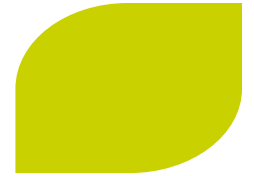


CoC Holder Presentation

Don Shaw
AREVA

August 8, 2016





Topics/Discussion Areas

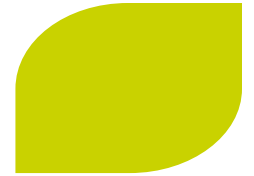
- ▶ **Overarching Thoughts**
- ▶ **Important To Safety Categories A, B, C**
- ▶ **NUREG-1536 Revision 1 Section 13.5**
- ▶ **Current CoC Conditions Seemingly Redundant to Regulations**
- ▶ **PRM 72-7 Format of the CoC (and TS)**
- ▶ **PRM 72-7 Content and Associated Criteria of the CoC (and TS)**
- ▶ **CoC 1004 Latest CoC Conditions and TS – Types of Information**
- ▶ **CoC 1004 Amendment 15 Scope and Schedule**

Overarching Thoughts (1 of 2)



- ▶ Agreement on the ground rules for format and for content must be established before the pilot application can proceed in earnest
- ▶ As the PRM points out 72.236, “Specific requirements for spent fuel storage cask approval and fabrication,” does not provide specific requirements for the CoC format and content
 - ◆ PRM 72-7 proposes a new CoC and TS format and content; at this point does NRC embrace those?
- ▶ NUREG-1536 Revision 1 Chapter 13 TS guidance may be contrary to the PRM in certain areas – is that recognized?

Overarching Thoughts (2 of 2)



- ▶ **The CoC has conditions which seem only to emphasize certain Part 72 requirements, but are basically redundant to those Part 72 paragraphs – are they really needed?**
- ▶ **Although the PRM has several pages for the criteria for CoC/TS content, there still may be gray areas. Are the ITS A, B, C definitions helpful in further defining safety significance, at least in regard to SSCs?**



NUREG/CR-6407

Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety

Category A - Critical to safe operation

Category A items include structures, components, and systems whose failure could directly result in a condition adversely affecting public health and safety. The failure of a single item could cause loss of primary containment leading to release of radioactive material, loss of shielding, or unsafe geometry compromising criticality control.

Category B - Major impact on safety

Category B items include structures, components, and systems whose failure or malfunction could indirectly result in a condition adversely affecting public health and safety. The failure of a Category B item, in conjunction with the failure of an additional item, could result in an unsafe condition.

Category C - Minor impact on safety

Category C items include structures, components, and systems whose failure or malfunction would not significantly reduce the packaging effectiveness and would not be likely to create a situation adversely affecting public health and safety.

Question: Should this be included in the Graded Approach decision process for CoC/TS content?

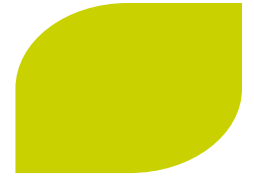


NUREG-1536 Revision 1 Section 13.5 (1 of 4)

“All reviewers should be familiar with the technical specifications of similar cask designs previously approved by the NRC staff. For example, the staff has previously approved cask designs and issued technical specifications regarding a variety of items including, but not limited to, the following examples:

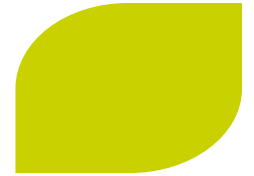
General requirements and conditions regarding site-specific parameters, operating procedures, quality assurance, heavy loads, training, etc.

A preoperational training exercise and demonstration of most cask operations including loading, sealing, and drying (using mockups as appropriate); placement in storage; and return of fuel to the SNF pool.



NUREG-1536 Revision 1 Section 13.5 (2 of 4)

Specifications for the SNF to be stored in the cask, including, but not limited to, the type of SNF (i.e., boiling water reactor [BWR], pressurized water reactor [PWR], or both), the minimum and maximum allowable enrichments of the fuel before irradiation, burnup (i.e., megawatt-days/MTU), the minimum acceptable cooling time of the SNF before storage in the cask, the maximum heat designed to be dissipated, the maximum SNF loading limit, condition of the SNF (i.e., intact assembly or consolidated fuel rods, allowable cladding condition), associated non-fuel hardware, and physical parameters (e.g., length, width, depth, weight, etc.). The reviewer should be aware that additional SNF specifications regarding operational history parameters (e.g., average moderator temperature, average in-core soluble boron concentrations, and operations under control rod banks or with control rod insertion) will need to be included in the technical specifications for cask systems relying on burnup credit.



NUREG-1536 Revision 1 Section 13.5 (3 of 4)

Criticality controls such as cask water boron concentrations, minimum flux trap/fuel cell pitch, use of fuel spacers, minimum neutron absorber loading, and neutron absorber tests.

The inerting atmosphere requirements during vacuum drying and helium backfill parameters.

Cask handling restrictions such as lift height limits and ambient temperature (high/low) conditions.

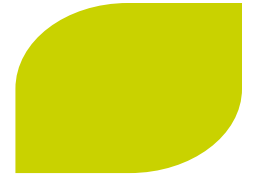
Confinement barrier requirements such as helium leak rate limits.

Thermal performance parameters such as maximum temperatures or delta-temperatures.

Radiological controls such as radiation dose rates and contamination limits.

Cask array and/or spacing limits for thermal performance and radiological considerations.

Definition of damaged fuel.



NUREG-1536 Revision 1 Section 13.5 (4 of 4)

Code of record and alternatives to specific Code requirements.

Specification/requirements for alternative materials for ITS components.

Manufacture and testing of neutron poison material(s) for criticality control.

Hydrogen monitoring/mitigation during wet loading/unloading.

Maintaining inert atmosphere during canister draining/flooding to prevent Oxidation.

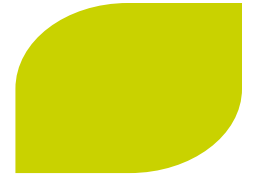
Use of copper bearing or weathering steel for structural steel components at coastal marine ISFSI sites (or other corrosion mitigation measures).

Operational controls to maintain cladding temperature limits.

Low Temperature Ductility of Ferritic Steels.”

Question: Should this list be dispositioned by key stakeholders early in the Graded Approach process as “CoC” or “TS” or “FSAR” or “Not Needed”?

Current CoC Conditions Seemingly Redundant to Regulations



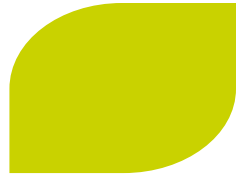
CoC 1004 Amendment 14 (in NRC review) Certificate Conditions 1, 2 4, and 6

1. Casks authorized by this certificate are hereby approved for use by holders of 10 CFR Part 50 or Part 52 licenses for nuclear power reactors at reactor sites under the general license issued pursuant to 10 CFR 72.210 subject to the conditions specified by 10 CFR 72.212 and the attached technical specifications.
2. The holder of this certificate who desires to change the certificate or technical specifications shall submit an application for amendment of the certificate or technical specifications.
4. Notification of fabrication schedules shall be made in accordance with the requirements of 10 CFR 72.232(d).

6. QUALITY ASSURANCE

Activities in the areas of design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems and components, and decommissioning shall be conducted in accordance with a quality assurance program that satisfies the applicable requirements of 10 CFR Part 72, Subpart G, and that is established, maintained, and executed with regard to the cask system.

Format of the CoC (and TS), per PRM 72-7



(1) CoC Section A: Certified Design (implementation by CoC holder)

Subsection 1: Technology

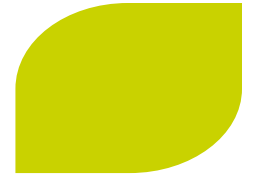
Subsection 2: Design Features

(2) CoC Section B: Inspections, Tests, and Evaluations, and acceptance criteria

Subsection 1: (implementation by CoC holder)

Subsection 2: (implementation by licensee)

Note: very different from NUREG-1745, “Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance”



Format of the CoC (and TS), per PRM 72-7

(3) CoC Section C: Technical Specifications (implementation by licensee)

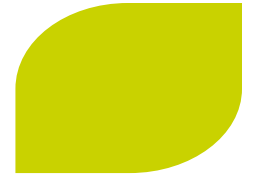
Subsection 1: Use and Application

Subsection 2: Approved Contents

Subsection 3: Limiting Conditions for Operation and Surveillance Requirements

Subsection 4: Administrative Controls

Note: same as NUREG-1745 but NUREG-1745 has “4.0 Design Features” and “5.0 Administrative Controls”

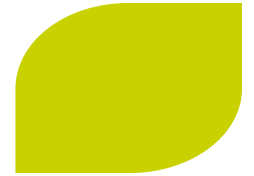


Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (1 of 9)

General comments from the PRM:

Consistent, where applicable, with the requirements in 10 CFR 72.44 (content for site-specific ISFSI technical specification)

The use of the terms related to "safety" in the selection criteria is important. These terms are intended to encompass only those requirements that, if complied with correctly, will ensure that public health and safety is protected, e.g., by preventing a criticality event or significant radiological release to the public.



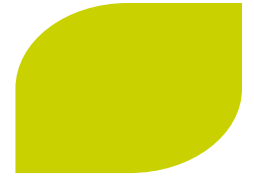
Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (2 of 9)

General comments from the PRM:

There are two overarching themes that distinguish spent fuel cask operation from power reactor operation. These themes were considered in developing the cask CoC selection criteria to ensure both NRC's and industry's resources are appropriately focused on safety significant issues.

The much lower relative risk to public health and safety of spent fuel cask operation compared to operating a reactor

The passive design of spent fuel storage casks. Active cooling for storage casks is prohibited by regulation, 10 CFR 72.236(f). Thus, no active failure modes need to be considered in ensuring the cask can perform its safety functions

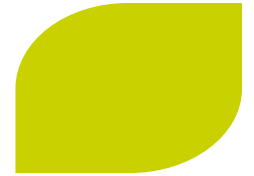


Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (3 of 9)

Certified Design Criteria

Information in the Certified Design section of the CoC must meet one or more of the following criteria:

1. A concise description of the type of technology (e.g., bare fuel cask or canister, above ground or below grade, etc.); the licensed components (e.g., canister, storage cask or module, transfer cask, etc.); and the fundamental manner in which the cask system operates (e.g., vertical or horizontal orientation, ventilated or unventilated, etc.)
2. Cask design features critical to performing cask safety functions (e.g., fuel cell pitch, number of fuel assemblies, neutron absorber B-10 areal density, canister decay heat, inert environment)



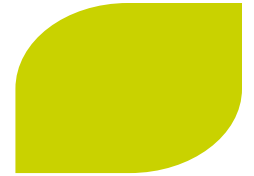
Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (4 of 9)

Inspection, *Tests, and Evaluations (ITE)*

Information in the Inspection, Tests, and Evaluations section of the CoC must meet one or more of the following criteria:

1. Inspections and tests that are critical to ensuring the cask is capable of performing the safety functions and, are required to confirm that a cask has been fabricated in compliance with the certified cask design features critical to performing safety functions (*Certified Design Criteria 2* above).
2. Site-specific evaluations that are critical to ensuring the cask safety functions will be performed for the specific site conditions.

Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (5 of 9)



ITE (continued)

The scope of the inspections and tests is limited to those that take place during component fabrication or during final sealing operations at the power plant after fuel loading.

Established based on the cask safety functions of maintaining subcriticality and confinement.

Should include the acceptance criteria the cask must satisfy during the inspection/test, to demonstrate the as-fabricated cask complies with the certified design.

Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (6 of 9)



ITE (continued)

Description of inspections and tests are only to be at a high level, e.g., confinement boundary test, with the stated acceptance criteria. Detailed description of the cask inspections and tests are to be provided in the cask FSAR

Inspections and tests required during storage operations to protect public health and safety would be included, as appropriate, in the technical specifications.

The scope of the site-specific evaluations includes those evaluations necessary to confirm that the generic cask design used at that particular site will ensure that the cask will perform the safety functions of maintaining subcriticality and confinement.

Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (7 of 9)



Technical Specifications (TS) Criteria

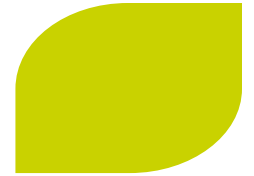
Section 1.0, Use and Application: No selection criteria required.

This section contains definitions developed by the COC holder, and standard rules for interpreting and using the cask TS.

Section 2.0, Approved Contents: Information in the Approved Contents Section of the TS must meet one or more of the following criteria:

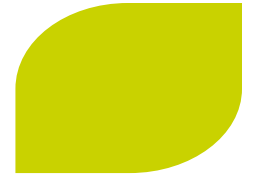
1. The characteristic or parameter is identified in 10 CFR 72.236(a);
2. The characteristic or parameter is critical to ensure the cask will perform its safety functions;
3. A characteristic or parameter for which operating experience or risk considerations has shown to be significant to ensuring public health and safety (e.g., Small changes to the characteristic or parameter can produce a significant impact on criticality control, shielding, or confinement).

Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (8 of 9)



Section 3.1, Limiting Conditions for Operation and Surveillance Requirements. Limiting Conditions for Operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the ISFSI facility or cask. A technical specification LCO for operation of the ISFSI facility or cask must be established for each item meeting one or more of the following criteria:

1. Installed instrumentation that is used to detect, and indicate a significant abnormal degradation of the cask confinement boundary (e.g., bolted lid bare fuel cask helium pressure monitoring system);
2. An initial condition of a design basis accident that either assumes the failure of or presents a challenge to the integrity of a fission product barrier (e.g., cask cooling flow paths, fuel decay heat, helium backfill pressure, cask cavity dryness, etc.);
3. A structure, system, or component which operating experience or risk considerations have been shown to be significant to public health and safety.

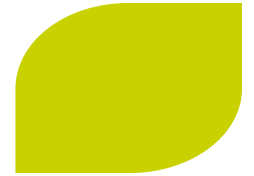


Content and Associated Criteria of the CoC (and TS), per PRM 72-7 (9 of 9)

Section 4.0, Administrative Controls:

No selection criteria required.

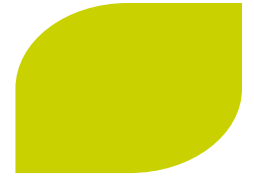
Includes programs for the activities requiring written procedures, cask transport evaluation, TS Bases control, etc. The CoC holder would determine the programs required and the level of description for program content that needs to reside in the CoC



CoC 1004 Latest CoC Conditions and TS Types of Information

Amendment 14 (in NRC review) Certificate Conditions (three pages)

1. (3 lines) Standard paragraph regarding 72.210 general license.
2. (2 lines) Standard paragraph for CoC holder regarding amendment applications.
3. (75 lines) CASK
 - a. (7 lines) Model numbers and explanation of alpha-numeric (e.g., 32PTH1)
 - b. (58 lines) Description – major components /functions, major subcomponents/functions, alternate configurations, heat loads
 - c. (3 lines) – Drawings – statement that the drawings are in the SAR
 - d. (7 lines) - Basic Components – very high level important to safety components and where in the FSAR they are described
4. (2 lines) – Notification of fabrication schedules pursuant to 72.232(d)
5. (6 lines) – if active cooling is engaged, notify NRC
6. (6 lines) – QUALITY ASSURANCE - cites Part 72, Subpart G
7. (8 lines) – HEAVY LOADS – general NUREG-0612 requirement, and an OS197L-specific item
8. (18 lines) – PRE-OPERATIONAL TESTING AND TRAINING EXERCISE – dry run requirements



CoC 1004 Latest CoC Conditions and TS Types of Information

Amendment 14 (in NRC review) Tech Specs

314 pages – total

10 pages – Title pages, table of contents

10 pages – Chapter 1, Use and Application

2 pages – Chapter 2, Functional and Operating Limits

12 pages – Chapter 3, LCOs, Surveillance Requirements

41 pages – Chapter 4, Design Features (30 pages of Code alternatives)

17 pages – Chapter 5, Administrative Controls

(five pages of Radiation Protection Program, citing ALARA, Part 20, 72.104, etc.)

176 pages – Tables

46 pages – Figures



CoC 1004 Amendment 15 Scope and Schedule

Changes related to authorized contents

Removal of certain dose rate measurements

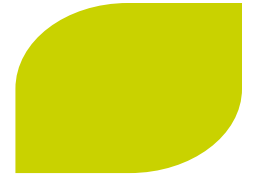
Graded-approach changes

**2016-08-17 - first pre-application meeting (specific to technical scope;
(too early for RIRP discussions)**

2016-Oct - second pre-application meeting, for RIRP-related changes*

2017-1st quarter - initial application

*** This would be a full meeting; interim meetings/calls/emails to seek alignment are anticipated.**



Acronyms

- CEA – control element assembly
- CFR – code of federal regulations
- CoC – certificate of compliance
- DSC – dry shielded canister
- FSAR – final safety analysis report
- ITE – inspections, tests, and evaluations
- LCO – limiting condition for operation
- MTU – mega tons of uranium
- NRC – Nuclear Regulatory Commission
- PRA – poison rod assembly
- PRM – petition for rulemaking
- RCCA – rod cluster control assembly
- RIRP – regulatory issue resolution protocol
- SNF – spent nuclear fuel
- TS – technical specifications