DERP Forum

Strengthening Relationships with our Regulatory Partners

St. Louis, Missouri

May 8-9, 2019

Military Munitions Response Program Remedial Alternatives, Achieving the Remedial Objective, Land Use Controls and 5-Year Reviews

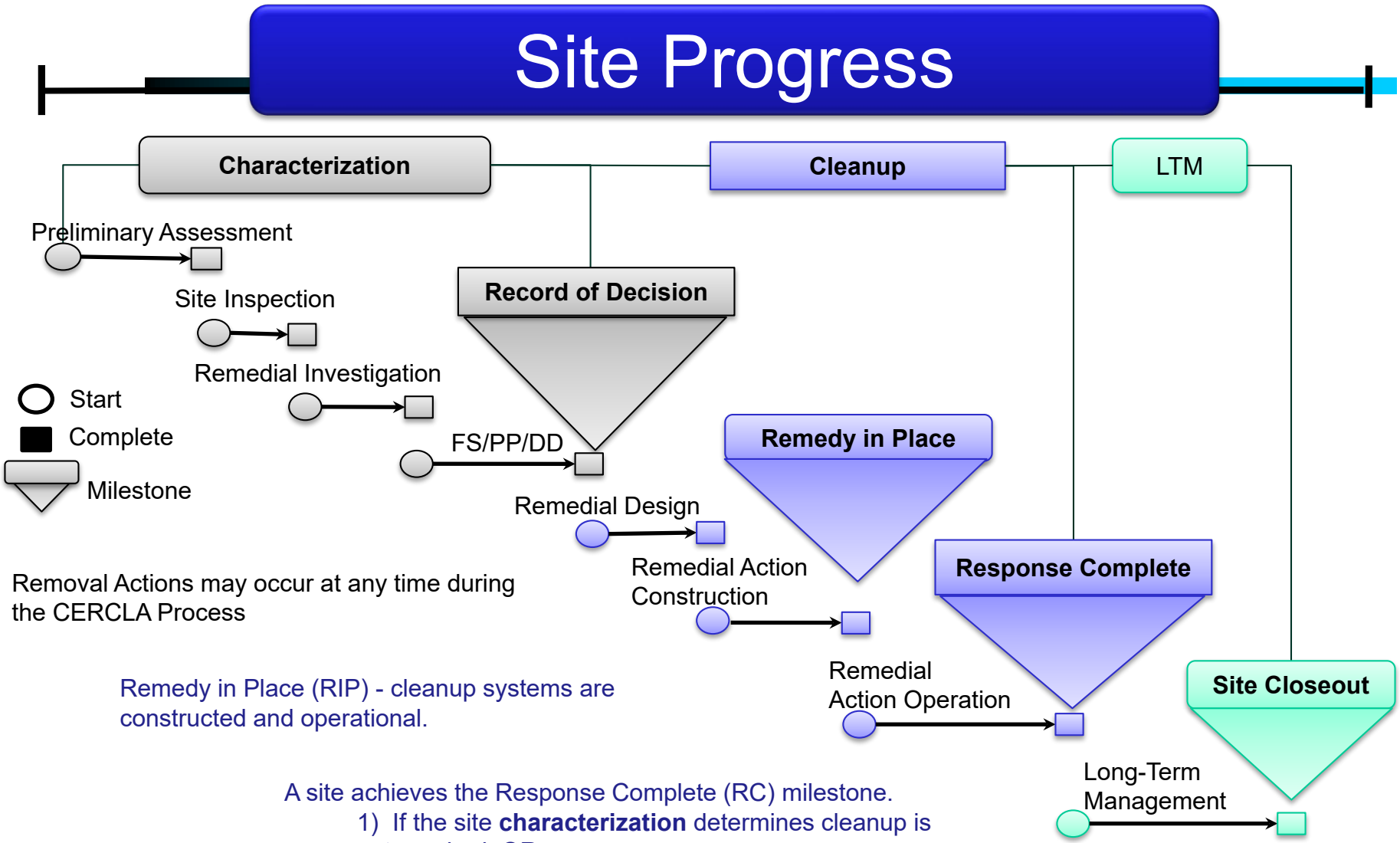
DERP FORUM

May 2019

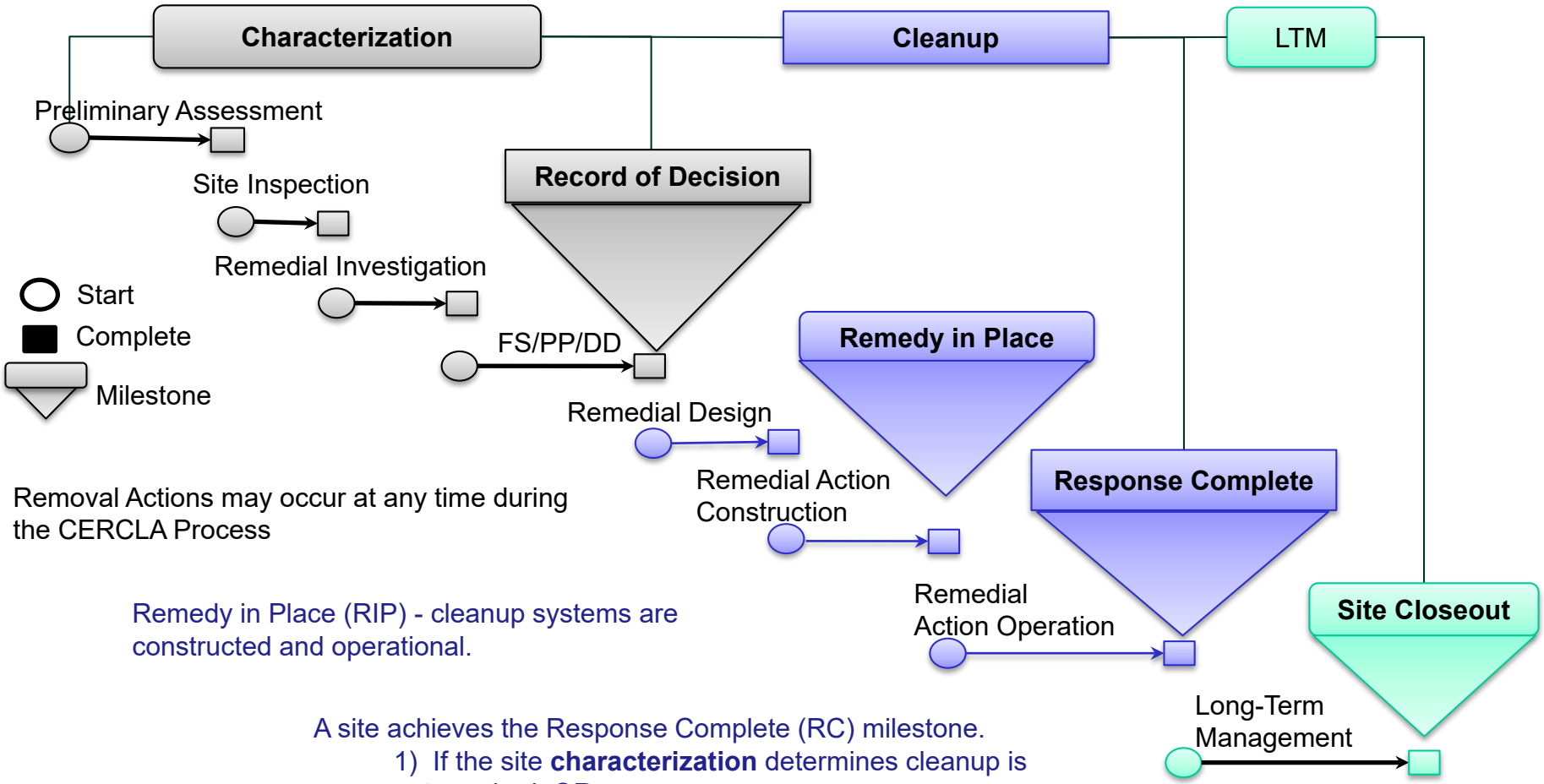
Agenda

- ROAD MAP: Where we are in the Process
  - Identified Unacceptable Scenario
- Case Study: Conceptual Site Model (CSM)
- Interactive - Develop Alternatives
  - Select an Alternative
- Revisit Data Usability and Confidence
  - Post Remedy Assessment
- Residual Risk
  - Land Use Controls
  - 5-Year Reviews

Site Progress



Site Progress



Removal Actions may occur at any time during the CERCLA Process

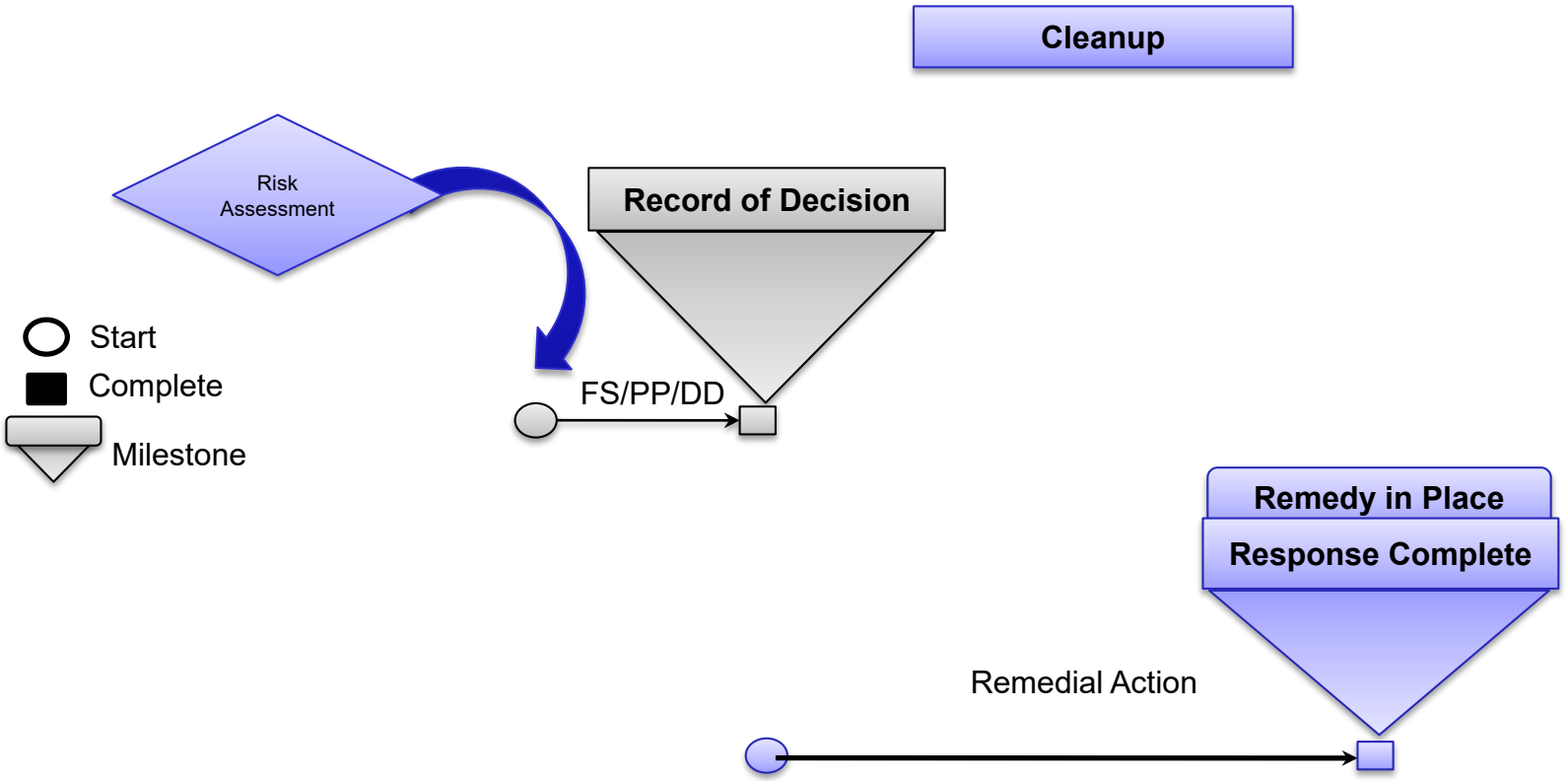
Remedy in Place (RIP) - cleanup systems are constructed and operational.

A site achieves the Response Complete (RC) milestone.

1) If the site **characterization** determines cleanup is not required, OR
2) When **cleanup** work is complete,

Site Closeout indicates that all environmental remediation requirements are complete.

Site Progress



Focus on developing Alternatives that meet the Remedial Objective, and Assessing completeness of Remedial Action.

CSM Review

What we need to know to make decisions…

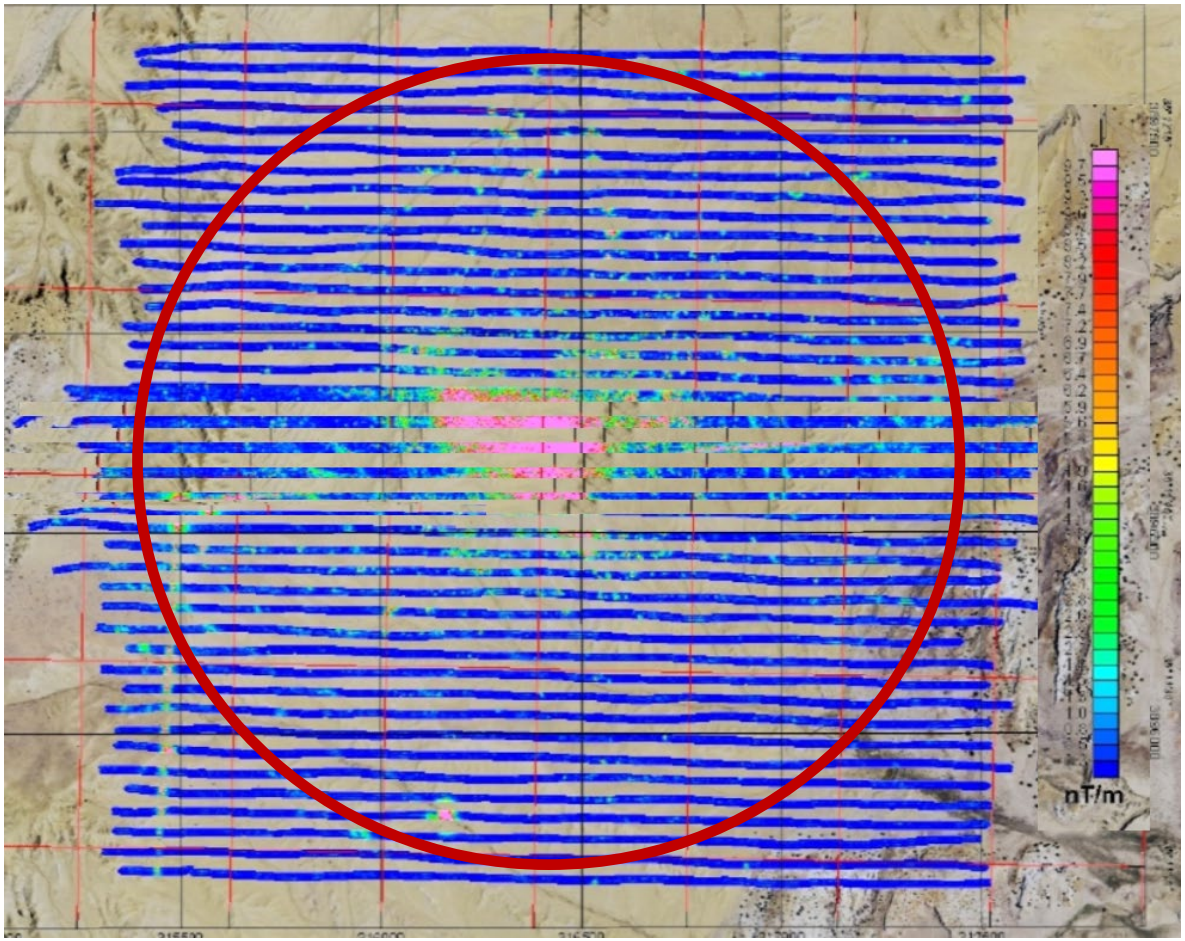
Interactive Site Scenario

- **Historic Air to Ground Bombing Target on an Active Installation**
  - 100 lb Bombs that contain High Explosives (Mk 4 Mod 1)
  - Fuze (AN-M101A1)

- **In class exercise, illustrate finding the target area**
  - Step 1: Find horizontal distribution of anomaly density
  - Step 2: Characterize and find vertical extent of munitions

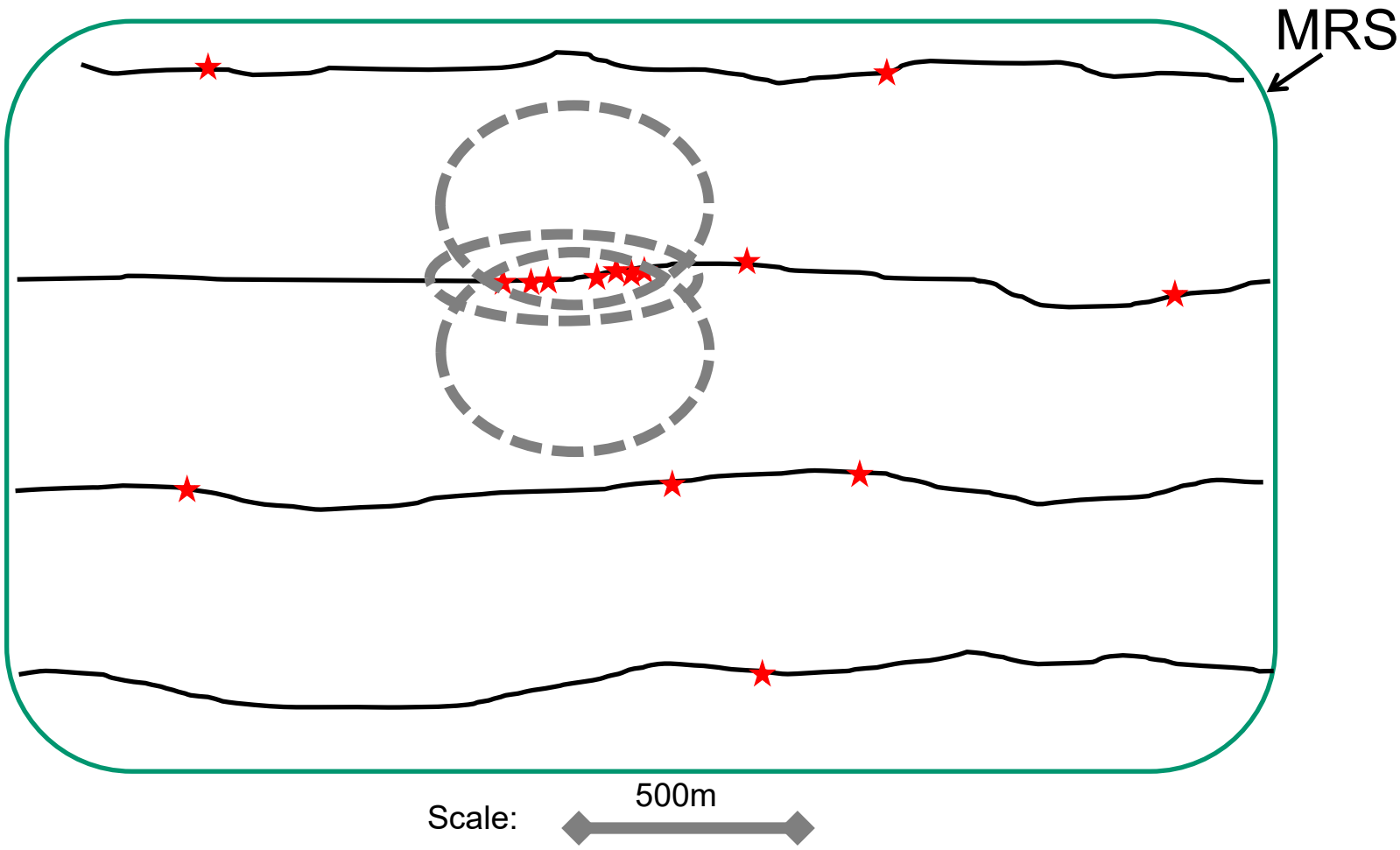
Interactive Exercise:
Horizontal Distribution

Find the Target (High Density Area in the room.



MRS Boundary

Where is the High Density Target Area?



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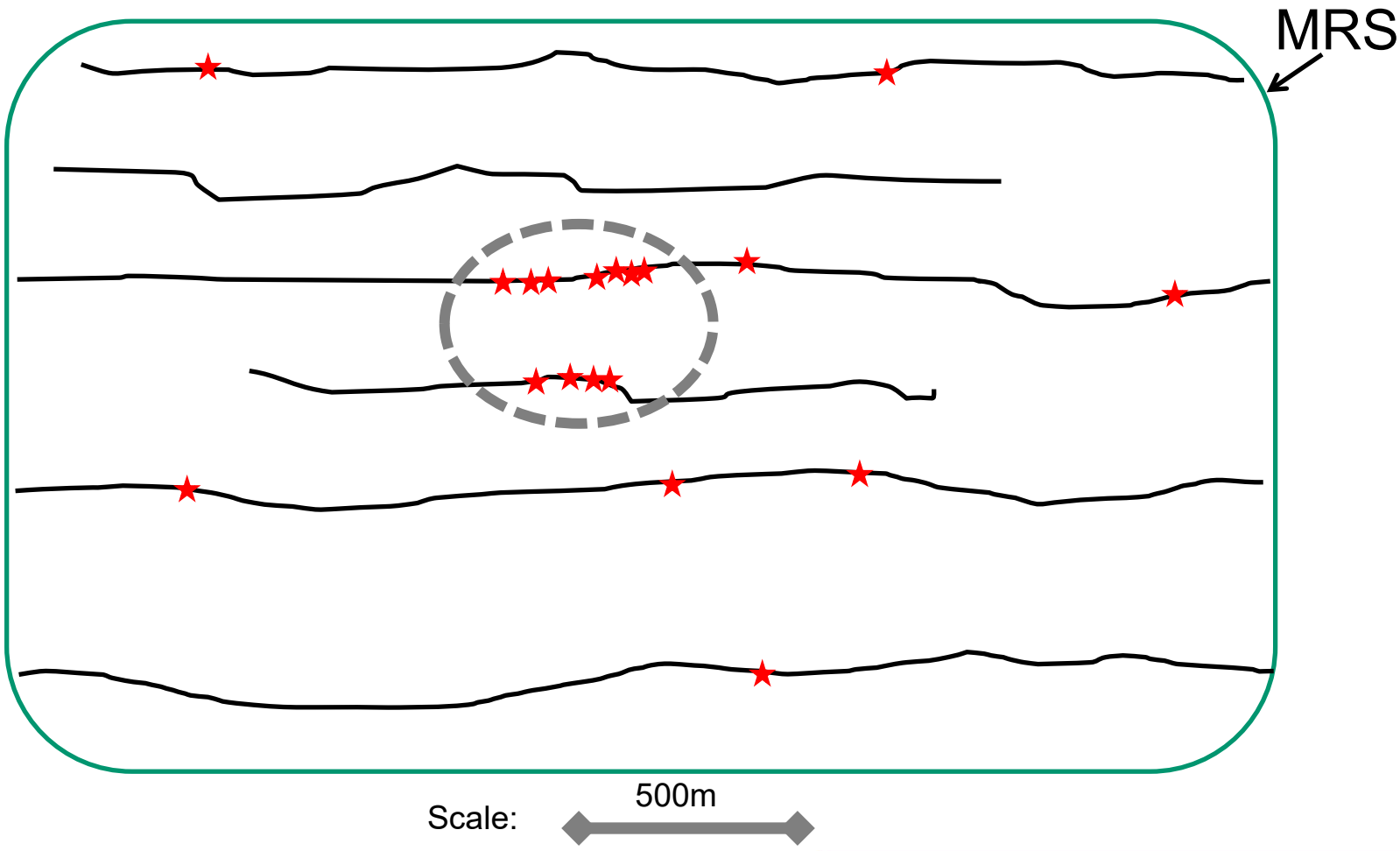


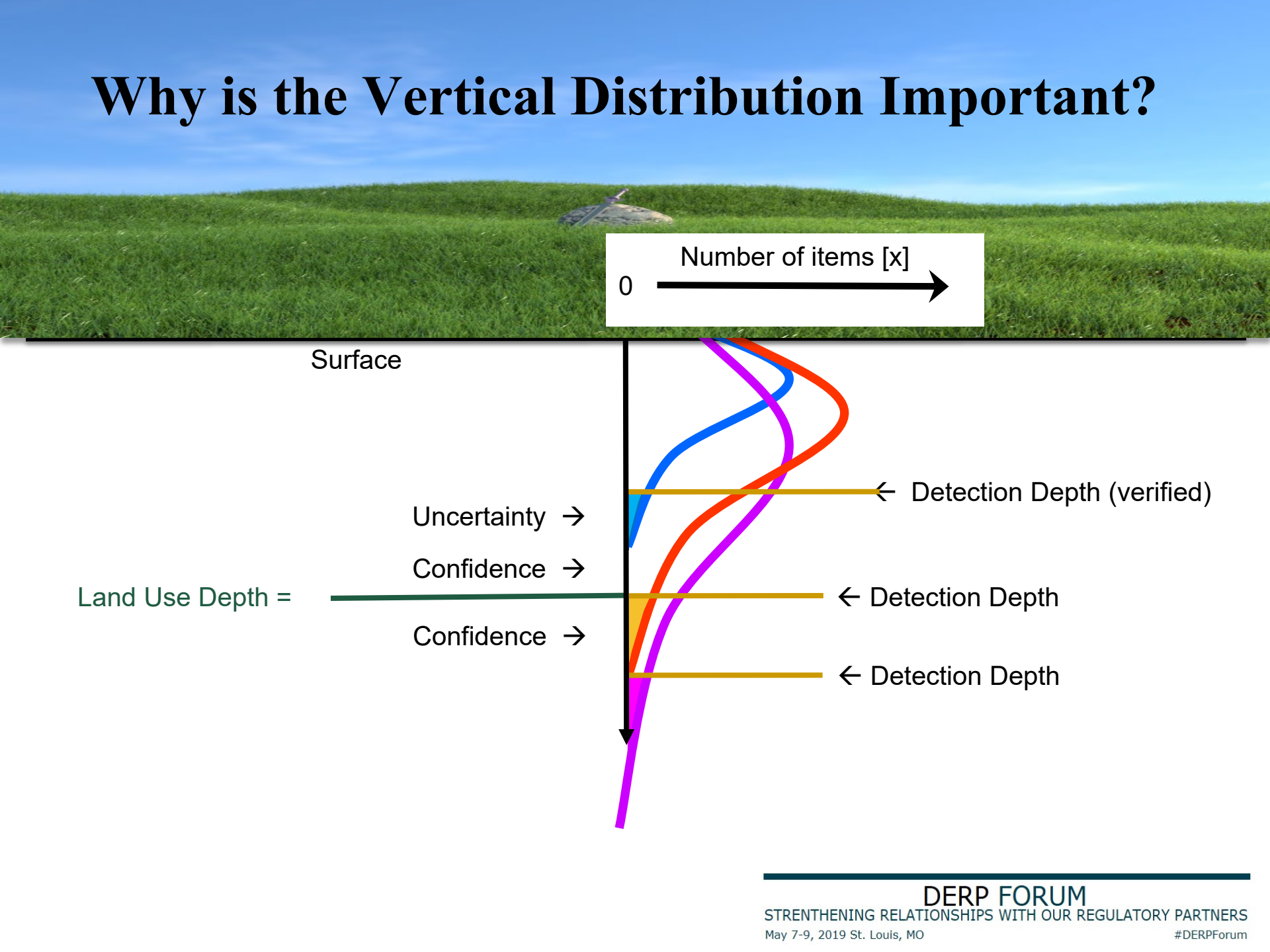
Receptors & Pathway

- **Land Use is now Recreational Area for Base Personnel**
  - Walking Trails, Picnic Areas
  - Adjacent to the Intermural Baseball/ Softball Fields and Housing
  - Recreation is *surface use only* for the foreseeable future
  - Maintenance is performed quarterly (trails, etc.)
- **List Receptors?**
- **Define Vertical Use?**

Define the Vertical Boundary

- **Index Cards randomly handed out**
  - Represents a 100 ft x 100 ft Grid within the MRS
  - Please share characteristics of items found

Why is the Vertical Distribution Important?



NOTICE!

- ***An acceptable remediation goal cannot be defined for an unknown or undefined risk!!***

- ***Two choices:***
  1. *RI is incomplete, need more data*
  2. *No evidence of hazard, No risk, RC*

Plan for the data needed for the decision point.

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

Amount of MEC		Access Conditions (frequency of use)			
		Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
Category I	• MEC is visible on the surface and detected in the subsurface.	Frequent	Frequent	Likely	Occasional
Category II	• The area is identified as a High Density Area (HDA) where an explosive hazard is known or suspected to be present in surface and subsurface (e.g., MD indicates the type of munitions includes an explosive hazard).	Frequent	Likely	Occasional	Seldom
Category III	• The area is not identified as a HDA, although physical evidence (e.g., MD) indicates the munitions includes an explosive hazard).	Likely	Occasional	Seldom	Unlikely
Category IV	• MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or • The area is determined to be a Low Density Area (LDA). • A DERP response action conducted to physically remove surface MEC (subsurface not addressed; known or suspected hazard remains).	Occasional	Seldom	Unlikely	Unlikely
Category V	• MEC presence is suspected based on historical evidence or of munitions use only, or • The area is identified as a Buffer Area. • A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains).	Seldom	Seldom	Unlikely	Unlikely
Category VI	• Investigation of the MRS did not identify evidence of an explosive hazard, or • A DERP response action has been conducted that will achieve UU/UE.	Unlikely	Unlikely	Unlikely	Unlikely

Interactive Case Study (Baseline)

Risk Management Method (RMM)

Likelihood to Encounter

Matrix 1

Likelihood of Encounter (Amount of MEC versus Access Conditions)		Access Conditions (frequency of use)			
		Regular	Often	Intermittent	Rare
Amount of MEC	Category I (Most)	Frequent	Frequent	Likely	Occasional
	Category II	Frequent	Likely	Occasional	Seldom
	Category III	Likely	Occasional	Seldom	Unlikely
	Category IV	Occasional	Seldom	Unlikely	Unlikely
	Category V	Seldom	Seldom	Unlikely	Unlikely
	Category VI (Least)	Unlikely	Unlikely	Unlikely	Unlikely

Severity of Incident

Matrix 2

Severity of Explosive Incident (Severity vs. Likelihood of Encounter)		Likelihood of Encounter (from Matrix 1)				
		Frequent	Likely	Occasional	Seldom	Unlikely
Severity	Catastrophic/Critical	A	A	B	B	D
	Modest	B	B	B	C	D
	Minor	B	C	C	C	D
	Improbable	D	D	D	D	D

Interactive Case Study (Baseline)

Risk Management Method (RMM)

Likelihood for Incident to Occur

Matrix 3

Likelihood of Detonation (Sensitivity vs. Likelihood to Impart Energy)		Likelihood to Impart Energy on an Item		
		High	Modest	Inconsequential
Sensitivity	High	1	1	3
	Moderate	1	2	3
	Low	1	3	3
	Not Sensitive	2	3	3

Resulting Site Conditions

Matrix 4

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

Defining Remedial Objectives (RAOs)

Risk Management Method (RMM)

Supports Remedial Action Objectives

- **RAOs established for each exposure scenario**
- **Identify acceptable conditions for each scenario**

MRS	Receptors	Location	Pathways	MEC Hazard	Vertical (ft bgs)	Baseline Risk	Acceptable Remediation Goals
Impact Areas (HUA)	Recreational users	All portions of impact area	Surface Interaction during hiking and recreation (Non-intrusive)	A1 Fuse	1.5	Unacceptable (B-2)	B-3 or D-2
				Mk4 GP 100lb Bomb	3.0	Unacceptable (A-2)	B-3 or D-2
	Maintenance Crews	Roads and trails plus 15 m buffer	Interaction during trail maintenance (Intrusive)	A1 Fuse	1.5	Unacceptable (B-2)	B-3 or D-1
				Mk4 GP 100lb Bomb	3.0	Unacceptable (B-2)	B-3 or D-1

So We Have an
Unacceptable Risk

Develop Alternatives to the RAO

Risk Management Method (RMM)

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

How do we reach an acceptable scenario??

Develop Alternatives to the RAO

Risk Management Method (RMM)

Matrix 2

Severity of Incident,
Severity vs. Likelihood of Encounter

Severity of Incident Associated with Specific Hazards	Likelihood of MEC Encounter: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic/Critical: May result in 1 or more death or permanent total disability	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

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

Amount of MEC			Access Conditions (frequency of use)			
			Regular (e.g., daily use, open access)	Often (e.g., less regular or periodic use, some access)	Intermittent (e.g., some irregular use, or access limited)	Rare (e.g., very limited use, access prevented)
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	Category IV	• MEC presence is based on isolated historical discoveries (e.g., EOD report) prior to investigation, or • The area is determined to be a Low Density Area (LDA). • A DERP response action conducted to physically remove surface MEC (subsurface not addressed; known or suspected hazard remains).	Occasional	Seldom	Unlikely	Unlikely
	Category V	• MEC presence is suspected based on historical evidence or of munitions use only, or • The area is identified as a Buffer Area. • A DERP response action has been conducted to physically remove surface and subsurface MEC (evidence that some residual hazard remains).	Seldom	Seldom	Unlikely	Unlikely
	Category VI	• Investigation of the MRS did not identify evidence of an explosive hazard, or • A DERP response action has been conducted that will achieve UU/UE.	Unlikely	Unlikely	Unlikely	Unlikely

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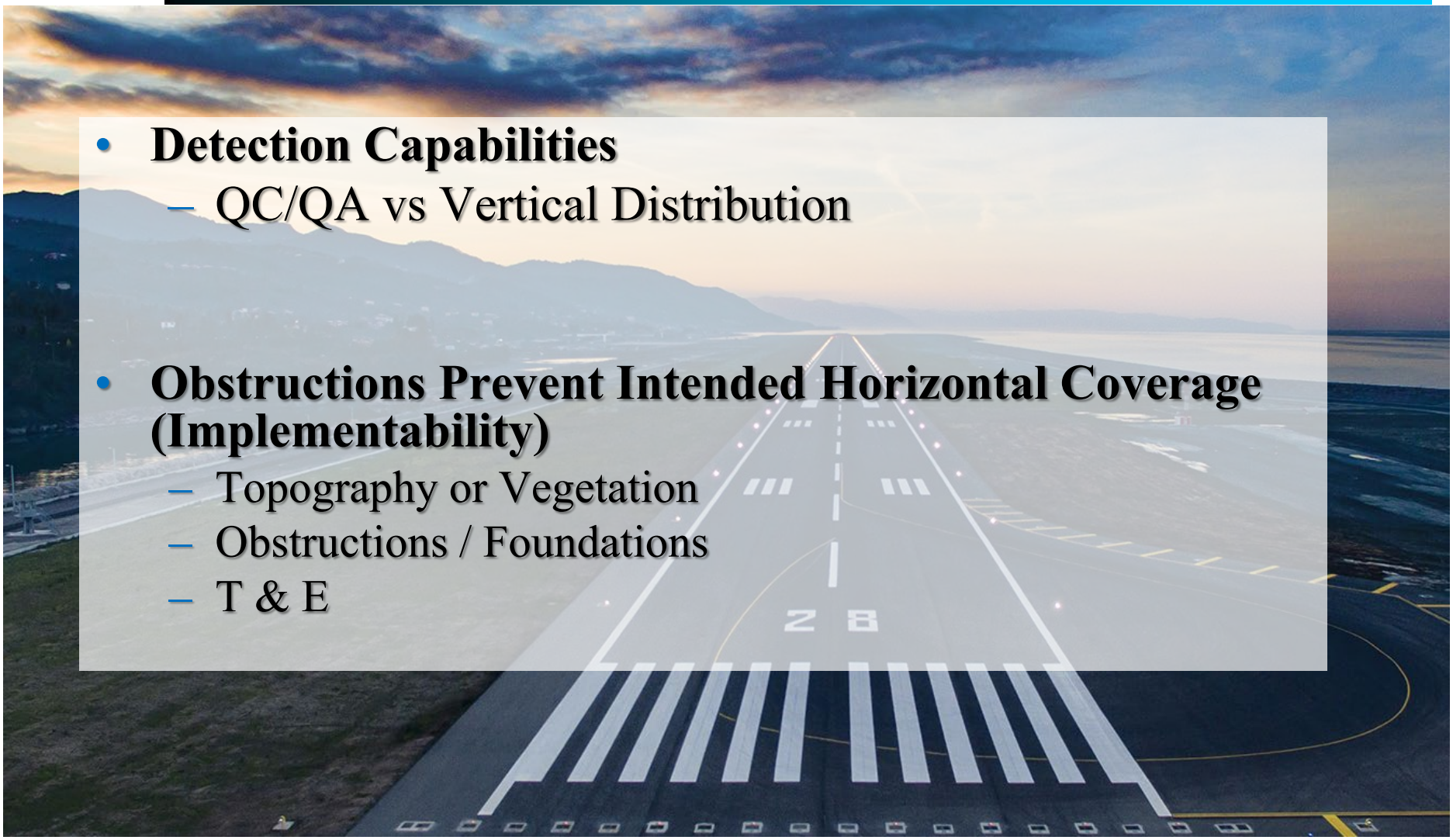
Factors Affecting Confidence in Detection

- **Detection Capabilities**
  - QC/QA vs Vertical Distribution
- **Obstructions Prevent Intended Horizontal Coverage (Implementability)**
  - Topography or Vegetation
  - Obstructions / Foundations
  - T & E

Factors Affecting Confidence in Detection



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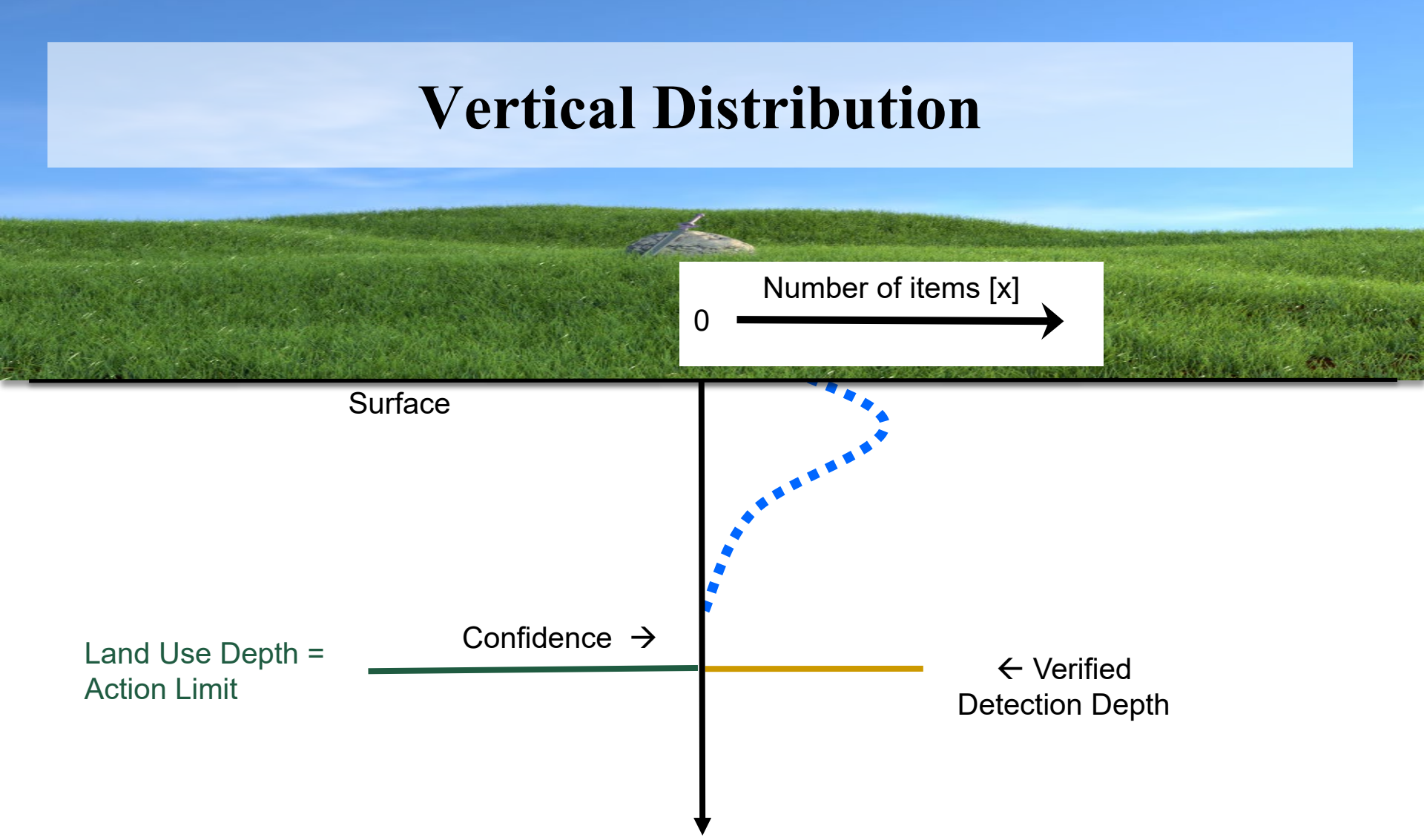
Vertical Distribution



This helps us develop the Remedial Action Objective (RAO)
And Alternatives!

RI
0
5
10
15
20
25
30
Depth (inches)
Depth of Contamination
Land Use Depth
100 lb HE Bomb
Fuzes
MD

Develop Alternatives to the RAO

Risk Management Method (RMM)

Acceptable and Unacceptable Site Conditions		Result from Matrix 2			
		A	B	C	D
Result from Matrix 3	1	Unacceptable	Unacceptable	Unacceptable	Acceptable
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How else do we reach an acceptable scenario??

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Matrix 3:

Likelihood of Detonation
Munitions Sensitivity vs. Likelihood of Energy to be Imparted

		Specific Land Use : Likelihood to Impart Energy		
		High e.g., areas planned for development	Moderate e.g., undeveloped, wildlife refuge, parks	Not Likely e.g., not anticipated, prevented, mitigated
Sensitivity: Susceptibility to Detonation	High Sensitivity	1	1	3
	Moderate Sensitivity High Explosive (HE) (used, unused, or Damaged); or Pyrotechnic (used or Damaged)	1	2	3
	Low Sensitivity Propellant; Bulk Secondary HE, Pyrotechnics or Propellant; Pyrotechnic (not used or damaged)	1	3	3
	Not sensitive	2	3	3

Class Discussion of Alternatives (List here)

Feasibility Study Analysis

	Threshold		Balancing*				
Alternative	**1 Protective**	**2 ARARs**	**3 Long Trm Effectiv'ns**	**4 Reduction of TMV**	**5 Short Trm Effectiv'ns**	**6 Implementability**	**7 Cost**
1 No Action							
2 EC IC LUC							
3 Surf Clear							
4 Surf & Sub Surf Clear							
UU/UE							

* Note, Only 7 criteria here, as the last 2 are in resolution of the public comment period.

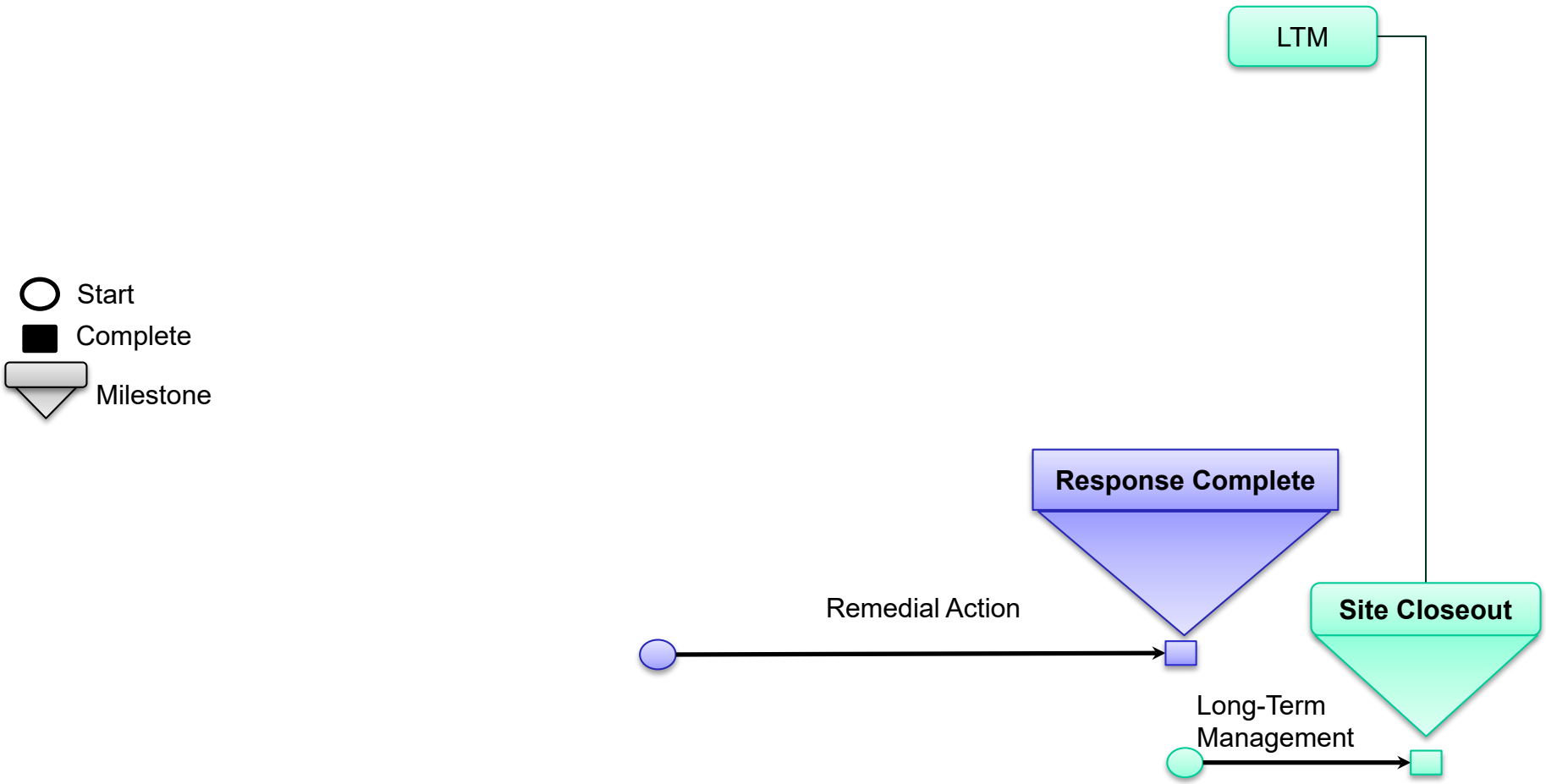
Proposed Plan (PP) & Record of Decision (ROD/DD)

- **Public Notice of Review & Comment**
  - Document Proposed Plan
  - Request Public & State Review

- **Record of Decision**
  - Document Response to Comments
  - Formalize Decision

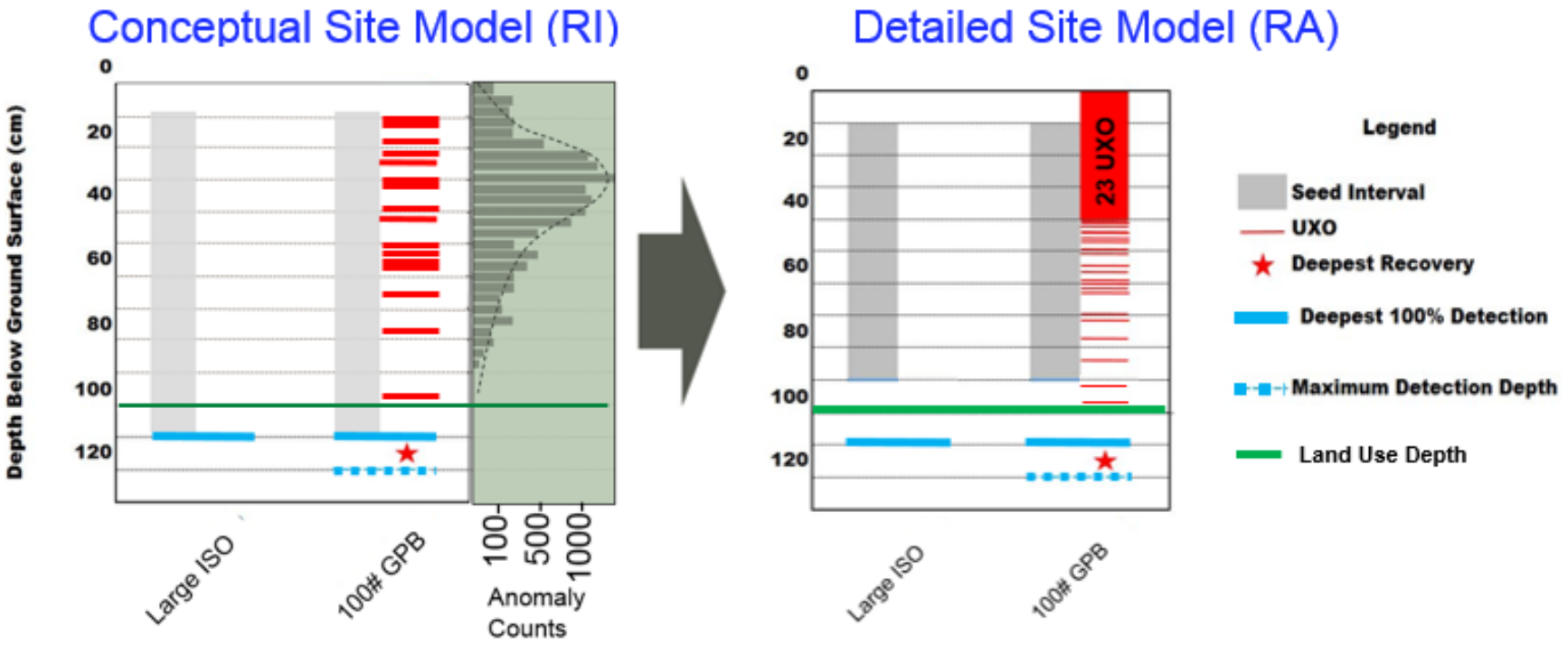
Post Remedy Data Assessment

Site Progress

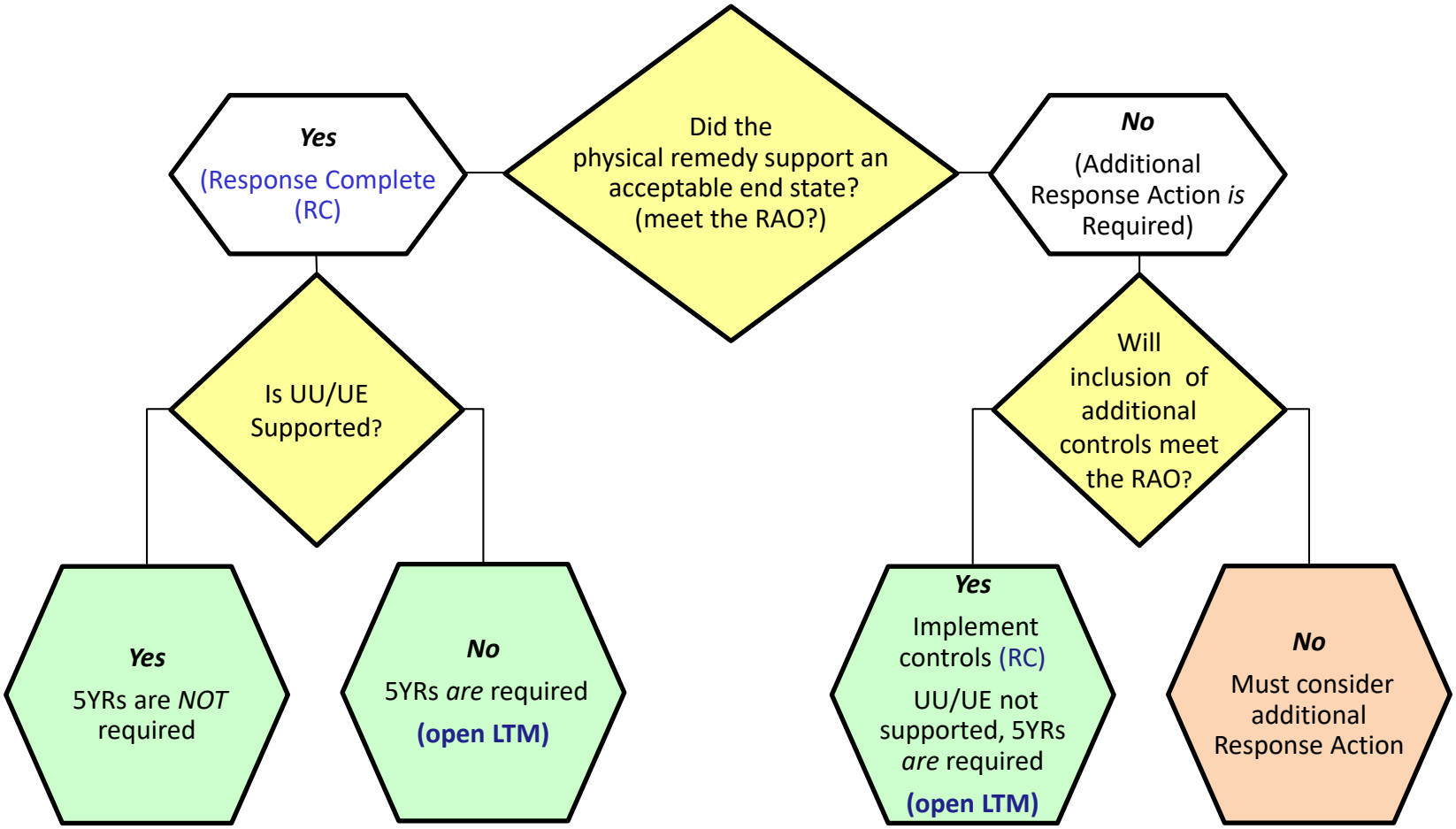


Plan Remedial Action for a Post Remedy Data Assessment

- Establish QC and QA Criteria with Appropriate Documentation for the Data (not just a safety QC)
- Determine how the Achievement of the Remedial Action will be measured against the RAO to establish "Acceptable".



Post Remedy Data Assessment



5YRs are required when the remedy selected does not achieve UU/UE; ongoing activities are conducted in Long Term Management (LTM).

Land Use Controls

- **Are not "standard inclusions" for a Munitions Response**
  - Must have a purpose: Tailored during the FS to address a specific anticipated exposure, or as part of an alternative to address residual risk
- **Are conducted in LTM**
- **Support 5 Yr Reviews**
  - Periodically revisited to ensure effectiveness.
- **When claiming benefit in the Risk Matrices, must justify how the particular control addresses behavior:**
  - Prevents Access → Reduces Frequency of Use, Matrix 1
  - Prevents Intrusive Activity→ Reduces Imparting Energy, Matrix 3

Site Progress

Start
Complete
Milestone

LTM

Site Closeout indicates that all environmental remediation requirements are complete.

Site Closeout

Long-Term Management

QUESTIONS?

- **Kari L. Meier** kari.l.meier@uace.army.mil
- **Brian Jordan** brian.d.jordan@usace.army.mil