Printed from: Interstate Technology & Regulatory Council (ITRC). 2018. *Quality Considerations for Multiple Aspects of Munitions Response Sites.* QCMR-1. Washington, D.C. https://qcmr-1.itrcweb.org/.

2 Quality Concepts

This chapter introduces general terms and definitions related to quality and serves as a basis for discussion of process-based quality management for MR projects. Process-based quality management planning evaluates how data gathering, decision-making, and follow-up activities may be efficiently ordered or merged to successfully execute a project. Note that all quality terms and definitions conform to International Organization for Standardization (ISO) 9000 (ISO 9001).

Quality – *Quality*, as it applies to an object (product, service, process), is defined as the "degree to which a set of inherent characteristics (attributes) of the object satisfies a set of requirements." Therefore, the quality of an object is determined by comparing a predetermined set of characteristics against a set of requirements. If those characteristics conform to the requirements, high quality is achieved, but if those characteristics do not conform, a low or poor level of quality is achieved.

Requirement – A *requirement* is a need, expectation, or obligation. A specified requirement is one that has been stated, as in the Quality Assurance Project Plan (QAPP) for example. Some of the many types of requirements include those for:

- quality
- quality management
- management
- product
- contracts
- statutes
- regulations

This document focuses on specific quality requirements for MR processes and products. Statutory and regulatory requirements are briefly discussed in Chapter 5.

Quality management – *Quality management* includes all activities that organizations use to direct, control, and coordinate quality. These activities include establishing quality policy, quality objectives, quality planning, quality control, quality assurance, and quality improvement.

Process – A *process* is a set of activities that are interrelated or that interact with one another. Processes use resources to transform inputs into outputs. Processes are interconnected because the output from one process often becomes the input for another process. An activity that is separate and distinct from other tasks, has quality control requirements, and has work crews unique to that task is often called a definable feature of work (DFW). See Chapter 7 for specific MR processes.

Process-based Quality Management System – A process-based quality management system uses a process approach to manage and control how quality objectives are achieved. The process approach is a management strategy. When managers use a process approach, it means that they manage and control the processes necessary to produce the desired product, the interaction between these processes, and the inputs and outputs that tie the processes together.

Quality Assurance – *Quality Assurance* (QA) and Quality Control (QC) are interrelated but defined differently. *QA* is an integrated system of quality management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, product, or service is of the type and quality needed and expected by the customer.

QA consists of that "part of quality management focused on providing confidence that quality requirements will be fulfilled" (ISO 9000). QA is process oriented. QA activities include:

- identifying quality requirements
- developing, identifying, or improving processes
- identifying standard operating procedures (SOP)
- planning QC activities
- establishing documentation requirements
- conducting audits

- analyzing trends in QC data
- implementing or reviewing corrective or preventive actions
- developing process checklists
- reviewing project QC documentation

MR QA specialists responsible for MR QA activities are often experienced project managers, and geophysicists.

Quality Control – *Quality control* (QC) consists of that "part of quality management focused on fulfilling quality requirements." (ISO 9000) While quality assurance relates to how processes are designed and performed or how a product is made, quality control is more the inspection aspect of quality management. Inspection is the process of measuring, examining, or testing one or more characteristics of a product or service and comparing these with specified requirements to determine conformity. Products and processes can be inspected to make sure that the product being provided is correct and meets requirements.

The aim of QC is to find (and correct) defects in a process or product. QC, therefore, is product oriented. QC activities are not intended to eliminate or minimize errors, but rather to measure their effect. QC activities include QC inspections (measurements or tests); gathering QC data, identifying, reporting and evaluating noncompliance, recommending process improvements; evaluating the effectiveness of corrective actions; and producing QC reports. Therefore, evaluating a QC check or procedure does not itself eliminate errors. The QC data can and should be used to take appropriate corrective actions which can minimize error or control data to an acceptable level of quality in the future. QC is both proactive and corrective. It establishes measures to determine if procedures are producing acceptable data and identifies actions to correct unacceptable performance.

QC should include both internally and externally performed activities. The contractor responsible for producing the product performs internal QC activities. MR QC activities are carried out by experienced geophysicists, chemists, and UXO Quality Control Specialists specific for their respective tasks. Most QC activities take place within the organization responsible for collecting the data. The organization also develops and implements the QC activities, evaluates the data, and takes corrective action when necessary. Example QC activities for MR projects include conducting daily instrument tests and implementing Geophysical System Verification (GSV) through the use of instrument verification strips (IVS) and blind seeds (MR-QAPP Worksheet 22).

Defect – A *defect* is a type of nonconformity. It occurs when a product or service fails to meet specified requirements. A defect is an error or mistake that must be corrected (see corrective actions). QC requirements and inspections should be designed to detect defects in processes or products.

Quality is best achieved by implementing a process-based quality management system, which can accomplish the following tasks:

- Identify, develop, and plan processes and activities to produce the desired outcome.
- Establish process and product requirements.
- Inspect (measure, examine, or test) certain process and product characteristics to verify conformance to requirements.
- Document requirements, decisions, and reporting.

Root Cause Analysis/Corrective Action – Once a defect is detected, a *Root Cause Analysis* (RCA)/*Corrective Action* process can identify the cause of the defect and an appropriate correction to eliminate the defect. An overview of this process is presented in Appendix A.

Back to Top ■ Next Section