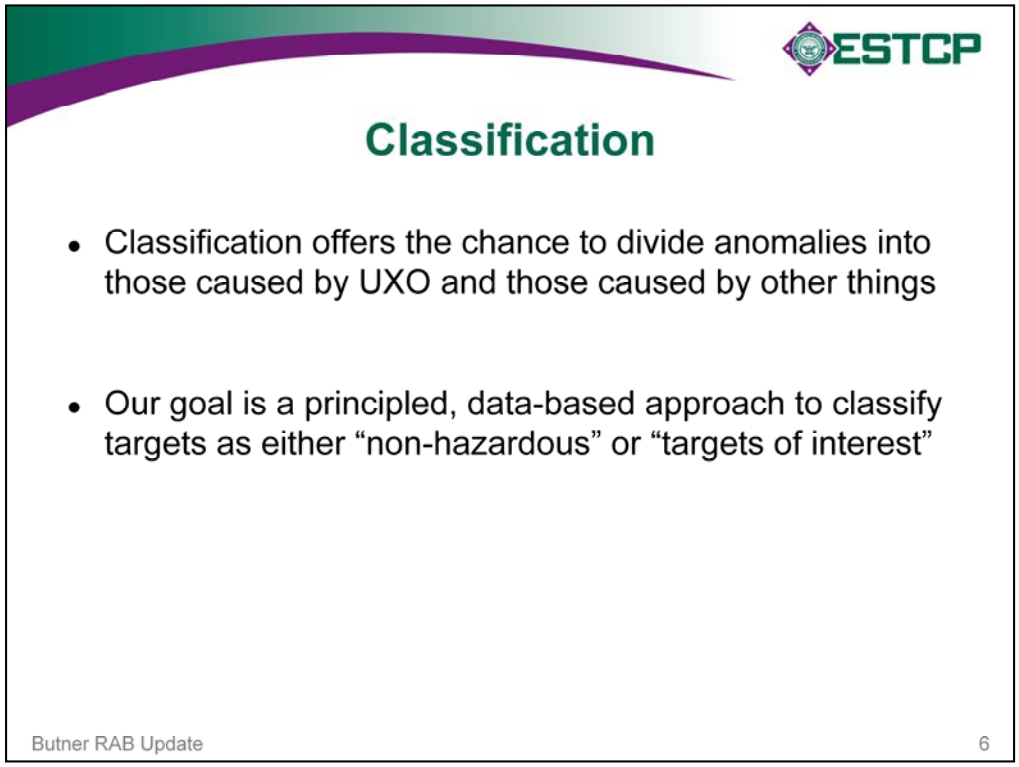
The Butner demonstration was a big success and we owe a big thanks to everybody that helped us.

The Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) are DoD's Environmental Technology programs. SERDP supports basic and applied research and ESTCP supports demonstration/validation projects. Many of the technologies discussed in this talk were developed with SERDP support while the demonstration itself was supported by ESTCP.

There are a very large number of sites in the US suspected of being contaminated with military munitions but the remediation budget each year represents only about 1% of the multi-billion dollar projected total remediation cost. This leads to remediation projects having planned completion dates late in this century. Given budget realities, the only way to accelerate this effort is to develop methods to accomplish more remediation with the available funding.



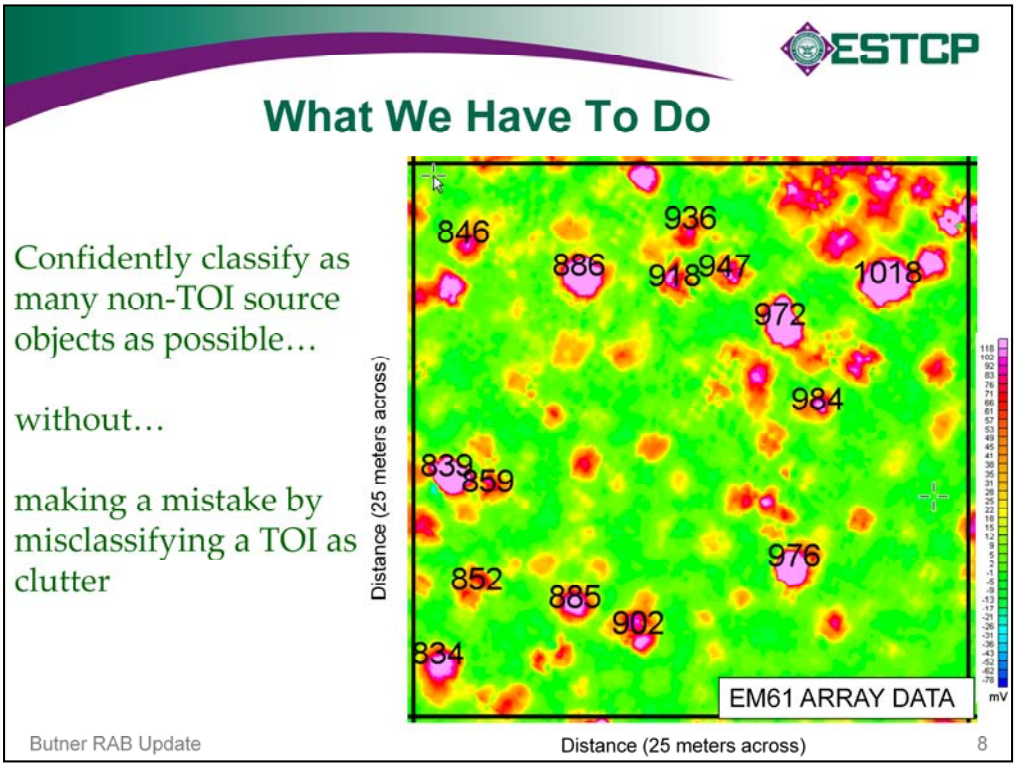
This chart is from the 2003 Defense Science Board Task Force report on the state of UXO remediation. The situation is the same today. Using conventional methods, three quarters of the funding at a munitions response is spent on removing non-hazardous scrap. We need a way to lower this percentage so we have more available to remove UXO.



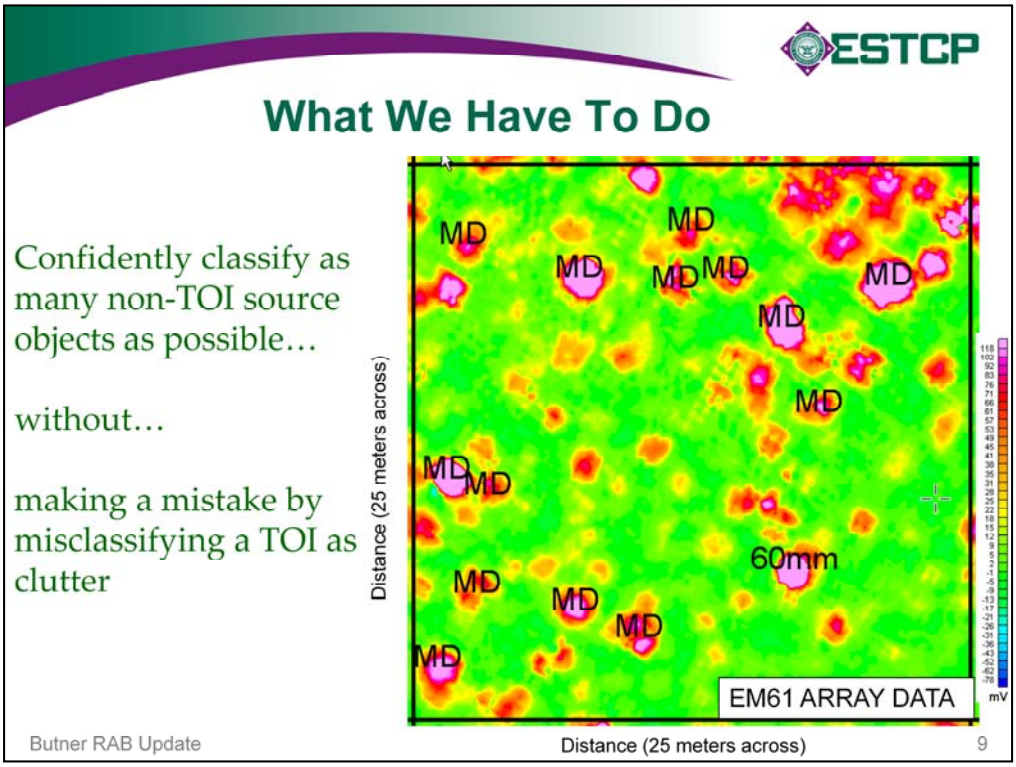
As we saw in the last slide, if we could sort the sources of geophysical anomalies into “targets-of-interest” and non-hazardous items we could spend more of our resources on the real goal of removing UXO. Classification is the term for this sorting.

What we seek is a principled, data-driven approach to classification. This involves data collection and analysis methods as well development of a process in which all stakeholders can have confidence.

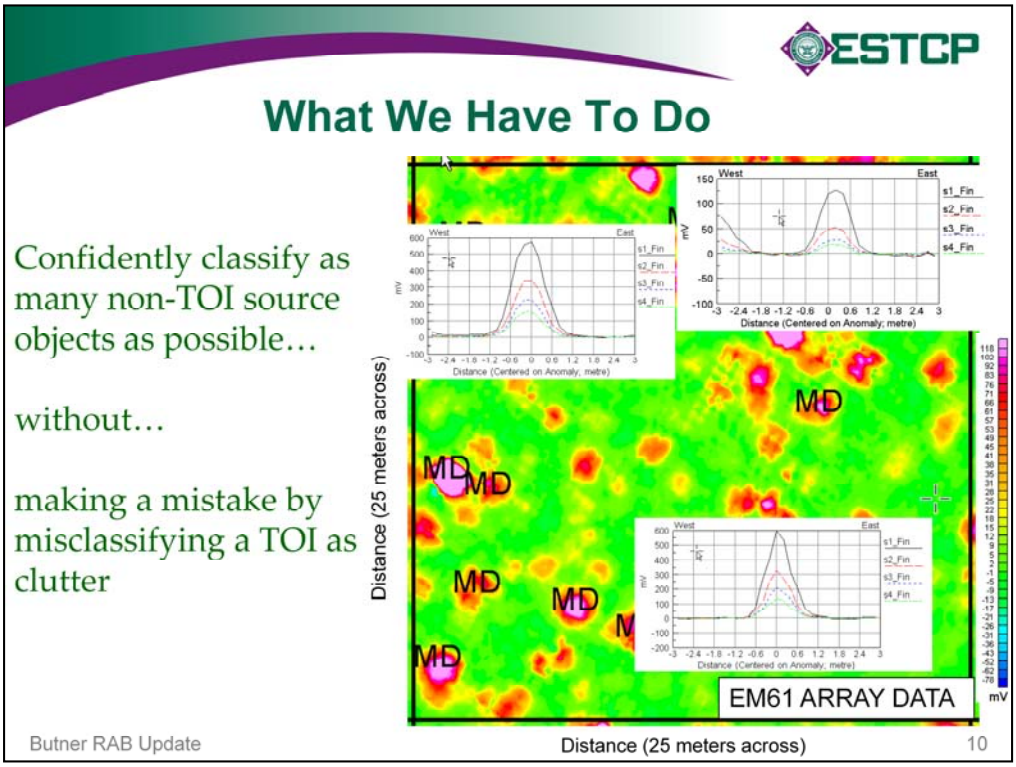
Okay – let's begin by discussing how we might perform the classification process if we could visually see the objects. This is something we can all relate to. We might use size if appropriate. We might use shape if appropriate. We might even use axial symmetry to group the objects.



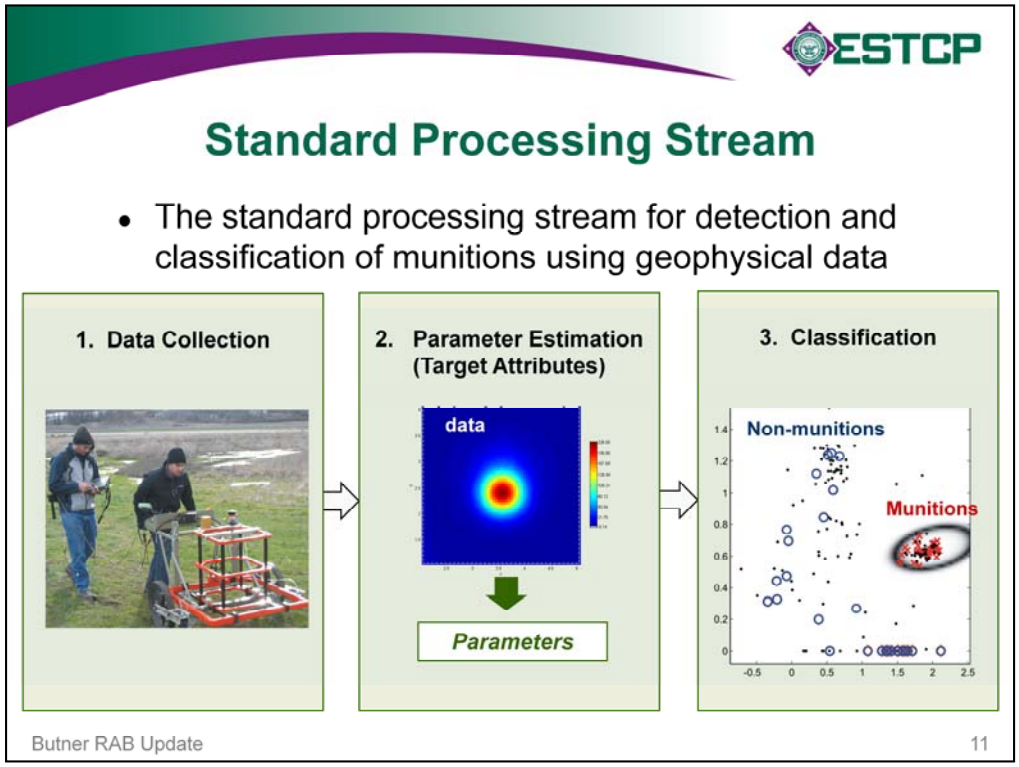
Since the objects we are interested in are buried, we are faced with the task of classifying them based on the signals from geophysical sensors. In the example shown here, one of these targets is a mortar and the rest are scrap. Although you can see differences in the signatures, there is nothing here that allows you to identify them.



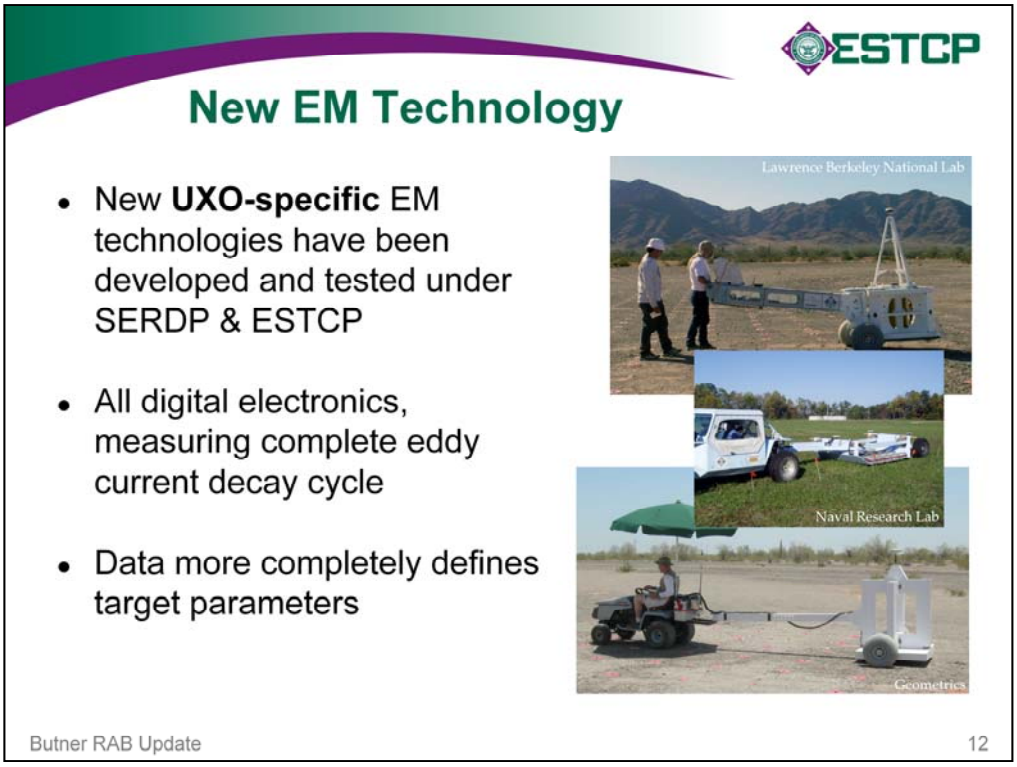
Even when you know which one is the UXO, you can't see anything that would let you know where the rest of the UXO in the field are.



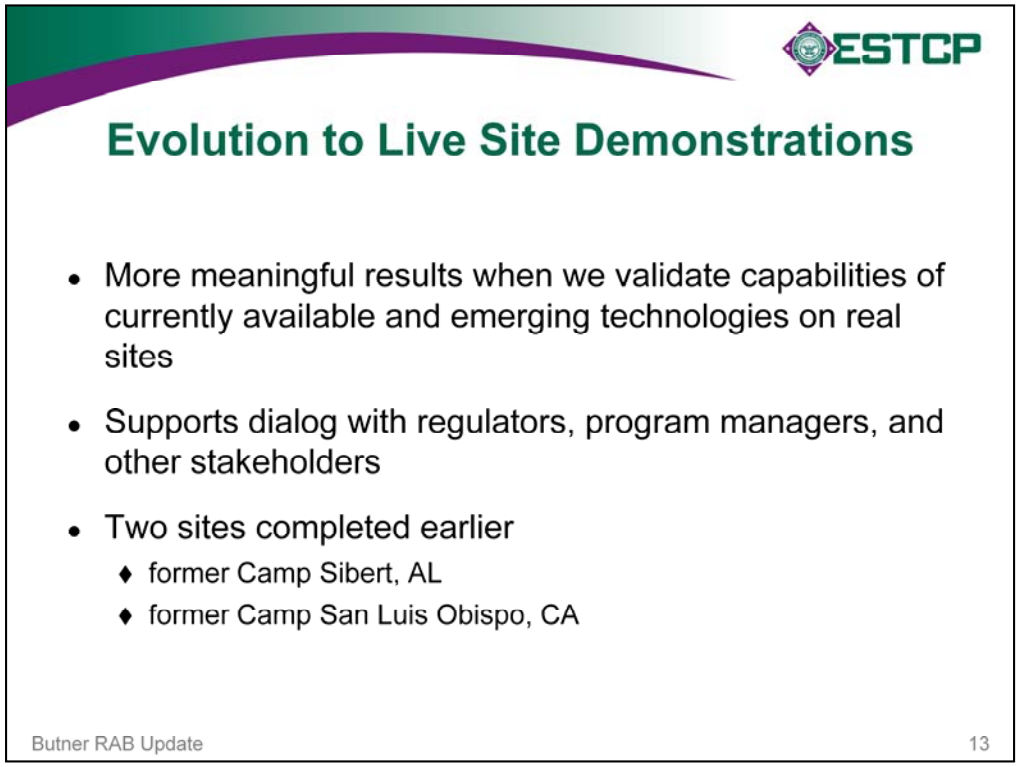
But, you have more to go on than just the map view. As the sensor passes over each target, it records more information about the target. Geophysicists use this additional informationand their knowledge of how the sensors work to construct models of the object that allow them to estimate parameters of the target such as physical size, length to diameter ration, and wall thickness. These parameters can be used to classify the buried object.



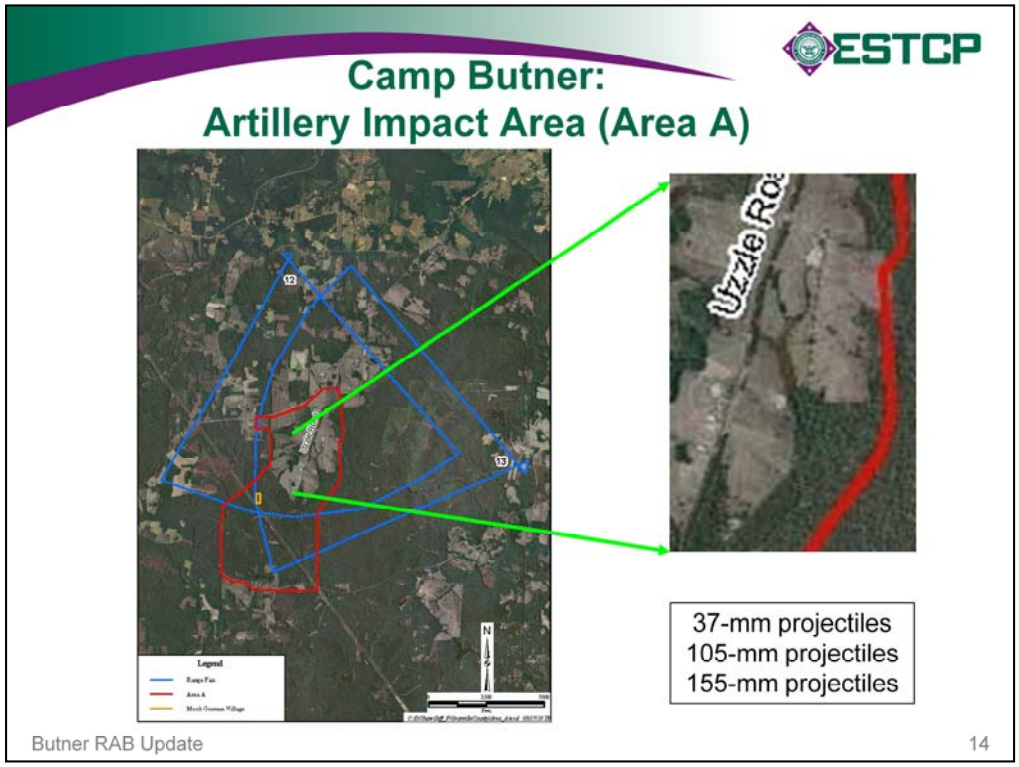
Schematic showing the standard process flow of a digital geophysical survey. The data are collected and captured by a data logger. After the survey is finished, the data are typically transferred to another computer where initial data processing and then parameter estimation are performed. The parameters are then used to make classification decisions.



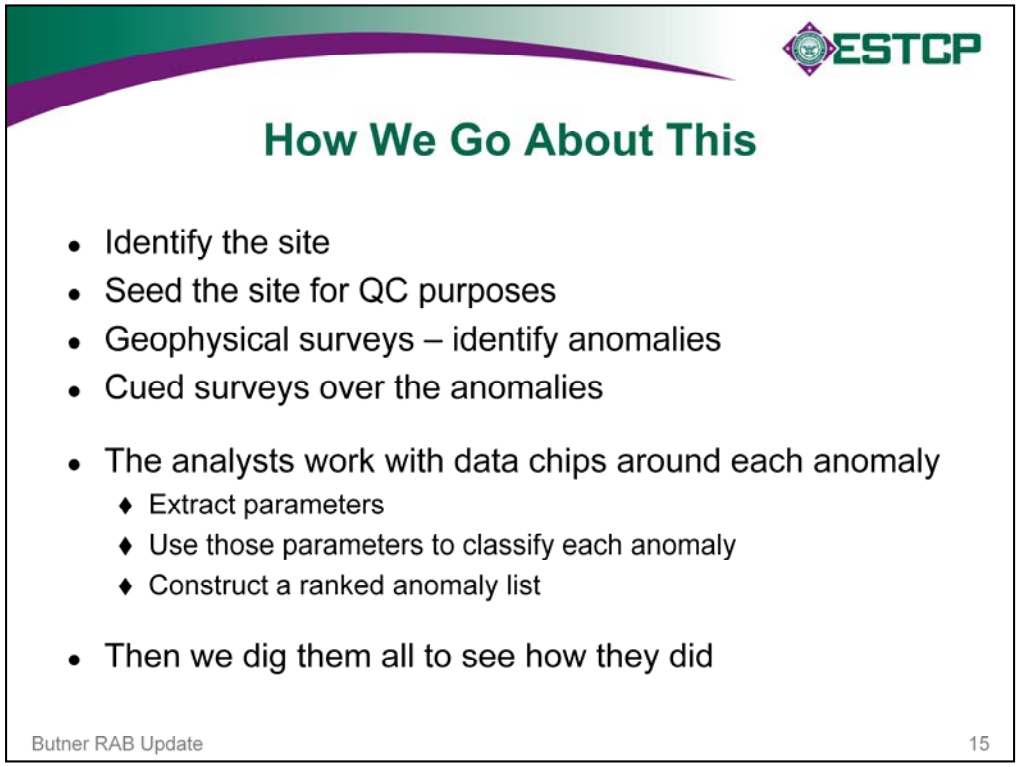
SERDP and ESTCP have developed and tested new munitions-specific technologies which provide significantly improved discrimination performance. Several of the new systems are shown in the pictures. They have all digital, programmable electronics and are capable of measuring the complete eddy current decay cycle. They provide multi-axis target excitation and observation for complete interrogation of the principal axis response functions.



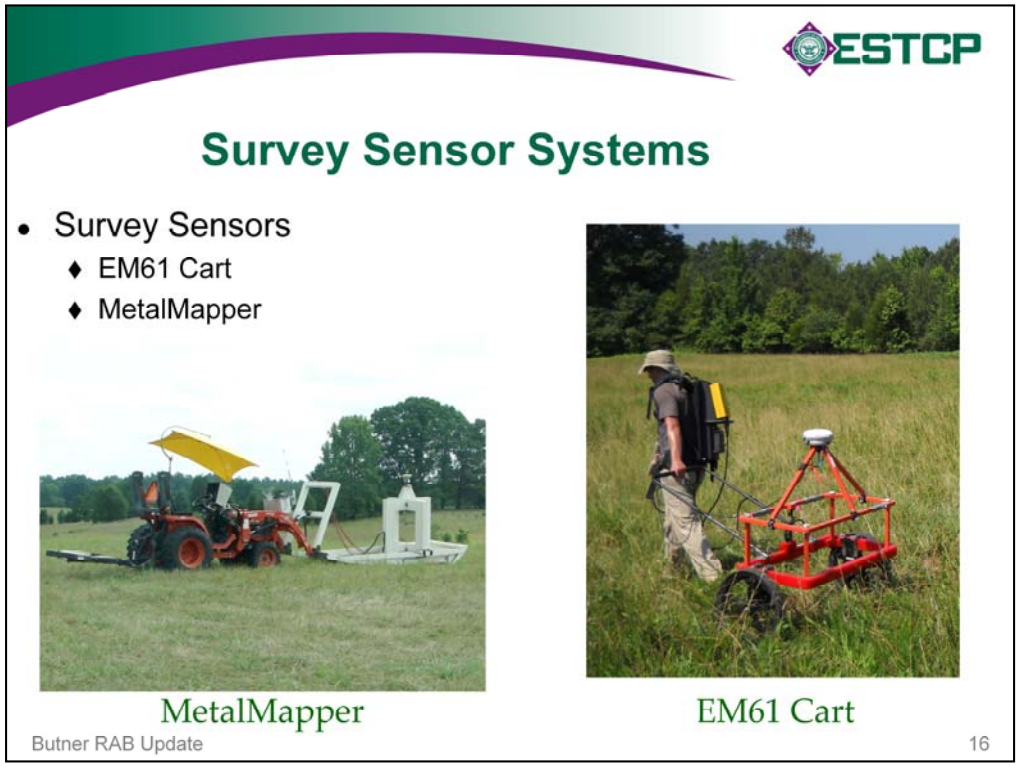
Now that these new sensors have been validated on prepared test sites, we are demonstrating them on live munitions sites. The first two demonstration sites are listed above, the third demonstration was a former Camp Butner.



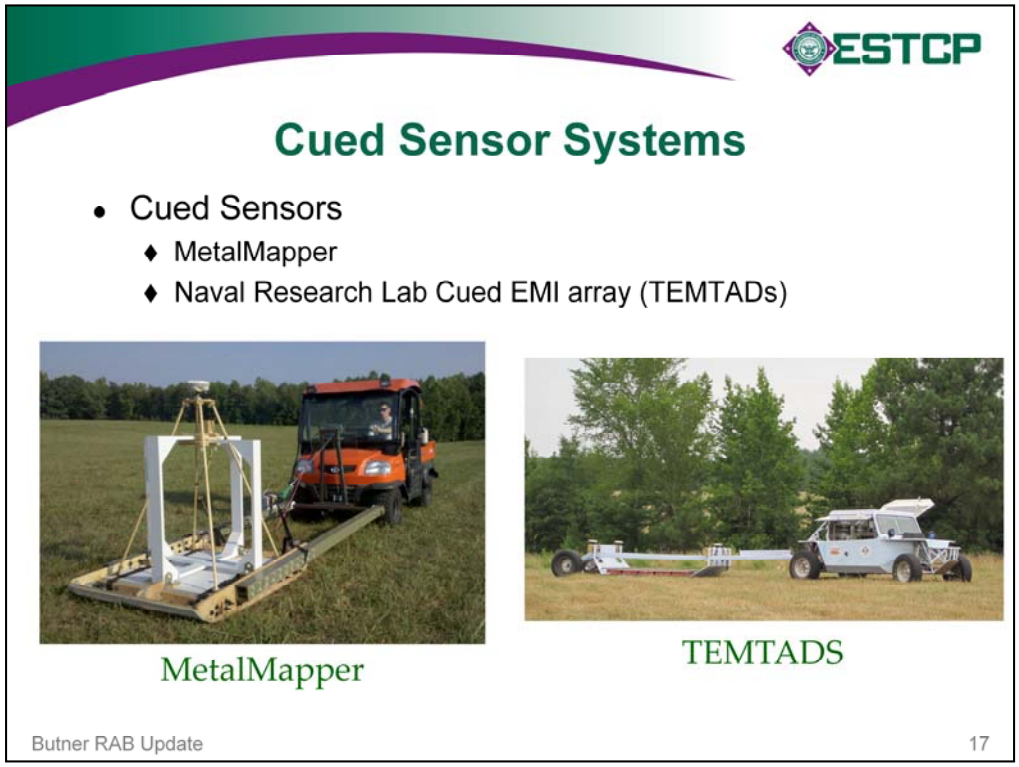
Here is an overview map of the Butner ranges with an expanded view of where we worked. The munitions know to be in this area are 37-mm, 105-mm, and 155-mm projectiles. This makes for a tough classification problem because a lot of the fragments from an exploded 105-mm projectile are very similar in size and shape to a 37-mm projectile.



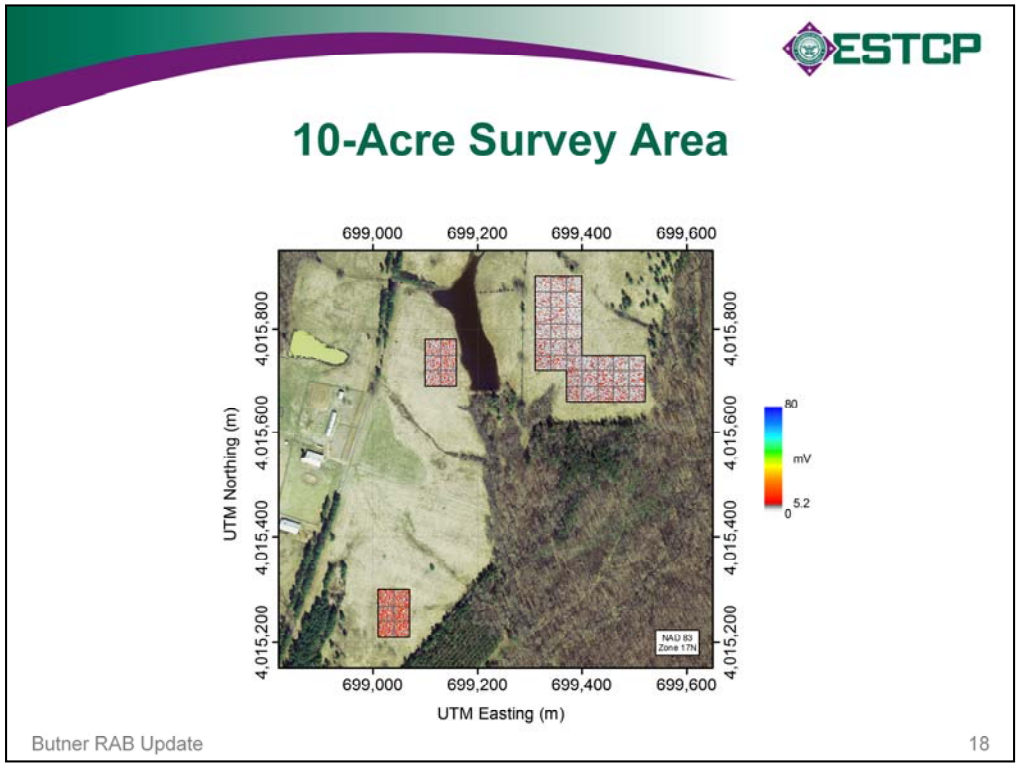
This is how we proceed with the demonstration. Of course, the goal of all this is to not waste resources digging up scrap but in order to judge how we did, we have to dig everything during the test.



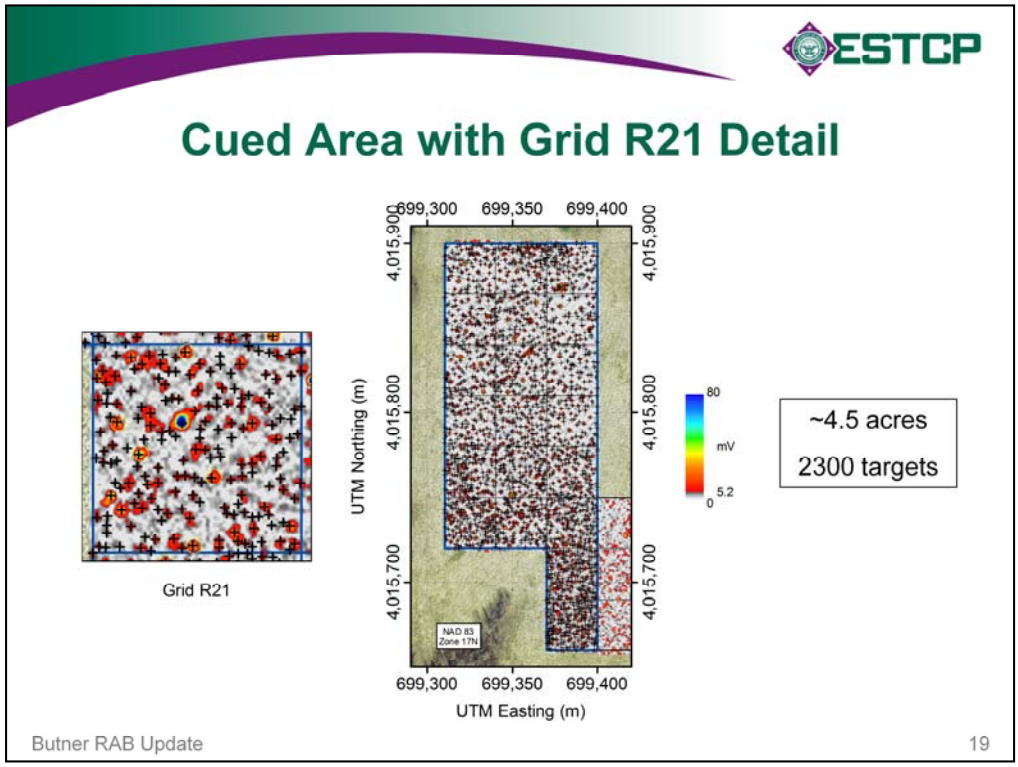
We used two sensor systems to survey the demonstration site and detect anomalies. The system on the left, MetalMapper, is one of the advanced sensors we have been developing. The one on the right, the Geonics EM61, is the sensor used on the majority of munitions response projects today. We use it to provide a baseline.



We also demonstrated two “cued sensors.” These sensors are positioned over previously identified anomalies and take data for a minute or less while stationary. These data are of much higher quality because the sensor is not moving, and bouncing, during the measurement. Although this adds an extra step to the process, it is relatively efficient. These sensors can interrogate 250 to 400 targets a day.

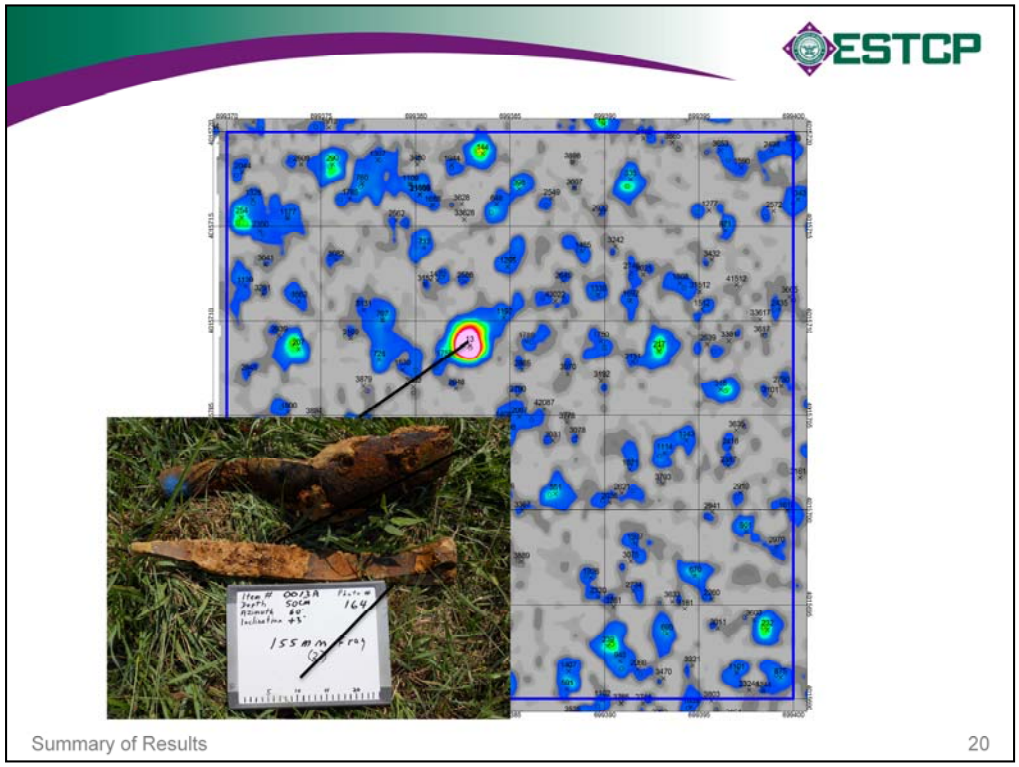


We originally planned to conduct the demonstration over a 10-acre area. But, we are constrained in the number of anomalies we can dig up and the anomaly density at this site is quite high.

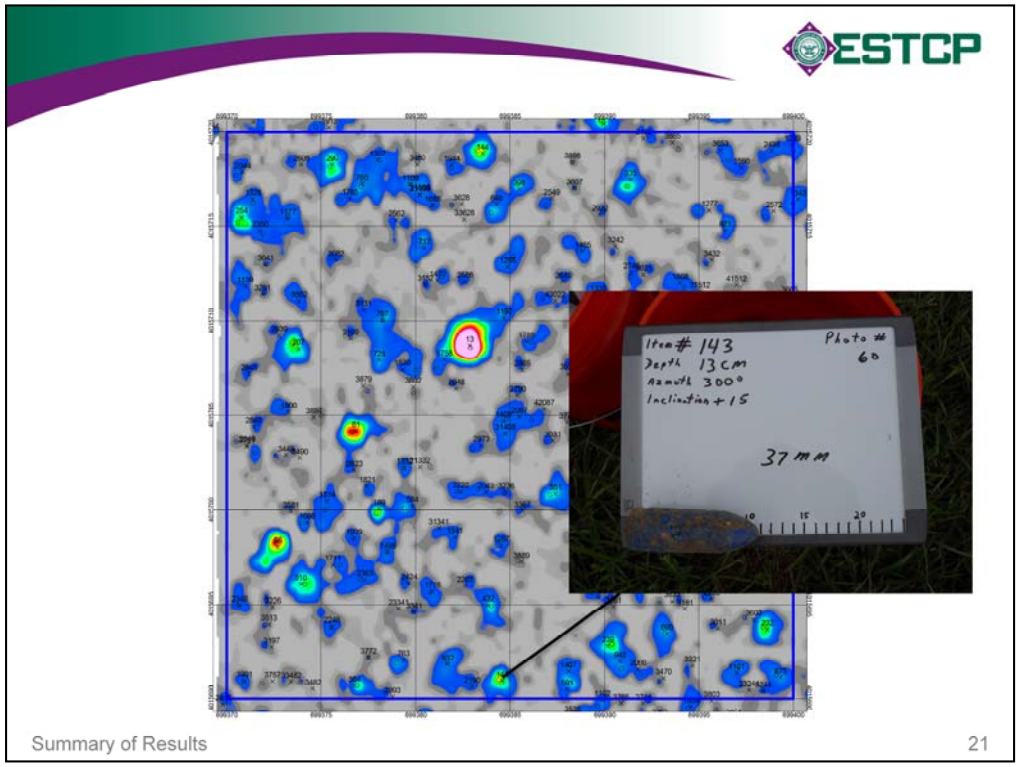


This is the 4.5-acre area we finally settled on. We can afford to dig up ~2,500 targets (it costs over $100 per target to remove things from a munitions site) so we were constrained in the area we could work on. Since we don't expect to encounter more than a handful of real UXO in an area this small, we seeded the area with 160 inert munitions. This will allow us to develop reasonable confidence in the classification results we achieve.

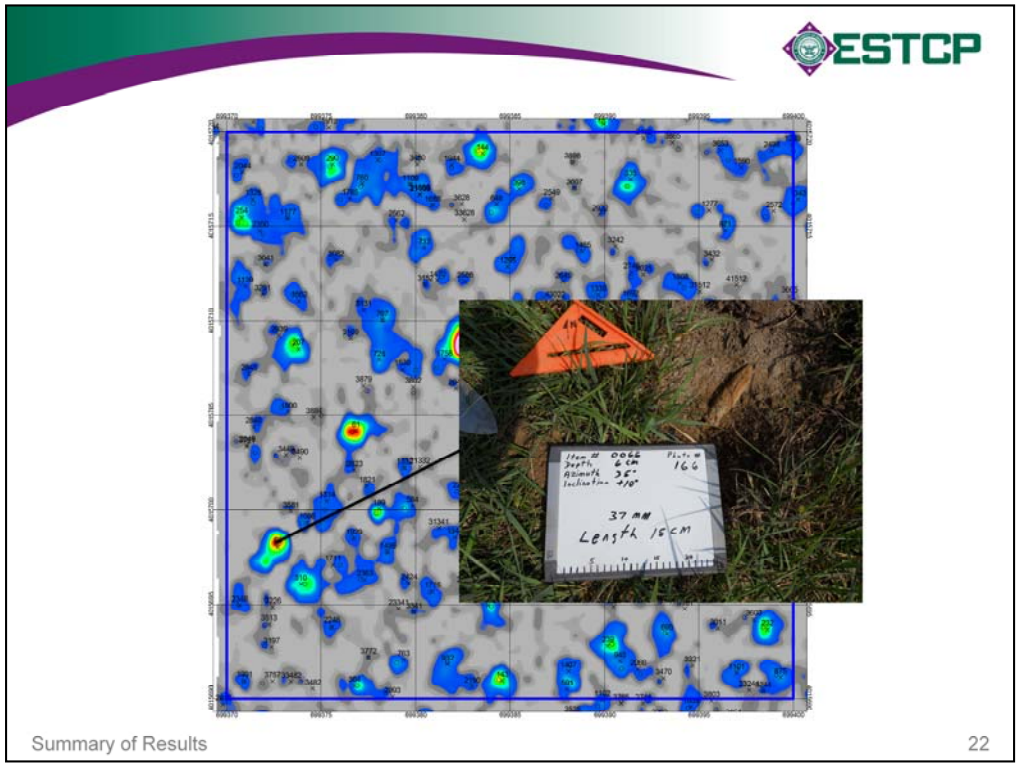
An expanded view of one 30-m x 30-m grid is shown. The next several slides will show you examples of objects excavated from this grid.



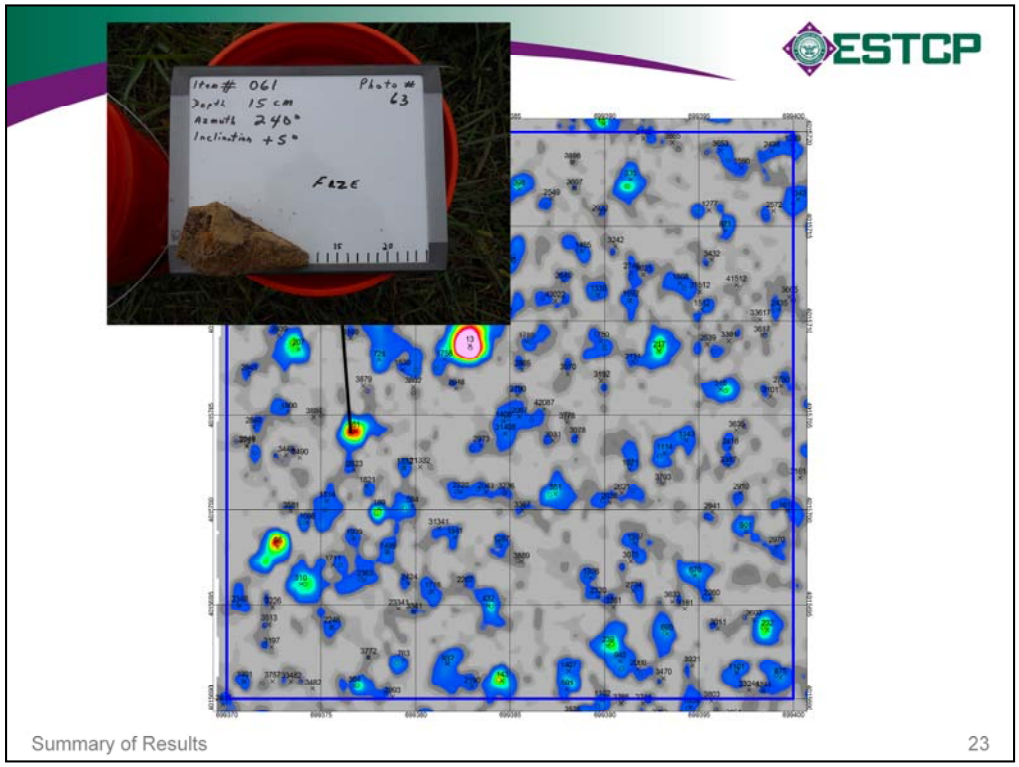
The big signal near the center of the grid corresponded to two large fragments from a 155-mm projectile.



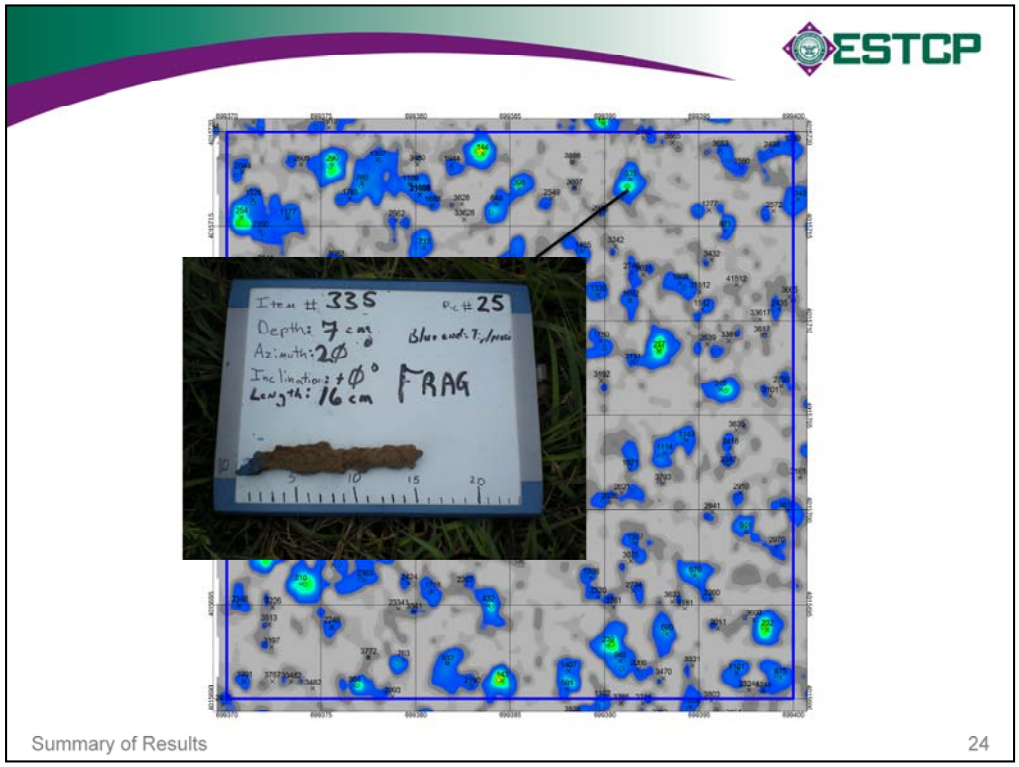
This anomaly was one of the inert 37-mm projectiles we seeded. Inerts are traditionally painted blue for identification.



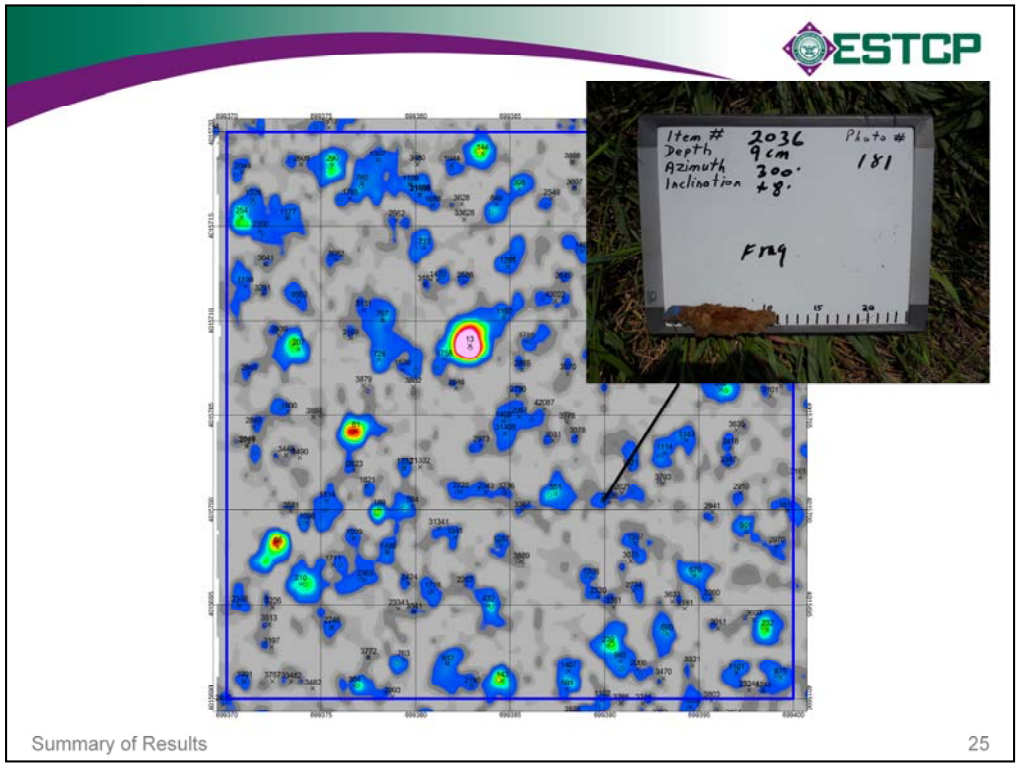
This one was a real UXO filled with high explosives. The dig team blew it up in place after uncovering it.



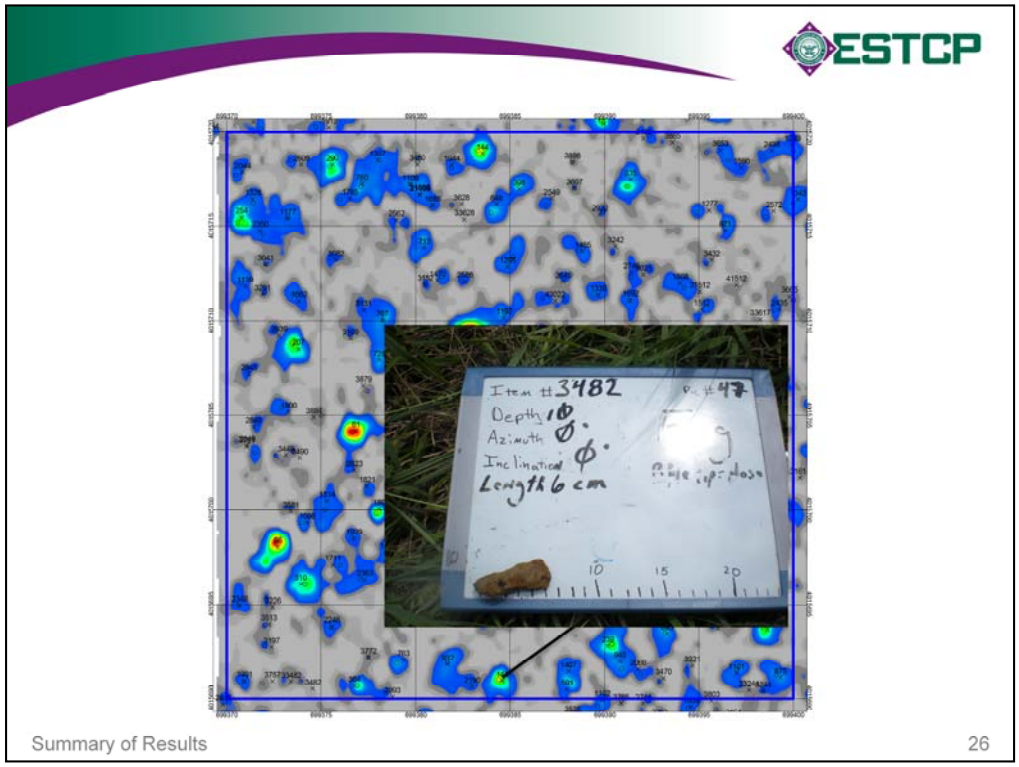
This is the fuze from a 105-mm projectile with the booster tube (additional explosive) attached. To be successful, the analysts had to mark items like this fro removal.



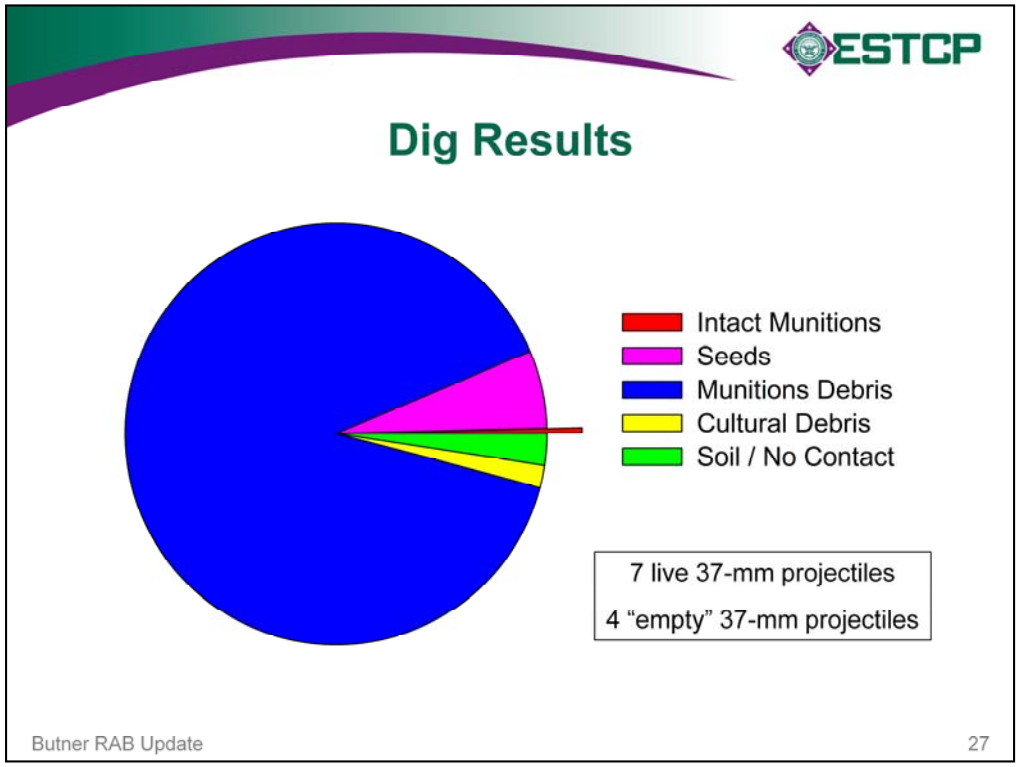
This is a piece of fragment from a 105-mm projectile.



Another fragment from a 105-mm projectile. Notice how much this matches the 37-m projectiles in length and widht.

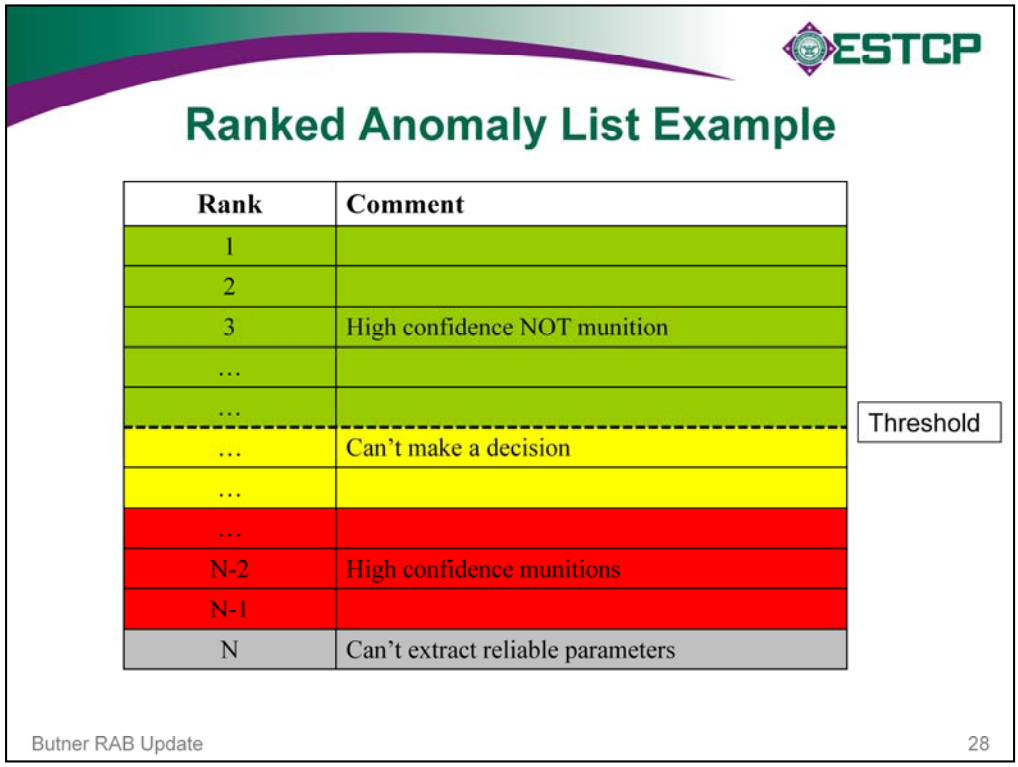


Here is a piece of frag that is smaller than any target we think is hazardous.



This chart summarizes the results from all 2300 digs. We seeded 160 inert munitions and found another 11 items that we determined must be removed from the site. Most of the rest was munitions debris.

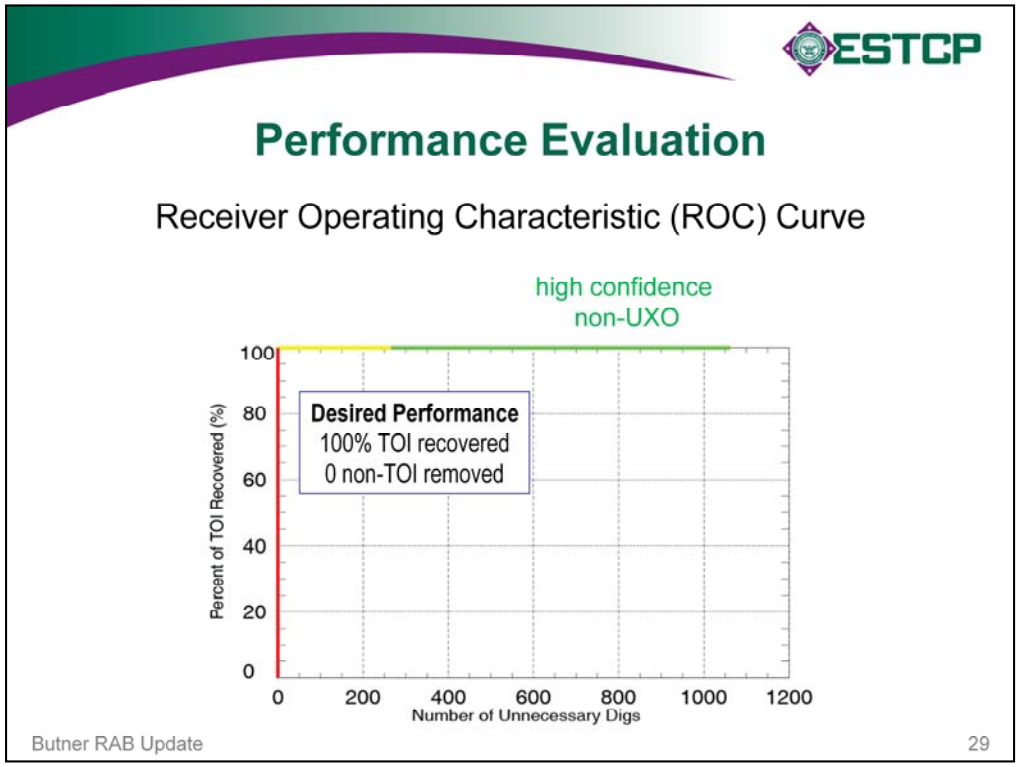
This ratio (11 UXO out of 2100 digs) is what drives the cost figures we saw earlier.



Once the analysts have finished extracting parameters and run their classification methods, we ask them to rank the anomalies as shown. Anything they are confident is not a munition goes on the top of the list, followed by anomalies for which they are unable to decide, followed by objects they are confident are UXO.

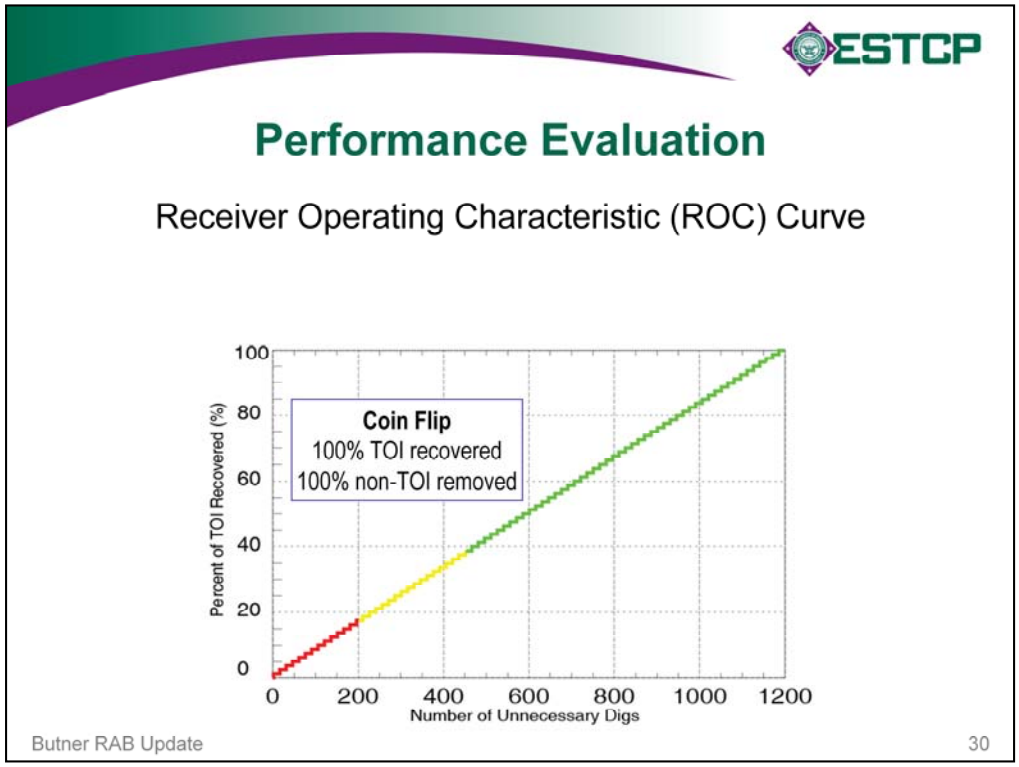
If there are a few objects for which the data are corrupted or missing they go on the bottom of the list. We can't say anything about these targets so they must be dug.

The only objects we would consider leaving in the ground are those raked as high confidence not hazardous.



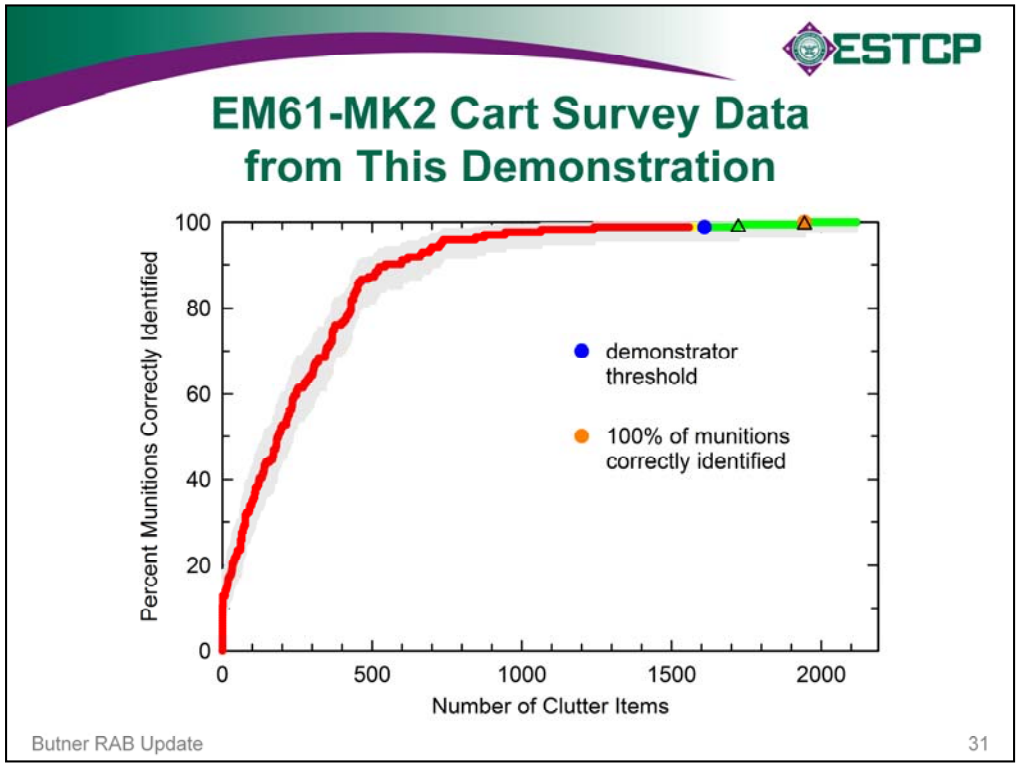
We evaluate the performance of the analysts using a Receiver Operating Characteristic, or ROC, curve. We construct this curve by digging everything starting at the bottom of the list on the last slide. If the item is a UXO, we go up on the plot; If it is clutter, we go to the right.

This is an example of a perfect result. Every item the analyst called UXO (in red) was a UXO and all the things she called non-hazardous were. This is what we are looking for.

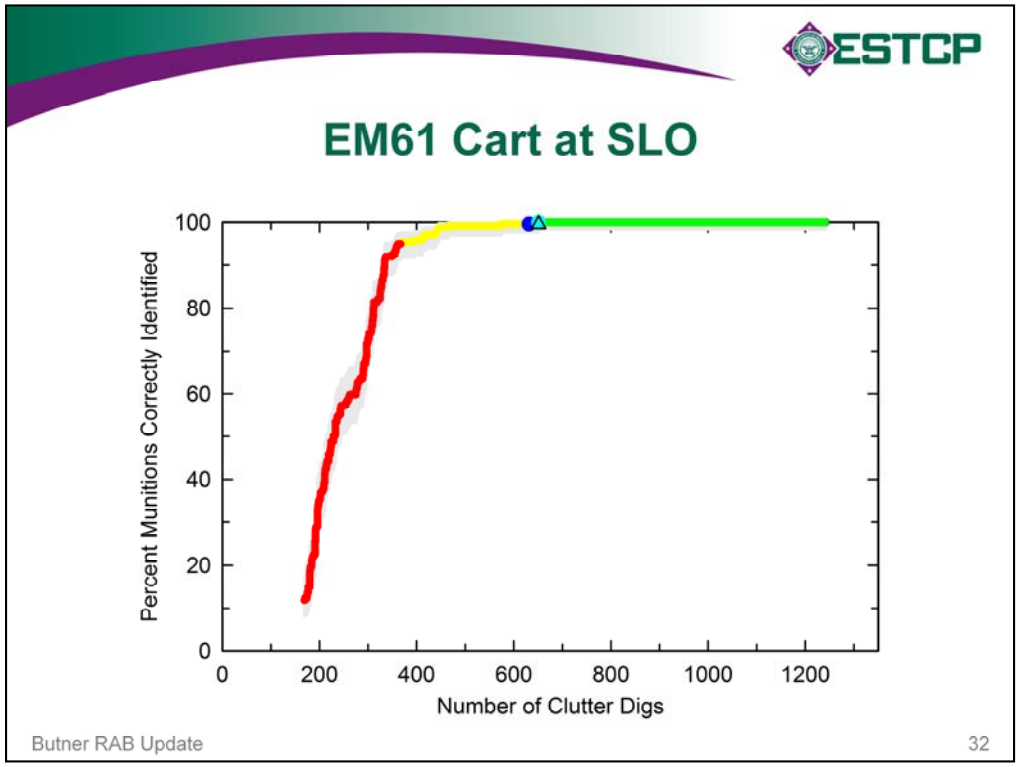


This, on the other hand, is as bad as can be done. The things called UXO were sometimes UXO and sometimes not. The things called not-hazardous had the same chance of actually being UXO as he things called UXO. This curve is sometimes called the chance diagonal. It is what you would get if you were just flipping a coin to decide what to call each object.

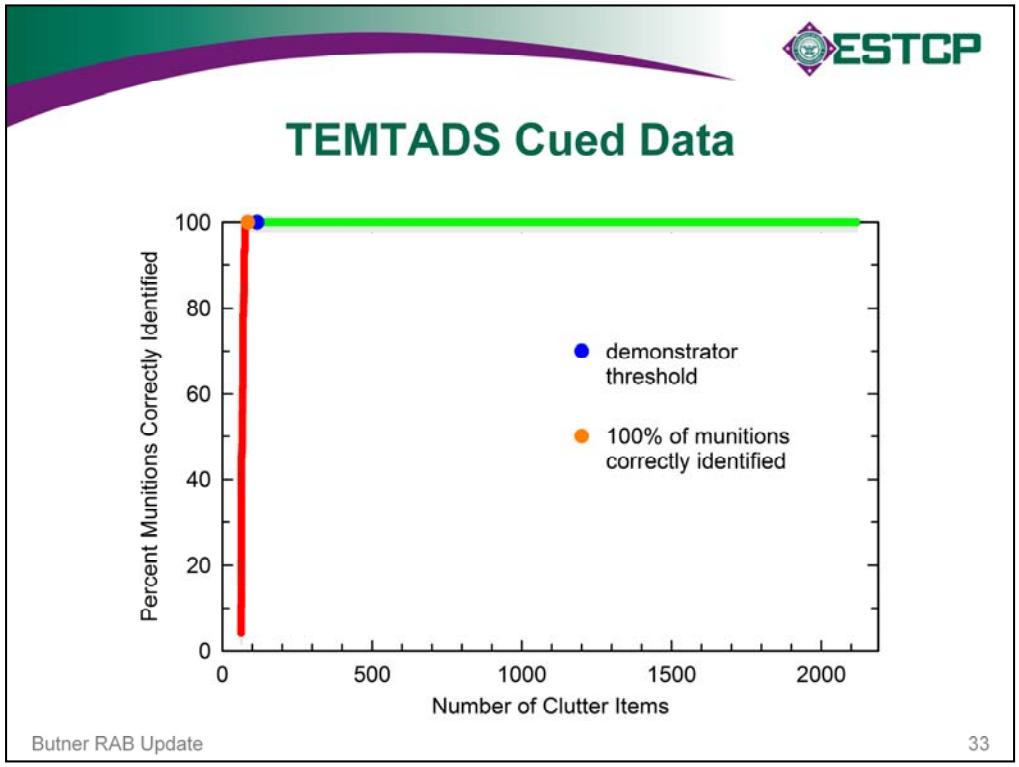
To the extent that a result looks like this, it is a failure of classification. The more it looks like the curve on the previous slide, the better.



We examined over 50 combinations of sensor data and analysis methods at Butner. Here is a representative example of analysis of the conventional EM61 data. It is not as bad as chance, the points in red do go generally up but it is very rounded after about 80% of the UXO have been identified. The worst part is the by the time all the UXO have been identified (orange dot), only about 150 clutter items remain. This is not what we are looking for.



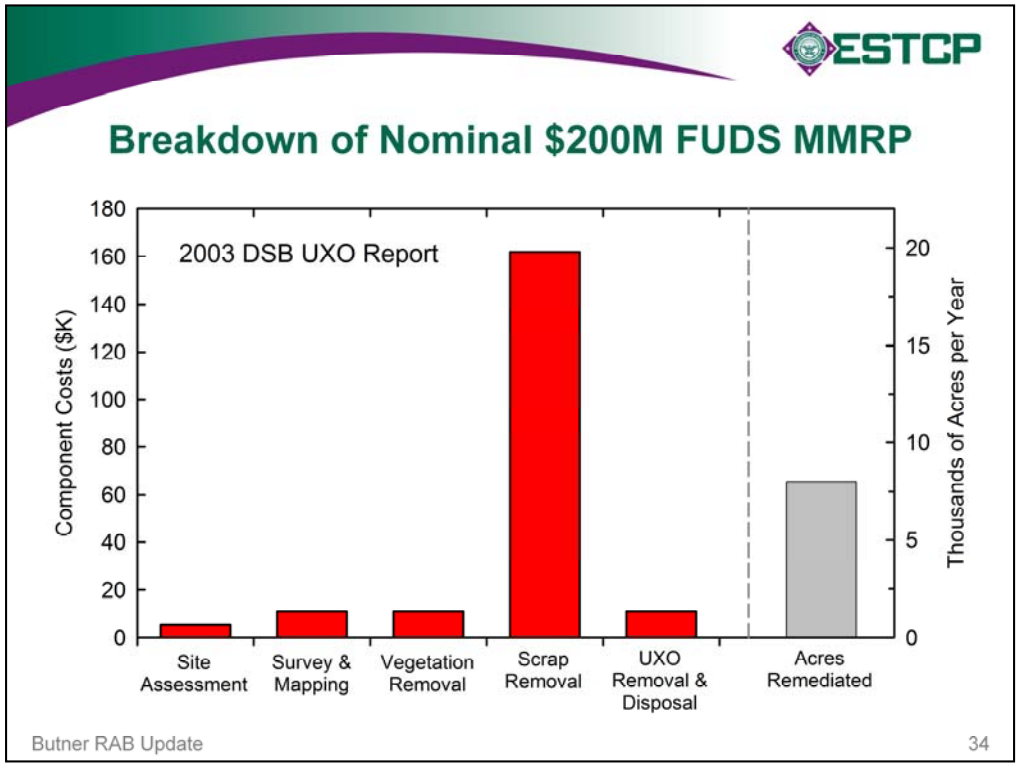
This same sensor did better at our last site. This analyst was able to correctly identify 40% of the clutter after getting all the UXO. Camp Butner is a harder site than San Luis Obispo and the EM61 data are not good enough to classify here. Recall how many fragments we saw that were close in size and shape to the 37-mm projectiles. The data from the EM61 do not allow us to distinguish them.



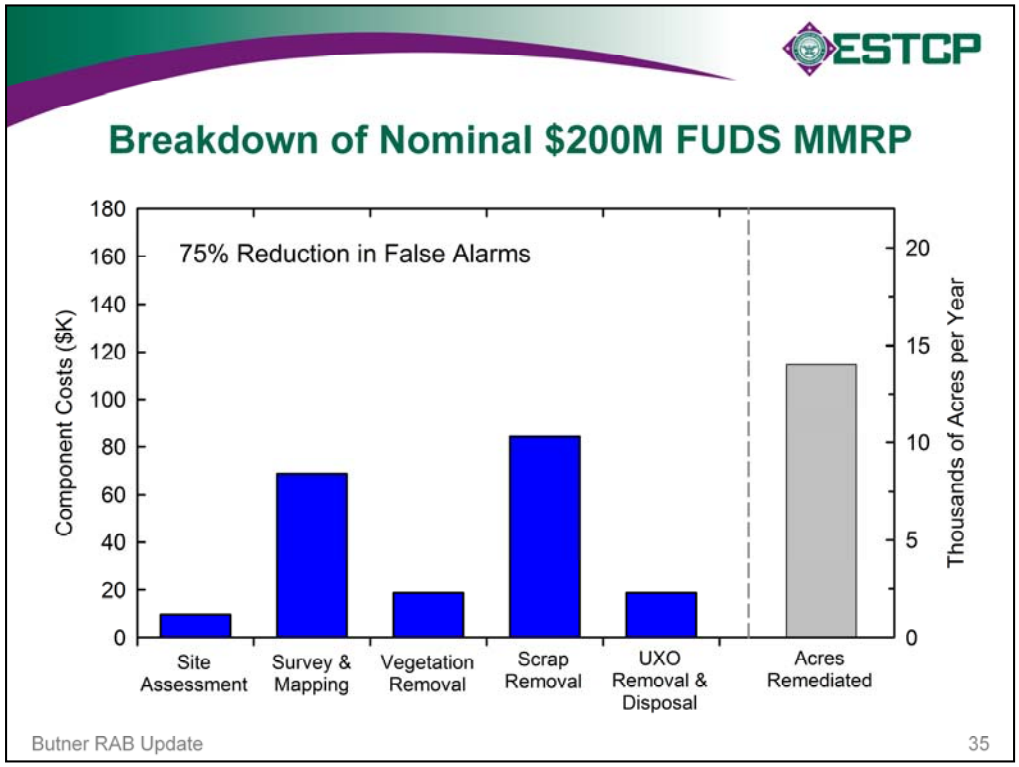
Here are the results from one of the advanced sensors. This is nearly perfect. The analysts was very efficient at identifying UXO (the red part of the curve goes almost straight up) and was able to correctly classify over 90% of the clutter after identifying all the UXO.

Not all analysts did this well with these data. The results shown here are from one of the developers of the methods. We also had a number of geophysicists from production companies work on this data set as well. Although they did not do this well, they were still able to correctly identify half the clutter while getting 100% of the UXO.

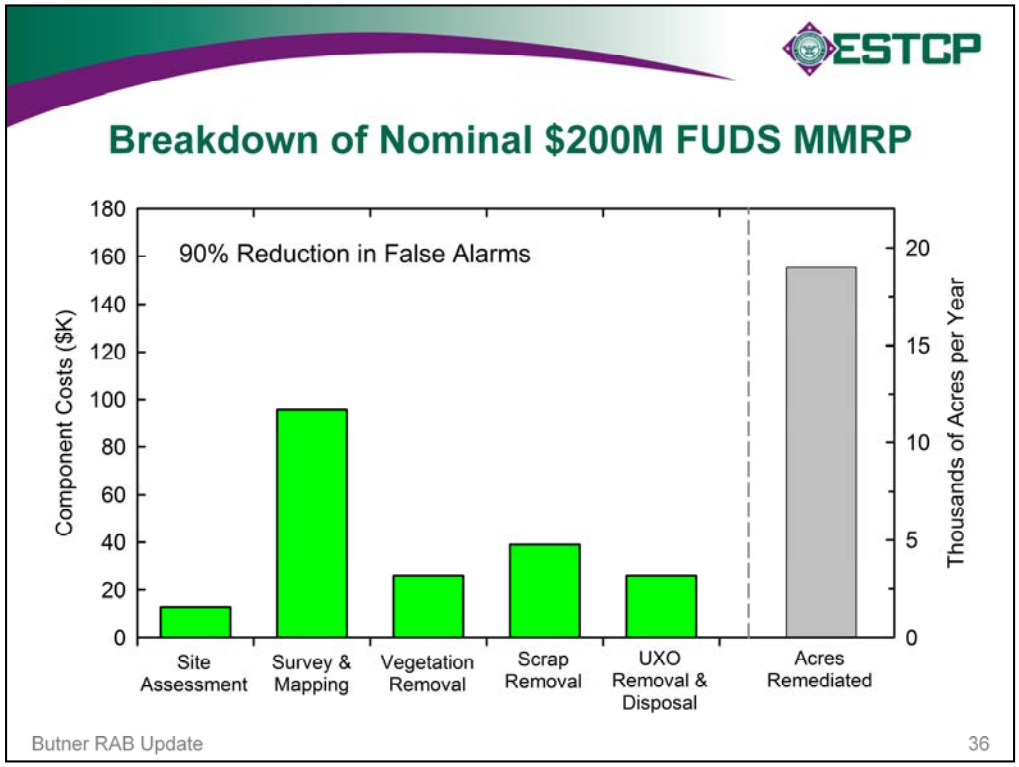
One of the goals of our next several demonstrations is to better train the production analysts so they can take advantage of the information from these sensors.



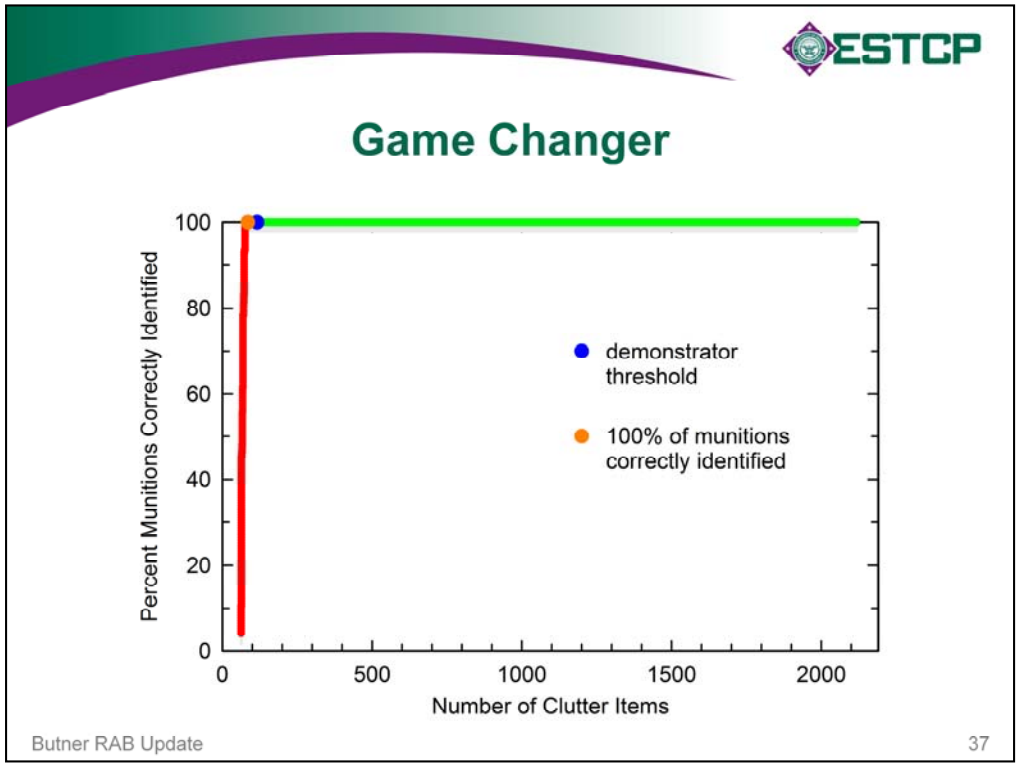
This is the cost breakdown from earlier applied to as nominal $200M yearly budget for Military Munitions Response at Formerly Used Defense Sites. The Army estimates that it cost ~$25,000 to clean an acre using current methods so that budget gets us 8,000 acres a year.



If we can cut the number of clutter digs down by 75%, we can increase the cares cleared to almost 15,000 with the same budget. Doing classification costs more than traditional surveys so the money devoted to “Surveying and Mapping” goes up but this is more than paid for by the fewer needless holes dug.



The goal laid out in the 2003 DSB report was a 90% reduction in clutter dug. Our best performers achieved that or better at Butner. If we could bring everybody's performance to that level, we could increase the number of acres cleared per year to 18,000. That would speed the completion of each project by nearly a factor of three.



This performance is proving to be a game changer. It has spurred senior management in DoD to start planning for incorporation of these methods in all munitions response actions. In future demonstrations in this series, we plan to expand the envelope of applicability by working on sites with difficult vegetation, topography, and limited sky view. As we expand the number of sites for which these methods are applicable, we can expect continued interest from policy makers.