



# **Munitions Response Site Prioritization Protocol**

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## **Module 4. Explosive Hazard Evaluation**

April 2007

# EHE Outline

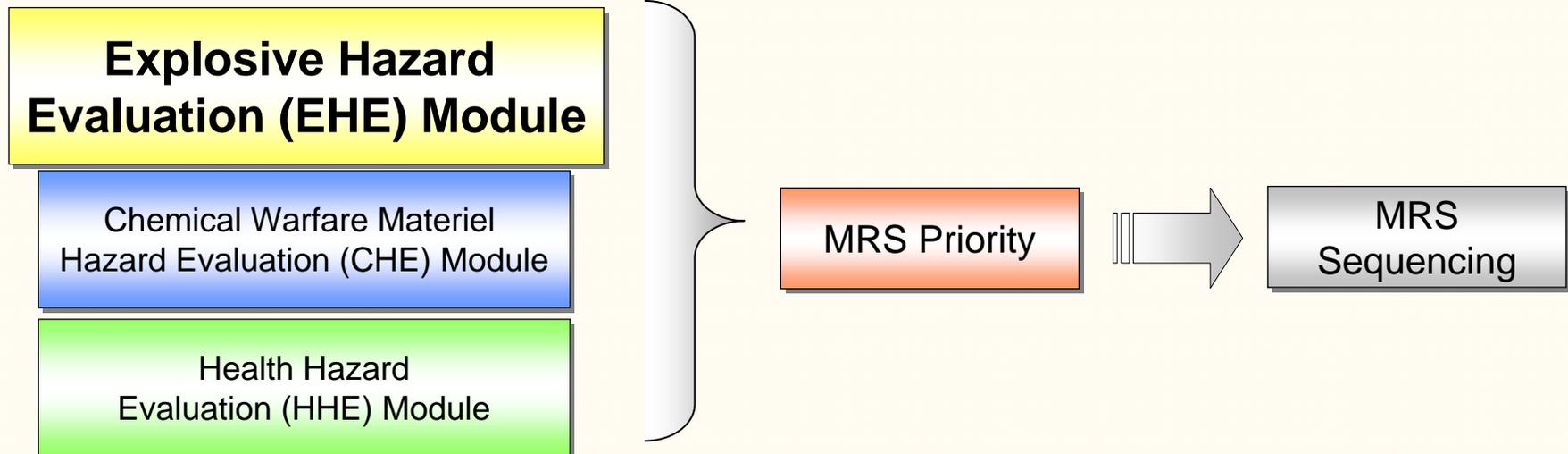
- Explosive Hazard Evaluation (EHE) Module
- Munitions and Explosives of Concern (MEC)
- EHE Module Structure and Scoring
- Explosive Hazard Factor
- Accessibility Factor
- Receptor Factor
- Determining the EHE Module Rating



# EHE Module

- Provides a consistent DoD-wide approach for assigning a relative priority to munitions response sites (MRSs) where unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) in high enough concentrations to pose an explosive hazard are known or suspected to be present

## Protocol Structure



# Munitions and Explosives of Concern

- Refers to specific categories of military munitions that may pose unique explosives safety risks –
  - ◆ Unexploded ordnance, as defined in 10 USC § 101(e)(5)
  - ◆ Discarded military munitions, as defined in 10 USC § 2710(e)(2)
  - ◆ Munitions constituents (e.g., TNT, RDX), as defined in 10 USC § 2710(e)(3), present in high enough concentrations to pose an explosive hazard
  
- Does not create a new category of materials covered under the Protocol and is adopted for consistency with DoD explosive safety terminology



# EHE Module Factors

- The EHE Module Rating for each MRS is derived from three categories of information, called factors –
  - ◆ Explosive Hazard Factor – characterizes the nature of the hazard
  - ◆ Accessibility Factor – characterizes the potential for a receptor to encounter the hazard
  - ◆ Receptor Factor – characterizes the human and ecological populations that may be impacted by the presence of MEC
- The EHE's structure limits the influence of any one factor on the overall EHE Module Rating
- Each factor is further comprised of two to four data elements used to score available MRS-specific data



# EHE Module Scoring

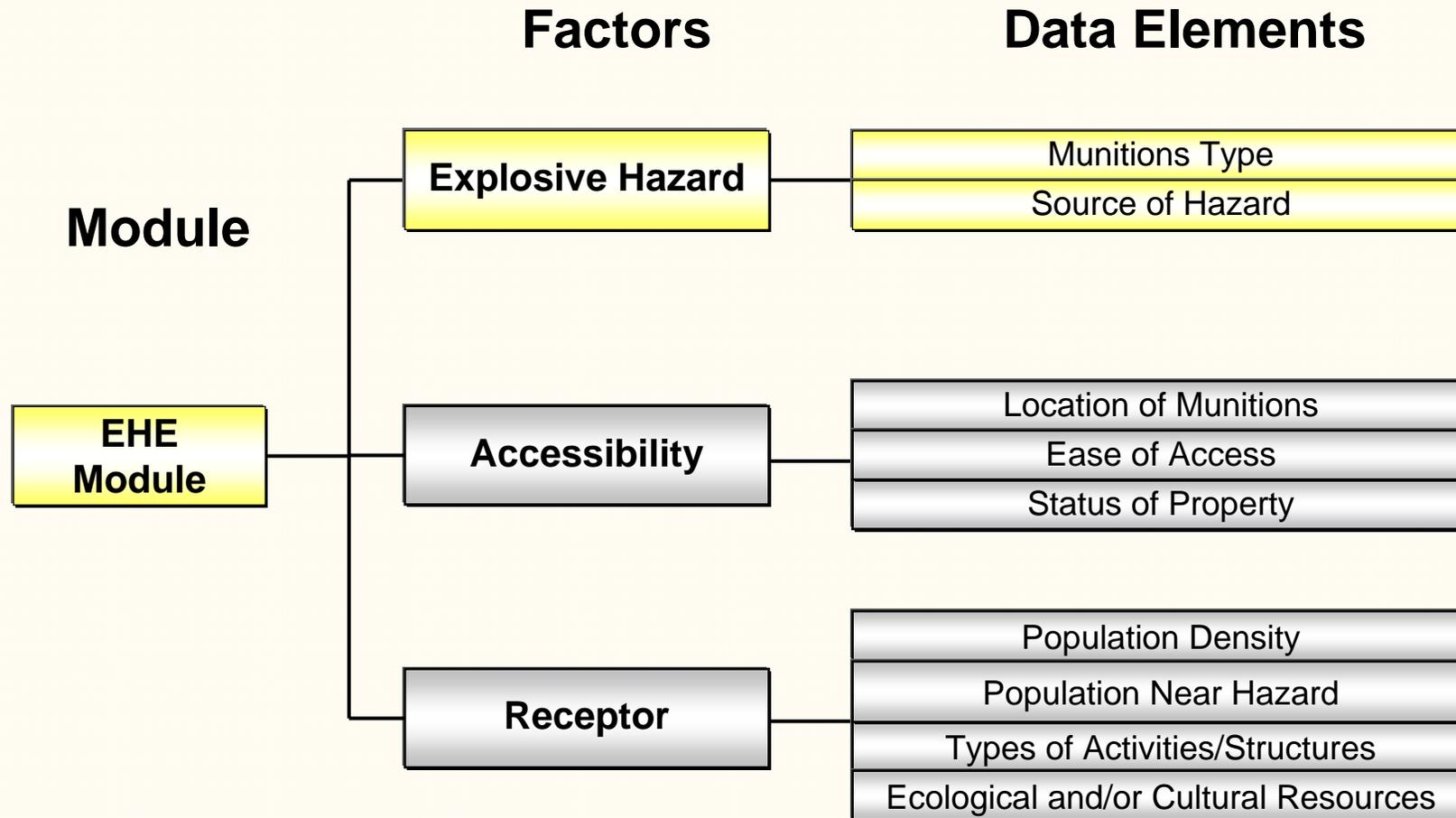
- The data elements of the three factors contribute to the EHE Module Rating

<b>Explosive Hazard Factor</b>	<b>40 pts</b>
<b>Accessibility Factor</b>	<b>40 pts</b>
<b>Receptor Factor</b>	<b>20 pts</b>
<b>Maximum Total</b>	<b>100 pts</b>

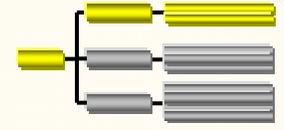
- Based on the sum of the EHE factor values, the module is assigned one of seven letter ratings (letters A – G)
- There are also three alternative module ratings for use when a letter rating is not appropriate –
  - ◆ Evaluation Pending
  - ◆ No Longer Required
  - ◆ No Known or Suspected Explosive Hazard



# Structure of EHE Explosive Hazard Factor



# EHE Explosive Hazard Factor



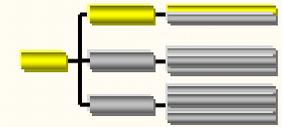
- Evaluates the munitions types known or suspected to be present at the MRS
- Assesses previous munitions-related activities that occurred at the MRS
- Comprised of two data elements –
  - ◆ Munitions Type
  - ◆ Source of Hazard
- Constitutes 40% of the EHE Module's numerical score

<b>Explosive Hazard Factor</b>	<b>40 pts</b>
<b>Accessibility Factor</b>	<b>40 pts</b>
<b>Receptor Factor</b>	<b>20 pts</b>
<b>Maximum Total</b>	<b>100 pts</b>

Munitions Type = ? out of 30 points  
Source of Hazard = ? out of 10 points



# Explosive Hazard Factor – Munitions Type



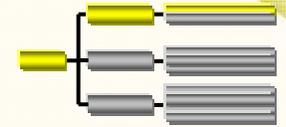
## Munitions Type Data Element Classifications (Max. 30 points)

<u>Classification</u>	<u>Point Value</u>
Sensitive	30
High explosive (used or damaged)	25
Pyrotechnic (used or damaged)	20
High explosive (unused)	15
Propellant	15
Bulk secondary high explosive, pyrotechnics, or propellant	10
Pyrotechnic (not used or damaged)	10
Practice	5
Riot control	3
Small arms	2
Evidence of no munitions	0

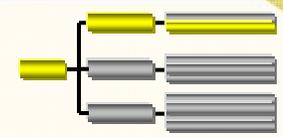


# Explosive Hazard Factor – Munitions Type (cont)

- Munitions Type is the data element with the highest potential score within the EHE Module
- Classifies military munitions known or suspected to be present based on their potential to detonate due to –
  - ◆ Sensitivity, which is based on the presence or absence of a fuze and the condition of the munition
    - Used (UXO)
    - Unused (DMM)
      - Damaged
      - Undamaged
  - ◆ Energetic materiel [propellants, explosives, pyrotechnics] involved
    - Propellants (e.g., single, double, triple grain) – characterized by slow (subsonic) reaction that generates low pressure over time to propel objects
    - Explosives (e.g., RDX, TNT) – characterized, when initiated, by rapid combustion or detonation
    - Pyrotechnics – characterized by slow, self-sustaining and -contained reactions that produce various effects (e.g., heat, sound, smoke, light)



# Explosive Hazard Factor – Source of Hazard

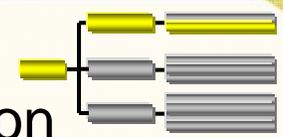


## Source of Hazard Data Element Classifications (Max. 10 points)

<u>Classification</u>	<u>Point Value</u>
Former range	10
Former munitions treatment (i.e., OB/OD) unit	8
Former practice munitions range	6
Former maneuver area	5
Former burial pit or other disposal area	5
Former industrial operating facilities	4
Former firing points	4
Former missile or air defense artillery emplacements	2
Former storage or transfer points	2
Former small arms range	1
Evidence of no munitions	0



# Explosive Hazard Factor – Source of Hazard (cont)

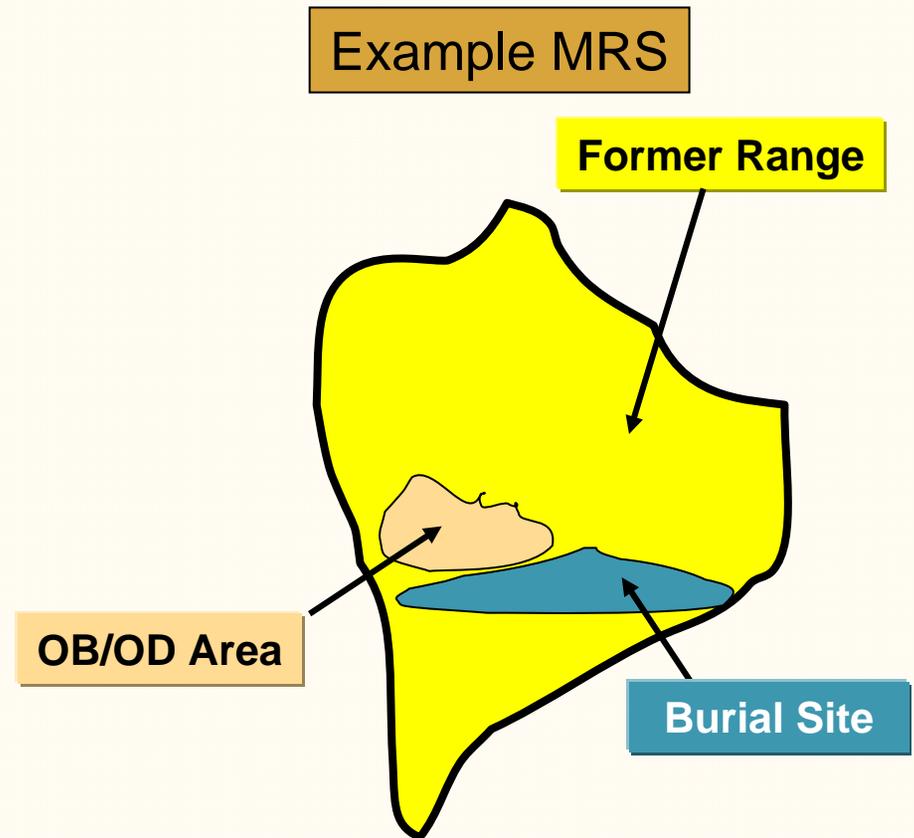


- Assesses the potential explosive risk at an MRS based on the MRS's previous uses
- Provides an indication of both the potential for different categories of MEC to be present and the associated explosive hazard level. For example –
  - ◆ Former ranges – high potential for UXO, high hazard
  - ◆ Former OB/OD site – high potential for DMM (kick-outs), moderate hazard
  - ◆ Former maneuver areas – potential for DMM, moderate to low hazard
  - ◆ Former manufacturing areas – potential for high concentrations of MC, moderate to low hazard
  - ◆ Former storage and transfer areas – low potential for DMM, low hazard
  - ◆ Former small arms range – potential for used or unused small arms ammunition, very low hazard



# Explosive Hazard Factor – Example

- During an investigation at a former range, white phosphorus grenades, smoke grenades, and small arms ammunition were found
- These munitions were found in separate locations that included both a former OB/OD area and a burial site
- Given the close proximity of both locations, they are addressed as a single MRS



**What is the Explosive Hazard Factor value?**



**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	<ul style="list-style-type: none"> <li>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).</li> <li>Hand grenades containing energetic filler.</li> <li>Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard.</li> </ul>	30
High explosive (used or damaged)	<ul style="list-style-type: none"> <li>UXO containing a high explosive filler (e.g., RDX, Composition B), that are not considered "sensitive."</li> <li>DMM containing a high explosive filler that have:                             <ul style="list-style-type: none"> <li>Been damaged by burning or detonation</li> <li>Deteriorated to the point of instability.</li> </ul> </li> </ul>	25
Pyrotechnic (used or damaged)	<ul style="list-style-type: none"> <li>UXO containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades).</li> <li>DMM containing a pyrotechnic filler other than white phosphorus (e.g., flares, signals, simulators, smoke grenades) that have:                             <ul style="list-style-type: none"> <li>Been damaged by burning or detonation</li> <li>Deteriorated to the point of instability.</li> </ul> </li> </ul>	20
High explosive (unused)	<ul style="list-style-type: none"> <li>DMM containing a high explosive filler that:                             <ul style="list-style-type: none"> <li>Have not been damaged by burning or detonation</li> <li>Are not deteriorated to the point of instability.</li> </ul> </li> </ul>	15
Propellant	<ul style="list-style-type: none"> <li>UXO containing mostly single, double, or triple based propellant, or composite propellants (e.g., a rocket motor).</li> <li>DMM containing mostly single, double, or triple based propellant, or composite propellants (e.g., a rocket motor) that are:                             <ul style="list-style-type: none"> <li>Damaged by burning or detonation</li> <li>Deteriorated to the point of instability.</li> </ul> </li> </ul>	15
Bulk secondary high explosives, pyrotechnics, or propellant	<ul style="list-style-type: none"> <li>DMM containing mostly single, double, or triple based propellant, or composite propellants (e.g., a rocket motor).</li> <li>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.</li> </ul>	10
Pyrotechnic (not used or damaged)	<ul style="list-style-type: none"> <li>DMM containing a pyrotechnic filler (i.e., red phosphorus), other than white phosphorus filler, that:                             <ul style="list-style-type: none"> <li>Have not been damaged by burning or detonation</li> <li>Are not deteriorated to the point of instability.</li> </ul> </li> </ul>	10
Practice	<ul style="list-style-type: none"> <li>UXO that are practice munitions that are not associated with a sensitive fuze.</li> <li>DMM that are practice munitions that are not associated with a sensitive fuze and that have not:                             <ul style="list-style-type: none"> <li>Been damaged by burning or detonation</li> <li>Deteriorated to the point of instability.</li> </ul> </li> </ul>	5
Riot control	<ul style="list-style-type: none"> <li>UXO or DMM containing a riot control agent filler (e.g., tear gas).</li> </ul>	3
Small arms	<ul style="list-style-type: none"> <li>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.)</li> </ul>	2
Evidence of no munitions	<ul style="list-style-type: none"> <li>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.</li> </ul>	0
<b>MUNITIONS TYPE</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<b>30</b>

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

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

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**Table 2**

**EHE Module: Source of Hazard Data Element Table**

**DIRECTIONS:** Below are 11 classifications describing sources of explosive hazards. Circle the scores that correspond with **all** the sources of explosive hazards known or suspected to be present at the MRS.

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

Classification	Description	Score
Former range	<ul style="list-style-type: none"> <li>The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include impact or target areas and associated buffer and safety zones.</li> </ul>	10
Former munitions treatment (i.e., OB/OD) unit	<ul style="list-style-type: none"> <li>The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal.</li> </ul>	8
Former practice munitions range	<ul style="list-style-type: none"> <li>The MRS is a former military range on which only practice munitions without sensitive fuzes were used.</li> </ul>	6
Former maneuver area	<ul style="list-style-type: none"> <li>The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category.</li> </ul>	5
Former burial pit or other disposal area	<ul style="list-style-type: none"> <li>The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment.</li> </ul>	5
Former industrial operating facilities	<ul style="list-style-type: none"> <li>The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility.</li> </ul>	4
Former firing points	<ul style="list-style-type: none"> <li>The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range.</li> </ul>	4
Former missile or air defense artillery emplacements	<ul style="list-style-type: none"> <li>The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range.</li> </ul>	2
Former storage or transfer points	<ul style="list-style-type: none"> <li>The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system).</li> </ul>	2
Former small arms range	<ul style="list-style-type: none"> <li>The MRS is a former military range where only small arms ammunition was used. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present to place an MRS into this category.)</li> </ul>	1
Evidence of no munitions	<ul style="list-style-type: none"> <li>Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present.</li> </ul>	0
<b>SOURCE OF HAZARD</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	<b>10</b>

Circle all applicable data element classifications

Record only the single highest classification score

Document any MRS-specific data used in selecting the hazard classifications here

**DIRECTIONS:** Document any MRS-specific data used in selecting the **Source of Hazard** classifications in the space provided.

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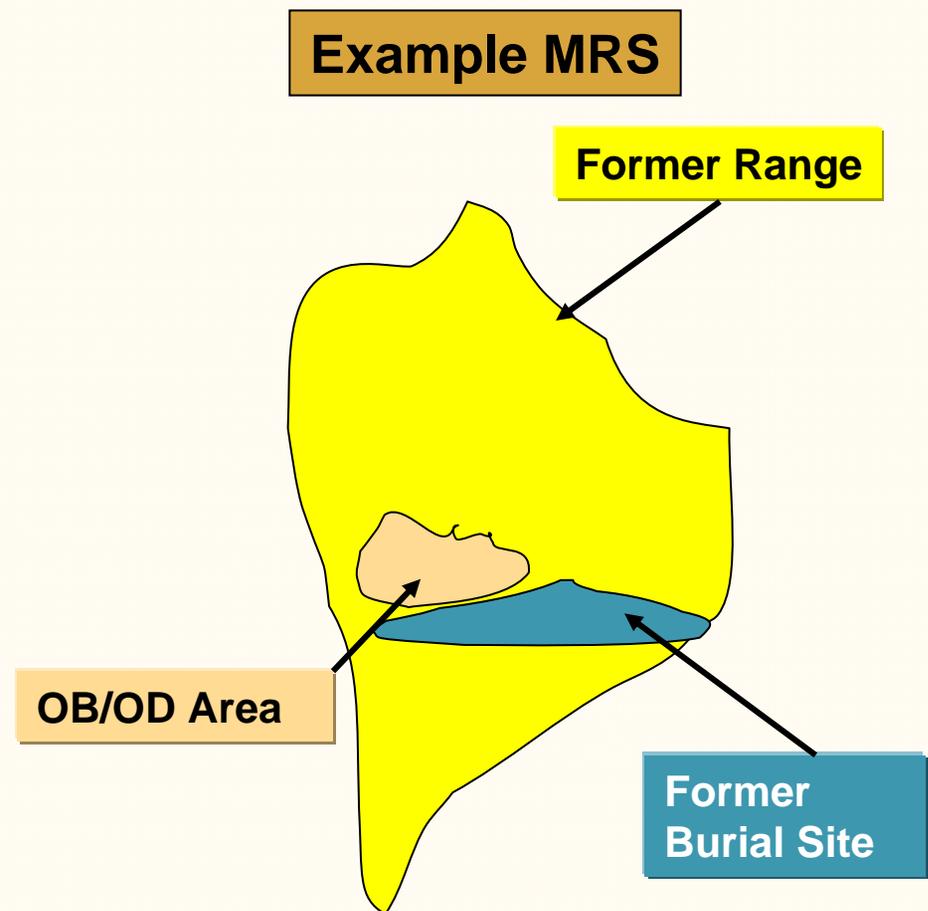
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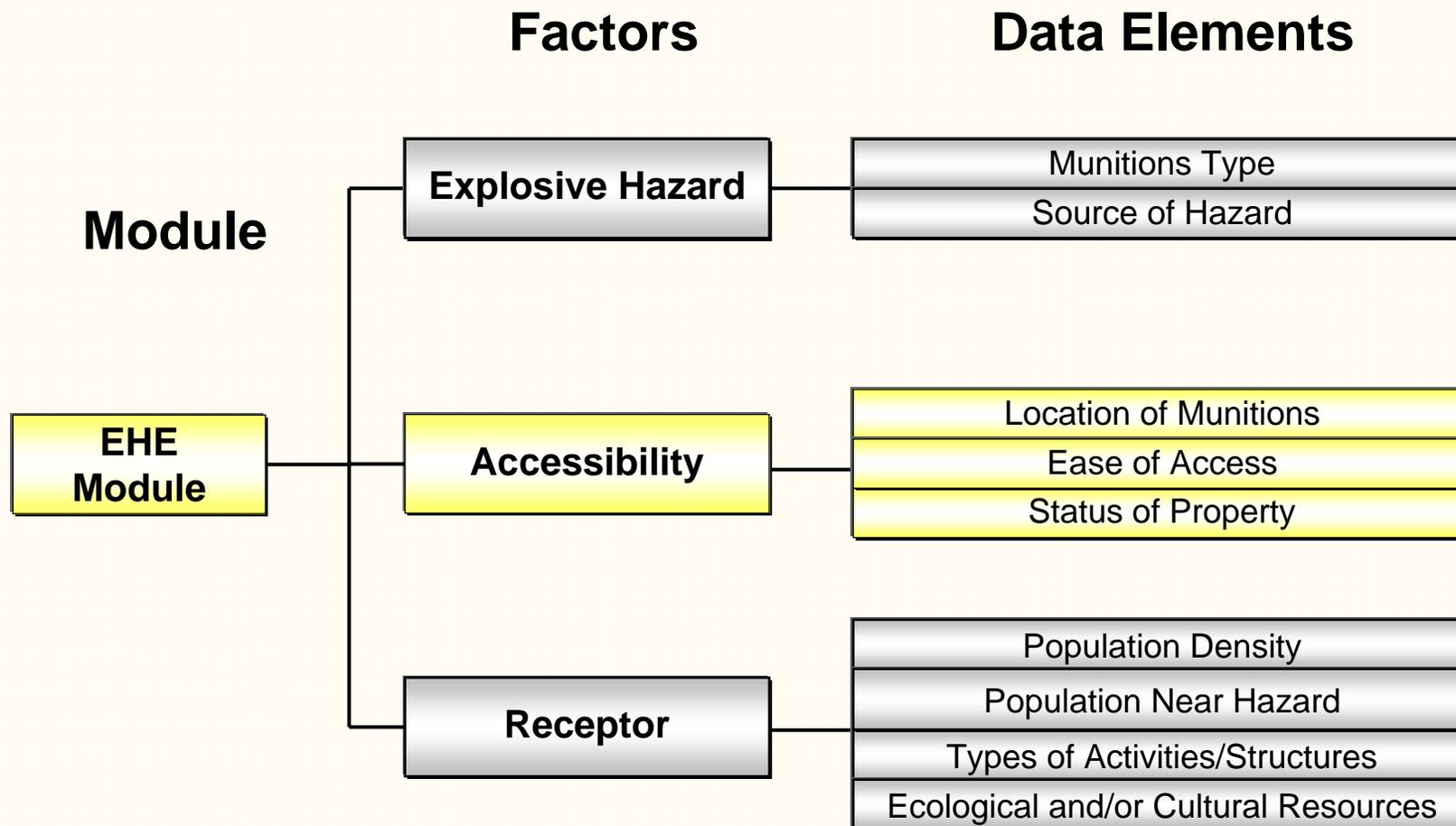
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# Explosive Hazard Factor Review

- To calculate the Explosive Hazard Factor value, the single highest data classification scores from Tables 1 and 2 are summed
- *Explosive Hazard Factor Value: 40 Points*
  - ◆ Under the Munitions Type data element, white phosphorous grenades would be classified as sensitive (30 points)
  - ◆ Under the Source of Hazard data element, the former range receives the highest score (10 points)

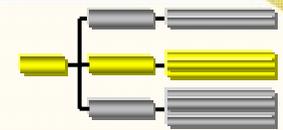


# Structure of the EHE Accessibility Factor



# Accessibility Factor

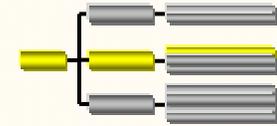
- Focuses on the potential to encounter MEC, and is comprised of three data elements
  - ◆ Location of Munitions, which assesses the potential for MEC to be –
    - Present and encountered (direct contact)
    - On the surface
    - Brought to the surface by naturally occurring phenomena (e.g., erosion, frost heave) or activities conducted (e.g., farming) at an MRS
  - ◆ Ease of Access evaluates –
    - The receptors potentially available to encounter MEC
    - The means (e.g., roadways) for accessing areas known or suspected to contain MEC
    - Any constraints to access (e.g., fencing) the MRS
  - ◆ Status of Property – differentiates between an MRS under DoD control and one no longer under DoD control
- Constitutes 40% of the EHE Module numerical score



<b>Explosive Hazard Factor</b>	<b>40 pts</b>	<b>Location of Munitions = ? out of 25 points</b> <b>Ease of Access = ? out of 10 points</b> <b>Status of Property = ? out of 5 points</b>
<b>Accessibility Factor</b>	<b>40 pts</b>	
<b>Receptor Factor</b>	<b>20 pts</b>	
<b>Maximum Total</b>	<b>100 pts</b>	



# Accessibility Factor – Location of Munitions



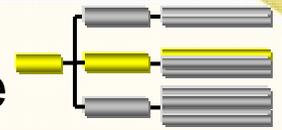
## Location of Munitions Data Element Classifications (Max. 25 points)

<u>Classification</u>	<u>Point Value</u>
Confirmed surface	25
Confirmed subsurface, active	20
Confirmed subsurface, stable	15
Suspected (physical evidence)	10
Suspected (historical evidence)	5
Subsurface, physical constraint	2
Small arms (regardless of location)	1
Evidence of no munitions	0



# Accessibility Factor – Location of Munitions (cont)

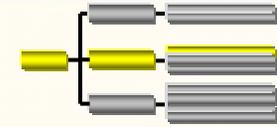
- Evaluates three conditions that together characterize the potential for encountering munitions
  - ◆ *Confirmed or suspected* presence of munitions (UXO or DMM) based on *physical or historical* evidence
  - ◆ Likelihood of encountering MEC based on its location (*surface or subsurface*)
  - ◆ Potential (*active, stable, or physical constraint*) for naturally occurring phenomena or intrusive activities conducted at the MRS to cause any MEC in the subsurface to move to the surface



*Investigators find physical evidence of munitions*



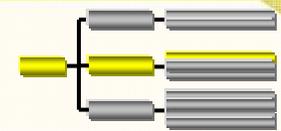
# Accessibility Factor – Location of Munitions (cont)



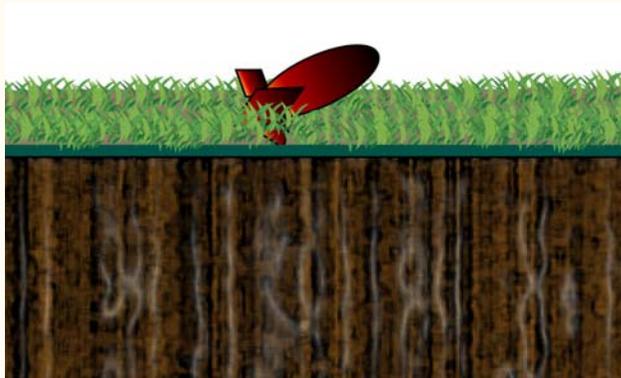
- Evidence of no munitions (0 points) can only be selected if, after investigation of an MRS, there is –
  - ◆ Physical evidence that there are no UXO or DMM present
  - ◆ Historical evidence that no UXO or DMM are present
- Physical or historical evidence of munitions
  - ◆ Physical evidence means –
    - Recorded observations from on-site investigations, such as finding intact UXO or DMM, or munitions debris (e.g., fragments, penetrators, projectiles, shell casings, links, fins)
    - The results of field or laboratory sampling and analysis procedures
    - The results of geophysical investigations
  - ◆ Historical evidence means –
    - Written documents or records
    - Documented interviews of persons with knowledge of site conditions
    - Other types of verified information



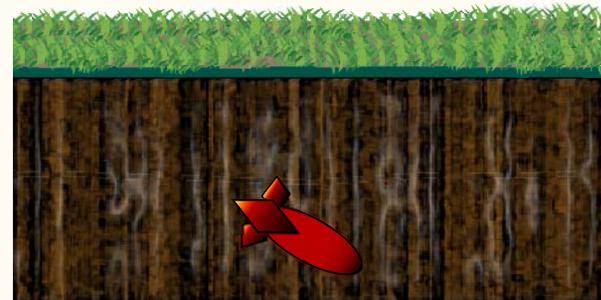
# Accessibility Factor – Location of Munitions (cont)



- Assesses the likelihood for encountering MEC based on its location
  - ◆ On the Surface means the munition is –
    - Entirely or partially exposed above the ground surface
    - Entirely or partially exposed above the surface of a water body
  - ◆ In the Subsurface means the munition is at all times –
    - Entirely beneath the ground surface
    - Submerged in a water body



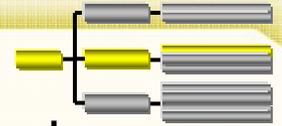
On the Surface



In the Subsurface



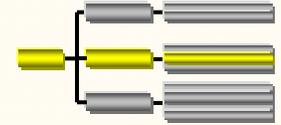
# Accessibility Factor – Location of Munitions (cont)



- Potential for MEC to be brought to the surface by dynamic conditions for access by, or impact to, receptors –
  - ◆ Active
    - Geologic conditions (e.g., drought, flooding, frost heave) are likely to expose subsurface UXO or DMM
    - Intrusive activities (e.g., plowing, construction, dredging) are likely to expose subsurface UXO or DMM
  - ◆ Stable
    - Geologic conditions are not likely to expose subsurface UXO or DMM
    - Intrusive activities are not likely to expose subsurface UXO or DMM
- Physical constraint
  - ◆ There is physical or historical evidence indicating that UXO or DMM are present in the subsurface, but there is a physical constraint (e.g., pavement, water depth >120 feet) that prevents direct access



# Accessibility Factor – Ease of Access

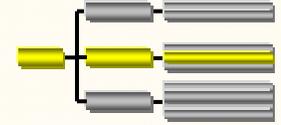


## Ease of Access Data Element Classifications (Max. 10 points)

<u>Classification</u>	<u>Point Value</u>
No barrier	10
Barrier to MRS access is incomplete	8
Barrier to MRS access is complete but not monitored	5
Barrier to MRS access is complete and monitored	0



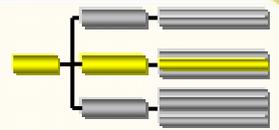
# Accessibility Factor – Ease of Access (cont)



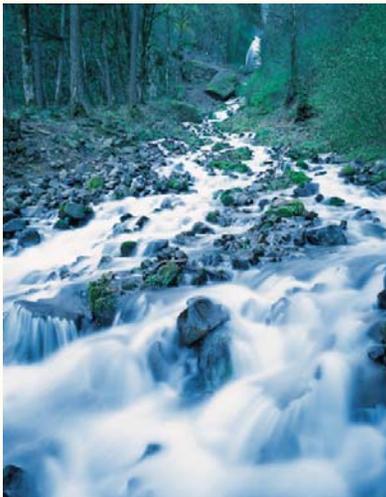
- Focuses on the extent controls prevent access or entry to the MRS
  - ◆ No barrier – all parts of the MRS are accessible; receives the highest score (10 points)
  - ◆ Barrier to MRS is incomplete – prevents access to some parts of the MRS (8 points)
  - ◆ Barrier to MRS access is complete but not monitored – prevents access to all parts of the MRS, but there is no monitoring of the barrier (5 points)
  - ◆ Barrier to MRS access is complete and monitored – prevents access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS; receives the lowest score (0 points)



# Accessibility Factor – Ease of Access (cont)



Natural obstacles and man-made controls are considered barriers



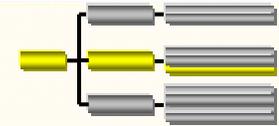
*Natural obstacles include difficult terrain, dense vegetation, and deep or fast-moving water*



*Man-made controls such as a fence*



# Accessibility Factor – Status of Property



## Status of Property Data Element Classifications (Max. 5 Points)

### Classification

Non-DoD control

Scheduled for transfer from DoD Control

DoD control

### Point Value

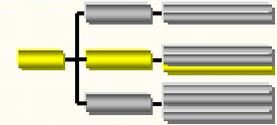
5

3

0



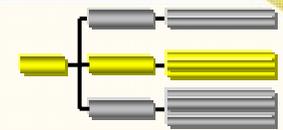
# Accessibility Factor – Status of Property (cont)



- Three classifications differentiate MRSs under DoD control from those not under DoD control –
  - ◆ Non-DoD control – the MRS is on land or in water that is no longer owned by, leased to, or otherwise possessed or used by DoD; receives the highest score (5 points)
  - ◆ Scheduled for transfer from DoD control – property transferring from DoD control within three years (3 points)
  - ◆ DoD control – the MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year; receives the lowest score (0 points)



# Accessibility Factor – Example



- Investigators recently discovered UXO on the surface of an uninhabited island that another federal agency is leasing from DoD
- The island is currently used as a wildlife refuge

**What is the Accessibility Factor Value?**



*Example uninhabited island*



**Table 3**

**EHE Module: Location of Munitions Data Element Table**

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

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

Classification	Description	Score
Confirmed surface	<ul style="list-style-type: none"> <li>Physical evidence indicates that there are UXO or DMM on the surface of the MRS.</li> <li>Historical evidence (i.e., a confirmed report such as an explosive ordnance disposal [EOD], police, or fire department report that an incident or accident that involved UXO or DMM occurred) indicates there are UXO or DMM on the surface of the MRS.</li> </ul>	25
Confirmed subsurface, active	<ul style="list-style-type: none"> <li>Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM.</li> <li>Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM.</li> </ul>	20
Confirmed subsurface, stable	<ul style="list-style-type: none"> <li>Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed.</li> <li>Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed.</li> </ul>	15
Suspected (physical evidence)	<ul style="list-style-type: none"> <li>There is physical evidence (e.g., munitions debris such as fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS.</li> </ul>	10
Suspected (historical evidence)	<ul style="list-style-type: none"> <li>There is historical evidence indicating that UXO or DMM may be present at the MRS.</li> </ul>	5
Subsurface, physical constraint	<ul style="list-style-type: none"> <li>There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM.</li> </ul>	2
Small arms (regardless of location)	<ul style="list-style-type: none"> <li>The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present at the MRS to place an MRS into this category.)</li> </ul>	1
Evidence of no munitions	<ul style="list-style-type: none"> <li>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.</li> </ul>	0
LOCATION OF MUNITIONS	<p><b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 25).</p>	25

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

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**Use Tables 3, 4, and 5 to calculate the Accessibility Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

**Table 4**

**EHE Module: Ease of Access Data Element Table**

**DIRECTIONS:** Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to the MRS. Circle the score that corresponds with the ease of access to the MRS.

**Note:** The term *barrier* is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	♦ There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible).	10
Barrier to MRS access is incomplete	♦ There is a barrier preventing access to parts of the MRS, but not the entire MRS.	8
Barrier to MRS access is complete but not monitored	♦ There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS.	5
Barrier to MRS access is complete and monitored	♦ There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS.	0
EASE OF ACCESS	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	5

**DIRECTIONS:** Document any MRS-specific data used in selecting the **Ease of Access** classification in the space provided.

**Use Tables 3, 4, and 5 to calculate the Accessibility Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

### Table 5

#### EHE Module: Status of Property Data Element Table

**DIRECTIONS:** Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
NonDoD control	<ul style="list-style-type: none"> <li>The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies.</li> <li>The MRS is at a location that is owned by DoD, but that DoD has leased to another entity and for which DoD does not control access 24 hours per day.</li> </ul>	5
Scheduled for transfer from DoD control	<ul style="list-style-type: none"> <li>The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the Protocol is applied.</li> </ul>	3
DoD control	<ul style="list-style-type: none"> <li>The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year.</li> </ul>	0
STATUS OF PROPERTY	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

**Use Tables 3, 4, and 5 to calculate the Accessibility Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Status of Property* classification in the space provided.

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# Accessibility Factor Example Review

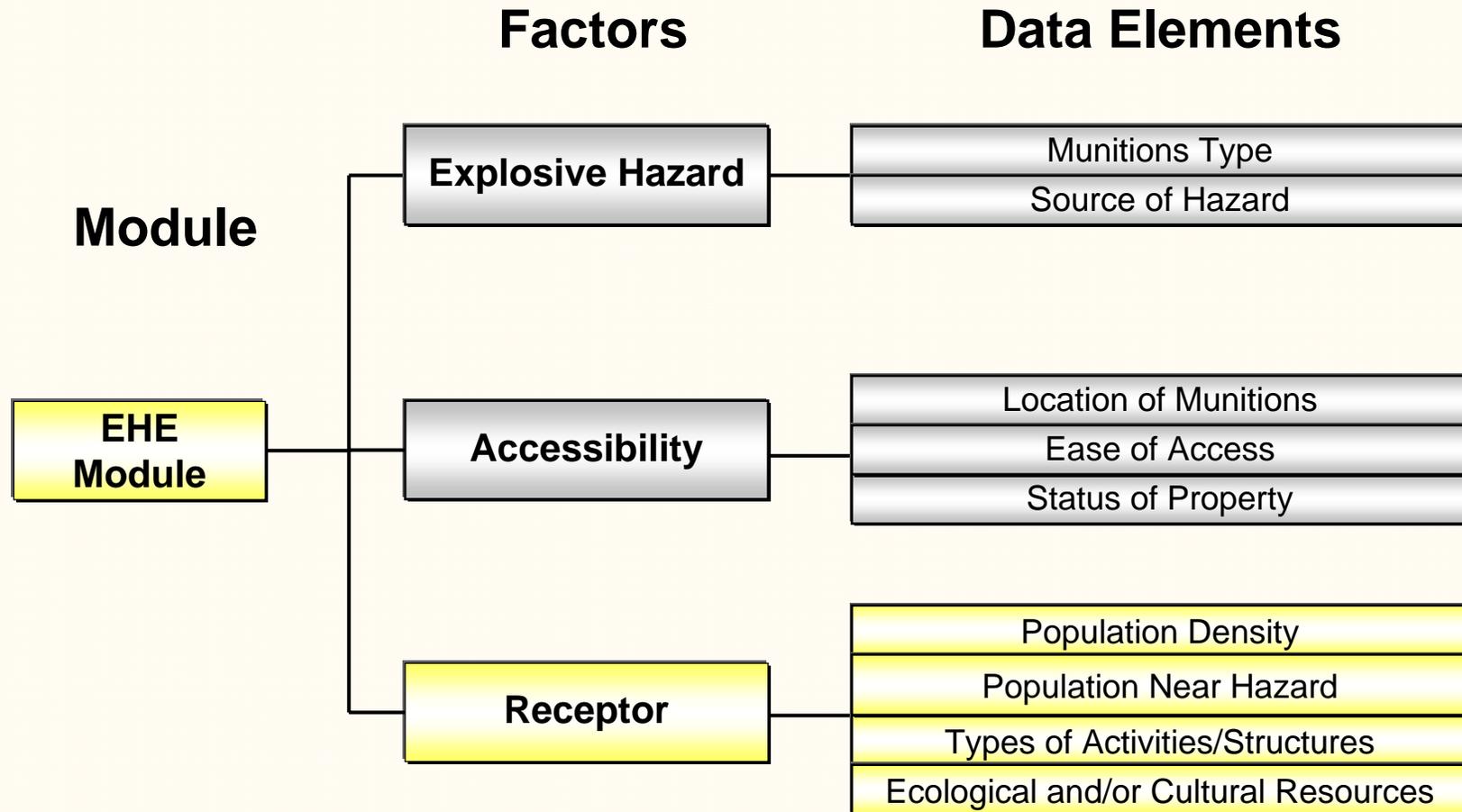
- To calculate the Accessibility Factor value, the single highest classification scores from Tables 3, 4, and 5 are summed
- *Accessibility Factor Value: 35 Points*
  - ◆ Under the Location of Munitions data element, explosive hazards are confirmed on the surface (25 points)
  - ◆ Under the Ease of Access data element, the island has a complete natural barrier that is not monitored (5 points)
  - ◆ Under the Status of Property data element, the island is currently managed by another federal agency (5 points)



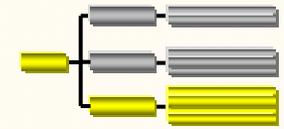
*Example uninhabited island*



# Structure of the EHE Receptor Factor



# Receptor Factor



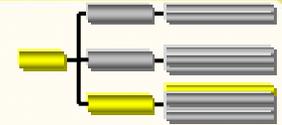
- Focuses on human and ecological populations that may be impacted by the presence of MEC
- Comprised of four data elements
  - ◆ Population Density
  - ◆ Population Near Hazard
  - ◆ Types of Activities/Structures
  - ◆ Ecological and/or Cultural Resources
- Constitutes 20% of the EHE Module numerical score

<b>Explosive Hazard Factor</b>	<b>40 pts</b>
<b>Accessibility Factor</b>	<b>40 pts</b>
<b>Receptor Factor</b>	<b>20 pts</b>
<b>Maximum Total</b>	<b>100 pts</b>

Population Density = ? of 5 points  
 Population Near Hazard = ? of 5 points  
 Types of Activities/Structures = ? of 5 points  
 Ecological and/or Cultural Resources = ? of 5 points



# Receptor Factor – Population Density



## Population Density Data Element Classifications (People/Sq Mile, Max. 5 Points)

### Classification

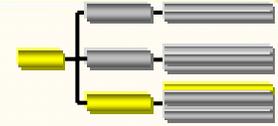
- > 500 persons per square mile
- 100 - 500 persons per square mile
- < 100 persons per square mile

### Point Value

- 5
- 3
- 1



# Receptor Factor – Population Density (cont)

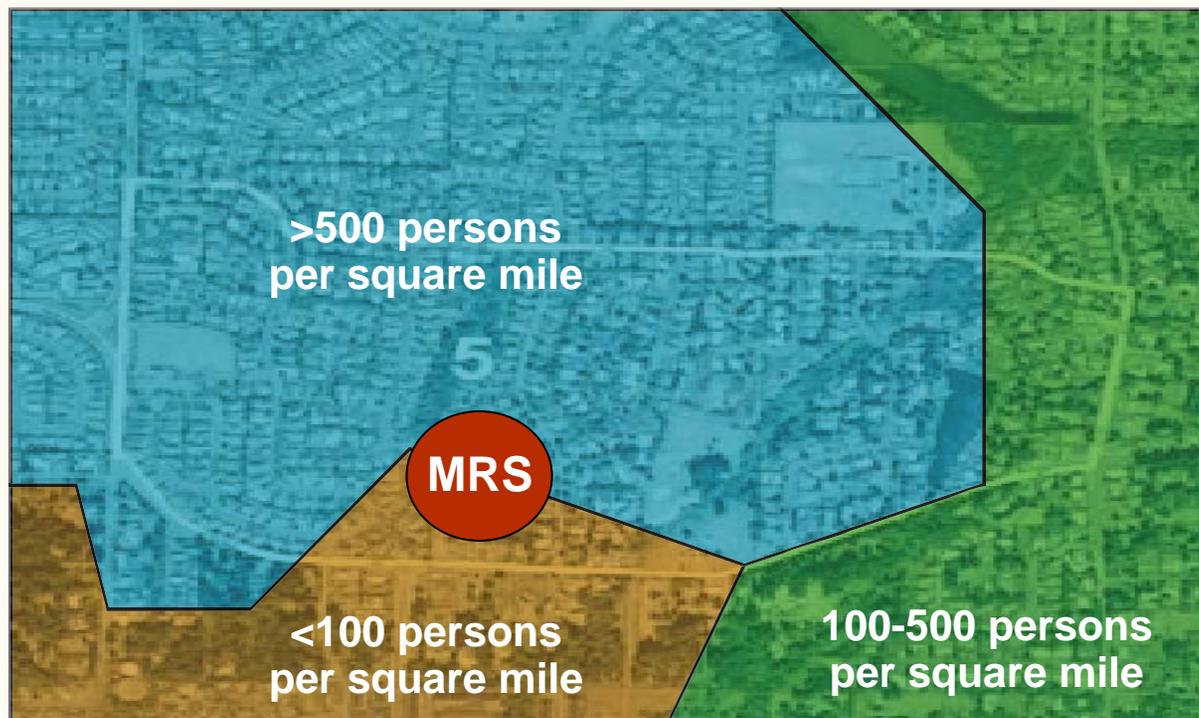


- Based on the number of people per square mile in the county or nearby city where an MRS is located, per US Census data
  - ◆ More than ( $>$ ) 500 persons per square mile (5 points)
  - ◆ 100 - 500 persons per square mile (3 points)
  - ◆ Fewer than ( $<$ ) 100 persons per square mile (1 point)
- If an MRS is located –
  - ◆ In more than one county, the largest population density value among the counties will be used
  - ◆ Within two miles of a city or town, the population density for the city or town, rather than that of the county will be used



# Receptor Factor – Population Density (cont)

Example –

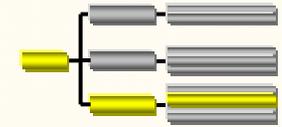


US Census population data *surrounding* an MRS

**What is the Population Density data element score for this MRS?**



# Receptor Factor – Population Near Hazard



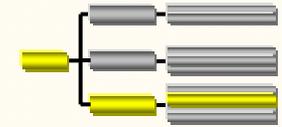
## Population Near Hazard Data Element Classifications (Max. 5 Points)

<u>Classification</u>	<u>Point Value</u>
26 or more inhabited structures	5
16 to 25 inhabited structures	4
11 to 15 inhabited structures	3
6 to 10 inhabited structures	2
1 to 5 inhabited structures	1
0 inhabited structures	0

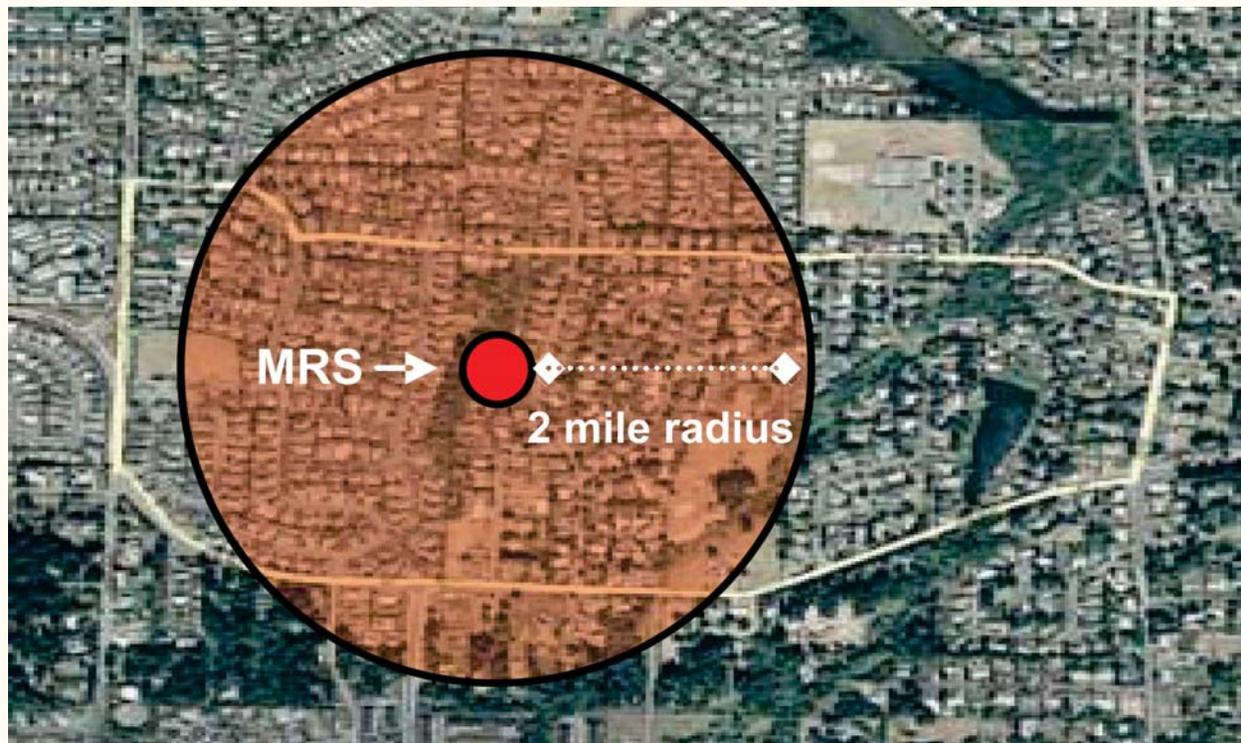
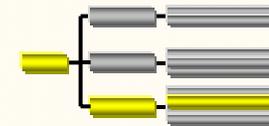


# Receptor Factor – Population Near Hazard (cont)

- Addresses the number of inhabited structures on the MRS and within *two miles* of the MRS's boundary
- Example classifications include –
  - ◆ Within an MRS's boundary and extending two miles outward from the MRS's boundary, there are 26 or more inhabited structures; receives highest classification score (5 points)
  - ◆ Within an MRS's boundary and extending two miles outward from the MRS's boundary, there are no inhabited structures; receives lowest classification score (0 points)
- Inhabited structures are permanent or temporary structures, other than munitions-related structures, routinely occupied by one or more persons for any portion of a day
- Considers both transient and permanent populations



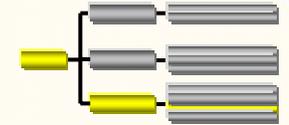
# Receptor Factor – Population Near Hazard (cont)



*Two-mile boundary example*



# Receptor Factor – Types of Activities/Structures



## Types of Activities/ Structures Data Element Classifications (Max. 5 Points)

### Classification

Residential, educational, commercial,  
or subsistence

Parks and recreational areas

Agriculture, forestry

Industrial or warehousing

No known or recurring activities

### Point Value

5

4

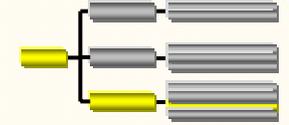
3

2

1



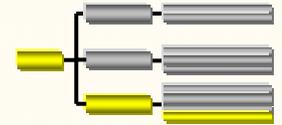
# Receptor Factor – Types of Activities/Structures (cont)



- Assesses the nature of the population near the hazard
- Example classifications include –
  - ◆ Within an MRS and extending two miles outward from the MRS's boundary, there are residential, educational, commercial, or subsistence activities conducted; receives highest classification score (5 points)
  - ◆ Within an MRS and extending two miles outward from the MRS's boundary, there are no known or recurring activities; receives lowest classification score (1 point)
- Provides an indication of the –
  - ◆ Extent, type, and intrusiveness of activities at an MRS
  - ◆ Likelihood of people being on or within a two-mile radius of an MRS
  - ◆ Accounts for permanent and transient populations



# Receptor Factor – Ecological and/or Cultural Resources



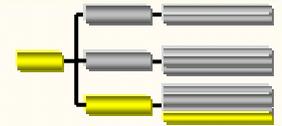
## Ecological and/or Cultural Resources Data Element Classifications (Max. 5 Points)

<u>Classification</u>	<u>Point Value</u>
Ecological and cultural resources present	5
Ecological resources present	3
Cultural resources present	3
No ecological or cultural resources present	0



# Receptor Factor – Ecological and/or Cultural Resources (cont)

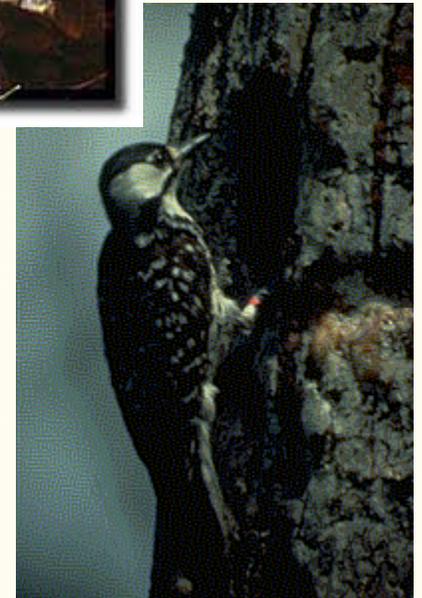
- Considers threatened/endangered species, critical habitats, historical sites, cultural items, American Indian and Alaska Native sacred sites, and other similar resources on the MRS
- Example classifications include –
  - ◆ Ecological and cultural resources are both present on the MRS; receives highest classification score (5 points)
  - ◆ No ecological or cultural resources are present on the MRS; receives lowest classification score (0 points)
- Focuses only on resources found on the MRS, not those outside the boundary



*Desert Tortoise*



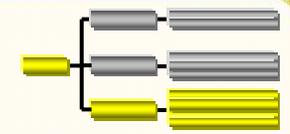
*Petroglyph*



*Red-Cockaded Woodpecker*

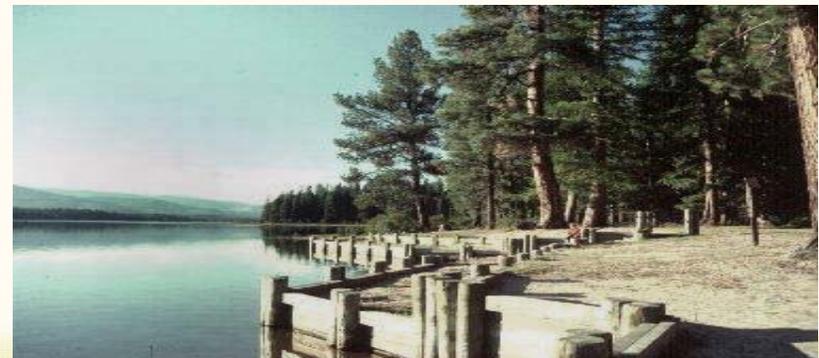


# Receptor Factor – Example



- An MRS, which was home to American Indians, is –
  - ◆ Located within a 500-square mile national forest
  - ◆ Contains important historical sites, numerous endangered species, natural rock formations, and water bodies
  - ◆ Daily, schools tour the national forest and seven buildings (i.e., a former trading post, five classrooms, and a lodge for the caretaker [the only person living in the area]) located within two miles of the MRS's boundary
- The population density of the surrounding counties is less than 100 persons per square mile

**What is the Receptor Factor Value?**



*Ecological receptors*



## Table 6

### EHE Module: Population Density Data Element Table

**DIRECTIONS:** Below are three classifications for population density and their descriptions. Determine the population density per square mile that most closely corresponds with the population of the MRS, including the area within a two-mile radius of the MRS's perimeter. Circle the most appropriate score.

**Note:** Use the U.S. Census Bureau tract data available to capture the **highest** population density within a two-mile radius of the perimeter of the MRS.

Classification	Description	Score
> 500 persons per square mile	♦ There are more than 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	5
100–500 persons per square mile	♦ There are 100 to 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	3
< 100 persons per square mile	♦ There are fewer than 100 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	1
POPULATION DENSITY	<b>DIRECTIONS:</b> Record <b>the single highest score</b> from above in the box to the right (maximum score = 5).	1

**DIRECTIONS:** Document any MRS-specific data used in selecting the **Population Density** classification in the space provided.

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Use Tables 6, 7, 8, and 9 to calculate the Receptor Factor

Circle all applicable data element classifications

Record only the single highest classification score

Document any MRS-specific data used in selecting the hazard classifications here

### Table 7

#### EHE Module: Population Near Hazard Data Element Table

**DIRECTIONS:** Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the potential population near the MRS. Determine the number of inhabited structures within two miles of the MRS boundary and circle the score that corresponds with the number of inhabited structures.

**Note:** The term *inhabited structures* is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	♦ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	5
16 to 25 inhabited structures	♦ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	♦ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	3
6 to 10 inhabited structures	♦ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	♦ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	♦ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
<b>POPULATION NEAR HAZARD</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	2

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Population Near Hazard* classification in the space provided.

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**Use Tables 6, 7, 8, and 9 to calculate the Receptor Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

**Table 8**

**EHE Module: Types of Activities/Structures Data Element Table**

**DIRECTIONS:** Below are five classifications of activities and/or inhabited structures and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the scores that correspond with **all** the activities/structure classifications at the MRS.

**Note:** The term *inhabited structure* is defined in Appendix C of the Primer.

Classification	Description	Score
Residential, educational, commercial, or subsistence	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering.</li> </ul>	5
Parks and recreational areas	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses.</li> </ul>	4
Agricultural, forestry	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry.</li> </ul>	3
Industrial or warehousing	<ul style="list-style-type: none"> <li>Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing.</li> </ul>	2
No known or recurring activities	<ul style="list-style-type: none"> <li>There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary.</li> </ul>	1
<b>TYPES OF ACTIVITIES/STRUCTURES</b>	<b>DIRECTIONS:</b> Record <b>the single highest score</b> from above in the box to the right (maximum score = 5).	<b>5</b>

**Use Tables 6, 7, 8, and 9 to calculate the Receptor Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**Document any MRS-specific data used in selecting the hazard classifications here**

**DIRECTIONS:** Document any MRS-specific data used in selecting the *Types of Activities/Structures* classifications in the space provided.

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**Table 9**

**EHE Module: Ecological and/or Cultural Resources Data Element Table**

**DIRECTIONS:** Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resources present on the MRS.

**Note:** The terms *ecological resources* and *cultural resources* are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	♦ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	♦ There are ecological resources present on the MRS.	3
Cultural resources present	♦ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	♦ There are no ecological resources or cultural resources present on the MRS.	0
<b>ECOLOGICAL AND/OR CULTURAL RESOURCES</b>	<b>DIRECTIONS:</b> Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<b>5</b>

**Use Tables 6, 7, 8, and 9 to calculate the Receptor Factor**

**Circle all applicable data element classifications**

**Record only the single highest classification score**

**DIRECTIONS:** Document any MR-s pecific data used in selecting the *Ecological and/or Cultural Resources* classification in the space provided.

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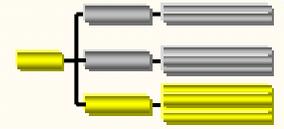
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**Document any MRS-specific data used in selecting the hazard classifications here**

# Receptor Factor Example Review



- To calculate the Receptor Factor Value, sum the single highest classification scores from Tables 6, 7, 8, and 9
- *Receptor Factor Value – 13 Points*
  - ◆ The population density data element is <100 persons per square mile (1 point)
  - ◆ There are seven inhabited structures near the hazard (2 points)
  - ◆ Since there are classrooms and a residential unit, the types of activities/structures are classified as residential/educational (5 points)
  - ◆ There are both ecological and cultural resources (5 points)



# Determining EHE Module Rating

- Table 10 is used to determine the EHE Module Rating
  - ◆ The data element scores are recorded on Table 10 and summed together to calculate the three factor values
  - ◆ The three factor values are summed to determine the EHE Module Total
  - ◆ The Module Total corresponds to a letter rating found at the bottom of Table 10 that becomes the EHE Module Rating
- An MRS can also receive one of three alternative module ratings –
  - ◆ Evaluation Pending
  - ◆ No Longer Required
  - ◆ No Known or Suspected Explosive Hazard
- The EHE Module Rating will be used to determine the MRS's relative priority based on known or suspected explosive hazards



**Table 10**  
Determining the EHE Module Rating

Source    Score    Value

**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.

Explosive Hazard Factor Data Elements		
Munitions Type	Table 1	
Source of Hazard	Table 2	
Accessibility Factor Data Elements		
Location of Munitions	Table 3	
Ease of Access	Table 4	
Status of Property	Table 5	
Receptor Factor Data Elements		
Population Density	Table 6	
Population Near Hazard	Table 7	
Types of Activities/Structures	Table 8	
Ecological and/or Cultural Resources	Table 9	
<b>EHE MODULE TOTAL</b>		
<b>EHE Module Total</b>	<b>EHE Module Rating</b>	
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	
<b>EHE MODULE RATING</b>		

Enter the Explosive Hazard Factor Value by summing the appropriate data element scores

Enter the Accessibility Factor Value by summing the appropriate data element scores

Enter the Receptor Factor Value by summing the appropriate data element scores

Add the three factor values

Select the Module Rating that corresponds with the Module Total calculated above

Record the Module Rating in the Module Rating box

# Explosive Hazard Evaluation Module

## Questions?

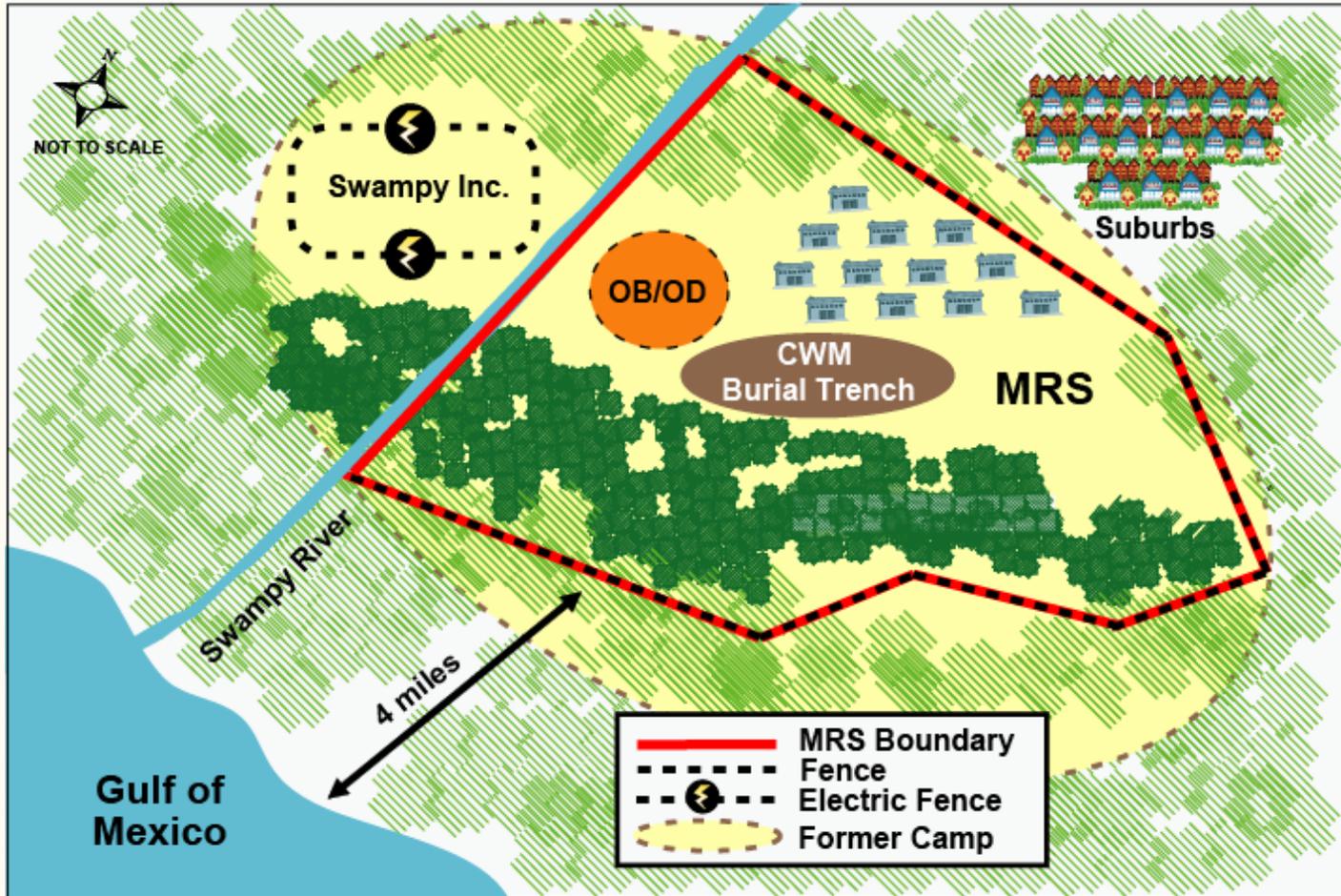


# Camp Swampy Example

- Former Camp Swampy is located about four miles from the Gulf of Mexico. The Swampy River flows through the Camp and discharges into the Gulf. The river is frequently used for recreational purposes
- The MRS is located on the eastern portion of the former Camp Swampy. The MRS is a state wildlife refuge containing three endangered species. The MRS is partially fenced and unmonitored
- The western half of Camp Swampy was sold to Swampy Inc. in 1993 and is surrounded by an electric fence
- The northern half of the Camp Swampy MRS contains 12 unused buildings, but a town with 600 houses and a population density of 125 people per square mile is only 1 mile away



# Camp Swampy Example



# Camp Swampy Example

- Munitions of all types were stored at Camp Swampy
- The OB/OD site was primarily used to detonate white phosphorus munitions and 8 inch artillery projectiles containing high explosives, and to burn unserviceable propellants
- A confirmed incident report indicates munitions were found on the surface near the former OB/OD



*Exposed white phosphorus*

**What is the EHE Module Rating for Camp Swampy?**



# EHE Module Rating

**Table 10**  
Determining the EHE Module Rating

- DIRECTIONS:**
- From Tables 1–9, record the data element scores in the **Score** boxes to the right.
  - Add the **Score** boxes for each of the three factors and record this number in the **Value** boxes to the right.
  - Add the three **Value** boxes and record this number in the **EHE Module Total** box below.
  - Circle the appropriate range for the **EHE Module Total** below.
  - 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
<b>Explosive Hazard Factor Data Elements</b>			
Munitions Type	Table 1	30	38
Source of Hazard	Table 2	08	
<b>Accessibility Factor Data Elements</b>			
Location of Munitions	Table 3	25	
Ease of Access	Table 4	08	38
Status of Property	Table 5	05	
<b>Receptor Factor Data Elements</b>			
Population Density	Table 6	03	
Population Near Hazard	Table 7	05	16
Types of Activities/Structures	Table 8	05	
Ecological and/or Cultural Resources	Table 9	03	
<b>EHE MODULE TOTAL</b>			92
<b>EHE Module Total</b>	<b>EHE Module Rating</b>		
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		
<b>EHE MODULE RATING</b>	<b>A</b>		

White phosphorous munitions  
OB/OD pits

Incident report confirms munitions on the surface  
Fence is incomplete  
Non-DoD Controlled

Population Density= 100-500 p/sq mi  
Nearby town >26 inhabited structures  
Residential area <2 miles away  
Ecological Resources – 3 Endangered species

Add the three factor values recorded above

Select the Module Rating that corresponds with the module total calculated above

Record the Module Rating in the EHE Module Rating box