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Military Munitions Support Services – Hazard Assessment

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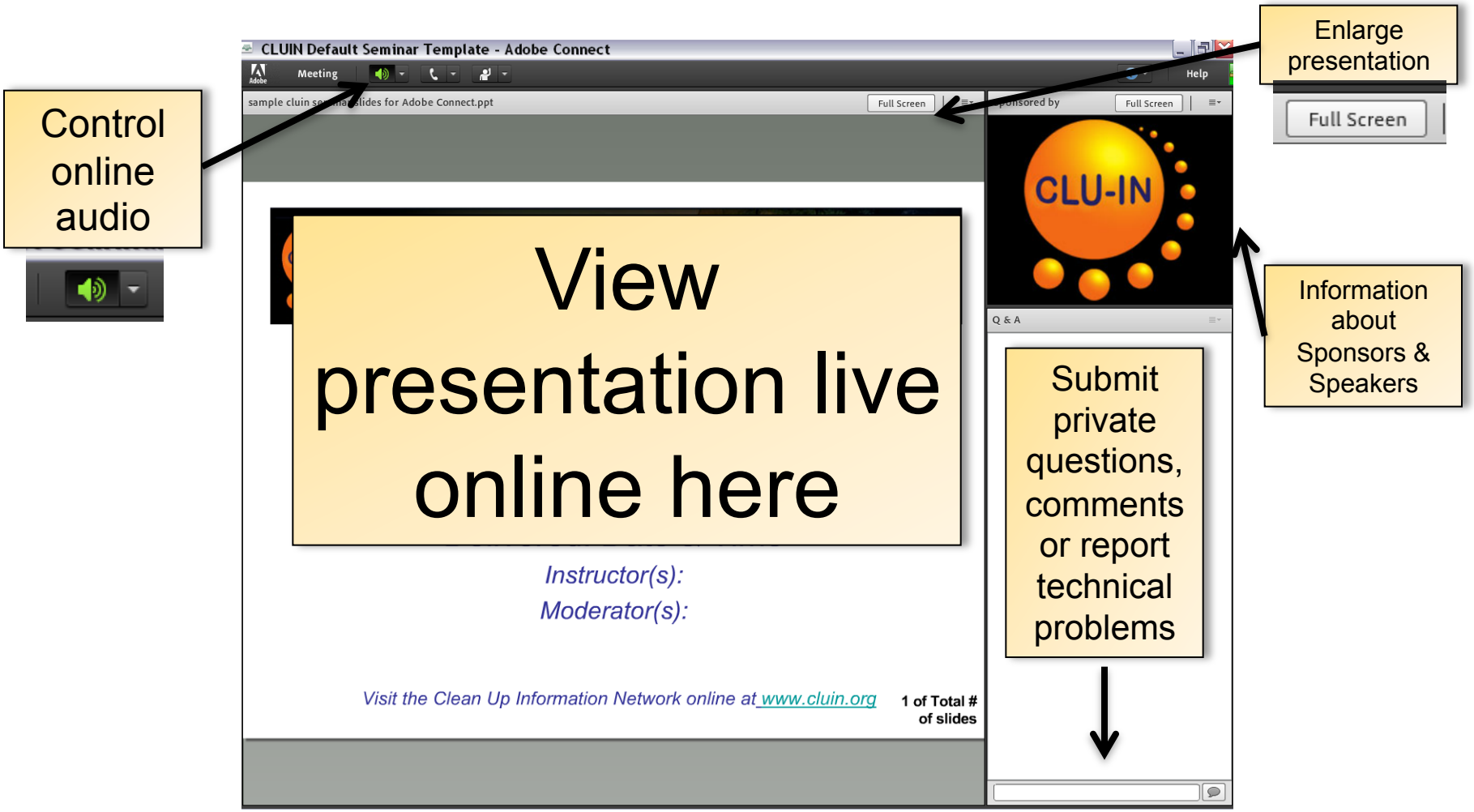
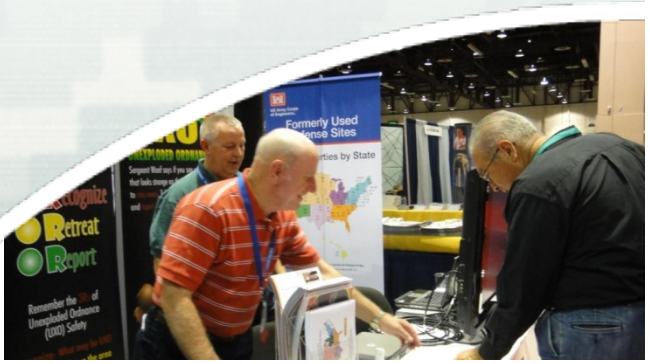


2013 Military Munitions Support Services (M2S2) Webinar Series

Welcome!



Our dilemma is that we hate change and love it at the same time; what we really want is for things to remain the same but get better.

Sydney J. Harris

US Army Corps of Engineers

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On Today's Episode…

- *Speakers* –

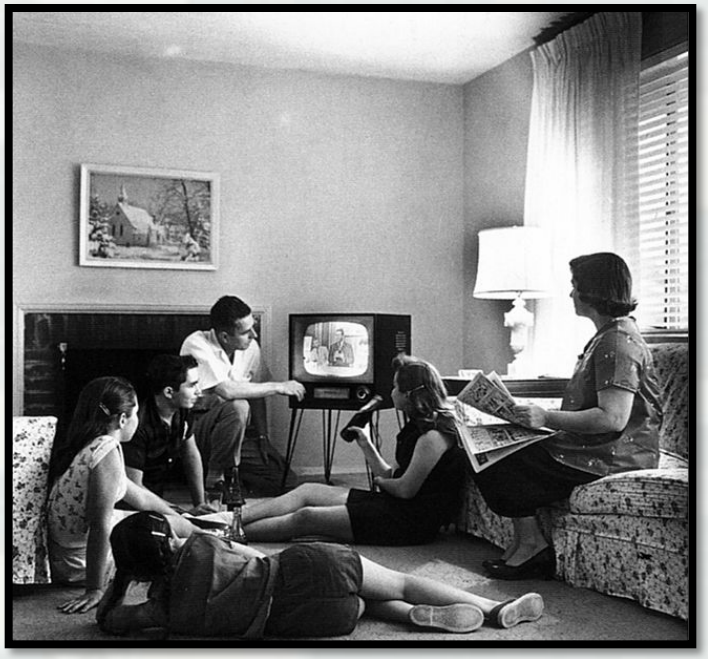
  J.C. King, Assistant for Munitions and Chemical Matters, ODASA(ESOH)

  Doug Maddox, EPA

  Neal Navarro, CESPK

  Nick Stolte, CEHNC

  Kevin Oates, CEHNC



- *Moderator* – Bill Veith, CEHNC
- *Facilitator* – Dwayne Ford, CEHNC

On Today's Episode…

Date	*Theme / Moderator*	*Time (EST)*	*Topic*	*Presenter*
1 March 2013	**Hazard Assessment** **Bill Veith**	1300 - 1310	Welcome & Introduction	Dwayne Ford, EM CX; Jean Balent, EPA
		1310 - 1325	Keynote speaker	J.C. King, Assistant for Munitions and Chemical Matters, ODASA(ESOH)
		1325 – 1345	MEC Hazard Assessment – A Collaborative Tool	Doug Maddox, EPA
		1345 - 1445	MEC HA Overview; Helpful Hints on Input Factors; Case Study & Automated Workbook	Kevin Oates, EM CX
		1445 - 1500	*Intermission*	
		1500 - 1530	MEC Hazard Assessment & Comparison with MRSPP	Nick Stolte, EM CX
		1530 - 1600	Significance of Data Quality in MEC Hazard Assessment and Risk/Hazard Management Decision Making	Neal Navarro, CESPK
		1600 - 1645	Questions and Open Discussion	Bill Veith, EM CX

Before We Begin…

- Technical assistance
- Q & A
  - ► During presentation
  - ► Open discussion period
- Presentation materials for download
- Registration for future sessions
- Be our ambassadors

Army UXO Safety Program

Munitions and Explosives of Concern Hazard Assessment (MEC HA) Methodology

1 March 2013

J. C. King
Director for Munitions and Chemical Matters
ODASA(ESOH)

MEC HA Methodology

- An initiative proposed by EPA in the spring 2004 to develop a methodology (tool) that was intended to:

  - Evaluate relative reductions in explosives hazards posed by munitions and explosives of concern (MEC) when comparing response alternatives on a site-specific basis.
  - Fit into DoD's military munitions response program (MMRP) and the regulatory structure of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
  - Satisfy CERCLA/NCP requirements for baseline risk assessment.

- Multi-agency (federal, state and Tribes) MEC HA Technical Work Group that developed the MEC HA:

  - Chaired by EPA – decisions made by consensus.
  - Included DoD representation, but only by OSD.
  - Supported by technical representatives from US Army Corp of Engineers and Naval Ordnance Safety and Security Activity (NOSSA.)

MEC HA Methodology

- OSD approved MEC HA's use for a two year trail basis on 26 Jan 09, extending the trial for another two years on 22 Jul 11

- Army:

  - Authorized and encouraged MEC HA's use by Army activities on trail basis on 24 Dec 08; continues the trial per OSD's 22 Jul 11 guidance.
  - Reserved right to limit MEC HA's use if its use did not prove to add value to the process – Army has not exercised this option.
  - Has several concerns with the methodology, but believes these will be resolved as DoD gains experience in MEC HA's use during trial period.
  - Supported extension of the trial use of MEC HA - Army is just recently completed Site Inspections of most MRS in its inventory of MRS and is now initiating a number of remedial investigations

- DoD nor Army mandated the MEC HA's use - usage is not a legal requirement nor required by policy or regulation

MEC HA Methodology

➢ Army believes use of the MEC HA's use supports:

- The MEC hazard management decision-making process by analyzing MRS-specific information.
- Hazard communication between members of the MRS project team and stakeholders by organizing MRS information in a consistent manner.
- MEC HA's use, primarily during remedial investigation and feasibility study phase, will be beneficial for allowing MRS project teams to develop and agree upon a baseline MEC hazard evaluation and the relative reduction to the hazard provided by varying response alternatives.

➢ Army intends, after the trial period, to:

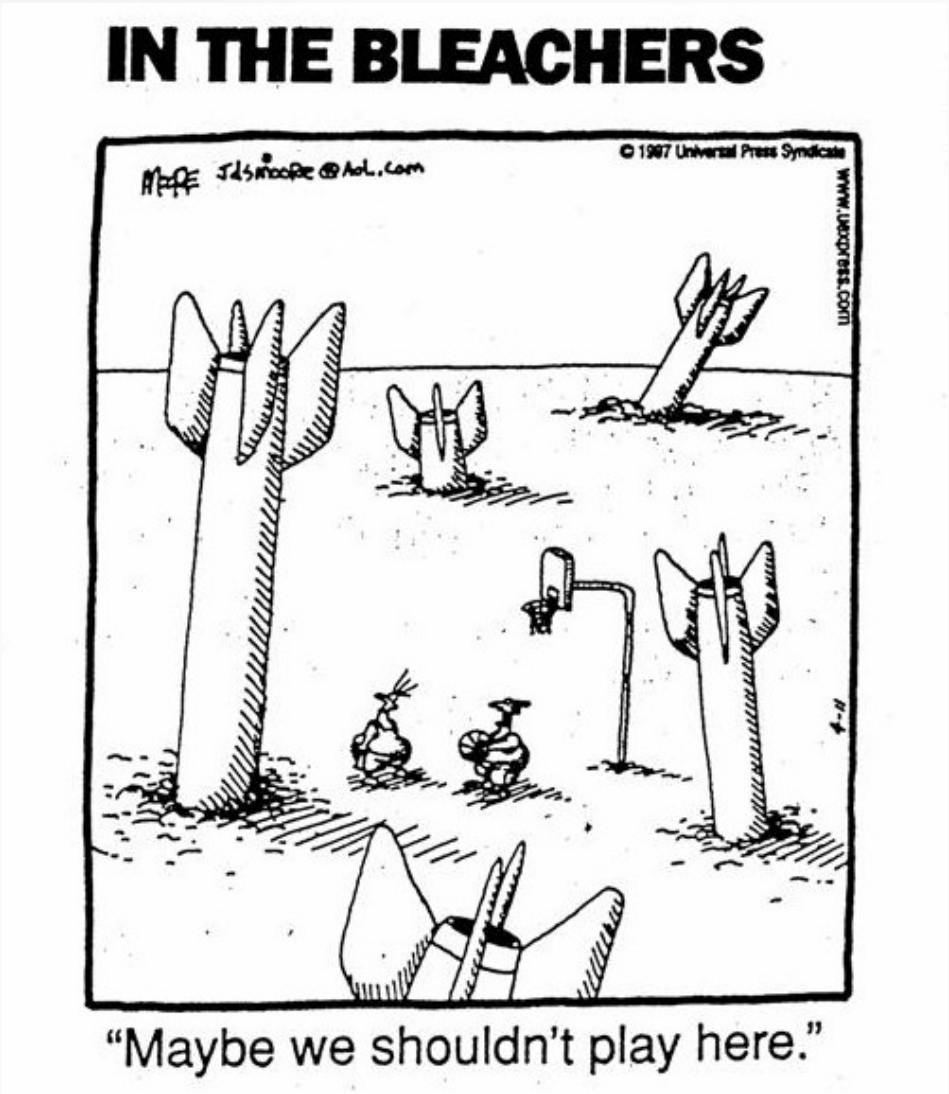
- Continue to encourage use of the MEC HA.
- Work with OSD and EPA to address both changes recommended as a result of the MEC HA's trial use and remaining Army concerns with the methodology.

MEC HA – A Collaborative Tool

Doug Maddox
U.S. EPA Federal Facilities Restoration and Reuse Office

Topics

- Why a MEC HA?
- MRSPP and MEC HA
- CERCLA Process
- MEC HA Workgroup
- Going Forward


IN THE BLEACHERS
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"Maybe we shouldn't play here."

Why a MEC HA ?

- CERCLA & NCP require “risk assessment”
- Traditional risk assessment methods not applicable to MEC hazards
- Need for consistent method under CERCLA for MEC response actions
- Emphasis for EE/CA, RI/FS analysis to support remedy selection

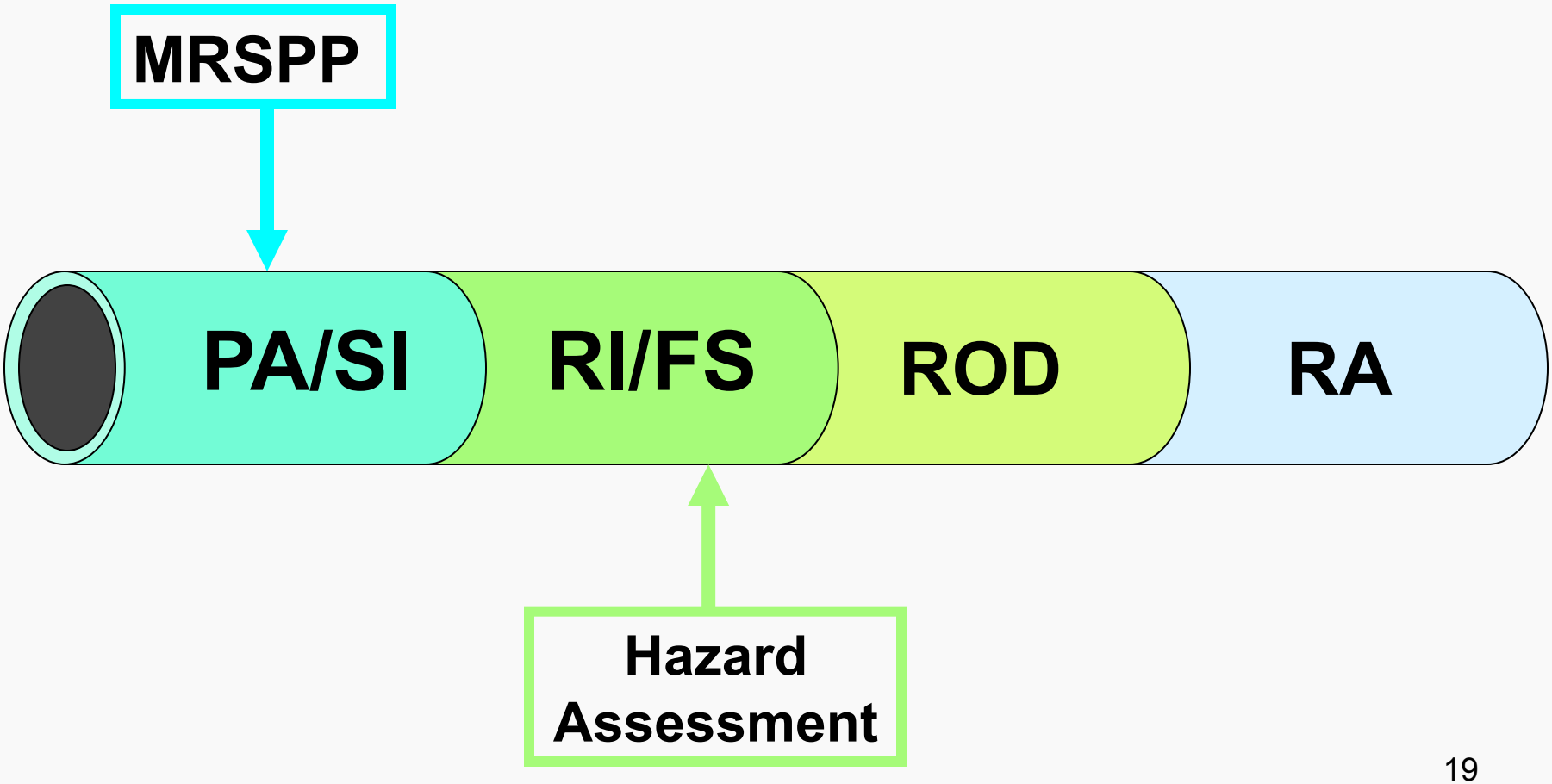
Why a MEC HA?

- Site teams historically spent many $100K and countless hours each time to develop site specific hazard assessment tools
- Some examples:
  - Adak
  - Ft Ord
- A consistent jointly developed tool enables DoD to focus more resources on actual cleanup

Relationship Between MEC HA and MRSPP

- MRSPP Supports Programmatic Goals
  - *Provides relative priority for each Munitions Response Site, based on overall risks*
  - *Allows sequencing decisions to consider Other Factors (e.g., programmatic, environmental justice, development)*
- MEC HA Supports Site Specific Decisions
  - *Removal & Remedial Actions*
  - *Land Use Activities*

CERCLA PROCESS



MEC HA Workgroup Participants

- EPA
- DOD (OSD and technical)
- ASTSWMO
- DOI
- TASWER

MEC HA Workgroup Underlying Principles

- Support management of uncertainty
- Connection to the Conceptual Site Model
- Utilize a relative hazard assessment approach
- Rely on factors compatible with the MRSPP
- Support early decision making
- Support communication with stakeholders

Relationship to Conceptual Site Model (CSM)

- The CSM components (source, pathways, receptors) are addressed by the MEC HA as severity, accessibility, and sensitivity components
- MEC HA organization follows the Hazard Assessment functions
  - Recognizes the fundamental differences from human health risk assessment
  - Focus on the functions of the MEC HA

MEC HA Development

- Issue papers on existing methodologies
- Development of draft methodology
- Outreach/stakeholder involvement efforts
- Pilot projects
- Concurrence/trial periods
- Reference documents on EPA website:

http://www.epa.gov/fedfac/documents/hazard_assess_wrkgrp.htm

What does the MEC HA Provide?

- Consistent framework for developing a site-specific hazard assessment
- Assistance in managing uncertainty
- Facilitate site-specific land use decisions
- Evaluation of hazard management choices – response actions
- Support hazard communication
- Build confidence in decision making process

Going Forward

- This is not the “EPA” MEC HA – it is a jointly developed tool
- Probability Assessment is not a substitute for a proper hazard analysis of alternatives
- Workgroup will reconvene to address comments and concerns through trial periods
- Underwater sites are an upcoming issue and need to be addressed in future version(s) of MEC HA or other tool

Contact Information

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Munitions and Explosives of Concern Hazard Assessment

Kevin Oates, EM CX

1 March 2013

US Army Corps of Engineers

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Presentation Topics

- Overview of MEC HA Methodology
- Helpful hints on input factors
- Case Study on application
- Helpful hints on use of automated workbook

Overview of MEC HA Methodology

- CERCLA & NCP call for “risk assessment”
- Traditional risk assessment methods not applicable to MEC explosive safety hazards
- Joint effort to develop consistent methodology for assessing MEC explosive hazards to people
- Currently in second two-year trial phase (July 2011 OSD Memo)

Overview: MEC HA Does…

- Promote consist HA Methodology
- Builds on SPP/TPP to help focus resources
- Promote communication through transparency
- Evaluate Baseline Explosive Hazards & support evaluation of CERCLA removal and remedial alternatives
- Give credit for taking action

Overview: MEC HA Does Not…

- *Set* Data Quality Objectives
- Replace CERCLA 9 Criteria Analysis
- Replace human health & eco-risk assessments for MC
- *Determine* "How clean is clean ?"
- *Make the cleanup decision*

Overview of MEC HA Methodology

- Designed to *complement* MRSPP
- *Qualitative* tool, scoring values are *relative*
- *Emphasis* on EE/CA, RI/FS evaluations & analyses to *support* site-specific remedy selections

MEC HA Structure

- The organization of the structure follows severity, accessibility and sensitivity components
- Includes weighting, scoring, and combining input factors
- Uses use a relative numeric approach, similar to the EHE module of the MRSPP
- Output – Hazard Levels

MEC HA Structure

The functional relationships addressed in the MEC HA are:

- ***Severity***: The potential severity of the result should an MEC item function.
- ***Accessibility***: The likelihood that a receptor will be able to interact with an MEC item.
- ***Sensitivity***: The likelihood that an MEC item will function should a receptor interact with it.

Nine Input Factors

- Sensitivity
  - Energetic Material Type
  - Location of Additional Human Receptors
- Accessibility
  - Site Accessibility
  - Potential Contact Hours
  - Amount of MEC
  - Minimum MEC Depth Relative to Maximum Receptor Intrusive Depth
  - Migration Potential
- Severity
  - MEC Classification
  - MEC Size

MEC HA Technical Framework Relationship to CSM

Explosive Hazard Component	Input Factor	CSM Based Input Factor Category
Severity	Type of filler	Source
	Distance between additional potential receptors and the explosive hazard	Pathway
Accessibility	Site accessibility	Pathway
	Total exposure hours	Receptor
	Amount of MEC	Receptor
	Minimum MEC depth/Maximum intrusive depth	Pathway/ Receptor
	Migration potential	Pathway
Sensitivity	MEC Category	Source
	MEC Size	Receptor

MEC HA Technical Framework Structure

Explosive Hazard Component		Input Factor	Maximum Score	Weight
Potential Severity of the impact should an MEC item function	*G*	Type of Filler	100	10%
	Y	Distance between additional receptors and explosive hazard	50	5%
		Category total	*150*	*15%*
Likelihood that a receptor can interact with an MEC item	*O*	Site Accessibility	60	6%
	O	Total Exposure Hours	140	14%
	B	Amount of MEC	220	22%
	B	Minimum MEC Depth/ Maximum Intrusive Depth	180	18%
	Y	Migration Potential	30	3%
		Category total	*630*	*63%*
Likelihood that item will function should receptor interaction occur	*G*	MEC Type	180	18%
	G	MEC Size	40	4%
		Category total	*220*	*22%*
		Total Score	**1000**	**100%**

G	Green total – Factors that will not change	320	32%
Y	Yellow Total – Factors unlikely to change	80	8%
B	Blue Total – Factors affected by clearance	400	40%
O	Orange Total – Factors affected by land use	200	20%

MEC HA Structure

- Each category has scores for three MRS conditions:
  - The MRS at baseline (current & future land use)
  - The MRS after a surface cleanup
  - The MRS after a subsurface cleanup
- This structure allows an MRS to be assessed with different removal or remedial alternatives, including LUCs

Energetic Material Type

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
High explosives and low explosive filler in fragmenting rounds	100	100	100
White phosphorus	70	70	70
Pyrotechnic	60	60	60
Propellant	50	50	50
Spotting charge	40	40	40
Incendiary	30	30	30

Location of Additional Human Receptors

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Inside the MRS or inside the ESQD arc surrounding the MRS	30	30	30
Outside of the ESQD arc	0	0	0

Site Accessibility

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Full accessibility	80	80	80
Moderate accessibility	55	55	55
Limited accessibility	15	15	15
Very limited accessibility	5	5	5

Potential Contact Hours

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Many hours	120	90	30
Some hours	70	50	20
Few hours	40	20	10
Very few hours	15	10	5

Amount of MEC

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Target area	180	120	30
OB/OD area	180	110	30
Function Test Range	165	90	25
Burial pit	140	140	10
Maneuver areas	115	15	5
Firing points	75	10	5
Safety buffer areas	30	10	5
Storage	25	10	5
Explosives-related industrial facility	20	10	5

Minimum MEC Depth Relative to the Maximum Intrusive Depth

Category or Value	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Baseline Condition: MEC located surface and subsurface **After Cleanup:** Intrusive depth *overlaps* with subsurface MEC	240	150	95
Baseline Condition: MEC located surface and subsurface **After Cleanup:** Intrusive depth *does not overlap* with subsurface MEC	240	50	25
Baseline Condition: MEC located only subsurface **Baseline Condition or After Cleanup:** Intrusive depth *overlaps* with minimum MEC depth	150	N/A*	95
Baseline Condition: MEC located only subsurface **Baseline Condition or After Cleanup:** Intrusive depth *does not overlap* with minimum MEC depth	50	N/A*	25

*N/A: No surface cleanup if MEC is only located subsurface.

Migration Potential

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Possible	30	30	10
Unlikely	10	10	10

Score is reduced for subsurface cleanup in the "Possible" category because removal of MEC reduces the likelihood of migration

MEC Classification

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
UXO Special Case	180	180	180
UXO	110	110	110
Fuzed DMM Special Case	105	105	105
Fuzed DMM	55	55	55
Unfuzed DMM	45	45	45
Bulk explosives	45	45	45

MEC Size

Category	Score		
	Baseline Condition	Surface MEC Cleanup	Subsurface MEC Cleanup
Small	40	40	40
Large	0	0	0

MEC HA Hazard Levels

The Hazard Level score ranges are:

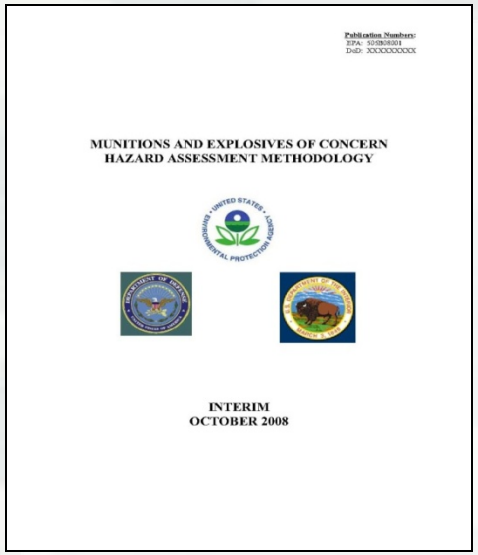
- ***Hazard Level 1:*** ***840 - 1000***
- ***Hazard Level 2:*** ***725 - 835***
- ***Hazard Level 3:*** ***530 - 720***
- ***Hazard Level 4:*** ***125 - 525***

MEC HA Hazard Levels

The Hazard Levels descriptions are:

- ***Hazard Level 1:*** Sites with the highest hazard potential
- ***Hazard Level 2:*** Sites with a high hazard potential
- ***Hazard Level 3***: Sites with a moderate hazard potential
- ***Hazard Level 4***: Sites with low hazard potential

MEC HA Info

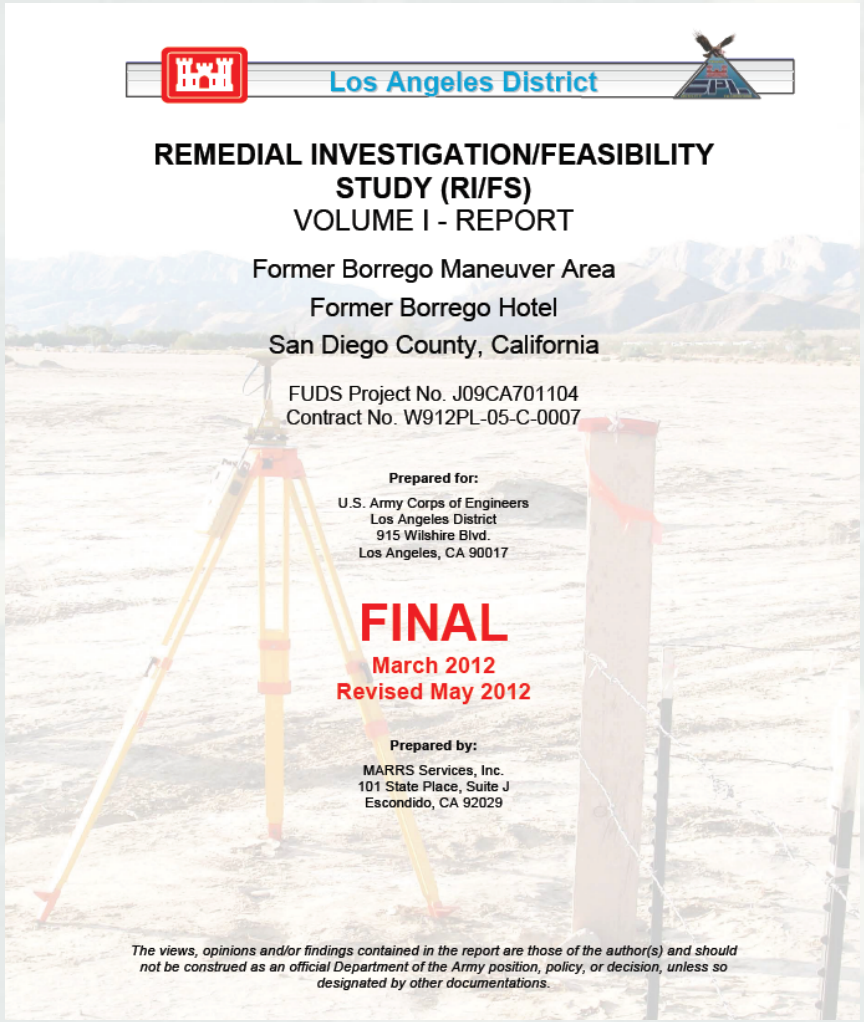


Documents at: www.epa.gov/fedfac/documents/munitions

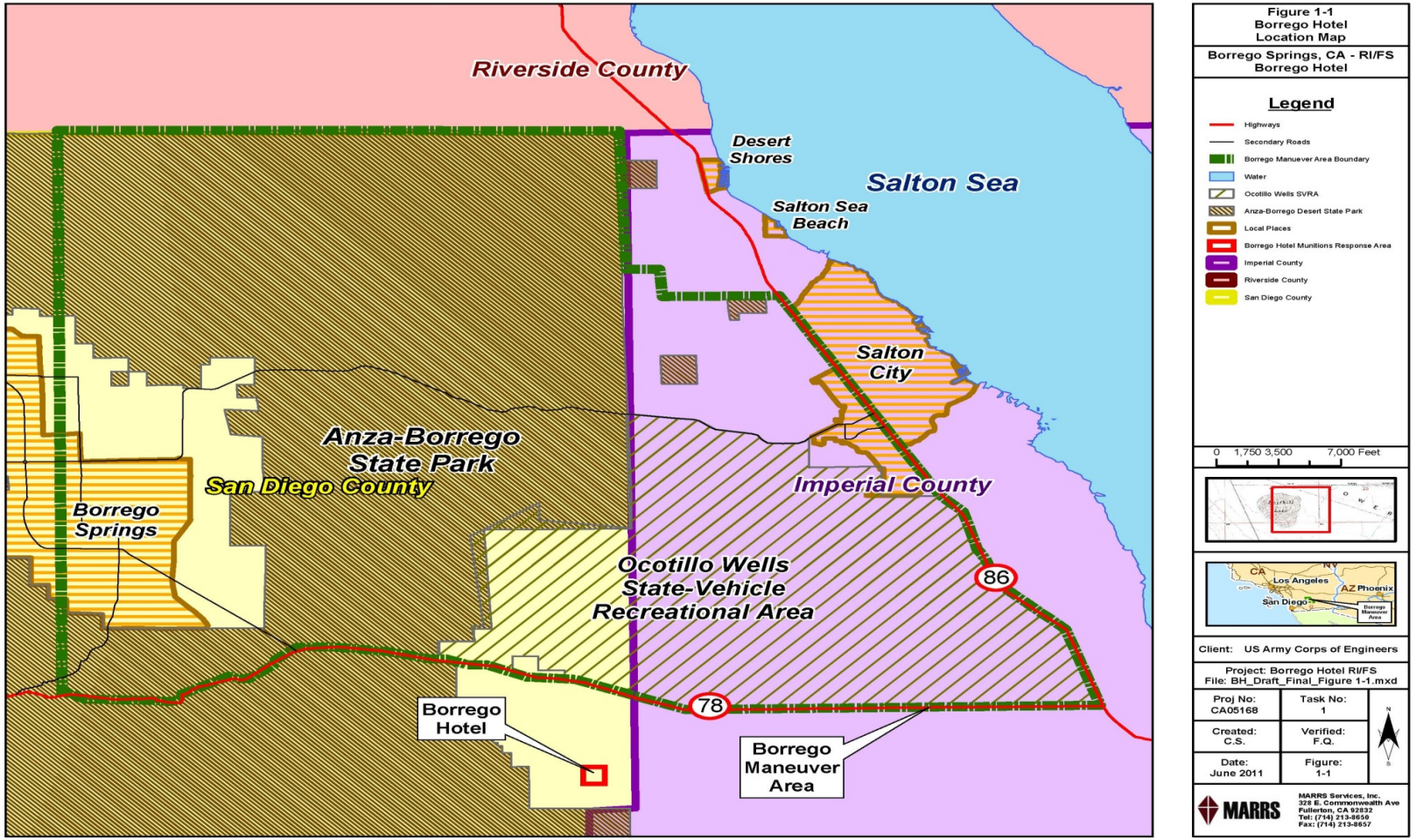
QUESTIONS?

Borrego Hotel MEC HA Case Study & Automated Workbook

Former Borrego Hotel RI/FS



Former Borrego Hotel



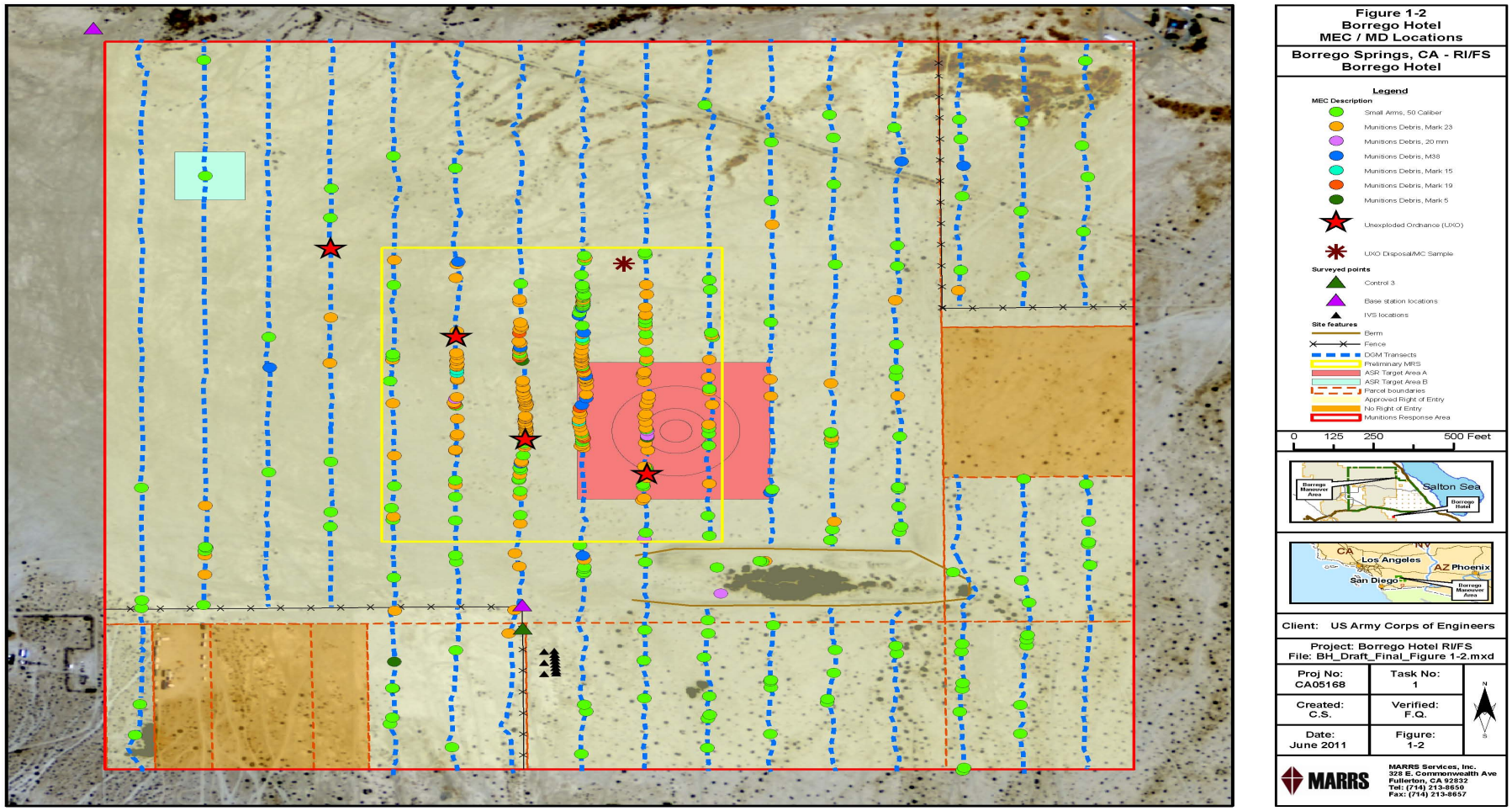
Borrego Hotel Historical Use

- WWII – Navy Use:
  - High Altitude Bombing
  - Dive Bombing
  - Target Strafing
  - Emergency Landing Field

Borrego Current Conditions

- MEC from RI and previous investigations
  - MK 23 3-lb practice bombs, with fired (MD) and with unfired signal cartridge (UXO)
  - MK 5 and Mk 19 practice bombs with fired signal cartridges (MD)
  - 20mm TP projectiles (MD)
  - Expended .50 caliber small arms
  - Surface and subsurface

Borrego Hotel MEC/MD Locations



Borrego Current Conditions

- 12 parcels – 222 acres total
- No access restrictions
- Primarily recreational activities
- Camping, RV use, off-road vehicles
- Limited residential use

Borrego FS Remedial Action Alternatives

- 1. NOFA
- 2. Institutional Controls (ICs)
- 3. Surface Clearance with ICs
- 4. Subsurface Clearance with ICs
- 5. Removal, Sifting, Restoration.

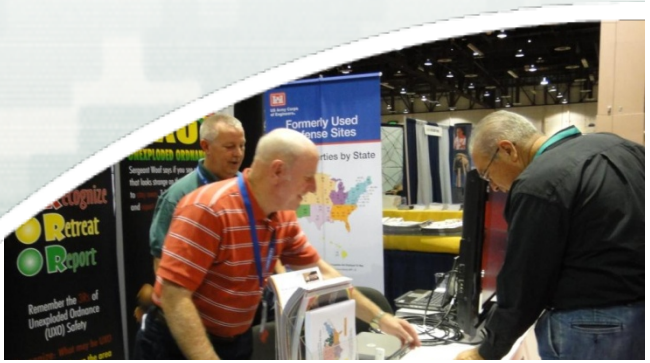
Borrego Hotel
MEC HA Automated Workbook

MRSPP and Comparison with the MEC Hazard Assessment

Nick Stolte, P.E.

EM CX

1 March 2013



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Outline

1. Where the MRSPP came from
2. Protocol Structure
3. Sequencing
4. How the MRSPP compares to the MEC HA
5. Summary

Frequently asked question:

Where did the MRSPP come from?


MRS
PP

Background

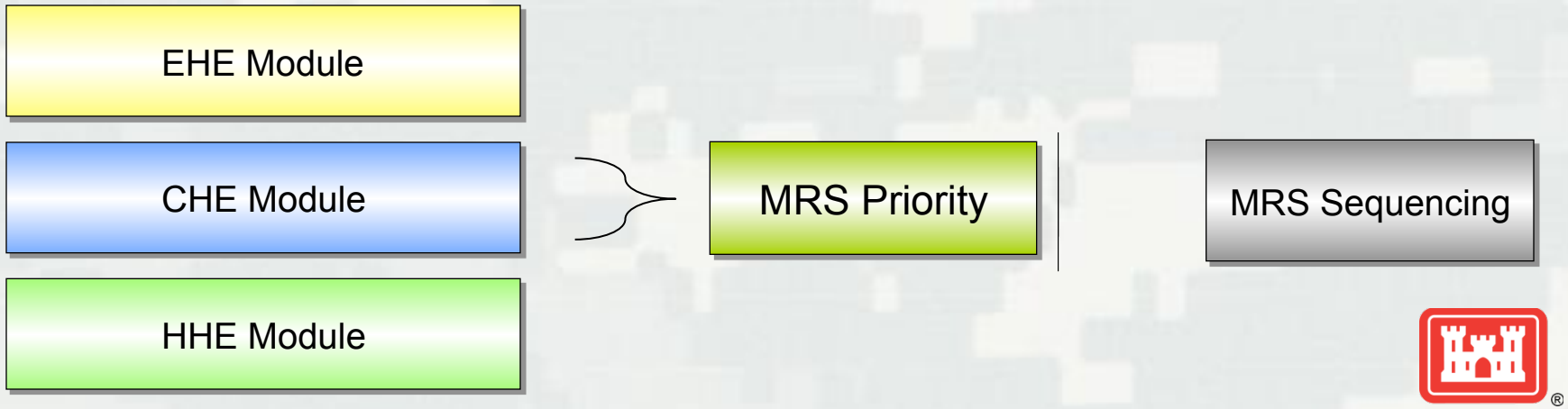
- National Defense Authorization Act for FY02 required the Secretary of Defense to:
  - Develop and maintain an inventory of sites with known or suspected UXO, DMM, or MC.
  - Develop a protocol for assigning relative priorities for response activities.
  - Annually update the inventory and priorities to reflect new information that becomes available.

Background

- OSD developed the Munitions Response Site Prioritization Protocol (MRSPP) aka, “the Protocol,” aka “the rule” and it was promulgated in 32 CFR 179.
  - Included several definitions, including Munitions Response Area (MRA) and Munitions Response Site (MRS).
  - Included requirements for stakeholder involvement.
  - Identified procedures and documentation requirements for sequencing decisions.

Protocol Structure

- The Protocol is designed to ensure that the priority assigned to an MRS reflects actual site conditions and potential hazards.
- An MRS priority is determined by:
  - Reviewing the ratings from the Explosive Hazard Evaluation (EHE), Chemical Warfare Materiel Hazard Evaluation (CHE), and Health Hazard Evaluation (HHE) Modules.
  - Selecting the highest rating.



Protocol Structure

- Series of 30 tables (or worksheets)
  - Table A: Summary table that describes the MRS
  - **EHE module:** Tables 1 – 10
  - **CHE module:** Tables 11 – 20
  - **HHE module:** Tables 21 – 28
  - Table 29 is used to calculate the relative priority

Table 1

EHE Module: Munitions Type Data Element Table

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the scores that correspond with **all** the munitions types known or suspected to be present at the MRS.

Note: The terms *practice munitions, small arms ammunition, physical evidence,* and *historical evidence* are defined in Appendix C of the Primer.

Classification	Description	Score
Sensitive	• UXO that are considered most likely to function upon any interaction with exposed persons (e.g., submunitions, 40mm high-explosive [HE] grenades, white phosphorus [WP] munitions, high-explosive antitank [HEAT] munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions). • Hand grenades containing energetic filler. • Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard.	30
High explosive (used or damaged)	• UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." • DMM containing a high-explosive filler that have: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	25
Pyrotechnic (used or damaged)	• UXO containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades). • DMM containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades) that have: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	20
High explosive (unused)	• DMM containing a high-explosive filler that: ▪ Have not been damaged by burning or detonation ▪ Are not deteriorated to the point of instability.	15
Propellant	• UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). • DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are: ▪ Damaged by burning or detonation ▪ Deteriorated to the point of instability.	15
Bulk secondary high explosives, pyrotechnics, or propellant	• DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). • DMM that are bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard.	10
Pyrotechnic (not used or damaged)	• DMM containing a pyrotechnic filler (i.e., red phosphorus), other than white phosphorus filler, that: ▪ Have not been damaged by burning or detonation ▪ Are not deteriorated to the point of instability.	10
Practice	• UXO that are practice munitions that are not associated with a sensitive fuze. • DMM that are practice munitions that are not associated with a sensitive fuze and that have not: ▪ Been damaged by burning or detonation ▪ Deteriorated to the point of instability.	5
Riot control	• UXO or DMM containing a riot control agent filler (e.g., tear gas).	3
Small arms	• Used munitions or DMM that are categorized as small arms ammunition. (Physical evidence or historical evidence that no other types of munitions [e.g., grenades, subcaliber training rockets, demolition charges] were used or are present on the MRS is required for selection of this category.)	2
Evidence of no munitions	• Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present.	0
MUNITIONS TYPE	**DIRECTIONS:** Record **the single highest score** from above in the box to the right (maximum score = 30).	

DIRECTIONS: Document any MRS-specific data used in selecting the ***Munitions Type*** classifications in the space provided.

MKII Hand Grenades have been discovered on the MRS.

This shows the structure of the tables. Selections are made based on most relevant information and supported in the notes at the bottom.

Table 10
Determining the EHE Module Rating

DIRECTIONS:

1. From Tables 1–9, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **EHE Module Total** box below.
4. Circle the appropriate range for the **EHE Module Total** below.
5. Circle the **EHE Module Rating** that corresponds to the range selected and record this value in the **EHE Module Rating** box found at the bottom of the table.

Note:
An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

	Source	Score	Value
Explosive Hazard Factor Data Elements			
Munitions Type	Table 1	30	40
Source of Hazard	Table 2	10	
Accessibility Factor Data Elements			
Location of Munitions	Table 3	10	25
Ease of Access	Table 4	10	
Status of Property	Table 5	5	
Receptor Factor Data Elements			
Population Density	Table 6	5	20
Population Near Hazard	Table 7	5	
Types of Activities/Structures	Table 8	5	
Ecological and/or Cultural Resources	Table 9	5	
EHE MODULE TOTAL			85

EHE Module Total	EHE Module Rating
92 to 100	A
82 to 91	B
71 to 81	C
60 to 70	D
48 to 59	E
38 to 47	F
less than 38	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected Explosive Hazard
EHE MODULE RATING	**B**

Table 10 is used to calculate the EHE module rating. The highest value from each of the previous tables are transposed here, then summed. The module total (number) is used to determine the module rating (letter).

Alternative module ratings are available for instances when a letter rating is not appropriate.

Table 20
Determining the CHE Module Rating

DIRECTIONS:

1. From Tables 11–19, record the data element scores in the **Score** boxes to the right.
2. Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
3. Add the three **Value** boxes and record this number in the **CHE Module Total** box below.
4. Circle the appropriate range for the **CHE Module Total** below.
5. Circle the **CHE Module Rating** that corresponds to the range selected and record this value in the **CHE Module Rating** box found at the bottom of the table.

Note:
An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

	Source	Score	Value
CWM Hazard Factor Data Elements			
CWM Configuration	Table 11	0	
Sources of CWM	Table 12		
Accessibility Factor Data Elements			
Location of CWM	Table 13		
Ease of Access	Table 14		
Status of Property	Table 15		
Receptor Factor Data Elements			
Population Density	Table 16		
Population Near Hazard	Table 17		
Types of Activities/Structures	Table 18		
Ecological and/or Cultural Resources	Table 19		
CHE MODULE TOTAL			0

CHE Module Total	CHE Module Rating
92 to 100	A
82 to 91	B
71 to 81	C
60 to 70	D
48 to 59	E
38 to 47	F
less than 38	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected CWM Hazard
CHE MODULE RATING	

Table 20 is used to calculate the CHE module rating. It is determined the same way as the EHE module.

Table 28
Determining the HHE Module Rating

DIRECTIONS:

1. Record the letter values (H, M, L) for the **Contaminant Hazard**, **Migration Pathway**, and **Receptor Factors** for the media (from Tables 21–26) in the corresponding boxes below.
2. Record the media's three-letter combinations in the **Three-Letter Combination** boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
3. Using the **HHE Ratings** provided below, determine each media's rating (A–G) and record the letter in the corresponding **Media Rating** box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)					
Surface Water/Human Endpoint (Table 22)					
Sediment/Human Endpoint (Table 23)					
Surface Water/Ecological Endpoint (Table 24)					
Sediment/Ecological Endpoint (Table 25)					
Surface Soil (Table 26)	L	M	M	MML	E

DIRECTIONS (cont.):

4. Select the single highest Media Rating (A is highest; G is lowest) and enter the letter in the **HHE Module Rating** box.

Note:

An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.

HHE MODULE RATING	E

HHE Ratings (for reference only)

Combination	Rating
HHH	A
HHM	B
HHL	C
HMM	C
HML	D
MMM	D
HLL	E
MML	E
MLL	F
LLL	G
Alternative Module Ratings	Evaluation Pending
	No Longer Required
	No Known or Suspected MC Hazard

Table 28 is used to calculate the HHE module rating. It is different from the EHE and CHE modules in that the supporting tables are populated based on MC sampling data rather than making selections.

Table 29
MRS Priority

DIRECTIONS: In the chart below, circle the letter **rating** for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical **priority** for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS Priority is the single highest priority; record this relative priority in the **MRS Priority or Alternative MRS Rating** at the bottom of the table.

Note: An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating	Priority	CHE Rating	Priority	HHE Rating	Priority
		A	1		
A	2	B	2	A	2
B	3	C	3	B	3
C	4	D	4	C	4
D	5	E	5	D	5
E	6	F	6	E	6
F	7	G	7	F	7
G	8			G	8
Evaluation Pending		Evaluation Pending		Evaluation Pending	
No Longer Required		No Longer Required		No Longer Required	
No Known or Suspected Explosive Hazard		No Known or Suspected CWM Hazard		No Known or Suspected MC Hazard	
MRS PRIORITY or ALTERNATIVE MRS RATING				**3**	

Table 29 is used to calculate the MRS Priority or Alternative MRS Rating. Each of the three module ratings are recorded onto this table. The module rating letters each correspond to a numeric priority. The lowest number for any module represents the MRS priority. The lower the number, the higher the priority. By design, only MRSs with CWM can have a priority of 1.

What Comes Next?

- Once all the MRSs have been assigned a relative priority, we make sequencing decisions.
- Sequencing refers to the order in which we will initiate follow-on munitions response actions.

Sequencing

- Generally, sequencing will be based on the relative priority, but may also consider other factors, referred to as “risk-plus factors.”
- Risk-plus factors do not change the MRS’s priority but may influence the sequence for munitions response actions.
- Risk-plus factors are identified in 32 CFR 179

Frequently asked question:

How does the MRSPP compare with the MEC HA?

Purpose of the MEC HA

- Support hazard management decision making process by analyzing site-specific information to:
  - ►Assess existing explosives hazards
  - ►Evaluate hazard reductions associated with removal and remedial alternatives

MRSPP kinda does this

MRSPP doesn't do this

Purpose of the MEC HA

- Support hazard communication:
  - Between members of the project team and among other stakeholders ← MRSPP kinda does this
  - By organizing MRS information in a consistent manner ← MRSPP also does this

MRSPP	MEC HA
Is a prioritization tool used to assign each MRS in the inventory a relative priority for response actions.	Is a tool used to compare the effects of clean-ups and/or changes to land use on the explosive hazard of an MRS (or subunit of an MRS).
Is applied: ▪ To each MRS ▪ Initially at the PA phase	Is applied: ▪ To each MRS (or subunit of an MRS) ▪ As part of the evaluation of baseline hazards and removal alternatives in an EE/CA ▪ At the conclusion of the RI process during the FS for each alternative to be evaluated.
Annually reviewed and reapplied: ▪ Upon completion of a response action ▪ When new information about the MRS is available ▪ Upon delineation of an MRS into multiple MRSs	Is reapplied ▪ When new information is available ▪ After removal/remedial actions ▪ At the five-year review

Source: MEC HA methodology

Differences

- Each serve a different and distinct purpose.
  - MRSPP is used to prioritize MRSs for future response actions based on explosive, CWM, or MC hazards.
  - MEC HA is used to evaluate remedial or removal alternatives for explosive hazards.

Similarities

The MEC HA and MRSPP use much of the same or similar site data. The following table illustrates the relationships between the MRSPP data elements and the MEC HA input factors.

EHE Data Element	Related MEC HA Input Factors	Remarks
Munitions Type	Energetic Material Type MEC Classification	EHE Data Element combine the two MEC HA Input Factors
Source of Hazard	Amount of MEC	
Location of Munitions	Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth; Migration Potential	EHE Data Element addresses both the MEC depth (surface and subsurface) and the stability of the MRS
Ease of Access	Site Accessibility	
Status of Property	No related MEC HA input factor	
Population Density	Potential Contact Hours	
Population Near Hazard	Location of Additional Human Receptors; Potential Contact Hours	
Types of Activities/Structures	Minimum MEC Depth Relative to the Maximum Receptor Intrusive Depth; Potential Contact Hours	
Ecological and/or Cultural Resources	No related MEC HA Input Factors	MEC HA guidance recommends that presence of ecological or cultural resources be addressed during CERCLA nine criteria analysis
No Related EHE Data Element	MEC Size	

Source: MEC HA methodology

Summary

- The MRSPP is a tool used to assign a relative priority to an MRS based on explosive, CWM, or MC hazards.
- The MEC HA is a tool used primarily to evaluate and compare the effective explosive hazard reductions that can be achieved through various removal or remedial actions.

Significance of Data Quality in MEC Hazard Assessment and Risk/Hazard Management Decision Making

Neal Navarro

CESPK

1 March 2013

US Army Corps of Engineers
BUILDING STRONG®

Ft Ord- Fritzsche Army Airfield (FAAF) – MRS-34

Background

- MRS-34 is 70.5 acres
- MRS-34 was used for training as a Range where practice versions of the 2.36-inch rocket and rifle grenades were employed (1940s through mid-1950s),
- “Ranging Area” used for tank gun sight calibration (not believed to have involved use of munitions) (1956), and
- Driver training (1957 through early 1960s).

Background (cont.)

- 1994 – Site Boundaries established; entire MRS surveyed using magnetometers; all anomalies excavated (deepest 3 foot bgs)
- MEC: M6 series 2.36-inch practice rockets (thought to actually be M7 practice)
- MD: five M18 hand-deployed smoke grenades, four M22 rifle-launched smoke grenades, eight M11 series anti-tank (AT) practice rifle grenades, five grenade fuzes, 44 M7 series 2.36-inch practice rockets, 241 M7 series 2.36-inch practice rocket motors, small arms, and other scrap (UXB, 1995)

Background (cont.)

- 1999 – USEPA: EM61 and G-858 in 9 200'x200' grids. 16 anomalies (2 MD from M7) other cultural or not found
- 2000 – Army: 100% resurvey of entire site (EM61 and G-858) using 100'x100' grids
  - 655 geophysical anomalies (all investigated)
  - 25 MD (M7 practice rockets)
  - No MEC items
- The investigation report concluded that the potential for additional MEC items remaining at the site was unlikely (USA, 2000a).

EVALUATION OF PREVIOUS WORK CHECKLIST (Removal Checklist)

Examples of some of the Evaluation Questions:

- **1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades or other launched ordnance)?**
  - **Sources reviewed and comments**
    - ✓ **Practice rifle grenades (MD), smoke grenades (MD), 23 suspected HE 2.36-inch rocket components (suspected MEC), and 5 TNT demolition charges (MEC) were reported in the UXB AAR (1995) that are now updated in the MMRP database as 21 rockets and 1 demolition charge.**
  - **References**
    - ✓ **USA, 2000; Fort Ord Military Munitions Response Program Database (USACE, 2012); UXB, 1995**
- **2. Is there evidence that training involved use of explosive items?**
  - **Sources reviewed and comments**
    - ✓ **21 components of suspected M6 anti-tank 2.36-inch rockets (suspected MEC) were found within MRS-34. These may have been incorrectly identified M7 practice rockets (MD). If M6, these are high explosive items (MEC); evidence suggested that they had been fired.**
  - **References**
    - ✓ **USA, 2000; Fort Ord Military Munitions Response Program Database (USACE, 2012); UXB, 1995**

EVALUATION OF PREVIOUS WORK CHECKLIST (Removal Checklist) (cont.)

- **4. Was removal performed within the appropriate area?**
  - **Sources reviewed and comments**
    - ✓ **The removal actions were performed within identified site boundaries. Review of 1994 UXB and 2000 USA removal action information for MRS-34 indicate that the removal was performed in the appropriate area.**
  - **References**
    - ✓ **USA, 2000; Fort Ord Military Munitions Response Program Database (USACE, 2012); UXB, 1995**
- **5. Were the type(s) of items found consistent with the type of training identified for the site?**
  - **Sources reviewed and comments**
    - ✓ **The items found within MRS-34 were consistent with the types of training identified on the historical Fort Ord Master Plan map with the exception of suspected M6 HE rockets (suspected MEC), hand-deployed smoke grenades (MD) and demolition charges (MEC).**
  - **References**
    - ✓ **Fort Ord Military Munitions Response Program Database (USACE, 2012) and Fort Ord training facilities maps, 1946 Fort Ord Master Plan Map; UXB, 1995; USA, 2000.**

EVALUATION OF PREVIOUS WORK CHECKLIST (Removal Checklist)

- **17. *Should current site boundaries be revised based on sampling results?***
  - **Sources reviewed and comments**
    - ✓ **Current site boundaries are based on existing parcel boundaries and were appropriately established according to the distribution of munitions debris encountered at the site. There is no data to indicate that the boundary should be modified.**
  - **References**
    - ✓ **USA, 2000; UXB, 1995**
- **18. *Was equipment used capable of detecting items suspected at the site at the maximum expected depth??***
  - **Sources reviewed and comments**
    - ✓ **The types of items that might be expected at MRS-34 are detectable using the Schonstedt 52Cx, G858, and the EM-61 at the expected penetration depths, as indicated by results of test plot use at the site and testing during the ODDS. However, 100-percent detection certainty is not achievable.**
  - **References**
    - ✓ **USAESCH, 1997; UXB, 1995; Parsons 2001; USA 2000.**

EVALUATION OF PREVIOUS WORK CHECKLIST (Removal Checklist) (cont.)

- **RESULTS OF REMOVAL EVALUATION**
  - ***A. Can the data be used to perform a risk assessment?***
    - ✓ **Review of the available data indicates that the data can be used for performance of the risk assessment**
  - **B. *Can the data be used to perform a feasibility study?***
    - ✓ **Review of available data indicates that the data can be used to prepare the feasibility study**
  - **References**
    - ✓ **USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey California. Prepared by US Army Corps of Engineers St Louis District. Army, 1980. Fort Ord Regulation 350-5, Appendix-B Training Area and Assignment of Training Facilities B-1, Department of the Army. September 9. USACE, 1961. Basic Information, Training Facilities. June 30. USACE, 2012. Fort Ord Military Munitions Response Program Database. Parsons, 2001. Draft Final Ordnance Detection And Discrimination Study, Volume I Text, Former Fort Ord, California, Presidio of Monterey, California. Prepared for US Army Corps of Engineers Sacramento District. December. USAESCH, 1997. Penetration of Projectiles Into Earth, An Analysis of UXO Clearance Depths at Ft. Ord. September 10. Appendix F of the Phase 2 EE/CA. USA Environmental, Inc., (USA) 2000. Final After Action Report Geophysical Sampling and Investigations, Inland Range Contract, Former Fort Ord, California, OE-34**

MEC Hazard Assessment and Data Quality/Usability

- Methodology that factors Data Quality into the overall assessment of potential explosive hazard
- Ft Ord OE Risk Assessment Protocol (2002)
  - MEC Hazard Factor (type of MEC)
  - Accessibility
  - Exposure

Overview Fort Ord Protocol

- Ft Ord OE Risk Assessment Protocol
  - MEC Hazard Factor (type of MEC)
  - Accessibility Factor
  - Exposure Factor
- Three Factors combined to give Overall Score
  - A (Lowest Potential Hazard) to E (Highest Potential Hazard)

MEC Hazard Factor
Inherent Hazard Associated with Particular MEC Item

- 0. Inert MEC, will cause no injury
- 1. MEC that will cause an injury, in extreme cases could cause major injury or death, to an individual if functioned by an individual's activities
- 2. MEC that will cause major injury, in extreme cases could cause death, to an individual if functioned by an individual's activities
- 3. MEC that will kill an individual if functioned by an individual's activities

Accessibility

- **Level of Intrusion**
  - **Dependent on Receptor Activity**
- **Site Stability**
  - **Erosion etc.**
- **MEC Depth Below Ground Surface**
  - **Surface; <1 foot; <4 foot etc.**
  - **<u>100% detected MEC removed considering Data Quality</u>**

Exposure

- Frequency of Entry to Site
- Intensity of Contact with Soil
- MEC Density
  - Low, Medium, High (items/acre)
  - 100% of detected MEC removed to Level of Intrusion (Data meets DQOs)

Data Quality

- Approved Removal/Remediation Workplan
- Investigative Process - Instrumentation
- Identification of DQOs and Agreement on how to Determine DQOs have been met.
- Consensus of Quality of Data

Data Quality (cont.)

- **Data and QA/QC show that DQOs have been met**
  - **Criteria for obtaining Accessibility and Exposure Scores of 1: Detection and removal procedures meeting the DQOs for the site based on clearly defined investigational objectives including reuse and the detection of designated MEC. If DQOs have not been established for the area, the quality of data should be approved by the base cleanup team (BCT) to score a "1".**

HEC Hazard (hypothetical) – DQOs not Met

Receptor	Baseline Analysis			After-Action Analysis		
	MEC Hazard Type 1	MEC Hazard Type 2	MEC Hazard Type 3	MEC Hazard Type 1	MEC Hazard Type 2	MEC Hazard Type 3
Surface Only	B	B	C	**A**	**A**	**B**
Intruding to 1 Foot	D	E	E	**B**	**B**	**C**
Intruding to 3 Foot	D	E	E	**D**	**E**	**E**
Intruding to 5 foot	D	E	E	**D**	**D**	**E**

Overall MEC Risk Score	A	B	C	D	E
	Lowest	Low	Medium	High	Highest

MEC Hazard (hypothetical) – DQOs Met

Receptor	Baseline Analysis			After-Action Analysis		
	MEC Hazard Type 1	MEC Hazard Type 2	MEC Hazard Type 3	MEC Hazard Type 1	MEC Hazard Type 2	MEC Hazard Type 3
Surface Only	B	B	C	**A**	**A**	**A**
Intruding to 1 Foot	D	E	E	**A**	**A**	**A**
Intruding to 3 Foot	D	E	E	**A**	**A**	**A**
Intruding to 5 foot	D	E	E	**A**	**A**	**A**

Overall MEC Risk Score	A	B	C	D	E
	Lowest	Low	Medium	High	Highest

FAAF MRS-34 Receptors of Concern

Table B.1 Description of Receptors Evaluated in the MRS-34 Remedial Investigation (RI)

Receptor	Description	Level of Intrusion	Frequency of Entry	Intensity of Contact with Soil
Recreational User	Expected recreational uses of the property include walking on established paths, golfing, and bicycling on established paths and roads.	A recreational user is not expected to intrude below the surface.	A recreational receptor is expected to enter the area frequently.	A recreational user is expected to spend up to six hours per day in contact with the soil.
Indoor Worker	An indoor worker would include an office worker, retail worker, indoor maintenance worker, and janitorial worker.	An indoor worker is not expected to intrude below the surface.	Indoor worker receptors are expected to enter the area frequently.	An Indoor worker is expected to spend less than 0.5 hours per day in contact with the soil.
Outdoor Maintenance Worker	An outdoor maintenance worker is assumed to be responsible for landscape and gardening activities in the area. The activities may range from golf course maintenance to planting associated with retail and hotel landscaping.	An outdoor maintenance worker is expected to intrude below the surface up to a depth of 3 feet.	An outdoor maintenance worker is expected to enter the area frequently.	An outdoor maintenance worker is expected to spend up to 8 hours per day in contact with the soil.
Construction Worker	Construction workers are expected to perform excavations for foundations and utilities and to construct structures in the area. Construction workers would also perform earth moving associated with building roads and recreational facilities such as golf courses, using power equipment.	A construction worker is expected to intrude below the surface up to a depth of 5 feet.	A construction worker is expected to enter the area frequently.	A construction worker is expected to spend 8 hours per day in contact with the soil.
Adult/Child Resident	A resident is a likely receptor based on the proposed reuse. Potential development in the area could include single and multifamily developments as well as senior housing. An adult resident is expected to perform lawn maintenance and gardening in the yard. The child resident is expected to spend time playing in the yard and possibly digging.	An adult/child resident is expected to intrude below the surface to a depth of up to 4 feet.	An adult/child resident is expected to frequently enter the area.	An adult/child resident is expected to spend 2 hours per day in contact with the soil.

FAAF Residual MEC Hazard Recreational Receptor

Table B.14 MEC Baseline Risk Analysis for a Recreational User (Following Removal Action)			
Sector	MRS-34, Fritzsche Army Airfield		
Proposed Property Reuse	Mixed Use Development		
Receptor Type	Recreational User		
Analysis	Post-Removal		
MEC Risk Score	A	Accessibility 1	• MEC items in MRS-34 are not accessible because a removal to depth has been completed and all detected MEC items have been removed; the work was completed according to a BCT-approved work plan; and the recreational user is not expected to intrude below the surface. • The area is on gently sloping terrain and is not expected to be affected significantly by erosion. In addition, the area is expected to be developed and covered with either structures or landscaping, which would also limit erosion.
		Exposure 1	• The Frequency of Entry for a recreational user is frequent and the Intensity of Contact with Soil is moderate: however, a removal to depth has been completed and all detected MEC items have been removed. The work was completed according to the BCT-approved work plan; therefore, the Exposure is low.
		MEC Type 3	The types of MEC discovered in MRS-34 include 2.36-inch high explosive, antitank, M6 rockets. This item is considered a Type 3 item. One Type 2 item was identified (charge, demo, TNT, 0.5 lb.). All items at Fort Ord are assumed to be fuzed (if not inert) and portable.
		Data Quality	The data used in preparing the Baseline Risk Analysis was collected according to the BCT-approved work plan and is considered usable for performing the risk assessment.

Overall MEC Risk Score	A	B	C	D	E
	Lowest	Low	Medium	High	Highest

FAAF Residual MEC Hazard Adult/Child Resident

Table B.18 MEC Baseline Risk Analysis for an Adult/Child Resident (Following Removal Action)			
Sector	MRS-34, Fritzsche Army Airfield		
Proposed Property Reuse	Mixed Use Development		
Receptor Type	Adult/Child Resident		
Analysis	Baseline		
MEC Risk Score	A	Accessibility 1	• MEC items in MRS-34 are not accessible because a removal to depth has been completed; all detected MEC items have been removed and the work was completed according to an approved work plan. The adult/child resident is expected to intrude to a depth of 1 foot; however, because the removal to depth has been completed according to a BCT approved work plan, the MEC depth score is low. • The area is on flat to gently sloping terrain and is not expected to be significantly affected by erosion. In addition, the area is expected to be developed and covered with either structures or landscaping which would also limit erosion.
		Exposure 1	• The Frequency of Entry for an adult/child resident is frequent and the Intensity of Contact with Soil is low. Although the frequency of entry is high for the resident the potential exposure is low because a removal to depth has been completed and all detected MEC items have been removed. The work was completed according to the BCT approved work plan.
		MEC Type 3	The types of MEC removed from MRS-34 include the 2.36 inch antitank rocket (M6). One type 2 item was identified (charge, demo, TNT, 0.5 lb.). All items at Fort Ord are assumed to be fuzed (if not inert) and portable
		Data Quality	The data used in preparing the Baseline was collected according to the BCT approved project work plan and is considered useable for performing the risk assessment.

Overall MEC Risk Score	A	B	C	D	E
	Lowest	Low	Medium	High	Highest

FAAF Residual MEC Hazard All Receptors

Table B.13 MRS-34 MEC Risk Assessment Analysis Results
Baseline Risk Analysis (Following Removal Action)

Receptor	MEC Hazard Type	MEC Depth Below Ground Surface	Migration/Erosion Potential	Level of Intrusion	Accessibility Factor Score	MEC Density	Frequency of Entry	Intensity of Contact with Soil	Exposure Factor Score	*Overall MEC Risk Score
Recreational User	1	1	1	1	1	1	4	3	1	A
	2	1	1	1	1	1	4	3	1	A
	3	1	1	1	1	1	4	3	1	A
Indoor Worker	1	1	1	1	1	1	4	1	1	A
	2	1	1	1	1	1	4	1	1	A
	3	1	1	1	1	1	4	1	1	A
Outdoor Maintenance Worker	1	1	1	4	1	1	4	4	1	A
	2	1	1	4	1	1	4	4	1	A
	3	1	1	4	1	1	4	4	1	A
Construction Worker	1	1	1	5	1	1	4	4	1	A
	2	1	1	5	1	1	4	4	1	A
	3	1	1	5	1	1	4	4	1	A
Adult/Child Resident	1	1	1	1	1	1	4	2	1	A
	2	1	1	1	1	1	4	2	1	A
	3	1	1	1	1	1	4	2	1	A

Overall MEC Risk Score	A	B	C	D	E
	Lowest	Low	Medium	High	Highest

FAAF MRS-34 Conclusion and Recommendation

- **Receptors evaluated in the risk assessment included a recreational user, an indoor worker, a construction worker, an outdoor maintenance worker, and an adult or child resident as described in MRS-34 Risk Assessment. The post-removal (current) risks for all receptors identified for MRS-34 are at the lowest risk level (Level A). Although the risk scores are at the lowest level, uncertainties are associated with MEC removal and geophysical instrument detection efficiencies are not expected to be 100 percent. Therefore, based on the possibility that MEC may remain below the surface at the site, it is also possible that an intruding receptor (i.e., the outdoor maintenance worker and construction worker) could encounter a MEC item. However, the potential that MEC will be encountered in the future is highly unlikely. (Final RI, ITSI, 2012)**
- **Recommendation: No Further Action**

Recommendations for Data Quality and Usability in MEC HAs

- DQOs – Address uncertainty upfront
- Include All Data Users in Determining DQOs
- Systematic and Well Documented Approach to Assess Data Quality/Achievement of DQOs
- MEC Hazard Assessment: Investigation vs. Post Removal
- Data Usability for MEC HA
- Ability to Assess and Present Potential MEC Hazard for All Receptors of Concern

Questions

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Resources & Feedback

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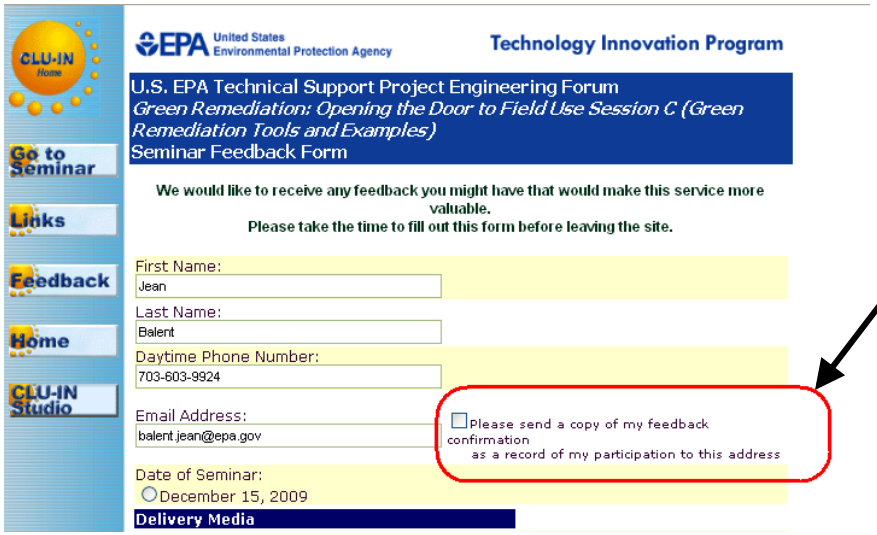

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