



Military Munitions Policy and Guidance – A Regulator's Perspective

FEDERAL FACILITIES ACADEMY WEBINAR

APRIL 15, 2024

US EPA FEDERAL FACILITIES RESTORATION AND REUSE OFFICE

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Group Poll

How many years of experience do you have with munitions
cleanup?

- A. 0-2 years
- B. 2-5 years
- C. 5-10 years
- D. More than 10 years

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Course Overview

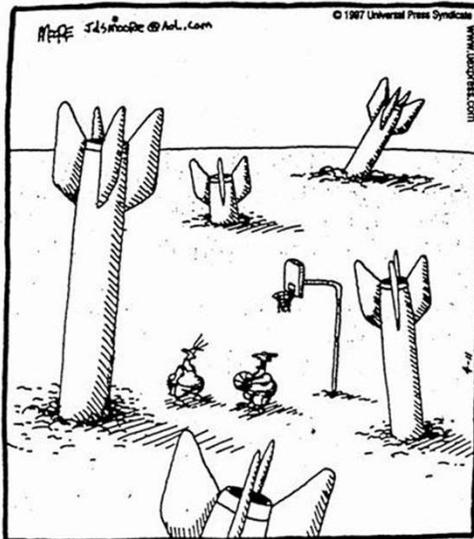
- Munitions Response Authorities under CERCLA
- DoD Military Munitions Response Program (MMRP)
- MMRP Unique Challenges
- EPA Regulations and Guidance
- Detection Technologies
- Sampling Design
- Data Quality/UFP-QAPP
- Current Munitions Policy Issues



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IN THE BLEACHERS



"Maybe we shouldn't play here."

The Problem

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Munitions Response Authorities Under CERCLA

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CERCLA Response Authorities

- ❑ Removal actions – §104
- ❑ Remedial actions – §104 and 121
- ❑ Federal Facilities – §120
- ❑ On-site actions are exempt from administrative and permitting requirements.
- ❑ *Key Point* – same regulatory process for munitions as other contaminants

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CERCLA Removal Actions (§104)

Removal process is generally implemented more quickly than remedial approach

Three types of removal actions:

- Emergency, time-critical = “hours”
- Time-critical = less than six months to plan
- Non-time-critical = greater than six months to plan

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CERCLA Remedial Response (§104 and 121)

- Used to achieve permanent remedies (investigation and response).
- Typically, will address:
 - Land use issues
 - Type of remedy
 - Use of institutional controls
 - Soil and groundwater remediation
- Remedial actions must meet CERCLA and NCP criteria and NCP expectations.

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Executive Order (E.O.) 12580

- Delegates President's CERCLA Authority to Federal Land Holding Agencies
- Most statutory functions are delegated to EPA Administrator
- Lead agency is responsible for cleanup of the site
- Agencies must address responsibility when transferring property

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E.O. 12580 (cont.)

- ❑ Delegation of authority is subject to CERCLA Section 120
- ❑ Federal agency conducts CERCLA response action
- ❑ EPA concurs/approves on remedial actions at NPL sites per FFA and may select remedies if parties don't agree
- ❑ State and Tribal governments
 - Are consulted
 - Have independent authorities

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NCP Expectations

- ❑ Treat principal threats
- ❑ Use combination of treatment and land use controls/institutional controls (LUCs/ICs) where appropriate
- ❑ Use LUCs/ICs where appropriate
- ❑ Innovative technologies

Source: 40 CFR 300.430(a)(1)(iii)

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DoD Military Munitions Response Program (MMRP)

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MMRP

- Definitions
- Key Regulatory Drivers
 - CERCLA (Superfund)
 - RCRA (Solid/Hazardous Waste)
 - Executive Order (EO) 12580
 - Superfund Amendments and Reauthorization Act (SARA)
 - Extended CERCLA to Federal Facilities and established the Defense Environmental Restoration Program (DERP)
 - National Oil and Hazardous Substances Pollution Contingency Plan (NCP)
- EPA Policy and Guidance
- DoD Policy and Guidance
- State Laws and Requirements

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What is the MMRP?

- ❑ Defense Environmental Restoration Program (DERP)*
 - Installation Restoration Program (IRP)
 - Military Munitions Response Program (MMRP)
- ❑ In 2001 10 U.S.C. Section 2710 directed DoD to establish the MMRP to address Munitions Response Sites (MRSs) known or suspected to contain UXO, DMM, or MC.
- ❑ MMRP addresses Munitions Response Areas (MRA) and Munitions Response Sites (MRS) on:
 - Active Installations
 - Formerly Used Defense Sites (FUDS) Properties
 - Base Realignment and Closure (BRAC) Locations

*10 U.S.C. Section 2701

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Agencies Involved with Munitions Response

- ❑ Environmental Protection Agency (EPA)
- ❑ DoD
- ❑ States
- ❑ Tribes
- ❑ Federal Land Managers (e.g.,
Department of Interior, Department of
Agriculture)
- ❑ Other Stakeholders

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EPA Oversight and Regulatory Offices

- ❑ Federal Facilities Restoration and Reuse Office (FFRRO), OLEM
- ❑ Office of Resource Conservation and Recovery (ORCR), OLEM
- ❑ Office of Superfund Remediation and Technology Innovation (OSRTI), OLEM
- ❑ Federal Facilities Enforcement Office (FFEO), OECA
- ❑ Regional Offices

EPA Military Munitions Website:
<https://www.epa.gov/fedfac/military-munitionsunexploded-ordnance>

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DoD Organization

- ❑ Office of the Secretary of Defense
 - DoD Explosives Safety Board
- ❑ DoD Components
 - Secretariat and Staff
 - Field Operating Agency/Installation Remedial Project Mangers
 - DoD Component Explosives Safety Offices
 - U.S. Army Technical Center for Explosives Safety
 - Naval Explosive Ordnance and Safety and Security (NOSSA)
 - Air Force Safety Center

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Definitions

- The term “**military munitions**” includes all types of conventional and chemical ammunition products and their components, produced or used by the armed forces for national defense and security

[Full definition at 10 U.S.C. 101(e)(4)]

- The term “**munitions constituents**” means any materials originating from unexploded ordnance, discarded military munitions, or other military munitions

[Full definition at 10 U.S.C. 2710(e)(3)]

Definitions (cont.)

- The term “**munitions and explosives of concern**” or **MEC** refers to specific categories of military munitions that may pose unique explosives safety risks:
 - Unexploded Ordnance (UXO);
 - Discarded Military Munitions (DMM); or
 - Munitions constituents (MC) present in high enough concentrations to pose an explosive hazard.

[Full definition at 32 CFR 179.3]

Definitions (cont.)

- The term “**unexploded ordnance**” or **UXO** refers to military munitions that have been:
 - primed, fuzed, armed, or otherwise prepared for action, and
 - have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and
 - remain unexploded either by malfunction, design, or any other cause.

[Full definition at 10 U.S.C. 101(e)(5)]

- The term “**discarded military munitions**” or **DMM** means military munitions that have been abandoned without proper disposal.

[Full definition at 10 U.S.C. 2710(e)(2)]

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Quiz

What is the difference between UXO and DMM?

- A) There is none.
- B) UXO has been fired/emplaced and DMM has not.
- C) DMM has been fired/emplaced and UXO as not.
- D) UXO is MEC and DMM is not.

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MMRP Site Inventory

- ❑ The FY Defense Environmental Programs Annual Report to Congress identifies the
 - Number of munitions response sites (MRSs)
 - Funding obligated to cleanup MRSs

<https://www.denix.osd.mil/arc/index.html>

<https://www.denix.osd.mil/mmrp/mrsi/home/>

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Munitions Response Site Prioritization Protocol (MRSPP)

- ❑ 32 CFR Section 179 established the Protocol to evaluate the primary hazards at munitions response sites.
- ❑ Three modules evaluate the unique characteristics of each hazard type:
 - Explosive Hazard Evaluation (EHE) Module
 - Chemical Warfare Material Hazard Evaluation (CHE) Module
 - Health Hazard Evaluation (HHE) Module
- ❑ National level ranking tool
- ❑ Review and update each munitions response site (MRS) priority at least annually to reflect any new information that affects the MRS priority.

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MMRP Unique Challenges

- ❑ No promulgated regulatory standards or “safe” levels
- ❑ Unique risks
 - Acute hazard
 - Direct interaction may cause serious injury or death
 - Discrete hazardous items, not plumes
 - Attractive nuisance

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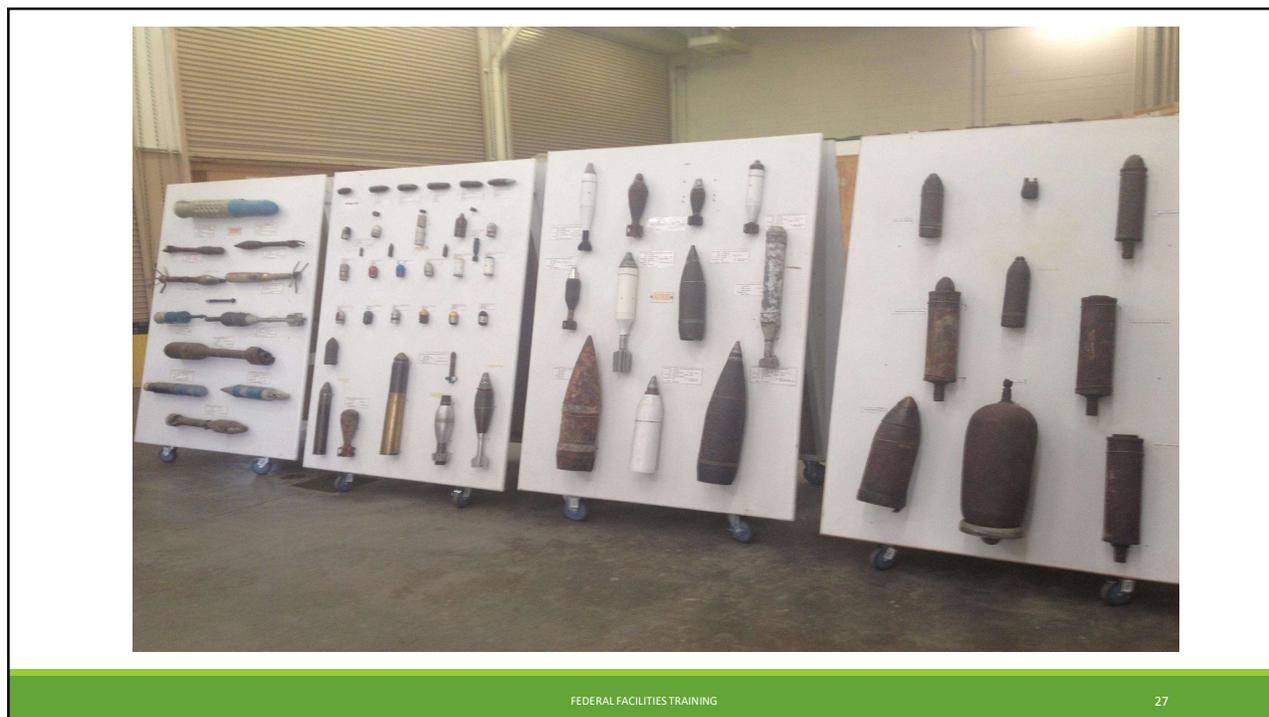
MMRP Unique Challenges (cont.)

- ❑ Variety of site conditions – MRS may vary greatly in size and topography
- ❑ Many types of munitions

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MMRP
Unique
Challenges
(cont.)

-  Technology limitations
-  Costs – may be orders of magnitude greater than traditional contaminants

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Quiz

DERP is an acronym for what?

- A) Deterring Explosives Restoration Program
- B) Defense Environmental Restoration Program
- C) Dangerous Environment Response Program
- D) Defensive Engagement Response Program

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Questions?

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EPA Regulations and Guidance

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Munitions and RCRA

- ❑ RCRA is the source of Military Munitions Rule.
- ❑ Authorized States may exercise their RCRA authorities through orders and permits.
- ❑ Examples of RCRA Authority
 - Characteristics tests
 - Management standards for hazardous waste
 - Standards for excluding processed scrap metal that can be recycled
 - Management standards for open burning/open detonation (OB/OD)

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EPA Military Munitions Rule (February 12, 1997)

- ❑ Avoids imposing RCRA Subtitle C on operational military ranges
 - Exempts munitions used for intended purpose and remaining on operational ranges from regulatory definition of solid waste under RCRA.

- ❑ Identifies when a military munition becomes a waste

- ❑ Maintains RCRA Federal-State-Tribal Relationship

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EPA Military Munitions Rule (cont.)

- ❑ Exempts the following from being subject to RCRA:
 - “Unsanitized” nuclear weapon components
 - Unserviceable munitions
 - Munitions used in training, research, development, test, and evaluation and range clearance of active/inactive ranges
 - Munitions being repaired, recycled, disassembled, reclaimed or reconfigured
- ❑ Includes the following as being subject to RCRA:
 - Overpacked leaking munitions
 - Abandoned munitions
 - On-range disposal (landfill) of munitions

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EPA Military Munitions Rule (cont.)

- ❑ Emergency Response
 - Military Munitions Rule states that an explosives or munitions emergency response may be taken if there is an imminent and substantial threat to human health and the environment.
 - RCRA Munitions Rule exempts explosives or munitions involved emergency responses from RCRA Subtitle C hazardous waste regulatory requirements.

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Open Burn / Open Detonation (OB/OD)

- ❑ Revisions to the Standards for OB/OD of Waste Explosives, Proposed 03/20/2024
- ❑ EPA Office of Resource Conservation and Recovery Memo - August 2022
- ❑ Impacts to CERCLA cleanups - ARARs

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EPA Munitions Response Guidelines (OSWER Directive 9200.1-101, July 27, 2010)

- ❑ Provides a framework to EPA Regional Offices overseeing responses involving munitions and explosives of concern (MEC) at locations other than operational ranges.
- ❑ Guides responding to sites where explosive hazards may be an additional or principal threat.
- ❑ Addresses situations where DoD Components conduct munitions response as the Lead Agency, and the EPA is responsible for oversight.

[Munitions Response Guidelines \(OSWER Directive 9200.1-101\)](#)

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EPA Munitions Response Guidelines

- ❑ General regulatory authorities
- ❑ Use of the CERCLA, RCRA, and other authorities
- ❑ Involvement of State and Tribal environmental regulator and the public
- ❑ Explosives safety principles
- ❑ Site characterization principles
- ❑ Geophysical Detection Techniques for MEC
- ❑ Transfer of ranges
- ❑ Land use and institutional controls
- ❑ Enforcement principles

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Detection Technology

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How do we find munitions?

- Detect metal case as a surrogate for the munition
 - Surface and/or buried
 - Most projectiles, mortars and bombs are steel
 - Some munitions contain other metals
 - Aluminum: practice rounds, some components
 - Brass: small arms

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Detection Technologies

Magnetic methods: A **passive** detection method that measures naturally occurring and man-made magnetic fields



Electromagnetic methods: An **active** detection method that generates a signal, which in turn, induces buried metal to generate a magnetic field

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Geophysical Systems

Digital Systems: digital geophysical mapping (DGM) systems

- Records all the data
- Comprehensive analysis → identifies anomalies

Analog Systems: analog geophysical mapping (AGM), also commonly called 'mag and flag' (M&F) or 'mag and dig'

- No record of data or interpretation
- "Real-time" analysis identifies anomalies



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Detection Technology (2001)

- ❑ A permanent record of the data including a clear audit trail of data analysis and resulting decisions and actions. Exceptions should be limited to emergency response actions or cases where impractical.
- ❑ Selection of the most appropriate and effective detection technologies
- ❑ Regulatory and public involvement when selecting the most appropriate detection technologies at a site.

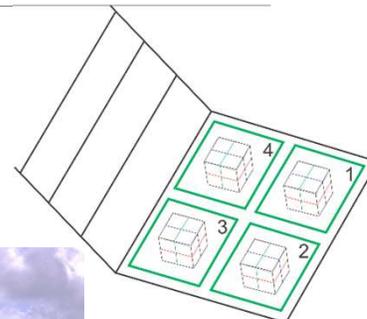
Uses and Limitations of Analog Technology



- Data quality depends on human factors that cannot be measured.
- Decisions are made in the field based on the operator's judgment.
- The instrument response provides no information regarding the source of the anomaly; therefore, it is unable to distinguish munitions from non-hazardous debris or geology.
- The probability of detection for munitions of concern has been demonstrated to be between 50 and 72% (ITRC 2006).
- No permanent electronic record (of either location coordinates or instrument response) is provided; therefore, no auditable decision record exists.

Advanced Geophysical Classification (AGC)

- ❑ Uses electromagnetic induction
- ❑ “Illuminates” the target and measure its response from multiple directions
- ❑ Analysis provides information related to
 - Size and shape of object
 - Material properties
- ❑ Can result in more accurate target selection and less digging



Advanced Geophysical Classification (AGC)

- ❑ DAGCAP - DoD Advanced Geophysical Classification Accreditation Program
- ❑ AGC Systems
 - Cued
 - One Pass (Dynamic)





Underwater Technology

- ❑ Underwater munitions investigation and cleanup may be more complex and difficult
- ❑ Technology development lags terrestrial development
- ❑ Current focus of SERDP/ESTCP Advisory Group
- ❑ Many emerging policy issues

Weight-of-Evidence Decision-Making

- ❑ Unlike traditional chemical cleanups, munitions sites do not have a clearly defined endpoint based on acceptable risk
- ❑ A weight-of-evidence (WoE) approach is a familiar concept found in scientific and regulatory literature; specifically for the purpose of assessing risk
- ❑ Decision-making using the WoE approach involves consideration of *multiple lines of evidence* incorporated into the CSM
 - Avoids relying solely on any one piece of information
 - Allows informed, defensible decisions on MRS

Sampling Design

- How do you design a geophysical investigation?
- Visual Sampling Plan (VSP)
 - Uses
 - Limitations
- Transect vs. full coverage

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Data Quality

- Effective QA/QC critical for stakeholder acceptance
- Clear and specific data quality objectives/remedial action objectives necessary
- Basis for well-informed data driven decisions
- Inform regulators of issues promptly

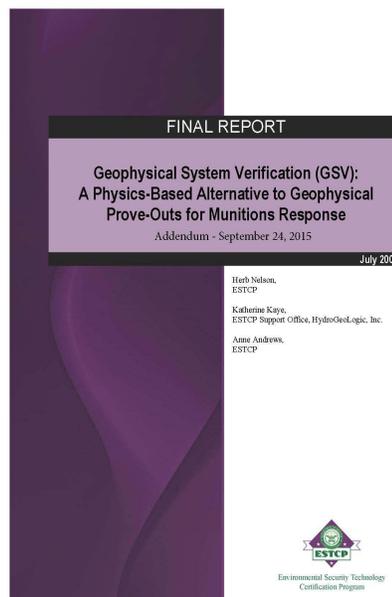
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Data Quality

- ❑ Geophysical Systems Verification
 - ❑ Instrument Verification Strip (IVS)
 - ❑ Blind Seeds (QA, QC)

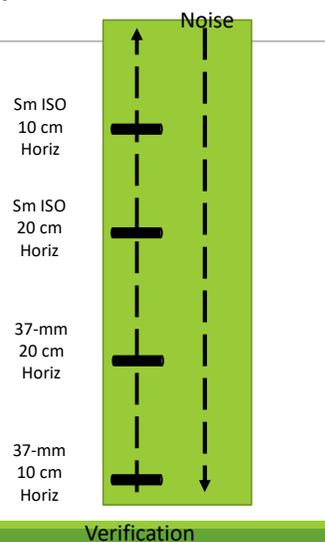
- ❑ ITRC Training: Quality Considerations for Multiple Aspects of Munitions Response Sites
[\(https://qcmr-1.itrcweb.org/training/\)](https://qcmr-1.itrcweb.org/training/)



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Instrument Verification Strip (IVS)

- ❑ DGM and AGC response of common munitions and industry standard objects (ISO) are well documented
 - ISO = pipes that approximate S, M, and L munitions
- ❑ Bury small number of objects at known locations and detectable depths
 - Verify expected responses
 - Verify location accuracy
 - Measure site noise to determine detectability
- ❑ Run beginning and end of each day



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Blind Seeds

- ❑ Bury munitions of interest and/or surrogates (ISOs) at known locations throughout the area
- ❑ Rate – minimum of one encounter per day per team
- ❑ Two types
 - QC seeds buried by contractor
 - Location unknown to data collector and analyst
 - Span the depth range of detectability
 - Validation or QA seeds
 - Buried by government (or designee)
 - At depths where 100% detection is expected
- ❑ Seeds must be located to specified accuracy and display the expected response in the data/analysis

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UFP-QAPP

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QUIZ

What does UFP-QAPP stand for?

- A. Uniform Font Program for Quality Assurance in Proposed Plans
- B. Understated Facts Project for Quality Assumption Project Plans
- C. Uninformed Federal Policy for Quality Aggregated Pilot Programs
- D. Uniform Federal Policy for Quality Assurance Project Plans

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UFP-QAPP Policy and Applicability

- The Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) is a tool to guide project teams through the systematic planning process.
- UFP-QAPP Munitions Response Toolkit
 - Module 1 - Remedial Investigation (RI)/Feasibility Study (FS)
 - Module 2 - Remedial Action (RA)

UFP QAPP info and other information at:

<https://www.epa.gov/fedfac/assuring-quality-federal-cleanups>

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UFP-QAPP

The QAPP is a structured planning document based on the optimized UFP-QAPP worksheets

Follows the “*Scientific Method*”

- 1. Problem Statement
- 2. Hypothesis or theory
- 3. Testing
- 4. Observations
- 5. Conclusion and communication of results

Ensures collected data will support intended uses

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Key MR-QAPP Worksheets

WS #6: Communication Pathways and Procedures

WS #9: Project Planning Sessions

WS #10: Conceptual Site Model (CSM)

WS #11: Data Quality Objectives (DQO)

WS #12: Measurement Performance Criteria (MPC)

WS #17: Sampling Design and Project Workflow

WS #22: Measurement Quality Objectives (MQO)

WS #37: Data Usability Assessment (DUA)

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Questions?

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Current Munitions Policy Issues

- Regulatory Issues
 - Munitions as a hazardous waste/hazardous substance
 - Principal threat waste determination
 - ARARs
- ROD/Decision Document Language
- Risk/Hazard Assessment
- Unlimited use/unrestricted exposure (UU/UE)

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Regulatory issues

- Munitions as a hazardous waste/hazardous substance
- Principal threat waste determination
- ARARs

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ROD/Decision Document Language

- Need robust remedial alternatives range
- Don't default to LUCs only every time
- ROD/PP language – need clear, concise and factually correct decisions
- Selected remedy needs to be clearly supported

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Munitions Risk/Hazard Assessment

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How are munitions risks unique?

- Individual discrete items, not a plume
- Every munition item is a source point
 - Can be a wide variety of types of source points (different types/components of munitions at different depths)
 - Much easier to define chemical source points as there is usually some logic as to where they are located –i.e., sump/dry well, uncontrolled dump, dry cleaning equipment, buried drums, outfall in river, etc. and chemical source points are often part of an industrial process
- Direct correlation of hazard to exposure
- Acute vs. chronic risks
 - Chronic exposure to an acute risk
- No agreement on acceptable risk –What is considered “Acceptable” risks re munitions often seem to be based on opinion, not statistical research
- No agreement on methodology

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DoD Risk Management Methodology (RMM)

- ❑ OSD RMM Memorandum signed July 2023
 - Update to USACE 2017 Risk Management Methodology for FUDS
 - OSD supports the RMM as one tool in the munitions response toolbox
- ❑ RMM Implementing Authority
 - DoD encourages and supports use RMM tool to guide decision making
 - RMM document references DERP Instruction and DERP Manual to support its use in CERCLA process
- ❑ Service Implementing Guidance
 - Services have not issued implementing guidance or requirements

DoD Risk Management Methodology (RMM)

- ❑ EPA involvement in RMM development:
 - EPA raised issues when USACE issued for trial period at FUDS (~2017)
 - Multiple meetings/briefings with regulator feedback
 - DoD brought into Munitions Response Dialogue (MRD) to further discuss/solicit feedback
- ❑ Some unresolved EPA Concerns:
 - Acceptable/unacceptable definitions
 - Use for baseline risk assessment issues – per DoD's Guidance:
 - Tool only intended to facilitate discussion and does not determine level of risk
 - Tool cannot be used for UU/UE scenarios
 - DoD discussion about exiting CERCLA at RI phase if “acceptable”

Other Munitions Risk/Hazard Assessment Tools

- ❑ MEC Hazard Assessment (MEC HA)
 - Jointly developed by EPA/States/DoD
 - Relative hazard tool
 - Use in feasibility study to compare/contrast remedial alternatives

- ❑ Air Force Munitions Hazard Assessment Tool (MHAT)
 - Air Force modified MEC HA unilaterally
 - More credit to LUCS, less for treatment
 - “Munitions Debris Only” category

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Unlimited Use/Unrestricted Exposure (UU/UE)

- ❑ Is it possible? ... Maybe, it depends on:
 - Start planning with potential end in mind – don't start asking at end of process what do we need to do to get UU/UE...
 - Site characteristics: terrain, geology, munitions type, etc.
 - QA/QC and data quality
 - Better characterization (e.g., depth profile, etc.)
 - Technology limitations
 - Build a strong CSM and limit uncertainty
 - Acceptable risk does not always = UU/UE

- ❑ MR QAPP Module 2 UU/UE example

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Other Munitions Sites

- ❑ OB/OD operating sites
- ❑ Operational Ranges
 - Addressed under various regulations, as appropriate
 - NOT DERP eligible

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EPA and DoD Partnerships

- ❑ Partnering between DoD and EPA maximizes transparency, public participation, and collaboration that is vital to ensure cost effective and efficient decisions about the MMRP.
- ❑ Munitions Response Dialogue (MRD)
- ❑ Intergovernmental Data Quality Task Force
- ❑ SERDP/ESTCP

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Summary

- ❑ EPA oversees DoD's cleanup of munitions response sites using the CERCLA process or as hazardous waste under RCRA Subtitle C.
- ❑ CERCLA is the preferred response mechanism for munitions response actions.
- ❑ DoD Components may conduct CERCLA response actions per the NCP. Response activities may include removal actions, remedial actions, or a combination of the two.
- ❑ Same process as other hazardous substances.

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Questions?

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