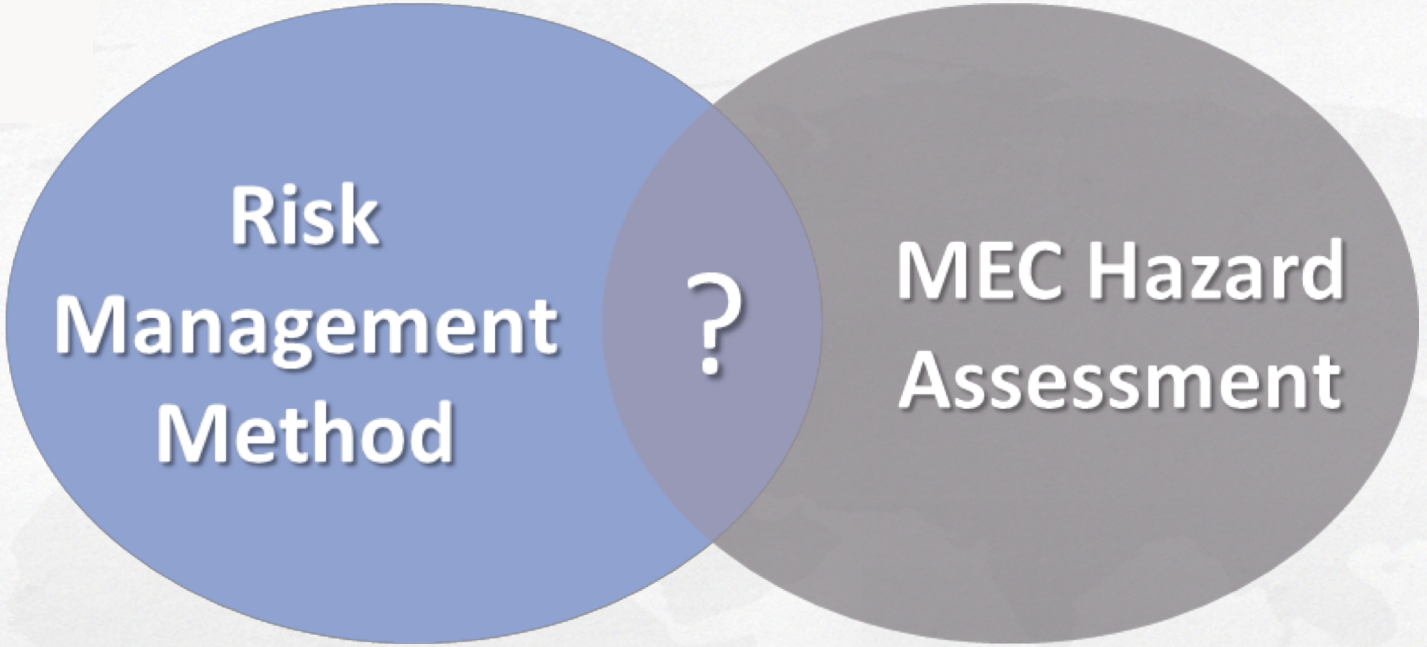
What's the Difference?

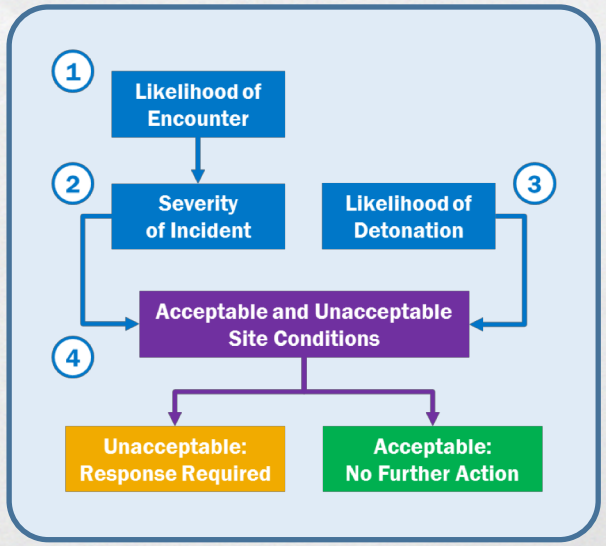
Comparison of the Army MEC Risk Management Method and the MEC HA Method

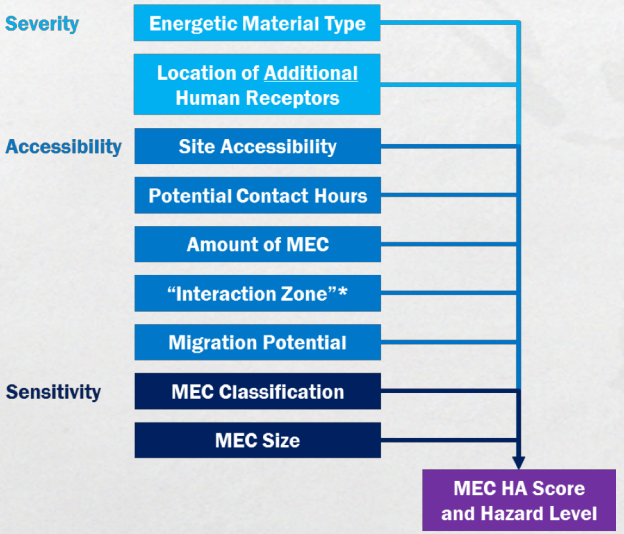
April 3, 2019

Agenda

- Overview of MEC HA
- Similarities and Differences
- Example Using Both Methods

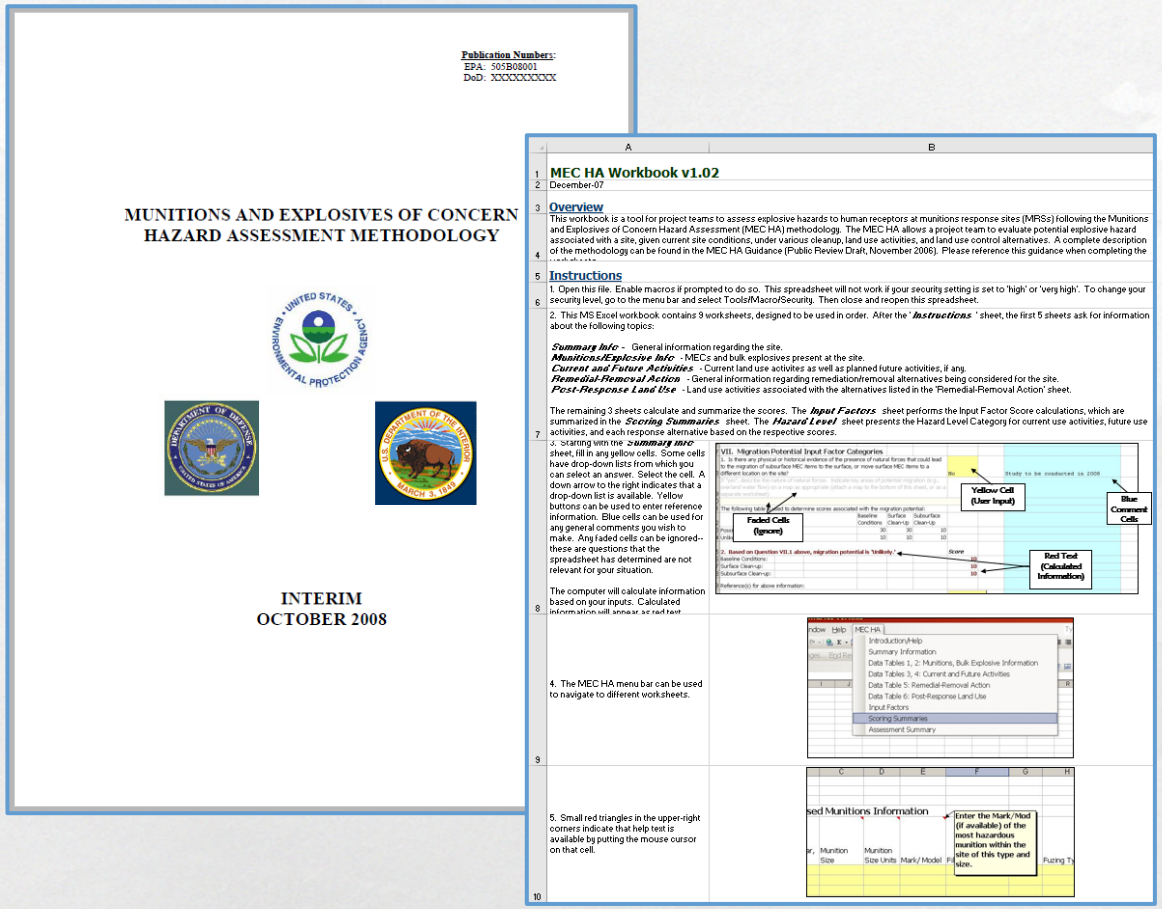




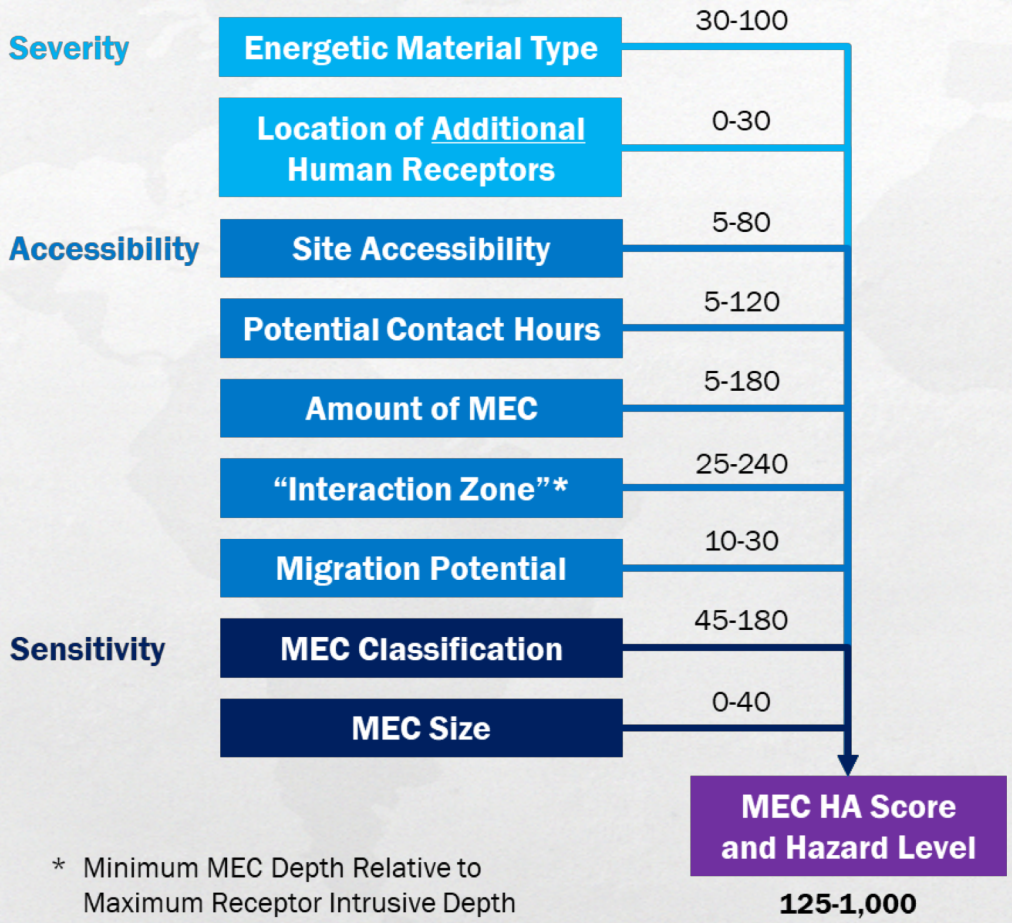


MEC Hazard Assessment (MEC HA)

- *Interim MEC Hazard Assessment Methodology*
  - Developed by USEPA, DoD, DOI, States, and Tribes
  - Recommended for a “two-year" trial period by the Dept of the Army in Jan 2009
  - Primarily for remedy selection decisions (FS or EE/CA)
- Just like RMM, it considers
  - Severity (of incident)
  - Accessibility (i.e., likelihood of encounter)
  - Sensitivity (i.e., likelihood of detonation)
- Generates a “MEC HA score” and “Hazard Level”
  - Has an automated Excel workbook



MEC Hazard Assessment (MEC HA), cont'd.



- MEC HA scores
  - Pre-cleanup (i.e., "baseline") and Post-cleanup
- Comparison of pre- and post-cleanup scores supports FS evaluation
  - Remedial alternatives modify scores
- Despite having scores, method is qualitative
  - Selection of inputs dependent on team decisions
  - Does not allow quantitative comparison between sites
  - "MEC HA does not answer the question of 'how clean is clean?'"
    - Low MEC HA score (e.g., Hazard Level 4) does not necessarily indicate "acceptable" risk
- Hard to model effect of non-structural LUCs

Similarities and Differences: General Comparison

MEC Hazard Assessment (MEC HA)

- Qualitative method
  - Provides framework for discussion/concurrence
  - Generates a score (can be helpful during FS)
- "Amount of MEC" input factor based on historic use only
- Most input factors are clearly defined
  - Minimal advance consideration needed
  - No need to include input factors in DQOs
- Does not link directly to RAOs
- Does not establish threshold for action
  - Does not assess "how clean is clean"
  - Baseline score only useful in FS

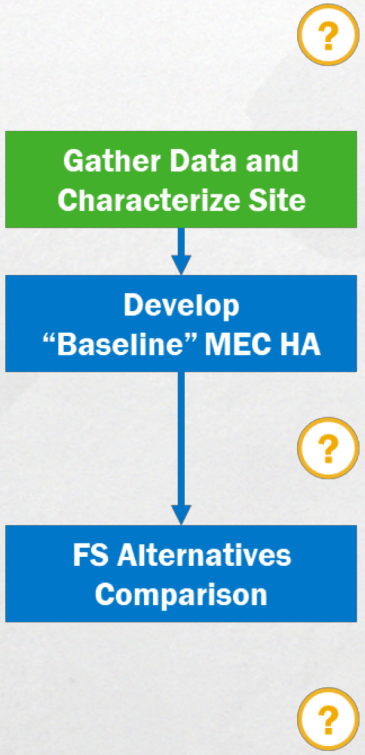
Risk Management Method (RMM)

- Qualitative method
  - Provides framework for discussion/concurrence
  - Does not generate a score
- "Amount of MEC" input factor based on historic information and investigation results
- Input factors are less clearly defined
  - Advance consideration preferred
  - Best to include Amount of MEC input factor in DQOs
  - Links directly to RAOs
- Establishes threshold for action
  - Supports decisions on "acceptable" vs. "unacceptable" risk
  - Conclusions potentially useful from SI through Remedial Action

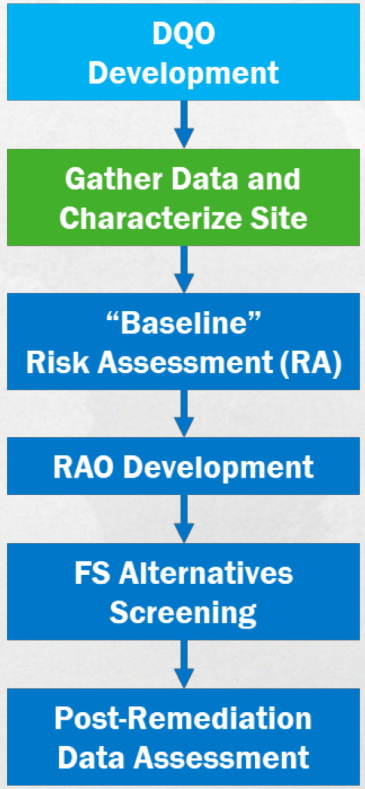
Similarities and Differences: Process Flow

MEC Hazard Assessment (MEC HA)

- Primarily for RI/FS
  - Baseline MEC HA
  - Alternatives evaluation
    - Comparison
    - Which are more effective?



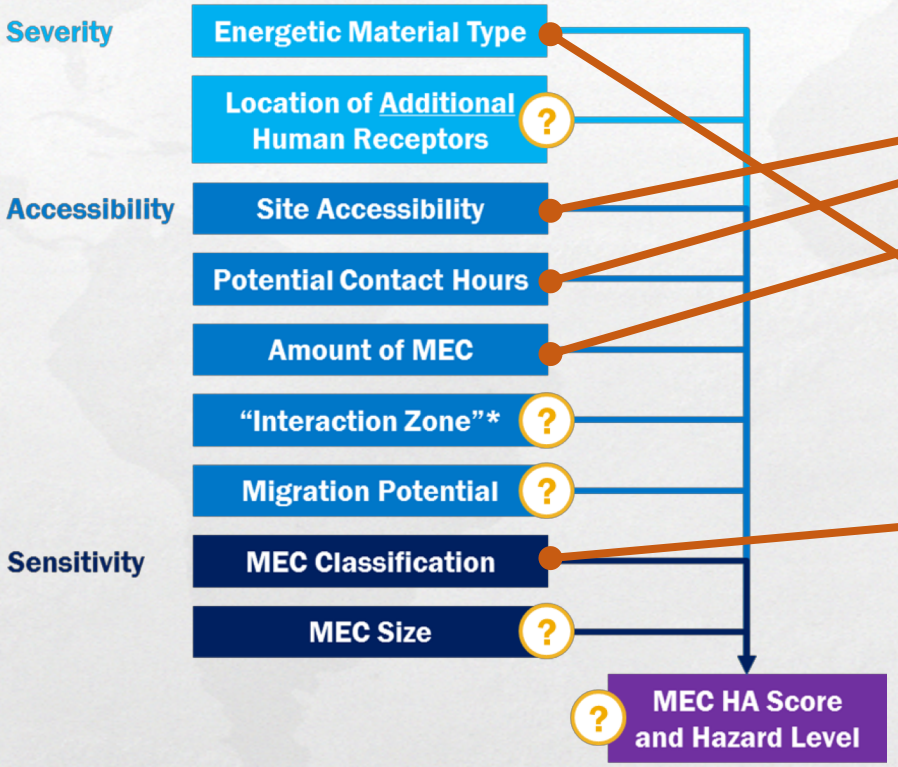
Risk Management Method (RMM)



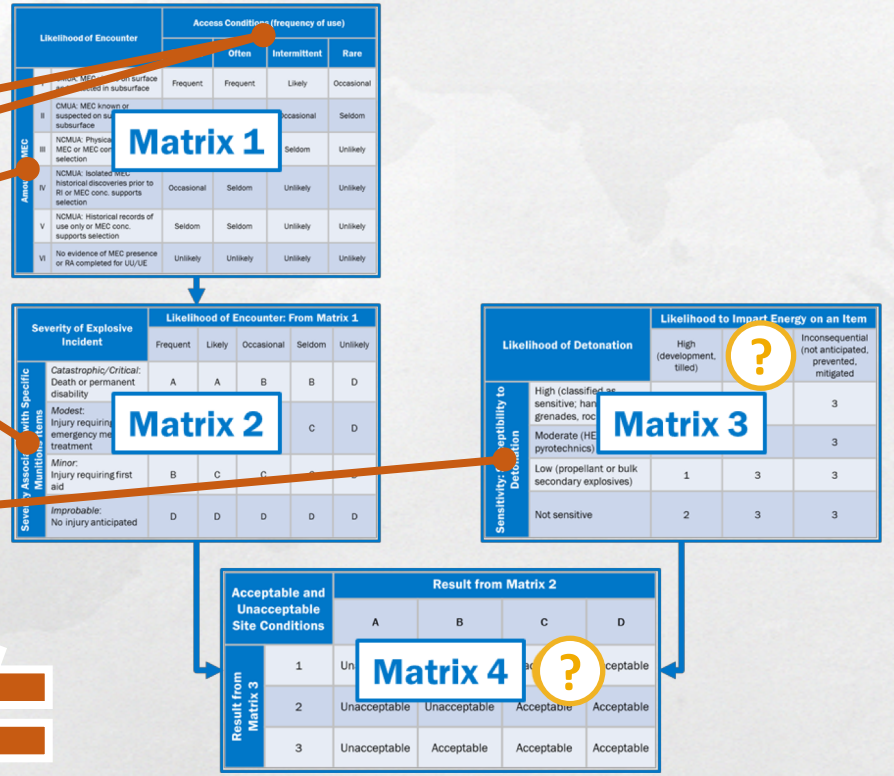
- Usable for SI, RI/FS, and Remedial Action
  - Baseline risk assessment
  - RAOs
  - Alternatives screening
    - Preliminary step
    - Do they achieve RAOs?
  - Post-remedy evaluation

Similarities and Differences: Data Inputs

MEC Hazard Assessment (MEC HA)



Risk Management Method (RMM)



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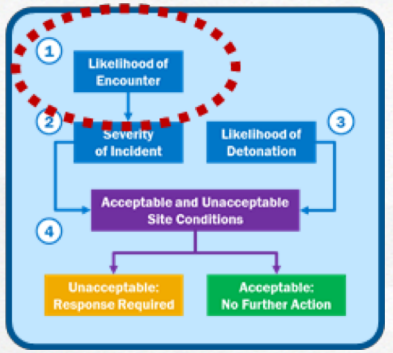


Similarities and Differences: Likelihood of Encounter

MEC Hazard Assessment (MEC HA)

- Site Accessibility
- Potential Contact Hours
- Amount of MEC
- "Interaction Zone"* ?
- Migration Potential ?

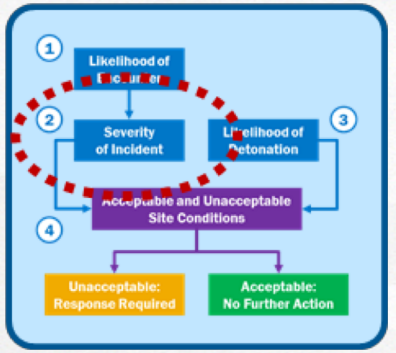
Risk Management Method (RMM)

Likelihood of Encounter			Access Conditions (frequency of use)			
			Regular	Often	Intermittent	Rare
Amount of MEC	I	CMUA: MEC visible on surface and detected in subsurface	Frequent	Frequent	Likely	Occasional
	II	CMUA: MEC known or suspected on surface and in subsurface	Frequent	Likely	Occasional	Seldom
	III	NCMUA: Physical evidence of MEC or MEC conc. supports selection	Likely	Occasional	Seldom	Unlikely
	IV	NCMUA: Isolated MEC historical discoveries prior to RI or MEC conc. supports selection	Occasional	Seldom	Unlikely	Unlikely
	V	NCMUA: Historical records of use only or MEC conc. supports selection	Seldom	Seldom	Unlikely	Unlikely
	VI	No evidence of MEC presence or RA completed for UU/UE	Unlikely	Unlikely	Unlikely	Unlikely

- "Access Conditions (frequency of use)"
  - Combines two separate MEC HA inputs
- No clear equivalent to "Interaction Zone*" and "Migration Potential"

- "Amount of MEC"
  - MEC HA – based on past use
  - RMM– based on estimated quantities

* Minimum MEC Depth Relative to Maximum Receptor Intrusive Depth



Similarities and Differences: Severity of Incident

MEC Hazard Assessment (MEC HA)

Energetic Material Type

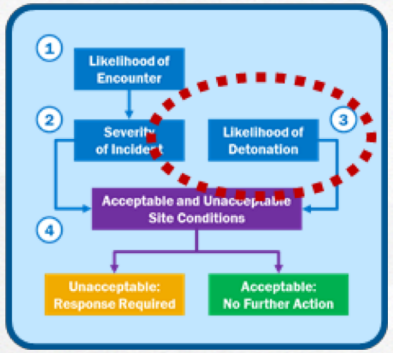
Location of Additional Human Receptors ?

- "Severity Assoc. w/ Specific Munitions Items"
  - Based on energetic material type, but not totally equivalent
  - Not prescribed
- No clear equivalent to "Location of Additional Human Receptors"

Risk Management Method (RMM)

Severity Associated with Specific Munitions Items	Severity of Explosive Incident	Likelihood of Encounter: From Matrix 1				
		Frequent	Likely	Occasional	Seldom	Unlikely
	Catastrophic/Critical: Death or permanent disability	A	A	B	B	D
	Modest: Injury requiring emergency medical treatment	B	B	B	C	D
	Minor: Injury requiring first aid	B	C	C	C	D
	Improbable: No injury anticipated	D	D	D	D	D

- Stakeholders can determine severity during planning based on expected munitions
  - Supported by UXO professionals' input



Similarities and Differences: Likelihood of Detonation

MEC Hazard Assessment (MEC HA)

MEC Classification

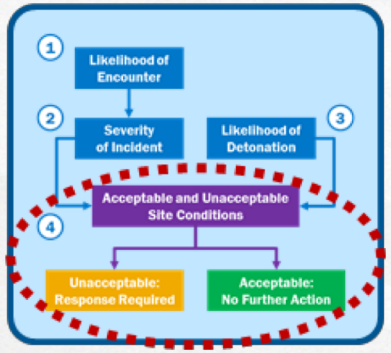
MEC Size ?

- Sensitivity: Susceptibility to Detonation
  - Correlates to "MEC Classification"
  - Supported by UXO professionals' input
- No clear equivalent to "MEC Size"

Risk Management Method (RMM)

Likelihood of Detonation		Likelihood to Impart Energy on an Item		
		High (development, tilled)	[illegible] ?	Inconsequential (not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (classified as sensitive; hand grenades, rockets, etc.)	1	1	3
	Moderate (HE or pyrotechnics)	1	2	3
	Low (propellant or bulk secondary explosives)	1	3	3
	Not sensitive	2	3	3

- No clear equivalent to "Likelihood to Impart Energy"



Similarities and Differences: Score/Site Conditions

MEC Hazard Assessment (MEC HA)

MEC HA Score and Hazard Level

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Risk Management Method (RMM)

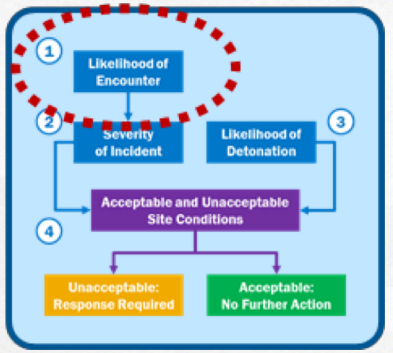
Acceptable and Unacceptable Site Conditions		Result from Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

- Single biggest difference between methods
  - RMM establishes threshold for action
  - MEC HA score ≠ threshold for action

- Remedial Action Objectives
  - RMM provides means to determine an adequate RAO
    - "Implement remedial actions to achieve acceptable site conditions"
  - MEC HA shows a reduced score, but this is only useful for alternatives comparison
    - Cannot based an RAO on reducing the MEC HA score

Example: Hypothetical Site – Background

- Evaluate a site where there is evidence of past use, but there might be an acceptable risk
  - Uses a hypothetical site
  - MEC HA vs. RMM: inputs and conclusions
- Background
  - Former maneuver/training area
  - Intermittent use
  - Current park land; accessible to public
  - Potential MEC items include flares and training munitions with small spotting charges
  - Small amounts of MD found during RI, but a couple of unexpended flares found historically



Example: Likelihood of Encounter

MEC Hazard Assessment (MEC HA)

Site Accessibility	Full Accessibility (80/80)
Potential Contact Hours	Few Hours (40/120)
Amount of MEC	Maneuver Area (115/180)
"Interaction Zone"*	Surface/Subsurface (240/240)
Migration Potential	Possible (30/30)

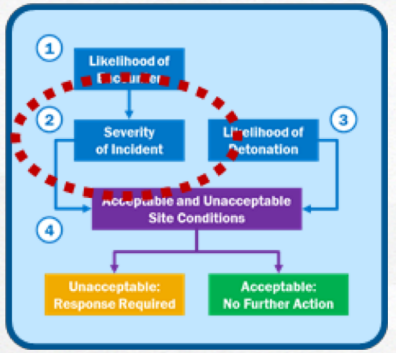
- Open park land, no access restrictions
- Park expects 1,000 users/week
- Area used for military exercises
- MD found on surface and in subsurface
- Soil erosion/frost heave possible

* Minimum MEC Depth Relative to Maximum Receptor Intrusive Depth

Risk Management Method (RMM)

Likelihood of Encounter			Access Conditions (frequency of use)			
			Regular	Often	Intermittent	Rare
Amount of MEC	I	CMUA: MEC visible on surface and detected in subsurface	Frequent	Frequent	Likely	Occasional
	II	CMUA: MEC known or suspected on surface and in subsurface	Frequent	Likely	Occasional	Seldom
	III	NCMUA: Physical evidence of MEC or MEC conc. supports selection	Likely	Occasional	Seldom	Unlikely
	IV	NCMUA: Isolated MEC historical discoveries prior to RI or MEC conc. supports selection	Occasional	**Seldom**	Unlikely	Unlikely
	V	NCMUA: Historical records of use only or MEC conc. supports selection	Seldom	Seldom	Unlikely	Unlikely
	VI	No evidence of MEC presence or RA completed for UU/UE	Unlikely	Unlikely	Unlikely	Unlikely

- Current land use is open park land
  - Periodic use, some access - Often
- NCMUA: MEC presence is based only on isolated historical discoveries supports Category IV



Example: Severity of Incident

MEC Hazard Assessment (MEC HA)

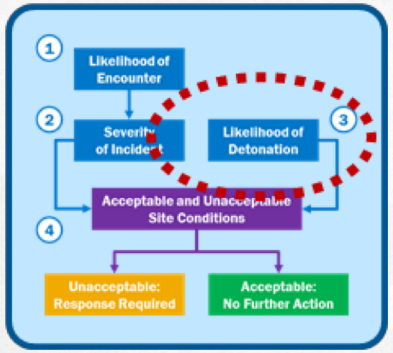
Energetic Material Type	Pyrotechnic (60/100)
Location of Additional Human Receptors	Inside ESQD Arc (30/30)

- Potential MEC items include flares and training munitions
- Picnic areas and pavilions located within park are in ESQD arc

Risk Management Method (RMM)

Severity of Explosive Incident		Likelihood of Encounter: From Matrix 1				
		Frequent	Likely	Occasional	Seldom	Unlikely
Severity Associated with Specific Munitions Items	*Catastrophic/Critical*: Death or permanent disability	A	A	B	B	D
	Modest: Injury requiring emergency medical treatment	B	B	B	**C**	D
	Minor: Injury requiring first aid	B	C	C	C	D
	Improbable: No injury anticipated	D	D	D	D	D

- Pyrotechnics (flares) and practice munitions
  - Modest – May result in 1 or more injuries resulting in emergency medical treatment, without hospitalization



Example: Likelihood of Detonation

MEC Hazard Assessment (MEC HA)

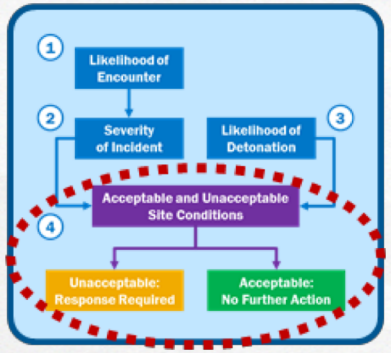
MEC Classification	UXO (110/180)
MEC Size	Small (40/40)

- Pyrotechnics (flares) considered UXO
- Small size increases portability and hazard

Risk Management Method (RMM)

Likelihood of Detonation		**Likelihood to Impart Energy on an Item**		
		High (development, tilled)	Modest (undeveloped, refuge, parks)	Inconsequential (not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High (classified as sensitive; hand grenades, rockets, etc.)	1	1	3
	Moderate (HE or pyrotechnics)	1	**2**	3
	Low (propellant or bulk secondary explosives)	1	3	3
	Not sensitive	2	3	3

- Land use is modest, because of use as a park
- Pyrotechnics are moderate sensitivity



Example: Score/Site Conditions

MEC Hazard Assessment (MEC HA)

Severity	Energetic Material Type	60/100
	Location of Additional Human Receptors	30/30
Accessibility	Site Accessibility	80/80
	Potential Contact Hours	40/120
	Amount of MEC	115/180
	"Interaction Zone"*	240/240
	Migration Potential	30/30
Sensitivity	MEC Classification	110/180
	MEC Size	40/40

MEC HA Score and Hazard Level: **745/1,000**

Hazard Level 2
High potential explosive hazard conditions

Risk Management Method (RMM)

Acceptable and Unacceptable Site Conditions		Result from Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable

- RMM output indicates possible acceptable risk
- But MEC HA indicates high Hazard Level; why?
  - Amount of MEC overestimated?
  - Other input factors inflexible?
  - NOTE: MEC HA doesn't establish threshold for action

Summary and Lessons Learned

- RMM and MEC HA
  - Both provide framework for discussion
- RMM
  - Threshold for action is biggest difference
  - Good for sites where NFA is option
  - Reflects impact of LUCs more effectively
  - Cannot compare FS alternatives
    - Though can use for initial screening
- MEC HA
  - Better for FS alternatives comparison

Questions or Comments?

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