



*Global Leader in Munitions Response*

# Trial Use of the USACE Risk Management Method

## Case Study #1

Remedial Investigation at Assateague Island FUDS

Presented by

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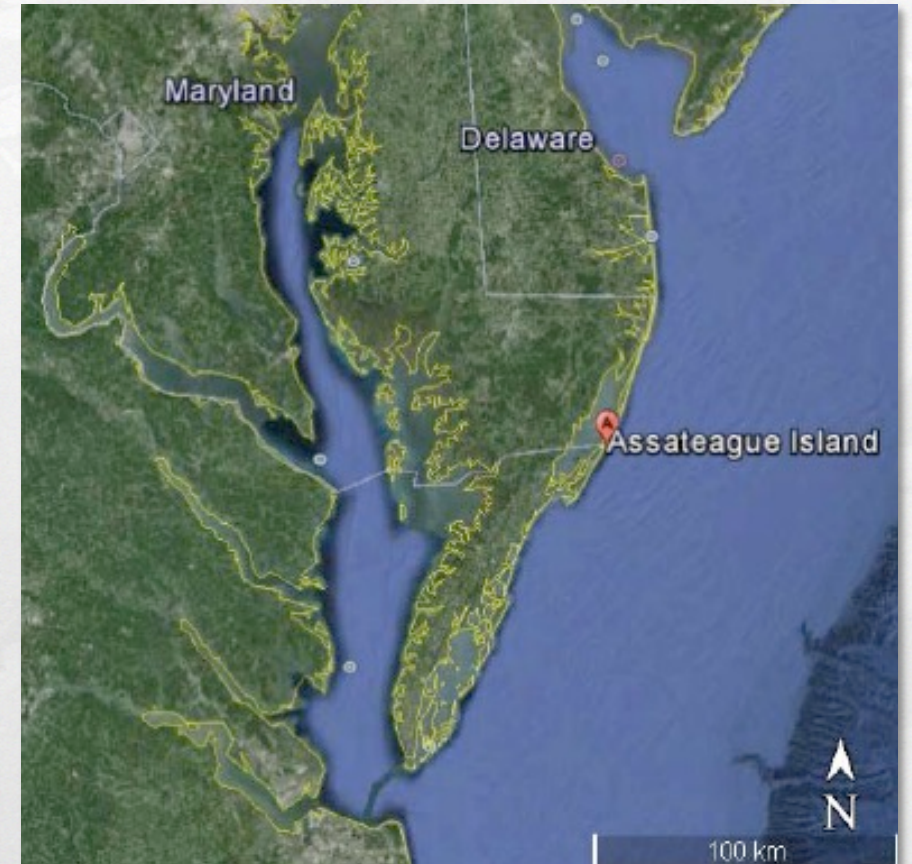
EA Engineering, Science, and Technology, Inc., PBC

Baltimore District FUDS Project Manager, Liza Finley



# Case Study #1

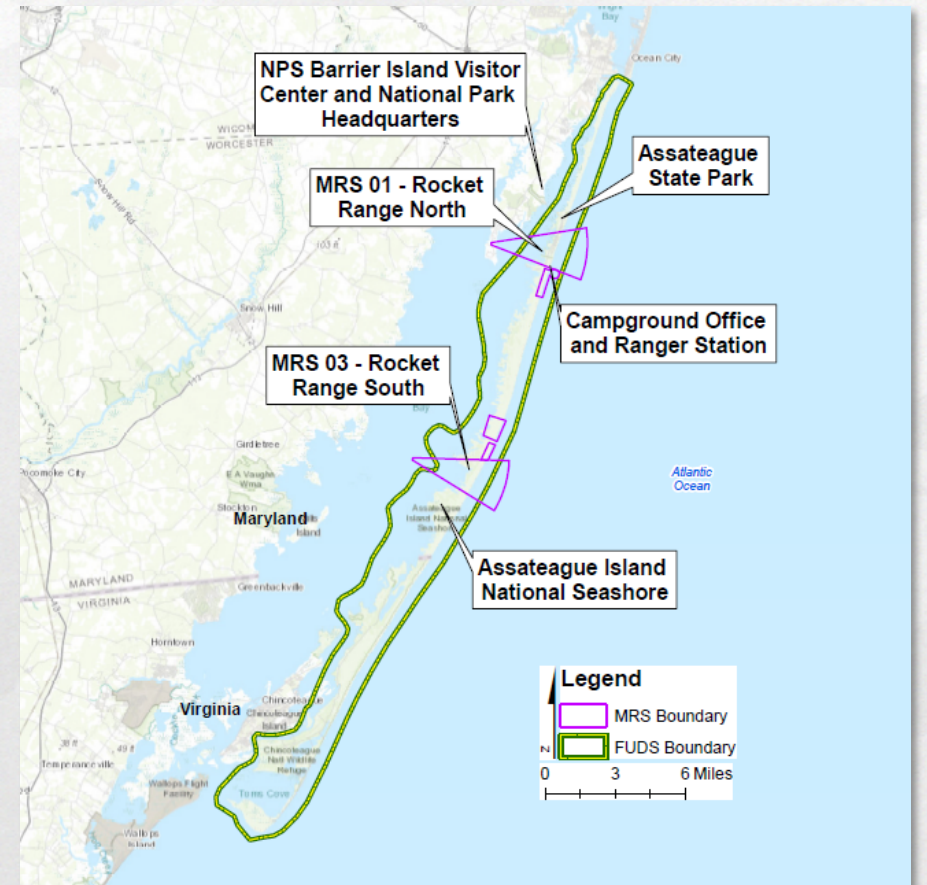
- **Project Name:** Remedial Investigation at Assateague Island FUDS
- **Location:** Worcester County, Maryland
- **Program and Project No:** FUDS Project No. C03MD093001 and C03MD093003
- **Δ Cost for Tool Use:** Slightly higher
- **State Concurrence:** Yes
- **Key Interest in this Project:** FUDS is on a National Seashore/Public Beach/ Recreation Area, MRSs are over both land and water, MD from practice munitions have washed ashore





# Assateague FUDS MMRP Site History

- Two practice ranges used by the Navy from 1944 to 1947.
- Air-to-ground practice bombing, rocket, and strafing range.
- Munitions used included practice rockets, practice bombs, and machine gun shot practice 20-millimeter projectiles.
- Surface debris in target areas was reportedly cleaned up and buried.





# Assateague FUDS MMRP Site History

- In 1965, Assateague Island was established as a National Seashore.
- The Munitions Response Sites (MRSs) are located on property owned by the National Park Service and the State of Maryland.
- Currently used as a nature preserve and recreation area.
- Ongoing investigations since 1988, when MD washed ashore.





# Summary of Remedial Investigation

- The following activities were conducted on land and in the water at MRS 01 and MRS 03
  - Collected Digital Geophysical Mapping (DGM) Data along pre-established paths.
  - Interpreted DGM data and selected anomalies for investigation.
  - Conducted intrusive investigation by reacquiring and digging up anomalies.
  - Properly inspected and disposed of munitions identified



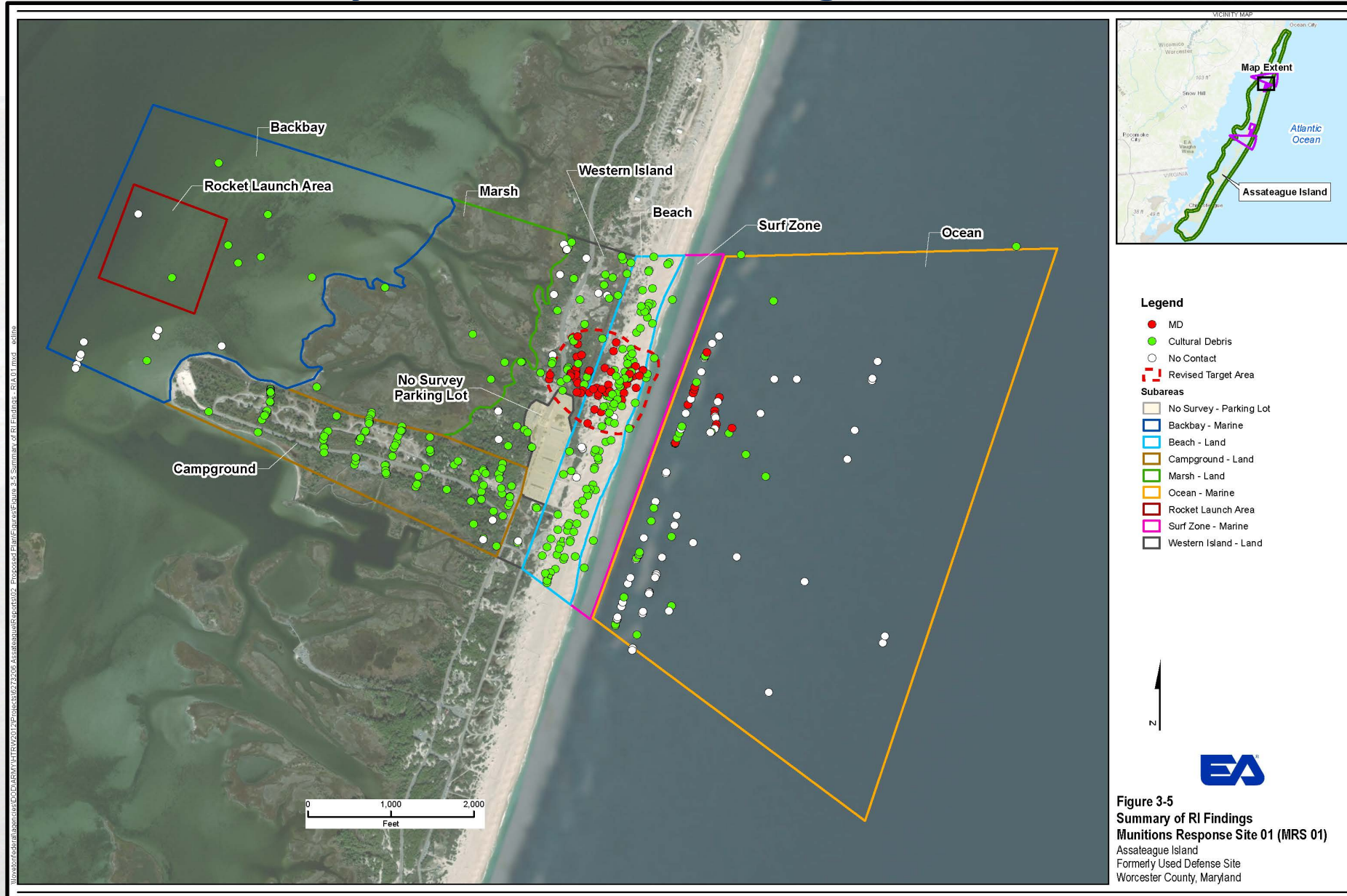


# Summary of Remedial Investigation—MRS 01

- RI Findings at MRS 01
  - Historical munitions use included practice rockets, practice bombs, and the practice 20-mm projectiles from machine gun shot
  - 1 Concentrated Munitions Use Area (CMUA) identified from the former Target Area
  - Only MD found, predominately from fired practice rockets
  - No propellant nor intact spotting charges were found in any items
  - No MEC identified



# Summary of Remedial Investigation—MRS 01





# Summary of Remedial Investigation—MRS 03

- RI Findings at MRS 03
  - Historic munitions use may have included practice rockets
  - No MD identified during the RI
  - Historically, only 2 pieces of MD from practice rockets identified
  - No MEC identified
  - Likely abandoned use as a target area



# Summary of RI Investigation—MRS 03



\\w01tonredatlab\arcgis\DCO\AR\W\HT\PM\012\PI\re\05275036\Assateague\Report\0302\_Proposed Final Findings\Figure 3-6\_Summary of RI Findings - RIA\03.mxd - editline





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# Risk Management Methodology

- FUDS Risk Management Methodology applied to determine MEC hazards (Matrixes 1 thru 4)
- Results of Risk Management Methodology: Acceptable Conditions at MRS 01 and MRS 03





## Likelihood of Encounter: Matrix 1. Amount of MEC vs. Access Conditions

	Regular (e.g., daily use, open access)	Often (e.g., periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
<ul style="list-style-type: none"> <li>• MEC is visible on the surface and detected in the subsurface.</li> </ul>	Frequent	Frequent	Likely	Occasional
<ul style="list-style-type: none"> <li>• The area is identified as a CMUA where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in the surface and subsurface.</li> </ul>	Frequent	Likely	Occasional	Seldom
<ul style="list-style-type: none"> <li>• MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or</li> <li>• The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95 percent confidence).</li> </ul>	Likely	Occasional	Seldom	Unlikely
<ul style="list-style-type: none"> <li>• MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or</li> <li>• A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface was not addressed), or</li> <li>• The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.5/acre at 95 percent confidence).</li> </ul>	Occasional	Seldom	Unlikely	Unlikely
<ul style="list-style-type: none"> <li>• MEC presence is suspected based on historical evidence of munitions use only, or</li> <li>• A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that residual hazard remains to support this selection), or</li> <li>• The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95 percent confidence).</li> </ul>	Seldom	Seldom	Unlikely	Unlikely
<ul style="list-style-type: none"> <li>• Investigation of the MRS did not identify evidence of MEC presence, or</li> <li>• A DERP response action has been conducted that will achieve UU/UE</li> </ul>	Unlikely	Unlikely	Unlikely	Unlikely



## Severity of Explosive Incident: Matrix 2. Severity vs. Likelihood of Encounter

Frequent: Regular, or inevitable occurrences	Likely: Several or numerous occurrences	Occasional: Sporadic or intermittent occurrences	Seldom: Infrequent; rare occurrences	Unlikely: Not probable
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### Catastrophic/Critical:

May result in 1 or more deaths, permanent total or partial disability, or hospitalization

A

A

B

B

D

### Modest:

May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization

B

B

B

C

D

### Minor:

May result in 1 or more injuries requiring first aid or medical treatment

B

C

C

C

D

### Improbable:

No injury is anticipated

D

D

D

D

D



## Likelihood of Detonation: Matrix 3. Munitions Sensitivity vs. Likelihood of Energy to be Imparted

	<b>High:</b> (e.g., areas planned for development, or seasonally tilled)	<b>Modest:</b> (e.g., undeveloped, wildlife refuge, parks)	<b>Inconsequential:</b> (e.g., not anticipated, prevented, mitigated)
<b>High:</b> (e.g., classified as sensitive)	1	1	3
<b>Moderate:</b> (e.g., high explosive or pyrotechnics)	1	2	3
<b>Low:</b> (e.g., propellant of bulk secondary explosives)	1	3	3
<b>Not Sensitive</b>	2	3	3



**Acceptable and Unacceptable Site Conditions**

**Result from Matrix 2**

		A	B	C	D
<b>Result from Matrix 3</b>	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
	2	Unacceptable	Unacceptable	Acceptable	Acceptable
	3	Unacceptable	Acceptable	Acceptable	Acceptable





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## PDT Points of Discussion

In Matrix 1, what is “MD Indicative of MEC” or “evidence of a MEC presence?”

- Is all MD originally manufactured with some sort of energetics indicative of MEC?
- Practice rockets, practice bombs, and practice 20-mm projectiles can contain propellant and/or spotting charges. Does that mean they are “indicative of MEC?” Or “evidence of a MEC presence?”

## Likelihood of Encounter: Matrix 1. Amount of MEC vs. Access Conditions

- MEC is visible on the surface and detected in the subsurface.
- The area is identified as a CMUA where MEC is known or suspected (e.g., MD indicative of MEC is identified) to be present in the surface and subsurface.
- MEC presence based on physical evidence (e.g., MD indicative of MEC), although the area is not a CMUA, or
- The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 1.0/acre at 95 percent confidence).
- MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or
- A DERP response action has been conducted to physically remove MEC and known or suspected hazard remains to support this selection, (e.g., surface removal where subsurface was not addressed), or
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- The MEC concentration is below a project-specific threshold to support this selection (e.g., less than 0.25/acre at 95 percent confidence).
- Investigation of the MRS did not identify evidence of MEC presence, or
- A DERP response action has been conducted that will achieve UU/UE



## PDT Points of Discussion

### Severity of Explosive Incident: Matrix 2. Severity vs. Likelihood of Encounter

#### **Catastrophic/Critical:**

May result in 1 or more deaths, permanent total or partial disability, or hospitalization

#### **Modest:**

May result in 1 (or more) injury resulting in emergency medical treatment, without hospitalization

#### **Minor:**

May result in 1 or more injuries requiring first aid or medical treatment

#### **Improbable:**

No injury is anticipated

### Likelihood of Detonation: Matrix 3. Munitions Sensitivity vs. Likelihood of Energy to be Imparted

#### **High:**

(e.g., classified as sensitive)

#### **Moderate:**

(e.g., high explosive or pyrotechnics)

#### **Low:**

(e.g., propellant of bulk secondary explosives)

#### **Not Sensitive**

**In Matrixes 2 and 3, should the munition type or items found (i.e., MD) in the field be considered?**

- Only spent/fired practice rockets, practice bombs with no evidence of spotting charges, and practice 20-mm projectiles were found.
- Is this a modest (Matrix 2) and low (Matrix 3) classification because practice bombs have spotting charges and rockets/projectiles contain propellant? Or improbable (Matrix 2) and not sensitive (Matrix 3) because only spent practice rockets found and no propellant or spotting charges remain?



## Positives

- Prompts **discussion** amongst PDT.
- Applicable to **MD only sites**.
- Standardization of process across a variety of situations.
- Allows for **bright line of acceptable vs unacceptable**—easy for lay person to understand.
- Helps **focus and guide the remedy selection** process and how to get to “acceptable” site conditions.



# Challenges

- Terminology and Interpretation of Concepts
  - “MD indicative of MEC” on Matrix 1.
  - “Evidence of MEC” on Matrix 1.
  - How to determine “Severity of Explosive Incident” in Matrix 2.
  - Expand on types of munitions listed for “Munitions Sensitivity” in Matrix 3.



# Summary

- New Method great guide/tool to help determine if acceptable conditions are present and, if not, what needs to be adjusted to get to acceptable conditions.
  - Requires PDT to really consider the details of the project, the munitions used, and how they are inter-related.
  - Applicable for sites with only MD.
  - Additional definitions and providing test cases/ examples would help users apply the tool and promote consistency.