UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

FINAL SAFETY EVALUATION REPORT

TN AMERICAS LLC

STANDARDIZED NUHOMS® HORIZONTAL MODULAR STORAGE SYSTEM FOR IRRADIATED NUCLEAR FUEL

DOCKET No. 72-1004

NUHOMS® SYSTEM

AMENDMENT NO. 16

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SUMMARY

The United States (U.S.) Nuclear Regulatory Commission (NRC) staff, along with stakeholders, engaged in an effort to streamline the format and content of a certificates of compliance (CoC) for a spent fuel storage system in a more risk-informed manner. After holding several public meetings to discuss the proposed evaluation criteria (also referred to as the graded approach criteria) that would be used to support a revised format and content for CoCs, TN Americas LLC (the applicant) volunteered to submit an amendment application to be used as a pilot to test the evaluation criteria and agreed that the amendment would contain no technical changes to the CoC.

The applicant submitted the application for Amendment 16, to CoC number (No.) 1004, Model No. Standardized NUHOMS® Horizontal Modular Storage System (thereafter, NUHOMS®), to test the criteria by letter dated June 29, 2017 (TN, 2017a) and supplemented its application on August 31, 2017 (TN, 2017b), October 13, 2017 (TN, 2017c), November 16, 2017 (TN, 2017d), April 26, 2018 (TN, 2017a), June 7, 2018 (TN, 2017b), September 3, 2019 (TN, 2019a), September 6, 2019 (TN, 2019b), September 10, 2019 (TN, 2019c), and September 11, 2019 (TN, 2019d). The applicant stated that the amendment request contained no design changes to the NUHOMS® system. The applicant included proposed changes to the CoC No. 1004 format and content by using the evaluation criteria discussed with the industry (NEI, 2017b). The staff retained the final decisions on the content of the CoC[1] and its appendices, including the technical specifications (TSs).

The application consisted of the evaluation forms, a proposed CoC, proposed TSs, and page changes to the final safety analysis report (FSAR). The staff used a standard evaluation form to analyze each of the proposed changes to the format and content of the CoC in a consistent manner. On each form, the applicant applied the evaluation criteria to its proposed change to determine if it met the criteria, and if so, to determine the appropriate location of the information.

The staff reviewed the evaluation performed by the applicant. Since the applicant did not propose design changes in this amendment, the staff did not use NUREG-1536, “Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility,” (NUREG-1536) to conduct this review. Instead, after verifying that no technical changes were made in the transition to the new CoC format and content, the staff reviewed each proposed change to the CoC, including the TS and appendices, against the evaluation criteria (also referred as the graded approach criteria) (NEI, 2017b), as discussed in Chapter 2.0 of this safety evaluation report (SER). During the evaluation process, the staff exercised engineering judgment, based on the staff’s technical and operating

experience, and used NRC's guidance[1] applicable to the specific changes proposed by the applicant.

This report includes background information about the genesis of this project (Chapter 1), the approach used to evaluate this amendment request (Chapter 2), and the staff's safety evaluation of this amendment request (Chapter 3).

[1] The staff used different guidance depending on the change requested. The evaluation of each form includes the references pertinent to the change evaluated by the staff. The references section includes the documents that the staff considered in its evaluation.

1.0 BACKGROUND

In August 1995, the Commission issued a final policy statement ("Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement") to present the policy that the NRC would follow "in the use of probabilistic risk assessment (PRA) methods in nuclear regulatory matters" in order "to promote regulatory stability and efficiency" and "complement the NRC's deterministic approach" (60 FR 42622).

Risk is defined by the "risk triplet" as:

1) What can go wrong? (e.g., equipment malfunction)

2) How likely is it? (e.g., probability or the chance of an equipment malfunction)

3) What are the consequences? (e.g., exposure to radiation)

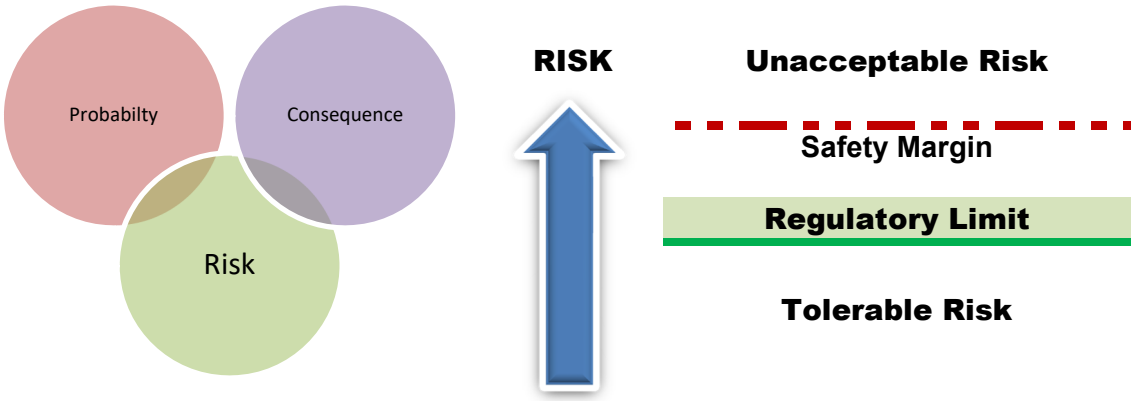

Figure 1.1. Graphical representation of the attributes of risk.

The NRC and industry performed some previous studies related to the risk of spent fuel storage. These studies determined that the risks of dry storage ranged from very low to extremely low, and that there was an opportunity to improve regulatory efficiency by modifying requirements based upon risk insights.

1.1 Using CoC No. 1004 to Pilot a Graded Approach Criteria to Revise the Format and Content of a Storage CoC

On October 3, 2012, the Nuclear Energy Institute (NEI) submitted a petition for rulemaking (i.e., PRM No. 72-7), "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste" (NEI, 2012). The goal of this petition was to revise the NRC's spent fuel storage regulations to include specific criteria for the format and content to be included in a CoC for a spent fuel storage system. This petition for rulemaking was the genesis for using amendment 16 to CoC 1004 for the NUHOMS® storage system as a pilot to develop a methodology to streamline the format and content of a CoC for a spent fuel storage system design.

The NRC approved PRM 72-7 (NEI, 2012). On September 30, 2014, the Division of Spent Fuel Storage and Transportation (renamed Division of Spent Fuel Management or DSFM) published a position paper titled, "Spent Fuel Storage and Transportation Scoping and Implementation Plan for Risk-Informing Regulatory Activities," (NRC, 2014) which included a high-level description of the activities needed to define a qualitative risk-informed framework for dry cask storage. The position paper outlined the NRC's implementation plan to use a "pilot project" as the first step in developing a risk-informed framework for certification of designs of dry cask spent fuel storage systems.

Following the issuance of the position paper, NEI developed a proposal to improve the efficiency of the regulatory framework used for certifying dry storage systems. In April 12, 2016, NEI submitted a proposal in the form of a "Regulatory Issue Resolution Protocol"[2] (RIRP) (i.e., RIRP-I-16-01) to NRC (NEI, 2016a). NEI discussed the proposal at a public meeting held on August 8, 2016 (NRC, 2016a). NEI proposed using an amendment to CoC No. 1004 as a "pilot" case to implement the graded approach methodology and determine how the proposed criteria would improve the format and content of a CoC for a storage system by using a qualitative risk-informed framework (later called the graded approach). The goal of the pilot project was to determine what information should be included in the CoCs, TS, and FSAR to comply with the regulatory requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72.

Figure 1.2 summarizes the path to the submittal of Amendment 16 to CoC 1004 of the NUHOMS® storage system as a pilot project for the graded approach. Figure 1.3 includes information related to the review of the application for Amendment 16.

[2] The RIRP is a process used by NEI to screen issues that may have generic implications (i.e., issues that may impact multiple companies or individuals). (https://www.nrc.gov/docs/ML0919/ML091960576.pdf)

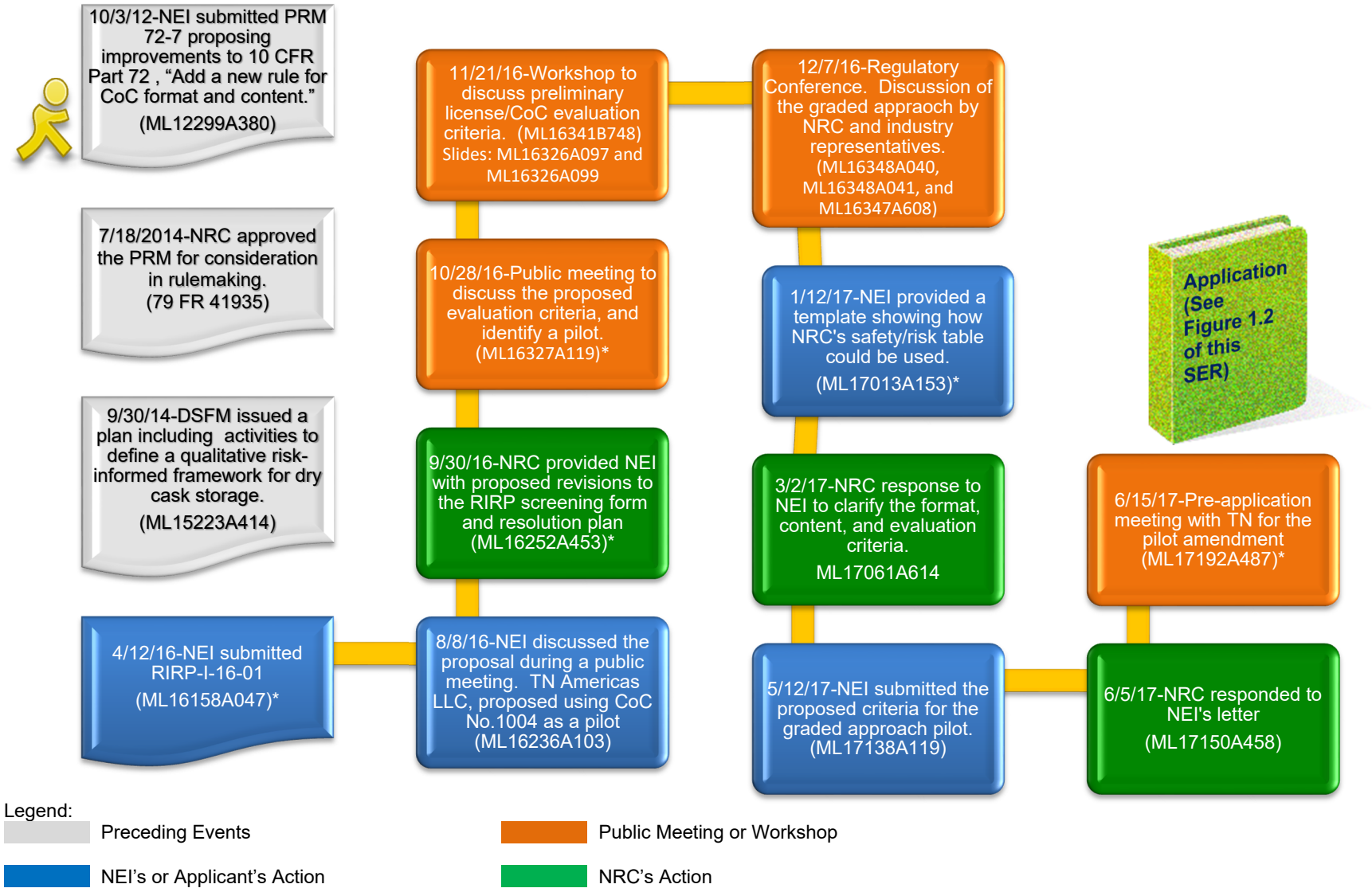

Figure 1.2. Path to the submittal of NUHOMS® storage system, Amendment 16, as a pilot project for testing the graded approach.[3]

[3] An " * " means that the Agencywide Documents Access and Management System (ADAMS) Accession No. corresponds to a package (a group of documents in ADAMS).

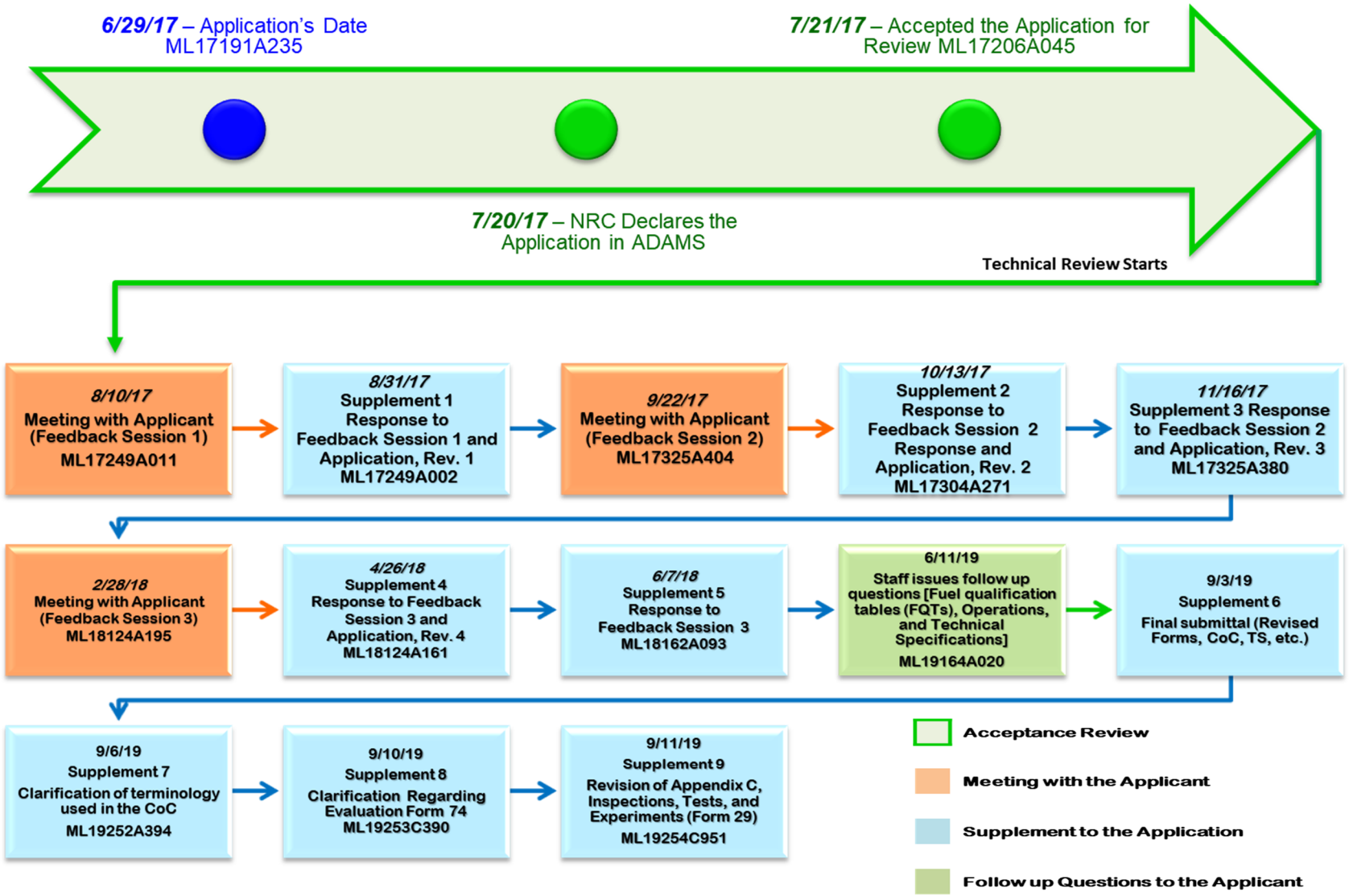

Figure 1.3. Timeline of the acceptance and technical review of the application used to implement the pilot graded approach methodology.

2.0 THE "GRADED APPROACH METHODOLOGY" AND ITS USE IN THIS AMENDMENT

The graded approach is a methodology comprised of evaluation criteria used to determine what information should be included in a CoC, including the TS appendices, for a spent fuel dry storage cask design (NEI, 2017b). This methodology includes a set of criteria that considered the overall safety goals associated with design features, operations, and testing requirements. These criteria were integrated in the "Used Fuel and Transportation Issue Screening Form" (TN, 2019a and Appendix B of this SER) that the applicant used to evaluate how to improve the format and content of the NUHOMS® CoC, including its appendices.

This review considered an amendment to an existing CoC (i.e., a CoC previously approved by the NRC) with no technical changes to the CoC's design in this application. Therefore, rather than focusing on design changes, as is generally typical with CoC amendment reviews, the applicant's analysis and staff's review for this CoC amendment focused, instead, on applying the graded approach to risk-inform the CoC, including the TS appendices, while updating the format and content of the document. The main objective of the staff's review was to determine whether the proposed amendment appropriately removed from the CoC information that is not significant to the staff's finding of reasonable assurance of public health and safety, and relocated this information to the most appropriate location.

In order to achieve this objective, the applicant's analysis, which supported their application (TN, 2019a) and the staff's review of it in this SER, uses the evaluation criteria briefly described in Table 2.1 of this SER (i.e., criteria Nos. 1 to 10). The first seven evaluation criteria (see Table 2.1, criteria Nos. 1 to 7) were used to evaluate various CoC components, including the TSs, to determine if the information was necessary to be retained in the CoC, or could be more appropriately moved to another licensing basis document. The last three criteria (see Table 2.1, criteria Nos. 8 to 10) apply the graded approach to risk-informing the CoC to ensure that no information was removed from the CoC if the information met at least one of the criteria 8, 9, or 10. If the information did not meet any of the criteria 8, 9 or 10, the information could be relocated to another licensing basis document, , as appropriate, or deleted in its entirety. Text was also deleted from the CoC in instances in which the staff determined that the information was redundant to existing regulatory requirements, or in which the information was not necessary for regulatory compliance.

If the review of the selected text that was the subject of the proposed change to the CoC demonstrated that the information fell within the scope of the evaluation criteria such that it should be retained in the CoC (the information was necessary for a thorough understanding of the system and/or the information was considered more risk significant), then, the analysis turned to where the information would be most appropriately located given the new format of the CoC. Additionally, if the applicant proposed edits to the selected text that were to be retained in the CoC, the review focused on whether the changes improved the CoC and verified that the edits did not result in substantive changes to the CoC requirements.

Figure 1.4. of this SER includes the main steps and criteria that the staff followed for identifying the information that should be removed, edited for clarity, or moved from CoC No. 1004 for the NUHOMS® storage system.

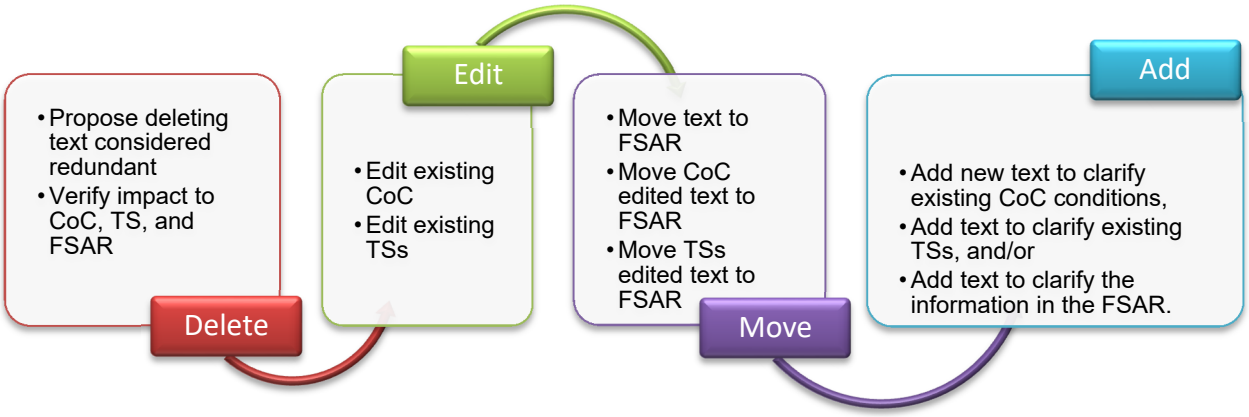

Figure 1.4. Overview of the process used for removing, editing, moving, or adding information to the CoC, TSs, or FSAR (Amendment 16, CoC 1004).

Table 2.1. New CoC format and content and corresponding evaluation criteria (NEI, 2017b; TN, 2019a).

	New CoC Location	Goal of the Evaluation	Criterion No.	Sub Criterion No.	Evaluation Criteria
Sections I and II	***CoC Body, Section I, "Technology"***	Include in the CoC a concise description of the technology, components, and functionality of the dry cask storage system.	1		Identify and evaluate: • if future modifications would be considered a significant deviation to the type of technology, components, or fundamental way the cask system operates. • if the modification to this section could not be performed through an amendment under 10 CFR 72.244, "Application for amendment of a certificate of compliance."
	CoC Body, Section II, "Design Features"	Include in the CoC design features that would have a significant effect on safety.	2		Identify and evaluate: • design features that would have a significant effect on safety if altered or modified (e.g., materials of construction, geometric arrangement). • if the modification to this section could not be performed through an amendment under 10 CFR 72.244, "Application for amendment of a certificate of compliance."
Appendix A	***CoC Appendix A, "Inspections, Tests, and Evaluations"***	Include in the CoC the inspections, tests, and evaluations (ITE), and acceptance criteria, that ensure that a dry storage cask system has been manufactured and will operate in conformance with the certified design.	3		• Identify the applicable ITEs, and acceptance criteria. • Evaluate if ITEs, and acceptance criteria are necessary and sufficient to provide reasonable assurance that a cask manufacturing and operation will conform with the certified design. • Ensure that the safety functions of confinement, sub-criticality and shielding are maintained. **NOTE: Assuming ITEs are performed and the acceptance criteria is met.**
Appendix B	***CoC Appendix B, "Technical Specifications," Section 1, "Definitions, Use, and Application"***	Include in the CoC the key definitions and administrative rules for implementing the TSs.	4		Identify the key definitions and administrative rules that should reside in ***CoC Appendix B, "Technical Specifications," Section 1,*** that allows for understanding **AND** implementing the logic of the Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) in the TSs.
	CoC Appendix B, "Technical Specifications," Section 2, "Approved Contents"	Include in the CoC the minimum set of parameters needed to define the approved contents in the certified design that, if altered or modified, would have a significant effect on safety.	5	A1 A2 A3	Evaluate if the information provided in ***CoC Appendix B, Technical Specifications, Section 2, "Approved Contents,"*** meets one or more of the following criteria: • ***Criterion A1:*** The characteristic or parameter is identified in 10 CFR 72.236(a). • ***Criterion A2:*** A characteristic or parameter for which verification is a necessary condition to provide reasonable assurance that the cask safety functions of confinement, sub-criticality, and shielding will be performed. • ***Criterion A3:*** A characteristic or parameter that has a significant impact on public health and safety, based on risk insights and expert knowledge.

	New CoC Location	Goal of the Evaluation	Criterion No.	Sub Criterion No.	Evaluation Criteria

Appendix B (Continue)	***CoC Appendix B, Technical Specifications, Section 3, "Limiting Conditions for Operations and Surveillance Requirements"***	Include in the CoC the following information:
		• the lowest functional capability or performance levels of equipment required for safe operation of the ISFSI and cask, and
		• functional and operating limits to protect the integrity of the stored fuel, workers, environment, and the public health and safety.
			6	L1	• Identify and evaluate functional and operating limits on fuel handling and storage conditions necessary to protect the integrity of the stored fuel, employees against occupational exposures, and prevent the uncontrolled release of radioactive materials.
					• Identify the subsequent subsections that will include LCOs for operation of the independent spent fuel storage installation (ISFSI) facility or cask with appropriate SRs.
					• To ensure the safe operation of the ISFSI and cask system, evaluate each LCO and corresponding SR that meet one or more of the following criteria:
					  • ***Criterion L1:*** Installed instrumentation that is used to detect and indicate a significant abnormal degradation of the cask's confinement boundary.
					  • ***Criterion L2:*** 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.
					  • ***Criterion L3:*** A structure, system, or component that has a significant impact on public health and safety, based on risk insights and expert knowledge.

				L2	
				L3	
	CoC Appendix B, Technical Specifications, Section 4, "Administrative Controls"	Include in the CoC the organization and management of procedures, recordkeeping, review and audit, and reporting requirements necessary to assure the safe operations related to the storage of spent fuel and reactor-related greater-than-class-C waste in an ISFSI.	7		• This section should include high-level descriptions of the programs and the essential elements of the programs required to assure safe cask or ISFSI operation. • Identify the programs descriptions that include only the essential elements of the programs required to assure safe cask or ISFSI operation, with additional supporting information relocated to the FSAR, as necessary. Implementation details would be included in general licensee procedures.
Risk insight	***Not Applicable***	Identify items that should not be removed from the CoC.			Evaluate the following questions:
			8		8. Will removing this requirement from the CoC result in a significant increase in the probability or consequences of an accident previously evaluated in the cask FSAR?
			9		9. Will removing this requirement from the CoC result in the possibility of a new or different kind of accident being created compared to those previously evaluated in the FSAR?
			10		10. Will removing this requirement from the CoC result in a significant reduction in the margin of safety for ISFSI or cask operation?

3.0 STAFF'S EVALUATION OF THE PROPOSED CHANGES

The application consisted of a group of evaluation forms [i.e., "Used Fuel and Transportation Issue Screening Form" (TN, 2019a)] proposing changes to the CoC (including TSs), and\or FSAR. Each evaluation form included ten evaluation criteria (see Table 2.1 of this SER and NEI, 2017b) and the applicant's evaluation of the change including a proposed disposition of the change (e.g., delete, move to the FSAR). (Appendix B includes an example of the evaluation form.) The staff reviewed each evaluation form against the applicable criteria in Table 2.1. In the context of this SER, the staff refers to this set of criteria as "evaluation criteria" because these are used to evaluate the information in Amendment 15 of CoC No. 1004 (NRC, 2018) to streamline the CoC (including TSs) format and content.

The staff reviewed the following documents to evaluate each change proposed by the applicant:

1) the "Used Fuel and Transportation Issue Screening Form" (TN, 2019a),

2) the Resolution Plan (NEI, 2017a), and

3) the ISFSI license and cask certificate of compliance format, content, and evaluation criteria (NEI, 2017b).

The staff evaluated the changes proposed by the applicant and documented its review in Section 3.0 of this SER. Section 3.0 includes the staff's evaluation of the applicant proposals documented in the evaluation forms (TN, 2019a). Section 3.0 is organized into two major topics:

1) Section 3.1, "Certificate of Compliance (Evaluation Forms 1 to 12)"

2) Section 3.2, "Technical specifications (TSs) (Evaluation Forms 13 to 99)"

The staff identified each subsection under these main topics by form No., identification (I.D.) number included in the form submitted by the applicant, and a brief description of the change. The staff divided its review and evaluation of each change proposed by the applicant into two parts. The first part includes a brief description of the applicant's proposal. The second part includes the staff's evaluation of the proposal. This format ensures that all the disciplines focus on the review and evaluation of each proposed change in an integrated manner. Also, the staff ensured that the that changes were within the scope of this project.

The review resulted in a revised format and content of the CoC (including TSs), which also risk informs the CoC by ensuring that only information necessary for the safe operation of the storage systems is included in the CoC and that information in the CoC is organized in the most effective manner. The new CoC format and content is reflected in Table 2.1 of this SER.

While the proposed approach is in general alignment with discussions during the October 28, 2016 public meeting (NRC, 2016c), the staff recognizes that the approach used by the staff in this review requires additional refinement of the evaluation criteria within the graded-approach framework (NRC, 2017a and b). The following sections include the staff's evaluation of each applicant's proposal to streamline the format and content of Amendment 16 to CoC No. 1004 (TN, 2019a).

3.1 Certificate of Compliance (Evaluation Forms 1 to 12)

3.1.1 Form No. 1. I.D. CoC-1, Condition No. 1, Casks approved under the general license.

(1) Proposed Change

The applicant proposed to substitute the text of CoC Condition No. 1 in Amendment 15 (NRC, 2018) with language suggested by the staff during a public meeting on September 22, 2017 (TN, 2017d), and to add text regarding Appendix C, "ASME Code Alternatives."[4]

Condition No. 1 of Amendment 15 states the following:

> "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." (NRC, 2018)

The new text in Amendment 16 (TN, 2019a), which precedes the new CoC Section I, "Technology," states the following:

> "This certificate is conditioned upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Inspections, Tests and Evaluations), Appendix B (Technical Specifications), Appendix C (ASME Code Alternatives), and the conditions specified below: …" (TN, 2019a)

(2) Evaluation of Change

The staff reviewed the proposed change and determined that the text of CoC Condition No. 1 of Amendment 15 (NRC, 2018) is within the scope of the evaluation criteria (see Table 2.1 of this SER) for retention because it is a necessary and fundamental description of the conditions upon which the CoC is granted. The staff also determined that revision of the condition and the addition of a reference to the new Appendix C, "ASME Code Alternatives," improved the CoC by adding clarity and specificity. Moreover, the staff concluded that because the modifications to the text are limited to clarifications, the proposed change does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the change to the text corresponding to Condition No. 1 of Amendment 15 (NRC, 2018) acceptable. The changes are implemented in the text preceding Section I of the CoC for Amendment 16.

[4] ASME stands for American Society of Mechanical Engineers.

3.1.2 Form No. 2. I.D. CoC-2, Condition No. 2, Changes to the certificate or technical specifications.

(1) Proposed Change

The applicant proposed to delete the text of Condition No. 2 of the CoC for Amendment 15 (NRC, 2018). Condition No. 2 of Amendment 15 states the following:

> "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." (NRC, 2018)

(2) Evaluation of Change

The staff reviewed the proposed change and determined that the text of Condition No. 2 of Amendment 15 (NRC, 2018) is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because retention of the text is not necessary for ensuring the safety of the CoC system. Moreover, the staff concluded that the text of Condition No. 2 of the CoC for Amendment 15 (NRC, 2018) is unnecessary to retain the text in the CoC, since it is reflected in an existing regulatory requirement located in 10 CFR 72.244. Because the text is duplicative of a regulatory requirement, the staff also concluded that deletion of the text does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the deletion of the text corresponding to Condition No. 2 of Amendment 15 (NRC, 2018) acceptable and the text is deleted in the CoC for Amendment 16.

3.1.3 Form No. 3. I.D. CoC-3a, Model Nos. included in the certificate.

(1) Proposed Change

The applicant proposed to consolidate the text of Condition No. 3 of the CoC for Amendment 15, "CASK," (NRC, 2018) into a brief description of the cask system. For Condition No. 3.a., the consolidated description further clarifies the dry shielded canister (DSC) models and their sub-designations. Condition No. 3.a. of Amendment 15 states the following:

> "Model Nos. Standardized NUHOMS®-24P, -52B, -61BT, -32PT, -24PHB, -24PTH, -32PTH1, -37PTH, -61BTH, and -69BTH…" (NRC, 2018)

The applicant identified that the proposed condition should be included in new Section I, "Technology," of the CoC corresponding to Amendment 16 (TN, 2019a). The applicant also identified that there would be an impact to evaluation criterion No. 9 (see Table 2.1 of this SER), if the condition is removed on the basis that a non-analyzed dry storage cask (DSC) configuration could be loaded.

(2) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained in the CoC because, if removed, a non-analyzed DSC configuration could be loaded. The staff reviewed the proposed relocation and revision to the text describing the DSC models and determined that the relocation is appropriate in the revised format, and that the consolidated description of Condition No. 3 in the new Section I, “Technology,” (TN, 2019a) of the CoC provides more specificity and clarity about the models and nomenclatures for the DSCs than the text in Amendment 15 (NRC, 2018). Additionally, the staff concluded that, because the modifications to the language were clarifying changes, the relocated and revised text would not result in a substantive change to the CoC requirements.

Therefore, the staff finds the relocation and consolidation of the description of the text corresponding to Condition No. 3 of Amendment 15 (NRC, 2018) acceptable. This change is implemented in the new Section I, “Technology,” of the CoC, Amendment 16.

3.1.4 Form No. 4. I.D. CoC-3b, Cask description.

(1) Proposed Change

The applicant proposed to consolidate the text of Condition No. 3 of the CoC for Amendment 15 (NRC, 2018) into a brief description of the cask system (NRC, 2018). For Condition 3.b., “Description,” the consolidated description states that the system is certified as described in the FSAR and in the NRC's SER, and contains a brief description of the main cask system components (NRC, 2018). The applicant also proposed to move the statement related to the design and fabrication of the transfer cask as a lifting device to meet NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36,” (NUREG-0612) and ANSI N14.6, “Radioactive Materials - Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More,” requirements to the new Section II of the CoC, “Design Features” (TN, 2019a).

The applicant identified that the text of Condition No. 3 of Amendment 15 (NRC, 2018) should be included in the new Section I, “Technology,” of the CoC of Amendment 16 (TN, 2019a). The applicant also identified that there would be an impact to evaluation criterion No. 9 (see Table 2.1 of this SER), if the condition were removed on the basis that a non-analyzed configuration of a DSC, horizontal storage module (HSM), or transfer cask (TC) could be loaded.

(2) Evaluation of Change

The staff confirmed that the proposed change is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained in the CoC because, if the text were removed, a non-analyzed configuration of a DSC, HSM, or TC could be loaded.

The staff reviewed the proposed updated text describing the cask components and found it to be an adequate summary of the technology, which comprises each cask system component along with their main function. The sub-models for the DSCs, HSMs, and TCs are also listed, providing clarity to the system's user. The statement that fuel transfer and auxiliary equipment, necessary for ISFSI operations, are not included as part of the system, has been retained.

The staff also reviewed the proposal to move the statement related to the design and fabrication of the TC (as a lifting device to meet NUREG-0612 and ANSI N14.6 requirements) to the new CoC Conditions Section II, "Design Features," of Amendment 16. This statement meets the criterion to be included in the design features section, according to the new CoC format, because it delineates standards that must be met and a CoC amendment would be necessary to modify them. There is no change to the requirement itself.

The staff concluded that the modifications to the text, both the consolidation of the description of the cask components, and the relocation of the statement related to design and fabrication of the TC, improve the clarity and specificity of the CoC. Finally, the staff concluded that neither the revision of the text regarding the cask components, nor the relocation of the text regarding the design and fabrication of the TC, result in substantive changes to the CoC requirements.

Therefore, the staff finds the consolidation of the description of the text corresponding to Condition No. 3 of Amendment 15 acceptable, as well as the relocation of the statement related to design and fabrication of the TC. These changes are implemented in the new Section I, "Technology," of the CoC of Amendment 16, and in the new CoC Conditions Section II, "Design Features," as Subsection II.3.a of Amendment 16 (TN, 2019a). Therefore, the staff finds the change acceptable and it is incorporated in Amendment 16.

3.1.5 Form No. 5. I.D. CoC-3c, Cask drawings.

(1) Proposed Change

The applicant proposed to consolidate the text of the CoC Condition No. 3 for Amendment 15 (NRC, 2018) into a brief description of the cask system in the conditions section of the new CoC for Amendment 16. For Condition No. 3.c of Amendment 15, the applicant proposed to delete the list of FSAR appendices that contain the system drawings that is currently part of Condition No. 3.c. of Amendment 15.

(2) Evaluation of Change

The staff reviewed the proposed changes and determined that the description of the cask system is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because, if the text were removed, a non-analyzed configuration of a DSC, HSM, or TC could be loaded. The staff also determined that the consolidation of the text into a brief description of the

cask system is an adequate summary and improves the CoC by adding clarity. Because the consolidation of information only clarified the text, the staff additionally concluded that the consolidation of the text does not result in substantive changes to the CoC requirements.

The staff also reviewed the proposed change regarding the deletion of the list of FSAR appendices and confirmed that the text of the list of the appendices is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because retention of the list is not necessary for ensuring safe operation of the cask system, and thus it can be removed from the CoC. The staff noted that in previous storage approvals of other CoCs, generally, those CoCs did not contain a list of drawings such as those in Amendment 15 (NRC, 2018). Moreover, the text in Amendment 15 (NRC, 2018) was only a pointer to the FSAR appendices, which already contained the drawings. Because the information is already contained in the FSAR, the staff concluded that removal of this pointer in the condition for Amendment 16 (TN, 2019a) would not result in substantial changes to the CoC requirements.

Therefore, the staff finds the consolidation of the text, as well as deletion of the appendices, corresponding to Condition No. 3 of Amendment 15 (NRC, 2018) acceptable. These changes are implemented in the CoC of Amendment 16.

3.1.6 Form No. 6. I.D. CoC-3d, Basic Components.

(1) Proposed Change

The applicant proposed to consolidate the text of CoC Condition No. 3.d. for Amendment 15 (NRC, 2018) to a brief description of the cask system in the conditions section of the new CoC for Amendment 16 (TN, 2019a). For Condition 3.d. of Amendment 15, the applicant proposed to delete the list of basic components (DSC, HSM, TC, etc.) important to safety and the references to the FSAR that describe the components that are currently in CoC 3.d. of Amendment 15.

The staff also reviewed the proposed deletion of the list of FSAR appendices and confirmed that the text in the list of the appendices is not within the scope of the evaluation criteria because retention of the list is not necessary, and thus can be removed from the CoC (see Table 2.1 of this SER).

Therefore, the staff finds the consolidation of the text, as well as deletion of the appendices, corresponding to Condition No. 3 of Amendment 15 (NRC, 2018) acceptable. These changes are implemented in CoC Conditions of Amendment 16.

The applicant proposed to consolidate the text of CoC Condition No. 3 of for Amendment 15 (NRC, 2018) to a brief description of the cask system in the conditions section of the new CoC for Amendment 16. For Condition No. 3.d. of Amendment 16 (TN, 2019a), the applicant proposed to delete the list of basic components (DSC, HSM, TC, etc.) important to safety and the

references to the FSAR that describe the components that are currently in this condition in Amendment 15.

(2) Evaluation of Change

The staff reviewed the proposed changes and determined that the text regarding the description of the cask system is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because if the text were removed, a non-analyzed configuration of a DSC, HSM, or TC could be loaded. The staff also determined that consolidation of the text into a brief description of the cask system improves the clarity of the CoC. Because consolidation of the text only clarified the text, the staff also concluded that the changes, do not result in substantive changes to CoC requirements.

Additionally, the staff noticed that the applicant changed the description of the support skid supplemental shielding for the OS197L TC to trailer shielding to be consistent with language in the TS in the CoC for Amendment 16 (TN, 2019a and b). Based on supplemental information provided by the applicant (TN, 2019b), the staff determined that the description change of the shielding used for the OS197L TC in Amendment 16 clarifies the CoC by ensuring consistency throughout the CoC and does not substantive change CoC requirements.

The staff also reviewed the proposed change to delete the text regarding the list of basic components and the references to the FSAR. The staff confirmed that the list of basic components is not within the scope of the evaluation criteria (see Table 2.1 of this SER) and can be removed from the CoC because retention of the text is not necessary for ensuring the safety of the CoC system. The staff concluded that the deletion of the list of basic components and the references to the FSAR does not result in substantive changes to the CoC requirements.

Therefore, the staff finds acceptable the consolidation and revision of the text, as well as deletion of the list of basic components and the references to the FSAR, corresponding to Condition No. 3 of Amendment 15 (NRC, 2018). These changes are implemented in the CoC for Amendment 16.

3.1.7 Form No. 7. I.D. CoC-4, Notification of fabrication schedules.

(1) Proposed Change

The applicant proposed to delete the text of CoC Condition No. 4 for Amendment 15 (NRC, 2018), which stated the following:

> "Notification of fabrication schedules shall be made in accordance with the requirements of 10 CFR 72.232(d)." (NRC, 2018)

(2) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is not within the scope of the evaluation criteria (see Table 2.1 of this SER) and can be removed from the CoC because retention of the text is not necessary for ensuring the safety of the CoC system. The CoC Condition No. 4 in Amendment 15 (NRC, 2018) reflects an existing regulatory requirement to submit a notification to the NRC at least 45 days prior to starting fabrication of the first spent fuel storage cask under a CoC, which is required by 10 CFR 72.232(d). The staff verified that the text was duplicative of a regulatory requirement. Additionally, the staff concluded that removal of this text would not result in substantive changes to the CoC requirements.

Therefore, the staff finds the deletion of CoC Condition No. 4 of Amendment 15 (NRC, 2018) acceptable.

3.1.8 Form No. 8. I.D. CoC-5, Notification of use of active cooling.

(1) Proposed Change

The applicant proposed to delete the text of CoC Condition No. 5 of Amendment 15 (NRC, 2018), notification of active cooling for transfer casks during transfer of a loaded DSC. (TN, 2019a)

(2) Evaluation of Change

The staff reviewed the proposed change and determined that the text is not within the scope of the evaluation criteria (see Table 2.1 of this SER) and can be removed from the CoC because retention of the text is not necessary for ensuring the safety of the CoC system.

The CoC Condition No. 5 for Amendment 15 (NRC, 2018) incorporated a reporting requirement when active cooling was used with several of the transfer cask models, and based upon additional information from the applicant, the staff verified that LCO 3.1.3, which provides time limits for completion of DSC transfer operation, covered the transfer casks listed in CoC Condition No. 5 of Amendment 15 (NRC, 2018). Thus, the information in the condition is redundant and unnecessary for retention. Moreover, this added reporting requirement is not an administrative control and has no safety or risk basis. Finally, because the information is redundant, the staff concluded that deletion of the text does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the deletion acceptable within the new CoC for Amendment 16.

3.1.9 Form No. 9. I.D. CoC-6, Quality assurance program.

(1) Proposed Change

The applicant proposed to delete the text of Condition No. 6 of the CoC for Amendment 15 (NRC, 2018), requiring conducting activities to comply with a quality assurance (QA) program that satisfies the applicable requirements of 10 CFR Part 72, Subpart G, "Quality Assurance." (TN, 2019a)

(2) Evaluation of Change

The staff reviewed the proposed change and determined that CoC Condition No. 6 in Amendment 15 (NRC, 2018) is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because retention of the text is not necessary for ensuring the safety of the CoC system. The text of the condition duplicates an existing regulatory requirement, located in 10 CFR 72, Subpart G, "Quality Assurance," and thus it is unnecessary to retain it in the CoC. Additionally, for the same reason, the staff concluded that deletion of the text does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the deletion acceptable within the new CoC for Amendment 16.

3.1.10 Form No. 10. I.D. CoC-7, Condition No. 7 (first paragraph), Heavy loads requirements and procedures for each lift.

(1) Proposed Change

The applicant proposed to move the text of the first paragraph of CoC Condition No. 7 of Amendment 15 (NRC, 2018) to the new TS, Section 4, "Administrative Controls," of Amendment 16 (TN, 2019a). The TS requires DSC and TC lifts to be made in accordance with existing heavy loads requirements and procedures of the licensed facility (i.e., plant-specific) at which the lift is made to show operational compliance with NUREG-0612 (NUREG-0612) and/or existing plant-specific heavy loads requirements. In addition, the applicant identified potential risk of reducing the margin of safety [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this condition were to be removed. (TN, 2019a)

(2) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet the condition could result in an increase in the probability or consequence of an accident, and the requirement is an administrative control to ensure safe operations. Thus, the staff confirmed that the text should be retained in the CoC. The staff concluded that retention of the text in the new proposed location improves the clarity of the CoC. Because there is no change to the text of the condition, only the location of it, the staff also concluded that relocating this condition would not result in substantive changes to the CoC requirements.

Therefore, the staff finds the proposed change acceptable and the information contained in Condition No. 7 of the CoC for Amendment 15 (NRC, 2018) is incorporated in the new TS 4.3.4, "Heavy Loads Requirements," of Amendment 16.

3.1.11 Form No. 11. I.D. CoC-7, Condition No. 7 (second paragraph), evaluation of consequences of accidental drops.

(1) Proposed Change

The applicant proposed to retain but relocate the text of the second paragraph of CoC Condition No. 7 in Amendment 15 (NRC, 2018), to the new TS, Section 4, "Administrative Controls," in Amendment 16. CoC Condition No. 7 in Amendment 15 requires evaluation of an accidental drop of the shielding components of the OS197L TC (if a single failure proof crane is not used) (NRC, 2018). In addition, the applicant identified potential risk in reducing the margin of safety [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this condition were to be removed (TN, 2019b).

(2) Evaluation of Change

The staff confirmed that the change proposed by the applicant is within the scope of the criteria because failure to meet the condition could result in an increase in the probability or consequence of an accident, and the requirement is an administrative control to ensure safe operations. Thus, the staff confirmed that the text should be retained. The staff concluded that retention of the text in the new proposed location improves the clarity of the CoC. Because there is no change to the text of the condition, only the location of it, the staff also concluded that relocating this condition would not modify the CoC requirements.

Therefore, the staff finds the proposed change acceptable, and the condition is incorporated in Amendment 16, specifically, TS 4.3.4, "Heavy Loads Requirements."

3.1.12 Form No. 12. I.D. CoC-8, Pre-Operational Testing and Training Exercise.

(1) Proposed Change

The applicant proposed to move the text verbatim of CoC Condition No. 8 in Amendment 15 (NRC, 2018) regarding dry run, loading, and unloading operations, to the Section 4, "Administrative Controls," of the TS in Amendment 16. (TN, 2019a)

(2) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria and should be retained because the requirement is an administrative control related to the safe of operation of the system, and therefore, the text should remain in the CoC. The staff concluded that, because there is no change to the text of CoC Condition No. 8 in Amendment 15 (NRC, 2018),

relocating this condition would not result in a substantive change to the CoC requirements.

Therefore, the staff finds acceptable incorporating the information in CoC Condition No. 8 of Amendment 15 (NRC, 2018) into the new TS 4.3.5, "Pre-Operational Testing and Training Exercise," of Amendment 16.

3.2 Technical Specifications (Evaluation Form Nos. 13 to 99)

3.2.1 Section 1.0, "Use and Application" (Evaluation Form Nos. 13 to 16)

3.2.1.1 Form No. 13. I.D. TS-1.1, Definitions.

(a) Proposed Change

The applicant proposed to retain the text of TS 1.1, "Definitions," of Amendment 15 (NRC, 2018) and relocate it in Appendix B of the CoC, Section 1, "Use and Application," in Amendment 16, and to add revised definitions for the new inspections, tests, and evaluations (ITE) and LCOs. The applicant proposed to retain the existing definitions, and to add a definition for "operable/operability" to this list. (TN, 2019a)

(b) Evaluation of Change

The staff verified that the definitions were within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because the key definitions are necessary to ensure a basic understanding and proper implementation of the TSs. The staff determined that the proposed relocation of the definitions is appropriate for the new format of the CoC, which improves clarity of the CoC. The staff also concluded that the revised definitions, as well as the new definition, improve the CoC by adding clarity and specificity.

Therefore, the staff finds acceptable incorporating the text of TS 1.1 of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," Subsection 1.1, "Definitions," for Amendment 16.

3.2.1.2 Form No. 14. I.D. TS-1.2, Logical connectors.

(a) Proposed Change

The applicant proposed to retain the text of TS 1.2, "Logical Connectors," of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," of Amendment 16. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because it allows for a proper understanding and implementation of necessary rules in the CoC. The staff determined that Section 1 of the TSs is the appropriate location for

this program in the new format because the logical connectors are key definitions for implementing the logic of the TS. The staff confirmed that there is no change to the text of TS 1.2. Thus, the staff concluded that there is no substantive change to the CoC requirements.

Therefore, the staff finds acceptable incorporating the text of the TS 1.2 of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," Subsection 1.2, "Logical Connectors," of Amendment 16.

3.2.1.3 Form No. 15. TS-1.3, Completion times.

(a) Proposed Change

The applicant proposed to retain the text of TS 1.3, "Completion Times," of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," of Amendment 16. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that this text is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because it allows for a proper understanding and implementation of necessary rules in the CoC. The staff determined that TS, Section 1, is the appropriate location for this program in the new format because the completion times are key definitions for implementing the logic of the TS. The staff confirmed that no changes were made to the text of TS 1.3. Thus, the staff concluded that there is no substantive change to the CoC requirements.

Therefore, the staff finds acceptable incorporating the text of TS 1.3 of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," Subsection 1.3, "Completion Times," of Amendment 16.

3.2.1.4 Form No. 16. I.D. TS-1.4, Frequency.

(a) Proposed Change

The applicant proposed to retain the text of TS 1.4, "Frequency," of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," of Amendment 16. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that this text is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because it allows for a proper understanding and implementation of necessary rules in the CoC. The staff verified that there is no change made to the location of the text, or to the text itself. Because there are no changes, the staff concluded that there is no substantive change to CoC requirements.

Therefore, the staff finds acceptable incorporating the text of TS 1.4. of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 1, "Use and Application," Subsection 1.4, "Frequency," of Amendment 16.

3.2.2 Section 2.0, "Functional and Operating Limits" (Evaluation Form Nos. 17 to 20)

3.2.2.1 Form No. 17. I.D. TS-2.1, Fuel to be stored in the Standardized NUHOMS® system.

(a) Proposed Change

The applicant proposed to retain the text of TS 2.1, "Fuel to be Stored in the Standardized NUHOMS® System," of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 2.0, "Functional and Operating Limits," of Amendment 16. (TN, 2019a)

The applicant recognized that the specification of the fuel to be stored is the single most important control of any dry storage cask system design. In addition, the applicant identified potential risk for all risk insight criteria [evaluation criteria Nos. 8, 9, and 10 (see Table 2.1 of this SER)], if this condition were to be removed.

The applicant also proposed to relocate a note located in a TS table in the CoC for Amendment 15 in Section 2.1 of Amendment 16, stating the following:

> "… 24PTH-S-LC is only authorized for storage of B&W 15x15 fuel assemblies."

The applicant proposed this change based on feedback given by the staff at a February 28, 2018 public meeting (TN, 2018a). The staff suggested this change because the note was previously incorporated in Table 1-1i, "PWR Fuel Specifications for Fuel to be Stored in the Standardized NUHOMS® -24PHB DSC."

(b) Evaluation of Change

The staff verified that the text the applicant proposed to retain from the TS, and the note the applicant proposed to relocate from the TS table, are within the scope of the evaluation criteria (see Table 2.1 of this SER). The staff determined that this information should be retained because it specifies the approved content for each DSC and removal of the text could create significant safety risks.

Regarding the text from the TS proposed for retention, the staff verified that there is no change made to the location of the TS text, or to the TS text itself. Because there are no changes, the staff determined that there is no substantive change in CoC requirements.

Regarding the note relocated from the table of the TS to the TS itself, the staff determined that the new location was the appropriate based upon the new format because it further clarifies the allowable contents for

the -24PTH-S-LC, and thus it improves the CoC. In addition, the staff concluded that the relocation of the note would not modify the CoC requirements.

Therefore, the staff finds acceptable incorporating the change in Appendix B of the CoC, Section 2.1, "Fuel to be Stored in the Standardized NUHOMS® System," of Amendment 16.

3.2.2.2 Form No. 18. I.D. TS-2.1.1, Dry shielded canister (DSC) models to be stored in the Standardized NUHOMS® system with Limiting Condition for Operation (LCO) 3.1.4.

(a) Proposed Change

The applicant proposed to retain, in Amendment 16, the text of TS 2.1.1, Section 2, "Functional and Operating Limits," of Amendment 15 (NRC, 2018), which states the following:

> "Each of the DSC models listed above may be stored inside an HSM model in accordance with [former] LCO 3.1.4."

(b) Evaluation of Change

The staff confirmed that the text of TS 2.1.1 is within the scope of the evaluation criteria (see Table 2.1 of this SER) and should be retained because the information specifies the approved content for each DSC, and removal of the text could create significant safety risks. The staff concluded that this is the appropriate location for this TS because TS 2.1.1 specifies which DSC models may be used in each HSM. Furthermore, the only change to the TS text is referencing "LCO 3.1.4" to "ITE 4.4," because the former LCO 3.1.4 has been incorporated as ITE 4.4 in the new CoC (TN, 2019a). With no substantive changes, the staff concluded that there are no changes to CoC requirements.

Therefore, the staff finds acceptable incorporating text of TS 2.1.1 of Amendment15 in Appendix B of the CoC, Section 2.0, "Functional and Operating Limits," of Amendment 16.

3.2.2.3 Form No. 19. I.D. TS-2.2.1, Place affected fuel assemblies in safe condition, and 2.2.2, Notify the NRC Operations Center per 10 CFR 72.75.

(a) Proposed Change

The applicant proposed to retain the text of TS 2.2.1 of Amendment 15 in Appendix B of the CoC, Section 2, "Functional and Operating Limits," for Amendment 16. This TS requires placing affected fuel assemblies in a safe condition. The applicant identified a potential risk in reduction in the margin of safety [evaluation criteria Nos. 8, 9, and 10 (see Table 2.1 of this SER)], if this specification was removed.

The applicant also proposed to relocate TS 2.2.2 of Amendment 15, which requires notification to the NRC Operations Center, in Appendix B of the

CoC, Section 4, “Administrative Controls,” for Amendment 16. Specifically, the applicant proposed to include the TS 2.2.2 of Amendment 15 in TS 4.1, “Functional and Operating Limits Violations Reportability Actions,” of Amendment 16, which groups the necessary reporting actions (when any functional and operating limit of TS 2.1 is violated). (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that, regarding the retention of the text of TS 2.2.1 of Amendment 15, the three risk criteria of the evaluation criteria (see Table 2.1 of this SER) are applicable because the information in the TS indicates the approved content for each DSC and lacking this information may result in increased risk.

The staff confirmed that no changes were made to the text of TS 2.2.1 of Amendment 15, and thus there are no changes to the CoC requirements.

Regarding the relocation of TS 2.2.2 of Amendment 15, the staff confirmed that the text is within the scope of the evaluation criteria for retention (see Table 2.1 of this SER) because the information in the TS includes essential elements necessary to ensure safe cask operation, and removal of this information may result in increased risk. Additionally, the staff concludes that Section 4, “Administrative Controls,” is the appropriate section to include the information because it is an action to incorporate a reporting requirement.

The staff verified that the TS 2.2.2 of Amendment 15 specifies a reporting action, and the revised TS 4.1.1 in Appendix B of the CoC, Section 4, “Administrative Controls,” for Amendment 16, does include this required reporting action in its entirety. Thus, the staff concluded that this change to the TS does not result in substantive changes to the CoC requirements.

Therefore, the staff finds acceptable incorporating the TSs 2.2.1 and 2.2.2 in Appendix B of the CoC, Section 2.2, “Functional and Operating Limits Violations Immediate Actions,” and Section 4.1, Subsection 4.1.1, “Functional and Operating Limits Violations Reportability Actions,” of Amendment 16, respectively.

3.2.2.4 Form No. 20. I.D. TS-2.2.3, Report within 30 days the cause of the violation and actions taken to restore compliance and prevent recurrence.

(a) Proposed Change

The applicant proposed to relocate TS 2.2.3 of Amendment 15 (NRC, 2018) to TS, Section 4, “Administrative Controls,” of Amendment 16 (TN, 2019a). TS 2.2.3 requires the licensee to submit a separate report that describes the cause of the violation and the actions taken to restore the system to compliance state and prevent recurrence within 30 days.

The applicant proposed to include the text of TS 2.2.3, Amendment 15, verbatim in the TS 4.1, “Functional and Operating Limits Violations

Reportability Actions," of Amendment 16, which groups the necessary reporting actions when any functional and operating limit of TS 2.1 is violated.

(b) Evaluation of Change

The staff confirms that this text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because the information in the TS includes essential elements necessary to ensure a safe operation of the cask, and removal of this information may result in increased risk. The staff also determined that Section 4, "Administrative Controls," of Amendment 16, is the appropriate section to incorporate this TS because it is an action to incorporate a reporting requirement. The staff verified that the applicant proposed to include the text of TS 2.2.3, Amendment 15, verbatim in the new TS 4.1, "Functional and Operating Limits Violations Reportability Actions," which groups the necessary reporting actions when any functional and operating limit of TS 2.1 is violated. Based upon this verification, the staff concluded that there is no modification of the CoC requirements.

Therefore, the staff finds the proposed change acceptable. The change is incorporated verbatim as TS 4.1.2 in Section 4, "Administrative Controls," of Amendment 16.

3.2.3 Section 3.0, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability" (Evaluation Form Nos. 21 to 26)

3.2.3.1 Form No. 21. I.D. TS-3.0, LCO and SR applicability.

(a) Proposed Change

The applicant proposed to retain the text of TS 3.0, "LCO and SR applicability," of Amendment 15 (NRC, 2018), verbatim, in Appendix B, Section 3, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16. TS 3.0 of Amendment 15 establishes the framework for using LCOs and SRs.

In addition, the applicant identified a potential risk reduction of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and a reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if TS 3.0 of Amendment 15 was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the text of TS 3.0, Section 3, "LCO and SR Applicability," is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet the specification could result in reduced margin of safety in cask operations. The staff confirmed that there were no changes made to the text of the TS. Thus, the staff concluded that there were no modifications of the CoC requirements.

Therefore, the staff finds acceptable incorporating the text of TS 3.0 of Amendment 15 as TS 3.0, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16.

3.2.3.2 Form No. 22. I.D. TS-3.1.1, DSC bulkwater removal medium and vacuum drying pressure.

(a) Proposed Change

The applicant proposed to retain the text of TS 3.1.1, "DSC Bulkwater Removal Medium and Vacuum Drying Pressure," of Amendment 15 (NRC, 2018), verbatim, in Appendix B of the CoC, Section 3, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," for Amendment 16. TS 3.1.1 of Amendment 15 specifies the medium and pressure for DSC drying. In addition, the applicant identified a potential risk in reducing the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if the text of TS 3.1.1 was removed.

(b) Evaluation of Change

The staff confirmed that the text of TS 3.1.1 of Amendment 15 is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet the specification could result in a reduced margin of safety in cask operations. The staff confirmed that no changes were made to the text or location of TS 3.1.1. Thus, the staff concluded that there are no modifications of the CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated as TS 3.1.1, "DSC Bulkwater Removal Medium and Vacuum Drying Pressure," of Amendment 16.

3.2.3.3 Form No. 23. I.D. TS-3.1.2, DSC Helium backfill pressure.

(a) Proposed Change

The applicant proposed to retain the text of TS 3.1.2, "DSC Helium Backfill Pressure," of Amendment 15 (NRC, 2018), verbatim, in Appendix B, Section 3, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16. TS 3.1.2 of Amendment 15 specifies the helium backfill pressure for vacuum drying of DSCs. In addition, the applicant identified the potential risk in reducing the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this TS was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet the specification could result in a reduced margin of safety in cask operations. The staff confirmed that no changes were made to the text of TS 3.1.2 of Amendment 15. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated as TS 3.1.2, "DSC Helium Backfill Pressure," of Amendment 16.

3.2.3.4 Form No. 24. I.D. TS-3.1.3, Time limit for completion of DSC transfer (only DSC 24PTH, 61BTH Type 2, 32PTH1, 69BTH, or 37PTH).

(a) Proposed Change

The applicant proposed to retain the text of TS 3.1.3, "Time Limit for Completion of DSC Transfer (24PTH, 61BTH Type 2, 32PTH1, 69BTH, or 37PTH DSC only)," of Amendment 15 (NRC, 2018) in Appendix B of the CoC, Section 3, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," for Amendment 16. TS 3.1.3 of Amendment 15 specifies the time limit for completion of DSC transfers. In addition, the applicant identified the potential risk in reducing the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this TS was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet this limit could result in reducing the margin of safety in cask operations. The TS 3.1.3 of Amendment 15 was approved based on the staff's detailed technical review (NRC, 2018). The staff confirmed that no changes were made to the text of TS 3.1.3 of Amendment 15. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated as TS 3.1.3, "Time Limit for Completion of DSC Transfer (24PTH, 61BTH Type 2, 32PTH1, 69BTH, or 37PTH DSC only)," of Amendment 16.

3.2.3.5 Form No. 25. I.D. TS-3.1.4, HSM maximum air exit temperature with a loaded DSC.

(a) Proposed Change

The applicant proposed to relocate the text of TS 3.1.4, "HSM Maximum Air Exit Temperature with a Loaded DSC," of Amendment 15 (NRC, 2018) to Appendix A of the CoC, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16. TS 3.1.4 ensures that the HSM concrete temperatures and fuel cladding temperatures remain below the TS limits. In addition, the applicant identified potential risk in reducing the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to meet the specification could result in reduced margin of safety in cask operations. Furthermore, the staff concluded that the relocation is appropriate because the requirement of the TS of Amendment 15 is a one-time action item, until equilibrium is achieved, and thus it should be incorporated as an ITE in the new Appendix A of the CoC. The staff reviewed the form of the new ITE and verified that the proposed text retained the intent and requirements of the original TS. Thus, the staff concluded that there is no modification of the CoC requirements.

Therefore, the staff finds this proposed change acceptable. The TS has been incorporated as ITE 4.4, "HSM Maximum Air Exit Temperature with a Loaded DSC," of Amendment 16.

3.2.3.6 Form No. 26. I.D. TS-3.2.1, Cask and criticality control.

(a) Proposed Change

The applicant proposed to retain the text of TS 3.2, "Cask Criticality Control," of Amendment 15 (NRC, 2018) in Appendix B, Section 3.0, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16. TS 3.2 specifies the boron concentration in water during loading and unloading operations for DSCs. The applicant evaluated the change pursuant to the evaluation criteria and concluded that there is a potential increase in risk of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because the minimal soluble boron concentration requirement is a key parameter to control during loading and unloading operations of the cask to ensure that the cask remains subcritical. Removing or lowering this limit would result in an increase in the probability of a criticality accident and a reduced margin of safety for operations. The staff verified that no changes were made to the text of the former TS. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated as LCO 3.2.1 in Appendix B, Section 3.0, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16.

3.2.4 Section 4.0, "Administrative Controls" (Evaluation Form Nos. 27 to 54)

3.2.4.1 Form No. 27. I.D. TS-4.0, Design features.

(a) Proposed Change

The applicant proposed to delete the introductory text of TS 4.0, "Design Features," of Amendment 15. (TN, 2019a)

The current leading paragraph of TS 4.0 of Amendment 15 states the following:

> "The specifications in this section include the design characteristics of special importance to each of the physical barriers and to maintenance of safety margins in the Standardized NUHOMS® System design. The principal objective of this section is to describe the design envelope that may constrain any physical changes to essential equipment. Included in this section are the site environmental parameters that provide the bases for design but are not inherently suited for description as LCOs." (NRC, 2018)

(b) Evaluation of Change

The staff reviewed the introductory text of former TS 4.0, "Design Features," and finds that the text is not within the scope of the evaluation criteria (see Table 2.1) because it does not address any criteria related to the TS. Additionally, the staff verified that the introductory text in the specification is not required by regulation. Thus, the staff concluded that the deletion of the information does not modify CoC requirements.

Therefore, the staff finds the deletion of the text of TS 4.0 in Amendment 16 of the CoC acceptable.

3.2.4.2 Form No. 28. I.D. TS-4.1, Canister criticality control (first paragraph and table).

(a) Proposed Change

The applicant proposed to delete the text of the first paragraph of TS 4.1, "Canister Criticality Control," of Amendment 15 (NRC, 2018) and move the table, listing of the applicable TS (i.e., specifying the boron, natural boron, or B-10 areal densities), to Appendix A, ITE 2.0, "Inspections, Tests, and Evaluations for Canister Criticality Control," of Amendment 16. (TN, 2019a)

TS 4.1, "Canister Criticality Control," requires the minimum natural boron or B-10 areal density, and it is a key design feature to provide assurance for the system to remain sub-critical. The applicant states that this information is for manufacture control and, therefore, it is more appropriate to be in the ITE section of the TS. For that reason, the applicant proposed to integrate the table as an ITE item. The applicant also identified potential risk in reducing the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification were to be removed from the TS.

In addition, the applicant expanded the table to include DSCs 24P, 24PHB, and 52B for completeness of the listing of all DSC designs because TS 4.1 of Amendment 15 does not include these three DSCs because they do not take credit for the boron in the component or contents. For clarity, the applicant added an explanation that these DSCs do not take credit for boron content in neutron absorber plates or poison rod assemblies even though boron exist in these components or content.

(b) Evaluation of Change

The staff reviewed the proposed changes. The staff confirmed that deletion of the text from the first paragraph of TS 4.1 of Amendment 15 is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because the text is not necessary for safe operation of the cask system. Additionally, the text is not needed for compliance with regulatory requirements. Thus, the staff concluded that deletion of the text does not modify CoC requirements.

The staff also reviewed and confirmed that the information in the table proposed to be relocated is within the scope of the evaluation criteria for retention in the CoC because meeting the boron (i.e., natural boron or B-10 as specified) areal density criteria ensures the criticality safety function of the cask. Without the specifications for natural boron or B-10 areal density, criticality safety will not be assured.

The staff verified that ITE 2.0 of Amendment 16 contained all the information in the table of TS 4.1 of Amendment 15. The addition of DSC modules 24P, 24PHB, and 52B is for completeness of the listing of all DSCs that contain boron (i.e., natural boron or B-10) even though these DSC designs do not take credit for the boron contents. The staff also confirmed that ITE 2.0 specifies that the 24P and 24PHB DSCs do not use neutron absorber plates and 52B uses borated stainless steel with a minimum natural boron areal density of 16 milligrams per square centimeter (mg/cm^2). The staff reviewed the form of the new ITE and finds that all the boron areal density requirements for each cask design for fuel type and enrichment is included in the ITE 2.0. Because the boron areal density specified in ITE 2.0 remains the same as in Amendment 15 (NRC, 2018), the staff concluded that there is no modification to the CoC requirements.

Therefore, the staff finds the changes acceptable and the changes are incorporated into ITE 2.0 in Amendment 16.

3.2.4.3 Form No. 29. I.D. TS-4.1, Canister criticality control (Notes and proposed alternatives provision).

(a) Proposed Change

In addition to the proposed changes discussed in Form No. 28, the applicant also proposed to remove the seven notes associated with the table for neutron poison plate boron content acceptance testing criteria in the text of TS 3.3, “Canister Criticality Control,” of Amendment 15 (NRC, 2018). The

FSAR sections referenced in the seven notes of TS 3.3, Amendment 15, include the following information concerning the various neutron poison plates:

(i) Production of materials of construction and final material composition for:

(A) borated aluminum,

(B) boron carbide/aluminum metal matrix composites (MMC), and

(C) boral.

(ii) Visual inspection of the neutron absorbers:

(A) percentage inspected in accordance with the NRC-approved QA program,

(B) inspection criteria, and

(C) instructions (rework, repair, or scrap).

(iii) Acceptance testing of the neutron absorbers:

(A) content by neutron transmission, and

(B) B-10 volume density measurement.

(iv) Qualification tests and examinations for:

(A) mechanical integrity, and

(B) uniform B-10 volume.

(v) Key material processing changes subject to qualification:

(A) adversely affecting uniform distribution of boron carbide,

(B) reducing the density,

(C) reducing corrosion resistance, and

(D) reducing mechanical strength or ductility of the MMC. (TN, 2019a and d)

(b) Evaluation of Change

The staff reviewed the proposed changes regarding deletion of the notes and finds that these are not within the scope of the evaluation criteria (see Table 2.1 of this SER) for retention for the following reasons:

(i) The neutron poison plate minimum boron areal density requirement in Appendix A, Section 2.0, “Inspections, Tests, and Evaluations for Canister Criticality Control,” of Amendment 16 provides enough detail to ensure subcriticality of the NUHOMS® spent fuel storage system.

(ii) The incorporation of the specific acceptance criteria for the various neutron poison plates is subject to quality assurance (QA) of the manufacturing process.

The staff determined that incorporating the acceptance tests criteria included in the FSAR by reference in Appendix B of the CoC, Amendment 15, is redundant, and thus unnecessary for retention.

The staff also determined that removal of the neutron absorber plate material production process, identified above, does not adversely impact the safety of the system key design parameter, the minimum B-10 areal density, because it shall continue to be subject to qualification, including following any key material processing changes identified above and prior to use. Furthermore, changes to the neutron absorber material production process are subject to the 72.48 process, the NRC-approved QA program, and NRC inspections. The staff also concluded that, because of these other existing requirements, the removal of the notes does not result in substantive changes to the CoC requirements.

Therefore, the staff finds acceptable moving the references related to the acceptance test criteria related to the B-10 areal density to the FSAR .

3.2.4.4 Form No. 30. I.D. TS-4.2.1, Codes and standards/Horizontal storage module (HSM) (first two paragraphs).

(a) Proposed Change

The applicant proposed to move the first two paragraphs of TS 4.2.1, “Codes and Standards / Horizontal Storage Module (HSM),” of Amendment 15 (NRC, 2018) from the TSs to the new CoC Conditions Section II, "Design Features,” of Amendment 16. In addition, the applicant evaluated the potential increase in the probability or consequences of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this specification was removed.

The first two paragraphs of TS 4.2.1 of Amendment 15 states the following:

> “The Standardized HSM and HSM-H reinforced concrete are designed to meet the requirements of ACI 349-85 and ACI 349-97 Editions, respectively.
>
> Load combinations specified in ANSI 57.9-1984, Section 6.17.3.1, are used for combining normal operating, off-normal, and accident loads for the HSM.” (NRC, 2018)

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because it defines codes and standards, which are fundamental for the safety of the design, and because failure to meet the condition could result in an increase in the probability or consequence of an accident. The staff confirmed that the relocation of the information improves the CoC by adding clarity. Additionally, because there is no change to the requirement itself, the staff concluded that there is no modification of the CoC requirement.

Therefore, the staff finds the proposed change acceptable and it is incorporated in the CoC Conditions Section II, “Design Features,” Subsection II.1.a, of Amendment 16.

3.2.4.5 Form No. 31. I.D. TS-4.2.1, Codes and Standards/Horizontal storage module (HSM) (third paragraph).

(a) Proposed Change

The applicant proposed to move the third paragraph of TS 4.2.1, “Codes and Standards / Horizontal Storage Module (HSM),” of Amendment 15 (NRC, 2018), which establishes HSM requirements for salt water marine atmospheres, from the TSs to the new CoC Conditions Section II, "Design Features,” of Amendment 16. In addition, the applicant evaluated the potential increase in the probability or consequences of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER), because failure to specify applicability would result in an increase in the probability or consequence of an accident, and lack of this information would lead to a reduced margin of safety for operations. Furthermore, the change falls within the scope of the evaluation criteria because it establishes material requirements, which are fundamental for the safety of the design. The staff confirmed that the relocation of the information was appropriate because it improved the CoC by adding clarity. The staff concluded that, because no changes were made to the text of TS 4.2.1, the relocation of the TS does not modify the CoC requirements.

Therefore, the staff finds the change acceptable and it is incorporated in the CoC Conditions Section II, “Design Features,” Subsection II.1.a, of Amendment 16.

3.2.4.6 Form No. 32. I.D. TS-4.2.2, Codes and standards/Dry shielded canister (DSC).

(a) Proposed Change

The applicant proposed to move TS 4.2.2, “Codes and Standards / Dry Shielded Canister (DSC),” of Amendment 15 (NRC, 2018) to the CoC Conditions Section II, "Design Features,” of Amendment 16. TS 4.2.2 includes lists of the codes and standards applicable to the different DSCs. In addition, the applicant evaluated the potential increase in the probability or consequences of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to specify applicability would result in an increase in the probability or consequence of an accident, and lack of this information would lead to a reduced margin of safety for operations. Furthermore, the change falls within the evaluation criteria because it defines codes and standards, which are fundamental for the safety of the design. The staff determined that the relocation of the text was appropriate because it improved the clarity of the CoC.

Additionally, the staff confirmed that the only change to the text was the deletion of the statement that code alternatives are discussed in TS 4.2.4 of Amendment 15 (NRC, 2018). This change is acceptable because of the addition of Appendix C, “ASME Code Alternatives,” and Subsection II.1.d of Amendment 16. Subsection II.1.d includes the following statement:

> “ASME Code alternatives for DSC pressure boundary or confinement boundary components, DSC basket assembly components, and TC components, can be found in CoC Appendix C.” (TN, 2019a)

The staff confirmed that no other changes were made to the text of the TS, and thus the proposed changes do not modify CoC requirements.

Therefore, the staff finds the change acceptable and it is incorporated in the CoC Conditions Section II, “Design Features,” Subsection II.1.b, of Amendment 16.

3.2.4.7 Form No. 33. I.D. TS-4.2.3, Codes and standards/Transfer canister (TC) (first two paragraphs and table).

(a) Proposed Change

The applicant proposed to move the first two paragraphs and table of TS 4.2.3, "Codes and Standards / Transfer Cask (TC),” of Amendment 15 (NRC, 2018), which lists codes and standards applicable to the TCs, to the CoC Conditions Section II, "Design Features,” of Amendment 16 (TN, 2019a). In

addition, the applicant evaluated the potential increase in risk of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER), because failure to specify applicability would result in an increase in the probability or consequence of an accident, and lack of this information would lead to a reduced margin of safety for operations. Furthermore, the change falls within the evaluation criteria because it defines codes and standards, which are fundamental for the safety of the design. The staff determined that the relocation of the text was appropriate because it improved the clarity of the CoC.

Additionally, the staff confirmed that the only change to the text was the deletion of the statement that code alternatives are discussed in TS 4.2.4 of Amendment 15 (NRC, 2018). The staff finds this change acceptable because of the addition of Appendix C, "ASME Code Alternatives," and Subsection II.1.d in Amendment 16 (TN, 2019a). Subsection II.1.d includes the following statement:

> "ASME Code alternatives for DSC pressure boundary or confinement boundary components, DSC basket assembly components, and TC components, can be found in CoC Appendix C." (TN, 2019a)

The staff concluded that no other changes were made to the text of the TS, and thus the change does not modify CoC requirements.

Therefore, the staff finds the change acceptable and it is incorporated in the new CoC Conditions Section II, "Design Features," Subsection II.1.c, of Amendment 16.

3.2.4.8 Form No. 34. I.D. TS-4.2.3, Codes and standards/Transfer canister (TC) (last two paragraphs).

(a) Proposed Change

The applicant proposed to move the last two paragraphs of TS 4.2.3, "Codes and Standards / Transfer Cask (TC)," of Amendment 15 (NRC, 2018) to the CoC Conditions Section II, "Design Features," of Amendment 16. TS 4.2.3 includes the lists of the codes and standards applicable to the OS197L TC shielding. In addition, the applicant evaluated the potential increase in risk of a previously evaluated accident [evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to specify applicability would result in an increase in the probability or consequence of an accident, and lack of this information would lead to a reduced margin of safety for operations. Furthermore, the change falls within the evaluation criteria because it defines codes and standards, which are fundamental for the safety of the design. The staff determined that the relocation of the text was appropriate under the new format of the CoC as it improved the clarity of the CoC. Additionally, the staff confirmed that no changes were made to the text of the TS. Thus, the staff concluded that the change does not modify CoC requirements.

Therefore, the staff finds the change acceptable and it is incorporated in the CoC Conditions Section II, “Design Features,” Subsection II.1.c, of Amendment 16.

3.2.4.9 Form No 35. I.D. TS-4.2.4, American Society of Mechanical Engineers (ASME) code alternatives.

(a) Proposed Change

The applicant proposed to move the tables of ASME Code alternatives contained in TS 4.2.4, “ASME Code Alternatives,” of Amendment 15 (NRC, 2018) to Appendix C, “ASME Code Alternatives,” of Amendment 16. In addition, the applicant proposed to retain the statement specifying requirements for proposals and approvals of alternatives to ASME Codes in the CoC Conditions Section II, "Design Features,” of Amendment 16. (TN, 2019a)

According to the applicant’s proposal, the new Appendix retains all the code alternative information previously contained in TS 4.2.4 of Amendment 15. There is no change to the requirements.

The only information not contained in the new Appendix C is the statement specifying requirements for proposals and approvals of alternatives to ASME codes. This information has been retained, verbatim, in CoC Conditions Section II, "Design Features,” Subsection II.1.d, “ASME Code Alternatives,” of Amendment 16.

(b) Evaluation of Change

The staff confirmed that the proposed changes are within the scope of the evaluation criteria (see Table 2.1 of this SER) because review and approval of code alternatives forms part of the certification basis. CoC Conditions Section II, “Design Features,” Subsection II.1.d, of Amendment 16 will provide a statement indicating that ASME code alternatives are presented in a new Appendix C to the CoC. Furthermore, the text, which outlines the process for obtaining approvals for proposed changes to code alternatives, is

retained. There is no change to the requirement itself. Thus, the staff concluded that the change does not modify CoC requirements.

Therefore, the staff finds the proposal acceptable and it is incorporated into a Appendix C, “ASME Code Alternatives”, and in CoC Conditions Section II, "Design Features,” of Amendment 16.

3.2.4.10 Form No. 36. I.D. TS-4.3 and 4.3.1, Storage location design features – storage configuration.

(a) Proposed Change

The applicant proposed to move the storage configuration design features of TS 4.3 and 4.3.1, “Storage Location Design Features – Storage Configuration,” of Amendment 15 (NRC, 2018) to the CoC Conditions Section II, "Design Features,” of Amendment 16. In addition, the applicant evaluated the potential increase in the probability or consequences of a previously evaluated accident [(evaluation criterion No. 8 (see Table 2.1 of this SER)], and reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because failure to specify applicability would result in an increase probability or consequence of an accident, and lack of this information would lead to a reduced margin of safety for operations. The staff determined that the relocation of the text was appropriate because it adds clarity to the CoC. This TS belongs in CoC Conditions Section II, "Design Features,” of Amendment 16 because it defines geometric arrangements, which are fundamental for the safety of the design. The staff verified that no changes were made to the text of the TS. Thus, the staff concluded that the change does not modify CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated in the CoC Conditions Section II, “Design Features,” Subsections II.2 and II.2.a of Amendment 16.

3.2.4.11 Form No. 37. I.D. TS-4.3.2, Concrete storage pad properties to limit DSC gravitational loadings due to postulated drops.

(a) Proposed Change

The applicant proposed to delete the text of TS 4.3.2, “Concrete Storage Pad Properties to Limit DSC Gravitational Loadings Due to Postulated Drops,” of Amendment 15 (NRC, 2018), which states the following:

> “TC/DSC has been evaluated for drops of up to 80 inches onto a reinforced concrete storage pad.” (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that this text from TS 4.3.2 is not within the scope of the evaluation criteria and can be removed because removal of it will not result in a significant increase in the probability or consequences of an accident previously evaluated in the FSAR. An administrative limit was imposed to limit TC/DSC lifting heights in TS 5.3.1 of Amendment 15, which is retained in the new TS 4.4.1, "TC/DSC Lifting/Handling Height Limits," Appendix B of the CoC, Amendment 16. The applicant stated, and the staff confirmed, that the FSAR already contains an analysis of the cask drop accident that includes bounding drop scenarios showing that the TC will maintain structural integrity for an 80-inch drop height (NRC, 1994) to support the previous administrative limits of TS 5.3.1 of Amendment 15 (new TS 4.4.1). Accordingly, this TS is duplicative of information presented in the FSAR. Thus, the staff concludes that the proposed deletion from this TS does not modify CoC requirements.

Therefore, the staff finds deletion of TS 4.3.2 acceptable.

3.2.4.12 Form Nos. 38 to 48. I.D. TS-4.3.3-1 to TS-4.3.3-11, Site-Specific Parameters and Analyses.

(a) Proposed Change

The applicant proposed to move the listed TS requirements to the new CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System."

(b) Evaluation of Change

The staff verified that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because the certification basis requires that the user verify that site-specific conditions are bounded by the enveloping design basis in the FSAR. The requirements of the TS of Amendment 15 were appropriate to be incorporated as ITEs, because each required evaluation, and associated acceptance criteria, are necessary and sufficient to provide reasonable assurance that, if the ITE are performed and the acceptance criteria are met, a cask has been manufactured and will operate in conformance with the certified design. The requirements were not changed. Thus, the staff concluded that the change does not modify CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated in ITE 3.1, "Site-Specific Parameters and Analyses," in Appendix A of Amendment 16.

3.2.4.13 Form No. 49. I.D. TS-4.4, Transfer cask design features (OS197L TC use with DSC models 61BT and 32PT).

(a) Proposed Change

The applicant proposed to move the text of TS 4.4, "TC Design Features," of Amendment 15 (NRC, 2018) to the CoC Conditions Section II, "Design

Features," Amendment 16 and delete the heat load limits in TS 4.4, which are redundant to the TS Figures. TS 4.4 includes the lists of requirements for the OS197L TC. In addition, the applicant identified the potential reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification in the text of TS 4.4 was removed.

(b) Evaluation of Change

The staff confirmed that the text, which lists requirements for the OS197L TC, is within the scope of the evaluation criteria (see Table 2.1 of this SER) because lack of this information would lead to a reduced margin of safety for operations. The staff concluded that the relocation of the TS to the CoC Conditions Section II, "Design Features," of Amendment 16 is appropriate because it defines features, which are fundamental for the safety of the design. The applicant proposed to include these requirements, verbatim, under the new CoC, except for the inclusion of heat load limits, which were identified as redundant to some TS Figures. The staff verified that the heat load limits were redundant to TS Figures 1-29 and 1-30 (the figure numbers have not changed in Amendment 16 to the CoC). No other changes were made to the text of the TS. Thus, the staff concluded that the proposed changes do not modify CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated in the CoC Conditions Section II, "Design Features," Subsection II.3.b, of Amendment 16.

3.2.4.14 Form No. 50. I.D. TS-4.4.1, Transfer cask design features (decontamination area shielding and trailer shielding).

(a) Proposed Change

The applicant proposed to move the text of TS 4.4.1, "TC Design Features," of Amendment 15, which outlines shielding requirements for the OS197L TC, to the CoC Conditions Section II, "Design Features," of Amendment 16. In addition, the applicant identified the potential reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER), because lack of this information would lead to a reduced margin of safety for operations. The staff concluded that relocation of this TS into CoC Section II, "Design Features," of Amendment 16 is appropriate because it defines features, which are fundamental for the safety of the design. No changes were made to the text of the TS. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposed change acceptable and it is incorporated in the new CoC Conditions Section II, "Design Features," in Subsections II.3.b and II.3.b.1 of Amendment 16.

3.2.4.15 Form No. 51. I.D. TS-4.4.2, Transfer cask design features (remote handling).

(a) Proposed Change

The applicant proposed to move the text of TS 4.4.2, “TC Design Features,” of Amendment 15 (NRC, 2018), which requires the bare OS197L TC to be handled using remote operations, to the CoC Conditions Section II, "Design Features,” of Amendment 16 and to add a clarification that this requirement only applies when the TC is carrying a loaded DSC. In addition, the applicant identified the potential reduction in the margin of safety [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the changes were within the scope of the evaluation criteria (see Table 2.1 of this SER) because lack of this information would lead to a reduced margin of safety for operations. The staff concluded that the relocation of this TS into CoC Section II, "Design Features,” of Amendment 16 is appropriate because it defines features fundamental for the safety of the design. The only change to the requirement text is revising the second sentence to clarify that this requirement only applies when the TC is carrying a loaded DSC. Because an unloaded TC does not require remote operation, the staff finds that this clarification is helpful to deter unnecessary remote operations and the edit, therefore, improves the CoC. With no changes to the text other than clarifications, the staff concluded that the proposed changes do not modify the CoC requirements.

Therefore, the staff finds the proposed changes acceptable and the text of TS 4.4.2 of Amendment 15 (NRC, 2018) is incorporated in the new CoC Conditions Section II, “Design Features,” Subsection II.3.b.2, of Amendment 16.

3.2.4.16 Form No. 52. I.D. TS-4.4.3, Transfer cask design features (outer top shield)

(a) Proposed Change

The applicant proposed to move the text of TS 4.4.3, “TC Design Features,” of Amendment 15 (NRC, 2018) to the CoC Conditions Section II, "Design Features,” of Amendment 16. TS 4.4.3 governs the placement of the “Outer Top Shield” of the “Transfer Trailer Shield” on the loaded OS197L TC. In addition, the applicant identified the potential reduction in the margin of safety for ISFSI or cask operation [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because, if removed, it would have the potential to reduce the margin of safety for cask

operation. The staff determined that relocation of this TS into CoC Conditions Section II, "Design Features," of Amendment 16 is appropriate because this section defines features that are fundamental for the safety of the design. No changes were made to the text of the TS. Thus, the staff concluded that the changes do not result in modifications to the CoC requirements.

Therefore, the staff finds the proposed change acceptable with the incorporation of the text into the new CoC Conditions Section II, “Design Features,” in Subsection II.3.b.3 of Amendment 16.

3.2.4.17 Form No. 53. I.D. TS-4.4.4, Transfer cask design features (outer top trailer shield).

(a) Proposed Change

The applicant proposed to move the text of TS 4.4.4, “TC Design Features,” of Amendment 15 (NRC, 2018), which requires monitoring and remediation of leakage from the OS197L TC neutron shield, to the CoC Conditions Section II, "Design Features,” of Amendment 16. In addition, the applicant identified the potential reduction in the margin of safety for ISFSI or cask operation [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because if removed, it would have the potential to reduce the margin of safety for cask operation. The staff determined that relocation of this TS into CoC Section II, "Design Features,” of Amendment 16 is appropriate because this section defines features that are fundamental for the safety of the design. No changes were made to the text of the TS. Thus, the staff concluded the proposed change does not modify the CoC requirements.

Therefore, the staff finds acceptable the proposed change including incorporation of the text into the new CoC Conditions Section II, “Design Features,” Subsection II.3.b.4 of Amendment 16.

3.2.4.18 Form No. 54. I.D. TS-4.5. Leakage testing of the confinement boundary.

(a) Proposed Change

The applicant proposed to move the first sentence of TS 4.5, “TC Design Features,” of Amendment 15 (NRC, 2018), which specifies leakage testing of base metal and associated confinement boundary welds, to the new formatted CoC, Appendix A, “Inspections, Tests, and Evaluations (ITE)s for the Standardized NUHOMS® Horizontal Modular Storage System,” of Amendment 16. The applicant also proposed to delete the second sentence of TS 4.5, which states, in part, the following:

"…inner seal welds, inner top cover and port covers are tested upon closure of the loaded DSC as specified in [former] Section 5.2.4c of the Technical Specifications." (NRC, 2018)

In addition, the applicant identified the potential reduction in the margin of safety for ISFSI or cask operation [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed changes and confirmed that the text of TS 4.5 is within the scope of the evaluation criteria because, if removed, it would have the potential to reduce the margin of safety for cask operation. The staff determined that relocation of this TS into the new formatted CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16 is appropriate because this fabrication testing ensures that the cask meets the confinement criteria. The only change to the requirement text is the applicant proposal to delete the second sentence of TS 4.5. The second sentence was only a pointer to TS 5.2.4.c of Amendment 15 and did not spell out a requirement by itself. The staff determined that the language was duplicative. The staff confirmed that no other changes were made to the text of the TS. Thus, the staff concluded that the changes do not modify the CoC requirements.

Therefore, the staff finds the proposed changes acceptable including incorporation of the text in the new CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," in ITE 4.1, "Leakage Testing of the Confinement Boundary," of Amendment 16.

3.2.5 Section 5.0, "Procedures" (Evaluation Form Nos. 55 to 76)

3.2.5.1 Form No. 55. I.D. TS-5.1, Procedures.

(a) Proposed Change

The applicant proposed to retain the first paragraph of TS 5.1, "Procedures," of Amendment 15 (NRC, 2018) in the Appendix B, Section 4, "Administrative Controls," of Amendment 16 and to delete the bulleted items following the first paragraph. Additionally, the applicant proposed to move the text of the last two paragraphs, which cover fuel removal from the DSC to the "Operating Systems" sections of the FSAR for each respective DSC. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed changes to retain the first paragraph of TS 5.1 and confirmed that the changes are within the scope of the evaluation criteria for retention in the new formatted CoC (see Table 2.1 of this SER) under Section 4, "Administrative Controls," of Amendment 16. The staff determined that the first paragraph contains requirements that met the

administrative controls section of the TS, and thus retention is appropriate. The staff determined that the applicant's proposal to delete the bulleted list at the end of the first paragraph is appropriate because, although the bulleted items are a list of written procedures that are important to safety, the items are already required as a part of regulations in 10 CFR Part 72, Subpart G, and in other TSs of CoC No 1004, Amendment 16. Since the bulleted list includes activities that are redundant to the regulations and other requirements, the staff determined that removal of the bulleted items does not modify the CoC requirements.

Finally, the staff determined that applying the evaluation criteria to the language regarding fuel removal dictates moving the text from the CoC to the FSAR because the staff evaluated all the risk insights criteria to identify if this item should be retained in the CoC (see Table 2.1 of this SER). The staff concluded that moving this language into the FSAR did not result in significant risk increases. The staff also determined that relocating the details of the fuel removal procedure for each DSC into the "Operating Procedures" section of the FSAR for each DSC does not decrease the operational requirements, and therefore, relocation into the FSAR is appropriate. The staff verified that the applicant incorporated the last paragraphs of the TS of Amendment 15 in the FSAR, as updated (i.e., FSAR pages 5.1-14, K.8-18, M.8-17, P.8-17, T.8-19, U.8-18, Y.8-19, and Z.8-18). There was no other change to the requirement. Thus, the staff concluded that this relocation does not modify the CoC requirements.

Therefore, the staff finds the proposed changes acceptable for all three proposals described above.

3.2.5.2 Form No. 56. I.D. TS-5.1.1, DSC loading, unloading, and preparation program.

(a) Proposed Change

The applicant proposed to delete TS 5.1.1 of Amendment 15, "DSC Loading, Unloading and Preparation Program." (TN, 2019a)

The TS 5.1.1 text stated the following:

> "Each user of the standardized NUHOMS® System shall establish a program to implement the FSAR requirements for loading fuel and components into the DSC, unloading fuel and components from the DSC, and preparing the DSC for storage. The requirements of the programs for loading and preparing the DSC shall be complete prior to removing the DSC from the 10 CFR Part 50 structure. At a minimum, the program shall establish criteria that need to be verified to address FSAR commitments and regulatory requirements for LCOs listed in TSs 3.1.1, 3.1.2, 3.2.1, 4.3.3, 5.2.4b, 5.2.4c, 5.2.4d, 5.2.4e, 5.2.6, and 5.4.
>
> "During unloading of fuel from the DSC, appropriate precautions shall be taken to limit the oxidation of the fuel. The recommendations of ISG-22, "Potential Rod Splitting Due to Exposure to an Oxidizing Atmosphere During Short-Term Cask Loading Operations in LWR or Other Uranium

Oxide Based Fuel," Revision 0 (ISG-22), can be used as a guideline to address fuel oxidation concerns.

The program shall include compensatory measures and appropriate completion times if the program requirements are not met." (NRC, 2018)

(b) Evaluation of Change

The staff reviewed the proposed changes and verified that the TS text is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because it is duplicated by other regulations and requirements, and thus it serves no independent safety purpose.

The first paragraph of TS 5.1.1 of Amendment 15 (NRC, 2018) requires the establishment of a program to implement the FSAR, as updated, requirements for loading, unloading, and preparing a DSC. The staff confirmed that for general licensees, the regulations in 10 CFR 72.212(b)(5) and (6) require the licensee using the cask system to evaluate and determine that the cask will conform and be bounded by the conditions and requirements in the CoC, TS, and FSAR referenced in the CoC. This evaluation is documented in the general licensee's report, which addresses 10 CFR 72.212 and includes an assessment of how the DSC loading, unloading, and preparation requirements will be met. In addition, 10 CFR 72.150 requires that procedures be documented and followed for activities affecting quality, which includes the DSC loading, unloading, and preparation requirements found in the CoC, TS, and FSAR. These procedures are also required to include all the appropriate acceptance criteria to ensure that the loading, unloading, and preparation requirements found in the CoC, TS, and FSAR have been satisfactorily accomplished. In addition, the staff verified that the requirements of the TS of Amendment 15, referenced at the end of the first paragraph of TS 5.1.1 of Amendment 15, are addressed throughout the amended CoC, specifically:

(i) TS 3.1.1 of Amendment 15 is evaluated in TS-3.1.1 (Form No. 22).

(ii) TS 3.1.2 of Amendment 15 is evaluated in TS-3.1.2 (Form No. 23).

(iii) TS 3.2.1 of Amendment 15 is evaluated in TS-3.2.1 (Form No. 26).

(iv) TS 4.3.3 of Amendment 15 is evaluated in TS-4.3.3-1 (Form No. 38) through TS-4.3.3-11 (Form No.48).

(v) TS 5.2.4b of Amendment 15 is evaluated in TS-5.2.4b (Form No. 64).

(vi) TS 5.2.4c of Amendment 15 is evaluated in TS-5.2.4c (Form No. 65).

(vii) TS 5.2.4d of Amendment 15 is evaluated in TS-5.2.4d (Form No. 66).

(viii) TS 5.2.4e of Amendment 15 is evaluated in TS-5.2.4e (Form No. 67).

(ix) TS 5.2.6 of Amendment 15 is evaluated in TS-5.2.6 (Form No. 69).

(x) TS 5.4 of Amendment 15 is evaluated in TS-5.4 (Form No. 74).

The FSAR includes loading, unloading, and preparation procedures for every DSC. Therefore, the staff finds this language redundant to the above referenced regulatory and TS requirements. The staff also finds acceptable the deletion of the text pertaining to the first paragraph of TS 5.1.1 of Amendment 15.

The applicant identified a redundancy of the second paragraph of TS 5.1.1 of Amendment 15 to TS 3.1.1, "DSC Bulkwater Removal Medium and Vacuum Drying Pressure." This TS specifies that helium be used for drainage of the DSCs and establishes vacuum pressure requirements. The second paragraph aims to limit oxidation of fuel. The staff reviewed the ISG-22, Revision 0 (ISG-22), to determine the applicability of the fuel oxidation guideline. The staff found that the applicable recommendation is to use an "appropriate environment such as argon (Ar), nitrogen (N_2), or helium (He) to prevent oxidation." Because TS 3.1.1 already requires use of helium for drainage of the DSC, the staff finds this language redundant and finds deletion of the text acceptable.

The third paragraph requires compensatory measures and appropriate completion times for loading, unloading and preparation requirements. Any loading, unloading, or preparation requirements that would require compensatory measures and completion times are already included in the TS LCOs, which have standard actions and associated completion times. Therefore, the staff finds the third paragraph redundant to current TS LCO requirements and deletion of the text acceptable.

Because all these items are redundant to other requirements, the staff concluded that the changes do not modify the CoC requirements.

Therefore, the staff finds the proposed changes acceptable.

3.2.5.3 Form No. 57. I.D. TS-5.1.2, Independent Spent Fuel Storage Installations (ISFSI) operations program.

(a) Proposed Change

The applicant proposed to delete items 1 and 3 of TS 5.1.2, "ISFSI Operations Program," of Amendment 15 (NRC, 2018), and incorporate item 2 into Appendix B, Section 4, "Administrative Controls," of Amendment 16. (TN, 2019a)

The TS of Amendment 15 stated the following:

> "A program shall be established to implement the FSAR requirements for ISFSI operations.
>
> At a minimum, the program shall verify that:

1. The HSMs are placed together in single rows or back-to-back arrays in accordance with the storage configuration specified in Technical Specification 4.3.1.
2. The concrete storage pad parameters are consistent with the FSAR analysis.
3. The maximum lifting heights for the cask system meet Technical Specification 5.3.1 requirements." (NRC, 2018)

(b) Evaluation of Change

The staff reviewed the proposed changes to delete items 1 and 3 of TS 5.1.2, "ISFSI Operations Program," of Amendment 15, and incorporate item 2 into Appendix B of Amendment 16. The staff verified that item 2 is within the scope of the evaluation criteria (see Table 2.1 of this SER) for retention in the new format of the CoC under Section 4, "Administrative Controls," of Amendment 16. The staff reached this conclusion because the information contains requirements that met the administrative controls section of the TS, and thus retention is appropriate. The staff also concluded that merging the information into the new TS is appropriate based upon the format of the new CoC. Because there was no change in the requirement, the staff determined that the proposal to merge the item with TS 5.3.1 does not result in substantive changes to the CoC requirements.

The staff reviewed the proposed changes to delete the text in items 1 and 3 and confirmed that the text regarding items 1 and 3 is redundant. Thus, the text is not required to be retained because it serves no independent safety function. Item 1 of TS 5.1.2 of Amendment 15 is a verification to ensure that TS 4.3.1 of Amendment 15 is met. TS 4.3.1 of Amendment 15 is incorporated as a requirement in the new CoC Conditions Section II, "Design Features," in Subsection II.2.a of Amendment 16, which makes TS 5.1.2, item 1, a duplicative requirement. Similarly, item 3 is a verification that the maximum lifting heights for the cask system meet the requirements of TS 5.3.1. The applicant incorporated TS 5.3.1 of Amendment 15 in the new TS 4.4.1.A (fourth bullet) in Appendix B, Section 4, "Administrative Controls," of Amendment 16. Because items 1 and 3 are duplicative of existing requirements, the staff concluded that deletion of these items does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the proposed changes acceptable. Item 2 of TS 5.1.2 of Amendment 15 is incorporated into the new TS 4.4.1.C in Amendment 16.

3.2.5.4 Form No. 58. I.D. TS-5.2, Programs - Introduction

(a) Proposed Change

The applicant proposed to retain and move the text of TS 5.2, "Programs - Introduction," of Amendment 15 (NRC, 2018), which introduces the programs that need to be implemented by a licensee, to Appendix B of the CoC, Section 4, "Administrative Controls," under TS 4.3, "Programs," of Amendment 16. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed changes and confirmed that the text is within the scope of the evaluation criterion (see Table 2.1 of this SER) for administrative controls because it introduces the required programs, which include the organization and management of procedures. The staff notes that the "10 CFR 72.48 Evaluation Program" (see Form No. 59), "Training Program" (see Form No. 60), and "HSM Thermal Monitoring Program" (see Form No. 68) are no longer included under this TS in accordance with staff's determinations in this safety evaluation. The staff concluded that these changes do not change the intent of the text. Thus, the changes do not result in substantive changes to the CoC requirements. Additionally, the staff concludes that moving the text is appropriate based upon the new format of the CoC.

Therefore, the staff finds the change acceptable, and it is incorporated into the new TS Section 4.3, "Programs."

3.2.5.5 Form No. 59. I.D. TS-5.2.1, 10 CFR 72.48 Evaluation Program

(a) Proposed Change

The applicant proposed to delete TS 5.2.1, "10 CFR 72.48 Evaluation Program," of Amendment 15 (NRC, 2018) because it is a duplication of regulatory requirements. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and determined that the TS text is within the scope of the evaluation criteria (see Table 2.1 of this SER) for moving from the CoC to the FSAR because the staff evaluated all the risk insights criteria [i.e., criteria 8 to 10 (see Table 2.1 of this SER)] to identify if this item should be retained in the CoC. Although the evaluation indicates the text should be retained, the staff verified that the previous TS-5.2.1 is a restatement of the regulations in 10 CFR 72.48, "Changes, tests, and experiments," and thus it is redundant to a regulatory requirement. Because of this redundancy, the staff concluded that the deletion of the text does not modify CoC requirements.

Therefore, the staff finds the proposed change acceptable.

3.2.5.6 Form No. 60. I.D. TS-5.2.2, Training Program

(a) Proposed Change

The applicant proposed to move the text from TS 5.2.2, "Training Program," of Amendment 15 (NRC, 2018) to the FSAR for Amendment 16. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and determined that the TS text is within the scope of the evaluation criteria (see Table 2.1 of this SER) for moving from the CoC to the FSAR because the staff evaluated all the risk insights criteria [i.e., criteria 8 to 10 (see Table 2.1 of this SER)] to identify if this item should be retained in the CoC. Although the evaluation indicates the text should be retained, the staff noted that the text is redundant to a regulatory requirement in 10 CFR 72.44(b)(4), which requires licensees, in part, to "…have an NRC-approved program in effect that covers the training and certification of personnel…" The staff also noted that details for training programs are not usually included in the TS. The staff verified that details in the TS 5.2.2 of Amendment 15 are now included in Chapter 9, under Subsection 9.3, "Training Program," in the FSAR. There was no change to the training program text. Thus, the staff concluded that relocating the text into the FSAR does not change CoC requirements.

Therefore, the staff finds the change acceptable, and the text from TS 5.2.2 of Amendment 15 is now incorporated in the FSAR, as updated.

3.2.5.7 Form No. 61. I.D. TS-5.2.3, Radiological environmental monitoring program.

(a) Proposed Change

The applicant proposed to retain the text of TS 5.2.4, "Radiological Environmental Monitoring Program," of Amendment 15 (NRC, 2018), which establishes requirements to verify dose and effluent compliance while using the cask system. The applicant identified Appendix B, Section 4, "Administrative Controls," of Amendment 16 as the appropriate CoC section to incorporate TS 5.2.4. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criterion for administrative controls (see Table 2.1 of this SER) because the requirements are administrative controls on operational safety limits that verify that the annual dose equivalent to an individual located outside the ISFSI does not exceed annual dose limits. The staff concluded that relocating the text to TS Section 4 is appropriate under the new CoC format, and that because the text did not change, there are no modifications to the CoC requirements.

Therefore, the staff finds the change acceptable, and the relocated text is incorporated into the new TS 4.3.1, "Radiological Environmental Monitoring Program," of Amendment 16.

3.2.5.8 Form No. 62. I.D. TS-5.2.4, Radiological protection program (introductory paragraph).

(a) Proposed Change

The applicant proposed to delete the introductory text of TS 5.2.4, "Radiation Protection Program," of Amendment 15 (NRC, 2018), which states the following:

> "The Radiation Protection Program shall establish administrative controls to limit personnel exposure to As Low As Reasonably Achievable (ALARA) levels in accordance with 10 CFR Part 20 and Part 72." (NRC, 2018)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the introductory text of TS 5.2.4 of Amendment 15 is within the scope of the evaluation criterion for administrative controls (see Table 2.1 of this SER) because the requirements are administrative controls on operational safety limits. However, the previous TS 5.2.4 introductory paragraph reflected existing regulatory requirements spelled out in 10 CFR Part 20 and Part 72. The staff verified that the text was duplicative of a regulatory requirement, and thus deletion of the TS does not modify CoC requirements. Therefore, the staff finds the deletion acceptable within the new TS.

3.2.5.9 Form No. 63. I.D. TS-5.2.4.a, Radiation protection program (remote handling, OS197L transfer cask, liquid neutron shield draining).

(a) Proposed Change

The applicant proposed to retain the text of TS 5.2.4.a of Amendment 15 (NRC, 2018), under Appendix B of the CoC, Section 4, "Administrative Controls," of Amendment 16. TS 5.2.4.a contains requirements for radiation protection, including consideration of actual site conditions and configurations, dose assessments for occupational exposures, and various requirements for use of the OS197L transfer cask. In addition, the applicant identified the potential reduction in the margin of safety for ISFSI or cask operation [evaluation criterion No. 10 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criteria identified by the applicant, because failure to meet the specification could result in reduced margin of safety in cask operations, and the requirements for administrative control on operation safety limits. The staff also noted that it establishes requirements such as analyses required as part of 10 CFR 72.212 evaluations, dose assessments for occupational exposures, and various radiation protection and dose assessment requirements for the transfer casks. There was no change in the

text of the TS. Thus, the staff concluded that there was no modification of CoC requirements.

Therefore, the staff finds the proposed change acceptable and the text of TS 5.2.4 of Amendment 15 is incorporated into the new TS 4.3.2, "Radiation Protection Program," of Amendment 16.

3.2.5.10 Form No. 64. I.D. TS-5.2.4.b, Radiation protection program - DSC closure weld.

(a) Proposed Change

The applicant proposed to retain the text of TS 5.2.4.b of Amendment 15 (NRC, 2018), which spells out requirements for non-destructive examination of DSC closure welds, as an ITE in the new CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16. Additionally, the applicant identified the potential increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8, (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) identified by the applicant, because the requirement of TS 5.2.4 of Amendment 15 is a one-time requirement that ensures that the cask has been manufactured and will operate in conformance with the certified design, and that the safety function of confinement will be performed. The staff reviewed the proposed new ITE and verified that the applicant retained verbatim language except for using "dye penetrant" versus "liquid penetrant" for consistency purposes with the rest of the CoC. Thus, the staff concluded that the change does not modify CoC requirements.

Therefore, the staff finds the change acceptable and the change is incorporated into the new ITE 4.3, "DSC Closure Weld Non-Destructive Examination," of Amendment 16.

3.2.5.11 Form No. 65. I.D. TS-5.2.4.c, Radiation protection program – Leak test of DSC inner seal weld.

(a) Proposed Change

The applicant proposed to retain the text of TS 5.2.4.c of Amendment 15 (NRC, 2018), which spells out requirements for helium leak testing of the DSC inner top cover shield plug assembly weld, as an ITE in the new CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16. Additionally, the applicant identified the potential increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criteria because the requirement of the TS of Amendment 15 is a one-time requirement that assures the cask has been manufactured and will operate in conformance with the certified design including the safety functions of confinement and sub-criticality. The staff reviewed the proposed new ITE and verified that the applicant retained the proposed verbatim language. Thus, the staff concluded that there is no modification to CoC requirements.

Therefore, the staff finds the change acceptable and the text is incorporated into the new ITE 4.1, "Leakage Testing of the Confinement Boundary," of Amendment 16.

3.2.5.12 Form No. 66. I.D. TS-5.2.4.d, Radiation protection program - TC/DSC contamination.

(a) Proposed Change

The applicant proposed to retain the text of TS 5.2.4.d of Amendment 15 (NRC, 2018), which spells out requirements to ensure that radioactive contamination does not exceed limits prior to DSC storage in the HSM, as an LCO in Appendix B, Section 3, "Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability," of Amendment 16. Additionally, the applicant identified the potential significant increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criteria because the requirements of the TS of Amendment 15 are limits on fuel handling and storage conditions that are necessary to protect the integrity of the stored fuel, to protect employees against occupational exposures, and to guard against the uncontrolled release of radioactive materials. The staff reviewed the proposed new LCO and verified it retained all the criteria of TS 5.2.4.d of Amendment 15. Additionally, the staff reviewed the new TS bases associated with the new TS. Thus, the staff concluded that there were no modifications to the CoC requirements.

Therefore, the staff finds the change acceptable and the text is incorporated into the new LCO 3.3.1, "Dry Shielded Canister Surface Contamination Levels," of Amendment 16.

3.2.5.13 Form No. 67. I.D. TS-5.2.4.e, Radiation protection program – TC dose rate measurements.

(a) Proposed Change

The applicant proposed to move the text of TS 5.2.4.e of Amendment 15 (NRC, 2018), which spells out requirements for dose rate measurements for use of transfer casks, to CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16. Additionally, the applicant identified the potential increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)] and reduction in the margin of safety for ISFSI or cask operation [evaluation criterion No. 10 (see Table 2.1 of this SER)], respectively. (TN, 2019a)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because meeting the acceptance criteria ensure that the safety functions of shielding are performed. The two risk criteria are applicable because the information in TS 5.2.4.e of Amendment 15 indicates the approved content for each DSC. Lacking the information in TS 5.2.4.e increases the consequences of analyzed accidents and reduces the margin of safety during operations. The staff reviewed the proposed new ITE and verified it retained all the criteria of TS 5.2.4.e of Amendment 15. Thus, the staff concluded that there were no modifications to CoC requirements.

Therefore, the staff finds the change acceptable and the text is incorporated into the new ITE 3.2, "Transfer Cask Dose Rate Evaluation," of Amendment 16.

3.2.5.14 Form No. 68. I.D. TS-5.2.5, HSM or HSM-H thermal monitoring program.

(a) Proposed Change

The applicant proposed to incorporate the text of TS 5.2.5 of Amendment 15 (NRC, 2018), which requires monitoring of thermal performance for each HSM or HSM-H, into Appendix B, Section 4, "Administrative Controls," of Amendment 16. Additionally, the applicant identified the HSM or HSM-H monitoring program as a risk insight for the potential significant increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)].

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the change is within the scope of the evaluation criterion for administrative controls because the requirements are administrative controls on operational safety limits and meet the risk insight for a potential significant increase in the probability or

consequences of an accident previously evaluated in the cask FSAR due to the probability of a blocked vent event that may go undetected. The requirements identified in the text did not change. Thus, the staff concluded that there were no modifications to CoC requirements.

Therefore, the staff finds the change acceptable and the text is incorporated into the new TS 4.3.6, “HSM or HSM-H Thermal Monitoring Program," of Amendment 16.

3.2.5.15 Form No. 69. I.D. TS-5.2.6, Hydrogen gas monitoring for 24P, 52B, 24PHB, 61BT, 32PT, 24PTH, 61BTH, 32PTH1, 69BTH, and 37PTH DSCs.

(a) Proposed Change

The applicant proposed to move the text of TS 5.2.6, “Hydrogen Gas Monitoring for 24P, 52B, 24PHB, 61BT, 32PT, 24PTH, 61BTH, 32PTH1, 69BTH, and 37PTH DSCs,” of TS 5.2.6 of Amendment 15 (NRC, 2018), which requires hydrogen gas monitoring during loading and unloading of DSCs, to Appendix B, Section 4, “Administrative Controls,” of Amendment 16. The applicant also identified the possibility of a new or different kind of accident being created compared to those previously evaluated [evaluation criterion No. 9 (see Table 2.1 of this SER)], if this specification was removed. (TN, 2019a)

(b) Evaluation of Change

The staff confirmed that the change is within the scope of the evaluation criteria (see Table 2.1 of this SER) because if removed, it could result in the possibility of a new or different kind of accident being created compared to those previously evaluated. With no substantive changes made, the staff determined that there were no modifications to CoC requirements. The only changes were in the text of the title to the TS, and in the beginning of the first paragraph of the new TS 4.3.3, which changed the language to specify “NUHOMS®” and “For all NUHOMS® DSCs,” respectively. Because this requirement is applicable to all DSCs (there is no need to list them separately), the staff concluded that the revisions to the text improved the clarity of the TS.

Therefore, the staff finds the changes acceptable and TS 5.2.6 of Amendment 15 is incorporated in Appendix B, Section 4, “Administrative Controls,” as TS 4.3.3, “Hydrogen Gas Monitoring for NUHOMS®,” of Amendment 16.

3.2.5.16 Form No. 70. I.D. TS-5.3.1, TC/DSC lifting/handling height limits.

(a) Proposed Change

The applicant proposed to move the text of TS 5.3.1, “TC/DSC Lifting/Handling Height Limits,” of Amendment 15 (NRC, 2018), which establishes TC and DSC lifting and handling height limits, to Appendix B, Section 4, “Administrative Controls,” of Amendment 16 The applicant also

identified a potential reduction in the margin of safety for ISFSI or cask operation under evaluation criterion No. 10 (see Table 2.1 of this SER), if this specification is removed. A significant reduction in the margin of safety for confinement is possible if there was no limit on the cask lifting and handling height.

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because if removed, it would have the potential to reduce the margin of safety for cask operation. The staff determined that relocation of this TS into Section 4, "Administrative Controls," of Amendment 16 is acceptable because of the administrative limits identified to maintain confinement safety analysis. There was no change made to the text. Thus, the staff concluded that there were no modifications to the CoC requirements.

Therefore, the staff finds acceptable the proposed change and the text of TS 5.3.1 of Amendment 15 is incorporated in Appendix B, Section 4, "Administrative Controls," as TS 4.4.1, "TC/DSC Lifting/Handling Height Limits," of Amendment 16.

3.2.5.17 Form No. 71. I.D. TS-5.3.2, Cask drop.

(a) Proposed Change

The applicant proposed to move the text of TS 5.3.2 of Amendment 15 (NRC, 2018) to the FSAR. TS 5.3.2 requires an inspection of the cask/DSC after a drop height of 15 inches or greater.

(b) Evaluation of Change

The staff reviewed the proposed change and determined that the text of TS 5.3.2 is within the scope of the evaluation criteria for moving from the CoC to the FSAR because the staff evaluated all the risk insights criteria to identify if this item should be retained in the CoC (see Table 2.1 of this SER). The DSC design has been analyzed to withstand a side drop height of 80 inches (NRC, 1994). The 80 inches drop analysis bounds all other drop scenarios and the applicant incorporated this information in Appendix B, Section 4, "Administrative Controls," as TS 4.4.1, "TC/DSC Lifting/Handling Height Limits," of Amendment 16.

The requirements of TS 5.3.2 of Amendment 15 are captured in the applicable "Operations" chapter of the FSAR for each DSC (e.g., Chapter 5, Chapter K.8, Chapter M.8) in both the loading and unloading sections, as necessary. Because these other TSs address this issue, the staff concluded that relocation of this text into the FSAR does not result in substantive changes to the CoC requirements.

Therefore, the staff finds the move to the FSAR acceptable and TS 5.3.2 of Amendment 15 is deleted in Amendment 16.

3.2.5.18 Form No. 72. I.D. TS-5.3.3, TC alignment with HSM or HSM-H.

(a) Proposed Change

The applicant proposed to move the text of TS 5.3.3 of Amendment 15 (NRC, 2018) to the FSAR. TS 5.3.3 provides the tolerance requirements and actions, if they are exceeded, for the TC alignment to the HSM or HSM-H during insertion and retrieval of the DSC.

(b) Evaluation of Change

The staff reviewed the proposed change and determined that the TS text is within the scope of the evaluation criteria (see Table 2.1 of this SER) for moving from the CoC to the FSAR because the staff evaluated all the risk insight criteria to identify if this item should be retained in the CoC or moved to the FSAR. The staff concluded that the TC alignment with the HSM or HSM-H did not result in significant risk increases. Based upon this conclusion, the staff determined that moving the text to the FSAR does not result in substantive changes to the CoC requirements. Furthermore, there were no changes made to the text. The requirements of TS 5.3.3 of Amendment 15, including the follow-up actions, have been moved to the FSAR in the applicable "Operations" chapter of the FSAR for each DSC (e.g., Chapter 5, Chapter K.8, Chapter M.8). The staff verified that the applicant moved the text to the "Operation" chapters of the FSAR, as applicable.

Therefore, the staff finds acceptable the relocation of the TS and the text of TS 5.3.3 of Amendment 15 is moved to the FSAR corresponding to Amendment 16.

3.2.5.19 Form No. 73. I.D. TS-5.3.4, Trailer shielding drop onto OS197L TC.

(a) Proposed Change

The applicant proposed to move the text of TS 5.3.4 of Amendment 15 (NRC, 2018), to Appendix B, Section 4.0, "Administrative Controls," of Amendment 16. TS 5.3.4 requires an inspection of the DSC, OS197L TC, and the trailer shielding after an accident drop of the trailer shielding and establishes a restriction on lifting the outer top trailer shielding such that the bottom, most part of the body of the outer top trailer shielding, is less than 4 inches above the inner top trailer shielding. The applicant also a potential reduction in the margin of safety for ISFSI or cask operation under evaluation criterion No. 10 (see Table 2.1 of this SER), on the basis that a drop of the outer top trailer shielding could damage the TC (thereby reducing margin of safety). For radiation shielding purposes to maintain dose to workers within acceptable levels, the outer top trailer shielding should be maintained just above the inner top trailer shielding.

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because if removed, it would have the potential to reduce the margin of safety for cask operation. The staff determined that relocation of this TS into Section 4, "Administrative Controls," of Amendment 16 is acceptable because of the administrative limits identified to maintain assumptions in the confinement and radiation shielding safety analysis. There was no change made to the text. Thus, the staff concluded that there were no modifications to the CoC requirements.

Therefore, the staff finds the location change acceptable and it is incorporated in Appendix B, Section 4, "Administrative Controls," as TS 4.4.2, "Trailer Shielding Drop onto OS197L TC," of Amendment 16.

3.2.5.20 Form No. 74. I.D. TS-5.4, HSM or HSM‐H dose rate evaluation program.

(a) Proposed Change

The applicant proposed to move the text of TS 5.4, "HSM or HSM-H Dose Rate Evaluation Program," of Amendment 15 (NRC, 2018), which spells out requirements for a dose rate evaluation program for HSMs, to CoC Appendix A, "Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System," of Amendment 16. The applicant also identified the text as a risk insight for a potential reduction in the margin of safety for ISFSI or cask operation under evaluation criterion No. 10 (see Table 2.1 of this SER), on the basis that a failure of the HSMs to provide adequate shielding could result in a significant reduction in the margin of safety for radiation shielding. (TN, 2019a and c)

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text of TS 5.4, "HSM or HSM-H Dose Rate Evaluation Program," of Amendment 15 (NRC, 2018), is within the scope of the evaluation criteria because, if removed, it would result in a potential reduction in the margin of safety for the ISFSI operation [evaluation criterion No. 10 (see Table 2.1 of this SER)]. The staff reviewed the proposed new ITE and verified it retained all the criteria of TS 5.4 of Amendment 15. Thus, the staff concluded that there were no modifications to the CoC requirements.

Therefore, the staff finds the location change acceptable and it is incorporated as ITE 3.3, "HSM or HSM-H Dose Rate Evaluation Program," od Amendment 16.

3.2.5.21 Form No. 75. I.D. TS-5.5, Concrete testing for HSM‐H.

(a) Proposed Change

The applicant proposed to move the text of TS 5.5, “Concrete Testing for HSM-H,” of Amendment 15 (NRC, 2018) to CoC Appendix A, “Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System,” of Amendment 16. TS 5.5 requires concrete be tested during the fabrication process for elevated temperatures to verify that there are no significant signs of spalling or cracking and that the concrete compressive strength is greater than that assumed in the structural analysis, In addition, the applicant identified a potential increase in the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)], if this specification was removed.

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text of TS 5.5, “Concrete Testing for HSM-H,” of Amendment 15, is within the scope of the evaluation criteria because, if removed, it would increase the probability or consequences of an accident previously evaluated in the cask FSAR [evaluation criterion No. 8 (see Table 2.1 of this SER)]. The staff determined that relocation of this TS into new formatted CoC Appendix A, “Inspections, Tests, and Evaluations for the Standardized NUHOMS® Horizontal Modular Storage System,” of Amendment 16 is acceptable because this concrete testing ensures that the HSM-H meet design requirements. The staff reviewed the proposed new ITE and verified it retained all the criteria of TS 5.5 of Amendment 15. Thus, the staff concluded that there were no modifications to CoC requirements.

Therefore, the staff finds the location change acceptable and it is incorporated as ITE 4.2, “Concrete Testing for HSM-H,” of Amendment 16.

3.2.5.22 Form No. 76. I.D. TS-5.6, HSM‐H configuration changes.

(a) Proposed Change

The applicant proposed to move the text of TS 5.6, “HSM-H Configuration Changes,” of Amendment 15 (NRC, 2018) to Appendix B, Section 4, “Administrative Controls,” of Amendment 16. TS 5.6 limits the applicability of the HSM-H thermal performance methodology when certain parameter changes exceed 8% of their nominal design. Although no other applicable evaluation criteria were identified by the applicant, the TS requirement is incorporated in the new formatted CoC because it was a condition imposed by NRC, as requested by the applicant, as part of the acceptance of the supporting analyses for the certification basis of the HSM-H thermal analysis for Amendment 8 of CoC No. 1004 (NRC, 2005).

(b) Evaluation of Change

The staff reviewed the proposed change and confirmed that the text is within the scope of the evaluation criteria (see Table 2.1 of this SER) because if removed, it would have the potential to reduce the margin of safety for cask operation. The staff determined that relocation of this TS into Section 4, "Administrative Controls," of Amendment 16 is appropriate based upon the new CoC format because the text identifies administrative limits to maintain assumptions in the thermal safety analysis. The applicant did not propose changes to the text. Thus, the staff concluded that there were no modifications to CoC requirements.

Therefore, the staff finds the location change acceptable and it is incorporated in Appendix B, Section 4, "Administrative Controls," as TS 4.5 "HSM-H Configuration Changes," of Amendment 16.

3.2.6 Tables (Evaluation Form Nos. 77 to 94)

3.2.6.1 Forms No. 77 – 79, 81, 85, 86, 88, 90, 91, 93, and 94. I.D. TS-Table 1-1a-c, 1-1e, 1-1i, 1-1l, 1-1t, 1-1aa, 1-1gg, 1-1ll, 1-2a-b, 1-2n, o-q, 1-3a, 1-4a-i, 1-6a-d, 1-7a-m, Fuel qualification tables.

(a) Proposed Change

The applicant proposes to replace the fuel qualification tables (FQTs) located in the TS of the TN-NUHOMS® DCS system with a simplified method for cask users to determine the fuel parameters qualified for loading in the DCS. These proposed changes include the fuel parameters for both PWR and BWR canisters and their associated loading patterns.

The purpose of this change is to simplify the parameters used to determine the allowable spent fuel contents to be loaded in the NUHOMS® cask system. The parameters in the FQTs include the fuel burnup, enrichment, and cooling time. The CoC of Amendment 15 included FQTs for the various canister designs for PWR and BWR fuel at various combinations of burnups, enrichments, and cooling times. These parameters are important to the shielding design of this storage system.

The applicant proposed a bounding FQT for every DSC design and every heat load pattern, also called heat load zone configuration (HLZC) in the TS. The FQTs are represented with the minimum required cooling time as a function of burnup and enrichment for the heat load limit of each canister design and HLZC. The source terms, used in the shielding analysis, provided in the FSAR are based on the burnup, enrichment, and cooling time (BECT) combinations in the FQT that maximize the dose rates. In this manner, the FQTs and the design basis sources provided in the FSAR are directly related to the decay heat limit for each cask design and decay heat limits for each cell or a group of cells in the loading pattern.

The proposed method consists of two parts: (1) a main FQT table for each decay heat load limit, and (2) a separate FQT and associated instructions for

the user to determine whether some of the fuel assemblies that do not meet the minimum enrichment requirement, determined by the main FQT, can still be loaded in the cask with further restrictions. In case of zoned loading, two main FQTs are provided if the dominating contribution to the dose rate is from the outer zone. Thus, there is a unique FQT for each heat loading limit in each loading zone of a HLZC. The burnup and enrichment combinations in the FQT encompasses the ranges of all allowable BECT combinations that meet the decay heat load limit. The applicant developed source terms based on the BECT that produces the maximum dose rates around the transfer cask.

In addition, the new method also includes a separate FQT for the user to determine if an outlier fuel assembly that does not meet the BECT in the FQT for a canister/loading pattern can be loaded. This allows for qualifying low-enriched outlier fuel (LEOF) which is the same as the method used in the approved CoC No. 1004, Amendment 15.

The applicant evaluated this new method for qualifying the contents of the cask using risk insights in its evaluation and justification as presented in forms 77, 78, 79, 81, 85, 86, 88, 90, 91, 93 and 94 submitted in accordance with the graded approach evaluation methodology.

(b) Evaluation of Change

The staff reviewed the proposed changes and confirmed that some of the information in the FQTs meets the evaluation criteria A1 and A2 of the Table 2.1 of this SER, and therefore needs to be retained. However, as explained in more detail below, because the proposed new method for specifying the authorized contents has significantly reduced the complexity and the size of the TS while retaining the substantive CoC requirements, the staff determined that the proposed changes were acceptable.

The staff reviewed the proposed changes following the guidance of NUREG-1536, the letter from NEI (NEI 2016a), and NRC's response to the NEI letter related to the RIRP (NRC, 2016b). The staff combined the evaluation of Form Nos. 77, 78, 79, 81, 85, 86, 88, 90, 91, 93 and 94 because these are related to the same proposed change for different canister designs. The following sections of this SER documents the details of the staff's evaluations.

(i) The regulatory perspectives on the definition of authorized contents with respect to shielding design of a spent fuel dry storage system.

Part 72 of 10 CFR sets the performance requirements for dry cask spent fuel storage systems. Specifically, 10 CFR 72.234(a) states the following:

> "The certificate holder and applicant for a CoC shall ensure that the design, fabrication, testing, and maintenance of a spent fuel storage cask comply with the requirements in 10 CFR 72.236."

Further, 10 CFR 72.236(d) requires that the cask shielding design must be capable of meeting the dose limits set forth in 10 CFR 72.104 and 72.106. To achieve these goals, 10 CFR 72.236(a) requires that specifications must be given for the spent fuel to be stored in the cask. To assure that the cask shielding design meet these regulatory requirements, the spent fuel contents must be adequately defined.

(ii) Background information on specification of authorized contents.

The NRC contracted Oak Ridge National Laboratory (ORNL) to perform a study to assess the importance of the various parameters of the spent fuel with respect to shielding. ORNL performed a study on the sensitivities of the source terms of the spent fuel against the major parameters of spent fuel and published the results in NUREG/CR-6802, "Recommendations for Shielding Evaluations for Transport & Storage Packages" (NUREG/CR-6802). Specifically, the study finds that for a given cooling time:

A. The neutron source is most strongly influenced by burnup, enrichment, fuel density, and moderator density.

B. The gamma source term is primarily influenced by burnup, fuel density, moderator density, specific power variations, and enrichment.

To standardize the TS with a balanced consideration of the risk resulting from missing important control parameters versus an overly prescriptive TS, the NRC requested ORNL to further evaluate the parameters that needed to be included in the TS for a dry cask spent fuel storage system design. The results of this evaluation are published in NUREG/CR-6716, "Recommendations on Fuel Parameters for Standard Technical Specifications for Spent Fuel Storage Casks" (NUREG/CR-6716). The study recommends that the spent fuel BECT parameters should be included in standard TS. The recommendation is based on a balanced consideration of the parameters that are important to safety with appropriate flexibility for the applicant to make changes to the allowed contents. Specifically, NUREG/CR-6716 states the following:

> "The objective is to replace the current detailed TS with more general Standard TSs (STSs) that concentrate control on those fuel parameters that are most important to maintaining safety. The remaining fuel parameters are of lesser importance and would be handled under the Section 72.48 process, which allows the licensees to change those parameters by performing additional safety analyses to update the FSAR."

Based on these studies (NUREG/CR-6802, NUREG/CR-6716), the vendor adopted the BECT method to define allowable contents in the TS. In the early applications, there was only one canister design and one loading pattern. The BECT for each fuel type and canister design

is directly used to calculate the design basis source terms. With the BECT parameter combinations, a cask can be loaded with spent fuel assemblies with a wide range of burnup and cooling times for a given enrichment. Also, the allowable contents can be expanded further by extending the enrichment range with new burnup and/or cooling time limits as long as the radiation sources from these combinations remain bounded by the design basis source terms.

The staff reviewed this proposed new approach for simplifying the FQTs and finds it to be acceptable because the new approach greatly simplifies the TS while retaining the parameters that are critical to a safe shielding design of the dry storage system. Specifically, the staff verified that the requested changes to the FQTs and find that the revised FQT specifications:

(i) continue to provide adequate protection from radiation associated with the authorized contents, and

(ii) ensure that the shielding design of the system is capable of meeting the dose limits set forth in 10 CFR 72.104 and 72.106 in accordance with the regulatory requirements of 10 CFR 72.236(d).

On these bases, the staff found that the new method developed by the applicant for specification of the allowed contents is acceptable because it provides the same level of assurance for protecting the public and the occupational workers as required by 10 CFR 72.236(d) and there is no undue increase in risk to the general public and the occupational workers for exposure to ionizing radiation from the spent fuel.

Therefore, the staff finds the proposed changes acceptable.

3.2.6.2 Form No. 80. I.D. Table 1-1d, BWR fuel assembly design characteristics for the NUHOMS® -61BT DSC.

(a) Proposed Change

The applicant proposed to delete Table 1-1d of Amendment 15 (NRC, 2018) from the TSs, since it is the same table as Table K.2-3 of the FSAR. The applicant further states the following:

> "If the Licensee has fuel that does not meet the conditions listed above, acceptability will be determined per 10 CFR 72.48."

(b) Evaluation of Change

The staff reviewed the proposed change and verified that some of the information in the table is not within the scope of the evaluation criteria (see Table 2.1 of this SER) because it is duplicated by regulations, specifically 72.236(a), and thus it serves no independent safety purpose. Additionally,

the staff notes that Table 1-1c, "BWR Fuel Specifications for Fuel to be Stored in the Standardized NUHOMS®-61BT DSC," will stay in Appendix B of the CoC with some changes and includes parameters (e.g., fuel array size, enrichment limit, and total weight limit) important to ensure criticality safety, adequate shielding, and appropriate thermal design of the cask system.

Other information in the table, while not duplicated by regulation, is controlled in part by Table K.2-3 of the FSAR. The staff reviewed the proposed change and determined that this additional information in the table is within the scope of the evaluation criteria (see Table 2.1 of this SER) for deleting it from the CoC because the staff evaluated all the risk insight criteria to identify if this item should be retained in the CoC. The staff concluded that removing this table from the TS did not result in significant risk increases because the fuel characteristic data in Table K.2-3 of FSAR is in part referenced by TS Table 1-1c.

Therefore, the staff finds this proposed changed to be acceptable.

Retaining the detailed information to the FSAR is appropriate because if the applicant or licensee needs to change any of the detailed fuel parameters, it will have to perform an evaluation of the impact on safety following the 10 CFR 72.48 rules or apply for an amendment to the CoC.

3.2.6.3 Form No. 82. I.D. Tables, PWR fuel characteristics for NUHOMS® DSCs.

(a) Proposed Change

The applicant proposed changes to the following tables (NRC, 2018):

(i) TS Table 1-1f, "PWR Fuel Assembly Design Characteristics for the NUHOMS®-32PT DSC,"

(ii) TS Table 1-1m, "PWR Fuel Assembly Design Characteristics for the NUHOMS®-24PTH DSC,"

(iii) TS Table 1-1bb, "PWR Fuel Assembly Design Characteristics for the NUHOMS®-32PTH1 DSC," and

(iv) TS Table 1-1nn, "PWR Fuel Assembly Design Characteristics for the 37PTH DSC."

The applicant's proposal included the following:

(i) move the maximum uranium content (MTU/assembly) limits in the tables to the respective fuel specification tables (e.g., Table 1-1e, "PWR Fuel Specifications for Fuel to be Stored in the NUHOMS® -32PT DSC,") in Appendix B of Amendment 16,

(ii) include footnote No. 3 of Table 1-1m of Amendment 15 (NRC, 2018) in the new Section 2, "Approve content" section of Appendix B of Amendment 16, and

(iii) retain the tables from the TSs to the FSAR.

The applicant proposed to remove this information from the TSs and retaining the information in the FSAR. The corresponding FSAR tables are Table M.2-2 (32PT), Table P.2-3 (-24PTH), Table U.2-3 (-32PTH1), and Table Z.2-3 (-37PTH).

(b) Evaluation of Changes

The staff confirmed that the information from the tables proposed to be moved to other TSs, specifically, the maximum uranium content and the 24 PTH-S-LC content restriction in footnote 3 of Table 1-1m, falls within the scope of the evaluation criteria because it meets the definition for criterion A1. Thus, the staff concluded that retaining the same text from these tables and relocating them into other TSs is appropriate. Because there is no change to the language, but only to the location, the staff determined that relocating this information does not result in substantive changes to the CoC requirements.

The staff also verified that the remaining text from Tables 1-1f, 1-1m, 1-1bb, and 1-1nn of the CoC for Amendment 15 is within the scope of the evaluation criteria (see Table 2.1 of this SER) for moving the information from the CoC to the FSAR because the staff evaluated all the risk insight criteria to identify if this item should be retained in the CoC or moved to the FSAR. The staff concluded that removing the tables from the TS did not result in significant risk increases because the TSs already include PWR fuel specification tables for -32PT, -24PTH, and -32PTH1 DSCs (e.g., Table 1-1e, "PWR Fuel Specifications for Fuel to be Stored in the NUHOMS®-32PT DSC," in Appendix B of Amendment 16). These tables already included the fuel array size, enrichment limit, and total weight limit for the various cask systems. Therefore, the staff concludes that most information in Tables 1-1f, 1-1m, 1-1bb, and 1-1nn of the TS for Amendment 15 was redundant and retaining the detailed information in the FSAR is appropriate.

Therefore, the staff finds these proposed changes to be acceptable.

3.2.6.4 Form No. 83. I.D Tables, Enrichment and B-10 requirements.

(a) Proposed Change

The applicant proposed to retain the following tables which contain details of characteristic parameters for fuel, in the TSs (NRC, 2018):

(i) TS Table 1-1g, Table 1-1g1, Table 1-1g2, and Table 1-1g3, "Maximum Planar Average, Enrichment, Number of PRAs and Minimum Soluble Boron Loading for the NUHOMS®-32PT DSC,"

(ii) TS Table 1-1p, Table 1-1q, and Table 1-1q1, "Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the NUHOMS®-24PTH DSC,"

(iii) TS Table 1-1v through 1-1x, “Maximum Fuel Assembly Lattice Average Enrichment v/s Minimum B-10 Requirements for the 61BTH DSC,”

(iv) TS Table 1-1cc, Table 1-1dd, and Table 1-1dd1, “Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for 32PTH1 DSC,”

(v) TS Table 1-1jj and 1-1kk, “BWR Fuel Assembly Lattice Average Initial Enrichment vs Minimum B-10 Requirements for the NUHOMS® - 69BTH DSC Poison Plates (Intact and Damaged Fuel),” and

(vi) TS Table 1-1oo and Table 1-1pp, “Maximum Planar Average Enrichment for the 37PTH DSC.”

These fuel assembly parameters are required per criterion A1 (see Table 2.1 of this SER) of Form No. 83 and shall be retained. (TN, 2019a)

(b) Evaluation of Change

The staff verified that the tables contain enrichment information for allowed fuel contents, which is identified in 10 CFR 72.236(a), and therefore meets the definition of criterion A1 for evaluation to be included in the TS. Also, the Tables are retained in their entirety in the new TS section. Thus, the staff concluded that retention of the tables did not result in modifications to the CoC requirements. The additional tables provide further clarifications for the canisters that were not clearly specified. Thus, the staff concluded that the changes further strengthened the criticality safety of the cask design.

Therefore, the staff finds the proposed changes acceptable.

3.2.6.5 Form No. 84. I.D. Tables, Specification for the NUHOMS® DSC poison plates and/or PRAs.

(a) Proposed Change

The applicant proposed to retain the following tables which contain areal density requirements of the poison plates and boron loading for “Poison Rod Assembly” in the TS (NRC, 2018):

(i) TS Table 1-1k, “B10 Specification for the NUHOMS®-61BT Poison Plates,”

(ii) TS Table 1-1r, “B10 Specification for the NUHOMS®-24PTH Poison Plates,”

(iii) TS Table 1-1ff, “B10 Specification for the NUHOMS®-32PTH1 Poison Plates,”

(iv) TS Table 1-1rr, “B10 Specification for the NUHOMS®-37PTH Poison Plates,” and

(v) TS Table 1-1ss, "B-10 Specification for the NUHOMS®-37PTH PRAs."

(b) Evaluation of Change

The staff verified that the tables contain the information on the required minimum B-10 areal densities of neutron poison plates and the minimum B-10 quantity per rod of the poison rod assembly, which is necessary to provide reasonable assurance that the criticality safety function of the cask will be maintained, thereby meeting the definition of criterion A2 for evaluation to be included in the TS. The staff also confirmed that there are no changes to the tables, which are retained in the new TS, Appendix B. Thus, the staff concluded that there are no modifications to CoC requirements.

The staff finds the applicant's proposed change to be acceptable.

3.2.6.6 Form No. 87. I.D. TS-Tables, Thermal and radiological characteristic or control components stored in the NUHOMS® DSCs.

(a) Proposed Change

The applicant proposed to retain the control component maximum gamma source but remove the decay heat values in the following tables (NRC, 2018):

(i) TS Table 1-1n, "Thermal and Radiological Characteristics for Control Components Stored in the NUHOMS®-24PTH DSC and 24PHB DSCs,"

(ii) TS Table 1-1ee, "Thermal and Radiological Characteristics for Control Components Stored in the NUHOMS®-32PT and NUHOMS®-32PTH1 DSCs," and

(iii) TS Table 1-1qq, "Characteristics of Control Components for the 37PTH DSC."

The applicant also proposed the following changes:

(i) move the decay heat limits to Table P.2-2 (24PTH), Table N.2-2a (24PHB), Table M.2-2a (32PT), Table U.2-2 (32PTH1), and Table Z.2-2 (37PTH) of the FSAR.

(ii) to avoid duplication, revise the FSAR to reference the parameter values that are defined in the TS.

(b) Evaluation of Change

The staff reviewed the proposed changes and confirmed that the gamma source limit information is within the scope of the evaluation criteria in Table 2.1 of this SER because it meets the evaluation criterion A2. The source term limit for the control components is necessary to control the quantity of the control components to be stored in the canister with respect to shielding design; thus, this information should be retained.

The staff also reviewed the proposed removal of the decay heat limits from the TS and the applicant's justification and finds that the proposed removal of the decay heat is acceptable because removing the decay heat of the control components does not fall within any of the evaluation criteria (see Table 2.1 of this SER). The removal of the decay heat limit for the control components from the TS has minimal impact as the decay heat contribution from the Co-60 in a fuel assembly at 60-gigawatt day per metric ton of uranium (GWd/MTU) and 5 years of cooling time contributes only about 3% to the total decay heat (NUREG/CR-6700). Similarly, the contribution to decay heat from control component is similar in comparison with the spent fuel. As such, the risk of exceeding decay heat limit is low with removal of the limit on decay heat from the control component contents.

In addition, because the decay heat limits for control components have been moved to the FSAR in Table P.2-2 (24PTH), Table N.2-2a (24PHB), Table M.2-2a (32PT), Table U.2-2 (32PTH1), and Table Z.2-2 (37PTH), there is no net loss of information. Moving the decay heat limits for control components from the TS to the FSAR meets the evaluation criterion 7 in Table 2.1 of this SER.

With respect to the proposed changes to allow the FSAR to reference the design parameter limits defined in the TS, the staff believes that it is appropriate to do so because the limits in the TS are the design bases of the system design and should be used in the design as a general practice.

Therefore, the staff finds the proposed changes is acceptable.

3.2.6.7 Form No. 89. I.D. TS-Table 1-1u, BWR fuel assembly design characteristics for the 61BTH DSC

(a) Proposed Change

TS Table 1-1u of Amendment 15 (NRC, 2018) provides detailed design characteristics of the BWR fuel assembly to be loaded in the 61BTH DSC. The applicant proposed to remove most of the information from Table 1-1u from the TSs in Amendment 15 (NRC, 2018) into Table T.2-2 of the FSAR for Amendment 16. Additionally, the applicant proposed to delete some information from the TS, specifically, the fuel assembly name, configuration, length, fissile material type, and number of fuel rods per assembly.

(b) Evaluation of Change

The staff reviewed the information in Table 1-1u of the TS and confirmed that the table is within the scope of the evaluation criteria (see Table 2.1 of this SER) for removing the information from the CoC. The staff evaluated all the risk insight criteria to identify if this item should be retained in the CoC or moved to the FSAR. The staff concluded that removing the detailed fuel parameters from the CoC did not result in significant risk increases because the data in this table that are essential to criticality, shielding, and decay heat removal capacity of the system design have been included in Table 1-1t, "BWR Fuel Assembly Design Characteristics for the NUHOMS®-61BTH DSC." Because Table 1-1t includes the fuel array size, enrichment limit, total weight limit that important to criticality, shielding, and thermal safety design, it is not necessary to keep the duplicated detailed information in Table 1-1u of the TS. Therefore, the staff concluded that moving the detailed information in Table 1-1u of the TS to Table T.2-2 of the FSAR and deleting the duplicative information will not result in substantive changes to the CoC requirements.

Therefore, the staff finds this proposed changed to be acceptable.

3.2.6.8 Form No. 92. I.D. TS Table 1-1ii, BWR fuel assembly design characteristics for the NUHOMS® -69BTH DSC.

(a) Proposed Change

The applicant proposed to delete Table 1-1ii of Amendment 15 (NRC, 2018) from the TS and keep the information in Table y.2-2 of the FSAR.

TS Table 1-1ii includes detailed design characteristics of BWR fuel assembly to be loaded in the 69BTH DSC. Specifically, the information to be deleted from the TS are the fuel assembly name, assembly configuration, active fuel length, fissile material type, and number of fuel rods per assembly.

(c) Evaluation of Change

The staff reviewed the information in Table 1-1ii of the TS and confirmed that the table is within the scope of the evaluation criteria (see Table 2.1 of this SER) for removing the information from the CoC because the staff evaluated all the risk insight criteria to identify if this item should be retained in the CoC or moved to the FSAR. The staff concluded that removing this detailed fuel parameter specification from the CoC would not result in significant risk increases because the data in this table that are essential to criticality, shielding, and decay heat removal capacity of the system design have been included in Table 1-1gg, "BWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-69BTH DSC," of the TS. The staff concluded that, because Table 1gg of the TS has already included the fuel array size, enrichment limit, and total weight limit that is important to criticality, shielding, and thermal safety design, it is not necessary to include the, duplicated detailed information in Table 1-1ii of the TS.

Therefore, the staff finds this proposed changed to be acceptable.

3.2.7 Figures (Evaluation Form Nos. 95 to 99)

3.2.7.1 Form No. 95. I.D Figure 1-1, PWR Fuel Criticality Acceptance Curve for the 24P DSC.

(a) Proposed Change

The applicant proposed to retain TS Figure 1-1, "PWR Fuel Criticality Acceptance Curve for the 24P DSC," of Amendment 15 (NRC, 2018), which contains criticality acceptance parameters, in the Appendix B of Amendment 16. The applicant identified that the figure contains information, which falls under evaluation criterion A2 (see Table 2.1 of this SER), and therefore proposed to retain the figure verbatim in the TS.

(b) Evaluation of Change

The staff verified that the figure contains criticality acceptance information, which is necessary to provide reasonable assurance that the cask safety function of sub-criticality will be maintained, thereby, meeting the definition of criterion A2 (see Table 2.1 of this SER) for evaluation to be included in the TS. There are no changes to the figure. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposal acceptable and the text of TS Figure 1-1 of Amendment 15 is retained in the new CoC, Appendix B, as Figure 1-1 of Amendment 16.

3.2.7.2 Form No. 96. I.D. Figures, Heat load zoning configurations for NUHOMS® DSCs.

(a) Proposed Change

The applicant proposed to retain the following TS figures of Amendment 15, which contain heat load zoning configurations for DSCs, in the TS (NRC, 2018):

(i) TS Figure 1-2 through Figure 1-4a, "Heat Load Zoning Configurations for the NUHOMS®-32PT DSC,"

(ii) TS Figure 1-8 and Figure 1-9, "Heat Load Zoning Configuration for Fuel Assemblies Stored in the NUHOMS®-24PHB DSC,"

(iii) TS Figure 1-11 through Figure 1-15a, "Heat Load Zoning Configurations for 24PTH DSCs,"

(iv) TS Figure 1-17 through 1-24, Figure 1-25a, and Figure 1-25b, "Heat Load Zoning Configurations for the 61BTH DSC,"

(v) TS Figure 1-26 through Figure 1-28c, "Heat Load Zoning Configurations for the NUHOMS®-32PTH1-S, 32POTH1-M and 32PTH1-L DSCs,"

(vi) TS Figure 1-29, “Heat Load Zone Configuration for the 61BT DSC Contained in an OS197L TC,”

(vii) TS Figure 1-30, “Heat Load Zone Configuration for the 32PT DSC Contained in an OS197L TC,”

(viii) TS Figures 1-31 through 1-36, and Figure 1-38, “Heat Load Zoning Configurations for the 69BTH DSCs,” and

(ix) TS Figure 1-39 and Figure 1-40, “Heat Load Zoning Configurations for the 37PTH DSC.”

The applicant identified that the figures contain information which falls under evaluation criterion A1 (see Table 2.1 of this SER), and therefore proposed to retain the figures verbatim in the TS. (TN, 2019a)

(b) Evaluation of Change

The staff verified that the figures contain information on maximum heat designed to be dissipated, which is identified in 10 CFR 72.236(a) and, therefore, meet the definition of criterion No. A1 for evaluation to be included in the TS. There are no changes to the figures. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds this proposal acceptable, and the TSs are retained.

3.2.7.3 Form No. 97. I.D. TS Figures, Location of damaged and/or failed fuel assemblies inside NUHOMS® DSCs

(a) Proposed Change

The applicant proposed to retain the following TS figures and figure numbers from Amendment 15 (NRC, 2018) in the CoC, Appendix B, of Amendment 16, which contain the permitted locations of damaged and failed fuel assemblies inside DSCs:

(i) TS Figure 1-4b, “Location of Damaged and Failed Fuel Assemblies Inside the NUHOMS®-32PT DSC,”

(ii) TS Figure 1-16, “Location of Failed or Damaged Fuel Inside 24PTH DSC,”

(iii) TS Figure 1-25, “Location of Damaged and Failed Fuel Assemblies for the 61BTH DSC,” and

(iv) TS Figure 1-37, “Location of Damaged Fuel Assemblies Inside the 69BTH DSC.”

The applicant identified that the figures contain information, which fall under evaluation criterion A2 (see Table 2.1 of this SER), and therefore proposed to retain the figures verbatim in the TS. (TN, 2019a)

(b) Evaluation of Change

The staff verified that the figures contains damaged fuel location information, which is necessary to provide reasonable assurance that the cask safety function of sub-criticality will be maintained, thereby meeting the definition of criterion A2 for evaluation to be included in the TS. Because there are no changes to the figures, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposal acceptable and the TSs are retained in the CoC, Appendix B, Amendment 16 with the same figure numbers.

3.2.7.4 Form No. 98. I.D. TS Figures, Required PRA locations for certain NUHOMS® DSCs.

(a) Proposed Change

The applicant proposed to retain the following TS figures of Amendment 15 (NRC, 2018), which contain required PRA locations for certain DSCs, in the CoC, Appendix B, of Amendment 16 with the same table numbers:

(i) TS Figures 1-5, 1-6 and 1-7, "Required PRA Locations for the NUHOMS®-32PT DSC Configurations," and

(ii) TS Figure 1-41 and Figure 1-42, "PRA Locations for the 37PTH DSC."

The applicant identified that the figures contain information which fall under evaluation criterion A2 (see Table 2.1 of this SER), and therefore proposed to retain the figures verbatim in the TS. (TN, 2019a)

(b) Evaluation of Change

The staff verified that the figures contains poison rod assembly location information which is necessary to provide reasonable assurance that the cask safety function of sub-criticality will be maintained, thereby meeting the definition of criterion A2 for evaluation to be included in the TS. There are no changes to the figures. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposal acceptable, and the TSs are retained in the new CoC, Appendix B, with the same figure numbers.

3.2.7.5 Form No. 99. I.D. TS Figure 1-10 and Figure 1-10a, Soluble boron concentration vs. fuel initial U-235 enrichment for the NUHOMS® 24PHB system

(a) Proposed Change

The applicant proposed to retain the following TS figures which contain "Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment…" in the CoC, Appendix B, of Amendment 16 with the same figure numbers.

(i) TS Figure 1-10, "Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment (Intact Fuel) for the NUHOMS® 24PHB System," and

(ii) TS Figure 1-10a, "Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment (Damaged Fuel) for the NUHOMS® 24PHB System."

The applicant identified that the figures contain information, which falls under evaluation criterion No. A1 (see Table 2.1 of this SER), and therefore proposed to retain the figures verbatim in the TS.

(b) Evaluation of Change

The staff verified that the figures contain information on maximum planar average initial enrichment, which is identified in 10 CFR 72.236(a), and therefore meets the definition of criterion A1 (see Table 2.1 of this SER) for evaluation to be included in the TS. There are no changes to the figures. Thus, the staff concluded that there are no modifications to the CoC requirements.

Therefore, the staff finds the proposal acceptable, and the TSs are retained in the CoC, Appendix B, of Amendment 16 with the same figure numbers.

3.3 Evaluation Findings

As explained in this report, the staff reviewed the proposed changes to the format and content of Amendment 16 to CoC No. 1004 applying the evaluation criteria in Table 2.1 of this SER. Based upon its review, and after exercising its engineering judgment, the staff finds that the changes proposed by the applicant are appropriate and the revised format and content of Amendment 16 to CoC No. 1004 provide reasonable assurance of adequate protection to the public health and safety.

CONCLUSION

Based on the statements and representations provided by the applicant in its amendment application, as supplemented, the staff concludes that the changes in Amendment 16 to the CoC for the Standardized NUHOMS® Horizontal Modular Storage System do not affect the ability of the cask system to meet the requirements of 10 CFR Part 72. Amendment 16 to CoC No. 1004 for the Standardized NUHOMS® System should be approved.

Issued with Certificate of Compliance No. 1004, Amendment No. 16
on August 21, 2020.

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APPENDIX A. ABBREVIATIONS

ACNW	NRC's Advisory Committee on Nuclear Waste	**mSv**	millisievert
ADAMS	Agencywide Documents Access and Management System	**NEI**	Nuclear Energy Institute
ALARA	as low as reasonably achievable	**NMSS**	Office of Nuclear Material Safety and Safeguards
ASME	American Society of Mechanical Engineers	**NRC**	U.S. Nuclear Regulatory Commission
BECT	burnup, enrichment, and cooling time	**NRR**	Office of Nuclear Reactor Regulation
BEIR	Committee on the Biological Effects of Ionizing Radiation	**NUHOMS®**	Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel
BWR	Boiling water reactor	**ORNL**	Oak Ridge National Laboratory
CBF	confinement breach frequency	**PRA**	probabilistic risk assessment
CDF	core damage frequency	**PRM**	petition for rulemaking
CoC	Certificate of Compliance	**PWR**	Pressurized water reactor
DSC	dry storage cask	**QA**	Quality assurance
DSFM	Division of Spent Fuel Management	**QHG**	Qualitative Health Guideline
EPRI	Electric Power Research Institute I	**RAI**	request for additional information
FQT	fuel qualification table	**RIRP**	Regulatory Issue Resolution Protocol
FSAR	final safety analysis report	**RSI**	request for supplemental information
HLZC	heat load zone configuration	**SER**	safety evaluation report
ISFSI	Independent Spent Fuel Storage Installation	**SR**	Surveillance Requirement
ITE	Inspections, Tests, and Evaluations	**SSC**	systems, structure, components
LCO	Limiting Condition for Operation	**TC**	transfer cask
LEOF	low-enriched outlier fuel	**TEDE**	total effective does equivalent
LERF	large early release frequency	**TN**	TN Americas LLC
mg/cm^2	milligrams per square centimeter	**TS**	technical specifications
MMC	metal matrix composites	**FSAR**	final safety analysis report
Mrem	millirem		
MRS	Monitored retrievable storage		

APPENDIX B. EXAMPLE OF AN EVALUATION FORM INCLUDED IN THE APPLICATION FOR EACH PROPOSED CHANGE OF COC NO. 1004. (NEI, 2017B; TN, 2019A)

Form identification No.

Form No.

E-54825 Enclosure 5
Evaluation Forms for CoC 1004 TS Section 1 Items

CoC Condition/TS Identifier: TS-1.2 (Form #14) Revision 0 (no NRC questions – no changes made)

* All LCOs also require an Applicability, Condition(s), Required Action(s), Completion Time(s), Surveillance Requirement(s), and Frequency(ies). Refer to NUREG-1745 for additional guidance.
** In performing the risk insight evaluation above, the evaluator should think about subsequent changes to a relocated CoC requirement. Specifically, ask the question "what is the likelihood and worst possible consequences of a future change to this requirement in the less-conservative direction"?

Requirement			TS 1.2: Logical Connectors (Section\text to be changed, moved, or removed.)
CoC Body Certified Design	Section I. Technology		No
	Section II. Design Features		No
Appendix A - Inspections, Tests, and Evaluations			No
Appendix B. Technical Specifications	Section 1 Definitions, Use and Application		Yes
	Section 2 Approved Contents (Selection Criteria)	A1	No
		A2	No
		A3	No
	Section 3 Limiting Conditions for Operation (LCOs)* and Surveillance Requirements (SRs) (Selection Criteria)	L1	No
		L2	No
		L3	No
	Section 4 Administrative Controls		No
Risk Insight**: Will removing this requirement from the CoC/TS result in...	A significant increase in the probability or consequences of an accident previously evaluated in the cask FSAR?		No
	The possibility of a new or different kind of accident being created compared to those previously evaluated in the FSAR?		No
	A Significant reduction in the margin of safety for ISFSI or cask operation?		No
Evaluation Summary			Retain in TS Appendix B Section 1 since it meets the criterion for inclusion in the new TS format (Use and Application). No change – Existing Purpose, Background, and Examples are helpful to understand the TS Use and Application.

Evaluation Criteria (Also, see Table 2.1 of this SER)

Yes\No Answer to each criterion.