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DOE-STD-1183-2019
April 2019

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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APPROVAL

The Federal Technical Capability Program (FTCP) 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 4.5.19

Karen L. Boardman, Chairperson Date
Federal Technical Capability Panel

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ACKNOWLEDGMENT

The Office of Enterprise Assessments, National Training Center (EA-50), in support of the FTCP Panel, facilitated the development of the revision of this Nuclear Safety Specialist (NSS) Functional Area Qualification Standard (FAQS).

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DOE-STD-1183-2019

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 (NSS) Functional Area Qualification Standard (FAQS) establishes common performance competencies for all DOE NSS 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 competency knowledge requirements. Satisfactory and documented attainment of the performance competencies contained in this FAQS ensures personnel possess the minimum requisite knowledge and skills to fulfill functional area duties and responsibilities common to the DOE complex. Additionally, required organization specific qualification standards, handled separately, supplement this FAQS and establish unique performance competencies at the organization level (headquarters, field element, site, or facility).

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 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 attainment of the performance competencies in this FAQS. These evaluation guides provide the expected level of knowledge for each knowledge requirement and are available for personnel assigned this FAQS and qualifying officials responsible for verifying

the attainment of performance competency knowledge requirements. The evaluation guides for this FAQS are available through the NTC TQP support site at: https://ntc.doe.gov/student/stp/techqualprogram.

Appendix B, *NSS Organization Specific Performance Activity Recommendations*, lists performance activities (PAs) that are not routinely performed by NSS personnel across most DOE sites or are not commonly expected to be performed by NSS personnel during initial qualification. If a supervisor determines that any of the activities in this appendix are needed for an NSS within their organization, the applicable PA from Appendix B should be considered for inclusion in the organization specific qualification standard. Use of Appendix B is optional and not required. Additionally, if NSSs have organization specific oversight responsibilities in areas not addressed in this FAQS, any knowledge requirements and performance activities related to these responsibilities should be included in the organization specific qualification standards.

Headquarters and field elements shall 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 should be documented using the NSSFAQS qualification card in the Electronic Technical Qualification Program at https://etqp.ntc.doe.gov.

Equivalencies should be used with the utmost rigor and scrutiny to maintain the spirit and intent of the TQP. Equivalencies may be granted for individual performance competencies or 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 specific organization qualifying the individual. Knowledge requirements and any MPAs should be met before granting an equivalency for the related performance competency.

The MPAs listed in this FAQS are required to be satisfactorily performed only once. If during a performance of the MPA any of the evaluation criteria are not satisfactorily met, the qualifying official may require the candidate to perform the MPA again. In these cases satisfactory completion of the MPA only needs to be documented once. Also, the intent is for NSS candidates to perform the MPAs as written in the organization that they are assigned. However, in cases where the MPAs cannot be performed exactly as written in the NSS's assigned organization within the required qualification timeframe, supervisors may use other options to complete the MPA requirements. This could include performance of the MPA in a simulated environment or performance of the activity using exercise materials. There also may be situations where minor modifications to the MPA or MPA evaluation criteria may be needed to fit organization specific conditions. The reason for any changes in the MPA or MPA evaluation criteria or changes in the method of performance (e.g. simulate or use of exercise materials) must be documented by the designated qualification official (QO) with approval of the supervisor and local FTCP agent.

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 organization qualifying the individual and the requirements in DOE O 360.1C, *Federal Employee Training*, and DOE O 426.1A, *Federal Technical Capability.*

Supervisory verification of attainment of all performance competency knowledge requirements and MPAs, in accordance with the TQP plan or policy of the particular organization, satisfies final qualification requirements for this FAQS.

INITIAL QUALIFICATION AND TRAINING

Qualification of Nuclear Safety Specialist personnel must be conducted in accordance with the requirements of DOE O 426.1A, *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 attain the knowledge requirements for each performance competency.

Personnel attending the NTC instructor-led safety basis review courses will be given the opportunity to practice the MPAs identified in this FAQS using a virtual nuclear facility with associated safety basis documents.

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:

- Safety Basis Document Review
- Oversight and Assessment of Contractor Activities
- 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 covered in *Part B, Oversight Performance*, of DOE-STD-1146-2017, *General Technical Base*.

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:

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 knowledge requirements that are distinct from knowledge requirements contained in the General Technical Base (GTB) Part A and B Qualification Standard (QS). All NSS personnel must satisfy the knowledge requirements of the GTB Part A QS and the knowledge requirements and MPAs in the GTB Part B QS prior to or in parallel with obtaining the knowledge requirements for the performance competencies contained in this FAQS. 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 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 1: 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 NSS personnel may oversee facilities that utilize predecessor documents to those identified. In these cases the versions included in the local contract should be referred to during the completion of the associated knowledge requirements. Any applicable knowledge requirements in predecessor documents that are not included in this FAQS should be included in the organizational specific QS or continuing training program.

Note 2: For activities that require evaluation of a DSA/TSR revision, the Qualifying Official (QO) determines whether the scope of the revision is adequate to satisfy the requirements and intent of the performance activity. Some safety basis revisions may lack the scope to be appropriate for use in meeting the requirements of this FAQS. An NSS qualifying per this FAQS is expected to get the concurrence of the QO prior to using a limited scope safety basis revision to meet an MPA in this FAQS.

Note 3: DOE-HDBK-1224-2018, *Hazard and Accident Analysis Handbook*, was approved for interim use. Qualifying Officials are encouraged to use this Handbook, as appropriate, when evaluating the trainee's knowledge of applicable requirements in this FAQS. DOE-STD-1027-2018 Chg. Notice 1 (CN 1) *Hazard Categorization of DOE Nuclear Facilities* was approved but its use is optional. Since DOE-STD-1027-92 CN 1 is referenced in 10 CFR 830 subpart B, and invoked by DOE O 420.1C, Chg. 2, *Facility Safety*, related knowledge requirements in this FAQS still refer to DOE-STD-1027-92.

1. **Nuclear Safety Specialists shall demonstrate knowledge of the Regulations and supporting DOE Directives and invoked Standards for the development and approval of documented safety analyses (DSAs) for DOE Hazard Category 1, 2, or 3 nuclear facilities.**

   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
      4) 10 CFR 830 – Subpart B Safety Basis Requirements

   B. Discuss the following related to 10 CFR 830, *Nuclear Safety Management:*
      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.

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.

5) Evaluations and approval of alternate methodologies.

D. Discuss the following guidance provided in DOE-STD-3009-94 Change Notice 3 (CN-3), *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.

3) How Quality Assurance requirements are applicable to the DSA preparation process.

4) The overall format and content of the DSA as provided in DOE-STD-3009-94 CN-3 and DOE-STD-3009-2014.

E. Discuss the requirements in DOE O 420.1C, Chg. 2, *Facility Safety,* for using DOE-STD-3009-2014 and DOE-STD-1104-2016.

F. Discuss the following from attachment 2, *Facility Safety Requirements*, of DOE O 420.1C, Chg. 2:

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-3007-2017, *Guidelines for Preparing Criticality Safety Evaluations at DOE Nuclear Facilities*.
5) Natural Phenomena Hazard (NPH) General requirements and the use of DOE-STD-1020-2016, *NPH Analysis and Design Criteria for DOE Facilities*.
6) Cognizant System Engineer Program General and program coverage requirements.
7) The purpose of a documented configuration management program and the use of DOE-STD-1073-2016, *Configuration Management Program*.

G. Describe the following requirements and related guidance provided in DOE-STD-1104-2016, *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-1104-2016.
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.
10) The appropriate use of SER addendum(s) and/or SERs for revisions.

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.

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.

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-3009-2014 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-3009-2014 mitigated evaluation such as the following:
      a. identifying consequence 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-3009-2014.

I. Discuss the required outputs of the DOE-STD-3009-2014 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 Change Notice No. 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*:

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 G 1027, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently* with DOE-STD-1027-92.
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-1104-2016.

Mandatory Performance Activity (MPA)

MPA 2.1: 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 Criteria

1) Develop review criteria that meets, or verify that existing criteria for reviewing the hazard analysis (including hazard identification, hazard evaluation, and hazard categorization) meets, DOE-STD-1104-2016 requirements.
2) 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.
3) Identify and document comments, if any, based on applicable review criteria.
4) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
5) Evaluate the adequacy of responses to significant issues, if any.

6) Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104-2016 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*.

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,* and DOE-STD-1628-2013, *Development of Probabilistic Risk Assessments for Nuclear Safety Applications*, in conducting accident analysis.

E. Discuss how DOE O 420.1C, Chg. 2 and its associated natural phenomena hazard (NPH) implementation standard (DOE-STD-1020-2016 or predecessor NPH standards as applicable) are used in deriving NPH DBAs/EBAs.

F. Discuss the purpose and steps involved in performing unmitigated analysis of DBAs/EBAs.

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.

H. Identify the factors in conducting the source term calculation and describe their derivation:

1) Discuss how MAR is derived and may be excluded.

2) Discuss how damage ratios are derived and how DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, may be used.

3) Discuss how DOE-HDBK-3010-94, *Airborne Release Fraction/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, is used in identifying the appropriate airborne release fraction and respirable fraction values.

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 LPF.

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

Mandatory Performance Activity (MPA)

MPA 3.1: Perform the following source term calculations that are consistent with DOE-STD-3009-2014:

1) Unmitigated source term calculation of a respective accident scenario.
2) Mitigated source term calculation of a respective accident scenario.

J. Identify the factors for conducting the radiological dose consequence calculation for both the public and co-located worker 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.

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)

MPA 3.2: Perform the following radiological dose consequence calculations for both the public and co-located worker that are consistent with DOE-STD-3009-2014 (using a derived chi/Q value):

1) Unmitigated dose consequence calculation for a respective accident scenario.
2) Mitigated dose consequence calculation for a respective accident scenario.

P. Discuss chemical source term and consequence determination requirements in DOE-STD-3019-2014.

Q. Describe the required outputs of accident analysis.

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)

MPA 3.3: 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 Criteria

1) Develop review criteria that meets, or verify that existing criteria for reviewing an accident analysis meets, DOE-STD-1104-2016 requirements.
2) Identify and document comments, if any, based on applicable review criteria.
3) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
4) Evaluate the adequacy of contractor response(s) to significant issues, if any.
5) Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104-2016 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*.

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-3007-2017, 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.

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, Chg. 2 requirements apply.

N. Discuss the importance of interfacing with DOE safety system oversight (SSO) personnel and/or the applicable DOE subject matter expert (SME), 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.

X. Discuss the required outputs of TSR derivation.

Mandatory Performance Activity (MPA)

MPA 4.1: 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 Criteria

1) Develop review criteria that meets, or verify that existing criteria for reviewing the safety control selection, classification, and description meets, DOE-STD-1104-2016 requirements.

2) Identify and document comments, if any, based on applicable review criteria.
3) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
4) Evaluate the adequacy of responses to significant issues, if any.
5) Develop an approval basis to be used as an input to the SER that meets DOE-STD-1104-2016 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*.

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, Chg. 2 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).

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.

Q. Describe how general LCO SR requirements are used in the TSRs.

R. Describe the approval bases for TSRs as contained in DOE-STD-1104-2016:

1) Discuss the review criteria provided in DOE-STD-1104-2016 used to determine the adequacy of TSRs.
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.

Mandatory Performance Activity (MPA)

MPA 5.1: Perform a review and determine the adequacy of initial TSRs developed for a DOE Hazard Category 1, 2, or 3 nuclear facility or a change to the TSRs, as documented in a DSA.

MPA Evaluation Criteria

1) Develop review criteria that meets, or verify existing criteria for reviewing TSRs meets, DOE-STD-1104-2016 requirements.
2) Identify and document comments, if any, based on applicable review criteria.
3) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
4) Evaluate the adequacy of the resolution of significant issues, if any.
5) Develop an approval basis for the TSRs to be used as an input to the SER that meets DOE-STD-1104-2016 requirements.

S. Discuss the following guidance in Appendix C, Implementation Verification Reviews (IVRs) of DOE G 423.1:

1) The purpose of IVRs (Federal and Contractor)
2) The timing of a Federal IVR

3) Considerations in the application of the graded approach when conducting IVRs

Mandatory Performance Activity (MPA)

MPA 5.2: Perform a DOE implementation verification review (IVR) for an initial TSR implementation or a TSR revision for a DOE Hazard Category 1, 2, or 3 nuclear facility.

MPA Evaluation Criteria

Participate in an implementation verification review (IVR) and evaluate the adequacy of the proper implementation of a new or revised safety basis control or assumption using DOE G 423.1-1B guidance.

6. Nuclear Safety Specialists shall conduct reviews of a contractor Unreviewed Safety Question (USQ) procedure, USQ Determination(s) (USQD), Potential Inadequacy of the Safety Analysis (PISA), Justification for Continued Operations (JCO), and Evaluation of the Safety of the Situation (ESS).

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.
7) Content of USQ implementing procedures.

Mandatory Performance Activity (MPA)

MPA 6.1: Perform a review and determine the adequacy of a contractor's initial submittal or periodic revision to the USQ procedure. (Note: This may be performed as desktop review using the currently approved USQ procedure if a revision is not planned during the qualification timeframe.)

MPA Evaluation Criteria

1) Develop review criteria that is consistent with, or verify existing criteria for conducting a review of the contractor's USQ procedure is consistent with, expectations in DOE G 424.1-1B.
2) Identify and document comments, if any, based on applicable review criteria.
3) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
4) Determine the adequacy of responses to significant comments, if any.
5) Develop an approval basis to be used as an input to a SER or approval letter for the local USQ procedure 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.
   5) Lessons learned from applying the USQ process in Attachment B of DOE G 424.1-1B.

Mandatory Performance Activity (MPA)

MPA 6.2: Perform a review and determine the adequacy of the contractor's implementation of the USQ process (Note: this may be performed using a sample of completed USQDs or by reviewing the contractors USQD summary report required as part of the DSA annual update process).

MPA Evaluation Criteria

1) Identify and document comments, if any, based on expectations in DOE G 424.1-1B;
2) For each significant issue identified, if any, develop and document a comment justification that provides an appropriate technical basis (e.g. reference to applicable safe harbor requirements, safety basis review criteria, or other applicable standards) for its safety significance.
3) Describe appropriate actions to be taken if the review of USQDs determines that the conclusion of no USQ (negative USQD) is not correct.
4) Determine the adequacy of responses to significant comments, if any.
5) When a review is being performed on the USQDs identified in the USQD summary report as part of an annual DSA update or safety basis amendment develop an

approval basis to be used as an input to the applicable SER that meets DOE-STD-1104-2016 requirements.

6) When the scope of the review includes a categorical exclusion USQD develop an approval basis to be used as input into a SER or approval letter for approval of the amendment to the USQ procedure including the requested categorical exclusion.

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.

6) DOE's responsibilities/authorities in resolving a PISA.

Mandatory Performance Activities (MPA)

MPA 6.3: Perform a review of a PISA and determine the adequacy of the resolution of the PISA. (Note: This may be performed as desktop review using an existing PISA, ESS, or JCO if there are none of these documents processed during the qualification timeframe.)

MPA Evaluation Criteria

If the associated USQD is **negative:**

1) Verify that the contractor submits an ESS that identifies the cause of the PISA and confirms the associated negative USQD determination.

2) Verify that the ESS confirms the facility is in a safe condition prior to removing any operational restrictions that may have been put in place when the PISA was initially declared.

If the associated USQD is **positive:**

1) Develop an approval basis for the ESS that meets DOE-STD-1104-2016 requirements; or

2) Develop an approval basis for the JCO that meets DOE-STD-1104-2016 requirements.

7. Nuclear Safety Specialists shall demonstrate knowledge of the requirements in 10 CFR 830 Subpart B and DOE-STD-1189-2016, *Integration of Safety into the Design Process,* for safety design basis documents for new DOE Hazard Category 1, 2, or 3 nuclear facilities, or major modifications of Category 1, 2 or 3 nuclear facilities.

Knowledge Requirements

A. Describe the requirements in 10 CFR 830.206 for a Preliminary Documented Safety Analysis (PDSA).

B. Describe the purpose and scope of DOE-STD-1189-2016, *Integration of Safety into the Design Process*.

C. Discuss the key concepts addressed in DOE-STD-1189-2016 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.
   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-1189-2016 (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.
   4) Identify the approval authorities for each safety design basis document submittal.

E. Identify the five chapter topics addressed in DOE O 420.1C, Chg. 2 and their applicability to new nuclear facilities and/or major modifications to existing nuclear facilities.

F. Describe how DOE O 420.1C, Chg. 2 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.

H. Describe the process and criteria for determining whether a facility modification is a major modification including the following:
   1) Identify the criteria for entering the major modification determination process.
   2) Identify the six criteria to be used in evaluating whether a major modification exists.

3) Discuss how the evaluation criteria results are used in determining whether a major modification exists and requirements for DOE concurrence.
4) Discuss how a graded approach can be applied to a major modification.
5) Discuss the requirement for a design upgrade analysis.
6) Discuss DOE-STD-3009-2014 guidance for updating a DSA for 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.
3) The approval bases requirements in DOE-STD-1104-2016 for the SDS.

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.
3) The approval bases requirements in DOE-STD-1104-2016 for the CSDR and the requirements for development of the Safety Review Letter (SRL).

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.
3) The approval bases requirements in DOE-STD-1104-2016 for the PDSA and the requirements for development of the SER.

APPENDIX A

INITIAL AND CONTINUING TRAINING RECOMMENDATIONS

For NSS personnel completing initial qualification Table 1 provides a list of NTC training courses that support attainment of the performance competency knowledge requirements in this FAQS. Table 1 also lists the NTC instructor led courses that provide an opportunity for NSS candidates to practice performance of the MPAs in this FAQS.

Following initial qualification NSS personnel should maintain proficiency in the performance of the MPAs 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 an assigned continuing training program to maintain proficiency. The list of courses in Table 1 should also be referred to for identifying courses as part of the continuing training program for NSS personnel.

Note: Refer to the NTC safety training course catalog at https://ntc.doe.gov/student/stp to verify the currently available safety basis courses and their titles.

TABLE 1 – Initial and Continuing Training Course Recommendations

Performance Competency (PC) Knowledge Requirements and MPAs	Applicable NTC Courses (*Note: DE refers to an online course)*	Training Recommendation: Initial and/or Continuing Training (CT)
PC #1		
A-B	SBA-100DE, *Safety Basis Fundamentals*	Initial and CT
C-D	SBA-110DE, *DSA Safe Harbors*	Initial and CT
E-F	SBA -150DE, *TSR Development and Implementation*	Initial and CT
G	SBA-170DE, *SER/ SLR Development*	Initial and CT
PC #2		
A-J	SBA-120DE, *Hazard Identification, Categorization and Evaluation*	Initial and CT
K	SBA-170DE, *SER / SLR Development*	Initial and CT
MPA 2.1	SBA-220, *Hazard Evaluation Review and Approval*	Initial and CT
PC #3		
A-R	SBA-130DE, *Accident Analysis and Control Selection*	Initial and CT
MPA 3.1, 3.2, and 3.3	SBA-230, *Accident Analysis & Control Selection Review*	Initial and CT

PC #4		
A-P	SBA-130DE, *Accident Analysis and Control Selection*	Initial and CT
Q-X	SBA-150DE, *TSR Development and Implementation*	Initial and CT
MPA 4.1	SBA-230, *Accident Analysis & Control Selection Review*	Initial and CT
PC#5		
A-S	SBA-150DE, *TSR Development and Implementation*	Initial and CT
MPA 5.1 and 5.2	SBA-240, *TSR Review and Approval*	Initial and CT
PC #6		
A-D	SBA-160DE, *USQ Process Implementation*	Initial and CT
MPA 6.1, 6.2, and 6.3	SBA-250, *USQ Process Implementation Review and Approval*	Initial and CT
PC#7		
A-K	SBA-140DE, *Safety Design Basis Document Development*	Initial and CT

APPENDIX B

NSS ORGANIZATION SPECIFIC PERFORMANCE ACTIVITY RECOMMENDATIONS

This appendix includes performance activities (PAs) that are either not routinely performed by NSS personnel across most DOE sites or are not commonly expected to be performed by NSS personnel during initial qualification. If a supervisor determines that any of the activities in this appendix are needed for an NSS within their organization, the applicable PA from this list should be considered for inclusion in the organization specific qualification standard. Use of this appendix is optional and not required.

Performance Activities (PA)

PA 1: Perform a review and determine the adequacy of a Safety Design Strategy (SDS) document.

PA 2: Perform a review and determine the adequacy of a Conceptual Safety Design Report (CSDR).

PA 3: Perform a review and determine the adequacy of a Preliminary Documented Safety Analysis (PDSA)

PA 4: Perform a review of and determine the adequacy of a major modification determination.

PA 5: Prepare a Safety Evaluation Report (SER) providing the basis for approval of a DSA or TSR revision.

Note: Organizational specific evaluation criteria should be developed for each selected Performance Activity. The following generic evaluation criteria may be used and updated as necessary:

1) Develop review criteria that meets, or verify existing criteria for the selected activity meets, applicable DOE requirements.

2) Identify and document comments, if any, based on applicable review criteria.

3) Provide a technically defensive basis for the safety significance of each comment, if any.

4) Evaluate adequacy of resolution of significant comments, if any.

5) Develop an approval basis as an input to the required approval document for the applicable review.

CONCLUDING MATERIAL

Review Activity:
EM
NNSA
NE
SC
EA

Preparing Activity:
EA-50

Project Number:
TRNG: P1183-2019REV

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
Princeton Area Office
Savannah River Field Office
Sandia Field Office