

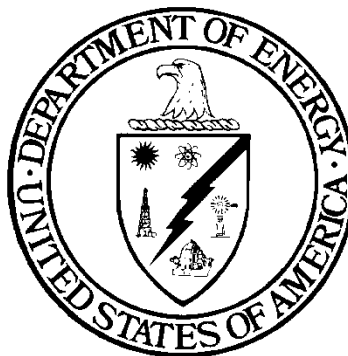
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DOE STANDARD

GENERAL TECHNICAL BASE QUALIFICATION STANDARD

DOE Defense Nuclear Facilities Technical Personnel



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

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DOE-STD-1146-2017

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.

<u><i>Karen L. Boardman</i></u>	<u>12.22.17</u>
Karen L. Boardman, Chairperson Federal Technical Capability Panel	Date

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DOE-STD-1146-2017

TABLE OF CONTENTS

APPROVAL	iii
TABLE OF CONTENTS	v
ACKNOWLEDGEMENT	vi
PURPOSE	1
GTB PART A, KNOWLEDGE REQUIREMENTS	1
• APPLICABILITY.....	1
• IMPLEMENTATION.....	2
• EVALUATION REQUIREMENTS.....	2
• INITIAL QUALIFICATION AND TRAINING.....	3
• DUTIES AND RESPONSIBILITIES.....	3
• BACKGROUND AND EXPERIENCE	3
• REQUIRED TECHNICAL COMPETENCIES.....	3
GTB PART B, OVERSIGHT PERFORMANCE	17
• APPLICABILITY.....	17
• IMPLEMENTATION.....	17
• EVALUATION REQUIREMENTS.....	18
• INITIAL QUALIFICATION AND TRAINING.....	19
• DUTIES AND RESPONSIBILITIES.....	20
• BACKGROUND AND EXPERIENCE	20
• REQUIRED PERFORMANCE COMPETENCIES	20
APPENDIX A	24
APPENDIX B	25
CONCLUDING MATERIAL	26

DOE-STD-1146-2017

ACKNOWLEDGEMENT

The Office of the Enterprise Assessments (EA) on behalf of the Federal Technical Capabilities Program (FTCP) Panel is the sponsor for the General Technical Base (GTB) Qualification Standard (QS) which includes two parts, Part A, *Knowledge Requirements*, and Part B, *Oversight Performance*. The sponsor is responsible for coordinating the development and/or review of this QS 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 program. The sponsor, in coordination with the FTCP Panel, is also responsible for ensuring this qualification standard is maintained current.

The following subject matter experts participated in the development and/or review of Part A, *Knowledge Requirements*, of the GTB QS:

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DOE-STD-1146-2017

U.S. DEPARTMENT OF ENERGY GENERAL TECHNICAL BASE QUALIFICATION STANDARD

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.

This General Technical Base (GTB) Qualification Standard (QS) includes two parts. The GTB Part A, *Knowledge Requirements* (referred to as GTB Part A) is intended to provide a common base of DOE specific technical knowledge that is needed for further functional area qualifications within the TQP. The GTB Part B, *Oversight Performance*, (referred to as GTB Part B), establishes performance competencies for conducting oversight duties and tasks that are common across all the functional areas within the TQP. Therefore, GTB Part B includes mandatory performance activities (MPAs) that must be completed to demonstrate the satisfactory performance of common oversight tasks.

GTB PART A, KNOWLEDGE REQUIREMENTS

APPLICABILITY

The GTB Part A establishes common technical competencies for all DOE 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. GTB Part A has been developed as a tool to assist DOE Program and Field Offices in the development and implementation of the TQP in their organization. It is intended to provide a common knowledge base for further functional area qualifications.

For ease of transportability of qualifications between DOE elements, Program and Field Offices must use this qualification standard without modification or addition to technical competency statements and supporting knowledge requirements. Needed additional office/site/facility specific technical competencies should be handled separately.

It should be noted that technical competencies related to management and leadership, general technical knowledge, regulations, departmental requirements and program implementation, administrative capability, 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, 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 competencies impacting safety.

DOE-STD-1146-2017

IMPLEMENTATION

The technical competencies in the GTB Part A provide a base level of technical knowledge across a broad range of topics for DOE personnel in the TQP. The technical competencies include supporting knowledge requirements that are intended to provide exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

Functional Area Qualification Standards (FAQS) build on this broad level of knowledge in specific topics and include unique performance tasks. Since oversight tasks are common to all DOE personnel in the TQP additional knowledge and MPAs related to oversight are addressed in the GTB Part B. The term “must” denotes a mandatory requirement, “should” denotes a recommended practice that is not required, and “may” denotes an option in this standard.

Headquarters and field elements must establish a program and process to ensure DOE personnel possess the competencies required by their position and the technical competencies identified in this qualification standard. Documentation of the completion of supporting knowledge requirements for the technical competencies in GTB Part A must be included in the employees’ training and qualification records.

Training must be provided to employees in the TQP who do not have the technical competencies identified in this FAQS. The DOE NTC has developed a computer based online training course, SAF-101DE, GTB Part A that covers all the supporting knowledge requirements in this qualification standard and includes knowledge checks for each of the related technical competencies. This training is found on the NTC website at <http://ntc.doe.gov>. Managers and personnel should use the online training course, SAF-101DE, to support obtainment of the technical competencies in this QS. However, supervisors may identify additional training as needed to support completion of this QS.

EVALUATION REQUIREMENTS

Attainment of the technical competencies listed in this qualification standard 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 O 360.1C, *Federal Employee Training*, and DOE O 426.1A, *Federal Technical Capability Program*. The FTCP Panel (referred to as the Panel) has determined that satisfactory completion of individual sections of SAF-101DE meets the intent of a written test to demonstrate completion of the supporting knowledge requirements for the technical competencies in this QS. The completion of supporting knowledge requirements contained in this QS should be documented using the GTB Part A, *Knowledge Requirements*, Qualification Card in the Electronic Technical Qualification Program at <https://etqp.ntc.doe.gov>. Qualifying officials may sign off each technical competency separately based on satisfactory completion of the individual sections of the GTB Part A online training course or sign off the entire qualification card based on satisfactory completion of the entire GTB Part A online training course.

Field element managers/headquarters program managers must qualify candidates as possessing the technical competencies in this QS. Therefore, depending on the experience and knowledge of each TQP candidate the qualifying official or supervisor may determine that written or oral examinations in addition to completion of the GTB Part A online course are needed prior to signing off individual technical competencies or the entire GTB Part A qualification card.

DOE-STD-1146-2017

INITIAL QUALIFICATION AND TRAINING

Qualification of personnel to the GTB Part A QS must be conducted in accordance with the requirements of DOE O 426.1A, *Federal Technical Capability Program*.

There are no continuing training requirements associated with the GTB Part A QS.

DUTIES AND RESPONSIBILITIES

There are no duties or responsibilities associated with the GTB Part A QS.

BACKGROUND AND EXPERIENCE

There are no background or experience recommendations associated with the GTB Part A QS.

REQUIRED TECHNICAL COMPETENCIES

Each technical competency includes the specific knowledge an individual must possess to meet the intent of this qualification standard. The level of expected knowledge for each technical competency statement is described by supporting knowledge requirements.

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

NUCLEAR FUNDAMENTALS

1. Personnel shall demonstrate knowledge of basic nuclear theory and principles.

Supporting Knowledge Requirements

- A. Identify and describe the three forces that are found within a nucleus.
- B. Define the terms “mass defect” and “binding energy” and discuss how they are related.
- C. Describe the following processes, and trace the decay chain for a specified nuclide on the chart of the nuclides:
 - 1) Alpha decay
 - 2) Beta-minus decay
 - 3) Beta-plus decay
 - 4) Electron capture
- D. Define the following terms:
 - 1) Radioactivity

DOE-STD-1146-2017

- 2) Radioactive decay constant
 - 3) Activity
 - 4) Radioactive half-life
 - 5) Radioactive equilibrium
- E. Describe the following neutron-nucleus interactions:
- 1) Elastic scattering
 - 2) Inelastic scattering
- F. Compare and contrast capture (absorption), fission, and particle ejection nuclear reactions.

2. Personnel shall demonstrate knowledge of the basic fission process and the results obtained from fission.

Supporting Knowledge Requirements

- A. Using the liquid drop model, explain the fission process.
- B. Compare and contrast the characteristics of fissile material, fissionable material, and fertile material.
- C. Discuss the various energy releases that result from the fission process.
- D. Define the term “criticality” and explain how criticality is detected.
- E. List five factors that affect criticality.
- F. Identify the hazards that result from an unwanted criticality.
- G. Explain the double contingency principle as it relates to criticality control.
- H. Discuss the potential hazards associated with accidental/unwanted criticality.

3. Personnel shall demonstrate knowledge of radiological controls and theory.

Supporting Knowledge Requirements

- A. Define the term “ionizing radiation.”
- B. Describe how nuclear radiation is generated.
- C. Describe each of the following forms of radiation in terms of structure, electrostatic charge, interactions with matter, and penetration potential:
 - 1) Alpha
 - 2) Gamma
 - 3) Beta
 - 4) Neutron (slow and fast)
- D. Discuss the types of materials that are best suited for shielding the radiation types listed in 3c.
- E. Describe the biological effects of ionizing radiation (acute and chronic).
- F. Discuss the primary hazards to the human body (the whole body or the skin or that are internal)

DOE-STD-1146-2017

of each type of radiation.

- G. Discuss radiation dose, including the terms rad, rem, roentgen, and international standard units (SI), and how it is measured.
- H. Define the term “quality factor” and discuss its application to radiation.
- I. Discuss the meaning of ALARA and describe the basic methods for achieving ALARA.
- J. Discuss the hazards, safe handling, storage requirements, and operational practices for each of the following nuclides in their various forms:
 - 1) Plutonium
 - 2) Uranium
 - 3) Tritium

4. Personnel shall demonstrate knowledge of contamination control and theory.

Supporting Knowledge Requirements

- A. Define the term “contamination” and list three types of contamination.
- B. Describe three ways to control contamination.
- C. Describe how contamination is detected.
- D. Describe three ways contamination could enter the body and the methods used to prevent internal contamination.
- E. Describe the methods used for internal dose determination.
- F. Describe the types of personal protective equipment (PPE).
- G. Describe the potential effects of radioactive contamination outside contamination areas.

5. Personnel shall demonstrate knowledge of basic radiation detection methods and principles.

Supporting Knowledge Requirements

- A. Describe the proper use and function of and radiation detected by different types of thermoluminescent dosimeters and self-reading dosimetry.
- B. State the purpose and function of the following radiation-monitoring systems:
 - 1) Criticality
 - 2) Area
 - 3) Process
 - 4) Airborne

6. Personnel shall demonstrate knowledge of the requirements documents for radiological control practices, procedures, and limits.

Supporting Knowledge Requirements

- A. Discuss the purpose and general requirements of 10 CFR 835, *Occupational Radiation Protection*, including the following:
 - 1) Access training
 - 2) Dose limits

DOE-STD-1146-2017

- 3) Posting types and use
 - 4) Access requirements
 - 5) Differences in radiological terminology between the 1998 and 2007 revisions of 10 CFR 835
- B. Discuss the purpose of and general guidance provided under DOE-STD-1098-2008, *Radiological Control*.

ENVIRONMENTAL MANAGEMENT

7. Personnel shall demonstrate knowledge of the sources and types of radioactive and hazardous waste associated with DOE facilities.

Supporting Knowledge Requirements

- A. Discuss the following terms and the differences among them:
- 1) Low-level radioactive waste
 - 2) Hazardous waste
 - 3) Transuranic waste
 - 4) High-level radioactive waste
 - 5) Mixed hazardous waste
- B. Describe potential sources of each of the following types of waste in a DOE facility:
- 1) Low-level radioactive waste
 - 2) Hazardous waste
 - 3) Transuranic waste
 - 4) High-level radioactive waste
 - 5) Mixed hazardous waste
- C. Discuss the various types of storage, treatment, and disposal used to manage the following types of waste:
- 1) Low-level radioactive waste
 - 2) Hazardous waste
 - 3) Transuranic waste
 - 4) High-level radioactive waste
 - 5) Mixed hazardous waste

8. Personnel shall demonstrate knowledge of DOE Orders, standards, regulations, and laws related to environmental protection, pollution prevention, environmental restoration, and waste management issues.

Supporting Knowledge Requirements

- A. Discuss the purpose of the following environmental laws as they apply to the Department and the contractors that operate its facilities:

DOE-STD-1146-2017

- 1) National Environmental Policy Act (NEPA)
 - 2) Resource Conservation and Recovery Act (RCRA)
 - 3) Comprehensive Environmental Response, Compensation, and Liability Act—Superfund Act (CERCLA)
- B. Using references, discuss the purpose of the following environmental laws as they apply to the Department and the contractors that operate its facilities:
- 1) Clean Water Act (CWA), including the National Pollution Discharge Elimination System (NPDES)
 - 2) Clean Air Act (CAA)
 - 3) Emergency Planning and Community Right-To-Know Act (EPCRA)
 - 4) Federal Facilities Compliance Act (FFCA)
 - 5) Pollution Prevention Act of 1990 (PPA)
 - 6) Safe Drinking Water Act (SDWA)
 - 7) Superfund Amendment Reauthorization Act (SARA)
 - 8) Toxic Substance Control Act (TSCA)
 - 9) Solid Waste Disposal Act (SWDA)
- C. Using the following documents as references, discuss their purpose and general requirements:
- 1) DOE O 436.1, *Departmental Sustainability*
 - 2) DOE O 451.1B, Chg. 3, *National Environmental Policy Act Compliance Program*
 - 3) DOE O 435.1, Chg. 1, *Radioactive Waste Management*
 - 4) DOE O 458.1, Chg. 3, *Radiation Protection of the Public and the Environment*
- D. Using DOE O 436.1 as a reference, discuss the concept of an Environmental Management System.
- E. Using DOE O 458.1, Chg. 3, as a reference, discuss the concept of maintaining doses to the public and to the environment as far below dose limits and constraints as is reasonably achievable (i.e., ALARA).
- 9. Personnel shall demonstrate knowledge of the purpose and content of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*.**

Supporting Knowledge Requirements

- A. Using 29 CFR 1910.120 as a reference, discuss its purpose, as it applies to the Department and the contractors that operate its facilities, with respect to the following:
- 1) Cleanup operations
 - 2) Corrective actions
 - 3) Voluntary clean-up operations
 - 4) Operations involving hazardous wastes
 - 5) Emergency response operations

DOE-STD-1146-2017

- B. Using 29 CFR 1910.120 as a reference, discuss the role of the Department in the identification, assessment, and reaction to potential risks posed by hazardous wastes that exist at Department sites.
- C. Describe the linkage between 10 CFR 851, *Worker Safety and Health Program*, and 29 CFR 1910.120.

10. Personnel shall demonstrate knowledge of potential personal and organizational liability associated with environmental laws.

Supporting Knowledge Requirements

- A. Using NEPA as a reference, discuss the Department's responsibilities associated with NEPA and the potential consequences of noncompliance with NEPA.
- B. Using RCRA as a reference, discuss the Department's responsibilities associated with RCRA and the potential consequences of noncompliance with RCRA.

SAFETY MANAGEMENT

11. Personnel shall demonstrate knowledge of the Department's philosophy and approach to implementing Integrated Safety Management (ISM).

Supporting Knowledge and/or Skills

- A. Explain the objective of ISM.
- B. Describe how the seven guiding principles in the ISM policy are used to implement an integrated safety management philosophy.
- C. Describe the five core safety management functions in the ISM policy and discuss how they provide the necessary structure for work activities.
- D. Identify and discuss existing Department manuals, guides, standards, and other documents and practices that support implementation of ISM, including the following:
 - 1) DOE O 450.2, *Integrated Safety Management*
 - 2) DOE G 450.4-1C, *Integrated Safety Management System Guide*
 - 3) Standards/Requirements Identification Documents (S/RIDs) and Work Smart Standards
 - 4) Contract reform and performance-based contracting
 - 5) Discuss the purpose, content, and application of DOE P 450.4A, *Integrated Safety Management Policy*.
- E. Discuss the relationship of the DEAR Clause 970.5223-1, Integration of Environment, Safety and Health into Work Planning and Execution, to the ISM process.
- F. Describe the requirements in 10 CFR 830 Subpart A and DOE O 414.1D, Chg. 1, *Quality Assurance*, to integrate the ISM system description with the Quality Assurance Program.

12. Personnel shall demonstrate knowledge of 10 CFR 851, *Worker Safety and Health Program*, and DOE O 440.1B, Chg. 2, *Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees*.

DOE-STD-1146-2017

Supporting Knowledge Requirements

- A. Discuss the requirements for the development and approval of worker safety and health programs.
- B. Describe management responsibilities and worker rights and responsibilities.
- C. Describe hazard identification, assessment, prevention, and abatement.
- D. Discuss applicable safety and health standards.
- E. Discuss the process for obtaining a variance from a safety and health standard.
- F. Discuss the 10 CFR 851 enforcement process.

13. Personnel shall demonstrate knowledge of the Occupational Safety and Health Act.

Supporting Knowledge Requirements

- A. Using the following documents as references, discuss the purpose of 29 CFR 1910, Occupational Safety and Health Standards; 29 CFR 1926, Safety and Health Regulations for Construction Industry; and 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health and Related Matters.
- B. Discuss the regulatory interfaces between the Occupational Safety and Health Administration (OSHA) and other regulatory agencies.
- C. Describe DOE's responsibilities with respect to the Occupational Safety and Health Act.
- D. Discuss workplace inspection techniques.
- E. Discuss the major components of the OSHA hazard communication protocol.
- F. Discuss how the OSHA Rule is invoked on DOE Federal and contractor staff by 10 CFR 851 and DOE O 440.1B, Chg. 2, respectively.

14. Personnel shall demonstrate knowledge of fire safety for Department facilities necessary to identify safe and unsafe work practices.

Supporting Knowledge Requirements

- A. Discuss the critical aspects of fire prevention, fire response planning, and control of fires.
- B. Describe fire hazards that could affect the safety of facility personnel.
- C. Discuss the key elements of the National Fire Protection Association (NFPA) Life Safety Code.
- D. Discuss the purpose of a fire hazard analysis.
- E. Describe the characteristics of and the methods/agents used to extinguish the following classes of fires:
 - 1) Class A
 - 2) Class B
 - 3) Class C
 - 4) Class D

DOE-STD-1146-2017

- F. Discuss the key components and use of building fire protection equipment, including detection, alarm, and communication systems, and extinguishing systems (automatic and manual).

15. Personnel shall demonstrate knowledge of electrical safety for Department facilities necessary to identify safe and unsafe work practices.

Supporting Knowledge Requirements

- A. Discuss general safety precautions for working near low voltage electrical equipment and high voltage electrical equipment.
- B. Describe basic electrical isolation devices and methods.
- C. Describe how safety considerations differ for alternating current and direct current.
- D. Describe basic office electrical safety precautions.
- E. Discuss NFPA 70E, *Standard for Electrical Safety in the Workplace*.

16. Personnel shall demonstrate knowledge of industrial hygiene principles.

Supporting Knowledge Requirements

- A. Define the term “industrial hygiene,” including the elements of anticipation, recognition, evaluation, and control of health hazards in the workplace.
- B. Discuss basic industrial hygiene concepts and terminology, including the following:
 - 1) Routes of exposure (inhalation, ingestion, dermal injection)
 - 2) Dose and toxicity (acute, chronic, concentration)
 - 3) Exposure limits [permissible exposure limit (PEL), time-weighted average (TWA), threshold limit values (TLV), short term exposure limit (STEL), ceiling, action level, parts per million (PPM), milligrams per cubic meter (mg/m³)]
 - 4) Hierarchy of controls (engineering, substitution, administrative, PPE)
 - 5) Health hazards (chemical, physical, biological)
 - 6) Key elements of a carcinogen control program, including carcinogenic chemicals and asbestos control
- C. Discuss the key elements (exposure assessment and monitoring, engineering controls, respiratory protection, PPE and clothing, housekeeping, labeling, training, medical surveillance, record keeping) of an industrial hygiene program.
- D. Discuss industrial hygiene requirements as found in the following regulations:
 - 1) 10 CFR 850, Chronic Beryllium Disease Prevention Program
 - 2) 10 CFR 851, *Worker Safety and Health Program*
- E. Discuss the key elements of a hazard communication program and the use of material safety data sheets.
- F. Discuss the importance of the following types of equipment used for personnel protection and safety:
 - 1) Eye protection

DOE-STD-1146-2017

- 2) Ear protection
- 3) Protective clothing/gloves
- 4) Respiratory protection

CONDUCT OF OPERATIONS

17. Personnel shall demonstrate knowledge of DOE O 422.1, Chg. 2, *Conduct of Operations*, and the principles of conduct of operations, and relate these principles to an operational environment.

Supporting Knowledge Requirements

- A. Discuss the purpose of DOE O 422.1, Chg. 2, *Conduct of Operations*.
- B. State the eighteen requirement areas in attachment 2 of DOE O 422.1, Chg. 2, and discuss how each requirement contributes to an effective and safe operational environment.
- C. Discuss how each of the following Orders contributes to a proper conduct of operations environment:
 - 1) DOE O 231.1B, Chg. 1, *Environment, Safety and Health Reporting*
 - 2) DOE O 433.1B, Chg. 1, *Maintenance Management Program for DOE Nuclear Facilities*
 - 3) DOE O 414.1D, Chg. 1, *Quality Assurance*
- D. Discuss proper critique principles and describe a proper critique process, including key elements.
- E. Define the term “root cause” and explain its importance in operational safety.
- F. Define the term “lessons learned” and explain their importance in operational safety.
- G. Describe stop work authority and the role of personnel in its application.
- H. Describe the key elements of a lockout/tagout system.

18. Personnel shall demonstrate knowledge of DOE O 231.1B, Chg. 1, *Environment, Safety and Health Reporting*, and DOE O 232.2A, *Occurrence Reporting and Processing of Operations Information*.

Supporting Knowledge Requirements

- A. State the purpose of DOE O 231.1B, Chg. 1, *Environment, Safety and Health Reporting*.
- B. Define the following terms:
 - 1) Event
 - 2) Condition
 - 3) Facility
 - 4) Notification report
 - 5) Occurrence report

DOE-STD-1146-2017

- 6) Reportable occurrence
- 7) Facility representative
- C. Discuss the occurrence-reporting responsibilities of a facility representative.
- D. State the different categories of reportable occurrences and discuss each.
- E. State the major criteria groups of categorized occurrences and discuss each.

19. Personnel shall demonstrate knowledge of 10 CFR 830 Subpart A, *Quality Assurance Requirements*, and DOE O 414.1D, Chg. 1, *Quality Assurance*.

Supporting Knowledge Requirements

- A. Discuss the objectives and applicability of the DOE quality requirements, including the relationship between 10 CFR 830 Subpart A and DOE O 414.1D, Chg. 1, and the relationship between DOE quality requirements and American National Standard ASME NQA-1 for nuclear facility applications.
- B. Discuss 10 CFR 830.4, General Requirements; 10 CFR 830, Subpart A, Quality Assurance Requirements; and DOE O 414.1D, Chg. 1, *Quality Assurance*, including the Federal responsibilities and the applicability of the requirements to DOE and its contractors.
- C. Describe, in general terms, the content and objectives of the quality assurance criteria in the following categories, as found in DOE O 414.1D, Chg. 1:
 - 1) Management
 - 2) Performance
 - 3) Assessment
- D. Discuss the quality requirements in the following attachments (and their supporting implementing guides) of DOE O 414.1D, Chg. 1, how the quality requirements become nuclear safety requirements for contractors, and how they apply to Federal organizations:
 - 1) Attachment 3, Suspect/Counterfeit Items Prevention, and the supporting guide, DOE G 414.1-2B, Chg. 2, *Quality Assurance Program Guide*.
 - 2) Attachment 4, Safety Software Quality Requirements for Nuclear Facilities, and the supporting guide, DOE G 414.1-4, *Safety Software Guide for Use with 10 CFR 830, Subpart A, Quality Assurance Requirements, and DOE O 414.1C, Quality Assurance*.
- E. Describe the Federal responsibilities for review, approval, and oversight of contractor quality assurance programs developed under 10 CFR 830, Subpart A, and DOE O 414.1D, Chg. 1.

20. Personnel shall demonstrate knowledge of DOE O 151.1D, *Comprehensive Emergency Management System*, and its implementing guides.

Supporting Knowledge Requirements

- A. Describe the relevant requirements, purpose, interrelationships, and importance of the following regulations and directives:
 - 1) 10 CFR 830, Nuclear Safety Management

DOE-STD-1146-2017

- 2) 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
 - 3) DOE O 151.1D, *Comprehensive Emergency Management System*
 - 4) DOE G 151.1-1A, *Emergency Management Fundamentals and the Operational Emergency Base Program* (Emergency Management Guide)
 - 5) DOE G 151.1-2, *Technical Planning Basis* (Emergency Management Guide)
 - 6) DOE G 151.1-3, *Programmatic Elements* (Emergency Management Guide)
 - 7) DOE G 151.1-4, *Response Elements* (Emergency Management Guide)
 - 8) DOE G 151.1-5, *Biosafety Facilities* (Emergency Management Guide)
- B. State what is meant by an operational emergency.
- C. Describe the purpose of a facility emergency plan and implementing procedures.
- D. Discuss the requirements for developing the hazards survey and the emergency planning hazards assessment.
- E. Describe the key roles and safety considerations during emergency response:
- 1) National Incident Management System
 - 2) Incident Command System
 - 3) Incident commander
 - 4) Emergency director
- F. Discuss the requirements for testing emergency plans and for interfacing with state and local officials and the public.

SAFETY BASIS REQUIREMENTS AND DOCUMENTATION

21. Personnel shall demonstrate knowledge of the Unreviewed Safety Question (USQ) process as discussed in 10 CFR 830 Subpart B, *Nuclear Safety Management*.

Supporting Knowledge Requirements

- A. Describe the purpose of the USQ process.
- B. Discuss the reasons for performing a USQ determination.
- C. Define and discuss key USQ terms.
- D. Describe the situations that require a USQ determination.
- E. Define the conditions for a USQ.
- F. Describe contractor responsibilities for performing USQ determinations.
- G. Describe site actions for identified potential inadequacy of previous safety analyses.
- H. Discuss site actions to be taken for a USQ.
- I. Discuss the qualification and training requirements for personnel performing safety evaluations.

22. Personnel shall demonstrate knowledge of the Documented Safety Analysis (DSA) and Technical Safety Requirements (TSRs) of 10 CFR 830 Subpart B, *Safety Basis*

DOE-STD-1146-2017

Requirements, and the DOE standards and Guides supporting implementation of 10 CFR 830 Subpart B.

Supporting Knowledge Requirements

- A. Define and compare the terms "hazard" and "risk."
- B. Explain and compare the terms "safety basis," "design basis," and "authorization basis."
- C. Discuss the relationship of DSAs to TSRs.
- D. Describe the contractor responsibilities for TSRs and DSAs.
- E. Define the following terms and discuss the purpose of each:
 - 1) Safety limit
 - 2) Limiting control settings
 - 3) Limiting conditions for operation
 - 4) Surveillance requirements
- F. Discuss the possible source documents that may be used in developing TSRs.
- G. Discuss the conditions that constitute a violation of TSRs.
- H. State the general requirements for a DSA and for a preliminary documented safety analysis.

23. Personnel shall demonstrate knowledge of DOE O 420.1C, Chg. 1, *Facility Safety*.

Supporting Knowledge Requirements

- A. Discuss the purpose and applicability of DOE O 420.1C, Chg. 1, *Facility Safety*.
- B. Discuss the requirements imposed by DOE O 420.1C, Chg. 1, on the contractors that operate DOE nuclear facilities.
- C. Discuss, in general terms, the focus and the content of the following sections of DOE O 420.1C, Chg. 1:
 - 1) Nuclear safety design criteria
 - 2) Fire protection
 - 3) Criticality safety
 - 4) Natural phenomena hazards mitigation
 - 5) Cognizant system engineer program

OVERSIGHT

24. Personnel shall demonstrate knowledge of DOE P 226.2, *Policy for Federal Oversight and Contractor Assurance Systems*, and DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*.

Supporting Knowledge Requirements

- A. Discuss the purpose and scope of DOE P 226.2.

DOE-STD-1146-2017

- B. Discuss why DOE performs oversight and the intended outcomes and goals of DOE P 226.2. Describe the relationships and operating principles between DOE line Management, DOE Contractors, and DOE contractor Parent Organizations in DOE P 226.2.
- C. Discuss the attributes of effective assurance systems and oversight processes in DOE P 226.2.
- D. Discuss federal requirements and responsibilities in DOE O 226.1B.
- E. Describe each of the required elements of a contractor assurance system in DOE O 226.1B.
- F. Explain a simplified process used to perform oversight.
- G. Describe the Contracting Officer and Contracting Officer Representative roles in performing oversight.

25. Personnel shall demonstrate knowledge of DOE O 210.2A, *DOE Corporate Operating Experience Program*.

Supporting Knowledge Requirements

- A. Describe the objectives of DOE O 210.2A, *DOE Corporate Operating Experience Program*.
- B. Describe the types of information that are collected and analyzed.
- C. Describe the types of operating experience reports that are developed.

26. Personnel shall demonstrate knowledge of DOE O 225.1B, *Accident Investigations*.

Supporting Knowledge Requirements

- A. Describe the accident investigation process.
- B. Describe the roles and responsibilities of key participants in accident investigations.
- C. Describe accident investigation data collection and data analysis techniques.
- D. Describe the development of conclusions and judgments of need.

27. Personnel shall demonstrate knowledge of DOE O 410.1, *Central Technical Authority Responsibilities Regarding Nuclear Safety Requirements*.

Supporting Knowledge Requirements

- A. State the purpose of DOE O 410.1, *Central Technical Authority Responsibilities Regarding Nuclear Safety Requirements*.
- B. Define the following terms:
 - 1) Exception
 - 2) Exemption
- C. List all the documents and directives that require Central Technical Authorities/Chief of Nuclear Safety/Chief of Defense Nuclear Safety concurrence before they are issued.

DOE-STD-1146-2017

- D. State the responsibilities of the Central Technical Authorities.
- E. State the responsibilities of the Chief of Nuclear Safety and of the Chief of Defense Nuclear Safety.

SECURITY

28. Personnel shall demonstrate knowledge of DOE security programs, including DOE O 470.4B, Chg. 2, *Safeguards and Security Program*, and its supporting directives.

Supporting Knowledge Requirements

- A. Discuss information security programs, including control of classified materials, as described in DOE O 471.6, Chg. 2, *Information Security*.
 - B. Discuss physical protection programs, including security areas, intrusion detection, and access controls, as described in DOE O 473.3A, *Protection Program Operations*.
 - C. Describe how graded security protection is used in safeguards and security planning in accordance with DOE O 473.3A, *Program Protection Operations*.
 - D. Discuss the basic requirements of material control and accountability per DOE O 474.2, Chg. 4, *Nuclear Material Control and Accountability*.
 - E. Discuss the responsibilities of field elements and contractor employees in identifying classified information as defined in DOE O 471.6, Chg. 2, *Information Security*.
-

GTB PART B, OVERSIGHT PERFORMANCE

APPLICABILITY

The GTB Part B QS establishes common performance competencies for all DOE personnel who provide assistance, direction, guidance, oversight, or evaluation of contractor technical activities that could impact the safe and secure operation of DOE's defense nuclear facilities. This QS has been developed as a tool to assist DOE Program and Field Offices in the development and implementation of the TQP in their respective organizations. GTB Part B is intended to be completed following completion of GTB Part A for all new TQP candidates. GTB Part B is not required for currently qualified staff.

For ease of transportability of qualifications between DOE elements, Program and Field Offices must use the GTB Part B without modification or addition to the performance competency supporting knowledge requirements. Additionally, to encourage transportability, Program and Field Offices should complete the MPAs in this QS without modification. However, in some situations, modifications to the MPAs may be needed to reflect local practices. For example, supervisors may determine that some of the MPAs in GTB Part B are not applicable to personnel in support or matrix roles. In these situations supervisors should determine and document completion of appropriate activities based on the individuals specific oversight duties and responsibilities. Satisfactory and documented attainment of the performance competencies contained in GTB Part B ensures personnel possess the knowledge and skills to fulfill fundamental oversight duties and responsibilities common to the DOE enterprise. Additionally, needed office-/site-/facility-specific qualification standards, handled separately, supplement this QS and establish unique performance competencies at the headquarters or field element, site, or facility level.

IMPLEMENTATION

The tasks and supporting knowledge requirements covered in the GTB Part B were derived from the NTC oversight curriculum process map that was initially developed through a job task analysis conducted with input from several DOE and NNSA sites. Representatives from DOE program offices validated the NTC oversight curriculum process map and grouped the tasks into the performance competencies included in this QS. Appendix B is a crosswalk of the tasks in the oversight curriculum process map to the performance competencies and related MPAs in GTB Part B. Since the GTB Part B was developed to address fundamental oversight tasks some higher level performance competencies such as developing program measures, oversight data analysis and trending, and conducting corrective action effectiveness reviews will be incorporated into appropriate Functional Areas Qualification Standards (FAQS).

Each performance competency includes supporting knowledge requirements and any MPAs that need to be completed in order to demonstrate the performance competency has been met. The NTC has developed an oversight performance qualification evaluation guide that is available for personnel assigned the GTB Part B and qualifying officials responsible for verifying the obtainment of required performance competencies. The oversight performance qualification evaluation guide provides the expected level of knowledge for each of the supporting knowledge requirements. Local terminology and procedures should be used as appropriate when addressing the supporting knowledge requirements in the GTB Part B.

DOE-STD-1146-2017

Personnel are required to complete the MPAs in the GTB Part B in the primary functional area¹ they are assigned oversight responsibilities. For example, a person assigned the Nuclear Safety Specialist FAQs and who is responsible for oversight of the nuclear safety basis program should perform the MPAs in this QS during oversight of the implementation of the safety basis program. Since technical knowledge in an assigned functional area is necessary to complete the MPAs in this QS, personnel should complete applicable competencies in their primary FAQs prior to performing the MPAs in GTB Part B. Personnel assigned oversight responsibilities in several functional areas may be assigned more than one FAQs or site/program-specific qualification standard. However, they are only required to complete the MPAs in the GTB Part B one time in any of the functional areas they are assigned oversight responsibilities.

The GTB Part B includes evaluation requirements that describe the general criteria for successfully demonstrating completion of each MPA. MPA evaluation checklists will be developed by the NTC that provide more detailed criteria for successfully completing the MPA evaluation requirements. These MPA evaluation checklists will be available for qualifying officials and/or supervisors to verify and document satisfactory completion of the MPAs. The MPA evaluation checklists may be modified locally to include local terminology and performance expectations for the MPAs. The NTC evaluation guides and MPA evaluation checklists are available through the NTC TQP support site at: <https://ntc.doe.gov/student/stp/techqualprogram>.

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 performance competencies or supporting knowledge requirements and/or MPAs based on objective evidence of previous experience. Examples of objective evidence for completing equivalencies includes a combination of transcripts, certifications, job history, work products, 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. All the supporting knowledge requirements and any MPAs should be met before granting an equivalency for an entire performance competency.

EVALUATION REQUIREMENTS

Completion of performance competency knowledge requirements and MPAs listed in the GTB Part B 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 O 360.1C, *Federal Employee Training*, and DOE O 426.1A, *Federal Technical Capability Program*.

¹ The term functional area includes the broad areas of environment, safety, security, health and business and financial systems listed in DOE Policy 226.2, *Policy for Federal Oversight and Contractor Assurance Systems* and the operational aspects of environment, safety, and health; safeguards and security; cyber security; and emergency management included in the scope of DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*. For example, functional areas would include safety management programs such as conduct of operations and maintenance, topical areas in safeguards and security such as information and physical security, safety management systems such as integrated safety management and quality assurance, program areas such as waste management and worker safety and health, and mission specific programs implemented by the various DOE program offices.

DOE-STD-1146-2017

Supervisory verification of obtainment of all performance competencies, in accordance with the TQP plan or policy of the site/office/headquarters organization, satisfies final qualification requirements for the GTB Part B.

It is preferred that personnel are given opportunities to demonstrate completion of the MPAs in an actual work setting in the specific functional area to which they are assigned oversight responsibilities. The MPA evaluation checklists are available for QOs/supervisors to use to document satisfactory completion of each MPA during site-specific oversight activities. At a minimum, candidates must demonstrate satisfactory completion of each MPA at least once.

Personnel attending the NTC instructor-led oversight courses will be evaluated on their ability to satisfactorily perform all the MPAs identified in this QS in a training environment that closely models an actual work setting. The course instructors will use the MPA evaluation checklists to document the satisfactory completion of the MPAs addressed in the specific course. In cases where there may be limited opportunities to perform the identified MPAs in an actual work setting within the required qualification timeframe, supervisors have the option of using satisfactory completion of the MPAs in the simulated classroom environment to demonstrate completion of the related MPA.

INITIAL QUALIFICATION AND TRAINING

Qualification of DOE oversight personnel must be conducted in accordance with the Requirements of DOE O 426.1A, *Federal Technical Capability Program*. Headquarters and field elements must establish a program and process to ensure DOE personnel possess the needed knowledge and skills to meet the performance competencies identified in GTB Part B. Documentation of the obtainment of the performance competencies in this QS must be included in the employee's training and qualification records. Satisfactory attainment of performance competencies contained in this QS should be documented using the GTB Part B QS in the Electronic Technical Qualification Program at <https://etqp.ntc.doe.gov>.

Training must be provided to employees in the TQP who do not meet the performance competencies contained in GTB Part B. 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 the knowledge requirements and performance of specific job tasks related to each performance competency statement. Headquarters and field elements should use the performance competency knowledge requirements as a basis for evaluating the content of any training.

The NTC has developed a comprehensive oversight curriculum to support the qualification and training of DOE oversight personnel. The oversight curriculum provides a standardized method for personnel to obtain the supporting knowledge requirements and perform the MPAs for each performance competency in this QS. Information on the oversight curricula is available on the NTC website at <https://ntc.doe.gov>. The use of the NTC oversight curricula is encouraged to provide personnel across the Department with a standardized level of oversight knowledge and performance.

DOE oversight personnel should maintain proficiency in the performance of oversight tasks identified in this QS through satisfactory performance of normally assigned oversight job tasks. For tasks that are infrequently performed or where there are no site-specific opportunities for actual performance, personnel may use exercises conducted by the NTC during formal

DOE-STD-1146-2017

classroom training or use locally developed exercises as part of continuing training to maintain proficiency.

DUTIES AND RESPONSIBILITIES

The GTB Part B addresses the common oversight duties and responsibilities associated with line management oversight of DOE mission work. The oversight tasks and related knowledge requirements and MPAs were derived from the NTC oversight curriculum process map and validated by team of subject matter experts representing all DOE program offices. Location specific duties and responsibilities for DOE oversight personnel are contained in office, site, or facility-specific qualification standards and/or position descriptions. A crosswalk of the oversight tasks to the Performance Competencies and MPAs in this QS is included in Appendix B.

BACKGROUND AND EXPERIENCE

There are no background or experience recommendations associated with the GTB Part B. The GTB Part B was designed to be completed following or in parallel with completion of any assigned functional area or other qualification standard which may have specific education and or experience requirements.

REQUIRED PERFORMANCE COMPETENCIES

The performance competencies contained in this standard include supporting knowledge requirements that are distinct from knowledge requirements contained in the GTB Part A. Also the performance competencies in this QS build on the knowledge requirements contained in competency 24, *Oversight*, of the GTB Part A. Therefore, all DOE oversight personnel should complete the GTB Part A prior being assigned the GTB Part B. Since technical knowledge in an assigned functional or program area is necessary to complete the MPAs in this QS, personnel should also complete applicable competencies in their assigned FAQs prior to performing the MPAs in the GTB Part B.

Each performance competency defines the expected level of knowledge and performance an individual must possess to meet the intent of this standard. Each performance competency is further described by supporting knowledge requirements, and if necessary mandatory performance activities, that describe the task(s) that must be demonstrated to meet the intent of the related performance competency.

Note: When regulations, DOE directives, or other industry standards are referenced in this FAQs, the most recent revision should be used.

1. DOE oversight personnel shall conduct oversight activities to evaluate contractor performance.

Knowledge requirements:

- A. Define baseline, supplemental, and reactive oversight.
- B. Identify the drivers and sources that contain requirements for identifying oversight

DOE-STD-1146-2017

activities.

- C. Describe the process used to determine the level and mix of oversight activities.
- D. Describe the purpose and scope of an oversight plan.
- E. Describe the types, purpose, and scope of oversight activities.
- F. Describe the purpose and relationship of evaluation criteria and lines of inquiry used in conducting oversight activities.
- G. Describe the three techniques used in conducting oversight activities.
- H. Discuss oversight result categorization using local nomenclature.
- I. Describe the applicable protocols for communicating (formal and informally) oversight results.

Mandatory Performance Activity (MPA)

Develop or tailor applicable oversight plan.

MPA Evaluation Requirements:

- a. Identify oversight activities at the appropriate level and mix and incorporate results into applicable oversight plan.

Mandatory Performance Activity (MPA)

Perform oversight activities to include at a minimum one operational awareness activity and participation in one assessment.

MPA Evaluation Requirements:

- a. Develop, or tailor existing evaluation criteria, to define the depth and breadth of assigned oversight activities.
- b. Conduct oversight activities using appropriate techniques and determine whether evaluation criteria are met.
- c. Properly categorize oversight activity results (e.g. noteworthy practices, discrepancies, findings, opportunities for improvement) based on approved organizational definitions.
- d. Document oversight activity results using applicable process.

2. DOE oversight personnel shall evaluate the adequacy of contractor issue resolution.

Knowledge requirements:

- A. State the purpose and scope of an issues management system.
- B. Describe the required elements of an issues management system.
- C. Describe the role risk and priority play in determining the significance of an issue.
- D. Define the following causal factor terms: root cause, apparent cause, direct cause, contributing cause, and common cause.
- E. Discuss attributes and applications of recognized causal analysis techniques.

DOE-STD-1146-2017

- F. Explain the corrective action process and how the graded approach is applied.
- G. Describe the types of corrective actions
- H. Discuss the considerations used in developing corrective actions.
- I. Describe the purpose, scope, and contents of a corrective action plan.
- J. Describe the purpose, scope, and contents of an effectiveness review plan.
- K. Discuss the process used to develop criteria for validating corrective action completion.
- L. Discuss the process used to select and conduct an effectiveness review.

Mandatory Performance Activity (MPA)

Evaluate the adequacy of a contractor corrective action plan.

MPA Evaluation Requirements:

- a. Evaluate whether the contractor's issue significance determination meets established criteria.
- b. Evaluate whether the contractor's causal analysis was performed using an appropriate technique(s) and resulted in suitable causal factor identification.
- c. Determine whether the contractor's corrective action plan includes appropriate corrective actions to address the causes identified by the causal analysis.
- d. When an effectiveness review is required, evaluate the contractor's corrective action effectiveness criteria.
- e. Document corrective action plan evaluation results as appropriate.

Mandatory Performance Activity (MPA)

Evaluate the contractor's corrective action closure documentation.

MPA Evaluation Requirements:

- a. Verify closure documentation supports issue resolution.

3. DOE oversight personnel shall evaluate and provide feedback on contractor periodic performance review.

Knowledge requirements:

- A. Describe the purpose and scope for evaluating contractor performance.
- B. Describe the purpose and scope of contractor assurance system (CAS) data analysis and trending.
- C. Discuss disposition of negative performance trends.
- D. Discuss the uses, advantages, and limitations of common quantitative data analysis techniques.
- E. Describe the uses, advantages, and limitations of qualitative data analysis.

Mandatory Performance Activity (MPA)

DOE-STD-1146-2017

Evaluate and provide input on contractor periodic performance review.

MPA Evaluation Requirements:

- a. Provide input, based on oversight data analysis for a periodic contractor performance review.
- b. Participate in a periodic contractor performance review.

DOE-STD-1146-2017

APPENDIX A

CONTINUING EDUCATION, TRAINING, AND PROFICIENCY PROGRAM

There is no specific continuing training associated with the General Technical Base Qualification Standard.

However, for the GTB Part A, personnel are encouraged to stay up-to-date on technical fundamentals. In particular, personnel should maintain a current level of knowledge of the Orders, Guides, and regulations referred to in this standard.

For GTB Part B, the MPAs and supporting training provided by the NTC should be reviewed by personnel and supervisors and incorporated as appropriate into local continuing training programs for qualified staff.

DOE-STD-1146-2017

APPENDIX B

GTB PART B OVERSIGHT PERFORMANCE TASKS

The job task analysis of functional area oversight duties and responsibilities identified six (6) main tasks in the oversight curriculum process map. The following is a crosswalk of these tasks to the performance competencies in the GTB Part B:

Oversight Process Task	Corresponding GTB Part B Performance Competencies (PC) and MPAs
1. Develop a Functional Area Oversight Plan	PC 1 and MPA to develop or tailor applicable oversight plan
2. Conduct Oversight Activities ²	PC 1 and MPA to perform oversight activities
3. Identify and communicate issues	PC 1 and MPA to perform oversight activities (task 3 is included in the evaluation criteria for this MPA)
4. Track resolution of contractor issues	PC 2 and MPAs to evaluate the adequacy of the contractor corrective action plan and corrective action closure documentation
5. Analyze and trend contractor performance data	PC 3 and MPA to evaluate and provide input on contractor periodic performance review (task 5 is included in the evaluation criteria for this MPA)
6. Provide input into contractor performance evaluation	PC3 and MPA to evaluate and provide input on contractor periodic performance review (task 6 is included in the evaluation criteria for this MPA)

² Oversight Activities is a broad term that refers to assessments, surveys, surveillances, inspections, limited scope performance reviews, operational readiness reviews, readiness assessments, operational awareness activities, and shadow assessments.

DOE-STD-1146-2017

CONCLUDING MATERIAL

Review Activity:

EA
NNSA
EM
SC
NE

Preparing Activity:

EA-50

Project Number:

TRNG-

Field and Operations Offices:

CBFO
ISC-CH
ID
OH
ISC-OR
ORP
RL
SR

Field or Site Offices:

Argonne Site Office
Brookhaven Site Office
Fermi Site Office
Berkeley Site Office
SLAC Site Office
ORNL Site Office
Thomas Jefferson Site Office
Ames Site Office
Pacific Northwest Site Office
Princeton Site Office
Kansas City Field Office
Livermore Field Office
Los Alamos Field Office
Nevada Field Office
NNSA Production Office
Savannah River Field Office
Sandia Field Office