



# REGULATORY GUIDE

## REGULATORY GUIDE 7.10

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### ESTABLISHING QUALITY ASSURANCE PROGRAMS FOR PACKAGING USED IN TRANSPORT OF RADIOACTIVE MATERIAL

#### A. INTRODUCTION

##### **Purpose**

This regulatory guide describes an approach that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for complying with the related regulatory requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71, “Packaging and Transportation of Radioactive Material” (i.e., Type B and fissile radioactive materials) (Ref. 1). The regulations in 10 CFR Part 71 apply to NRC licensees that transport licensed material or that deliver licensed material to a carrier for transport, and to certificate holders who design and fabricate packages for the transport of Type B and fissile radioactive materials. This guidance provides licensees, certificate holders, and applicants with an acceptable method to prepare and submit quality assurance (QA) program descriptions for NRC staff review.

##### **Applicable Rules and Regulations**

The 10 CFR Part 71 regulations define requirements for packaging of radioactive materials for transport. Specifically:

- 10 CFR 71.37(a) states that applicants requesting package design approval must describe, consistent with Subpart H of Part 71, “Quality Assurance,” the QA programs that they will apply in the design, fabrication, assembly, testing, maintenance, repair, modification, and use of the proposed packaging.
- 10 CFR 71.101, “Quality Assurance Requirements,” states that licensees, certificate holders, and applicants for a certificate of compliance (CoC) must implement and use a QA program that the NRC staff has previously approved.
- 10 CFR 71.101(b) requires, in part, that QA programs of licensees, certificate holders, and applicants for a CoC satisfy each of the applicable criteria specified in 10 CFR 71.101–71.137.

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## **Related Guidance**

- Terms used in this guide are consistent with those used in 10 CFR Part 71; and standards promulgated by the American National Standards Institute (ANSI) and the American Society of Mechanical Engineers (ASME), ANSI/ASME Standard NQA-1- 2008 and NQA-1a-2009 Addenda, “Quality Assurance Requirements for Nuclear Facility Applications,” (Ref. 2)
- Regulatory Guide 7.6, “Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels,” (Ref. 3) describes design criteria acceptable to the NRC staff for use in the structural analysis of the containment vessels of Type B packages used to transport irradiated nuclear fuel.
- Regulatory Guide 7.7, “Administrative Guide for Verifying Compliance With Packaging Requirements for Shipments of Radioactive Material,” (Ref. 4) describes an approach that the staff considers acceptable for meeting the administrative requirements associated with transferring, shipping, and receiving radioactive material.
- Regulatory Guide 7.9, “Standard Format and Content of Part 71 Applications for Approval of Packages for Radioactive Material,” (Ref. 5) provides guidance on preparing applications for approval of Type B and fissile material transportation packages. It is intended to assist applicants in preparing applications that thoroughly and completely demonstrate the ability of the given packages to meet the regulations.

## **Purpose of Regulatory Guides**

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency’s regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required.

## **Information Collection Requirements**

This regulatory guide contains information collection requirements covered by 10 CFR Part 71, that Office of Management and Budget (OMB) approved under OMB control number 3150-0008. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

## **B. DISCUSSION**

### **Reason for Revision**

This guide is being revised to address new and revised NRC regulatory requirements applicable to QA programs under 10 CFR Part 71. The regulatory revisions include, among other things, (1) establishing requirements to allow some changes to be made to a previously approved QA program without obtaining additional NRC approval, and (2) removing the requirements for renewal of QA program approvals. This updated guidance accompanies the final 10 CFR Part 71 rule. The amendments revise the regulations for the packaging and transportation of radioactive material to: (a) make the NRC regulations compatible with the 2009 edition of the International Atomic Energy Agency's (IAEA) transportation standards, "Regulations for the Safe Transport of Radioactive Material," (TS-R-1), (Ref. 6), (b) maintain consistency with changes in the U.S. Department of Transportation (DOT) regulations, and (c) make other clarifying changes to the requirements for the packaging and transportation of radioactive material.

### **Regulatory Framework for Transport of Radioactive Material**

The NRC's regulatory requirements for packaging and transporting radioactive materials are codified in 10 CFR Part 71. Those requirements state that the agency grants licenses to transport radioactive materials, under the provisions of 10 CFR Part 71, Subpart C, "General Licenses," only to licensees whose QA programs the NRC has previously approved as satisfying the provisions of 10 CFR Part 71, Subpart H. The NRC also imposes QA requirements on those who submit applications for approval of package designs under the provisions of 10 CFR Part 71, Subpart D, "Application for Package Approval." Specifically, in accordance with 10 CFR 71.31(a), an application for approval under Subpart D must include, for each proposed package design, a QA program description as required by Subpart H, or a reference to a QA program that the NRC has previously approved. If an applicant fails to include a QA program description or to reference a previously approved description, the NRC staff considers the application incomplete and may return it. As used in 10 CFR Part 71 Subpart H, quality assurance comprises all planned and systematic actions necessary to provide adequate confidence that a system or component will perform satisfactorily in service. As such, QA includes quality control (QC), which comprises those quality assurance actions that relate to controlling the physical characteristics and quality of the materials or components in accordance with predetermined requirements.

Subpart H of 10 CFR Part 71 establishes QA requirements that apply to design, purchase, fabrication, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, and modification of packaging of components important to safety (i.e., the features of a structure, component, or system under control of the QA program and necessary to ensure the integrity of the packaging and its capability to prevent or mitigate the consequences that could result from release of radioactive material). To meet those requirements, licensees, certificate holders and applicants (hereinafter referred to as "QA program user") should control the quality of each of the above activities using a graded approach (i.e., the QA effort expended on an activity should be consistent with the importance to safety of the associated structures, systems, and components). For the purposes of this regulatory guide, structures, systems, and components important to safety mean the features of a Type B or fissile material package that are intended to (1) maintain the conditions required to safely transport the package contents, (2) prevent damage to the package during transport, or (3) provide reasonable assurance that the radioactive contents can be received, handled, transported, and retrieved without undue risk to the health and safety of the public or the environment. Appendix A to this guide, "A Graded Approach to Developing Quality Assurance Programs for Packaging Radioactive Materials," describes a method for developing a QA program with a graded approach. Additional guidance on the graded approach for

QA programs is available in NUREG/CR-6407, “Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety” (Ref. 7).

Pursuant to §71.101(c), before any package is used to ship licensed material, each licensee must obtain NRC approval of its QA program, along with a discussion of which Subpart H requirements apply and how those requirements will be satisfied. The licensee should address the regulations delineated in Subpart H to the extent they are applicable to its operations.

The types of activities in which a given QA program user engages will determine which sections of the Subpart H regulations will need to be addressed and which activities the NRC staff will review before approving the QA program. The QA program activities may be divided into two major areas. The first area comprises activities associated with 10 CFR Part 71, Subpart D, which usually leads to issuance of a CoC and fabrication of the approved packaging. The activities normally authorized by an NRC-approved QA program in this area are design, testing, repair, fabrication, procurement, modification, assembly, maintenance, and use. The second area comprises activities associated with 10 CFR Part 71, Subpart C, “General Licenses.” The activities normally authorized by an NRC approved QA program in this area are repair, procurement, maintenance, and use.

This regulatory guide includes information about commonly misinterpreted areas of 10 CFR Part 71, such as (1) the level of detail required in QA program descriptions, (2) submittal of program descriptions based solely on other QA standards, and (3) requirements for changes to previously approved NRC QA program descriptions.

### **Level of Detail in QA Program Descriptions**

In their program description submittals, QA program users should identify how each regulation in 10 CFR Part 71, Subpart H, applies to their particular situation and how those regulations will be satisfied. Thus, the information supplied for NRC review varies as a function of the nature of the activities in which a given QA program user will engage. For example, a QA program user who has a general license solely to transport radioactive materials in packages purchased or leased for that purpose would be expected to address criteria governing such activities (e.g., procurement, shipment, and handling). By contrast, a QA program user who designs and fabricates a package would be expected to address criteria for design and testing, as well as activities related to procuring the component materials. Elements that are common to all QA program descriptions include the quality organization and program, corrective actions, QA records, and audits (among others).

In defining what the NRC staff considers to be an acceptable QA program description submittal, it is beneficial to discuss what the NRC considers an unacceptable submittal. Generally, in an unacceptable submittal, the QA program description may contain either too little or too much information. In terms of not providing enough information, this includes a QA program description that basically restates the QA program requirements in Subpart H of 10 CFR Part 71, fails to describe which elements of the NRC’s QA program requirements apply to the QA program user’s activities, and fails to describe how the QA program user would satisfy those requirements. However, a QA program submittal may be extremely detailed, to the point that it contains actual implementing procedures, which the staff does not review. Thus, an acceptable QA program submittal addresses each regulation in Subpart H of 10 CFR Part 71 that applies to the QA program user’s activities and describes how the QA program user will comply with such requirements.

## **Quality Assurance Program Submittals Based on Other Standards**

The NRC staff occasionally receives QA program descriptions that are based on QA standards other than 10 CFR Part 71 Subpart H, such as ANSI/ASME NQA-1-2008 with the NQA-1a-2009 Addenda (Ref. 2), or the standard promulgated by the International Organization for Standardization (ISO) 9000 series, “Quality Management Systems” (Ref. 8). While the staff may find such submittals acceptable upon review, QA program users should be aware that the QA regulations in 10 CFR Part 71 include requirements that other standards may not fully address. In general, programs based on certain NQA-1 revisions or the ISO 9000 standards will require supplementation to address all applicable Subpart H regulations. The only exception is the ANSI/ASME NQA-1-2008 with the NQA-1a-2009 Addenda, which the NRC has endorsed in its entirety. Without supplementation, the NRC may require the QA program user to submit additional information about how the applicable Subpart H regulations will be met, if standards other than ANSI/ASME NQA-1-2008 with the NQA-1a-2009 Addenda are being relied on. This may necessitate changes to the submitter’s underlying QA program and delay NRC review and approval. Additional guidance may also be found in NRC Information Notice 86-21, “Recognition of American Society of Mechanical Engineers Accreditation Program for N Stamp Holders,” and its two supplements (Ref. 13, and 14).

## **Changes to Approved QA Program Descriptions**

Based on the applicable NRC regulations and the approved QA program, the QA program user should develop and implement lower-level (working-level) documents to govern the conduct of QA activities that are important to safety.

Previously, all changes to an approved QA program description required NRC approval. Therefore, before implementing any change in the QA program description that was used as the basis for NRC approval, the QA program user was required to submit the proposed change for NRC review. That requirement was significantly changed under new provision §71.106. Specifically, new §71.106(a) requires that the NRC only review and approve changes that reduce commitments to an approved QA program description before they are implemented. Under new provision §71.106(a)(1), the NRC requires the following information for submitted changes that reduce commitments, made to an approved QA program description: (1) a description of the proposed changes to the approved QA program description, (2) the reason for the change, and (3) the basis for concluding that the revised program incorporating the change continues to satisfy the requirements of Subpart H. Requests for review and approval of such changes are handled through amendments to the QA program approvals.

In accordance with new §71.106(b), administrative changes (e.g., revisions to format, font size or style, paper size for drawings and graphics, or revised paper color) and clarifications, spelling corrections, and nonsubstantive editorial or punctuation changes will not require NRC approval. Changes to reporting responsibilities, functional responsibilities, and functional relationships, may be substantive and have the potential to reduce commitments made to the NRC and, in these instances, would require prior NRC approval before being implemented. The new §71.106(b) lists the following changes that are not considered to reduce commitments made to the NRC:

- (1) use of a QA standard that the NRC has approved, which is more recent than the QA standard in the current QA program at the time of the change
- (2) use of generic organizational position titles that clearly denote the position function, supplemented as necessary by descriptive text, rather than specific titles

- (3) use of generic organizational charts to indicate functional relationships, authorities, and responsibilities, or alternatively, the use of descriptive text
- (4) elimination of QAP information that duplicates language in QA regulatory guides and QA standards to which the holder of the QAP approval is committed
- (5) organizational revisions that ensure that personnel and organizations performing QA functions continue to have the requisite authority and organizational flexibility, including sufficient independence from cost and schedule when opposed to safety considerations

All changes made to an approved QA program description must be reported to the NRC every 24 months. If the QA program approval holder has not made any changes to their approved QA program description during the preceding 24-month period, then the QA program approval holder would indicate to the NRC that no changes have been made. Additionally, each QA program approval holder must maintain records of all QA program changes, in accordance with new §71.106(c).

### **Harmonization with International Standards**

The International Atomic Energy Agency (IAEA) has established a series of safety standards and guides to provide for a high level of safety for protecting people and the environment. IAEA safety standards present a point of reference for international good practices to help users striving to achieve high levels of safety. This regulatory guide is compatible with the 2009 edition of the IAEA transportation requirement, TS-R-1, “Regulations for the Safe Transport of Radioactive Material” (Ref. 6).

Also pertinent to this regulatory guide is IAEA Safety Standards Series no. GS-R-3, “The Management System for Facilities and Activities” (Ref. 9). The standard is broadly written, addressing quality of components and processes, as well as management and safety culture. It uses the term ‘management system’ rather than ‘quality assurance.’ The term management system reflects and includes the initial concept of ‘quality control’ (controlling the quality of products) and its evolution through quality assurance (the system to ensure the quality of products) and ‘quality management’ (the system to manage quality). The management system is defined as a set of interrelated or interacting elements that establishes policies and objectives and which enables those objectives to be achieved in a safe, efficient and effective manner. Implementing guidance is provided in an IAEA Safety Guide, IAEA Safety Standards Series No. GS-G-3.1, “Application of the Management System for Facilities and Activities” (Ref. 10). This regulatory guide is consistent with the basic safety principles outlined in IAEA Safety Standard GS-R-3 and Safety Guide GS-G-3.1.

### **Documents Endorsed in this Guide**

This regulatory guide endorses, in part, the use of one or more codes or standards developed by external organizations, and other third party guidance documents. These codes, standards and third party guidance documents may contain references to other codes, standards or third party guidance documents (“secondary references”). If a secondary reference has itself been incorporated by reference into NRC regulations as a requirement, then licensees and applicants must comply with that standard as set forth in the regulation. If the secondary reference has been endorsed in a regulatory guide as an acceptable approach for meeting an NRC requirement, then the standard constitutes a method acceptable to the NRC staff for meeting that regulatory requirement as described in the specific regulatory guide. If the secondary reference has neither been incorporated by reference into NRC regulations nor endorsed in a regulatory guide, then the secondary reference is neither a legally-binding requirement nor generically approved as an acceptable approach for meeting an NRC requirement. However, licensees and applicants

may consider and use the information in the secondary reference, if appropriately justified and consistent with current regulatory practice, consistent with applicable NRC requirements such as 10 CFR 50.54.

## C. STAFF REGULATORY GUIDANCE

To evaluate compliance with the QA requirements of Subpart H of 10 CFR Part 71, the NRC staff typically reviews elements of a QA program that involve activities related to the design, fabrication, procurement, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, modification, and use of radioactive material packaging. The applicability of each element depends on the activities in which the QA program user is involved as well as the graded approach that the QA program user implements for items that are important to safety.

Individuals and organizations that are subject to Subpart H should submit their QA program descriptions to obtain NRC approval before engaging in any activity that is important to safety. Those who engage in activities important to safety before obtaining NRC approval of their QA programs are at risk of having to demonstrate that such activities were in compliance with the QA program submitted. Upon determining that a given QA program submittal is adequate, the NRC will issue a QA program approval. Establishment of a QA program implies that all activities important to safety and applicable to the design, fabrication, procurement, handling, shipping, storing, cleaning, assembly, inspection, testing, operation, maintenance, repair, modification, and use of packages are implemented with written procedures approved by appropriate levels of management. Certificate holders and applicants for a package approval are responsible for satisfying the QA requirements that apply to design, fabrication, testing, and modification of packaging. Licensees are responsible for satisfying the quality assurance requirements which apply to their use of a packaging for the transport of licensed material. The licensee will notify the NRC before its first use of any package, and certificate holders and applicants will notify the NRC before the fabrication, testing, or modification of a package.

A previously approved quality assurance program that satisfies the applicable criteria of 10 CFR Part 71 subpart H, 10 CFR Part 50 Appendix B, or 10 CFR Part 72 subpart G, and that is established, maintained, and executed regarding transport packages, will be accepted as satisfying the requirements of 71.101(b). Before first use, the licensee, certificate holder, or applicant for a CoC, shall notify the NRC of its intent to apply its previously approved subpart H, Appendix B, or subpart G quality assurance program to transportation activities. The licensee, certificate holder, or applicant for a CoC shall identify the program by date of submittal, docket number, and date of approval. The NRC also has endorsed the use of ANSI/ASME NQA-1-2008 and the NQA-1a-2009 Addenda, "Quality Assurance Requirements for Nuclear Facility Applications," as a standard that, when properly applied and supplemented (as necessary) to meet all applicable criteria, should result in the development of a QA program that is acceptable to the NRC staff.

### 1. Guidance on 10 CFR 71.103, "Quality Assurance Organization"

#### 1.1 Structure and Authority

For each function, the structure of the organization and the assignment of responsibility should ensure that the following requirements are fulfilled:

- The formal structure of the organization is documented by organization charts that identify each organizational element that functions under the QA program.
- The discussion specifies the required authority and organizational responsibility, including sufficient independence from influences of cost and schedule.
- The specified quality requirements are achieved and maintained by those who have been assigned the responsibility for performing the work.



- The QA program user has established measures to provide adequate control over activities important to safety (e.g., inspecting, cleaning, purchasing, and preparing the packaging for delivery).
- The conformance to established requirements is verified by individuals and groups not directly responsible for performing the work.

*Note:* If, because of staffing limitations, the same individuals perform multiple functions (including QA), the QA program user should establish measures to ensure that the designated individuals performing QA and QC functions have the responsibility and authority to stop unsatisfactory work and delivery or installation of nonconforming material. These individuals also should have direct access to management levels that can ensure that QA procedures important to safety have been accomplished.

In addition, the QA program user should establish and document the required duties and qualifications for (1) the individual who has overall authority and responsibility for the QA program, as well as (2) other personnel performing QA and QC functions. Individuals with QA and QC functions should have the written endorsement of upper management.

## 1.2 Senior Management Endorsement of a QA Program

Senior management, the company or corporate president or chief executive officer, should maintain a continuing involvement in QA matters to ensure that the QA program is effective. Senior management should establish a written company or corporate policy to perform work on items important to safety in accordance with the requirements of 10 CFR Part 71, Subpart H. This policy should be described in or incorporated into the QA program plan and implemented through the QA program procedures.

The policy statement should also identify the functions and positions that have delegated authority for the following tasks:

- Implement and revise the provisions of the described QA program.
- Regularly assess the scope, status, implementation, and effectiveness of the QA program.

## 2. Guidance on 10 CFR 71.105, “Quality Assurance Program”

### 2.1 General Guidance on QA Programs

In its program description submittal, the QA program user should describe to the NRC how each of the requirements in Subpart H of 10 CFR Part 71 applies to its particular situation and how each requirement will be satisfied. The information supplied for NRC review will vary as a function of the nature of activities in which the QA program user is involved. For example, an individual or organization using a general license solely for transportation of radioactive material in packages purchased or leased for that purpose would be expected to address regulations governing activities such as procurement, shipment, and handling. By contrast, someone who designs and fabricates packaging would be expected to address criteria for design and testing, as well as material

procurement activities. Elements common to all QA program descriptions include the quality organization and program, corrective action, QA records, and audits.

In developing its program, a prospective QA program user can refer to the NRC's guidance in this regulatory guide, as well as the additional guidance on graded QA approach in NUREG/CR-6407 (Ref. 7). In developing its program, a QA program user should apply each of the applicable Subpart H regulations in a graded approach (i.e., to an extent that is consistent with items important to safety).

Following the NRC staff's technical review and determination that the QA program submittal meets regulatory requirements, the Commission issues a QA program approval. Changes to an approved QA program are specifically addressed in new §71.106 as described in Section B, "DISCUSSION," of this Regulatory Guide. Based on NRC approval of its QA program description submittals, a QA program user will translate the regulations discussed in its submittals into lower-level (working-level) implementing procedures that govern the conduct of QA activities important to safety.

If the NRC staff reviews a QA program submittal and finds that it inadequately describes how the requirements will be met or fails to specifically address some Subpart H regulation(s), the staff will either reject the QA program submittal or ask the QA program user to submit additional information to correct the deficiencies.

## 2.2 Scope of QA Program

The QA program user should establish measures for identifying: (1) the components, structures, and systems that the QA program will cover, and (2) the approach for verifying that the applicable components, structures, and systems meet design objectives. Although 10 CFR Part 71 allows the development of a "graded" QA program, this does not preclude the alternative of defining a program with additional measures if such a program is deemed necessary to attain the confidence needed for meeting design objectives. In particular, the QA program user should establish measures to ensure that the following requirements are fulfilled:

- Activities important to safety are performed using specified equipment and under suitable environmental conditions.
- QA and QC manuals specify the designated responsibilities for implementation of activities important to safety.
- The QA program user has established indoctrination programs to ensure that personnel performing activities important to safety are trained and qualified to perform those activities.

## 2.3 Applicability of QA Program

Measures that the QA program covers should be compatible with and emphasize characteristics identified in the manufacturer's QA program. The QA program user should establish the rationale for identifying items classified as important to safety and subject to the user's QA program.

## 2.4 Documentation

The QA program user should ensure that written procedures and instructions: (1) describe all activities that are important to safety and applicable to the design, procurement, fabrication, and testing of packaging, and (2) will be in place before the QA program user engages in those activities.

If the QA program user has not yet initiated activities important to safety, the user should identify the implementing procedures for such activities by title and procedure number and provide a brief description of the content of those procedures with an estimated date for their completion. The following table shows a suitable format for listing procedures to demonstrate implementation of a documented QA program.

**Table 1. Format for Listing Implementing Procedures\***

<b>Implementing Document</b>	<b>Title</b>	<b>Regulatory Position per Regulatory Guide 7.10</b>	<b>Description</b>
Quality Assurance Manual (QAM), Quality Procedure (QP) 1	Organization	1	Identifies the QA organization, its relationship to other organizations within the company, and its responsibilities for activities affecting quality.
QAM, QP 2	QA Program	2	Describes basic methods for establishing a documented QA program that implements requirements of Subpart H to Part 71.
QAM, QP 3	Design Control	4	Describes design control measures established for structures, systems, and components.
QAM, QP 4	Procurement Document Control	5	Describes procedures for ensuring that applicable regulatory requirements, design bases, and other requirements necessary to ensure adequate quality are suitably included or referenced in documents for procurement of material, equipment, and services.
QAM, QP 18	Audits	19	Describes internal and external audit programs applicable to both in-house and major suppliers.

\* This table shows examples only for Regulatory Positions 1, 2, 4, 5, and 19; however, the QA program user should provide the requested information for all 18 regulatory positions, as applicable.

To demonstrate that written procedures fully implement and reflect the current status of the documented QA program, the QA program user should establish and maintain a master index of QA procedures related to all activities important to safety, as well as a matrix of the QA procedures that implement each section of 10 CFR Part 71, Subpart H. These written procedures should also address the use, management, and storage of electronic records and data.

## 2.5 Controlled Conditions and Assignment of Responsibilities

The QA program user should establish measures to ensure that activities important to safety are accomplished using appropriate production and test equipment, suitable environmental conditions, applicable codes and standards, and proper work instructions. The QA program user should also document the assignment of responsibility for each task and method used to verify conformance to these quality requirements.

### 3. Guidance on 10 CFR 71.107, “Package Design Control”

Essential elements of adequate design control are (1) clearly-established working relationships among those responsible for preparing design disclosures, (2) conducting independent design analyses, (3) coordinating interfaces, and (4) maintaining lines of communication. To ensure an adequate commitment to control of design activities, applicants should consider the three principal areas of (1) control of the design process, (2) control of design input, and (3) control of design verification, as defined in regulatory positions 4.1 - 4.3.

Computer-aided design (CAD) is extensively used in current design applications. Designs developed using CAD methods are prepared and stored electronically. Thus, applicable QA procedures for verification and validation, management of electronic records, and quality control of electronic data should address the control of electronic data in design applications to ensure authenticity and technical accuracy. The Nuclear Information and Records Management Association (NIRMA), ANSI, and the Electric Power Research Institute (EPRI) provide guidance for use in developing QA programs for managing electronic data. In addition, NRC Generic Letter 88-18, “Plant Record Storage on Optical Disks” (Ref. 11), and Regulatory Information Summary 00-18, “Guidance on Managing Quality Assurance Records in Electronic Media” (Ref. 13), provide guidance on the use of optical disc document imaging systems for retrieving record copies of QA records.

#### 3.1 Control of the Design Process

The QA program user should establish measures such as “classification of characteristics” to ensure that packaging designs are reviewed to emphasize parameters important to safety that can be controlled by inspections or tests and to identify test and inspection criteria and quality standards.

To control the preparation of drawings and specifications, the QA program user should establish recognized engineering practices. Engineering practices may include: (1) prescribing drafting room standards, (2) checking methods, establishing review and approval and issuance and distribution requirements (including revisions to them), (3) maintaining current “as-built” configurations, and (4) storing and controlling original and master copies.

#### 3.2 Control of Design Input

The QA program user should establish measures to ensure that appropriate codes and standards are used in the design of the packaging. In the absence of such codes and standards for formulation of the design activities, the QA program user should identify alternative approaches.

The QA program user should establish measures to ensure that (1) the responsible design organization has properly considered, reviewed, and approved all design parameters (e.g., criticality physics, cooling, and decontamination of an item), (2) the parameters are in accordance with the applicable performance codes, standards, and regulatory requirements, and (3) design documents specify the related maintenance, repair, inservice inspection, handling, storage, and cleaning requirements.

### 3.3 Control of Design Verification

The QA program user should establish methods for use in verifying the adequacy of the design (e.g., qualification testing, design review, or alternative calculations, including use of computer programs). Technically qualified individuals or groups responsible for design verification should not be in the administrative line of authority of the original designer, with the exception that the designer's immediate supervisor may perform the verification, provided that the following criteria are met:

- The supervisor is the only technically qualified individual.
- The supervisor's management documents and approves the need in advance.
- The QA audits cover the effectiveness of the use of supervisors as design verifiers to guard against abuse of this practice.

Changes to the final design may arise during the sequence of design verification. Consequently, the QA program user should establish measures to ensure that drawing and specification changes are reviewed and approved by the same individuals or organizations that reviewed and approved the original documents. Changes in design that could result in conditions different from those prescribed in the CoC should be approved by the NRC prior to implementation.

Design verification, if other than by qualification testing of a prototype or lead production unit, should be satisfactorily completed before release (1) for procurement or fabrication and (2) to other organizations for use in other design activities, except when this timing cannot be met. In such cases, design verification may be deferred, provided that the justification for this action is documented and the unverified portion of the design output documents are appropriately identified and controlled. When a test program is used to verify the adequacy of a design, the prototype should be subjected to the most adverse design conditions.

Even though users of packaging do not normally perform design activities, users should establish and verify that the packaging was designed under the control of an NRC-approved QA program.

## 4. Guidance on 10 CFR 71.109, "Procurement Document Control"

The QA program user should establish measures to control the preparation, review, concurrence, and approval of all procurement documents.

### 4.1 Content of Procurement Documents

The QA program user should establish measures to ensure that procurement documents include the following information (to the extent applicable to their respective operations):

- The scope of work to be performed by the prospective supplier.
- The design-basis technical requirements (or references thereto), including applicable regulatory requirements, material and component identification

requirements, drawings, specifications, codes and standards, special process instructions, and test and inspection requirements.

- Applicable Subpart H requirements that should be complied with and described in the supplier's QA program (e.g., qualified QA personnel from the purchaser's organization should review and provide review concurrence on the supplier's QA program or portions thereof before the purchaser initiates activities that the program affects. Also, if subtier suppliers are involved, the QA program user should specify the QA provisions appropriate to those procurements. The extent of the supplier's and subtier supplier's QA programs will depend on the particular item or service being procured).
- Permission to gain access to the supplier's and subtier supplier's plant facilities and records for inspection and audit purposes (e.g., procurement documents should identify the type of verification activities required of any subtier suppliers for supplied materials, as well for any design, fabrication, assembly, testing, maintenance, and repair services or activities supplied).
- Identification of the documentation (e.g., drawings, specifications, procedures, inspection and fabrication plans, inspection and test records, personnel and procedure qualifications, results of chemical and physical tests on material) that the supplier(s) must prepare, maintain, and submit to the purchaser for approval.
- Requirements for reporting and approving disposition of nonconformances.
- Identification of records that the supplier must retain, control, and maintain, as well as those records that the supplier must deliver to the purchaser before installation of hardware. These records should include the pertinent documentation to be furnished with the procured materials or services (e.g., CoC, as-built drawings, photographs, sketches, and use and maintenance manuals). If the pertinent documentation is in an electronic format, the QA program user also should maintain information on the specific software applications and storage or computing hardware.

#### 4.2 Replacement Part Procurement

Measures should be established to require that the QA program user reviews procurements of replacement parts important to safety to ensure that appropriate technical and QA requirements are included in purchase orders and that the purchase orders are placed with suppliers previously qualified during packaging fabrication. If replacement parts are purchased from suppliers not previously identified as qualified sources, the QA program user should ensure that the replacement parts meet requirements at least as stringent as the original criteria.

#### 4.3 Review and Changes to Procurement Documents

The QA program user should establish measures to ensure that review and approval of procurement documents are recorded before release, and that changes and revisions to those documents are subject to at least the same review and approval process as the original documents.

## 5. Guidance on 10 CFR 71.111, “Instructions, Procedures, and Drawings”

### 5.1 Quality Assurance Program Procedures

The QA program user should establish measures to ensure that the following requirements are fulfilled:

- Activities important to safety are prescribed and accomplished in accordance with current documented instructions, procedures, or drawings that have been approved by appropriate levels of management.
- Instructions, procedures, and drawings specify the methods for complying with each of the applicable sections of Subpart H of 10 CFR Part 71.
- All work activities are coordinated with QA personnel to ensure that the work-controlling documents incorporate appropriate inspection and hold points to verify that initial work, planned work, effective repairs, or rework have been performed satisfactorily.
- Instructions, procedures, and drawings include quantitative acceptance criteria (e.g., dimensions, tolerances, and operating limits) and qualitative acceptance criteria (e.g., workmanship samples) to verify that activities important to safety have been accomplished satisfactorily.
- Written procedures address the use, management, storage, and protection of electronic records and data. The QA program user should also maintain information on the specific software applications and storage or computing hardware.

### 5.2 QA Review and Concurrence

The QA program user should establish measures to ensure that the QA organization reviews and concurs in inspection plans; test, calibration, and special process procedures; and specifications as well as any changes thereto. Before fabrication of an item, the QA organization should review and concur in the related manufacturing plans, as they relate to scheduled witness and hold points during fabrication.

## 6. Guidance on 10 CFR 71.113, “Document Control”

### 6.1 Controlled Documents

The QA program user should maintain control of each of the documents of the QA program to reflect the current status. As a minimum, the QA program user should exercise control over the following:

- design documents (e.g., drawings, specifications, and computer codes)
- procurement documents
- QA and QC manuals
- operating, maintenance, and modification procedures
- inspection and test procedures
- nonconformance reports

- design change requests
- corrective action reports

## 6.2 Control of Document Generation and Issuance

The QA program user should establish controls to ensure that all documents and any changes are adequately reviewed and approved before they are issued. These controls should include measures (e.g., the use of a master document list) to ensure that current issues of applicable documents are available at the location where the activity is being performed, to preclude use of obsolete or superseded documents. The QA program user also should check all packaging affected by design changes to verify that it is in accordance with the appropriate revision. In addition, the QA program user should identify (by function or position) the individuals or groups responsible for reviewing, approving, and issuing documents and revisions thereto.

## 6.3 Control of Document Changes

The QA program user should establish measures to ensure that changes to documents are reviewed and approved by the same organization that performed the original review and approval, and the changes are in accordance with established configuration control procedures.

## 6.4 Control of Electronic Documents

If the documents are stored electronically, the QA program user should establish controls over access to the documents to ensure that the latest versions are available and changes are properly authorized and implemented. The software and hardware systems used to store electronic information should be reliable and secure to avoid alteration or corruption of the information.

## 7. Guidance on 10 CFR 71.115, “Control of Purchased Material, Equipment, and Services”

The QA program user should establish measures in the areas identified below to ensure that materials, equipment, and services conform to procurement documents.

### 7.1 Procurement Document Planning

The QA program user should establish procurement planning procedures that describe each procurement step leading to contract award for items and services. These procedures should identify the organizations responsible for each procurement step.

### 7.2 Selection of Procurement Sources

The QA program user should establish measures for evaluating and selecting procurement sources, including the extent of QA and engineering involvement. Specifically, the QA program user should consider establishing the following provisions (if applicable):

- the supplier’s capability to comply with applicable sections of Subpart H
- results of the survey of the supplier’s facility and QA program
- review of the supplier’s previous records and performance



### 7.3 Bid Evaluation and Award

The QA program user should establish measures to ensure that designated individuals or organizations evaluate proposed suppliers, as applicable to the type of procurement, based on technical considerations, conformance to QA requirements, production capability, and past performance. Before contract award, the QA program user should resolve (if possible) all unacceptable conditions identified during the bid evaluation. If any unacceptable conditions cannot be resolved before contract award, the QA program user should obtain the supplier's commitment that the conditions will be resolved at a mutually agreeable date during the contract period.

### 7.4 Supplier Performance Control

The QA program user should establish measures for pre- and post-award activities. These activities may include meetings and other communications, to ensure that the supplier understands procurement requirements, including, if applicable, "hold points" (i.e., pre-established inspection points in the manufacturing process that require inspection approval and release by the QA organization before further processing) during manufacturing and testing and before shipment.

### 7.5 Verification Activities

The QA program user should establish the extent to which source surveillance will be performed during fabrication, assembly, maintenance, modification, repair, inspection, testing, and shipment to ensure conformance with the purchase order requirements. The source surveillance should cover the following aspects:

- instructions specifying characteristics or processes to be witnessed, inspected, or verified
- the documentation required
- identification of those responsible for implementing source surveillance

The QA program user also should establish the extent to which inspection will be performed upon receipt of supplier-furnished hardware to ensure that items are properly identified and correspond with procurement documentation. When acceptance of an item is contingent on tests after installation in the package, the QA program user and item supplier should mutually establish the relevant acceptance documentation before its use.

In addition, the QA program user should take appropriate measures (such as source surveillance and audits of records) to ensure that the supplier performed the design and fabrication of packaging under the control of an NRC-approved QA program.

### 7.6 Controlling Nonconformances

The QA program user should establish measures to ensure the proper disposition of items or services that do not meet procurement requirements. These measures should include evaluation of nonconforming items categorized by the supplier, along with technical justification and recommended disposition (e.g., "use as is" or "repair").

## 7.7 Records

The QA program user should establish measures to ensure that the supplier furnishes the following records to the purchaser (as a minimum):

- documentation that identifies material or equipment and the specific procurement requirements (e.g., codes, standards, and specifications met by the items)
- documentation that identifies any procurement requirements that have not been met, along with a description of those nonconformances designated “use as is” or “repair”
- documentation that the supplied material and equipment meets the applicable procurement requirements before installation or use
- appropriate documentation, as identified in the purchase order, which will accompany the NRC-approved packaging during transport and be received at the destination by the user

Such documents should (1) be referenced in the CoC, (2) relate to the use and maintenance of the packaging, and (3) identify necessary actions to be taken before delivery of the licensed material to a carrier for transport. If the pertinent documentation is in an electronic format, the QA program user should also maintain information on the specific software applications and storage or computing hardware that must be used to prepare and deliver the documentation.

The QA program user should retain the documentation at the facility or site of material or equipment use.

## 8. Guidance on 10 CFR 71.117, “Identification and Control of Materials, Parts, and Components”

The QA program user should establish measures to ensure that materials, parts, and components, including partially fabricated assemblies, are adequately identified to preclude the use of incorrect or defective items. These measures should provide the means for physical identification (e.g., stamping, tags, labels, or lot-follower cards) and traceability to appropriate documentation (e.g., mill reports, drawings, or specifications) throughout fabrication, installation, and use. Also, when replacement of limited-life items is specified, the QA program user should establish measures to preclude use of items for which the shelf life or prescribed operation time has expired.

In addition, the QA program user should establish measures to facilitate continued processing, when required inspections or tests have not been completed, to maintain physical identity and control over affected materials.

## 9. Guidance on 10 CFR 71.119, “Control of Special Processes”

Special processes are not normally performed by the user of packaging. However, if packaging maintenance requires the use of special processes (e.g., welding or heat treating) or nondestructive testing, or if special processes are required to meet CoC requirements, the QA program user should establish measures to ensure that the special processes are controlled in accordance with the following suggested elements of process control:

- Procedures, equipment, and personnel are qualified in accordance with applicable codes, standards, and specifications.
- The operations are performed by qualified personnel and accomplished in accordance with written process or procedure sheets that direct the recording of evidence of verification.
- Qualification records of procedures, equipment, and personnel are established, filed, and kept current.

## 10. Guidance on 10 CFR 71.121, “Internal Inspection”

10.1 The QA program user should establish measures for internal inspection that consider the following recommendations:

- The prerequisites to be satisfied before inspection are identified, including operator qualification and equipment calibration. Where sampling is used, the standard used as the basis for verifying acceptability of a group of items should be identified.
- Inspection procedures, instructions, or checklists should be available for each work operation, where necessary to ensure quality.
- Documents developed should include methods for identifying characteristics and activities to be inspected, acceptance and rejection criteria, and the individuals or groups responsible for performing the inspection.
- “Hold” or witness points should be identified.
- Inspection results should be recorded and objectively verifiable.
- The appropriate personnel should approve data to ensure that all inspection requirements have been satisfied.

## 10.2 Inspections

### 10.2.1 Receiving Inspections

The QA program user should establish measures to ensure that items that are important to safety meet the requirements specified on the purchase order when the items are received at the plant.

The QA program user should establish the criteria for acceptance of each of these inspections, as well as the action to be taken, if noncompliance is encountered. These visual inspections should include the following aspects:

- surface conditions
- weld and structural integrity
- the condition of flange faces or sealing areas, gaskets, seals, gauges, rupture disks, valves, and pressure relief devices

- the condition of tie-down members (if applicable)
- labeling and marking
- leak-tightness of the packaging

In addition, the QA program user should establish provisions to control accepted items until they are placed in stock or released for use, as well as provisions for the proper disposition of rejected items.

#### 10.2.2 In-Process Inspections

The QA program user should establish measures to ensure that process specifications and their supporting documentation provide for indirect control by monitoring processing methods, equipment, and personnel if direct inspection is impractical.

#### 10.2.3 Final Inspections

The QA program user should establish measures to ensure the following: (1) final inspections provide for resolution of nonconformances identified in earlier inspections, (2) the inspected item is identifiable and traceable to specific records and is adequately protected from physical or environmental damage, and (3) supervisors review inspection records to verify that all inspection requirements have been satisfied, as described in Section 11.2 of this document.

For packaging use, the QA program user should establish checklists to ensure that inspections are performed to verify the following:

- Packages are properly assembled.
- Moderators and neutron absorbers are present (if applicable).
- Valves through which primary coolant flows are protected against tampering.
- Valves are set to specifications.
- All shipping papers are properly completed.
- Packages are conspicuously and durably marked as required by the regulations set forth by the U.S. Department of Transportation (DOT).
- Measures are established to ensure that appropriate personnel designated by the package user sign the shipping tags or indicators before authorization for shipping.

#### 10.2.4 Maintenance Inspections

The QA program user should establish measures for an inspection program to ensure adequate maintenance of packaging. This inspection program should identify the items to be maintained, criteria for acceptability or replacement, and the frequencies of inspection assigned to each item.

#### 10.2.5 Inspectors

The QA program user should establish measures to ensure that (1) inspectors are qualified in accordance with applicable codes, standards, and company training programs, (2) such qualifications and certifications are kept current, and (3) inspection personnel are independent from all individuals performing the activity being inspected.

#### 10.2.6 Inspection Documentation

The QA program user should maintain inspection records as QA records to document performance of inspection activities.

### 11. Guidance on 10 CFR 71.123, “Test Control”

#### 11.1 Requirements

The QA program user should establish measures to ensure that applicable test programs, including prototype qualification tests, production tests, proof tests, and operational tests, are accomplished in accordance with written procedures. The QA program user should also establish measures to ensure that modifications, repairs, and replacements are tested in accordance with the original design and testing requirements.

#### 11.2 Procedures

The QA program user should establish measures to ensure that test prerequisites identified in the appropriate design disclosures are properly translated into test procedures. For example, design closures may include instrument calibrations, monitoring to be performed, mandatory “hold” points, suitable environmental conditions to be maintained, condition of the test equipment, methods for physical identification of test specimen, methods for documenting or recording test data, and criteria for acceptance of the package.

#### 11.3 Acceptance Tests

The QA program user should establish measures, as appropriate, to ensure that acceptance tests are conducted before delivering packages for transport to a carrier. These measures should identify the basis for acceptance criteria (e.g., CoC, maintenance and operational manuals furnished by the packaging manufacturers). Tests should typically include the following considerations:

- structural integrity
- leak-tightness (on containment vessel as well as auxiliary equipment and shield tanks)
- component performance for valves, gaskets, and fluid transport devices
- shielding integrity
- thermal integrity

#### 11.4 Maintenance Tests

The QA program user should establish maintenance test programs to ensure that packages remain usable and free of excessive radiation and contamination. These test programs should include measures to ensure that qualified and responsible individuals document, evaluate, and assess the acceptability of all test results.

#### 11.5 Results

The QA program user should establish measures to ensure that test results are documented, evaluated, and maintained as QA records. These records should be readily available if questions arise concerning operational aspects of the packages. In addition, a qualified individual or group should determine the acceptability of the records.

### 12. Guidance on 10 CFR 71.125, “Control of Measuring and Test Equipment”

#### 12.1 Calibration Control

The QA program user should establish guidelines to ensure that measurement and test equipment (e.g., gauges, fixtures, and devices used to measure product characteristics) is calibrated, adjusted, and maintained at prescribed intervals or before use. Such equipment should be labeled or tagged to indicate the planned date of its next calibration. Calibration records should be identified, traceable, and maintained as QA records. The QA program user should also establish measures to ensure that in-house reference or transfer standards used in calibrating measuring and test equipment are traceable to nationally recognized standards. Calibrating standards should have known valid relationships to nationally recognized standards. If no known recognized standard exists, the QA program user should document the basis for calibration.

#### 12.2 Out-Of-Calibration Equipment

When test and measuring equipment is found to be out of calibration, the QA program user should take measures to validate previous inspection and test results up to the time of previous calibration.

In addition, the QA program user should repair or replace any measuring equipment that is consistently out of calibration.

13. Guidance on 10 CFR 71.127, “Handling, Storage, and Shipping Control”

13.1 Preservation

The QA program user should establish measures to ensure that cleaning, handling, storage, and shipping are accomplished in accordance with design requirements to preclude damage or deterioration by environmental conditions such as temperature and humidity. When necessary, the QA program user also should establish provisions for the use of special handling, lifting, or storage devices (e.g., cranes, shock absorbers, or special markings) to adequately identify and preserve packaging components or assemblies. In addition, the QA program user should ensure that conditions identified in the CoC are adhered to when unloading packaging.

13.2 Preparation, Release, and Delivery to Purchaser

The QA program user should establish measures to ensure that a final pre-release review has been completed. This review should ensure that the packaging (1) is prepared for delivery to the purchaser in accordance with NRC-approved drawings, specifications, and government regulations, (2) has passed all applicable inspections and tests, (3) is properly identified by physical markings or tags, and (4) contains operating manuals, maintenance manuals, and generic procedures relating to its use.

In addition, the QA program user should establish measures to ensure that the following requirements are fulfilled:

- Cavities within gas-cooled package containments have been adequately dried, and cavities within liquid-cooled packages have been drained to allow adequate void space.
- All conditions (including specified operations, inspections, and tests) have been completed before delivery to a carrier.
- All NRC and DOT requirements have been satisfied before delivery to a carrier.
- All necessary shipping papers have been prepared as required and reviewed by qualified personnel to verify completeness and accuracy.

14. Guidance on 10 CFR 71.129, “Inspection, Test, and Operating Status”

The QA program user should establish measures to ensure that the status of inspections, tests, and operating conditions (including maintenance of items) is known by organizations responsible for ensuring quality. The QA program user should also establish measures to control the application and removal of status indicators (e.g., tags, markings, stamps) and to ensure that bypassing a required inspection or test or any other required operation is procedurally controlled under the cognizance of the QA organization.

15. Guidance on 10 CFR 71.131, “Nonconforming Materials, Parts, or Components”

An acceptable program for controlling nonconforming items should include the following principal elements:

- proper identification
- segregation of discrepant or nonconforming items
- evaluation of the nonconforming items
- disposition of the nonconforming items

16. Guidance on 10 CFR 71.133, “Corrective Action”

16.1 Reporting

The QA program user should establish measures to ensure that the causes of conditions detrimental to quality (e.g., those resulting from failures, malfunctions, deficiencies, deviations, or defective material and equipment) are identified promptly and reported to appropriate levels of management. In addition, the QA program user should establish measures to obtain corrective actions from suppliers and ensure that followup actions are documented to verify that the corrective actions were implemented and effective.

16.2 Closeout, Retrieval, and Disposition of Records

The QA program user should establish measures to ensure that corrective actions designated by cognizant individuals have been implemented to preclude recurrence. In addition, the QA program user should identify (by function or position) the individuals or organizations responsible for closing out corrective actions and documenting their resolution.

17. Guidance on 10 CFR 71.135, “Quality Assurance Records”

17.1 General

QA records should furnish documentary evidence of the activities that affect quality and should provide sufficient information to allow each record to be identified with the items or activities to which it applies. In accordance with 10 CFR 71.135, QA records shall be retained for 3 years beyond the date when the QA program user last engaged in the activity for which the QA program was developed. If any portion of the written procedures or instructions is superseded, the QA program user shall retain the superseded material for 3 years after it is superseded. As a minimum, QA records should include the following information:

- design, procurement, manufacturing, and installation records
- supplier evaluations
- nonconformance reports
- results of inspections and tests
- failure analyses
- as-built drawings and specifications
- qualification of personnel, procedures, and equipment
- calibration procedures
- training and retraining records
- corrective action reports
- records demonstrating evidence of operational capability
- records verifying repair, rework, and replacement
- audit plans, audit reports, and corrective actions
- records that are used as a baseline for maintenance



- maintain records documenting changes to the QA program as required by 10 CFR 71.106

In addition, the QA program user should retain records that show evidence of package delivery to a carrier and proof that all NRC and DOT requirements have been satisfied (with their retention times identified).

Where applicable, inspection and test records should contain the following information:

- a description of the observation
- evidence of completion of the inspection or test operation
- results of inspections or tests with appropriate data
- conditions detrimental to quality
- names of inspectors, testers, or data recorders
- evidence of acceptability

## 17.2 Generating Records

The QA program user should establish measures to ensure that methods employed to generate and manage documents that are designated as QA records result in information that is retrievable, intelligible, and reliable. Such records should reflect the work accomplished and should be stored in a manner that avoids unnecessary delay when access to the record is needed. In addition, procedures for generating QA records should address both hard copy records and electronic information.

## 17.3 Indexing and Classification of Records

The QA program user should classify QA records as either “lifetime” or “nonpermanent”:

- Lifetime records include those pertaining to package fabrication and those associated with a particular item while it is installed in the packaging or stored for future use. These records (1) demonstrate the capability for safe operation, (2) provide evidence of repair, rework, replacement, or modification, (3) aid in determining the cause of an accident or malfunction of an item, and (4) provide a baseline for inservice inspection.
- Nonpermanent records are those that show evidence that an activity has been performed but do not meet the criteria for lifetime records. Records pertaining to use of a package should be retained for a period of 3 years after each shipment.

## 17.4 Receipt, Retrieval, and Disposition of Records

The QA program user should establish measures to provide a receipt control system, including identification of functions or positions in each organization responsible for receiving records and assessing the current status of records in their possession. The QA program user should also establish measures to ensure that records maintained in-house or at other locations are identifiable and retrievable, and are not disposed of until prescribed conditions are satisfied. For electronic records, the software systems used to image and store information should be compatible with new hardware as current technologies are implemented. In addition, the QA program user should have a

procedure in place before installing any new hardware systems to ensure that the new systems can reliably store and retrieve information from existing software systems.

#### 17.5 Storage, Preservation, and Safekeeping

The QA program user should establish measures to ensure that the following outcomes are fulfilled:

- Facilities used to store records should be constructed to minimize the risk from damage or destruction by severe natural conditions, such as wind, flood, fire, temperature, humidity, mold, or infestation by insects or rodents.
- Records should be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets.
- Electronic records should be maintained in facilities that minimize or eliminate the potential for destruction of information as a result of demagnetization (Ref. 12).
- Electronic records should be backed up daily to eliminate the potential for loss of information as a result of equipment failure or human error (Ref. 12).
- If dual storage facilities are used to ensure the record integrity, the storage facilities should be sufficiently remote from each other to preclude a single event (such as a fire or flood) from damaging both facilities.
- The QA program user should take measures to protect special records (e.g., radiographs and microfilm) from excessive light, electromagnetic fields, and temperature.
- The QA program user should take measures to prevent unauthorized personnel from entering record storage areas.
- Electronic information storage systems should be accessible only through security measures such as passwords, and the number of personnel who have authorized access should be limited. In addition, personnel who have authorized access should have identified privileges, such as “read only” or “read and add only.”
- The QA program user should establish measures to ensure prompt replacement of lost or damaged records.

#### 18. Guidance on 10 CFR 71.137, “Audits”

##### 18.1 Elements of an Audit Program

A comprehensive audit program should include the following elements:

- assurance of the authority and organizational independence of the auditors
- a commitment to adequate manpower, funding, and facilities to implement the audit

- identification of audit personnel and their qualifications
- provisions for reasonable and timely access of audit personnel to facilities, documents, and qualified personnel necessary for performing audits
- use of established procedures and checklists
- methods for reporting audit findings to responsible management of both the audited and auditing organizations
- provisions for the audit team to gain access to levels of management that have responsibility and authority for corrective action
- methods for verifying that effective corrective action has been accomplished on a timely basis
- The QA program user also should establish and maintain a list to reflect the current status of the activities important to safety that are to be audited and the frequency at which each quality criterion is to be audited. The frequency of audits should be based on each activity's importance to safety; however, each quality criterion should be audited at least once each year.
- The QA program user also should establish measures to ensure that packaging manufacturers are audited to assess the extent of their compliance with purchase orders and to verify that their work is controlled under an NRC-approved QA program. In addition, the QA program user also should identify (by function or position) the individuals or groups that have the responsibility and authority to ensure that corrective actions resulting from audit findings are accomplished on a timely basis. The QA program user should re-audit deficient areas on a timely basis to verify implementation of corrective actions.

## 18.2 Scheduling of Audits

- The QA program user should establish schedules for internal audits, external audits, and audits performed by management. These schedules should ensure that key activities of the QA program (e.g., design, fabrication) receive priority consideration.
- For audits performed by management, the schedules should identify the level of management (usually from the corporate office or another division) designated to assess the overall effectiveness of the implementation of the described in-house QA program. The QA program user should also identify the activities important to safety (e.g., procurement, training of personnel) that should be included in the audit program. Management audits should be conducted at least once every 12 months.
- For internal audits, the schedules should ensure that applicable elements of the QA program are audited annually or at least once within the life of the activity, whichever is shorter.

- For external audits, the schedules should ensure that all elements of a major supplier's (or major contractor's) QA program are audited on a triennial basis. The 3-year period should begin with performance of an audit when sufficient work is in progress to demonstrate implementation of a QA program that has the required scope for purchases placed during the 3-year period.

### 18.3 Team Selection

- The QA program user should establish the qualifications of the lead auditor and audit team members and specify their respective responsibilities for evaluating and issuing audit reports. The auditing organizations should be responsible for establishing qualifications for prospective audit personnel and the requirements for the use of technical specialists to accomplish auditing activities that are important to safety. The QA program user should select the lead auditor and audit team members from personnel who do not have direct responsibility in the areas being audited.
- Specific guidance for determining qualifications for the lead auditor and individual audit team members may be obtained from ANSI/ASME NQA-1-2008 with the NQA-1a-2009 Addenda, "Quality Assurance Requirements for Nuclear Facility Applications (QA)" (Ref. 2).

### 18.4 Pre-Audit Conference

Before an audit, the QA program user should specify the nature and scope of the pre-audit conference between management of the organizations being audited and the team conducting the audit. The purpose of the pre-audit conference should be to (1) meet counterparts, (2) confirm the audit scope and dates, (3) establish channels of communication, (4) discuss the sequence and duration of the audit, (5) prepare an agreed-upon agenda for the audit, and (6) set the time for the post-audit conference.

### 18.5 Post-Audit Conference

The QA program user should establish measures to conduct a post-audit conference between management of the organizations being audited and the team conducting the audit to present the results and clarify any questions that may arise.

### 18.6 Reporting and Response

The QA program user should establish measures to identify time constraints imposed for issuing audit reports and the requested date for a corrective action response by the audited organization. The response should clearly state the corrective action taken to prevent recurrence of nonconformances. If corrective action cannot be taken immediately, the response of the audited organization should include scheduled dates for initiation and completion of the corrective action.

### 18.7 Followup Action

The audit team leader should verify that (1) the audited organization provides a timely response to the audit report, (2) the response is adequate, and (3) the corrective action has been accomplished within the prescribed schedule.

## **D. IMPLEMENTATION**

The purpose of this section is to provide information to licensees, certificate holders and applicants regarding the NRC's plans for using this regulatory guide.

Methods or solutions that differ from those described in this regulatory guide may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations. Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged. Backfit and issue finality considerations do not apply to licensees and applicants under 10 CFR Part 71.

## REFERENCES<sup>1</sup>

1. *U.S. Code of Federal Regulations (CFR)*, “Packaging and Transportation of Radioactive Material,” Part 71, Title 10, “Energy.”
2. American National Standard Institute/American Society of Mechanical Engineers (ANSI/ASME) NQA-1- 2008 with the NQA-1a-2009 Addenda, “Quality Assurance Requirements for Nuclear Facility Applications,” ASME, New York, NY, 2008.<sup>2</sup>
3. NRC, Regulatory Guide (RG) 7.6, “Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels,” Washington, DC.
4. NRC, Regulatory Guide (RG) 7.7, “Administrative Guide for Verifying Compliance With Packaging Requirements for Shipping and Receiving of Radioactive Material,” Washington, DC.
5. NRC, Regulatory Guide (RG) 7.9, “Standard Format and Content of Part 71 Applications for Approval of Packages for Radioactive Material,” Washington, DC.
6. International Atomic Energy Agency (IAEA), “Regulations for the Safe Transport of Radioactive Material,” (TS-R-1), Vienna, Austria, 2009.<sup>3</sup>
7. U.S. Nuclear Regulatory Commission, “Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety,” NRC NUREG/CR-6407, Washington, DC, February 1996.
8. International Organization for Standardization (ISO) 9000, “Quality Management Systems,” Geneva, Switzerland, 2000.<sup>4</sup>
9. IAEA, “The Management System for Facilities and Activities,” Vienna, Austria, 2006.
10. IAEA, “Application of the Management System for Facilities and Activities,” IAEA Safety Standards Series No. GS-G-3.1, Vienna, Austria, 2006.

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<sup>1</sup> Publicly available documents from the U.S. Nuclear Regulatory Commission (NRC) are available electronically through the NRC Library on the NRC’s public Web site at <http://www.nrc.gov/reading-rm/doc-collections/>. The documents can also be viewed on-line for free or printed for a fee in the NRC’s Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone (301) 415-4737 or (800) 397-4209; fax (301) 415 3548; and e-mail [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov).

<sup>2</sup> Copies of American Society of Mechanical Engineers (ASME) standards may be purchased from ASME, Two Park Avenue, New York, New York 10016-5990; Telephone (800) 843-2763. Purchase information is available through the ASME Web site store at <http://www.asme.org/Codes/Publications/>.

<sup>3</sup> Copies of International Atomic Energy Agency (IAEA) documents may be obtained through their Web site [WWW.IAEA.Org/](http://WWW.IAEA.Org/) or by writing the International Atomic Energy Agency P.O. Box 100 Wagramer Strasse 5, A-1400 Vienna, Austria. Telephone (+431) 2600-0, Fax (+431) 2600-7, or E-Mail at [Official.Mail@IAEA.org](mailto:Official.Mail@IAEA.org)

<sup>4</sup> Copies of International Organization for Standardization (ISO) documents may be obtained by writing to the International Organization for Standardization, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, Telephone: +41 22 749 01 11, Fax: +41 22 749 09 47, by E-mail at [sales@iso.org](mailto:sales@iso.org), or on-line at the ISO Store Web site: <http://www.iso.org/iso/store.htm>.

- 11 NRC, Generic Letter 88-18, "Plant Record Storage on Optical Disks," Washington, DC, October 20, 1988. (ADAMS accession number: 8810250164)
- 12 NRC, Regulatory Issue Summary (RIS) 00-18, "Guidance on Managing Quality Assurance Records in Electronic Media," Washington, DC, October 23, 2000. (ADAMS accession number: ML003739359)
- 13 NRC, Information Notice (IN) 86-21, "Recognition of American Society of Mechanical Engineers Accreditation Program for N Stamp Holders," Washington, DC, March 31, 1986. (ADAMS accession number: 031220635)
- 14 NRC, IN 86-21 supplement 2, "Recognition of American Society of Mechanical Engineers Accreditation Program for N Stamp Holders," Washington, DC, April 16, 1991. (ADAMS accession number: 031220630).

## APPENDIX A

### A GRADED APPROACH TO DEVELOPING QUALITY ASSURANCE PROGRAMS FOR PACKAGING RADIOACTIVE MATERIAL

The design effort and requirements for a QA program are interrelated and should be developed simultaneously. Addressing them as independent functions may result in an overly stringent QA program (i.e., one that imposes unnecessary QA activities to verify attainment of design objectives) or an inadequate QA program (i.e., one that imposes too few QA activities to verify attainment of design objectives). To develop a QA program in which the application of QA requirements is commensurate with their safety significance, it is essential that engineering personnel perform a systematic analysis of each component, structure, and system of packages to assess the consequences to the health and safety of the public and the environment that would result from malfunction or failure of such items. This engineering assessment and development of the QA program should be initiated as early in the design process as practicable and should be in accordance with approved procedures. Establishment of an engineering basis for the formulation of a QA program early in the design process enables a uniform, consistent application of QA requirements during the fabrication, use, and maintenance of packaging.

A logical sequence leading to the identification of realistic QA requirements would involve (1) classifying each structure, system, and component as important to safety or not important to safety (“Q” or “non Q”); (2) grouping items classified as important to safety into quality categories; and (3) specifying the applicable level of QA effort for each category. To ensure a better understanding of the process, the remaining sections of this appendix provide additional detail concerning each of these three steps.

#### 1. Classifying Structures, Systems, and Components

To begin the process of identifying realistic QA requirements, the QA program user should first analyze all structures, systems, and components that appear on the latest packaging parts list to determine whether their functions or physical characteristics are important to safety. Items identified as essential to safety (often referred to as “Q” items) should then be subjected to a QA program based on the requirements of Subpart H of 10 CFR Part 71.

#### 2. Grouping Items into Quality Categories

After classifying the structures, systems, and components that appear on the latest packaging parts list, the QA program user should establish quality categories based on the relative safety significance of each “Q” item and, where appropriate, their subcomponent parts. In doing so, the QA program user could identify the categories as “A” for items that are critical to safe operation, “B” for items that have a major impact on safety, and “C” for items that have only a minor impact on safety. For example, Category A items could include structures, systems, and components for which a failure or malfunction could directly result in a condition that would adversely affect public health and safety. This would include such conditions as loss of primary containment with subsequent release of radioactive material, loss of shielding, or an unsafe geometry compromising criticality control. Category B items could include structures, systems, and components for which a failure or malfunction could indirectly result in a condition that would adversely affect public health and safety. However, an unsafe condition could result only if the primary event occurs in conjunction with a secondary event or other failure or environmental occurrence. Finally, Category C items could include the structures, systems, and components for which a failure or malfunction would not significantly reduce packaging effectiveness and would be unlikely to



create a condition that would adversely affect public health and safety such as the dunnage, packaging hardware, protective cover, security lockwire and seals, and skids or forklift channels for low specific activity and Type A (fissile) shipments as well as all of the previously mentioned items and vent and drain port plug and pressure relief device outer seals, vent, drain and leak check port plug cover plates for Type B shipments.

### **3. Specifying the Applicable Level of QA Effort**

The last step in the process of identifying realistic QA requirements would be to assign an appropriate degree of QA effort to each quality category. For example, QA requirements for Category A items would include the following specifications:

- The design should be based on the most stringent industrial codes or standards, and design verification would be accomplished by prototype testing or formal design review.
- The procurement documentation for materials or services should specify that the QA program user should use only suppliers from qualified vendor lists.
- The suppliers and subtier suppliers should have QA programs based on the applicable criteria in Subpart H to 10 CFR Part 71.
- The manufacturing planning should specify complete traceability of raw materials and the use of certified welders and processes.
- The verification planning (test and inspection) should require use of qualified inspectors (i.e., personnel performing nondestructive examinations such as radiography and ultrasonic testing would be qualified in accordance with recommended practices described in such documents as ASNT-TC-1A<sup>1</sup> and Section IX of the ASME Boiler and Pressure Vessel Code or other industrial standards).
- Only qualified auditors and lead auditors should perform audits.
- A representative of the buyer would be present at a supplier's facility to approve the final acceptance test and to authorize shipment.

#### **Category B quality requirements should include the following specifications:**

- The design should be based on the most stringent industrial codes and standards, but design verification could be achieved through use of calculations or computer codes.
- Materials need not be procured from a qualified vendor list.
- Manufacturing planning need not require traceability of materials, and only specified welds would be done by qualified welders.
- Verification activities would still require use of inspectors qualified to appropriate codes, standards, or other industrial specifications.

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<sup>1</sup>

ASNT-SNT-TC-1A, "Recommended Practice for Personnel Qualification and Certification for Nondestructive Testing," American Society for Nondestructive Testing (ASNT), Columbus, Ohio, 2001.

- Only the lead auditor need meet certain qualification requirements.

With respect to Category C items, the only enforced quality requirements include the following specifications:

- Items should be purchased from a catalog or “off the shelf.”
- When the item is received, the material should be identified and checked for damage.