



Installation Restoration Program



Air Force Civil Engineer Center

Air Force Civil Engineer Center (AFCEC)

Introduction to the Munitions Response Site Prioritization Protocol (MRSPP)

Jon Davis, Sol Solutions
JBCC Cleanup Team Meeting
12 April 2023

OUTLINE

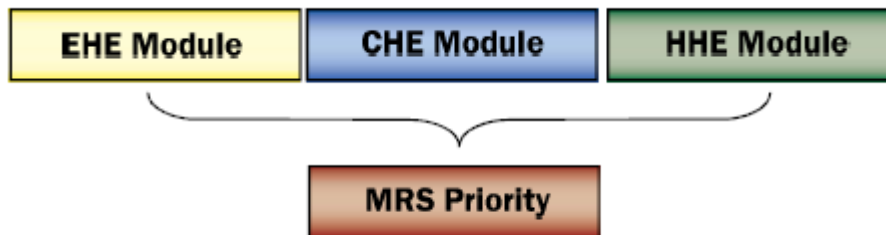
- What is the MRSPP?
- Elements of the MRSPP
- Example MRSPP (Abbreviated)
- MRSPP – Future JBCCCT Activity

What is the Munitions Response Site Prioritization Protocol (MRSP)?

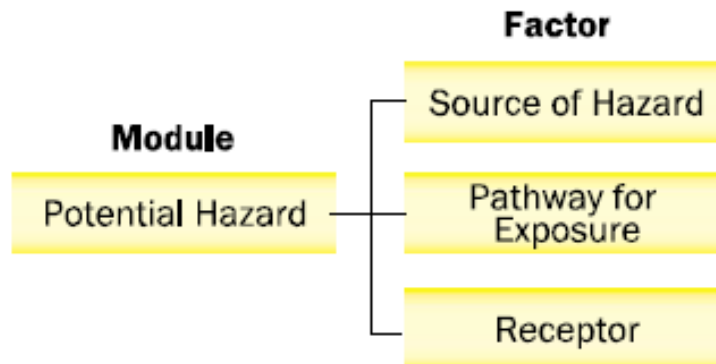
- Reminder – the AFCEC Environmental Response Program is divided into two separate sub-programs:
 - Installation Restoration Program (IRP)
 - Military Munitions Response Program (MMRP)
- Sites being addressed under the MMRP are called Munitions Response Sites (MRS).
 - A Munitions Response Area (MRA) – a suspected area of concern - can be divided into multiple MRSs.
- The **MRSP assigns a relative priority** for munitions response actions based on the overall conditions at the MRS.
- The relative priority is a factor in sequencing response actions – other factors include:
 - Findings of health, safety or ecological risk assessments or evaluations
 - Concerns expressed by stakeholders
 - Reasonable anticipated land use
 - Programmatic (e.g., implementation and execution) considerations
 - The capability of technology to detect, discriminate, recover and destroy military munitions
 - Cultural, social and economic factors

Elements of the MRSPP

- Each MRSPP comprises a background (Table A) and a series of worksheets (#1 – #29) divided into three Modules:
 - Explosive Hazard Evaluation (EHE) Module
 - Chemical Warfare Materiel Hazard Evaluation (CHE) Module
 - Health Hazard Evaluation (HHE) Module



- Each Module comprises three Factors:



Example MRSP - DoD Property MRS (Old Grenade Courts MRA)

Table A - Background

Table A
MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the **MRS Summary**, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental non munitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

Munitions Response Site Name: DoD Property (MMR-003-R-01)

Component: Army National Guard

Installation/Property Name: Joint Base Cape Cod

Location (City, County, State): Joint Base Cape Cod, Barnstable County, MA

Site Name/Project Name (Project No.): Old Grenade Courts / Joint Base Cape Cod Military Munitions Response Program Comprehensive Site Evaluation Phase II Supplemental Investigation, Project No. MA03520XX8912PB

Date Information Entered/Updated: 13 February 2023

Point of Contact (Name/Phone): Rose Forbes / (508) 968-4670 x 5613

Project Phase (check only one):

<input type="checkbox"/> PA	<input checked="" type="checkbox"/> SI	<input type="checkbox"/> RI	<input type="checkbox"/> FS	<input type="checkbox"/> RD
<input type="checkbox"/> RA-C	<input type="checkbox"/> RIP	<input type="checkbox"/> RA-O	<input type="checkbox"/> RC	<input type="checkbox"/> LTM

Media Evaluated (check all that apply):

<input type="checkbox"/> Groundwater	<input type="checkbox"/> Sediment (human receptor)
<input checked="" type="checkbox"/> Surface soil	<input type="checkbox"/> Surface Water (ecological receptor)
<input type="checkbox"/> Sediment (ecological receptor)	<input type="checkbox"/> Surface Water (human receptor)

MRS Summary:

MRS Description: Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM, or MC known or suspected to be present. When possible, identify munitions, CWM, and MC by type:

The MRS was used during the 1940s and potentially into the 1950s by the Army for training in the handling and throwing of dummy/practice grenades and live grenades. Two former live grenade courts and five former practice grenade courts are located entirely within the DoD Property MRS. Potential munitions use on the MRS was limited to live grenades (high explosive [HE] Mk2) at the two live grenade courts and practice/dummy (i.e., inert) grenades (Mk1A1) at the practice courts.

A CSE Phase II Supplemental Investigation was conducted which included a surface and subsurface investigation of the two live grenade courts for MEC. MEC and MDEH were found at the DoD Property MRS in the live grenade courts including one Mk 2 grenade and grenade fuzes as well as grenade related MD (M15 white phosphorus grenade remnants, M2 igniters, and Mk 2 grenade frag) consistent with the site historical use and CSM. Unrelated MD associated with other military installation uses include buried DMM in the form of thirteen 2.36-in. practice rockets (wax-filled) and associated fuzes were also found. There is no history of CWM use at JBCC.

The CHE Module has an alternative score of NKSH as there is no history of CWM use at JBCC-Camp Edwards.

Description of Pathways for Human and Ecological Receptors:

MEC: MEC could be transported via soil to human receptors. The human pathway is potentially complete, as evidence of MEC/ MDEH was identified during the Supplemental Investigation. An incomplete MEC pathway is expected for biota.

MC: All pathways (soil, surface water/sediment, and groundwater) are incomplete to human receptors and biota. No source of MC was identified during the CSE Phase II Investigation and CSE Phase II Supplemental Investigation.

Table A
MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the **MRS Summary**, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental non munitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

Description of Receptors (Human and Ecological):

MEC: Potential receptors at the MRS include authorized installation personnel and contractors, recreational users and visitors, trespassers, future residents and biota.

Stakeholder Involvement: All below cited meetings included a Public Notice in area newspapers.

A Massachusetts Military Reservation Cleanup Team (MMRCT – RAB equivalent) meeting was held on 12 Feb 2014 at the conclusion of the CSE Ph I for all JBCC (then called MMR) MRAs including the Grenade Courts MRA (w/DoD Property MRS). Discussion included the MRSP as an output of the CSE Ph I and the major conclusions of the CSE Ph I including the recommendation for the Grenade Courts MRA (w/DoD Property MRS) to proceed to a CSE Ph II.

A Joint Base Cape Cod Cleanup Team (JBCCCT – RAB equivalent) meeting was held on 29 Aug 2018 at the conclusion of the CSE Ph II for all JBCC MRAs including the Grenade Courts MRA (w/DoD Property MRS). Discussion included the recommendation for the Grenade Courts MRA (w/DoD Property MRS) to proceed to a streamlined RI/FS and PP/ROD.

A JBCCCT meeting was held on 24 Mar 2021. Discussion included the revised approach for the Grenade Courts MRA (w/DoD Property MRS) to proceed to an Expanded CSE Ph II Investigation.

A JBCCCT meeting was held on 3 Aug 2022. Discussion included the on-going investigation at the Grenade Courts MRA (w/DoD Property MRS) as part of an Expanded CSE Ph II Investigation.

References for Table A:

- Comprehensive Site Evaluation Phase II Report (CSE Ph II) dated Feb 2018
 - Section 5.5.7, Page 5-15 (potential receptors)
- Draft Addendum 2: Comprehensive Site Evaluation Phase II Report Supplemental Investigation, Old Grenade Courts MRA dated Dec 2022
 - Section 2.2, Page 2-1 (MRS activities, dates, suspected munitions)
 - Section 4.1, Page 4-1; Table 3-2, Page 3-9; Table 3-3, Page 3-9 (known munitions)
 - Section 6.2, Page 6-3 (CWM Use)
 - Section 3.8.5, Page 3-11 (non-existent MC risk)
 - Section 4.1.1, Pages 4-2 thru 4-4 (MEC pathways and receptors)
- MMRCT MMRP Slide Deck dated 12 Feb 2014 (Stakeholder Involvement)
- JBCCCT MMRP Slide Deck dated 29 Aug 2018 (Stakeholder Involvement)
- JBCCCT MMRP Slide Deck dated 24 Mar 2021 (Stakeholder Involvement)
- JBCCCT MMRP Slide Deck dated 3 Aug 2022 (Stakeholder Involvement)

References for Remainder of MRSP Tables:

- Comprehensive Site Evaluation Phase II Report (CSE Ph II) dated Feb 2018
- Draft Addendum 2: Comprehensive Site Evaluation Phase II Report Supplemental Investigation, Old Grenade Courts MRA dated Dec 2022

Example MRSP – DoD Property MRS (Old Grenade Courts MRA)

Explosive Hazard Evaluation (EHE) Module - Abbreviated

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"> 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)	<ul style="list-style-type: none"> UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." DMM containing a high-explosive filler that have: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	25
Pyrotechnic (used or damaged)	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	20
High explosive (unused)	<ul style="list-style-type: none"> DMM containing a high-explosive filler that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	15
Propellant	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Damaged by burning or detonation Deteriorated to the point of instability. 	15
Bulk secondary high explosives, pyrotechnics, or propellant	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> DMM containing a pyrotechnic filler (i.e., red phosphorus), other than white phosphorus filler, that: <ul style="list-style-type: none"> Have not been damaged by burning or detonation Are not deteriorated to the point of instability. 	10
Practice	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Been damaged by burning or detonation Deteriorated to the point of instability. 	5
Riot control	<ul style="list-style-type: none"> UXO or DMM containing a riot control agent filler (e.g., tear gas). 	3
Small arms	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 <u>single highest score</u> from above in the box to the right (maximum score = 30).	30

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
Explosive Hazard Factor Data Elements		
Munitions Type	Table 1	30
Source of Hazard	Table 2	10
Accessibility Factor Data Elements		
Location of Munitions	Table 3	20
Ease of Access	Table 4	10
Status of Property	Table 5	0
Receptor Factor Data Elements		
Population Density	Table 6	5
Population Near Hazard	Table 7	5
Types of Activities/Structures	Table 8	5
Ecological and/or Cultural Resources	Table 9	3
EHE MODULE TOTAL		88
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	

Example MRSP – DoD Property MRS (Old Grenade Courts MRA)

Chemical Warfare Materiel Hazard Evaluation (CHE) Module - Abbreviated

- No history of Chemical Warfare Materiel (CWM) use at JBCC
- All JBCC MRSs have a “No Known Or Suspected CWM Hazard” Score

Table 20 Determining the CHE Module Rating				
	Source	Score	Value	
<p>DIRECTIONS:</p> <ol style="list-style-type: none"> From Tables 11–19, 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 CHE Module Total box below. Circle the appropriate range for the CHE Module Total below. 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. <p>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.</p>	CWM Hazard Factor Data Elements			
	CWM Configuration	Table 11	0	0
	Sources of CWM	Table 12		
	Accessibility Factor Data Elements			
	Location of CWM	Table 13		0
	Ease of Access	Table 14		
	Status of Property	Table 15		
	Receptor Factor Data Elements			
	Population Density	Table 16		0
	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: There is no history of CWM use at JBCC-Camp Edwards.		Evaluation Pending		
		No Longer Required		
		No Known or Suspected CWM Hazard		
CHE MODULE RATING		No Known or Suspected CWM Hazard		

Example MRSP – DoD Property MRS (Old Grenade Courts MRA)

Health Hazard Evaluation (HHE) Module - Abbreviated

Table 26
HHE Module **Surface Soil** - Data Element Table
Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface soil and their comparison values (from Appendix B) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the ratios for each medium together, including additional contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard present in the surface soil, select the box at the bottom of the table.

Contaminant	Maximum Concentration (mg/kg)	Comparison Value (mg/kg)	Ratio
Arsenic	8.4	34	0.18
Copper	17.1 J	3,100	0.005
Cadmium	2.1 J	70	0.03
Chromium	11.7	1,800	0.007
Lead	38.1	400	0.09
CHF Scale	CHF Value	Sum the Ratios	0.43
CHF > 100	H (High)	$CHF = \sum \frac{\text{Maximum Concentration of Contaminant}}{\text{Comparison Value for Contaminant}}$	
100 > CHF > 2	M (Medium)		
2 > CHF	L (Low)		
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record the CHF Value from above in the box to the right (maximum value = H).		L
Migratory Pathway Factor			
DIRECTIONS: Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.			
Classification	Description	Value	
Evident	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.	H	
Potential	Contamination in surface soil has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M	
Confined	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L	
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		M
Receptor Factor			
DIRECTIONS: Circle the value that corresponds most closely to the surface soil receptors at the MRS.			
Classification	Description	Value	
Identified	Identified receptors have access to surface soil to which contamination has moved or can move.	H	
Potential	Potential for receptors to have access to surface soil to which contamination has moved or can move.	M	
Limited	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.	L	
RECEPTOR FACTOR	DIRECTIONS: Record the single highest value from above in the box to the right (maximum value = H).		M
No Known or Suspected Surface Soil MC Hazard			<input type="checkbox"/>

Table 28
Determining the HHE Module Rating

DIRECTIONS:

- 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.
- 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).
- Using the reference 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)	NA	NA	NA	NA	NA
Surface Water/Human Endpoint (Table 22)	NA	NA	NA	NA	NA
Sediment/Human Endpoint (Table 23)	NA	NA	NA	NA	NA
Surface Water/Ecological Endpoint (Table 24)	NA	NA	NA	NA	NA
Sediment/Ecological Endpoint (Table 25)	NA	NA	NA	NA	NA
Surface Soil (Table 26)	L	M	M	MML	E

DIRECTIONS (cont.):

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

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

Example MRSP – DoD Property MRS (Old Grenade Courts MRA)

Table 29 - MRS Priority

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 number in the MRS or Alternative Priority box 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	2	A	1	A	2
B	3	B	2	B	3
C	4	C	3	C	4
D	5	D	4	D	5
E	6	E	5	E	6
F	7	F	6	F	7
G	8	G	7	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 or ALTERNATIVE PRIORITY				3	

- Scores from the three Modules are entered here.
- The Highest priority score from the three modules determines the overall MRS priority.
- In this case, the priority “3” score from the Explosive Hazard Evaluation is assigned as the MRS priority.

MRSP – Future JBCCCT Activity

- Future MMRP presentations will include discussion of MRSP scores.
 - MRSPs are reviewed annually and will be updated based on new information or cleanup progress.
 - AFCEC will seek JBCCCT feedback on MRSPs.
 - Type of feedback may help focus future MRSP discussion with JBCCCT.
 - Some score sheets may need a discussion while others are routine.
-
- QUESTIONS?