



## **QC/QA, Risk Management, and Explosive Safety Submissions for Sites in the Munitions Response Program**

**Jim Austreng**  
NAVFAC EXWC

**Les Clarke**  
Battelle

## Presenters

- **Jim Austreng, P.E.**

- Joined Navy's Environmental Program February 2015
- Corps of Engineers 2010
- California's Department of Toxic Substances Control (DTSC) 1986-2010
- US Marine Corps 1974-1980

- **Les Clarke, PMP**

- At Battelle since 2006
- MR Practice Area Leader
- PM for Adak QA contract with NW since 2007
- US Marine (Ret) EOD
- Been in UXO industry since 1993

# Agenda

## Introduction

– Why MRP Again, Focus, Assumptions, and Vocabulary

- Quality Control (QC) and Quality Assurance (QA)
- Risk Management
- Munitions Site Safety and Safety Submissions
- Wrap-Up

## Why MRP Again?

- **1983 Accident in San Diego (not the only one but one of the most influential)**
- **Congressional Mandates – 1986 Superfunds Amendments and Reauthorization Act (SARA) – Defense Environmental Response Program (DERP)**
- **DERP Program Goals**
- **DoD Report to Congress – \$14 Billion Liability for MMR**
- **Environmental Stewardship and Compliance**
- **Technology Advancements, i.e., Advanced Classification**

## Our Focus (for Today)

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- **During this session we will**

- Review who is responsible for quality control (QC) and quality assurance (QA)
- Discuss use of UFP QAPP Process and how quality affects project success...the “Achilles Heel”
- Review Risk Management and use of Institutional Controls (ICs), Engineering Controls (ECs) and how the two make up Land Use Controls...Not to be confused with Land Use Covenants
- Discuss site safety and the importance of the Explosives Safety Submission (ESS) – and provide helpful suggestions for passing a NOSSA audit

## Assumptions

- **We assume you, our audience**
  - Have some familiarity with projects involving munitions response
  - Are familiar with Geophysical Systems Verification (GSV), Industry Standard Objects (ISOs), and Blind Seeding
  - Have had some exposure to Advanced Geophysical Classification and Pending Accreditation
  - Know who your Explosive Site Safety Personnel are and coordinate compliance with DDESB/NOSSA requirements
  - Can speak in MR Acronyms...not really, we'll try to use the words

## Vocabulary

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- **LUCs – Land Use Controls or Land Use Covenant**
- **Others**
  - LUST
  - RC
  - BRA
  - RAGS
  - CCR

**Bottom Line – Make sure you're speaking the same Language**

## Agenda

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- **Introduction**

  - Why MRP Again, Focus, Assumptions, and Vocabulary

  - Quality Control (QC) and Quality Assurance (QA)**

- **Risk Management**

- **Munitions Site Safety and Safety Submissions**

- **Wrap-Up**

## Quality Control and Quality Assurance

- **Who does what?**

- **Quality Control (QC)** – It's what the Contractor does and is product driven
- **Quality Assurance (QA)** – It's what the Government (or Customer) does and is process driven

## Quality for Today's MRP

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- **Quality systems for MRP have evolved**
  - Driven primarily by Advanced Classification
- **To Better Appreciate how far we've come**
  - Quick review of Past Practices

## Early MRP

- **Early MRP**

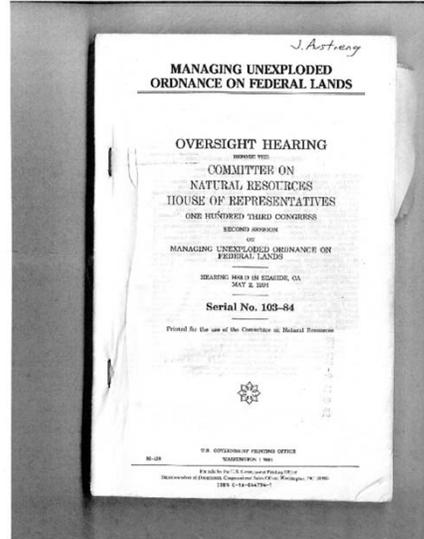
- Analog....commonly referred to Mag and Flag (or Mag and Dig): Field Teams survey/clear grids, Contractors' QC surveys a percentage – usually 10%. If munitions found, “corrective action” applied to re-survey the grid.
- Government QA oversee field work, independently performs 10% analog survey

**KEY  
POINT**

**NOTE: Can still be used...but modified w/seeding & more.**

## 1993-1996 DOIT Committee

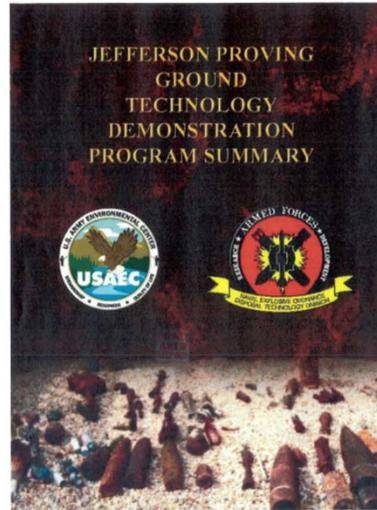
- Members: DoD, DOI, DOE, EPA and WGA (Western Governors' Association)
- UXO Subgroup Findings (1994)
  - Push for Innovative Technologies, e.g., 3-dimensional imaging



## Evolution....continued

- 1994-1999

- Jefferson Proving Ground Technology Demonstration Program, Phase I – IV



24 May 1999

## Move to Digital...and Increase Awareness to Document Quality

- **JPG**

- Examined state of the art geophysical platforms and their capability to “...detect, classify and remove Unexploded Ordnance (UXO).”

- **Phase I included Congressional mandate to test most applicable technologies at five “Live Sites”**

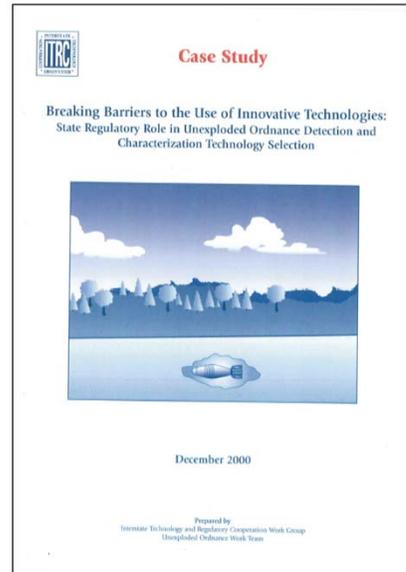
- Results: “The Average  $P_D$  [probability of Detection]...was 0.44.”

## JPG (cont.)

- $P_D$  Improved through Phase II-III but tradeoff was increase number of false positives
- Phase IV (1996) focused on demonstrating discrimination capabilities
  - Early days of what is now Advanced Geophysical Classification

# Interstate Technology and Regulatory Council (ITRC)

- **First UXO Report:  
December 2000**



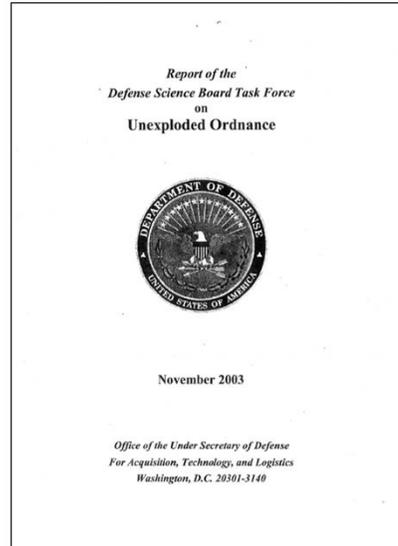
## Defense Science Board

- **Transmittal Memorandum,  
William Schneider, Jr.,  
October 24, 2003**

- “The Task Force found that technology can be of dramatic help in each problem area. The current cleanup problem is massive in scale but there is a clear opportunity to save tens of billions of dollars in the total cleanup process by the use of more modern technology”

- **Appendix J, page 2**

- “We then “process the daylight” out of this data with powerful digitally implemented algorithms and data processing routines”



## JPG to GPOs

### Survey of Munitions Response Technologies



Prepared by:

The Environmental Security Technology Certification Program (ESTCP)  
The Interstate Technology & Regulatory Council (ITRC)  
The Strategic Environmental Research and Development Program (SERDP)

June 2006

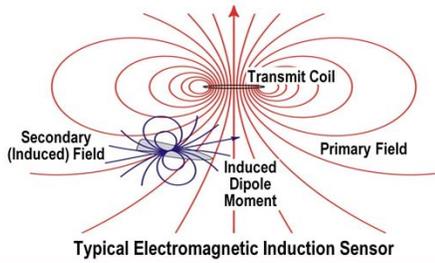
*The publication of this document does not indicate endorsement by the Department of Defense, nor should the contents be construed as reflecting the official position of that Agency. Mention of specific product names or vendors does not constitute an endorsement by any of the authoring organizations.*

<http://www.itrcweb.org/GuidanceDocuments/UXO-4.pdf>

# EM & Magnetometers



**Wheeled EMI System**  
Photo courtesy of US Army



## Limits of Geophysical Prove-Outs

- Does not translate (or indicate) quality of field work
- Has significant statistical uncertainties
- GPO construction is not representative of site conditions
- Excess construction costs, needless document production and root cause for duplicative deployments

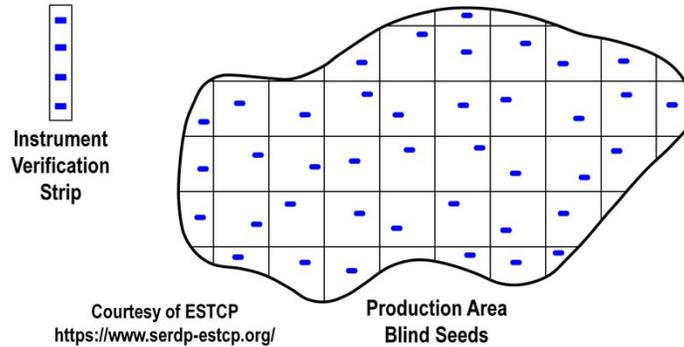
## Fast Forward to Today

- **ESTCP 2007 – 2015 (terrestrial)**

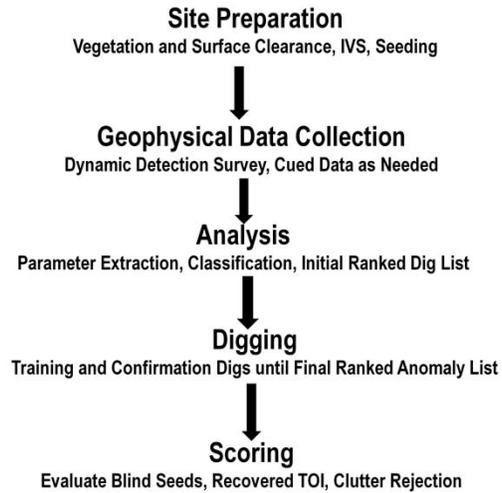
- Initiated demonstration of Advanced Geophysical Platforms (GSV) – 26 locations throughout the U.S.
- Focused on use of commercially available Sensors – MetalMapper, MetalMapper 2X2, and Person Portable Vector
- Incorporated UXAnalyze Software into Geosoft's Oasis Montaj platform which is the software commonly used for processing digital data collected by systems such as the EM 61
- Developed comprehensive library of electronic signatures of common munitions
- Worked in Conjunction with Environmental Data Quality Work Group to develop a Quality Assurance Project Plan (QAPP)

## Principal of GSV Process

- Provides documentation through the use of a physics-based approach that is transparent, objective, and provides quantifiable results allowing unbiased validation that the project data quality objectives (DQOs) and hence, the response action objectives have been met



## Quality Throughout the MR Response Process



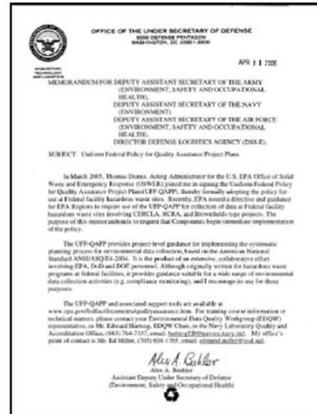
## Quality via Accreditation

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- **Contracting firms will soon require Accreditation to perform Classification**
- **Accreditation Program has two main requirements**
  - Firms accredited, not individuals
  - Demonstrate competence of operators and analysts (at a test site)
- **Must follow UFP-QAPP**

# Uniform Federal Policy for Quality Assurance Project Plans

- Jointly developed by EPA, DoD, DOE
- Sets requirements for all environmental data collection, including MR data
- Provides details for
  - Specific data requirements or other information that must be collected to demonstrate conformance to requirements
  - Required data in 37 worksheets
  - Emphasis on systematic planning



## QAPP Worksheet for Classification

Worksheet #		Title	
1 & 2	Title and Approval Page	20	Quality Control and Corrective Action
3 & 5	Project Organization and QAPP Distribution	21	Field and Data Analysis SOPs
4, 7, & 8	Personnel Qualifications and Sign-off Sheets	22	Field Equipment Calibration, Maintenance, Testing and Inspection
6	Communication Pathways	29	Project Documents and Records
9	Project Planning Session Summary	31	Planned Project Assessment
10	Conceptual Site Model	32	Change Control Document
11	Data Quality Objectives	33	QC Management Reports
12	Measurement Performance Criteria	37	Data Usability Assessment
13	Secondary Data Uses and Limitations	34	SAP Verification
14 & 16	Project Tasks and Schedule	35	SAP Validation
17	Sampling Design and Project Work Flow	36	Product QC Tier 3 Summary Report

## Worksheet Not Used for Geophysical Classification

Worksheet #	Title
15	Project Action Limits and Evaluation
19	Analytical Methods/SOP Requirements
20	Field Quality Control Sample Summary
23	Analytical SOP References
24	Analytical Instrument Calibration
25	Analytical Instrument & Equipment Maintenance, Testing and Inspection
26	Sample Handling System
27	Sample Custody Requirements
28	Laboratory QC Samples Table
30	Analytical Services Table

## QAPP – SOPs

1	Assemble the Geophysical Platform (MetalMapper, etc.) and verify correct operation
2	Test Sensor and System at the IVS
3	Production Area Seeding
4	Collect Dynamic Data Using the advanced geophysical platform
5	Preprocess Dynamic Data and Identify Anomalies
6	Collect Static Background Measurements
7	Collect Cued Target Measurements
8	Verify Usability of Advanced Sensor Data
9	Background Correct Cued Anomaly Data
10	Invert anomaly data to extract source parameters
11	Compare extracted parameters to MEC signatures in the data library
12	Develop prioritized dig list using library matching and other factors
13	Verify recovered objects are compatible with predictions based on the advanced sensor data
14	Develop verification sampling dig list and perform verification sampling

## Quality – Not just for Classification

- **QAPP process can be used for Traditional detection/dig processes**
- **Incorporates High Fidelity Detection surveys**
- **Seeding provides increased confidence throughout the response actions**
- **Provides systematic approach for corrective action(s)**
- **Avoids Garbage in, Garbage out**

## Changing Gears

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- **Introduction**
  - Why MRP Again, Focus, Assumptions, and Vocabulary
- **Quality Control (QC) and Quality Assurance (QA)**
- **Risk Management**
- **Munitions Site Safety and Safety Submissions**
- **Wrap-Up**

## Risk Management

- LUC = Engineering Controls (ECs) & Institutional Controls (ICs)



Courtesy of Dwayne Ford, USACE Environmental and Munitions Center of Expertise (EM CX)

## Risk Management (cont.)

- **California also uses LUCs, but their version is a Land Use Covenant: See California Health and Safety Code, Section 25220 et. seq.**
  - Notification of restriction attached to Deed
  - “Runs with the Land”
  - References Ordinance Ordinance (e.g., Fort Ord)
  - Provides access to State (to inspect restriction)
  - Costs associated with removing restriction

## Risk Management (cont.)

- **Ordinance Ordinance**

- **Fort Ord, CA Monterey County Ordinance – Notification attached to digging permit.**

**MARINA MUNICIPAL CODE**  
A Codification of the General Ordinances  
of the City of Marina, California

Chapter 15.56  
**DIGGING AND EXCAVATION ON THE FORMER FORT ORD**

## Up Next

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- **Wrap-Up**

## **Les Clarke – A little additional information about me**

- **USMC Ammunition Technician**
- **USMC EOD – Instructor at NAVSCOLEOD**
- **Navy Explosives Hazards Control Course (Indiana University – NAD Crane)**
- **US Army Technical Escort Course – Chemical Weapons**
- **American Society for Quality (ASQ) – Certified Quality Manager (expired)**
- **Project Management Institute (PMI) – Project Management Professional (PMP – current)**
- **Bachelor's Degree – History**

## General MR Site Safety Management

- **MR Site Safety Statistics**

- NOSSA doesn't maintain MR safety-specific statistics
- Anecdotally, there's no record of any incidents in the history of the MRP. There was one incident last year – 5-inch projectile inadvertently put through a rock crusher – this was on a MILCON project, not an MRP (environmental) project
- My experience has been that safety incidents are of the general safety type (slip, fall, cuts, scrapes, etc.) not related to munitions

**KEY POINT** Navy MR projects are generally safe for the reasons we shall discuss in the slides that follow.

## General MR Site Safety Management People and Processes

- **Foundation for Safety**
  - People: the who
  - Processes: the what
- **People**
  - Qualifications: why you are even qualified to do UXO work
  - Training: technical education
  - Experience: what have you done specifically and for how long
- **Processes**
  - Risk-based: no safe procedures, just least-risky
  - Audited for compliance: contractor, NOSSA, DDESB
  - Adapted based on experience: lessons learned, near-misses

**KEY  
POINT**

**All of this is crafted to manage behavior at the site!**

## General MR Site Safety Management People and Processes

### • Qualifications

- Former military EOD personnel are vetted for the EOD program (general aptitude, technical skills, vetted for security clearance, etc.)
- Civilian UXO technicians (non-EOD) undergo a local agency check
- Employers are responsible for verifying that all UXO personnel meet State and Federal (BATF) requirements for access to explosives (e.g., not a convicted felon, outstanding warrants, etc.)
- Qualification impacts safety because with enough time in the industry, all of these folks may become key decision-makers on the site (UXO III, SUXOS, UXOSO, etc.)

## General MR Site Safety Management People and Processes

- **DDESB Technical Paper 18 (TP 18) – training and experience**
  - Latest version: **September 2015**
  - **Specifies minimum training and experience (years)**
    - SUXOS – 10 years total if EOD, 13 years if not EOD
    - UXOSO and UXOQCS – 8 years total if EOD, 10 years if not EOD
    - UXO III (Team Leader) – 8 years total (either way)
  - **Defines UXOQP (qualified personnel) and UXOT (technician) which determines who can do what on the site**
  - **Defines qualifications for Divers**
  - **Specifies additional training requirements for key positions**
  - **Specifies that training must be documented and verifiable**

**KEY  
POINT**

**These are key NOSSA audit points!**

## General MR Site Safety Management People and Processes

### • TP 18

KEY  
POINT

These are key NOSSA audit points!

– **Only time spent working on a MEC project counts toward advancement**

- 1,880 to 1,920 hours considered a year
- UXOT and UXOQP are responsible for maintaining a logbook of their hours and should be able to support the hours logged

– **EOD School graduates with less than 18 consecutive months are not considered EOD qualified and are not considered a military EOD school graduate**

- Must complete the UXO T1 training
- Must document their experience for advancement

## General MR Site Safety Management People and Processes

- **SUXOS and UXOSO**

- Must have completed the 10-hour OSHA Construction Safety and Health Training and earned the Dept. of Labor Construction Safety Course Completion Card

- **SUXOS and UXOQCS, either;**

- Completed training as a quality professional (ASQ – certified quality auditor or ISO 9001 internal auditor); or
- Possess a quality-professional certification (USACE or NAVFAC Training Course Construction Quality Management for Contractors); or
- Receive company- and project-specific QC training and work under the supervision of a certified quality professional
- Note no additional safety or quality training required for TIII (Team Leader)

**KEY  
POINT**

**Moving forward getting and maintaining these qualifications is going to be a challenge.**

## General MR Site Safety Management People and Processes

- **UXOSO – THE key safety person on site**
  - EZ setup and control
  - EZ access
  - Monitor team behavior – implement corrective action
  - Identify, correct and report unsafe or substandard situations, conditions or actions
  - Daily safety observations and reporting
  - Place of duty is in the field, not in the office
- **UXO TIII – Responsible for direct implementation**
  - Controls team behavior in the field
  - First contact with all MEC/MPPEH
  - Directly teaches subordinates; strong TIII may influence peers

## General MR Site Safety Management People and Processes

- **Site Safety Controlling Documents**
  - OP 5 Vol. 1 – Ammo and explosives ashore
  - NOSSAINST 8020.15\_ – Explosives Safety, Review, Oversight for NAVSEA and MARCORSSYSCOM
  - EM 385-1-1 – Safety and Health Requirements
  - EM 385-1-97 – Explosives Safety and Health Requirements
- **Site Activity Controlling Documents**
  - Quality Assurance Project Plan (QAPP) – quality requirements
  - Standard Operating Procedures (SOP) – work processes
  - APP/SSHP – General site safety
  - ESS – Explosives safety

## General MR Site Safety Management People and Processes (Evaluation Tools)

- **NAVFAC Munitions Response Quality Assessment Spreadsheet**

- Contains focused questions for the RPM/NTR to use during document review
- Contains a specific question set for ESS review
- Contains questions for APP/SSHP review (along with other site documents – EPP/WMP, Cultural or Historical Preservation Plans, etc.)
- Contains specific questions for in-field operational reviews which include safety-related topics for all definable features of work (DFW)

## Site Safety Management Site Safety Tools

- **Safety is based on exposure – minimum number of people for the minimum duration**
  - Exclusion Zones (ESS) – NOSSA and DDESB
  - Team size – EM 385-1-97
  - Team separation distance – EM 385-1-97
- **MPPEH Management Process**
  - Inspection procedures – OP 5; DoD 4140.62\_series
  - UXO TII to inspect and document the explosives safety status of MPPEH
  - UXO TIII – perform the tasks of a TII; supervise MEC-related activities; serve as UXO Team Leader.
  - Two independent inspections to document as MDAS
  - Strict MDAS management/control procedures – no comingling

## Site Safety Management MEC (UXO) Management Process

- **SUXOS and UXOSO must concur that MEC item is safe to move if in situ destruction is not the selected option**
  - **Must be documented in writing: “For MEC to be moved into storage, the SUXOS and the UXOSO must determine and agree that the risk associated with movement of the item to the storage magazine is acceptable and is necessary. This decision must be documented in writing prior to the movement of the MEC or munitions item.”**
  - **How is that decision made (i.e., blow-in-place or move)?**
    - SUXOS/UXOSO Preference?
    - Company Policy?
- **Destruction of MEC is generally led by a UXO TIII**

## Site Safety Management MEC (UXO) Management Process

- Do not underestimate the effects of Company Policy – law of unintended consequences
- In 2013 on Adak, an NCR was issued after multiple UXO were found in the shot hole after a BIP by QC doing a check of the shot location

90mm APC-T (Armor-Piercing, Capped w/Tracer)  
0.44lbs Explosive D (ammonium picrate)  
Base Fuze with Tracer element  
Some not loaded with HE, only steel plug with Tracer

## Site Safety Management MEC (UXO) Management Process

- **Root cause determined that the team didn't check the shot hole adequately after the detonation event (obviously)**
- **Digging a little deeper found**
  - Company policy was to BIP everything – move nothing
  - Considered this the best, safest policy
  - Till found the item nearest the surface and quit looking
  - QC found 4 more UXO right in the immediate vicinity
  - Company policy was changed for this project to allow SUXOS and UXOSO to decide move/don't move

## ESS – Exclusion Zones

- **Table 3-1 – MGFD**

- Drives exclusion zones
- Determines the kinds of equipment you can use and the types of operations you can conduct (e.g., direct excavation of MEC vs removal of overburden)
- **Two Types of MGFD – Primary and Contingency**
  - Primary is a ‘for sure’ item you’ll encounter
  - Contingency is the ‘we might’ encounter
- **If you find a munition type with a greater exclusion distance than is shown in your ESS, you must stop work and amend the ESS – the contingency is there to help mitigate this possibility**

## ESS – Exclusion Zones (cont.)

- **MGFD Example #1 – 500lb bomb (old style)**

- Explosive Weight – 262 lbs (amatol) (ammonium nitrate/TNT)

- HFD – 581 ft    MFD – **2,849 ft**

- K18 – 114 ft    K24 – 152 ft    K40 – 253 ft    K328 – **2,078 ft**

- **MGFD Example #2 – 155mm M101 Projectile**

- Explosive Weight – 14.6 lbs (TNT)

- HFD – 389 ft    MFD – **2,894 ft**

- K18 – 44 ft    K24 – 59 ft    K40 – 98 ft    K328 – **802 ft**

- Note that the maximum fragmentation distance is greater for the 155mm than for the bomb

- Note the blast overpressure (K) distances are greater for the bomb (much more explosives – 262 lbs vs. 15 lbs)

## ESS (cont.)

### • Table 6-1 – Exclusion Zones

– Info all comes from Fragmentation Data Review Forms

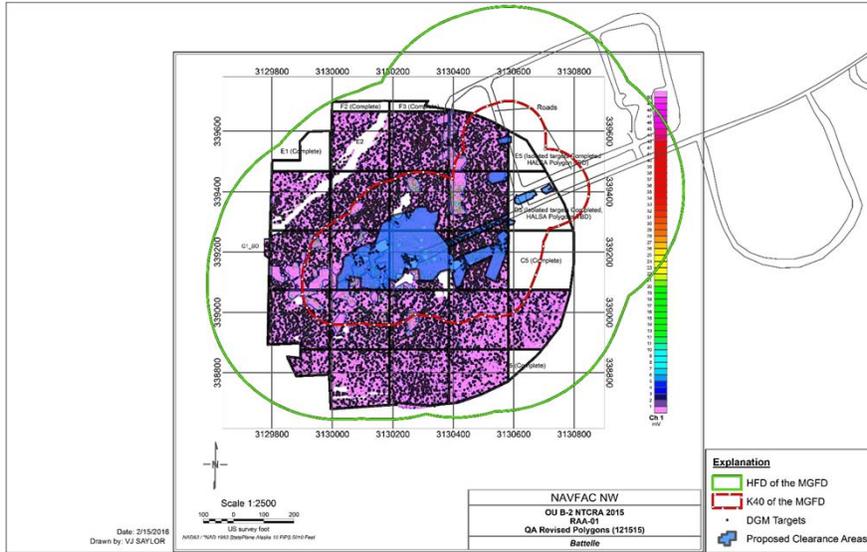
MGFDs		EZs (ft)				
Description	NEW (lb) <sup>a</sup>	Fragmentation Effects		Blast Overpressure Effects		
		HFD	MFD	K328	K40	K24
75 mm, M48	1.34 <sup>b</sup>	224 <sup>b</sup>	1,794 <sup>b</sup>	362 <sup>b</sup>	44 <sup>b</sup>	26 <sup>b</sup>
3.5-inch Rocket, M28A2, HEAT	2.18 <sup>b</sup>	157 <sup>b</sup>	772 <sup>b</sup>	425 <sup>b</sup>	52 <sup>b</sup>	31 <sup>b</sup>
155mm, M101, HE	14.6 <sup>b</sup>	389 <sup>b</sup>	2,894 <sup>b</sup>	802 <sup>b</sup>	98 <sup>b</sup>	59 <sup>b</sup>

Notes:  
a. TNT equivalent weight  
b. From Fragmentation Data Review Form (DDESB, August 21, 2014)

## ESS – Exclusion Zones

- **Table 6-2 – Controlling Exclusion Zones**
  - Lists the Site Operations – manual, mechanized, disposal events, storage, etc.
  - Identifies who or what the exposed site (ES) is – essential or non-essential personnel (public, UXO teams, etc.)
  - Basis for the EZ – blast overpressure and fragmentation
  - Distances to observe for each (HFD, MFD, K40, K328, etc.)
- **Guides how you work – what sort of concurrent/adjacent operations can you perform?**
- **Guides where you work – where can you conduct the concurrent/adjacent operations?**

# ESS – Exclusion Zones (Example)



## NOSSA Audits

- **Key technical inspection areas during NOSSA audits**
  - **Personnel qualifications, training and experience – document, document, document**
  - **Consistency between the MEC QAPP, SOPs and ESS**
    - NOSSA doesn't see the QAPP and SOPs until the audit
    - Contractor is going to have to identify and fix inconsistencies
  - **On-site documentation**
    - Safe to Move documentation
    - MDAS documentation
  - **Segregation of materials**

**KEY  
POINT**

**If you said you were going to do it, you need to be doing it!**

## **NOSSA Audits**

- **Majority of audit findings in these 4 categories**
  - **SOPs for explosives operations (intrusive investigation, storage and disposal operations)**
  - **Documents not matching (ESS/QAPP/SOPs)**
  - **QAPP is insufficient and non-MEC-specific**
  - **MPPEH training (lack of)**
    - Required by OP 5, Appendix D
    - Training is Annual

## NOSSA Audit Finding Examples

- UXO contractor personnel are conducting ammunition and explosive operations without having written and approved Standard Operating Procedures (SOP)
- UXO contractor does not have a UXO Quality Control Supervisor
- Work plan states soil will be removed in 1-foot lifts whereas the Explosive Safety Submission (ESS) states 10-inch lifts. Work plan and ESS are in conflict for soil removal procedures.
- No formal Operational Risk Management assessment was conducted by the UXO Safety Officer as per ESS
- There was no physical means to visually identify separation distance between bucket and equipment operator to maintain the required blast protection
- No qualified UXO contractor personnel were designated in writing by direction of the Commanding Officer, Naval Facilities Engineering Command to inspect MPPEH and document its explosive safety status
- The Standard Operating Procedures had not been read and signed by all UXO workers

## NOSSA ESS Submittals Findings

- ESS not following format in NOSSA INST 8020.15D
- ESS not containing the required info from the 8020.15D
- RPMs not conducting a review of the ESS
- Many ESSs coming in as expedited. Must have sufficient justification and an endorsement from the CO.

**KEY  
POINT**

Except for that last bullet, using the Quality Assessment Spreadsheet to review the ESS before submittal to NOSSA will eliminate these types of findings.

## ESS Question Set Examples

- Have one or more items been selected as the munition with the MGF<sub>D</sub> from among the known or suspected MEC and/or MPPEH at the site?
- Was one munition with a larger MFD selected as a contingency MGF<sub>D</sub>, even if that munition is only discussed in anecdotal evidence?
- Are the types of blast overpressure protections, including personnel protective measures and engineering controls which will be employed to reduce arcs or reduce minimum separation distances discussed?
- Does the section state that MEC safe-to-move decisions must be documented in writing prior to movement?
- Are the operations to be conducted at each site identified and characterized for the potential for either having an unintentional or an intentional detonation, including collection points?
- Does Section 6.3.2 describe how the SUXOS and UXOSO determine that a MEC and/or MPPEH item is safe to move on site and how that agreement is documented prior to movement?

## General MR Site Safety Management Summary

- **Safety is a function of People and Processes**
- **People are assigned based on Qualifications, Training and Experience**
  - They are responsible to document their experience
  - Contractors (and Navy/Marine Corps) are responsible to verify
- **MR has no SAFE processes, only those considered least-risky**
  - ESS governs explosives safety on our sites
  - QAPPs and SOPs describe and govern how we do our work
  - All must align and be familiar to the operators
  - Company policies may have an unintended impact on safety
- **Question sets will help you develop solid documents**

## Agenda

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  - Why MRP Again, Focus, Assumptions, and Vocabulary
- **Quality Control (QC) and Quality Assurance (QA)**
- **Risk Management**
- **Munitions Site Safety and Safety Submissions**

**Wrap-Up**

## Summary

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- **Safety Always comes first**
- **Advanced Classification is here to stay**
- **Maintain Firewall between QC and Production**
- **Quality can be the “Achilles Heel”**