

MR-QAPP Toolkit, Module 2: Remedial Action

MPCs and MQOs

Steve Stacy
USACE Environmental & Munitions
Center of Expertise (EM CX)

M2S2 Webinar Series
5 June 2024

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."



U.S. ARMY



US Army Corps
of Engineers®

INTERGOVERNMENTAL DATA QUALITY TASK FORCE

Uniform Federal Policy For Quality Assurance Project Plans (UFP-QAPP)

Munitions Response QAPP Toolkit

Module 2:
Remedial Action

Final, March 2023



Worksheet #12: Measurement Performance Criteria
(UFP-QAPP Manual Section 2.6.2)

Worksheet documents the project-specific measurement performance criteria in terms of data quality indicators (i.e., accuracy, sensitivity, representativeness, completeness, and comparability) for remedial actions at munitions response sites (MRS). MPCs are the minimum performance specifications that the remedial action must meet to ensure collected data will satisfy the DQOs documented in Steps 1-5 on Worksheet #11. They are the criteria against which the intermediate and final data usability assessments will be conducted as documented in Worksheet #37. The DUA must evaluate and document the data quality and decision-making impacts of any failures to meet these criteria (Worksheet #37). Minimum recommended MPCs applicable to the RA phase are presented in black text. Project teams may revise these MPCs to establish additional MPCs if necessary to achieve project-specific DQOs; however, the project-specific QAPP must explain and justify any changes in black text. An appendix may be used for this purpose.

Table 12-1: MPC for MRS A1, Maneuver Area Development Area - MEC Surface and Subsurface Removal using non-AGC DGM Detection Cued AGC

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
W 1 – Site Preparation and CSM			
Accessibility	Completeness	All areas inaccessible to remediation or inaccessible to use of proposed geophysical systems are identified and mapped in a GIS.	Visual Inspection QA Report and/or Database
Surface Sweep Coverage	Representativeness/Completeness	Surface sweep completed across the entire site. Identified Saturated Response Areas (SRAs) have been documented.	Surface Sweep Technical Memo and updated CSM
IOC Completeness	Representativeness/Completeness (recoverability)	All recoveries (IOC and MD) were reviewed and CSM confirmed or updated. All recovered munitions, as well as munitions related to recovered MD, were included in the site-specific TOI library.	Surface Sweep Technical Memo and Updated CSM
Survey Control	Completeness	All survey control points placed by Professional Licensed Surveyor (PLS) and survey control report submitted.	Surveyor and/or QC Report
W 2 & 3 – IWS			



U.S. ARMY

WHAT ARE MPCs?

Think of Measurement
Performance Criteria (MPCs) as
the tools we use to set ourselves
up for success

IF all these criteria are met at the
end of the project,
THEN these components of the
remedy will have been
implemented





MPCs

❖ “Project-level Criteria”

- *Common MMRP examples include in MR-QAPP WS12*
- *Use of new technologies will require development of new MPCs*

❖ *Minimum performance* specifications that the remedial action must meet to ensure collected data will satisfy the DQOs documented in Steps 1-5 on Worksheet #11

❖ Expressed in terms of “data quality indicators”

Accuracy, Representativeness, Completeness, Comparability, Sensitivity

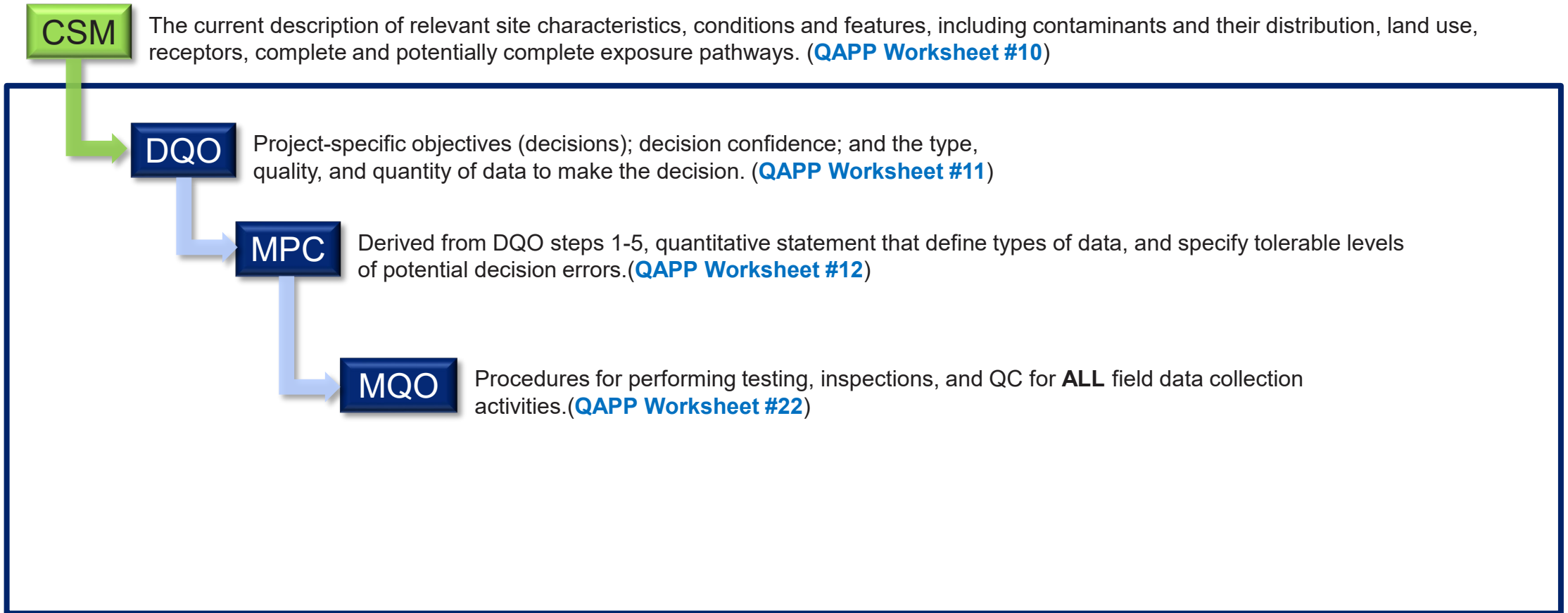
❖ Criteria against which the intermediate and final data usability assessments (DUAs) will be conducted



U.S. ARMY



HOW DO MPCS RELATE TO DQOS AND MQOS



Think of MQOs as the QC checks we use during project execution to identify problems before they impact DQOs.



WHAT IS REQUIRED FOR AN MPC?



For each MPC

❖ Data Quality Indicator

- Accuracy
- Representativeness
- Completeness
- Comparability
- Sensitivity

❖ Specification

- How will the PDT measure success?

❖ Document/Activity Used to Assess Performance

- How will the PDT report the results?

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
DFW 1 – Site Preparation and CSM			
1. Accessibility	Completeness	All areas inaccessible to remediation or inaccessible to use of proposed geophysical systems are identified and mapped in a GIS.	Visual Inspection QA Report and/or GIS Database
2. Surface Sweep Coverage	Representativeness/Completeness	Surface sweep completed across the entire site. Identified Saturated Response Areas (SRAs) have been documented.	Surface Sweep Technical Memorandum and updated CSM
3. IOC Completeness	Representativeness/Completeness (recoverability)	All recoveries (IOC and MD) were reviewed and CSM confirmed or updated. All recovered munitions, as well as munitions related to recovered MD, were included in the site-specific TOI library.	Surface Sweep Technical Memorandum and Updated CSM
4. Survey Control	Completeness	All survey control points placed by Professional Licensed Surveyor (PLS) and survey control report submitted.	Surveyor and/or QC Report
DFW 2 & 3 – IVS			
5. IVS Construction	Accuracy/Completeness	Seeds placed so that each sensor passes at least one seed item during IVS surveys. Seed type, depth, and location accuracy recorded during placement.	IVS Memorandum



U.S. ARMY

HOW MANY MPCs ARE NEEDED?

6



MPCs specified for each Definable Feature of Work (DFW)

Activity	Definable Features of Work (WS-17)
Activity 1 –Site preparation and anomaly detection using dynamic AGC	<ol style="list-style-type: none">1. Site Preparation & CSM update2. Seeding & IVS3. Assemble sensor system and verify it's working4. Conduct detection survey5. Data processing and select anomalies
Activity 2 – Cued AGC data collection and TOI selection	<ol style="list-style-type: none">6. Collect Cued Data7. Processing, classification, dig list, threshold
Activity 3 - TOI investigation and source removal	<ol style="list-style-type: none">8. Dig List Excavation9. Threshold Verification & Validation Target Selection10. Validation Target Excavation11. MPPEH Handling & Disposal12. Final DUA
Activity 4 – Implement LUCs	<ol style="list-style-type: none">13. Install signs14. Mail out Educational Pamphlets

DQO Step 1
Problem Statement

DQO Step 2
Goals of Data Collection

DQO Step 3
Information Inputs

DQO Step 4
Define Boundaries

DQO Step 5
Approach

DQO Step 6
MPCs

DQO Step 7
Sampling Design



Measurement Quality Objectives (MQOs)

- ❖ Document procedures and acceptance criteria to control and document measurement uncertainty during the data collection process
- ❖ Nonconformances (*i.e.*, results outside acceptance criteria) trigger root-cause analysis and corrective action
- ❖ Provides opportunities to correct problems before they can have an impact on project objectives
 - Catches and fixes problems before they impact results





WHAT IS REQUIRED FOR AN MQO?

For each MQO

- ❖ Frequency
 - How often will the MQO be evaluated?
- ❖ Responsible person
 - Who will evaluate the data?
- ❖ Reporting Method
 - How will the responsible person report the results?
- ❖ Verified by
 - Who will verify the MQO is met?
- ❖ Acceptance Criteria
 - What is the standard and how do we measure it?
- ❖ Failure Response
 - How will the responsible person respond when a failure occurs?

Measurement Quality Objective	MQO#	Frequency	Responsible Person/ Reporting Method/ Verified by:	Acceptance Criteria	Failure Response
Survey control (loop closure)		At beginning of project	Project Geophysicist or Surveyor/ Survey Control Report/ QC Geophysicist	All loop closures within 0.05 m (if established from existing monument(s)) Estimated accuracy from static GPS occupation calculations (e.g., OPUS) less than or equal to 0.05 m.	RCA/CA: reset survey monuments
Construct IVS: Verify as-built IVS against design plan (DGM)		Once following IVS construction	Project Geophysicist/ IVS Technical Memorandum/ Lead Organization	Small ISO seed items buried at 0.15 m; All seeds buried horizontally in the cross-track orientation	RCA/CA: Make necessary changes to seeded items and re-verify



U.S. ARMY

MPC VS. MQO

9



What is the difference between MPCs and MQOs?

❖ MQO failures are recoverable, MPC failures are not

- Fail an MQO-> RCA/CA -> recollect and/or reprocess the data and modify procedures. Or it doesn't matter too much.
 - Often, contractor and government Geophysicist can address this issue with help from others.
 - Validation seed failures, though, would require more PDT involvement.
- Fail an MPC-> Sampling design was not met.
 - Can we meet the DQO?
 - Is the project objective achievable?
 - Is the CSM accurate?
 - Requires full PDT to reconvene and make a decision.

❖ DUA must evaluate and document the data quality and decision-making impacts of any failures to meet these criteria



MR-QAPP EXAMPLES



MR-QAPP Toolkit: Module 2 does not address all technologies and processes

❖ Examples in Module 2

- Surface and Subsurface with Non-AGC DGM and cued AGC surveys
- Surface Removal using Instrument-Aided Visual Identification
- Surface and Subsurface Removal using non-AGC DGM
- Surface and Subsurface Removal using Analog Detection
- Surface and Subsurface Removal using Dynamic AGC and Cued AGC

❖ Project QAPP must develop and add MPCs and MQOs for:

- Uses of technologies in ways not described in the MR-QAPP Toolkit
- Technologies not identified in the MR-QAPP

❖ Recommend coordination with EM CX in advance of QAPP development if new technologies/different processes require new MPCs and MQOs

❖ Project QAPP must explain and justify any changes to black text

Newly added MPCs



US Army Corps
of Engineers®

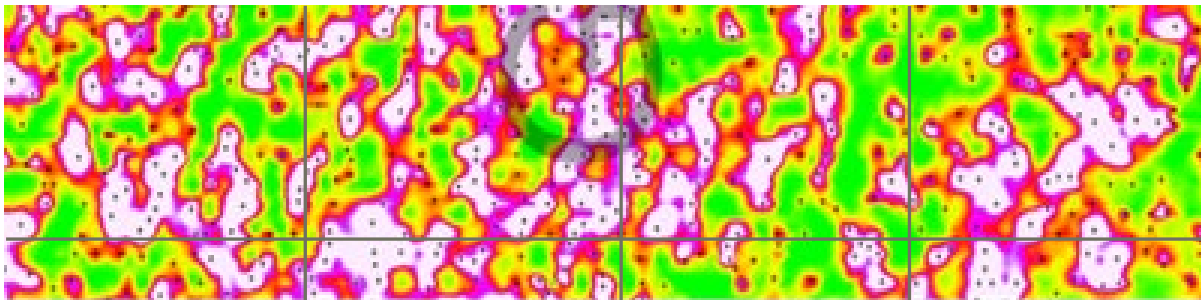


DETECTION MAP IS A FINAL PRODUCT FOR SRAs

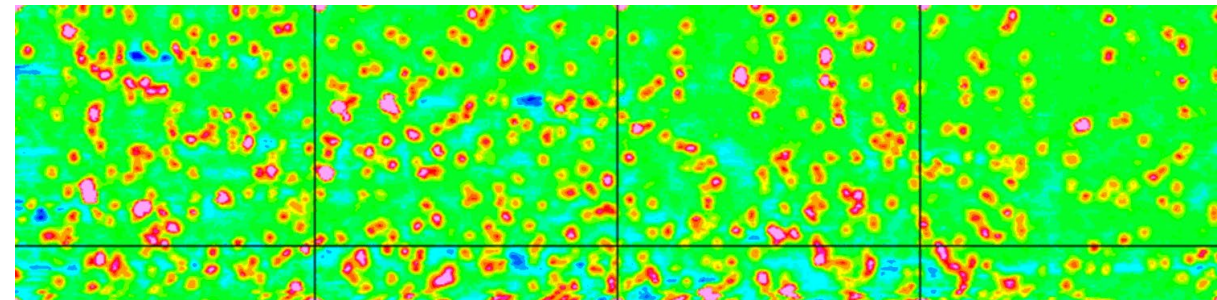


Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
DFW 4 & 5 – Data Acquisition Detection Survey			
17. Saturated Response Areas	Completeness	No SRAs in final detection survey data. All SRAs digitally remapped to confirm anomaly densities reduced to below DQO thresholds. [Example] The analog anomaly reduction survey reduces the anomaly density to below 3500 anomalies/acre.	1) Detection Survey Database 2) GIS database

SRAs Identified



Post SRA anomaly reduction activities





MPCS- SITE PREPARATION



Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
1. Accessibility	Completeness	All areas inaccessible to remediation or inaccessible to use of proposed geophysical systems are identified and mapped in a GIS.	Visual Inspection QA Report and/or GIS Database
2. Surface Sweep Coverage	Representativeness/Completeness	Surface sweep completed across the entire site. Identified Saturated Response Areas (SRAs) have been documented.	Surface Sweep Technical Memorandum and updated CSM
3. IOC Completeness	Representativeness/Completeness (recoverability)	All recoveries (IOC and MD) were reviewed and CSM confirmed or updated. All recovered munitions, as well as munitions related to recovered MD, were included in the site-specific TOI library.	Surface Sweep Technical Memorandum and Updated CSM

Why is this in the site prep phase... what are we looking for? Changes in the CSM



QC vs. Validation Seed MPC Specification

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
22. Anomaly classification (QC seeds)	Accuracy/Completeness	100% of QC seeds are correctly classified as TOI for excavation. QC Seeds classified as inconclusive are discussed in DUA.	1) QC Seed Database 2) RCA/CA review and acceptance
23. Anomaly classification (Validation seeds)	Accuracy/Completeness	100% of validation seeds are correctly classified as TOI for excavation.	1) Validation Seed Database 2) RCA/CA review and acceptance

Validation Seeds

- ❖ Are placed at depths where classification is not challenging
- ❖ Inconclusive AGC results indicate there is a failure



MEC Subsurface Removal using Analog

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
15. Intrusive Investigation	Accuracy	QC or 3 rd party re-check of 10% of the excavated locations result in zero additional intrusive investigations	QC Database

MEC Subsurface Removal using non-AGC DGM

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
20. Intrusive Investigation	Accuracy/Completeness	Digital post-mapping verification of selected excavated locations result in a geophysical response less than the detection threshold or documented as fully resolved	Post-mapping database

MEC Subsurface Removal using AGC DGM to achieve UU/UE

Measurement	Data Quality Indicator	Specification	Document/Activity Used to Assess Performance
29. Intrusive Investigation	Accuracy/Completeness	AGC results indicate original polarizabilities resulting in TOI are no longer present and no additional TOI sources are present above the project-specific stop-dig threshold.	Post-mapping database