1 GENERAL INFORMATION EVALUATION

1.1 Review Objective

The objective of this U.S. Nuclear Regulatory Commission's (NRC's) general information evaluation is to verify that the applicant has provided an adequate description of the package to familiarize reviewers with the pertinent features of package. The NRC reviewer will verify that the application (i) includes an overview of relevant package information, including its intended use; (ii) provides a summary description of the packaging, operational features, and contents; and (iii) provides engineering drawings that are sufficiently detailed and consistent with the package description to provide reasonable assurance that the transportation package can meet the regulations.

1.2 Areas of Review

All NRC reviewers should evaluate the General Description section of the application, regardless of their specific review assignments, to obtain a basic understanding of the package, its components and contents, and the protections afforded for the health and safety of the public. This chapter of the standard review plan (SRP) focuses on familiarizing the reviewer with general package design and contents and ensuring consistency between the package's general description and the remaining sections of the application. Much of the information relevant to this initial aspect of the package review is presented in more detail in later chapters of this SRP. The NRC staff should review the application for adequacy of the package and its descriptions and drawings.

Proprietary information, such as specific design details shown on the engineering drawings, may be withheld from public disclosure, subject to the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding." The request for withholding must be accompanied by an affidavit and must include information to support the claim that the material is proprietary.

The NRC staff should review the application to verify that it adequately describes the package and includes adequately detailed drawings. In general, the staff should review the following information to determine the adequacy of the package description:

- package design information
    - — purpose of application
    - — proposed use and contents
    - — package type and model number
    - — package category and maximum activity
    - — codes and standards
    - — criticality safety index (CSI)
    - — quality assurance program
- package description
    - — packaging
    - — operational features
    - — contents of packaging

- summary of compliance with 10 CFR Part 71, “Packaging and Transportation of Radioactive Material”
    - — general requirements of 10 FR 71.43, “General Standards for All Packages”
    - — condition of package after tests in 10 CFR 71.71 and 10 CFR 71.73, “Hypothetical Accident Conditions”
    - — structural, thermal, containment, shielding, criticality, materials
    - — operational procedures, acceptance tests, and maintenance
- certification approach for commercial spent nuclear fuel (SNF)
- drawings
- appendix

1.3 Regulatory Requirements and Acceptance Criteria

This section provides a summary of those sections of 10 CFR Part 71 relevant to the review areas addressed in this SRP chapter. Table 1-1 identifies some regulatory requirements associated with the areas of review this chapter covers. These are not necessarily the only regulations that may apply but are meant to guide the reviewer’s initial assessment of whether sufficient information has been provided to conduct the safety evaluation.

The following paragraphs briefly describe the regulatory requirements and acceptance criteria of 10 CFR Part 71 applicable to the general information review. Each requirement includes the applicable section(s) of the regulation.

In addition to the requirements listed in Table 1-1, the following identifies additional specific regulatory requirements and acceptance criteria for assessing the adequacy of the package description and evaluation.

While there are no specific regulatory requirements on the format of the application for package approval, NRC Regulatory Guide (RG) 7.9, “Standard Format and Content of Part 71 Applications for Approval of Packaging for Radioactive Material,” provides recommendations on the format in which the content of the application is presented in order to facilitate the review of the information submitted in the application. The application for package approval should include the following items in sufficient detail such that the performance of the package can be evaluated:

- a description of the packaging design (10 CFR 71.31(a)(1), 10 CFR 71.33, “Package Description”)
- engineering drawings showing the design that can be referenced in the certificate of compliance (10 CFR 71.31, 10 CFR 71.33)
- a brief description of package operations (10 CFR 71.33, 10 CFR 71.35(c), 10 CFR 71.89)
- a description of a feature located outside of the package that, while intact, would provide evidence that unauthorized persons had not opened the package [10 CFR 71.43(b)]

Table 1-1 Relationship of Regulations and Areas of Review for Transportation Packages												
Areas of Review	**71.19**	**71.31**	**71.33**	**71.35**	**71.37**	**71.41**	**71.43**	**71.55**	**71.59**	**71.71**	**71.73**	**71.89**
Package design information	●	(a)(c)	(a)(1), (a)(3)	(b)(c)	●				(c)			
Package description		(a)(1)	●				●			●	●	●
Compliance with 10 CFR Part 71		●	●	●		(a)				●	●	
Certification approach for commercial SNF								(e)(1), (e)(2)				
Drawings		(a)(1)	●									
Note: The bullet (●) indicates the entire regulation as listed in the column heading applies.												

The applicant must describe and evaluate the application for a transportation package in sufficient detail to demonstrate compliance with the requirements specified in 10 CFR Part 71, Subpart E, "Package Approval Standards," under the tests and conditions in Subpart F, "Package, Special Form, and LSA-III Tests." [10 CFR 71.31, "Contents of Application;" 10 CFR 71.33; 10 CFR 71.35, "Package Evaluation;" and 10 CFR 71.41(a) and (b)]. The applicant should include a concise statement in the General Information section of the application that the package complies with the requirements in 10 CFR Part 71. This statement should provide a reference to the sections of the application that are used to specifically address compliance with the requirements of Subparts E and F of 10 CFR Part 71.

1.3.1 Drawings

Applicants should submit drawings that are sufficiently detailed to provide a package description that can be evaluated for compliance with 10 CFR Part 71. The packaging drawings become regulatory conditions for compliance, since the certificate of compliance incorporates them by reference. The applicant should clearly identify proprietary information and submit an affidavit in accordance with 10 CFR 2.390 to withhold such information in the NRC's Agencywide Documents Access and Management System (ADAMS).

The drawing should include the following information, on the drawing, and should be consistent with the description of the package included in the text:

- a title block that identifies the preparing organization
- drawing number
- sheet number
- title
- date
- signature or initials indicating approval of the drawing

The revised drawings should identify, on the drawing, the revision number, date, and incorporate an indicator of the change for each revision.

The drawings should include the following elements:

- general arrangement of the packaging and contents, including dimensions
- design features that affect the package evaluation
- package markings
- maximum allowable weight of the package
- maximum weight of contents and secondary packaging
- minimum weights, if appropriate

Information on design features should include the following details, as appropriate:

- identification of the design feature and its components
- materials of construction, including appropriate material specifications and material specification tolerances (e.g., minimum boron-10 areal density for poison plates, minimum boron and hydrogen content of neutron shields)
- classification of components according to importance to safety
- codes, standards, or similar specification for fabrication, assembly, and testing
- dimensions with appropriate tolerances
- operational specifications (e.g., bolt torque)

RG 7.9 and NUREG/CR-5502, "Engineering Drawings for 10 CFR Part 71 Package Approvals," provide additional guidance on engineering drawings submitted in the application.

1.3.2 Quality Assurance

Applicants should provide either a reference to an approved quality assurance program or provide a description of the quality assurance program in the application (see Chapter 10, "Quality Assurance Evaluation," of this SRP).

1.4 Review Procedures

The purpose of reviewing the General Information section of the application is to determine whether the applicant provided sufficient detail concerning the description of the package to provide an adequate basis for the staff to review it against applicable requirements in 10 CFR Part 71. All the remaining application sections consider the information and results of the General Information section. Figure 1-1 illustrates the information flow between the contents of an application and the review of the General Information section.

The applicant should ensure that the General Information section provides an adequate description of the package to allow the staff to evaluate its design and operation in subsequent sections. Note that the General Information section:

- does not contain the information necessary for a comprehensive technical review of the package

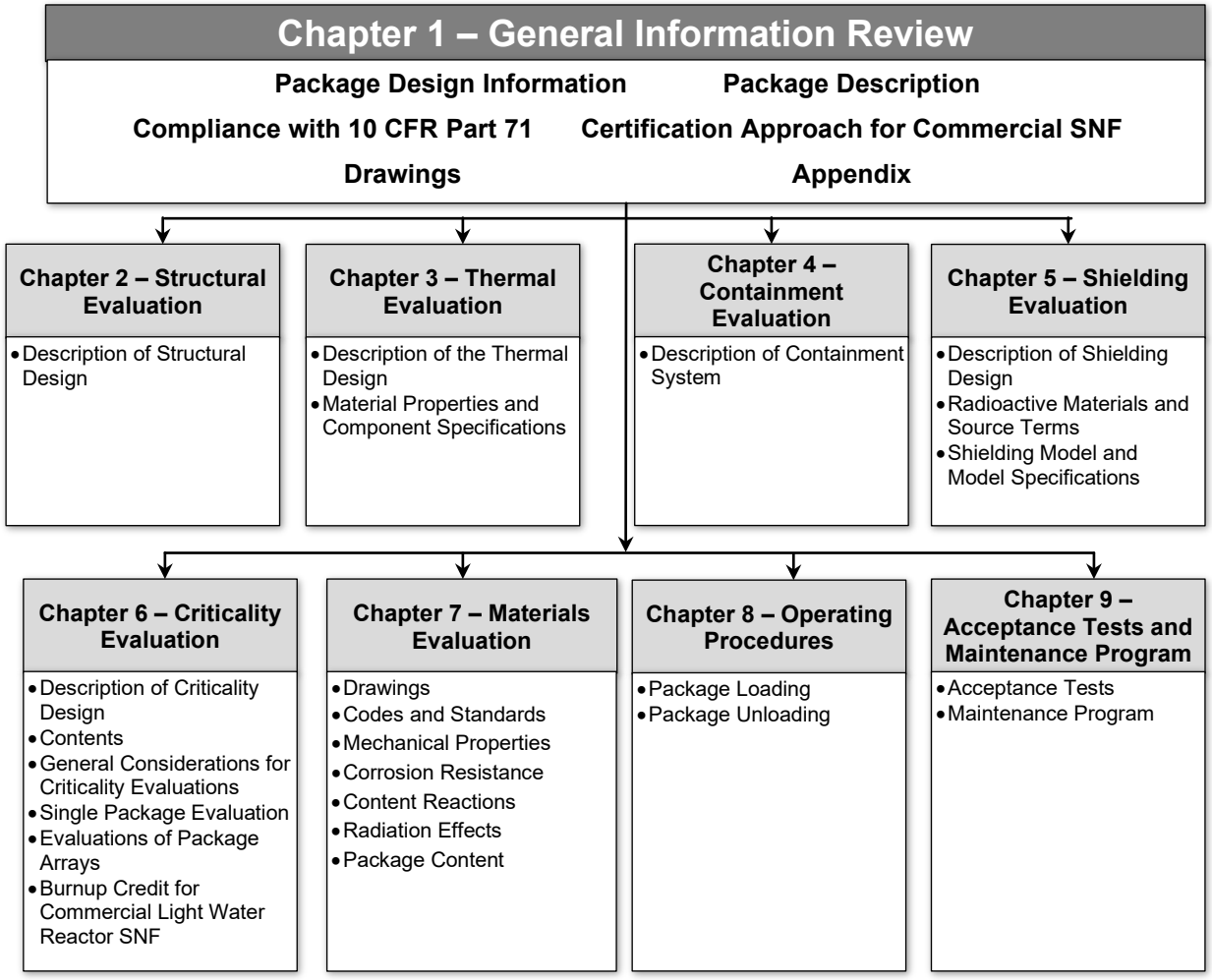

Figure 1-1 Overview of General Information Evaluation

- serves as a vehicle to facilitate consistency and reduce repetition between the various review disciplines (e.g., structural and shielding reviews)

- presents summary information for the nontechnical reviewer

1.4.1 Package Design Information

1.4.1.1 Purpose of application

Verify that the purpose of the application is clearly stated. The application may be for approval of a new design or revised certificate. (Note: in terms of transportation package approvals, the NRC uses the terms “certificate revision” and “amendment” interchangeably.) Ensure that an application for approval of a new design is complete and contains the information identified in 10 CFR Part 71, Subpart D, “Application for Package Approval.” If the application is for modification of an approved design, verify that the changes being requested are clearly identified. Modifications may include design changes, additions/changes in authorized contents, or changes in conditions of the approval. Design changes should be clearly identified and

should be included in revised packaging drawings. Packaging that does not conform to the drawings referenced in the NRC approval is not authorized for use under 10 CFR 71.17, "General License: NRC-Approved Package." Likewise, only package contents specified in the approval may be transported. The NRC will likely include package operating procedures, acceptance tests, and a maintenance program, as a condition of the approval.

Verify that an application for modification to an approved design includes an assessment of the requested changes and an explanation of why these changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71. Applications for modifications may be subject to the provisions of 10 CFR 71.19(c) and 10 CFR 71.31(b), as applicable. When an application for modification of a certificate does not have the "-96" designation in the identification number of the NRC certificate, verify that it meets the provision of 10 CFR 71.19(c). Verify that the application includes an explanation of why the requested change is not significant, with respect to the following:

- design, operating characteristics, or safe performance of the containment system when the package is subjected to the tests specified in 10 CFR 71.71, "Normal Conditions of Transport," and 10 CFR 71.73

- prevention of criticality when the package is subjected to the tests specified in 10 CFR 71.71 and 10 CFR 71.73

1.4.1.2 Proposed use and contents

Verify that the description for the proposed use of the packaging and the contents of the package are sufficient to allow the reviewer to understand exactly how the packaging is to be used and what is to be transported. The proposed contents description, as required by 10 CFR 71.33(b), should be sufficient to determine the package category, as discussed in Section 1.4.1.4, below.

1.4.1.3 Package type and model number

Confirm that the application clearly designates the type and model number of the package, as required by 10 CFR 71.33(a)(1). A new Type B transportation package will be designated either B(U)-96 or B(U)F-96, depending on whether the package contains fissile material. If the package has a maximum normal operating pressure greater than 700 kilopascals [100 pounds per square inch] or a pressure-relief device that would allow the release of radioactive material under the tests specified in 10 CFR 71.73 (i.e., hypothetical accident conditions), in those cases, the package will be designated B(M)-96 or B(M)F-96. A new Type A fissile package will be designated AF-96.

Verify that a model number is designated for the package, as required by 10 CFR 71.33(a)(3), and that it is specified on the appropriate drawings.

1.4.1.4 Package category and maximum activity

For Type B packages, verify that the application properly justifies the designated package category. Definitions of package categories are provided in RG 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)." Detailed justification, including calculation of an effective

A_1 or A_2 from the maximum activity of the contents, might be presented in the appendix or in another section of the application (e.g., Containment).

With respect to the following SRP review procedures, SNF transportation packages are assumed to be Category I. Verify that SNF packages are designated Category I and that the maximum activity of these package contents is specified.

1.4.1.5 Codes and standards

Verify that any proposed codes and standards, as required by 10 CFR 71.33(c), are appropriate for the intended purpose and are properly applied. Ensure that the application identifies established codes and standards or justifies the basis used for the package design and fabrication.

NUREG/CR-3854, "Fabrication Criteria for Shipping Containers," identifies codes and standards that may be used for fabricating components of SNF transportation packaging based on the container contents.

1.4.1.6 Criticality safety index

For a package containing fissile material, verify that the applicant, as required by 10 CFR 71.59(b), has assigned a CSI to the package for each of the package contents and has provided a reference to the relevant section of the application.

1.4.1.7 Quality assurance program

Verify that the applicant, as required by 10 CFR 71.31(a)(3), has provided a description of its quality assurance program or identifies by reference a quality assurance program that has been previously approved under the requirements of 10 CFR 71.17, 10 CFR 71.37, and 10 CFR Part 71, Subpart H.

1.4.2 Package Description

1.4.2.1 Packaging

Review the text description of the packaging, as required by 10 CFR 71.33(a), and verify that the following information, as applicable, is discussed. Sketches, figures, or other schematic diagrams should be used, as appropriate, and include the following:

- general packaging arrangement
- dimensions, including tolerances, and materials of construction
- maximum weight and, if appropriate, the minimum weight
- neutron- and gamma-shielding dimensions and tolerances and material specifications
- personnel barriers, if used

- structural features, such as lifting and tie-down devices, impact limiters or other energy-absorbing features, internal supporting or positioning features, outer shell or outer packaging, and packaging closure devices

- heat transfer features, including fins

- criticality control features, including neutron poisons, moderators, spacers, and items used for geometric confinement

- baskets or other configurations for fuel assemblies or rods, such as damaged fuel cans for geometry control

- containment vessel, which may include welds, drain or fill ports, valves, seals, test ports, pressure-relief devices, lids, cover plates, and other closure devices

- The containment reviewer should, in conjunction with Chapter 4, "Containment Evaluation," of this SRP, ensure that the containment boundary is clearly shown on the drawings. If multiple seals are used for a single closure, verify that the seal defined as the containment system seal is clearly identified

If criticality safety relies on certain components for spacing or confinement of the fissile material to a known geometry, verify that these are defined in packaging drawings, as well as included in the structural evaluation, to ensure performance under normal conditions of transport and hypothetical accident conditions.

1.4.2.2 Operational features

Verify that the application includes the following information as it relates to operational features:

- a discussion on all operational features and functions

- a schematic diagram showing all valves, connections, piping, openings, seals, and containment boundaries

- if needed, detailed operational schematics in accordance with the operations described in the Operating Procedures section of the application

However, details may be referenced in the General Information section of the application if provided in a later application section or appendix. In this case, simplified operational schematics should be an acceptable alternative. In the General Information section of the application, verify that loading configurations for all contents are provided and annotated in a manner consistent with the Structural Evaluation, Containment Evaluation, Thermal Evaluation, Shielding Evaluation, Criticality Evaluation, Materials Evaluation, and Operating Procedures sections of the application. Confirm that a reference is provided to any other section of the application where evaluations of the operability and safety of the operational features are found.

Ensure that the application identifies any codes and standards proposed for controlling the operation of the package and provides a reference to the relevant section of the application that discusses the proposed codes and standards.

1.4.2.3 Contents of packaging

Verify that the package application clearly identifies the contents, as required by 10 CFR 71.33(b), to be authorized for transport and is consistent with the description of the contents in other sections. Ensure that the contents are described at the same level of detail as that intended for the certificate of compliance and in a manner consistent with the package evaluations. The specificity of the contents description may be different for different package types and the safety significance of the contents but should be sufficient to provide a basis for evaluating the package. Review the description of the contents and verify that, at a minimum, the application includes the following information, consistent with the type of package:

- identification and maximum quantity of all radioactive material, including radionuclides, their quantities, and, as needed, mass
- chemical and physical form (e.g., liquid, powder), including density and moisture content, and the presence of other moderating constituents. For Type B quantities of radioactive material in normal form, verify that the applicant specified the chemical and physical form of the material
- identification of whether the contents are special form or normal form
- location and configuration of contents within the packaging, including secondary containers, wrapping, shoring, and other material not defined as part of the packaging
- any material subject to chemical, galvanic, or other reaction, including the generation of combustible gases
- maximum weight and, if appropriate, minimum weight
- maximum decay heat
- for fissile material packages, verify that the application includes the following:
- identification and maximum quantity of fissile material, including the fissile nuclides present and the concentrations, or enrichments, and masses of each
- for packages with fuel assemblies:
    - fuel assembly specifications, including dimensional data for the fuel rods and assembly structure, number of fuel rods per assembly
    - maximum quantity of unirradiated fuel
    - maximum uranium-235 mass per assembly or per rod, as appropriate
    - number of fuel assemblies or rods per package
    - presence of any annular pellets

— maximum initial enrichment, including a description of nonuniform enrichment (e.g., rod-variable enrichments, axial natural or low-enrichment blankets), if applicable

- information on spacers or other features used for geometry control or confinement of fissile material. If these features are needed to demonstrate criticality safety, then ensure they are included in the description of the authorized contents

- identification and quantity of nonfissile materials used as, or that can act as, neutron absorbers (i.e., poison rods) or moderators. Moderators can include polymer fingers (items inserted into fresh fuel assemblies in places to minimize or prevent rod clad fretting from vibration), moisture in powder, plastic inserts or wraps, and foams.

Note that wrapping fresh fuel assemblies with plastic is permitted if the top and bottom are free to allow flow of water sufficient to prevent preferential flooding of the fuel region. If the top and bottom of the fuel assemblies are enclosed, the criticality evaluation should consider preferential flooding.

- In general, if credit is taken for certain parameters (e.g., confinement features, uranium enrichment, chemical form), verify that those parameters are specified in the description of the authorized contents.

- In addition to the above, for SNF packages, verify that the application includes the following:

- the type of SNF and maximum and, as appropriate, minimum initial enrichment; maximum initial uranium-235 mass (for mixed oxide fuel assemblies, plutonium mass, and nuclides)

- maximum burnup, specific power, and minimum cooling time

- control assemblies or other contents (e.g., startup sources) that may be present

- maximum quantities of radionuclides estimated to be available for immediate release within the void space of the fuel rods

- maximum quantity of unirradiated fuel or replacement rods, if any

- a statement of whether SNF with known or suspected cladding defects greater than a hairline crack or a pinhole leak will be placed in a damaged fuel can. Canning of damaged fuel is intended to facilitate handling and to confine gross fuel particles to a known subcritical volume under normal conditions of transport and hypothetical accident conditions

- any unique or unusual conditions (e.g., failed fuel and nonuniform enrichment) or damaged fuel, the maximum quantity of damaged fuel, initial enrichment, and extent of damage

For SNF, NUREG/CR-6716, “Recommendations on Fuel Parameters for Standard Technical Specifications for Spent Fuel Storage Casks,” includes useful information about the fuel parameters that are important for criticality safety and radiation shielding in a transport package.

Parameters that are normally controlled for criticality safety include fuel type, lattice size, enrichment, fuel rod pitch, fuel pellet diameter, cladding thickness, and active fuel length. Parameters that are normally controlled for radiation shielding include some of those controlled for criticality safety as well as burnup, cooling time, uranium mass (or uranium and plutonium mass for mixed-oxide fuel) and nonfuel hardware (e.g., control components). It is not necessary to limit all parameters if the analysis has shown that they are not important for the package evaluation. For example, if the applicant evaluates the criticality safety of the fuel without taking credit for the clad material being present, the minimum clad thickness may not need to be specified.

1.4.3 Summary of Compliance with 10 CFR Part 71

Refer to the specific section of the application to ensure compliance with regulations.

1.4.3.1 General requirements of 10 CFR 71.43

Verify that the package incorporates a tamper-proof seal and the application includes a summary statement indicating compliance with the general standards for all packages. Verify that references to the relevant sections of the application are provided.

1.4.3.2 Condition of package after tests in 10 CFR 71.71 and 10 CFR 71.73

Verify that the application provides summary descriptions for the physical condition of the package subsequent to the tests specified in 10 CFR 71.71 and 10 CFR 71.73. Verify that references to all relevant sections of the application are provided.

1.4.3.3 Structural, Thermal, Containment, Shielding, Criticality, Materials

Verify that the application provides summary statements attesting to the adequacy of the package design to meet the structural, thermal, containment, shielding, criticality, and materials requirements of 10 CFR Part 71.

1.4.3.4 Operational procedures, acceptance tests, and maintenance

Verify that the application provides a summary statement attesting to the adequacy of the development of the operational procedures, acceptance tests, and maintenance program to ensure compliance with the requirements of 10 CFR Part 71.

1.4.4 Certification Approach for Commercial Spent Nuclear Fuel

The provisions of 10 CFR 71.55(e) require that a fissile material package be subcritical under hypothetical accident conditions, assuming, among other things, that the fissile material is in the most reactive credible configuration, consistent with the damaged condition of the package and the chemical and physical form of the contents and water moderation occurs to the most reactive credible extent consistent with the damaged condition of the package and the chemical and physical form of the contents. The guidance in this section applies only to commercial SNF packages, and only to the SNF contents categorized as intact or undamaged fuel,[1] for hypothetical accident conditions. The guidance in this section does not change the review

[1] Note that the International Atomic Energy Agency's Safety Series No. 6, "Regulations for the Safe Transport of Radioactive Material," includes similar, but not identical, requirements for fissile material packages.

practices described elsewhere in this SRP, with respect to damaged SNF or fissile materials other than commercial SNF. The guidance in this section also does not apply to evaluations for compliance with 10 CFR 71.55(b) and so does not change the guidance related to meeting that requirement described elsewhere in this SRP.

Because of the effects of irradiation, the cladding of SNF, and particularly high burnup SNF (i.e., fuel with a burnup greater than 45,000 megawatt-days per metric ton of uranium), may become brittle. If excessively brittle, the cladding could fracture under impact loads currently associated with hypothetical, accident free drop-test conditions; that is, the SNF may not retain its geometric configuration, an important part of ensuring subcriticality. Consequently, the applicant's criticality safety evaluation would need to demonstrate that the package is subcritical for reconfigured SNF assemblies in order to comply with the requirements in 10 CFR 71.55(e)(1) and (2). SNF with nonbrittle cladding that is undamaged has been shown to maintain its geometric configuration under current impact loads associated with hypothetical accident conditions. Therefore, the evaluation of undamaged SNF with nonbrittle cladding can credit the SNF with maintaining its geometric configuration and subcriticality should be demonstrated consistent with the approach described in the other sections and chapters of this SRP. Additional information on cladding mechanical properties is found in Chapter 7, "Materials Evaluation," of this SRP.

The applicant may demonstrate that the package remains subcritical by showing that (i) reconfigured fuel is subcritical even with water inleakage or (ii) the package excludes water under hypothetical accident conditions. Table 1-2 lists the characteristics and objectives of each of these approaches.

Coordinate with the structural, materials, and criticality reviewers to ensure the applicant includes the necessary analyses for and that the analyses adequately support the applicant's selected approach.

1.4.5 Drawings

Examine the engineering drawings. Verify that the information shown on the drawings is consistent with that discussed in the text. Confirm that the criteria provided in Section 1.4 of this SRP have been met.

For each package type described in Appendix A, "Description, Safety Features, and Areas of Review for Different Types of Radioactive Material Transportation Packages," to this SRP, general guidance is provided on the safety functions of the package. Safety features are described, and specific areas of technical review are identified in the text of Appendix A. Technical review should focus on these features. Drawings should clearly identify, with sufficient specificity, components and features that provide a safety function. The degree of specificity should be commensurate with its safety function and the sensitivity of package performance with the particular feature.

In general, the engineering drawings define the design that is authorized for shipment of radioactive material. The packagings used for shipment must conform in all ways to the engineering drawings that are referenced in the certificate of compliance. It is important, therefore, to verify that the drawings capture the safety features that are needed to ensure package performance under normal conditions of transport and hypothetical accident conditions.

Table 1-2 Summary of Approaches for Demonstrating Subcriticality of SNF Under the Requirements of 10 CFR 71.55(e)		
(1) EVALUATIONS BASED ON RECONFIGURED FUEL		
Approach	**Characteristics**	**Objective**
Criticality Assessment of Bounding or Credible Reconfigured Fuel Geometries Assuming Water Inleakage	1. Postulate bounding fuel configurations for criticality. 2. Evaluate criticality and credibility of bounding configurations based on basic structural and material behavior. 3. Reduce reliance on material properties of high-burnup fuel cladding and failure criteria. 4. Perform criticality analyses of reconfigured fuel for bounding configurations.	With water inleakage, demonstrate subcriticality of defined set of credible or bounding fuel configurations based on criticality.
Criticality Assessment of Reconfigured Fuel Geometries Based on Actual Structural and Material Behavior Assuming Water Inleakage	1. Use material properties of high-burnup fuel cladding and failure criteria. 2. Perform nonlinear finite element analysis of fuel assemblies and fuel rods under drop impact conditions. 3. Address failure modes and fuel rod failure distributions (probabilistic approach to the distribution of material properties among fuel rods). 4. Develop credible fuel reconfiguration geometries. 5. Perform criticality analyses of reconfigured fuel from structural analysis results.	With water inleakage, demonstrate subcriticality of credible fuel configurations based on actual structural and material behavior. This requires extensive data for irradiated hydride cladding material properties for high-burnup fuels. These data are currently not available. Therefore, the staff's view is that this approach is currently not practical.
(2) EVALUATIONS BASED ON MODERATOR EXCLUSION		
Approach	**Characteristics**	**Objective**
Criticality Assessment of Reconfigured Fuel Assuming Moderator Exclusion	1. Demonstrate water-tight barrier under hypothetical accident conditions. 2. Perform drop test of package (i) OR inner canister (ii) as described below.	
(i) For Welded Canister-Based Systems: Canister Drop Test as Part of Impact Limiter Testing	1. Include scale model of canister and contents in transport package impact limiter 30-foot drop tests. 2. Perform relative leak-rate testing by testing before and after each drop. 3. Demonstrate leakage rate acceptable to prevent water inleakage.	Conduct physical test of scaled canister to provide added assurance of moderator exclusion under accident conditions.
(ii) For Canister-Based Systems and Direct-Loaded Packages: Bolt Closure System Test as Part of Impact Limiter Testing	1. Include transport package bolt closure system in scale model of package in 30-foot drop tests of the impact limiter. 2. Perform relative leak rate testing by testing before and after each drop. 3. Demonstrate leakage rate acceptable to prevent water inleakage.	Conduct physical test of scaled bolt closure system to provide added assurance of moderator exclusion under accident conditions.

Ensure that reasonable tolerances for dimensions and weights are specified because packaging features may be subject to some variability in fabrication. Not only does this assure the safety performance of each packaging, it also provides flexibility for reasonable variation in the fabrication of the packagings. Furthermore, it is important for demonstrating compliance and facilitating inspection activities. For example, when tolerances are not specified, any slight deviation in dimensions could cause the package to be out of compliance, even though the deviation may not affect safety. Thus, drawings that are well-prepared and include appropriate tolerances facilitate the inspection process.

Engineering drawings often include features that may not contribute to safety, but are part of the package design. These features may be important for other reasons (e.g., ease of handling radioactive material within a facility, product protection, or cosmetic reasons). It is important that flexibility be allowed for these nonsafety features to eliminate unnecessarily restricting or regulating nonsafety significant design features. However, it is often necessary to show the features to ensure that the package configuration is authorized. For these cases, verify that the drawing includes a general representation or optional configurations. The package descriptions in Appendix A discuss the safety importance of certain package features, which varies between designs. For example, the O-ring seals on Type B packages provide a safety function (containment), whereas for a fresh fuel package, the O-ring seals only provide weather protection for product cleanliness. The safety importance of the sealing system design and specificity of the design information for these two packages would therefore be significantly different. Verify that the drawings for the package show the seal surface and O-ring groove details, including surface finish, groove dimensions within strict tolerances, and O-ring size, type, and material. However, when reviewing a fresh fuel package, the applicant's drawing may note the presence of a gasket, but its use may be considered optional for safety in transport.

Some examples of package features that may be important to safety for some designs, but not for others, include paint and coatings; seals, spacers, and dunnage; supplemental radiation shielding; inner containers; outer packagings; impact limiters; or overpacks. For those package features that are not important to safety in a design, the drawings do not need to show detailed information.

NUREG/CR-5502 contains information useful for the technical review of packaging designs and engineering drawings. NUREG/CR-5502 includes information on the purpose of the drawings submitted with the package application and describes recommended format and technical content for these drawings. In general, engineering drawings should focus on the safety features of the package and the components that are important in the performance of the package and in the package evaluation. NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," also contains useful information about the safety significance of packaging components and features. These documents may be useful for the reviewer in determining whether the information provided is sufficiently detailed.

1.4.6 Appendix

There is no specific review procedures for the appendix. The information in the appendix assists the review of the other sections. The appendix may include a list of references and copies of any applicable references not generally available to the reviewer. The appendix may also provide supporting details on special fabrication procedures, material specifications or qualifications (if needed), and other appropriate supplemental information, as needed.

1.5 Evaluation Findings

The safety evaluation report does not normally include specific findings for the General Information section of the application. However, before proceeding with the review of the other sections of the application, verify, at a minimum, that the following criteria have been met:

F1-1 The application describes the package in sufficient detail to provide an adequate basis for its evaluation.

F1-2 Drawings contain information that provides an adequate basis for evaluation against 10 CFR Part 71 requirements. Each drawing is identified, consistent with the text of the application, and contains keys or annotations to explain and clarify information on the drawing.

F1-3 The application for package approval includes either a description of the quality assurance program or a reference to the applicant's approved quality assurance program.

F1-4 The application for package approval identifies applicable codes and standards for the package design, fabrication, assembly, testing, maintenance, and use.

F1-5 Drawings submitted with the application provide a detailed packaging description that can be evaluated for compliance with 10 CFR Part 71 for each of the technical disciplines.

F1-6 The application specifies any restrictions on the use of the package.

F1-7 The description of the contents meets the requirements in 10 CFR 71.63 (for packages with plutonium contents).

F1-8 Any modifications to a previously approved package do not violate the restrictions in 10 CFR 71.19, "Previously Approved Package."

1.6 References

10 CFR Part 71, “Packaging and Transportation of Radioactive Material.”

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