



Overview

There are a total of 5,400 former ranges and munitions operating facilities throughout the United States. As of fiscal year 2016, the U.S. Department of Defense (DoD) completed cleanup at 61% of the munitions response sites (MRS) in its inventory, leaving 39% that still require a munitions response (MR). The total cost-to-complete estimate for the Military Munitions Response Program (MMRP) is \$11.2 billion, which includes the cost to complete cleanup for the subset of sites MRS that may contain unexploded ordnance (UXO) and discarded military munitions (DMM) and still require a munitions response, and the cost for monitoring activities once cleanup is complete. The scope of the MMRP, including the costs, is available in the DOD Environmental Restoration Program Annual Reports to Congress.

ITRC's *Geophysical Classification for Munitions Response Sites* (GCMR-2) and companion internet-based training introduced new Quality Assurance/Quality Control (QA/QC) procedures developed for geophysical classification surveys using advanced geophysical sensors. As a result of these advances, some QA/QC recommendations presented in previous ITRC documents are obsolete—specifically, guidance in *Geophysical Prove-outs for Munitions Response Projects* (UXO-3) and *Quality Considerations for Munitions Response Projects* (UXO-5). This current guidance document applies to any MR project and adds the latest advances in QA/QC procedures from advanced geophysical classification (AGC) and all aspects of MR.

This document, QCMR-1, highlights the high-quality products and performance standards required for all geophysical surveys including analog detection methods, digital geophysical mapping (DGM), and AGC. Detailed and documented QC/QA procedures are required for each of these geophysical technologies and should be expected in all MR projects, regardless of the selected technology. A companion on-demand training video is available that provides an approximately 30-minute overview of key concepts from this guidance document. This document includes information on related guidance, recent programs, and programs under development, including:

- Overall Munitions Response Quality Assurance Project Plan (MR-QAPP), a toolkit developed by the Intergovernmental Data Quality Task Force (IDQTF)
- Advanced Geophysical Classification for Munitions Response Quality Assurance Project Plan (AGC-QAPP) template
- DOD Advanced Geophysical Classification Accreditation Program (DAGCAP)

The MR-QAPP templates follow a similar format as the AGC-QAPP. These templates simplify QAPP development by walking the project team and other stakeholders through a systematic planning process. The templates also tie data collection to the specific decisions to be made. Consequently, the type, quality, and quantity of data collected will be suitable for the intended uses and agreed upon before data collection begins.

This guidance explains the decision logic used for an MR project and offers resources for planning and monitoring QA/QC activities to ensure quality data and confidence in decisions. An overview of the MR process is presented, as well as particular quality considerations at critical decision points for MR projects. Planning for each decision point requires specific

quality metrics be assigned and ongoing monitoring confirms project objectives are met. This document is useful for the following audiences:

- federal, state, and local environmental regulators and land management agencies
- MR site managers, technical staff, and contractors such as scientists, engineers, and geophysicists
- tribal, environmental, community, and other stakeholders with an interest in MR

Using this guidance, regulators and stakeholders can quickly review MR project work plans, evaluate the quality of MR work performed, and identify quality goals, steps, and metrics. This knowledge will minimize rework, speed up projects, and reduce cost.

Evidence-based decision making makes use of relevant information to provide a clear and defensible basis for project decisions. Two primary elements that are the basis for evidence-based decisions include:

1. Conceptual Site Model (CSM) that evolves throughout an MR project life cycle. A CSM represents relevant site characteristics, conditions and features developed from lines of evidence collected or acquired throughout the project life cycle. A CSM can be presented in multiple ways including text description, tables, figures, flow diagrams, maps, and pictures. Attributes of a high-quality MR CSM are type of munitions and extent (horizontal and vertical distribution) of UXO/DMM and munitions debris (MD), as well as current and anticipated future land use exposure pathways and receptors. Depending on the phase of the MR, the CSM may be based on historical information or on investigation derived data. The CSM should be updated throughout the process of MR as additional information becomes available and initial assumptions are confirmed or refuted. Further information on these methods and their QC requirements can be found in *Environmental Quality-Conceptual Site Models" Engineer Manual EM-200-1-12* (USACE 2012).
2. Well-defined data quality objectives (DQOs). DQOs stipulate project-specific objectives (decisions), decision confidence and the type, quality, and quantity of data to make the decision. To effectively implement DQOs during a project's life cycle, qualitative and quantitative requirements and acceptance thresholds and limits for these requirements should be defined and documented. These elements are defined during the systematic planning process and documented in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) as part of that process. This document presents an overview of DQOs and the progression of their development. Further information regarding the development and planning of DQOs can be found in the document: *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA 2006).

This document addresses only land-based MR and not the underwater environment. This document also does not address munitions constituents (MC) or explosive safety as related to MR. MCs are generally addressed during MRs, when encountered, but the focus of this document is on managing risks posed by UXO and DMM. For further information on MC, see DOD Manual 4715.20, *Defense Environmental Restoration Program (DERP)* (DOD 2012), which describes potential risks posed by UXO, DMM, and MC at MR sites.

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