



**NOT MEASUREMENT
SENSITIVE**

**DOE-STD-1026-2016
April 2016**

**Superseding
DOE-STD-1026-2009**

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**

AREA TRNG

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

DOE-STD-1026-2016

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

<http://energy.gov/ehss/services/nuclear-safety/department-energy-technical-standards-program/>

APPROVAL

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

Karen L. Boardman, Chairperson
Federal Technical Capability Panel

TABLE OF CONTENTS

APPROVAL.....	iii
TABLE OF CONTENTS	iv
ACKNOWLEDGMENT	1
PURPOSE	2
APPLICABILITY	2
IMPLEMENTATION	2
EVALUATION REQUIREMENTS	4
INITIAL QUALIFICATIONAND TRAINING	5
DUTIES AND RESPONSIBILITIES	6
BACKGROUND AND EXPERIENCE	7
REQUIRED TECHNICAL COMPETENCIES.....	8
APPENDIX A	19

ACKNOWLEDGMENT

The NNSA Office of Packaging and Transportation (OPT, NA-531) is the sponsor for this 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 the technical content of the standard is accurate and adequate for Department-wide application for those involved in the NNSA Package Certification Engineer program. The sponsor, in coordination with the Federal Technical Capability Panel, is also responsible for ensuring the FAQS is maintained current.

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

Chad Thompson	NNSA OPT (Team Leader)
Ahmad Al-Daouk	NNSA OPT
Kathleen Burianek	NNSA OPT
Daisy Nez	NNSA OPT
Kathy Schwendenman	NNSA OPT

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

NNSA Package Certification Engineer

PURPOSE

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

APPLICABILITY

The NNSA Package Certification Engineer Functional Area Qualification Standard (FAQS) establishes common functional area competency requirements for all NNSA Package Certification Engineers who provide assistance, direction, guidance, oversight, or evaluation of contractor technical activities that could impact the safe operation of NNSA packaging and transportation activities. The NNSA OPT performs a unique function, and this FAQS is generally not applicable to packaging and transportation functions performed by Program and Field Offices. For ease of transportability of qualifications between DOE elements, Program and Field Offices choosing to use this FAQS must use this FAQS without modification or addition to competency statements or Knowledge, Skills and Abilities (KSA's). Satisfactory and documented attainment of the competency requirements contained in this technical FAQS ensures personnel possess the minimum requisite competence to fulfill functional area duties and responsibilities. Needed office-/site-/facility-specific qualification standards, handled separately, supplement this technical FAQS and establish unique operational competency requirements at the headquarters or field element, site, or facility level.

Competencies related to management and leadership, general technical knowledge, regulations, departmental requirements and program implementation, administrative capability, and assessment and oversight are embodied in the competencies in this FAQS. All these factors have a bearing on safety. Although the focus of this FAQS is technical competence, good communication, recognized credibility, ability to listen and process information, and the ability to guide an effort to get it right the first time are recognized as important competencies impacting safety.

IMPLEMENTATION

This FAQS identifies the minimum technical competency requirements for NNSA personnel. Although there are other competency requirements associated with these positions, this FAQS

DOE-STD-1026-2016

identifies the specific, common technical competencies required throughout all defense nuclear facilities for NNSA Package Certification Engineers.

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

The competencies identify various levels of knowledge; or they require the individual to “**Demonstrate the ability**” to perform a task or activity as defined by supporting KSAs. These levels are further defined as follows:

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

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

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

Mandatory performance activities are performance factors that require the candidate to perform a specific and discrete task to demonstrate an understanding of the associated competency.

Competency Mandatory Performance Activities specified as a supporting knowledge and/or skill participants with qualifying official approval/sign-off. For example, “participate as a member of a Transportation Safety Review Panel (TSRP) in the review of a SARP” or “write an OTA, OTC and/or an OTD.”

NOTE: Supporting knowledge and/or skill statements should be considered by qualifying officials in the sign-off of individual competencies; however, all of the listed Knowledge, Skills and Abilities to be met for an individual competency are determined by the TQP participant’s supervisor and qualifying official to satisfy the competency.

Headquarters and field elements must establish a program and process to ensure DOE personnel possess the competencies required by their position and 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 competency requirements contained in this FAQS may be documented using the NNSA Package Certification Engineer FAQS qualification card from the Federal Technical Capability Program Guiding Documents page, <http://www.energy.gov/ehss/ftcp-guiding-documents>.

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

DOE-STD-1026-2016

Training must be provided to employees in the TQP who do not meet 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 appropriate supporting knowledge and/or skill statements similar to those listed for each competency requirement. Headquarters and field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training.

EVALUATION REQUIREMENTS

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

The qualifying official or immediate supervisor should ensure the candidate meets the background and experience requirements of this FAQS. If the immediate supervisor is not qualified in this functional area, the supervisor should consult with a qualified individual prior to using two or a combination of the following individual competency evaluation methods:

- Satisfactory completion of a written examination
- Satisfactory completion of an oral examination
- Satisfactory accomplishment of an observed task or activity related to a competency; or
- Documented evaluation of equivalencies.

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

Final qualification of candidates must be performed using two of the following methods:

- Satisfactory completion of a comprehensive written examination with a minimum passing score of 80 percent;
- Satisfactory completion of an oral examination by a qualified STSM or a qualification board of technically qualified personnel that includes at least one qualified STSM;
- Attend package regulatory testing and satisfactorily demonstrate knowledge of practical skills related to 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, qualifying officials or board members should ask critical questions intended to integrate identified learning objectives during qualification. Field element

DOE-STD-1026-2016

managers/headquarters program managers or designees must develop formal guidance for oral examinations 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
- Documented process

INITIAL QUALIFICATION AND TRAINING

Qualification of NNSA Package Certification Engineers must be conducted in accordance with the requirements of DOE O 426.1 Chg.1, *Federal Technical Capability*.

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

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

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

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

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

DUTIES AND RESPONSIBILITIES

The following are 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 or other hazardous materials.
 - 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 Authorizations (OTA), Offsite Transportation Certificates (OTC), Offsite Transportation Directions (OTD), or Certificates of Compliance (CoC).
 - 1.5 Evaluate Type B packages certified by the United Kingdom (UK) Ministry of Defense 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/OTD requirements.
 - 1.7 Coordinate with OST to ensure that tie-downs are developed and approved for packages and shipping configurations authorized, certified, or directed by NNSA.
 - 1.8 Provide technical safety information to the Central Technical Authority (CTA) in support of national security exemption requests.
 - 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 packaging procedures and Quality Assurance (QA) plans.
 - 2.3 Perform surveillances of package users to determine whether sites have the proper procedures and programs in place to implement requirements.
3. Provides guidance to users in accordance with approved NNSA Safety Guides (SG).
 - 3.1 Develop and issue guidance to assist sites in preparing documentation in support of

DOE-STD-1026-2016

shipment requests.

3.2 Provide technical interpretation to NNSA Headquarters and sites regarding regulations, guidelines, and orders related to packaging and transportation of radioactive and other hazard materials.

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 NNSA Package Certification Engineer personnel are contained in office-/site-/facility-specific qualification standards and/or position descriptions.

BACKGROUND AND EXPERIENCE

The OPM *Qualification Standards Operating Manual* establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements. 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 preferred education and experience for NNSA Package Certification Engineer personnel 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, 850, 893, or 1310.

2. Experience

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

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

1. **NNSA Package Certification Engineer must demonstrate a working level knowledge of DOE O 461.1B or latest revision, *Packaging and Transportation For Offsite Shipment 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. Discuss what function the TSRP serves, how it is organized and staffed, and the basic steps in the review process.
- e. Discuss the purposes of the OTA, OTC, OTD and how they differ. Describe the information required in an OTA, OTC and OTD.
- f. Explain the purpose of the SER and discuss the information required in the SER for HARs, SARPs, and TSRAs.
- g. Discuss what is required for a contractor to be an authorized user of an NNSA Type B package.

2. **NNSA Package Certification Engineer must demonstrate a working level knowledge of DOE O 460.1C, or latest revision, *Packaging and Transportation Safety*.**

Supporting Knowledge and/or Skills:

- a. Discuss the significance of the offsite safety requirements.
- b. Describe the application process for NRC or DOT certified packages.
- c. Describe the application process for other Type B or fissile materials certified packages.

DOE-STD-1026-2016

- d. Discuss the Quality Assurance (QA) requirements of this order.
 - e. Discuss the significance of the onsite safety requirements.
 - f. Discuss the Department of Transportation (DOT) Hazardous Materials Regulations (HMR) in Title 49 Code of Federal Regulations (CFR) Parts 171-180.
 - g. Describe the DOT Special Permit Application Process in 49 CFR 107 Subpart B.
3. **NNSA Package Certification Engineer must demonstrate a working level knowledge of DOE O 461.2, or latest revision, *Onsite Packaging and Transfer of Materials of National Security Interest* and DOE M 441.1-1, *Nuclear Material Packaging Manual*.**

Supporting Knowledge and/or Skills

- a. Discuss the purpose and scope of DOE O 461.2. Describe the following:
 - o Packaging and Transfer procedures
 - o Transfer Authorization
 - o Review and Approval Process
 - o Quality Assurance
 - o Transfer Operations
 - o Scheduling TSS transfers
 - b. Discuss the purpose and scope of DOE M 441.1-1. Describe the following:
 - o Overview and Responsibilities
 - o Scope of Materials
 - o Nuclear Material Packaging Requirements
4. **NNSA Package Certification Engineer must 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:
 - o Containment features/boundaries
 - o Neutron and gamma shielding features
 - o Lifting and tie-down devices, impact limiters, and other structural features
 - o Heat transfer features
 - o Packaging tags, markings, and labels
- b. Define and discuss the following items related to radioactive material contents:
 - o Maximum activity
 - o Fissile material spatial separation and quantity limits
 - o Neutron absorbers or moderators
 - o Materials subject to chemical or galvanic reactions
 - o Decay heat

DOE-STD-1026-2016

5. **NNSA Package Certification Engineer must 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:
 - NNSA Safety Guide 100 (SG100) as it pertains to structural design and development: 1) mechanical design, 2) material selection, 3) fabrication (including welding), 4) examination, 5) testing, 6) SARP preparation, and 7) certification.
 - 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)*
 - NUREG/CR-3854, *Fabrication Criteria for Shipping Containers*
 - The purpose and scope of NRC Regulatory Guide 7.6, *Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels*
 - The purpose and scope of NRC Regulatory Guide 7.8, *Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material*
 - 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
 - Most limiting initial test conditions
 - Most damaging orientations
- c. Discuss the criteria that determine whether the dynamic crush test applies and 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) and discuss the requirements that pertain to the sequence of HAC tests and the allowable and typical methods of demonstrating compliance.
- e. Discuss the NNSA Safety Guide 600, *Regulatory Compliance Testing of NNSA Type B Packages*

6. **NNSA Package Certification Engineer must demonstrate a working level knowledge of the thermal evaluation information required in Chapter 3 of a SARP.**

DOE-STD-1026-2016

Supporting Knowledge and/or Skills:

- a. Discuss the NNSA SG100 Section 3.2.3.2 (Physical Systems) through Section 3.2.5.2 (Successful Designs) as they pertain to thermal evaluation.
- b. Discuss the NNSA Safety Guide 140.1, *Combination Test/Analysis Method Used to Demonstrate Compliance to DOE Type B Packaging Thermal Test Requirements*.
- c. *Discuss the purpose and scope of ASTM E 2230, Standard Practice for Thermal Qualification of Type B Packages for Radioactive Material*
- d. Discuss the NCT thermal analyses/tests that are evaluated in the SARP.
- e. Discuss the HAC thermal analyses/tests that are evaluated in the SARP.
- f. Discuss the thermal test methods used to demonstrate compliance with 10 CFR 71 thermal requirements.
- g. Discuss the application of fire resistant and consumable thermal insulation materials, and describe the benefits and disadvantages of each.

7. NNSA Package Certification Engineer must demonstrate a working level knowledge of the containment information required in Chapter 4 of a SARP.

Supporting Knowledge and/or Skills:

- a. Discuss the NNSA SG100 Sections 4.2 through 4.8 as they pertain to containment.
- b. Discuss the containment criteria for normal form radioactive material under NCT and HAC.
- c. Discuss the following related to ANSI N14.5:
 - o Discuss the different methods for leak testing a small drum type package.
 - o Discuss the standard(s) utilized by DOE for leak tests of Type B radioactive material.
 - o Discuss packages, and the following containment boundary test requirements for: 1) Design verification, 2) Fabrication, 3) Pre-shipment, 4) Periodic, and 5) Maintenance.
- d. Discuss the following:
 - o The definition of A_1 and A_2 and the units commonly used.
 - o 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.
 - o The definition of a Type A and Type B package relative to the quantity of the content.
 - o The definition of exclusive use and highway route control, and how these

DOE-STD-1026-2016

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.

8. **NNSA Package Certification Engineer must 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 NNSA SG100 Sections 5.2 through 5.8 as it pertains to shielding
- b. Discuss the maximum allowable dose rates for NCT and the impact of package measurement locations on dose rate.
- c. Describe how the Transport Index is determined.
- 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.

9. **NNSA Package Certification Engineer must 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 NNSA SG100 Sections 6.2 through 6.9 as it pertains to criticality.
- b. 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
- c. Discuss the influence of the presence of non-fissionable materials mixed with, or in contact with, fissionable material on nuclear criticality safety.

DOE-STD-1026-2016

- d. Discuss the criticality requirements in 10 CFR 71.55. Describe the factors that should be considered in determining whether it is acceptable to grant the 10 CFR 71.55(c) exception.
 - e. Discuss how the Criticality Safety Index is determined.
 - f. Discuss the three characteristics of neutron balance that controls the criticality of a fissile system, and discuss how k_{eff} is determined.
 - g. Discuss criticality control devices.
 - h. Discuss 10 CFR 71.59 standards for arrays of fissile material packages.
 - i. 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.
 - j. Discuss key factors and conservatisms used in criticality models.
- 10. NNSA Package Certification Engineer must demonstrate a working level knowledge of the package operations information required in Chapter 7 of a SARP.**

Supporting Knowledge and/or Skills:

- a. Discuss the NNSA SG100 as it pertains to package operations.
 - b. Discuss several key factors that must be addressed in Chapter 7 related to package loading, unloading, and transport of empty packages.
 - c. Discuss issues related to package operations by multiple users, including equipment differences, facility differences, and internal procedure differences.
 - d. Describe the linkage of Chapters 1-6 evaluation results with package operations requirements provided in Chapter 7.
 - e. Discuss the Routine Determinations required by 10 CFR 71.87.
- 11. NNSA Package Certification Engineer must 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 NNSA SG100 as it pertains to package testing and maintenance.
- b. Discuss the Preliminary Determinations required by 10 CFR 71.85.
- c. Discuss the following acceptance tests performed on Type B packages:

DOE-STD-1026-2016

- Visual inspections and measurements
- Weld examinations
- Structural and pressure tests
- Leakage tests
- Component and material tests
- Shielding tests
- Thermal tests

d. Discuss the following maintenance program tests:

- Structural and pressure tests
- Leakage tests
- Component and material tests
- Thermal tests

12. NNSA Package Certification Engineer must demonstrate a working level knowledge of the applicable QA requirements for fissile and Type B packages.

Supporting Knowledge and/or Skills:

- a. Discuss the purpose and scope of 10 CFR 71, Subpart H.
- b. Discuss, at a summary level, the required elements of 10 CFR 71, Subpart H.

71.101 Quality assurance requirements.

71.103 Quality assurance organization.

71.105 Quality assurance program.

71.107 Package design control.

71.109 Procurement document control.

71.111 Instructions, procedures, and drawings.

71.113 Document control.

71.115 Control of purchased material, equipment, and services.

71.117 Identification and control of materials, parts, and components.

71.119 Control of special processes.

71.121 Internal inspection.

71.123 Test control.

71.125 Control of measuring and test equipment.

71.127 Handling, storage, and shipping control.

71.129 Inspection, test, and operating status.

71.131 Nonconforming materials, parts, or components.

71.133 Corrective action.

71.135 Quality assurance records.

71.137 Audits.

- c. For a DOE/NNSA drum-type package, discuss the quality levels typically assigned to packaging components.

DOE-STD-1026-2016

- d. Discuss the requirements for obtaining NNSA approval for packaging component changes.
- e. Discuss QA requirements for being approved as an authorized user of a DOE/NNSA Type B package.
- f. Discuss the NRC Regulatory Guide 7.10, *Establishing Quality Assurance Programs for Packaging Used in Transport of Radioactive Material*.
- g. Discuss the QA program information required in Chapter 9 of a SARP.

13. NNSA Package Certification Engineer must 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:
 - o Risk of a criticality event and its consequences
 - o Risk of special nuclear material release and its consequences
 - o Risk of hazardous material release and its consequences
 - o 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:
 - o Time
 - o Distance
 - o Shielding
 - o Inverse square law
 - o As Low As Reasonably Achievable (ALARA)
- d. Discuss the following and their use in consequence assessment:
 - o Emergency Response Planning Guidelines (ERPG)
 - o Temporary Emergency Exposure Limits (TEEL)
 - o Subcommittee on Consequence Assessment and Protective Actions (SCAPA)

14. NNSA Package Certification Engineer must 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.

DOE-STD-1026-2016

- c. Describe the purpose and use of Technical Publication (TP) 20-11 hazardous material categories/designators and the Department of Transportation (DOT) Emergency Response Guidebook (ERG) numbers.
- d. Discuss the requirements for analyzing potential hazards and their associated consequences.
- e. Discuss the use of posttest inspection/evaluation procedures to ensure MNSI assemblies are safe to ship.

15. NNSA Package Certification Engineer personnel must demonstrate a working level knowledge of the following guides:

- a. NRC Regulatory Guide 7.9, *Standard Format and Content of Part 71 Applications for Approval of Packages for Radioactive Material*
- b. NNSA SC Safety Guide 500, *Defense Programs Package Certification and Offsite Transportation Authorization Guide*

Supporting Knowledge and/or Skills:

- o Discuss the purpose, scope, and applicability of each guide.
- o Discuss the role of a NNSA Package Certification Engineer in utilizing/applying the following guides

16. NNSA Package Certification Engineer must demonstrate a working level knowledge of the process for certifying UK packages within the U.S.

Supporting Knowledge and/or Skills:

- a. Discuss the scope and content of the Memorandum of Arrangement between the U.S. and UK for the certification of packages and transport of radioactive materials.
- b. Discuss the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (SSR-6, 2012) and IAEA Safety Guide (SSG-26, 2012) with respect to UK shipments.
- 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.
- e. Discuss the National Security Exemption, 10 CFR 871.1.

17. NNSA Package Certification Engineer must demonstrate a working level knowledge of the transportation requirements and the interface with the Office of Secure Transportation (OST).

DOE-STD-1026-2016

Supporting Knowledge and/or Skills:

- a. Discuss the DOE/NNSA process used to schedule TSS shipments.
- b. Discuss TSS requirements regarding the use of OTAs, OTCs, and OTDs.
- c. Discuss the applicable tie down procedures for MNSI assemblies and Type B Containers in aircraft and Safeguards Transporter (SGT) modes of transport.
- d. Discuss the maximum allowable dose rates and package locations for HAC, and briefly discuss why the Transportation Safeguards System (TSS) limits radiation dosage to no greater than the non-exclusive use limits in 10 CFR 71.

18. NNSA Package Certification Engineer must demonstrate a familiarity level knowledge of the Price-Anderson Amendment Act of 1988 (PAAA) and its relationship to Subparts A and B of 10 CFR 830.

Supporting Knowledge and/or Skills

- a. Describe the purpose of the PAAA.
- b. Discuss the general applicability to the Department's nuclear safety activities.
- c. Describe the general indemnity that DOE offers to contractors.
- d. Demonstrate an understanding of the topics below, associated with the PAAA:
 - o Documented Safety Analyses (10 CFR 830 Subpart B);
 - o Unreviewed Safety Questions (10 CFR 830 Subpart B);
 - o Quality Assurance Requirements (10 CFR 830 Subpart A);
 - o Technical Safety Requirements (10 CFR 830 Subpart B); and
- e. Demonstrate an understanding that violations of applicable nuclear safety rules and regulations are enforceable criminally and civilly.
- e. Discuss the role of Federal line management with respect to implementing the requirements of the PAAA.

19. NNSA Package Certification Engineer must demonstrate the technical writing and assessment/performance skills necessary to execute the responsibilities of a NNSA 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 or TSRA.

DOE-STD-1026-2016

- d. Write an OTA, OTC and/or an OTD.
- e. Participate in a packaging and transportation assessment that evaluates DOE/NNSA site performance.
- f. Participate in the development or revision of a DOE/NNSA packaging safety guidance document.

20. NNSA Package Certification Engineer must demonstrate a working level knowledge of assessment techniques and DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*

Supporting Knowledge and/or Skills:

- a. Describe the assessment requirements and limitations associated with the interface of NNSA Package Certification Engineer personnel with contractor employees.
- b. 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
- c. Describe the following assessment methods and the advantages or limitations of each method:
 - Document review
 - Observation
 - Interview
- d. Describe the methods by which noncompliance is determined and communicated to the contractor and Departmental management.
- e. Describe the action to be taken if the contractor challenges the assessment findings, and explain how such challenges can be avoided.
- f. Discuss NNSA Business Operating Procedure (BOP) 10.003, *Site Integrated Assessment Plan (SIAP) Development, Updating, and Reporting*.
- g. Discuss NNSA NAP-21, *Transformational Governance and Oversight*.

APPENDIX A

CONTINUING EDUCATION, TRAINING, AND PROFICIENCY PROGRAM

This standard does not require requalification (See FTCP Issue Paper FTCP 08-002 on the FTCP website. Document decisions and provide a summary of positive Requalification recommendations to the FTCP). Headquarters or field element managers must ensure the following:

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

LIST OF CONTINUING EDUCATION, TRAINING, AND OTHER ACTIVITIES

NNSA Package Certification Engineer personnel must complete continuing technical education and/or training covering topics directly related to the NNSA Package Certification Engineer FAQS as determined by appropriate management as follows:

1. Address changes to DOE directives, guides, standards, policies, and rules since the last qualification was completed.
2. Continuing technical education and/or training covering topics directly related to the package certification area as determined by appropriate 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.
3. Actively perform the duties of a NNSA package certification engineer a minimum of 500 hours per year.
4. Attend seminars, symposia, or technical meetings related to NNSA Package Certification Engineer functions as resources are available.
5. Engage in self-study of new regulations, requirements, or advances related to package design and testing, package certification, and hazardous materials transportation.
6. Specific continuing training requirements shall be documented in Individual Development Plans (IDPs).

Note: Continuing technical education and/or training may include courses/training provided by the DOE, other government agencies, outside vendors, or local educational

DOE-STD-1026-2016

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

DOE-STD-1026-2016

CONCLUDING MATERIAL

Review Activity:

NNSA

AU

Preparing Activity:

DOE/NNSA OPT (NA-531)

Project Number:

P1026-2009REV

Field or Site Offices:

Kansas City Field Office

Livermore Field Office

Los Alamos Field Office

Nevada Field Office

NNSA Production Office

Savannah River Field Office

Sandia Field Office