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**DOE-STD-1026-2009
February 2009**

DOE STANDARD

NNSA PACKAGE CERTIFICATION ENGINEER FUNCTIONAL AREA QUALIFICATION STANDARD

DOE Defense Nuclear Facilities Technical Personnel



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

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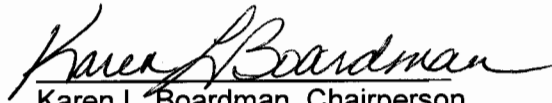
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DOE-STD-1026-2009

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.

A handwritten signature in black ink, reading "Karen L. Boardman". The signature is written in a cursive style with a horizontal line underlining the name.

Karen L. Boardman, Chairperson
Federal Technical Capability Panel

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DOE-STD-1026-2009

TABLE OF CONTENTS

ACKNOWLEDGMENT vii

PURPOSE 1

APPLICABILITY 1

IMPLEMENTATION 2

EVALUATION REQUIREMENTS 3

INITIAL QUALIFICATION AND TRAINING..... 4

DUTIES AND RESPONSIBILITIES 5

BACKGROUND AND EXPERIENCE..... 6

REQUIRED TECHNICAL COMPETENCIES 6

APPENDIX A 19

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DOE-STD-1026-2009

ACKNOWLEDGMENT

The National Nuclear Security Administration (NNSA) Service Center is the sponsor for the NNSA Package Certification Engineer 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 that the technical content of the standard is accurate and adequate for Department-wide application for those involved in the package certification program. The sponsor, in coordination with the Federal Technical Capability Panel, is also responsible for ensuring that the FAQS is maintained current.

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

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U.S. DEPARTMENT OF ENERGY
FUNCTIONAL AREA QUALIFICATION STANDARD

NNSA Package Certification Engineer

PURPOSE

DOE M 426.1-1A, *Federal Technical Capability Manual*, commits the Department to continuously strive for technical excellence. The Technical Qualification Program (TQP), along with the supporting technical qualification standards, complements the personnel processes that support the Department's drive for technical excellence. In support of this goal, the competency requirements defined in the technical qualification standards should be aligned with and integrated into the recruitment and staffing processes for technical positions. 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. The U.S. Office of Personnel Management (OPM) minimum qualifications standards will be greatly enhanced by application of appropriate materials from the technical FAQs.

The technical qualification standards are not intended to replace the OPM qualifications standards or other Departmental personnel standards, rules, plans, or processes. The primary purpose of the TQP is to ensure that employees have the requisite technical competency to support the mission of the Department. The TQP forms the basis for the development and assignment of DOE personnel responsible for ensuring the safe operation of defense nuclear facilities.

APPLICABILITY

The NNSA Package Certification Engineer FAQs establishes common functional area competency requirements for all DOE package certification engineers who provide assistance, or direction, guidance, oversight, or evaluation of contractor technical activities that could impact the safe operation of DOE's defense nuclear facilities. The technical FAQs has been developed as a tool to assist DOE program and field offices in the development and implementation of the TQP in their organization. For ease of transportability of qualifications between DOE elements, program and field offices are expected to use this technical FAQs without modification. Needed additional office-/site-/facility-specific technical competencies should be handled separately. Satisfactory and documented attainment of the competency requirements contained in this technical FAQs (see the Federal Technical Capability Program [FTCP] Directives and Standards page at <http://www.hss.energy.gov/deprep/ftcp/directives/directives.asp> for an example of the NNSA Package Certification Engineer FAQs qualification card) ensures that personnel possess the minimum requisite competence to fulfill their functional area duties and responsibilities common to the DOE complex. Additionally, office-/site-/facility-specific qualification standards supplement this technical FAQs and establish unique operational competency requirements at the Headquarters or field element, site, or facility level.

It should be noted that the competencies of management and leadership, general technical

DOE-STD-1026-2009

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

IMPLEMENTATION

This FAQs identifies the minimum technical competency requirements for DOE personnel. Although there are other competency requirements associated with the positions held by DOE personnel, this FAQs is limited to identifying the specific, common technical competencies required throughout all defense nuclear facilities. The competency requirements define the expected knowledge and/or skill that an individual must meet. Each of the competency requirements is further described by a listing of supporting knowledge and/or skill statements. The supporting knowledge and/or skill statements for each competency requirement are provided to challenge the employee in the breadth and depth of his/her understanding of the subject matter. In selected competencies, expected knowledge and/or skills have been designated as “mandatory performance activities.” In these competencies, the actions are not optional.

The terms “shall,” “must,” and “will” denote mandatory requirements in this standard. “Should” denotes a recommended practice that is not required. “May” denotes an option.

The competencies identify a familiarity level, a working level, or an expert level of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

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

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

Expert level is defined as a comprehensive, intensive knowledge of the subject or process sufficient to provide advice in the absence of procedural guidance.

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

Headquarters and field elements shall establish a program and process to ensure that DOE personnel possess the competencies required by their position, including the competencies identified in this technical FAQs. Documentation of the completion of the requirements of this standard shall be included in the employees' training and qualification records. Satisfactory attainment of the competency requirements contained in this technical FAQs may be documented using the example NNSA Package Certification Engineer FAQs qualification card

DOE-STD-1026-2009

that can be obtained from the Federal Technical Capability Program Directives and Standards page at <http://www.hss.energy.gov/deprep/ftcp/directives/directives.asp>.

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

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

EVALUATION REQUIREMENTS

Attainment of the competencies listed in this technical FAQs shall be documented in accordance with the TQP plan or policy of the site/office/Headquarters organization qualifying the individual and the requirements in DOE M 360.1-1B, *Federal Employee Training Manual*, and DOE M 426.1-1A.

The qualifying official or immediate supervisor should ensure that the candidate meets the background and experience requirements of this FAQs. Unless stated otherwise within the program or site TQP plan, attainment of the competencies listed in the NNSA Package Certification Engineer FAQs should be evaluated and documented by either a qualifying official or immediate supervisor who is qualified in the FAQs. If the immediate supervisor is not qualified in the NNSA Package Certification Engineer FAQs, it is expected the supervisor will consult with a qualified package certification engineer. Competency attainment will be evaluated and documented using one or a combination of the following methods:

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

Field element managers/Headquarters program managers shall qualify candidates as possessing the basic technical knowledge, technical discipline competency, and position-specific knowledge, skills, and abilities required for their positions. Final qualification should be performed using one or a combination of the following methods:

DOE-STD-1026-2009

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

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

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

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

INITIAL QUALIFICATION AND TRAINING

Qualification of package certification engineers shall be conducted in accordance with the requirements of DOE M 426.1-1A.

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

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

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

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

DOE-STD-1026-2009

A description of suggested learning activities and the requirements for the continuing education and training program for the NNSA Package Certification Engineer FAQs are included in Appendix A of this document.

DUTIES AND RESPONSIBILITIES

The following are the typical duties and responsibilities expected of personnel assigned to the NNSA Package Certification Engineer Functional Area:

1. Perform safety evaluations of packages for shipment of materials of national security interest.
 - 1.1 Serve as chairperson for the Transportation Safety Review Panel (TSRP); arbitrate and resolve Panel comments.
 - 1.2 Review Safety Analysis Reports for Packaging (SARP), Transportation System Risk Assessments (TSRAs), and Hazards Analysis Reports (HARs) for compliance with regulations, Orders, and guidelines.
 - 1.3 Prepare the Safety Evaluation Report (SER) to document the review of a SARP, TSRA, or HAR.
 - 1.4 Prepare Offsite Transportation Certificates (OTC) or Offsite Transportation Authorizations (OTA).
 - 1.5 Evaluate Type B packages certified by the United Kingdom (UK) Ministry of Defence that will be transported in the Transportation Safeguards System.
 - 1.6 Interface with NNSA Office of Secure Transportation (OST) personnel regarding shipping schedules and OTA/OTC requirements.
 - 1.7 Coordinate with OST to ensure that tie downs are developed and approved for packages and shipping configurations certified or authorized by the Packaging Certification Division (PCD).
 - 1.8 Provide technical safety information to the Chief of Defense Nuclear Safety (CDNS) and Central Technical Authority (CTA) in support of exemption requests from DOE O 461.1A, *Packaging and Transfer or Transportation of Materials of National Security Interest*.
 - 1.9 Serve on NNSA Safety Basis Review Teams (SBRTs) to evaluate the adequacy of Transportation Safety Documents (TSDs) and/or Documented Safety Analyses (DSAs) for transfers of hazardous materials.
2. Provide oversight of packaging and transportation operations.
 - 2.1 Perform appraisals of DOE/NNSA packaging and transportation activities.
 - 2.2 Review and approve site packaging procedures and Quality Assurance (QA) plans.

DOE-STD-1026-2009

- 2.3 Perform surveillances of package users to determine whether sites have the proper procedures and programs in place to implement requirements.
3. Provide packaging and transportation safety guidance.
 - 3.1 Develop and issue guidance to assist sites in preparing documentation in support of shipment requests.
 - 3.2 Provide technical guidance to NNSA Headquarters and sites regarding regulations, guidelines, and Orders related to packaging and transportation of materials of national security interest.
 - 3.3 Provide technical input to NNSA Headquarters and container design and testing organizations to support development of 10 CFR 71 compliant containers.

Position-specific duties and responsibilities for package certification engineers are contained in their office/site/facility-specific qualification standard and/or position description.

BACKGROUND AND EXPERIENCE

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

The preferred education and experience for package certification engineers are:

1. Education:

A package certification engineer must possess the minimum of a Bachelor's of Science degree in Engineering or Physics and meet OPM's requirements for one or more of the following Occupational Series: 801, 810, 830, 840, 893, or 1310.

2. Experience:

A package certification engineer should have experience in industrial, military, Federal, State, or other directly-related background that has provided specialized experience in package certification and hazardous materials transportation. Specialized experience can be demonstrated through possession of the competencies outlined in this standard.

REQUIRED TECHNICAL COMPETENCIES

The competencies contained in this standard are distinct from those competencies contained in the General Technical Base (GTB) Qualification Standard. All package certification engineers must satisfy the competency requirements of DOE-STD-1146-2007, *General Technical Base Qualification Standard*, prior to or in parallel with the competency requirements contained in this standard. Each of the competency requirements defines the level of expected knowledge and/or skill that an individual must possess to meet the intent of this standard. Each of the competency requirements is further described by a listing of supporting knowledge and/or skill

DOE-STD-1026-2009

statements that describe the intent of the competency statement(s). In selected competencies, expected knowledge and/or skills have been designated as “mandatory performance activities.” In these competencies, the actions are not optional.

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

Regulatory

1. Package certification engineers shall demonstrate a working level knowledge of DOE O 461.1A, *Packaging and Transfer or Transportation of Materials of National Security Interest*.

Supporting Knowledge and/or Skills:

- a. Describe the purpose of the SARP, the HAR, and the TSRA.
- b. Discuss the significance of the information required in a HAR.
- c. Discuss the information required in a TSRA.
- d. Describe the process for obtaining an exemption from the Deputy Administrator for Defense Programs for shipment(s) of a Type B quantity of radioactive material in a package that does not meet 10 CFR 71 requirements.
- e. Discuss what function the TSRP serves, how it is organized and staffed, and the basic steps in the review process.
- f. Discuss the purposes of the OTC and the OTA and how they differ. Describe the information required in an OTC and OTA.
- g. Explain the purpose of the SER and discuss the information required in the SER for SARPs, TSRAs, and HARs.
- h. Discuss what is required for a contractor to be an authorized user of an NNSA Type B package.

2. Package certification engineers shall demonstrate a working level knowledge of the information required in Chapter 1 of a SARP.

Supporting Knowledge and/or Skills:

- a. Define and discuss the following items related to a packaging:
 - Containment features/boundaries
 - Neutron and gamma shielding features
 - Criticality control features

DOE-STD-1026-2009

- Lifting and tie-down devices, impact limiters, and other structural features
 - Heat transfer features
 - Packaging tags, markings, and labels
- b. Define and discuss the following items related to radioactive material contents:
- Maximum activity
 - Fissile material spatial separation and quantity limits
 - Neutron absorbers or moderators
 - Materials subject to chemical or galvanic reactions
 - Decay heat
- c. Discuss the following:
- The definition of A_1 and A_2 and the units commonly used
 - How to calculate A_2 for a mixture of radionuclides, and how to calculate the number of A_2 s in the package contents using the guidance in 10 CFR 71
 - The definition of a Type A and Type B package relative to the quantity of the content
 - The definition of exclusive use and highway route control, and how these declarations alter package transport, whether by the DOE or for the DOE by a commercial carrier
 - The definition of normal, depleted, and enriched Uranium based on isotopic content
 - The definition of weapons grade, reactor grade, and heat source grade plutonium
- 3. Package certification engineers shall demonstrate a working level knowledge of the structural evaluation information required in Chapter 2 of a SARP.**

Supporting Knowledge and/or Skills:

- a. Discuss the following:
- Determination of the design criteria for package design per Nuclear Regulatory Commission (NRC) Regulatory Guide 7.11, *Fracture Toughness Criteria of Base Material for Ferritic Steel Shipping Cask Containment Vessels with a Maximum Wall Thickness of 4 Inches (0.1 m)*, and NUREG/CR-3854, *Fabrication Criteria for Shipping Containers*
 - Material properties and specifications
 - The application of austenitic stainless steel as opposed to ferritic steels in the design and construction of small Type B packages
 - Chemical, galvanic, and other reactions, and the application of corrosion inhibiting coatings
 - General requirements for all packages per 10 CFR 71.43
 - 10 CFR 71 requirements for lifting and tie-down devices
- b. Discuss the following related to Normal Conditions of Transport (NCT):
- Evaluation methods

DOE-STD-1026-2009

- Most limiting initial test conditions
 - Most damaging orientations
- c. Discuss the criteria that determine whether the dynamic crush test applies. Describe how this test affects DOE's ability to add new contents to packages certified prior to October 2004.
- d. Describe the 10 CFR 71 tests required for Hypothetical Accident Conditions (HAC). Discuss the requirements that pertain to the sequence of HAC tests and the allowable and typical methods of demonstrating compliance.

4. Package certification engineers shall demonstrate a working level knowledge of the thermal evaluation information required in Chapter 3 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the NCT thermal analyses/tests that are evaluated in the SARP.
- b. Discuss the HAC thermal analyses/tests that are evaluated in the SARP.
- c. Discuss the scope and content of NNSA SC Safety Guide 140.1, Combination Test/Analysis Method Used to Demonstrate Compliance to DOE Type B Packaging Thermal Test Requirements.
- d. Discuss the thermal test methods used to demonstrate compliance with 10 CFR 71 thermal requirements.
- e. Discuss the application of fire resistant and consumable thermal insulation materials, and describe the benefits and disadvantages of each.

5. Package certification engineers shall demonstrate a working level knowledge of the containment information required in Chapter 4 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the containment criteria for normal form radioactive material under NCT and HAC.
- b. Discuss the different methods for leak testing a small drum type package.
- c. Discuss the standard(s) utilized by DOE for leak tests of Type B radioactive material packages, and the following containment boundary test requirements:
- Design verification
 - Fabrication
 - Pre-shipment
 - Periodic
 - Maintenance

DOE-STD-1026-2009

6. Package certification engineers shall demonstrate a working level knowledge of the shielding evaluation information required in Chapter 5 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the maximum allowable dose rates for NCT, and the impact of package measurement locations on dose rate.
- b. Describe how the Transport Index is determined.
- c. Discuss the maximum allowable dose rates and package locations for HAC, and briefly discuss why the Transportation Safeguards System (TSS) limits exclusive use carriage radiation dosage to no greater than the non-exclusive use limits in 10 CFR 71.
- d. Discuss typical modeling assumptions applied for DOE/NNSA Type B packages.
- e. Discuss how representative source terms are developed for shielding analysis.
- f. Discuss shielding models used in Type B package shielding evaluations.

7. Package certification engineers shall demonstrate a working level knowledge of the criticality evaluation information required in Chapter 6 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the effects and applications of the following factors relevant to criticality safety:
 - Mass
 - Geometry
 - Interaction and separation
 - Moderation
 - Reflection
 - Concentration
 - Volume
 - Density
 - Neutron absorbers
 - Heterogeneity
 - Enrichment
 - Fissile material
- b. Discuss the influence of the presence of non-fissionable materials mixed with, or in contact with, fissionable material on nuclear criticality safety.
- c. Discuss the criticality requirements in 10 CFR 71.55. Describe the factors that would be considered in determining whether it is acceptable to grant the 10 CFR 71.55(c) exception.
- d. Discuss how the Criticality Safety Index is determined.

DOE-STD-1026-2009

- e. Discuss the three characteristics of neutron balance that controls the criticality of a fissile system, and discuss how k_{eff} is determined.
- f. Discuss 10 CFR 71.59 standards for arrays of fissile material packages.
- g. Discuss the acceptance criteria for subcriticality, and define over-moderation and why it is such a beneficial and achievable feature for safe transportation of arrays of small Type B packages.
- h. Discuss key factors and conservatisms used in criticality models.

8. Package certification engineers shall demonstrate a working level knowledge of the package operations information required in Chapter 7 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss several key factors that must be addressed in Chapter 7 related to package loading, unloading, and transport of empty packages.
- b. Discuss issues related to package operations by multiple users, including equipment differences, facility differences, and internal procedure differences.
- c. Describe the linkage of Chapters 1-6 evaluation results with package operations requirements provided in Chapter 7.
- d. Discuss the Routine Determinations required by 10 CFR 71.87.

9. Package certification engineers shall demonstrate a working level knowledge of the acceptance tests and maintenance program information required in Chapter 8 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the Preliminary Determinations required by 10 CFR 71.85.
- b. Discuss the following acceptance tests performed on Type B packages:
 - Visual inspections and measurements
 - Weld examinations
 - Structural and pressure tests
 - Leakage tests
 - Component and material tests
 - Shielding tests
 - Thermal tests
- c. Discuss the following maintenance program tests:
 - Structural and pressure tests
 - Leakage tests

DOE-STD-1026-2009

- Component and material tests
- Thermal tests

10. Package certification engineers shall demonstrate a working level knowledge of the required QA program information required in Chapter 9 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the purpose and scope of 10 CFR 71, Subpart H.
- b. Discuss, at a summary level, the 18 required elements of 10 CFR 71, Subpart H.
- c. For a DOE/NNSA drum-type package, discuss the quality levels typically assigned to packaging components.
- d. Discuss the requirements for obtaining NNSA regulatory approval for packaging component changes.
- e. Discuss QA requirements for being approved as an authorized user of a DOE/NNSA Type B package.

11. Package certification engineers shall demonstrate a working level knowledge of the required elements and their evaluation within the Probabilistic Risk Assessment section of a TSRA.

Supporting Knowledge and/or Skills:

- a. Describe the different risks addressed in the Probabilistic Risk Assessment:
 - Risk of a criticality event and its consequences
 - Risk of special nuclear material release and its consequences
 - Risk of hazardous material release and its consequences
 - Consequences of a combined release event with two or three of the above risks
- b. Discuss the differences between direct dose and latent dose.
- c. Describe the following aspects of dose reduction:
 - Time
 - Distance
 - Shielding
 - Inverse square law
 - As Low As Reasonably Achievable (ALARA)
- d. Discuss the following and their use in consequence assessment:
 - Emergency Response Planning Guidelines (ERPG)
 - Temporary Emergency Exposure Limits (TEEL)
 - Subcommittee on Consequence Assessment and Protective Actions (SCAPA)

DOE-STD-1026-2009

12. Package certification engineers shall demonstrate a working level knowledge of the required format and content of a HAR.

Supporting Knowledge and/or Skills:

- a. Discuss the basic information required to be included in a HAR.
- b. Discuss the information required to be included in a hazardous materials table.
- c. Describe the purpose and use of Technical Publication (TP) 20-11 hazardous material categories/designators.
- d. Discuss the requirements for analyzing potential hazards and their associated consequences.
- e. Discuss the use of posttest inspection/evaluation procedures to ensure special assemblies are safe to ship.

13. Package certification engineers shall demonstrate a familiarity level knowledge of the following guides and regulations:

- **NRC Regulatory Guide 7.6, *Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels***
- **NRC Regulatory Guide 7.8, *Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material***
- **NRC Regulatory Guide 7.10, *Establishing Quality Assurance Programs for Packaging Used in Transport of Radioactive Material***
- **NRC Regulatory Guide 7.11, *Fracture Toughness Criteria of Base Material for Ferritic Steel Shipping Cask Containment Vessels with a Maximum Wall Thickness of 4 Inches (0.1 m)***
- **NNSA SC Safety Guide 100, *Design and Development Guide for NNSA Type B Packages***
- **NNSA SC Safety Guide 140.1, *Combination Test/Analysis Method Used to Demonstrate Compliance to DOE Type B Packaging Thermal Test Requirements***
- **NNSA SC Safety Guide 600, *Regulatory Compliance Testing of NNSA Type B Packages***
- **49 CFR Parts 100-185**

Supporting Knowledge and/or Skills:

- a. Discuss the purpose, scope, and applicability of each document.
- b. Discuss the role of a package certification engineer in utilizing/applying the above guides and regulations.

14. Package certification engineers shall demonstrate a working level knowledge of the following guides:

- **NRC Regulatory Guide 7.9, *Standard Format and Content of Part 71 Applications***

DOE-STD-1026-2009

for Approval of Packages for Radioactive Material

- **NNSA SC Safety Guide 500, Defense Programs Package Certification and Offsite Transportation Authorization Guide**

Supporting Knowledge and/or Skills:

- a. Discuss the purpose, scope, and applicability of each document.
- b. Discuss the role of a package certification engineer in utilizing/applying the above guides.

15. Package certification engineers shall demonstrate a familiarity level knowledge of the process for certifying UK packages within the US.

Supporting Knowledge and/or Skills:

- a. Discuss the scope and content of the Memorandum of Arrangement between the US and UK for the certification of packages and transport of radioactive materials.
- b. Discuss the scope and content of the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (TS-R-1) and IAEA Safety Guide ST-2.
- c. Discuss the 10 CFR air transport requirements for radioactive material, and describe any significant differences with IAEA requirements.
- d. Describe the process used to issue an OTC for a package certified by the UK.

16. Package certification engineers shall demonstrate a working level knowledge of the transportation requirements and the interface with the OST.

Supporting Knowledge and/or Skills:

- a. Discuss the DOE/NNSA process used to schedule TSS shipments.
- b. Discuss TSS requirements regarding the use of OTCs, OTAs, and NRC or DOE Certificates of Compliance.
- c. Discuss the applicable tie down procedures for Special Assemblies and Type B Containers in aircraft and Safe Secure Trailer/Safeguards Transporter (SST/SGT) modes of transport.

17. Package certification engineers shall demonstrate a familiarity level knowledge of 10 CFR 830.204, Documented Safety Analysis, DOE G 421.1-2, Implementation Guide For Use in Developing Documented Safety Analyses, and DOE M 461.1-1, Packaging and Transfer of Materials of National Security Interest Manual.

Supporting Knowledge and/or Skills

- a. Discuss the basic purposes and objectives of a DSA.

DOE-STD-1026-2009

- b. Describe the responsibilities of contractors for the development and maintenance of a DSA.
- c. Define the following terms and discuss the purpose of each:
 - Design basis
 - Safety analysis
 - Safety basis
 - Basis for Interim Operations (BIO)
 - Transportation safety document
 - SAR for packaging
 - Health and safety plan
 - HAR
- d. Discuss the six items a DSA for a hazard Category 1, 2, or 3 DOE nuclear facility must address:
 - Description of facility and work to be performed
 - Systematic identification of natural and man-made hazards
 - Evaluation of normal, abnormal, and accident conditions
 - Derivation of hazard controls, demonstration of the adequacy of the controls, and description of how the controls are maintained
 - Definition of the characteristics of safety management programs
 - Definition of criticality safety program, when required
- e. Discuss the approval requirements for the DSA for new facilities and subsequent changes to the DSA.
- f. Define who approves facility operations prior to achieving DSA upgrade approval.
- g. Discuss the provisions for deviations and temporary and permanent exemptions from the 10 CFR 830.204 and safe harbor methodologies.
- h. Discuss the application of the graded approach relative to the DSA development.
- i. 10 CFR 830.205 and DOE G 423.1-1, *Implementation Guide For Use In Developing Technical Safety Requirements* address Technical Safety Requirements (TSRs). Define TSR. Discuss what DOE G 423.1-1 says about packaging and transportation.
- j. Discuss the safe harbor methods for DSAs outlined in 10 CFR 830, Appendix A, Table 2 and DOE G 421.1-2, Table 1. Summarize what the documents state for transportation and onsite transfer activities.
- k. Discuss the purpose and scope of DOE M 461.1-1. Describe the following:
 - Department of Transportation (DOT) compliant transfers
 - Hazards/accident analyses
 - Design basis conditions
 - Controls for design basis conditions

DOE-STD-1026-2009

- Use of a graded approach
- Routine and non-routine transfers

18. Package certification engineers shall demonstrate a familiarity level knowledge of the Price-Anderson Amendment Act of 1988 and its relationship to Subparts A and B of 10 CFR 830.

Supporting Knowledge and/or Skills

- a. Describe the purpose of the Price-Anderson Amendment Act.
- b. Discuss the general applicability to the Department's nuclear safety activities.
- c. Describe the general indemnity that DOE offers to contractors.
- d. Discuss the requirements associated with the topics below:
 - QA
 - Safety basis
- e. Discuss the role of the DOE/NNSA Federal personnel with respect to implementing the requirements of the Price-Anderson Amendment Act.

19. Package certification engineers shall demonstrate the technical writing and assessment/performance skills necessary to execute the responsibilities of a package certification engineer.

Mandatory Performance Activities:

- a. Participate, as a member of a TSRP, in the review of a SARP.
- b. Write a SER to document review of a HAR.
- c. Write a SER to document review of a SARP.
- d. Write an OTA and an OTC.
- e. Participate in a packaging and transportation appraisal that evaluates DOE/NNSA site performance.
- f. Participate in the development or revision of a DOE/NNSA packaging safety guidance document.

Management, Assessment, and Oversight

20. Package certification engineers shall demonstrate a working level knowledge of assessment techniques (such as the planning and use of observations, interviews, and document reviews) to assess site packaging and transportation performance, report results of assessments, and follow up on actions taken as the result of assessments.

DOE-STD-1026-2009

Supporting Knowledge and/or Skills

- a. Describe the role of package certification engineers in the assessment of Government-Owned, Contractor-Operated (GOCO) facilities.
- b. Describe the assessment requirements and limitations associated with the interface with contractor employees.
- c. Discuss the essential elements of a performance-based assessment including:
 - Assessment planning
 - Defined assessment criteria/checklists
 - Investigation
 - Fact finding
 - Exit interview
 - Reporting
 - Follow-up
 - Closure
- d. Describe the following assessment methods and the advantages or limitations of each method:
 - Document review
 - Observation
 - Interview
- e. Describe the action to be taken if the contractor challenges the assessment findings, and explain how such challenges can be avoided.

21. Package certification engineers shall demonstrate a familiarity level knowledge of DOE P 450.4, *Safety Management System Policy*; DOE P 226.1A, *Department of Energy Oversight Policy*; and DOE O 226.1A, *Implementation of Department of Energy Oversight Policy*.

Supporting Knowledge and/or Skills

- a. Discuss the fundamentals of Integrated Safety Management (ISM) and its application to nuclear safety.
- b. Describe the key elements of an effective contractor self-assessment program.
- c. Discuss the following nuclear safety assessments/surveillance activities:
 - Determination of assessment/surveillance requirements
 - Operation/area/site office and contractor notification
 - Assessment/surveillance agenda

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DOE-STD-1026-2009

APPENDIX A CONTINUING EDUCATION, TRAINING, AND PROFICIENCY PROGRAM

The following list represents suggested continuing education, training, and other opportunities that are available for DOE personnel after completion of the competency requirements in this FAQs. It is extremely important that personnel involved with this program maintain their proficiency primarily by regularly demonstrating their competency through on-the-job performance, supplemented with continuing education, training, reading, or other activities, such as workshops, seminars, and conferences. The list of suggested activities was developed by the subject matter experts involved in the development of the FAQs and is not all-inclusive.

Based on the knowledge and experience of the subject matter experts, it is suggested that the following activities support the maintenance of proficiency in the NNSA Package Certification Engineer Functional Area after completion of the competencies in this standard and other requirements of the TQP.

LIST OF CONTINUING EDUCATION, TRAINING, AND OTHER ACTIVITIES

1. Continuing technical education and/or training covering topics directly related to the package certification area as determined appropriate by management. This may include courses/training provided by 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.
2. Actively perform the duties of a package certification engineer a minimum of 500 hours per year.
3. Attend seminars, symposia, or technical meetings related to package certification and/or hazardous materials transportation.
4. Engage in self-study of new regulations, requirements, or advances related to package design and testing, package certification, and hazardous materials transportation.
5. Participate in site reviews or assessments of DOE/NNSA packaging and transportation operations.
6. Specific continuing training requirements shall be documented in Individual Development Plans (IDPs).

DOE-STD-1026-2009

CONCLUDING MATERIAL

Review Activity:

NNSA

Preparing Activity:

NNSA Service Center

Site Offices:

Kansas City Site Office
Livermore Site Office
Los Alamos Site Office
Nevada Site Office
Pantex Site Office
Savannah River Site Office
Sandia Site Office
Y-12 Site Office

Project Number

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