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DOE-STD-1183-2016  
October 2016

# DOE STANDARD

## NUCLEAR SAFETY SPECIALIST FUNCTIONAL AREA QUALIFICATION STANDARD

DOE Defense Nuclear Facilities Technical Personnel



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

**AREA TRNG**

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# DOE-STD-1183-2016

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# DOE-STD-1183-2016

## 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.

  
\_\_\_\_\_  
Karen L. Boardman, Chairperson  
Federal Technical Capability Panel

  
\_\_\_\_\_  
Date

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**DOE-STD-1183-2016**

**TABLE OF CONTENTS**

APPROVAL ..... iii

TABLE OF CONTENTS ..... v

ACKNOWLEDGMENT ..... vi

PURPOSE ..... 1

APPLICABILITY ..... 1

IMPLEMENTATION ..... 1

EVALUATION REQUIREMENTS ..... 2

INITIAL QUALIFICATION AND TRAINING ..... 3

DUTIES AND RESPONSIBILITIES ..... 4

BACKGROUND AND EXPERIENCE ..... 4

REQUIRED PERFORMANCE COMPETENCIES ..... 5

APPENDIX A ..... 21

APPENDIX B ..... 22

# DOE-STD-1183-2016

## ACKNOWLEDGMENT

The Office of Safety, Infrastructure, and Operations (NA-50) is the sponsor for this Nuclear Safety Specialist 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 Nuclear Safety Specialist 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:

Albert MacDougall	EA-50
Andrew Delapaz	SC-3
Norman Garrett	SR
Charles Maggart	NE-ID
Liz Roybal	EA-50
Dan Schwendenman	NA-512
Garrett Smith	AU-31
Ivan Trujillo	NA-511
Gerald Sauve	SC-PNSO

**U.S. DEPARTMENT OF ENERGY  
FUNCTIONAL AREA QUALIFICATION STANDARD**

**NUCLEAR SAFETY SPECIALISTS**

**PURPOSE**

The primary purpose of the Technical Qualification Program (TQP) is to ensure employees have the requisite knowledge, skills, and abilities 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 Nuclear Safety Specialist Functional Area Qualification Standard (FAQS) establishes common performance competencies for all DOE Nuclear Safety Specialist 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 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 FAQS without modification or addition to performance competencies and supporting knowledge requirements. Satisfactory and documented attainment of the performance competencies contained in this technical FAQS ensures personnel possess the minimum requisite knowledge and skills 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 performance competencies at the headquarters or field element, site, or facility level.

**IMPLEMENTATION**

This FAQS, derived from a functional area job-task analysis, is composed of performance competencies based on task performance. The Nuclear Safety Specialist Functional Area Job Task Analysis identified tasks that were grouped into performance competencies in this FAQS.

Each performance competency includes supporting knowledge requirements and any mandatory performance activities (MPA) that need to be completed in order to demonstrate the performance competency has been met. The DOE National Training Center (NTC) developed evaluation guides to support obtainment of the performance competencies in this FAQS. These evaluation guides provide the expected level of knowledge required for each knowledge

## DOE-STD-1183-2016

requirement and are available for personnel assigned this FAQs and qualifying officials responsible for verifying the obtainment of required knowledge.

Supporting MPA evaluation requirements may also be included in the FAQs that describe the general criteria for successfully demonstrating completion of a particular MPA. MPA evaluation checklists will also be developed that provide more detailed criteria for successfully completing the supporting MPA evaluation requirements. These MPA evaluation checklists will be available for qualifying officials and/or supervisors to use to verify and document satisfactory completion of any required 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>.

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 this FAQs. Documentation of the completion of the requirements in this FAQs must be included in the employees' training and qualification records. Satisfactory attainment of performance competencies contained in this FAQs may be documented using the Nuclear Safety Specialist FAQs qualification card in the Electronic Technical Qualification Program at <https://etqp.ntc.doe.gov>.

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. 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 requirements and any MPAs should be met before granting an equivalency for the related performance competency.

Training must be provided to employees in the TQP who do not meet the performance competencies contained in this 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 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.

## EVALUATION REQUIREMENTS

Attainment of performance competency knowledge requirements and MPAs listed in this 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 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 qualified in this functional area, the supervisor should consult with a qualified individual prior to performance competency evaluation.



## DOE-STD-1183-2016

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

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 this FAQs.

As noted in the previous section, NTC evaluation guides and MPA evaluation checklists are available to support verification of obtainment of performance competencies in this FAQs by qualifying officials and/or supervisors.

### INITIAL QUALIFICATION AND TRAINING

Qualification of Nuclear Safety Specialist personnel must be conducted in accordance with the requirements of DOE O 426.1 Chg.1, *Federal Technical Capability*.

To support the initial training of personnel to this FAQs, the DOE NTC has developed a comprehensive safety basis training curriculum. This curriculum directly aligns with the information provided in the evaluation guides for this FAQs and provides a standardized method for personnel to obtain the supporting knowledge requirements for each performance competency.

Personnel attending the NTC instructor-led safety basis review courses will be evaluated on their ability to satisfactorily perform all of the MPAs identified in this FAQs using a virtual nuclear facility with associated safety basis documents. The course instructors will use the MPA evaluation checklists to document the satisfactory completion of the MPAs addressed in the specific course.

It is preferred that personnel are given opportunities to demonstrate completion of the MPAs in an actual work setting. The MPA evaluation checklists are available for QOs/supervisors to use to document satisfactory completion of each MPA on site specific reviews. At a minimum, candidates must demonstrate satisfactory completion of each MPA at least once. However, it is recognized that depending on the experience level, some individuals may need to demonstrate performance of the MPAs more than once. In cases where there may be limited opportunities to perform any of the identified MPAs in an actual work setting within the required qualification timeframe, supervisors have the option of using the satisfactory completion of the MPAs in the simulated classroom environment to demonstrate completion of the related MPA.

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:

## DOE-STD-1183-2016

- 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 personnel assigned to the Nuclear Safety Specialist functional area:

- A. Safety Basis Document Review
- B. Oversight and Assessment of Contractor Activities
- C. Technical Support

Position-specific duties and responsibilities for Nuclear Safety Specialist personnel are contained in office, site, or facility-specific qualification standards and/or position descriptions. This FAQS addresses the performance competencies for the tasks in the Safety Basis Document Review duty area. The tasks associated with the Safety Basis Document Review duty area are listed in Appendix B.

The Oversight and Assessment of Contractor Activities duty area is addressed through a set of standard oversight performance competencies that will be incorporated into a revision to the General Technical Base Qualification Standard.

Technical support duties are dependent on the level of subject-matter expertise of the individual and the needs of the organization and will not be addressed by any performance competencies in this FAQS.

### 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. Professional Certification or Engineer certification must only be referenced in an FAQS when consistent with and required by a particular OPM occupational series/grade level.

The knowledge requirements and associated MPAs identified in the FAQS were developed based on candidates having the preferred education and experience levels identified below. Personnel assigned to complete this FAQS who do not meet these requirements may need additional developmental assignments and supporting training to satisfactorily complete this FAQS.

The preferred education and experience for Nuclear Safety Specialists personnel are:

# DOE-STD-1183-2016

## 1. Education

A Bachelor's of Science degree in Engineering or Physics and meet OPM's requirements for Occupational Series 801, 810, 830, 840, 893, or 1310 (one or more).

## 2. Experience

Industrial, military, Federal, state, or other directly related background that has provided specialized experience in Nuclear Safety. Specialized experience can be demonstrated through possession of the knowledge requirements and performance of tasks outlined in this standard.

## REQUIRED PERFORMANCE COMPETENCIES

The performance competencies contained in this standard include supporting knowledge requirements that are distinct from knowledge requirements contained in the General Technical Base (GTB) Qualification Standard. All Nuclear Safety Specialists personnel must satisfy the knowledge requirements of the GTB Qualification Standard prior to or in parallel with obtaining the supporting knowledge requirements for the performance competencies contained in this standard. 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. It is recognized that some Nuclear Safety Specialist personnel may oversee facilities that utilize predecessor documents to those identified. In those cases, such documents should be included in local qualification standards.

### 1. Nuclear Safety Specialists shall conduct reviews of documented safety analyses (DSAs) for DOE Hazard Category 1, 2, or 3 nuclear facilities that support DOE approval as required by 10 CFR 830 Subpart B, *Safety Basis Requirements*.

NTC Evaluation Guides supporting this competency are: 1) 10 CFR 830, *Nuclear Safety Management*, 2) DOE-STD-3009-94 and DOE-STD-3009-2014, 3) DOE-STD-1104-2014, and 4) *Criticality Safety*.

#### Knowledge Requirements

- A. Discuss the DOE Policy 420.1, *Department of Energy Nuclear Safety Policy*, and identify/discuss the current DOE Nuclear Safety Regulations.
  - 1) 10 CFR 820 – Procedural Rules (e.g., Subpart E and exemption process to 10 CFR 830);
  - 2) 10 CFR 835 – Radiation Protection;
  - 3) 10 CFR 830 – Subpart A Quality Assurance; and
  - 4) 10 CFR 830 – Subpart B Safety Basis Requirements.
- B. Discuss the following related to 10 CFR 830, *Nuclear Safety Management*:

## DOE-STD-1183-2016

- 1) The provisions and requirements contained within the following sections of 10 CFR 830:
    - a. 830.1 – Scope
    - b. 830.2 – Exclusions
    - c. 830.3 – Definitions
    - d. 830.4 – General Requirements
    - e. 830.5 – Enforcement
    - f. 830.6 – Recordkeeping
    - g. 830.7 – Graded Approach
  - 2) The applicability of 10 CFR 830 Subpart A, *Quality Assurance Requirements*, to the requirements of 10 CFR 830 Subpart B;
  - 3) The requirements in sections of 10 CFR 830 Subpart B, *Safety Basis Requirements*, Sections 830.200 through 830.207;
  - 4) The content of 10 CFR 830, Appendix A to 10 CFR Subpart B, *General Statement of Safety Basis Policy*;
  - 5) Identify and discuss the applicability of the acceptable methodologies for preparing a documented safety analysis as listed in Table 2 of Appendix A; and
  - 6) The purpose, scope, and content of DOE G 421.1-2A, *Implementation Guide for Use in Developing Documented Safety Analysis* (DSAs), identified in 10 CFR 830, Section III.
- C. Discuss the following, related to approval of exemptions to nuclear safety rules and approval of an alternate method for developing a documented safety analysis in DOE-STD-1083-2009, *Processing Exemptions to Nuclear Safety Rules and Approval of Alternate Methods for Documenting Safety Analysis*:
- 1) The scope, applicability, and responsibilities of Field Element Managers for processing nuclear safety rule exemptions;
  - 2) Concurrence of Central Technical Authorities and Approval Official for nuclear safety rule exemptions;
  - 3) Criteria for nuclear safety rule exemptions;
  - 4) Requirements, approval authorities, and concurrences for alternate methodologies for preparing a DSAs; and
  - 5) Evaluations and approval of alternate methodologies.
- D. Discuss the following guidance provided in DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, and DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*, for preparing a DSA that meets the requirements of 10 CFR 830 Subpart B.
- 1) The purpose, scope, and major tasks involved in the development of the DSA;
  - 2) The application of the graded approach in the DSA preparation process;

## DOE-STD-1183-2016

- 3) How QA requirements are applicable to the DSA preparation process; and
  - 4) The overall format and content of the DSA as provided in DOE-STD-3009-94 and DOE-STD-3009-2014.
- E. Discuss the requirements in DOE O 420.1C, *Facility Safety*, for using DOE-STD 3009-2014 and DOE-STD-1104-2014.
- F. Discuss the following from attachment 2, *Facility Safety Requirements*, of DOE O 420.1C:
- 1) The objectives and applicability for each of the 5 chapters;
  - 2) Defense in Depth and active confinement ventilation requirements;
  - 3) Fire Hazard Analysis (FHA) requirements;
  - 4) Criticality Safety Evaluation requirements and the use of DOE STD-3007-2007, *Guidelines for Preparing Criticality Safety Evaluations at DOE Nuclear Facilities*;
  - 5) Natural Phenomena Hazard (NPH) General requirements and the use of DOE STD-1020-2012, *NPH Analysis and Design Criteria for DOE Facilities*;
  - 6) Cognizant System Engineer Program General and program coverage requirements; and
  - 7) The purpose of a documented configuration management program and the use of DOE-STD-1073-2003, *Configuration Management Program*.
- G. Describe the following requirements and related guidance provided in DOE-STD-1104-2014, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*:
- 1) The major tasks that are required to be performed by DOE during the review and approval of a DSA;
  - 2) The purpose, scope and the steps involved in the management of the review/approval task;
  - 3) The purpose, scope and the steps involved in establishing the basis for approval task for a DSA;
  - 4) The purpose, scope and the steps involved in establishing the basis for approval for Technical Safety Requirements (TSRs);
  - 5) The purpose, scope and the steps involved in establishing the basis for approval of other safety basis-related documents covered in section 6.0 of DOE-STD-1104-2014;
  - 6) The proper use of conditions of approval (COAs) in the approval of DSAs;
  - 7) Situations that are not appropriate to be addressed as COAs and would provide a basis for a rejection of the DSA;
  - 8) The purpose, scope and the steps involved in preparing the Safety Evaluation Report (SER);
  - 9) The format and content requirements of the SER; and
  - 10) The appropriate use of SER addendum(s) and/or SERs for revisions.

## DOE-STD-1183-2016

2. **Nuclear Safety Specialists shall conduct reviews of hazard analysis (includes hazard identification, evaluation, and categorization) for DOE Hazard Category 1, 2, or 3 nuclear facilities that support DOE approval as required by 10 CFR 830 Subpart B, Safety Basis Requirements.**

NTC Evaluation Guides supporting this competency are: 1) Hazard Analysis (includes hazard identification, evaluation, and categorization), and 2) DOE-STD-1027-92 and NNSA SD 1027.

### Knowledge Requirements

- A. Describe the purpose and scope of hazard identification;
- B. Identify/discuss the steps involved in performing hazard identification;
- C. Discuss the selection of a hazard identification methodology such as those described in the Center for Chemical Process Safety's Guidelines for Hazard Evaluation Procedures;
- D. Describe the required outputs of hazard identification (e.g., summary table that identifies form, type, location, and total quantity);
- E. Describe the purpose of using screening criteria as part of hazard identification and guidance provided in DOE-STD-3009-2014; and
- F. Describe the purpose and scope of hazard evaluation.
- G. Describe the following hazard evaluation techniques found in the Center for Chemical Process Safety's Guidelines for Hazard Evaluation Procedures:
  - 1) Checklist
  - 2) What if
  - 3) What if/Checklist
  - 4) Hazards and operability (HAZOP) study
  - 5) Failure modes and effects analysis (FMEA)
- H. Discuss the following steps involved in performing hazard evaluations:
  - 1) The considerations for selecting a specific hazard evaluation technique appropriate to the complexity of operations and the magnitude of the hazards.
  - 2) The requirements for a DOE-STD-3009 unmitigated evaluation such as the following:
    - a. assuming the absence of preventive and mitigative controls
    - b. identifying consequence estimates that address potential effects on facility workers, co-located worker per DOE-STD-3009-2014, and the public
    - c. identifying likelihood estimates
    - d. the use of risk ranking/binning
  - 3) The requirements for a DOE-STD-3009 mitigated evaluation such as the following:

## DOE-STD-1183-2016

- a. identifying consequences estimates for facility workers, co-located workers per DOE-STD-3009-2014, and the public crediting mitigative controls
  - b. identifying likelihood estimates for facility workers, co-located workers per DOE-STD-3009-2014, and the public crediting preventive controls
  - c. the use of mitigated risk ranking/binning
  - d. the application of the control selection hierarchy discussed in DOE-STD-3009
- I. Discuss the required outputs of the DOE-STD-3009 hazard evaluation task (e.g., the documentation of the rationale for designation of safety significant SSCs or SACs).
- J. Describe the following related to hazard categorization in DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Orders 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1:
- 1) The purpose of DOE-STD-1027-92;
  - 2) The process for determining the initial hazard categorization of a DOE nuclear facility;
  - 3) The process for determining the final hazard categorization of a DOE nuclear facility;
  - 4) The four provisions for reducing the facility radioactive material inventory as part of determining the final hazard categorization;
  - 5) The three specific applications of the ground rules in determining the appropriate hazard categorization;
  - 6) The provisions for changing a nuclear facility hazard categorization contained in both DOE-STD-1027-92 and the NNSA SD 1027, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE-STD-1027-92*; and
  - 7) Changes to the radionuclide threshold values presented in NNSA SD 1027.
- K. Discuss the approval basis for the hazard analysis (includes hazard identification, hazard evaluation, and hazard categorization) as provided in DOE-STD-1104-2014.

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of a hazard analysis (including hazard identification, hazard evaluation, and hazard categorization) for a DOE Hazard Category 1, 2, or 3 nuclear facility as documented in a DSA.

#### MPA evaluation requirements

- a. Develop or select review criteria for the hazard analysis (including hazard identification, hazard evaluation, and hazard categorization) that meets DOE-STD-1104-2014, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, requirements;
- b. Confirm the appropriate application of the summation of radionuclide threshold ratios in determining the hazard categorization of a nuclear facility where there are combinations of radioactive materials as discussed in DOE-STD-1027-92, Attachment 1;

## DOE-STD-1183-2016

- c. Identify and document comments based on applicable review criteria;
  - d. Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance; and
  - e. Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104 requirements for the evaluation of hazard analysis (includes hazard identification, hazard evaluation, and hazard categorization).
3. **Nuclear Safety Specialists shall conduct reviews of accident analysis for DOE Hazard Category 1, 2, or 3 nuclear facilities that support DOE approval as required by 10 CFR 830 Subpart B, *Safety Basis Requirements*.**

NTC Evaluation Guide supporting this competency is [Accident Analysis](#).

### Knowledge Requirements

- A. Describe the purpose and scope of conducting an accident analysis;
- B. Describe the steps involved in performing the accident analysis;
- C. Discuss the process for the selection of Design Basis Accidents (DBAs)/Evaluation Basis Accidents (EBAs) such as the grouping of accidents based on type and the identification of representative bounding accidents and unique accidents;
- D. Discuss the application of DOE-STD-3014-2006, *Accident Analysis for Aircraft Crash into Hazardous Facilities*, or successor document, and DOE-STD-1628-2013, *Development of Probabilistic Risk Assessments for Nuclear Safety Applications*, or successor document, in conducting accident analysis;
- E. Discuss how DOE O 420.1C, or successor document, and its associated natural phenomena hazard (NPH) implementation standards (DOE-STD-1020-2002 through DOE-STD-1024 for existing facilities and DOE-STD-1020-2012 for new facilities or major modifications) are used in deriving NPH DBAs/EBAs (address successor documents as appropriate);
- F. Discuss the purpose and steps involved in performing unmitigated analysis of DBAs/EBAs; and
- G. Identify the computer codes available on the DOE Safety Software Central Registry and discuss the factors that should be considered when using these codes to support the accident analysis.

### **Mandatory Performance Activity (MPA)**

Perform a source term calculation to confirm the value of the source term used in the unmitigated analysis.

- H. Discuss the purpose and steps involved in performing mitigated analysis of DBAs/EBAs.



## DOE-STD-1183-2016

- I. Identify the factors in conducting the source term calculation and describe their derivation:
  - 1) Discuss how DOE-HDBK-3010-94, *Airborne Release Fraction/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, or successor document, is used in identifying the appropriate airborne release fraction and respirable fraction values;
  - 2) Discuss how MAR is derived and may be excluded;
  - 3) Discuss how damage ratios are derived and how DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, or successor document, may be used; and
  - 4) Discuss how the leak path factor (LPF) value is derived including how the MELCOR and CFAST toolbox codes support the derivation of the mitigated LFP.

### **Mandatory Performance Activity (MPA)**

Perform a source term calculation to confirm the value of the source term used in the mitigated analysis.

- J. Identify the factors for conducting the radiological dose consequence calculation and describe their derivation;
- K. Identify the three options for selecting an atmospheric dispersion model as provided in DOE-STD-3009-2014;
- L. Describe the parameters listed in DOE-STD-3009-2014, and how they are used as an input to the MACCS2 toolbox code for calculating offsite dose;
- M. Discuss how the Nuclear Regulatory Commission (NRC) Regulatory Guide 1.145, *Atmospheric Dispersion Models for Potential Accident Consequence Assessments of Nuclear Power Plants*, is applied to the calculation of chi/Q;
- N. Discuss how the NRC Regulatory Guide 1.23, *Meteorological Monitoring Programs for Nuclear Power Plants*, is used in conducting dispersion modeling; and
- O. Discuss how International Commission on Radiological Protection Publication (ICRP) 68, *Dose Coefficients for Intakes of Radionuclides by Workers*, and ICRP 72, *Age-dependent Doses to Members of the Public from Intake of Radionuclides*, are applied to radiological dose calculations.

### **Mandatory Performance Activity (MPA)**

Perform a radiological dose consequence calculation using the derived chi/Q value in the mitigated analysis.

- P. Discuss chemical source term and consequence determination requirements in DOE-STD-3019-2014;
- Q. Describe the required outputs of accident analysis; and

## DOE-STD-1183-2016

- R. Discuss the purpose, scope, and steps (including required outputs) involved in conducting the evaluation of beyond design basis accidents (BDBAs) and beyond evaluation basis accidents (BEBAs).

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of the accident analysis conducted for a DOE Hazard Category 1, 2, or 3 nuclear facility, as documented in a DSA.

#### MPA evaluation requirements

- a. Develop or select review criteria for the accident analysis that meets DOE-STD-1104-2014, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, requirements;
  - b. Identify and document comments based on applicable review criteria;
  - c. Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance;
  - d. Evaluate the adequacy of responses to significant comments; and
  - e. Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104 requirements for the evaluation of the accident analysis.
4. **Nuclear Safety Specialists shall conduct reviews of safety control selection, classification, and description for DOE Hazard Category 1, 2, or 3 nuclear facilities that support DOE approval as required by 10 CFR 830 Subpart B, *Safety Basis Requirements*.**

NTC Evaluation Guide supporting this competency is [Control Selection, Classification, and Description](#).

#### Knowledge Requirements

- A. Discuss the purpose and scope of safety control selection and classification;
- B. Describe the steps involved in performing the safety control selection/classification;
- C. Describe how to determine if safety class controls are required;
- D. Describe how to determine if safety significant controls are required;
- E. Describe how other hazard controls documented in hazard evaluations are maintained in the DSA;
- F. Describe how criticality safety controls are identified and documented in the DSA;
- G. Discuss how DOE-STD-3007, provides the linkage between the criticality safety evaluation process and the requirements in DOE-STD-3009-2014 with respect to the identification of safety controls;

## DOE-STD-1183-2016

- H. Discuss the control selection hierarchy provided in DOE-STD-3009-2014;
- I. Describe the purpose of Safety Management Programs (SMPs);
- J. Describe how Specific Administrative Controls (SACs) are identified;
- K. Discuss the required outputs of safety control selection/classification;
- L. Describe the purpose and scope of safety control description;
- M. Identify how safety functions, functional requirements, and performance criteria for safety controls are developed, documented, and how DOE O 420.1C requirements apply;
- N. Discuss the importance of interfacing with DOE safety system oversight (SSO) personnel and the contractor cognizant system engineer (CSE) in determining the adequacy of performance criteria/evaluation of safety controls;
- O. Discuss the actions to be taken in circumstances where no viable control strategy exists in an existing facility to prevent or mitigate the consequences of one or more accident scenarios from exceeding the Evaluation Guideline (EG);
- P. Describe the required outputs of safety control description;
- Q. Discuss the purpose and scope of TSR derivation;
- R. Describe the steps involved in TSR derivation;
- S. Discuss the derivation of facility modes;
- T. Describe the information necessary to derive safety limits, limiting control settings, and limiting conditions of operation for respective safety control;
- U. Discuss the derivation of surveillance requirements;
- V. Describe how passive design features are identified in TSR derivation;
- W. Describe how administrative controls such as SACs are identified in TSR derivation; and
- X. Discuss the required outputs of TSR derivation.

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of safety control selection, classification, and description conducted for a DOE Hazard Category 1, 2, or 3 nuclear facility, as documented in a DSA.

#### MPA evaluation requirements

## DOE-STD-1183-2016

- a. Develop or select review criteria for the safety control selection, classification, and description that meets DOE-STD-1104-2014;
- b. Identify and document comments based on applicable review criteria;
- c. Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance;
- d. Evaluate the adequacy of responses to significant comments; and
- e. Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104 requirements for the evaluation of the safety control selection, classification, and description.

### **5. Nuclear Safety Specialists shall conduct reviews of Technical Safety Requirements (TSRs) for DOE Hazard Category 1, 2, or 3 nuclear facilities that support DOE approval as required by 10 CFR 830 Subpart B, *Safety Basis Requirements*.**

NTC Evaluation Guide supporting this competency is *Reviewing TSRs*.

#### Knowledge Requirements

- A. Describe the requirements in 10 CFR 830.205 and Appendix A, Section G, Table 4, for establishing TSRs for a DOE Hazard Category 1, 2, or 3 nuclear facility/activity;
- B. Describe the purpose and scope of TSRs;
- C. Identify the steps in the development of the TSRs;
- D. Describe the inputs from the DSA in the development of the TSRs;
- E. Identify the specific types of TSRs and the criteria/considerations for determining the most appropriate TSR type for the control under consideration;
- F. Discuss the definition for each type of TSR listed in Appendix A to Subpart B of 10 CFR 830 and the guidance in DOE G 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements*, for writing each type of TSR;
- G. Describe the TSR document organization and development guidance in DOE G 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements*;
- H. Describe the general principles of operability and how they are addressed in TSRs;
- I. Describe how DOE O 420.1C requirements relate to TSR development such as the development of surveillance requirements based on national codes and standards;
- J. Identify the expectations for administrative controls as provided in Appendix A to Subpart B of 10 CFR 830;
- K. Discuss the different types of administrative controls (programmatic administrative control such as safety management programs and specific administrative controls);

## DOE-STD-1183-2016

- L. Describe the guidance provided in DOE-STD-1186, *Specific Administrative Controls*, and the two different formats for writing the SAC in the TSRs;
- M. Describe how MAR limits developed per DOE-STD-1027 are treated in the TSRs;
- N. Discuss how design features are treated in the TSRs;
- O. Discuss the expectations for the bases appendix of TSRs as provided in Appendix A to Subpart B of 10 CFR 830;
- P. Describe the four circumstances of TSR violations that can occur and associated reporting requirements; and
- Q. Describe how general LCO SR requirements are used in the TSRs.
- R. Describe the approval bases for TSRs as contained in DOE-STD-1104:
  - 1) Discuss the review criteria provided in DOE-STD-1104 used to determine the adequacy of TSRs; and
  - 2) Describe the general TSR format/organization (sections 1, 2, 3 & 4, 5, plus design features and bases appendix) that meets DOE G 423.1-1 guidance.
- S. Discuss the following guidance in Appendix C, Independent Verification Reviews (IVRs) of DOE G 423.1:
  - 1) Purpose of IVRs
  - 2) When to conduct an IVR

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of TSRs developed for a DOE Hazard Category 1, 2, or 3 nuclear facility, as documented in a DSA.

#### MPA evaluation requirements

- a. Develop or select review criteria for TSRs that meets DOE-STD-1104 requirements;
  - b. Identify and document comments based on applicable review criteria;
  - c. Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance;
  - d. Evaluate the adequacy of resolution of significant comments; and
  - e. Develop an approval basis for the TSRs to be used as an input to the SER that meets DOE-STD-1104 requirements.
- 6. Nuclear Safety Specialists shall conduct reviews of a contractor Unreviewed Safety Question (USQ) procedure, USQ Determinations (USQDs), Potential Inadequacy of the Safety Analysis (PISAs), Justification for Continued Operations (JCOs), and Evaluation of the Safety of the Situation (ESSs).**

NTC Evaluation Guide supporting this competency is [Reviewing USQ Process](#).

# DOE-STD-1183-2016

## Knowledge Requirements

- A. Describe the requirements in 10 CFR 830.203 and Appendix A, Section H, for the USQ process;
- B. Discuss the guidance and related requirements provided in DOE G 424.1-1B, *Implementation Guide for Addressing Unreviewed Safety Question (USQ) Requirements* for the following topics:
  - 1) The background and basis for the USQ process;
  - 2) The types of changes that apply to the USQ process;
  - 3) Integration of the USQ process into the facility's change control process;
  - 4) USQ screening;
  - 5) Documentation retention;
  - 6) Training and qualification; and
  - 7) Content of USQ implementing procedures.

## **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of a contractor's USQ procedure.

### MPA evaluation requirements

- a. Develop or select review criteria for conducting a review of the contractor's USQ procedure based on expectations in DOE G 424.1-1B;
  - b. Identify and document comments based on applicable review criteria;
  - c. Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance and DOE G 424.1-1B;
  - d. Determine the adequacy of responses to significant comments; and
  - e. Develop an approval basis to be used as an input to a SER or approval letter that addresses the expectations from DOE G 424.1-1B.
- C. Discuss the following guidance and related requirements in DOE G 424.1-1B for performing USQ Determinations (USQDs):
    - 1) The questions that need to be addressed when performing a USQD and the possible outcomes;
    - 2) Examples of questions provided in attachment A of DOE G 424.1-1B that assist in performing USQDs;
    - 3) Documenting the results of the USQD;
    - 4) Actions and approval process that can result from positive USQDs; and
    - 5) Lessons learned from applying the USQ process in Appendix B.

## **Mandatory Performance Activities (MPA)**

## DOE-STD-1183-2016

### MPA evaluation requirements

- a. Perform a review and determine the adequacy of the performance of USQDs.
    - i) Identify and document comments based on expectations in DOE G 424.1-1B;
    - ii) Develop and document a technically defensible basis for the safety significance of each comment based on DOE-STD-1104 guidance and DOE G 424.1-1B; and
    - iii) Determine the adequacy of responses to significant comments.
  - b. Develop an approval basis (e.g., SER) for a safety basis revision or amendment resulting from a positive USQD that meets DOE-STD-1104 requirements.
- D. Discuss the following guidance and related requirements in DOE G 424.1-1B for Potentially Inadequate Safety Analyses (PISAs), Evaluation of the Safety of the Situation (ESS), and Justification for Continued Operation (JCO):
- 1) The four actions required for PISAs per 10 CFR 830.203;
  - 2) The initial confirmatory process in declaring a PISA provided in DOE G 424.1-1B;
  - 3) The timelines and process for resolution of a PISA;
  - 4) The purpose and content of the ESS;
  - 5) The purpose and content of a JCO; and
  - 6) DOE's responsibilities/authorities in resolving a PISA.

### **Mandatory Performance Activities (MPA)**

Perform a review of a PISA and determine the adequacy of the resolution of the PISA.

### MPA evaluation requirements

- a. MPA evaluation requirements for when the USQD is **negative**
    - i) Identify the cause of the PISA and submittal of the ESS prior to the lifting of any operational restrictions; and
    - ii) Determine whether the facility is in a safe condition.
  - b. MPA evaluation requirements for when the USQD is **positive**
    - i) Develop an approval basis for the ESS that meets DOE-STD-1104 requirements; and
    - ii) Develop an approval basis for the JCO that meets DOE-STD-1104 requirements.
7. **Nuclear Safety Specialists shall conduct reviews of safety design basis documents for new DOE Hazard Category 1, 2, or 3 nuclear facilities, or major modifications that support DOE approval, as required by 10 CFR 830 Subpart B and DOE-STD-1189-2008, *Integration of Safety into the Design Process*.**

NTC Evaluation Guide supporting this competency is DOE-STD-1189-2008 Requirements.

## DOE-STD-1183-2016

### Knowledge Requirements

- A. Describe the requirements in 10 CFR 830.206 for a Preliminary Documented Safety Analysis (PDSA); and
- B. Describe the purpose and scope of DOE-STD-1189-2008, *Integration of Safety into the Design Process*.
- C. Discuss the key concepts addressed in DOE-STD-1189-2008 such as the following:
  - 1) The identification of hazards early in the project and the use of an integrated team approach to design safety into the facility;
  - 2) Establishing the safety design for a nuclear facility in an incrementally progressive way to provide some assurance that the safety design basis will be demonstrated to be acceptable when the design is complete; and
  - 3) The overarching philosophy and logic in the standard is that a heightened degree of conservatism is demanded in the earlier phases of a project when design details are not available.
- D. Discuss how the DOE Acquisition Management System described in DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, provides for implementation of Safety-in-Design requirements in DOE-STD-1189 (e.g., safety design basis document development):
  - 1) Identify the project phases and Critical Decisions (CDs);
  - 2) Identify key responsibilities for ensuring that DOE expectations for Safety-in-Design are met;
  - 3) Identify the safety design basis documents submitted for DOE approval prior to each CD; and
  - 4) Identify the approval authorities for each safety design basis document submittal.
- E. Identify the five chapter topics addressed in DOE O 420.1C and their applicability to new nuclear facilities and/or major modifications to existing nuclear facilities;
- F. Describe how DOE O 420.1C establishes requirements for the design and construction of safety SSCs and how these requirements are addressed in safety design basis documents;
- G. Discuss how DOE-STD-3009-2014 applies to new nuclear facilities and/or major modifications; and
- H. Describe the process and criteria for determining whether a facility modification is a major modification.
- I. Discuss the following related to Safety Design Strategy (SDS) documents:
  - 1) The purpose, scope, and required content of the SDS;
  - 2) The federal roles and responsibilities for approval of the SDS; and
  - 3) The approval bases requirements in DOE STD-1104 for the SDS.



## DOE-STD-1183-2016

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of a Safety Design Strategy (SDS) document.

#### MPA evaluation requirements

- a. Develop or select review criteria for a safety design basis document that meets DOE-STD-1104 and DOE-STD-1189 requirements; and
  - b. Identify and document comments based on applicable review criteria.
    - i) Provide a technically defensive basis for the safety significance of each comment;
    - ii) Evaluate adequacy of resolution of significant comments; and
    - iii) Develop an approval basis as input to the required approval document that meets DOE-STD-1104 and DOE STD-1189 requirements for the safety design basis document reviewed.
- J. Discuss the following related to Conceptual Safety Design Reports (CSDRs):
- 1) The purpose, scope, and content requirements of the CSDR;
  - 2) The federal roles and responsibilities for approval of the CSDR; and
  - 3) The approval bases requirements in DOE STD-1104 for the CSDR and the requirements for development of the Conceptual Safety Validation Report (CSVR).

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of a Conceptual Safety Design Report (CSDR).

#### MPA evaluation requirements

- a. Develop or select review criteria for a safety design basis document that meets DOE-STD-1104 and DOE-STD-1189 requirements;
  - b. Identify and document comments based on applicable review criteria;
  - c. Provide a technically defensive basis for the safety significance of comments;
  - d. Evaluate adequacy of resolution of significant comments; and
  - e. Develop an approval basis as input to the required CSVR that meets DOE-STD-1104 and DOE STD-1189 requirements for the safety design basis document reviewed.
- K. Discuss the following related to Preliminary Documented Safety Analysis (PDSA) documents:
- 1) The purpose, scope, and content requirements of the PDSA;
  - 2) The federal roles and responsibilities for approval of the PDSA; and
  - 3) The approval bases requirements in DOE STD-1104 for the PDSA and the requirements for development of the SER.

## DOE-STD-1183-2016

### **Mandatory Performance Activity (MPA)**

Perform a review and determine the adequacy of a Preliminary Documented Safety Analysis (PDSA) that verifies: (1) the nuclear safety design criteria in DOE O 420.1C have been satisfied; (2) DOE O 420.1C and DOE-STD-1189-2008 requirements have been met; and (3) an initial listing is provided of the SMPs that have been or will be developed to address operational safety considerations.

#### MPA evaluation requirements

- a. Develop or select review criteria for a safety design basis document that meets DOE-STD-1104 and DOE-STD-1189 requirements;
- b. Develop comments based on review criteria and classify the comments using a technical basis for the safety significance of an issue;
- c. Evaluate adequacy of resolution of significant comments; and
- d. Develop an approval basis as input to the required SER that meets DOE-STD-1104 and DOE STD-1189 requirements for the safety design basis document reviewed.

# DOE-STD-1183-2016

## APPENDIX A

### CONTINUING EDUCATION, TRAINING, AND PROFICIENCY PROGRAM

This standard does not require requalification (See FTCP Issue Paper FTCP 08-002 on the FTCP website. Document decisions and provide a summary of positive Requalification recommendations to the FTCP).

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.

Nuclear Safety Specialist personnel must complete continuing technical education and/or training covering topics directly related to the Nuclear Safety Specialists 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. Attend seminars, symposia, or technical meetings related to Nuclear Safety 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).

Nuclear Safety Specialist personnel should maintain proficiency in the performance of NSS tasks identified in this FAQS through satisfactory performance of normally assigned job tasks (e.g. DSA reviews, USQD reviews, etc.). 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 classroom training or use locally developed exercises as part of continuing training to maintain proficiency.

# DOE-STD-1183-2016

## APPENDIX B

### NSS SAFETY BASIS DOCUMENT REVIEW DUTY AREA

The job-task analysis of Nuclear Safety Specialist duties and responsibilities yielded 14 tasks associated with the NSS Safety Basis Document Review duty area. The 14 task areas are:

<b>NSS Task Area</b>	<b>Corresponding FAQs Performance Competencies</b>
1. Review DSA/PDSA	1, 2, 3, 4, 7
2. Comment resolution	1, 2,3, 4, 7
3. Develop SER	1, 2, 3, 4, 7
4. Review/recommend approval of TSRs	5
5. Review/recommend approval of USQ procedure and positive USQs	6
6. Review/recommend approval of Safety Basis Change Package	6
7. Review/recommend approval of JCO	6
8. Review of ESS	6
9. Review/recommend approval of SDS	7
10. Review/recommend approval of CSDR / PSDR	7
11. Review/recommend approval of categorical exclusion	6
12. Review major modification determination	7
13. Develop SVR	7
14. Review exemption to 10 CFR 830 or review request for use of alternate methodology	1

# DOE-STD-1183-2016

## CONCLUDING MATERIAL

**Review Activity:**

EM  
NNSA  
NE  
SC  
EA

**Preparing Activity:**

EA-50

**Project Number:**

TRNG: P1183-2007REV

**Field and Operations Offices:**

CBFO  
CH  
ID  
OH  
OR  
ORP  
RL  
SR

**Field or Site Offices:**

Argonne Site Office  
Brookhaven Site Office  
Fermi Site Office  
Kansas City Field Office  
Livermore Field Office  
Los Alamos Field Office  
Nevada Field Office  
Nuclear Production Office  
Princeton Area Office  
Savannah River Field Office  
Sandia Field Office