

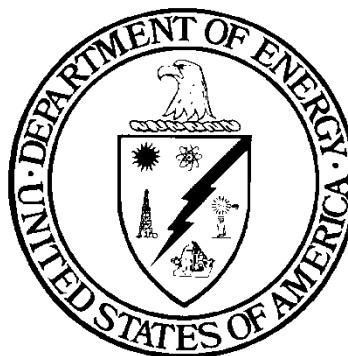
NOT MEASUREMENT
SENSITIVE

DOE-STD-1150-2013
December 2013

DOE STANDARD

QUALITY ASSURANCE FUNCTIONAL AREA QUALIFICATION STANDARD

DOE Defense Nuclear Facilities Technical Personnel



U.S. Department of Energy
Washington, D.C. 20585

AREA TRNG

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

DOE-STD-1150-2013

This document is available on the
Department of Energy
Technical Standards Program
Website at

<http://www.hss.energy.gov/nuclearsafety/ns/techstds/>

DOE-STD-1150-2013

APPROVAL

The Federal Technical Capability Panel consists of senior U.S. Department of Energy (DOE) managers responsible for overseeing the Federal Technical Capability Program. This Panel is responsible for reviewing and approving the Qualification Standard for Department-wide application. Approval of this qualification standard by the Federal Technical Capability Panel is indicated by signature below.

 12.2.13

KAREN L. BOARDMAN, CHAIRPERSON
FEDERAL TECHNICAL CAPABILITY PANEL

INTENTIONALLY BLANK

DOE-STD-1150-2013

TABLE OF CONTENTS

APPROVAL.....iii

TABLE OF CONTENTS v

ACKNOWLEDGMENTvii

PURPOSE..... 1

APPLICABILITY 1

IMPLEMENTATION 1

EVALUATION REQUIREMENTS..... 2

INITIAL QUALIFICATION AND TRAINING 4

DUTIES AND RESPONSIBILITIES..... 4

BACKGROUND AND EXPERIENCE 5

REQUIRED TECHNICAL COMPETENCIES 6

APPENDIX A..... 19

APPENDIX B..... 21

CONCLUDING MATERIAL 23

INTENTIONALLY BLANK

DOE-STD-1150-2013

ACKNOWLEDGEMENT

The Office of Health, Safety and Security, Office of Quality Assurance is the sponsor for the Quality Assurance (QA) Functional Area Qualification Standard (FAQS). The sponsor is responsible for coordinating the development and/or review of the FAQS by subject matter experts to ensure the technical content of the standard is accurate and adequate for Department-wide application for those involved in the QA program. The sponsor, in coordination with the Federal Technical Capability Panel, is also responsible for ensuring the FAQS is maintained current.

The following subject matter experts participated in the development and/or review of this qualification standard:

Colette Broussard	DOE-HSS
Debbie Rosano	DOE-HSS
Sonya Barnette	DOE-HSS
Duli Agarwal	DOE-HSS
John Adachi	DOE-SC-CH
Krishna Vadlamani	DOE-RL
Steven Chalk	DOE-RL
Sam Johnson	DOE-NNSA
Thanhtan VanOber	DOE-NNSA
Anita Leivo	DOE-NA-00-LA
Nathan Morley	DOE-NA-SH-50
Robert Blyth	DOE-ID
Samuel Vega	DOE-ORP
Darrell Huff	DOE-NE
Larry Adkinson	DOE-SR

INTENTIONALLY BLANK

DOE-STD-1150-2013

U.S. DEPARTMENT OF ENERGY FUNCTIONAL AREA QUALIFICATION STANDARD

QUALITY ASSURANCE

PURPOSE

The primary purpose of the Technical Qualification Program (TQP) is to ensure employees have the requisite technical competency to support the mission of the Department. The TQP forms the basis for the development and assignment of DOE personnel responsible for ensuring the safe operation of defense nuclear facilities. The technical qualification standards are not intended to replace the U.S. Office of Personnel Management (OPM) qualifications standards or other departmental personnel standards, rules, plans, or processes. However, the technical qualification standards should form the primary basis for developing vacancy announcements, qualification requirements, crediting plans, interview questions, and other criteria associated with the recruitment, selection, and internal placement of technical personnel.

APPLICABILITY

The Quality Assurance (QA) Functional Area Qualification Standard (FAQS) establishes common functional area competency requirements for all DOE QA personnel who provide assistance, direction, guidance, oversight, or evaluation of contractor technical activities that could impact the safe operation of DOE's defense nuclear facilities. This technical FAQS has been developed as a tool to assist DOE program and field offices in the development and implementation of the TQP in their organization. For ease of transportability of qualifications between DOE elements, program and field offices must use this technical FAQS without modification. Satisfactory and documented attainment of the competency requirements contained in this technical FAQS ensures personnel possess the minimum requisite competence to fulfill functional area duties and responsibilities common to the DOE complex. Additionally, needed office/site/facility-specific qualification standards, handled separately, supplement this technical FAQS and establish unique operational competency requirements at the headquarters or field element, site, or facility level.

It should be noted that the competencies of management and leadership, general technical knowledge, regulations, administrative capability, and assessment and oversight are embodied in the competencies in this standard. All these factors have a bearing on safety. Although the focus of this standard is technical competence, competencies such as good communication, recognized credibility, ability to listen and process information, and the ability to guide an effort to get it right the first time are recognized as important aspects of safety.

IMPLEMENTATION

This FAQS identifies the minimum technical competency requirements for DOE personnel. Although there are other competency requirements associated with these positions, this FAQS identifies the specific, common technical competencies required throughout all defense nuclear facilities for QA personnel.

DOE-STD-1150-2013

The term “must” denotes a mandatory requirement, “should” denotes a recommended practice that is not required, and “may” denotes an option in this standard.

The competencies identify various levels of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

Familiarity level is basic knowledge of or exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

Working level is knowledge required to monitor and assess operations/activities, to apply standards of acceptable performance, and to recognize the need to seek and obtain appropriate expert advice (e.g., technical, legal, safety) or consult appropriate reference materials required to ensure the safety of DOE activities.

Demonstrate the ability is the actual performance of a task or activity in accordance with policy, procedures, guidelines, and/or accepted industry or DOE practices.

Headquarters and field elements must establish a program and process to ensure DOE personnel possess the competencies required by their position, including the competencies identified in this technical FAQs. Documentation of the completion of the requirements in this standard must be included in the employees’ training and qualification records. Satisfactory attainment of competency requirements contained in this technical FAQs may be documented using the example QA FAQs qualification card from the Federal Technical Capability Program Directives and Standards page, <http://www.hss.energy.gov/deprep/ftcp/directives/directives.asp>.

Equivalencies should be used sparingly and with the utmost rigor and scrutiny to maintain the spirit and intent of the TQP. Equivalencies may be granted for individual competencies based on objective evidence of previous education, training, certification, or experience. Objective evidence includes a combination of transcripts, certifications, and in some cases, a knowledge sampling obtained through written and/or oral examinations. Equivalencies must be granted in accordance with the TQP plan of the site/office/headquarters organization qualifying the individual. Supporting knowledge and/or skill statements should, and mandatory performance activities must, be considered before granting an equivalency for a competency.

Training must be provided to employees in the TQP who do not meet competencies contained in this technical FAQs. Training may include, but is not limited to, formal classroom and computer- based courses, self-study, mentoring, on-the-job training, and special assignments. Departmental training must be based on appropriate supporting knowledge and/or skill statements similar to those listed for each competency requirement. Headquarters and field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training.

EVALUATION REQUIREMENTS

Attainment of competencies listed in this technical FAQs must be documented in accordance with the TQP plan or policy of the site/office/headquarters organization qualifying the individual and the requirements in DOE Order (O) 360.1C, *Federal Employee Training*, and DOE O 426.1, Chg 1, *Federal Technical Capability*.

The qualifying official or immediate supervisor should ensure the candidate meets the background and experience requirements of this FAQs. If the immediate supervisor is not

DOE-STD-1150-2013

qualified in this functional area, the supervisor should consult with a qualified individual prior to using one or a combination of the following individual competency evaluation methods:

- Satisfactory completion of a written examination
- Satisfactory completion of an oral examination
- Satisfactory accomplishment of an observed task or activity directly related to a competency
- Documented evaluation of equivalencies (such as applicable experience in the field) without a written examination

Field element managers/headquarters program managers must qualify candidates as possessing the basic technical knowledge, technical discipline competency, and position-specific knowledge, skills, and abilities required for their positions.

Final qualification of candidates must be performed using one or a combination of the following methods:

- Satisfactory completion of a comprehensive written examination with a minimum passing grade of 80 percent.
- Satisfactory completion of an oral examination by a qualified Senior Technical Safety Manager (STSM) or a qualification board of technically qualified personnel that includes at least one qualified STSM.
- Satisfactory completion of a walkthrough of a facility with a qualifying official for the purpose of verifying a candidate's knowledge and practical skills of selected key elements.

Guidance for oral interviews and written exams is contained in DOE-HDBK-1205-97, *Guide to Good Practices for the Design, Development, and Implementation of Examinations*, and DOE-HDBK-1080-97, *Guide to Good Practices for Oral Examinations*.

For oral examinations and walkthroughs, qualifying officials or board members should ask critical questions intended to integrate identified learning objectives during qualification. Field element managers/headquarters program managers or designees must develop formal guidance for oral examinations and walkthroughs that includes:

- Standards for qualification.
- Use of technical advisors by a board.
- Questioning procedures or protocol.
- Pass/fail criteria.
- Board deliberations and voting authorization procedures.
- Documentation process.

DOE-STD-1150-2013

INITIAL QUALIFICATION AND TRAINING

Qualification of QA personnel must be conducted in accordance with the requirements of DOE O 426.1, Chg 1. DOE O 414.1D, *Quality Assurance* requires personnel responsible for QA oversight of defense nuclear facilities to be qualified to this FAQ.

DOE personnel must participate in continuing education and training as necessary to improve performance and proficiency and ensure they stay up-to-date on changing technology and new requirements. This may include courses and/or training provided by:

- DOE
- Other government agencies
- Outside vendors
- Educational institutions

Beyond formal classroom or computer-based courses, continuing training may include:

- Self-study
- Attendance at symposia, seminars, exhibitions
- Special assignments
- On-the-job experience

A description of suggested learning activities and the requirements for the continuing education and training program for this FAQS are included in Appendix A.

DUTIES AND RESPONSIBILITIES

The following are typical duties and responsibilities expected of DOE personnel assigned to the QA functional area:

- a. Serve as or support the senior manager responsible for developing and ensuring implementation of the organization's QA Program (QAP) consistent with DOE O 414.1D, 10 Code of Federal Regulations (CFR) 830, "Nuclear Safety Management," and other customer requirements.
- b. Review, monitor and evaluate the organization's and the contractor's QAP, plans, and processes to verify compliance with applicable regulations, standards, and DOE Orders.
- c. Lead/perform implementation assessments of DOE and contractor QAPs and processes to verify adequacy, effectiveness, and compliance with applicable regulations, standards, and DOE Orders. Advise management regarding QA and participate in the evaluation of QA-related award fee and performance based incentives, when requested.
- d. Write and review procedures; investigate technical problems; develop QA project and program plans; review project procurement strategies and documents, test plans, test reports, software; and interface with projects to develop processes, etc.

DOE-STD-1150-2013

- e. Obtain and track information concerning QA issues throughout the organization's area of responsibility (e.g., the site) and provide advice and recommendations for corrective and improvement actions to the applicable line management.
- f. Support the senior management regarding QA enforcement (i.e., Price-Anderson Amendments Act) activities involving contractors and accident/event investigations.
- g. Serve as a subject matter expert and/or technical point-of-contact for QA activities, including reviewing products and activities to ensure QA requirements have been effectively implemented.
- h. Interface with DOE Headquarters and Field elements, regulators, and stakeholders to ensure the organization's effective application of DOE QA rules, directives, standards, and national/international consensus standards (e.g., NQA-1, ISO 9001, etc.).
- i. Serve as a QA representative on Integrated Project Teams (IPT).

Position-specific duties and responsibilities for QA personnel are contained in office/site/facility-specific qualification standards and/or position descriptions.

BACKGROUND AND EXPERIENCE

The OPM *Qualification Standards Operating Manual* establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements.

The preferred education and experience for QA personnel are:

1. Education

Bachelor of Science degree in engineering, science, or a related discipline; or meet the alternative requirements specified for engineers or scientists in the OPM Qualifications Standards Handbook. Bachelor degrees in other disciplines are also appropriate based on the duties to be performed and considering the experience gained in performing related QA activities.

2. Experience

Industrial, military, Federal, state, or other directly related background that has provided specialized experience in QA. Specialized experience can be demonstrated through possession of the competencies outlined in this standard.

In addition to the above stated education and experience, a national Lead Auditor Certification (e.g., NQA-1, ISO 9001, and ASQ), Certified Quality Engineer (CQE), or Certified Manager of Quality/Organizational Excellence (CMQOE) may serve as the basis for equivalency of competencies in portions of this standard.

DOE-STD-1150-2013

REQUIRED TECHNICAL COMPETENCIES

The competencies contained in this standard are distinct from competencies contained in the General Technical Base (GTB) Qualification Standard. All QA personnel must satisfy the competency requirements of the GTB Qualification Standard prior to or in parallel with the competency requirements contained in this standard. Each competency requirement defines the level of expected knowledge and/or skill an individual must possess to meet the intent of this standard. Each competency requirement is further described by supporting knowledge and/or skill statements that describe the intent of the competency statement. In selected competencies, expected knowledge and/or skills have been designated as “mandatory performance activities.” In these competencies, the actions are not optional.

Note: When regulations, DOE directives, or other industry standards are referenced in this FAQs, the most recent revision should be used. It is recognized that some QA personnel may oversee facilities that utilize predecessor documents to those identified. In those cases, such documents should be included in local qualification standards.

QA PROGRAM MANAGEMENT

1. QA personnel must have a working level of knowledge of DOE QA policy, programs, processes, and regulatory requirements contained in:

- DOE O 414.1D, *Quality Assurance*
- 10 CFR 830, “Nuclear Safety Management”
- 10 CFR 820, “Procedural Rules for DOE Nuclear Activities”

Supporting Knowledge and/or Skills

- a. Be able to identify the source of DOE enforceable nuclear safety requirements enforced as Nuclear Safety Rules and discuss the purpose and scope of the Price-Anderson Amendments Act and its applicability to the DOE’s QA activities.
- b. Discuss the purpose, interrelationships, and importance of DOE P 450.4A, *Integrated Safety Management Policy*, DOE O 414.1D, and 10 CFR 830, Subpart A, “Quality Assurance Requirements.”
- c. Discuss the DOE and contractor requirements and responsibilities for development, review, approval, and implementation of QAPs.
- d. Discuss the processes for obtaining an exemption to DOE O 414.1D and 10 CFR 830, Subpart A, “Quality Assurance Requirements.”
- e. Discuss the requirements of DOE O 414.1D and 10 CFR 830, Subpart A, “Quality Assurance Requirements” and discuss the similarities and differences between the two documents.
- f. Referring to DOE Guide (G) 414.1-2B Admin Chg 1, *Quality Assurance Program Guide*, discuss the implementation of an effective Quality Assurance Program (QAP).

DOE-STD-1150-2013

- g. Referring to DOE G 414.1-2B Admin Chg 1, discuss the shared attributes of quality and safety management systems and the methods for integrating the implementation of the DOE Safety Management System and QAP.
- h. Discuss the purpose, benefits, and restrictions of the graded approach in the implementation of DOE QA requirements.

2. QA personnel must have a working level knowledge of the QAP requirements identified in their organization and the contractor's QA documents.

Supporting Knowledge and/or Skills

- a. Describe the purpose and elements of your organization's QAP and discuss its effectiveness.
- b. Discuss line management's responsibilities for the QAP.
- c. Describe the graded approach for application of quality requirements.

3. QA personnel must have a working level knowledge of the application of appropriate regulations and national/international consensus standards to support DOE QAP implementation of work being performed within your organization.

Supporting Knowledge and/or Skills

- a. Discuss the applicability of external QA regulations to the organization's activities (e.g., NRC, EPA, DOT, etc.)
- b. Describe the general relationship and applicability of the latest version of each of the following documents to DOE QA requirements, as applicable:
 - American Society for Quality ASQ-E4, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*;
 - ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*;
 - ASQ Q9001, *Quality Management Systems - Requirements*;
 - ISO 14001, *Environmental Management System*;
 - International Atomic Energy Agency (IAEA) Technical Standards/Guides; and
 - Intergovernmental Data QA Project Plans – Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs.
- c. Describe the purpose for DOE and contractor organizations adopting consensus standards to implement DOE QA requirements. Explain the need for addressing any requirement in the adopted consensus standards necessary to meet DOE QA requirements.

4. QA personnel must have a familiarity level knowledge between the DOE QA requirements and DOE Regulations, Orders, Guides, and Standards as applicable

DOE-STD-1150-2013

to DOE contracts, programs, and projects that affect QA within their organization.
For example:

- NAP-24, *Weapon Quality Policy*
- 10 CFR 835, "Occupational Radiation Protection"
- 10 CFR 708, "DOE Contractor Employee Protection Program"
- 10 CFR 970, "Department of Energy Acquisition Regulations (DEAR), DOE Management and Operating Contracts"
- 10 CFR. 851, "Worker Safety and Health Program"
- DOE O 430.1B, Chg 2, *Real Property and Asset Management*
- DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*
- DOE O 200.1A, *Information Technology Management*
- DOE O 251.1C, *Departmental Directives Program*
- DOE O 360.1C, *Federal Employee Training*
- DOE O 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities*
- DOE O 422.1, *Conduct of Operations*
- DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*
- DOE O 433.1B, *Maintenance Management Program For DOE Nuclear Facilities*
- DOE O 435.1, Chg 1, *Radioactive Waste Management*
- DOE O 451.1B, Chg 3, *National Environmental Policy Act Compliance Program*
- DOE O 460.2A, *Departmental Materials Transportation and Packaging Management*
- DOE O 470.4B, *Safeguards and Security Program*
- DOE O 151.1C, *Comprehensive Emergency Management*
- DOE O 442.1A, *Department of Energy Employee Concerns Program*
- DOE O 225.1B, *Accident Investigations*
- DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*
- DOE O 232.2, *Occurrence Reporting and Processing of Operations Information*
- DOE/RW/0333P, *Quality Assurance Requirements and Description*
- U.S. Department of Energy, Carlsbad Field Office, Quality Assurance Program Document, DOE/CBFO-94-1012 Revision 11
- DOE Guide 413.3-2, *Quality Assurance Guide for Project Management*
- DOE Guide 430.1-2, *Implementation Guide for Surveillance and Maintenance During Facility Transition and Disposition*
- DOE Guide 430.1-3, *Deactivation Implementation Guide*
- DOE Guide 430.1-4, *Decommissioning Implementation Guide*
- DOE Guide 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*
- DOE-STD-1073-2003, Parts I & II, *Guide for Operational Configuration Management Program*

DOE-STD-1150-2013

- DOE-STD-1083-2009, *Processing Exemptions to Nuclear Safety Rules and Approval of Alternative Methods for Documented Safety Analyses*
- DOE-STD-7501-99, *The DOE Corporate Lessons Learned Programs*
- DOE STD-1172-2011, *Safety Software Quality Assurance Functional Area Qualification Standard*
- DOE STD-1182-2004, *Civil/Structural Engineering Functional Area Qualification Standard*

Supporting Knowledge and/or Skills

- a. Discuss the applicability, purpose, scope and impact of the above DOE Regulations, Orders, Guides, and Standards as they relate to the ten criteria in DOE O 414.1D.
- b. Discuss the authorities, roles, and responsibilities of QA personnel with regard to the DOE Regulations, Orders, Guides, and Standards that may be applicable to the candidates' contracts, programs, and projects.

5. QA personnel must have a working level knowledge of channels to maintain communication with Headquarters, field elements, and the public.

Supporting Knowledge and/or Skills

- a. Identify the various internal and external groups with whom QA personnel must interface in the performance of their duties.
- b. Describe DOE's organization and discuss DOE's procedures for communicating between organizational elements.
- c. Describe the activities of the DOE Federal Quality Council.

6. Describe DOE's procedures and policies for communicating with regulatory agencies and other stakeholders. QA personnel must demonstrate the ability to effectively communicate (both orally and in writing).

Mandatory Performance Activities

- a. Demonstrate written communication skills, as applicable, in the development of:
 - Assessment reports
 - Technical reports
 - Technical papers
 - QAP
 - Work process documents (e.g., procedures)
- b. Demonstrate effective and appropriate communications skills during interactions with contractors.

Supporting Knowledge and/or Skills

DOE-STD-1150-2013

- c. Describe effective and appropriate interface with Defense Nuclear Facilities Safety Board (DNFSB) per DOE M 140.1-1B, *Interface with the Defense Nuclear Facilities Safety Board*.
- d. Discuss effective and appropriate interaction with citizen advisory boards (CABs), political entities, and other stakeholders.

7. QA personnel must have a working level knowledge of control of documents and records.

Supporting Knowledge and/or Skills

- a. Describe the role of documents for prescribing processes, specifying requirements, and establishing a design.
- b. Define and explain the control of documents and records, including disposal and destruction.
- c. Describe implementation techniques and/or procedures for the development and control of documents and records.
- d. Discuss requirements for preparation, maintenance, review, approval, issuance, use, and revision of documents used to prescribe processes, specify requirements or establish a design.
- e. Discuss methods of record storage and retrieval requirements. Discuss the definitions of “temporary records,” “lifetime records,” and “permanent records.” Identify the sources of requirements and describe how different types of records are maintained.
- f. Discuss the management requirements contained in DOE O 243.1B, *Records Management Program*; 10 CFR 830.6, “Recordkeeping,” and 10 CFR 820.11, “Information Requirements.”

GENERAL TECHNICAL PERFORMANCE

8. QA personnel must have a familiarity level knowledge of the processes for performing work to established technical standards, administrative controls, and other hazard controls to meet regulatory or DOE requirements

Supporting Knowledge and/or Skills

- a. Describe the methods used to identify work to be performed and the associated hazards (e.g., DOE O 440.1B, *Worker Protection Program for DOE* (including the National Nuclear Security Administration) *Federal Employees*, 10 CFR. 851, “Worker Safety and Health Program”).
- b. Describe the methods for approving work process controls, such as procedures or instructions.
- c. Discuss the use of approved work process controls to conduct work, including stop work authority.

DOE-STD-1150-2013

- d. Discuss nuclear facility safety requirements including: Documented Safety Analyses (DSAs); hazard analysis; development of and reasons for Technical Safety Requirements (TSRs); design of engineered safety features; and other QA-related aspects of 10 CFR 830, Subpart B and DOE nuclear safety standards (such as DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*).

9. **QA personnel must have a familiarity level knowledge of the processes for identification, marking, and control of items. Reference DOE G 414.1-2B, *Quality Assurance Program Guide*, and International Atomic Energy Agency (IAEA) standard, IAEA-TECDOC-1169, *Managing Suspect and Counterfeit Items in the Nuclear Industry* for guidance on Suspect and Counterfeit Items.**

Supporting Knowledge and/or Skills

- a. Discuss methods of identifying and controlling items that have been procured and accepted.
- b. Discuss methods for the control of items during handling, storage, and shipping.
- c. Discuss methods and equipment used to identify counterfeit handling equipment, piping system components, electronic equipment and digital safety software.
- d. Describe methods for assuring that items remain properly identified throughout their life cycle.

10. **QA personnel must have a familiarity level knowledge of maintenance management practices. Reference DOE O 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, DOE G 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B*.**

Supporting Knowledge and/or Skills

- a. Identify the key elements of a Nuclear Maintenance Management Program for which QA involvement is essential.
- b. Define the program required for maintenance and the reliable performance of structures, systems, and components (SSCs) that are part of the safety basis required at hazard category 1, 2, and 3 DOE nuclear facilities.
- c. Be able to explain each of the following maintenance-related terms.
 - Corrective
 - Planned
 - Preventive
 - Reliability-centered
 - Predictive
 - Surveillance and Testing
- d. Describe the elements of an effective work control program and the documentation used to control maintenance.

DOE-STD-1150-2013

- e. Discuss the relationship between maintenance, Conduct of Operations, QA, and Configuration Management.
- f. Discuss the storage and maintenance requirements for parts, materials, and equipment.
- g. Describe the difference between temporary and permanent repairs/work and the requirements and controls to prevent inadvertent modifications.

11. **QA personnel must have a familiarity level knowledge of the processes for design and engineering practices.**

Supporting Knowledge and/or Skills

- a. Discuss the expectations for incorporating safety in the design process for new or major modifications to DOE Hazard Category 1, 2, and 3 facilities by demonstrating knowledge of DOE-STD-1189-2008, *Integration of Safety into the Design*.
- b. Discuss different methods of design analysis and design changes, and state how they are documented and controlled.
- c. Identify the methods of design verification and describe their relative advantages and disadvantages.
- d. Discuss the controls, including verification and validation, for computer software used to originate design solutions and design verification.

12. **QA personnel must have a familiarity level knowledge of software quality assurance, especially safety software quality assurance (SSQA).**

Supporting Knowledge and/or Skills

- a. Discuss the software QA and safety software QA (SSQA) objectives, applicability, requirements, and responsibilities prescribed in DOE O 414.1D.

Note: There is a functional area qualification standard for SSQA, i.e., Standard 1172.

13. **QA personnel must have a familiarity level knowledge of the procurement processes.**

Supporting Knowledge and/or Skills

- a. Discuss the relationship between the organization with technical authority over the procurement (engineering) and the procurement organization that negotiates and executes the purchase; organizations responsible for QA programmatic implementation; and, the organization performing receipt inspection.
- b. Discuss the importance of clearly specifying the contents (especially technical and quality requirements) of procurement documents and the effective flow down of this information to suppliers.

DOE-STD-1150-2013

- c. Discuss the purpose and methods of supplier qualification during a typical procurement process, including the process approach used to evaluate the supplier.
- d. Discuss the purpose and methods of supplier performance monitoring.
- e. Discuss the methods for assuring that suppliers continue to provide acceptable items and services.
- f. Discuss the purpose and importance of acceptance inspection(s) during a typical procurement process.
- g. Discuss the purpose and importance of supplier documentation and controls.
- h. Discuss the purpose and methods of commercial grade item dedication process for items important to safety.
- i. Discuss methods for control of nonconforming items to prevent use until disposition is determined.

14. **QA personnel must have a working level knowledge of suspect/counterfeit items requirements.**

Supporting Knowledge and/or Skills

- a. Discuss the suspect and counterfeit item controls and reporting requirements contained in DOE O 414.1D.
- b. Discuss the suspect/counterfeit item notification and reporting requirements in DOE O 232.2, *Occurrence Reporting and Processing of Operations Information*.

15. **QA personnel must have a familiarity level knowledge of testing and inspection techniques and methods.**

Supporting Knowledge and/or Skills

- a. Describe the use of dimensional measurement devices (e.g., proper instruments used for degree of accuracy required, temperature, cleanliness, and calibration effects on instruments, as well as work pieces).
- b. Discuss the basic operating principles of the following:

Nondestructive examination (NDE) methods:

- visual
- radiography
- magnetic particle
- liquid penetrant
- ultrasonic
- spectral analysis
- hardness tests and
- eddy current

DOE-STD-1150-2013

Destructive examination methods

- tensile tests
 - compression tests
 - fatigue tests
 - bend tests and
 - metallurgical sectioning
- c. Discuss methods for control of nonconforming items to prevent use until disposition is determined.
- d. Discuss the advantages, disadvantages, and inherent limitations of destructive and nondestructive examination methods.
- e. Describe testing and inspection methods commonly used in the following areas:
- Electrical
 - Mechanical
 - Chemical
 - Soil and concrete
 - Welding/fabrication and
 - Computer software

16. QA personnel must have a familiarity level knowledge of inspection and test planning methodology.

Supporting Knowledge and/or Skills

- a. Discuss the criteria/logic used to determine critical characteristics that need to be verified through inspection (i.e., operational and design requirements) and testing.
- b. Describe the merits of inspection at source, receipt, in process, and final stages.
- c. Compare the advantages and disadvantages of inspection by item attributes versus inspection of process variables.

17. QA personnel must have a familiarity level knowledge of metrology and calibration systems.

Supporting Knowledge and/or Skills

- a. Discuss the purpose and application of calibration systems with respect to:
- Process/product quality
 - Accuracy
 - Precision
- b. Discuss the requirements for calibration programs contained in the latest version of the following:
- 10 CFR 830, Subpart A, "Quality Assurance"
 - DOE O 414.1D requirements applicable to *Work Processes* and *Inspection and Testing*, regarding Control of measurement and test equipment

DOE-STD-1150-2013

- ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*, Basic Requirement 12 (with appropriate guidance), regarding control of measurement and test equipment.
 - c. Discuss the components of an effective calibration recall system.
 - d. Discuss the importance of calibration traceability.
 - e. Discuss methods for determining a proper calibration interval.
18. **QA personnel must have a familiarity level knowledge of statistical process control and sampling procedures for work processes, inspection/testing, and quality improvement.**

Supporting Knowledge and/or Skills

- a. Discuss the following statistical terms and their inter-relationships:
 - Mean
 - Median
 - Mode
 - Variance
 - Mean variance
 - Standard deviation
- b. Discuss in general, the following probability sampling methods:
 - Simple random sampling
 - Stratified sampling
 - Cluster sampling
 - Systematic selection sampling
- c. Discuss the terms “confidence interval” and “confidence limit.”
- d. Discuss control charts and their relationship to statistical process controls.

ASSESSMENT, OVERSIGHT AND IMPROVEMENT

19. **QA personnel must demonstrate the ability and skill to properly apply and implement assessment principles and techniques. Reference DOE G 414.1-1B, *Management and Independent Assessments Guide* and DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*.**

Supporting Knowledge and/or Skills

- a. Describe the assessment requirements applicable to DOE and contractor organizations.
- b. Explain the essential elements of assessments, the relationship and differences between management and independent assessments, and the role of QA personnel relative to the two assessment types.

DOE-STD-1150-2013

- c. Describe how the results of management assessments are used by management to improve their management processes
 - d. Describe how the results of independent assessments are used by the management assessment process.
 - e. Describe the fundamental differences between performance and compliance based assessments.
 - f. Describe the contents of a typical assessment report.
 - g. Discuss the conduct of formal meetings between DOE management and senior contractor management to discuss results of quality assurance assessments.
 - h. Discuss the ethical responsibilities of QA personnel when conducting assessments.
- 20. QA personnel must have a working level knowledge of quality improvement principles, processes and methods including: problem analysis techniques used to identify problems/potential improvements; analysis tools to determine potential causes of problems; and systems to identify track and complete corrective action(s) or improvement opportunities. Reference G 414.1-1B, G 450.4-1C and G 414.1-2B Admin Chg 1.**

Supporting Knowledge and/or Skills

- a. Discuss problem analysis techniques used to identify quality problems (includes clearly defined variations from requirements).
- b. Discuss methods to ensure effectiveness of resolution to quality problems.
- c. Describe tools in analysis and prioritization of quality problems used to identify immediate, short-term and long term corrective as well as preventive measures.
- d. Discuss the attributes of an effective corrective action tracking system.
- e. Discuss quality improvement strategies including feedback, monitoring, method of measuring effectiveness, and programmatic adjustments.
- f. Describe the application of effective problem analysis principles and techniques commonly used by DOE including the following:
 - Root cause analysis
 - Causal factor analysis
 - Change analysis
 - Barrier analysis
 - Management Oversight Risk Tree (MORT) analysis
 - Project Evaluation Tree (PET)
- g. Describe the application of root cause analysis processes in the establishment of corrective actions and improvement opportunities.
 - Event and causal factor charting
 - Root cause coding

DOE-STD-1150-2013

- Generation of recommendation(s)
- h. Discuss the importance of conducting Extent of Condition Reviews and Extent of Cause Reviews.
- i. Describe various data gathering techniques and the use of trending and history when analyzing problems.
- j. Using event report information, discuss problem analysis techniques used to identify problems and how they could have been avoided.

21. QA personnel must have a working level knowledge to trend performance.

Supporting Knowledge and/or Skills

- a. Discuss the key process methodology used in the trending analysis of operations information.
- b. Using an actual list of performance measures, explain what type of assessments should be performed and in what areas.
- c. Given a set of assessment report data for a specified period, discuss potential quality trends or compliance problems.

22. QA personnel must have a working level knowledge of how to conduct independent assessments of the contractor's approved QAP implementation in accordance with all applicable QA requirements and standards. Reference G 414.1-1B and G 414.1-2B Admin Chg 1.

Supporting Knowledge and/or Skills

- a. Discuss the means for determining the adequacy and effectiveness of a work activity being assessed.
- b. Discuss some criteria that may be used by line management to determine the significance of issues or observations.
- c. Describe possible assessment alternatives when actual work activities cannot be observed.
- d. Discuss conventional assessment team member qualification requirements.
- e. Describe the benefits of monitoring or surveillance of contractor activities.
- f. Discuss how QA criteria are evaluated in a readiness review.
- g. Discuss "performance-based" assessment method of a QA program.

23. QA personnel must have a working level knowledge of how to oversee the effective implementation of appropriate QA criteria. Reference DOE G 414.1B.

Supporting Knowledge and/or Skills

DOE-STD-1150-2013

- a. Describe the goals, objectives, and methods used to conduct effective oversight of QA activities contained in 10 CFR 830, Subpart A, "Quality Assurance," and DOE G 414.1-2B Admin Chg. 1.
- b. Explain how the following elements of the QAP benefit the organization's effectiveness:
 - Management assessment
 - Quality improvement
 - Actual performance to schedule
 - Performance of Corrective action
- c. Discuss the reporting techniques for communicating evaluation results to DOE and contractor management.

APPENDIX A

CONTINUING EDUCATION, TRAINING AND PROFICIENCY PROGRAM

This standard does not require requalification.

Headquarters or field element managers must ensure the following:

1. Establish expectations related to the performance of duties and responsibilities in this FAQs, considering regulatory and/or contractual requirements as appropriate.
2. Identify specific continuing training requirements in the site/office/position specific qualification standard(s) or procedures.
3. Approve all established continuing training requirements related to defense nuclear facility safety oversight as determined for their office or site.

QA personnel must complete continuing technical education and/or training covering topics directly related to the QA FAQs as determined by the appropriate headquarters or field element managers as follows:

1. Address changes to DOE directives, guides, standards, policies, and rules since the last qualification was completed.
2. Perform practical factor exercises as appropriate, especially those that are mandatory and others as required by the associated FAQs.
3. Attend seminars, symposia, or technical meetings related to QA as resources are available.

Note: Continuing technical education and/or training may include courses/training provided by the DOE, other government agencies, outside vendors, or local educational institutions. Continuing training topics should also address identified weaknesses in the knowledge or skills of the individual personnel, and current technical issues related to the associated FAQs. Where continuing education is mandatory for maintaining professional registration (e.g., Professional Engineer) or professional certification (e.g., Certified Health Physicist), this will normally be sufficient, and only needs to be augmented by DOE directives reviews and any site-specific requirements (e.g., new/revised DSAs).

DOE-STD-1150-2013

INTENTIONALLY BLANK

APPENDIX B

TYPICAL SUPPLIER DOCUMENTATION

PREAWARD AND SUPPLIER FABRICATION

Quality Assurance Program Submittal and
Pre-award Survey
Supplier Quality Program Evaluation
Certified Quality Program
Quality System for Materials Specifying Testing Per ASME
Supplier Use of Calibrated Equipment
Fabrication/Inspection/Test Plan
Supplier Use of Software Controlled Instruments and Equipment Containing
Embedded Software (Firmware)
Supplier Use of Commercial off the Shelf Software
Source Inspection
Certified Electrical Inspector (Non-NEC-IAEI)
Supplier Use of Spreadsheet Calculations Using Commercial off the Shelf Software
First Article Inspection-Source
Nonconformance Documentation and Reporting
Certified Weld Inspector (CWI)
Welding Procedures and Qualifications
Nondestructive Examination Process

MATERIAL IDENTIFICATION

Identification of Items with Part number/Model number
Identification of Items with Catalog Cut
Identification of Items
Identification and Traceability of Items
Identification of Age Control Items

TESTING AND TEST DATA

Liquid Penetrant Material Certification
Certified Material Test Report
Inspection and Test Report
Flame Test Report
Calibration Report
Certification of Calibration
Repair and Calibration Services
Nationally Recognized Testing Laboratory (NRTL) Listed or Labeled
Nationally Recognized Testing Laboratory (NRTL) Listed or Labeled components in a system

DOE-STD-1150-2013

INSPECTION AND ACCEPTANCE CRITERIA

First Article Inspection/Test-Receiving

Supplier Furnished Items

Control of Graded Fasteners

Procurement of Potentially Suspect or Counterfeit Items

Certificate of Conformance

Certificate of Conformance for Commercial Grade Surveyed Procurements

Recommended Spare Parts Listing

Certificate of Conformance for Respiratory Protection Equipment

Commercial Grade Dedication of Items/Services

MATERIAL HANDLING

Packaging/Shipping Procedures

Direct Drop Shipment

Note: Obtained from one of the DOE-RL contractor's acquisition and verification quality assurance practices.

DOE-STD-1150-2013

CONCLUDING MATERIAL

Review Activity:

EM
NNSA
NE
SC

Preparing Activity:

DOE HS-33

Project Number:

P1150-2002REV

Field and Operations Offices:

Carlsbad Field Office
Chicago Operations Office
Idaho Operations Office
Oak Ridge Operations Office
Office of River Protection
Richland Operations Office
Savannah River Operations Office

NNSA Field Offices:

Kansas City Field Office
Livermore Field Office
Los Alamos Field Office
Nevada Field Office
Savannah River Field Office
Sandia Field Office
NNSA Production Office

Site Offices:

Argonne Site Office
Brookhaven Site Office
Fermi Site Office
Princeton Area Office