Guidance for Operations-Based Aging Management for Dry Cask Storage

September 2014
Nuclear Energy Institute

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NOTICE

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This document provides guidance for 10 CFR 72 specific licensees and Certificate of Compliance holders to prepare applications to be submitted to the NRC seeking renewal of the license or CoC. NEI 14-03 complements NRC staff review guidance in NUREG-1927 and provides an administrative and licensing perspective to licensees and CoC holders as part of the overall regulatory framework for Part 72 license and CoC renewals. Specifically, NEI 14-03 provides guidance to renewal applicants in the area of format and content of applications and how to address potential aging mechanisms during the extended dry storage period when the operating experience is inconclusive regarding management of that aging mechanism.

NEI 14-03 introduces “tollgates” into the Part 72 license and CoC renewal process. “Tollgate” is a new term created by the industry to address the fact that verification of the applicability of potential dry cask storage aging mechanisms may not be available at the time license and CoC renewal applications are submitted. This information will enhance the current understanding of the future state of the dry spent fuel and the canisters containing the fuel. Briefly put, tollgates are part of a learning, operations-based aging management program implemented by licensees via requirements in the renewed license or CoC, and associated FSAR. These requirements obligate the licensees to perform periodic assessments of the aggregate state of knowledge of aging-related operational experience, research, monitoring, and inspections to ascertain the ability of in-scope DCS structures, systems and components to continue performing their intended safety functions throughout the renewed period of operation.

NEI 14-03 is written consistent with the overall philosophy described in NEI Petition for Rulemaking (PRM) 72-7 as it relates to aging management document hierarchy and change control. Of particular focus is the assignment of the information to the correct change control process for modifying the aging management information in the future, based on the risk-informed, public health and safety-focused philosophy described in the PRM. The NRC controls changes to the ISFSI license, CoC, and associated attachments and appendices that includes such items as technical specifications, authorized contents, design features and administrative controls. Other information, typically contained in the ISFSI or cask UFSAR and licensee implementing procedures, is subject to the change controls in 10 CFR 72.48. To maintain safety focus and avoid assigning resources to less significant matters, NRC change control should be limited to information that is truly safety- and risk-significant.

In accepting PRM 72-7 for future rulemaking (FR Volume 79, No. 138, pp 41935 – 41938), the NRC stated that the recommended rule changes support the agency’s strategic goals proposed in NRC’s 2014-2018 Strategic Plan. The NRC further states that the issues in the petition considered for rulemaking could make the regulations for spent fuel dry cask storage more efficient. Consistent with those goals, the PRM recommends that information subject to NRC change control should only be that with a clear nexus to public health and safety. This guidance is written considering that same principle of effective regulation.
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# ACRONYMS AND ABBREVIATIONS

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<tr>
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<td>Aging Management Activity</td>
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<td>CoC</td>
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<td>CSF</td>
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<td>DCS</td>
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<td>DCSS</td>
<td>Dry Cask Storage System</td>
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<td>EPRI</td>
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<td>HBU</td>
<td>High Burnup</td>
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<td>HDRP</td>
<td>High Burnup Dry Storage Cask Research and Development Project</td>
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<td>HSM</td>
<td>Horizontal Storage Module</td>
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<td>INPO</td>
<td>Institute of Nuclear Power Operations</td>
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<td>ISFSI</td>
<td>Independent Spent Fuel Storage Installation</td>
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<td>ITS</td>
<td>Important to Safety</td>
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<tr>
<td>MWd/MTU</td>
<td>Megawatt-day per Metric Ton Uranium</td>
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<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>NRC</td>
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<tr>
<td>OE</td>
<td>Operating Experience</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>RAI</td>
<td>Request for Additional Information</td>
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<td>RIRP</td>
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<td>SER</td>
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<td>SNF</td>
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<td>TIN</td>
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<td>TLAA</td>
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GLOSSARY¹

Aging Management Activity (AMA) (NUREG-1927) – An application of either an aging management program or time-limited aging analysis to provide reasonable assurance that the intended functions of structures, systems, and components of independent spent fuel storage installations are maintained during the license period of extended operation.

Aging Management Program (AMP) (10 CFR 72.3) – A program established by the specific licensee or DCSS CoC holder for addressing aging mechanisms and effects that may include prevention, mitigation, condition monitoring, and performance monitoring. This term is used in two contexts: 1) the single, over-arching program that is a requirement described in the license or CoC, and 2) the Implementation AMP.

Aging Management Review (AMR) (NUREG-1927) – An assessment conducted by the specific licensee or CoC holder that addresses aging effects that could adversely affect the ability of SSCs to perform their intended important-to-safety functions during the license period of extended operation.

Bare Fuel Cask – A metal cask with a bolted lid and a fuel basket inside designed for spent fuel storage and/or transportation. A bare fuel cask performs the confinement function during storage and the containment function during transportation. A bare fuel cask does not employ a canister.

Canister – A fully welded metal cylinder with a fuel basket inside that is placed inside a vertical cask or overpack (ventilated or unventilated) or a ventilated horizontal module for storage at an ISFSI. The canister performs the confinement function during storage at the ISFSI.

Cask (10 CFR 72.3) – All the components and systems associated with the container in which spent fuel or other radioactive materials associated with spent fuel are stored in an ISFSI. “Cask” is also a colloquial term that can mean a bare fuel cask, a transportation cask, or a ventilated or unventilated overpack. The term “cask,” in the context of the 10 CFR 72 regulations and this guidance, applies to bare fuel casks and both vertical and horizontal canister-based dry cask storage systems (see also “DCSS”).

Cask Vendor – The entity that is the design authority and supplier of a bare fuel cask or canister-based dry cask storage system. The vendor is usually the CoC holder.

Confinement Systems (10 CFR 72.3) – Those systems, including ventilation, that act as barriers between areas containing radioactive substances and the environment.

Consolidated Interim Storage (CIS) – The concept of transporting spent nuclear fuel from various locations around the country to one or more interim storage facilities to await further disposition.

Consolidated Storage Facility (CSF) – A facility designed, licensed and constructed for consolidated interim storage.

¹ See NUREG-1927 for additional definitions.
Certificate of Compliance (CoC) (10 CFR 72.3) – The certificate issued by the NRC that approves the design of a spent fuel storage cask in accordance with the provisions of 10 CFR 72, Subpart L. The CoC contains the terms, specifications, and conditions for using the cask or DCSS under a Part 72 general license.

CoC Holder (10 CFR 72.3) – A person who has been issued a Certificate of Compliance by the NRC for a spent fuel storage cask design.

Contents – The material authorized for storage in the DCSS by the specific license or the DCSS CoC. Contents may include spent fuel, non-fuel hardware, and reactor-related GTCC waste.

Dry Cask Storage System (DCSS) - A spent fuel storage technology comprised of a canister inside a ventilated or unventilated vertical cask (overpack) or horizontal storage module used at an ISFSI (see also “cask”).

General License – A general license is a license that has been provided to 10 CFR 50 power licensees by regulation (§72.210) to store spent fuel from a reactor at an ISFSI on the site governed by that Part 50 license pursuant to 10 CFR 72, Subpart K.

Greater-Than-Class-C (GTCC) Waste (10 CFR 72.3) – Low-level radioactive waste that exceeds the concentration limits of radionuclides established for Class C waste in 10 CFR 61.55.

High Burnup (HBU) Fuel – Spent nuclear fuel with an average assembly burnup exceeding 45,000 MWd/MTU.

Horizontal Storage Module (HSM) – A ventilated concrete structure used to store a canister in the horizontal orientation at an ISFSI or CSF.

Implementation AMP - Detailed actions for individual in-scope SSCs that are contained in site aging management procedures.

Important to Safety (ITS) (10 CFR 72.3) – A term used to describe ISFSI or DCSS SSCs whose functions are:

- To maintain the conditions required to store spent fuel, high-level radioactive waste, or reactor-related GTCC waste safely;
- To prevent damage to the spent fuel, the high-level radioactive waste, or reactor-related GTCC waste container during handling and storage; or
- To provide reasonable assurance that spent fuel, high-level radioactive waste, or reactor-related GTCC waste can be received, handled, packaged, stored, and retrieved without undue risk to the health and safety of the public.

Independent Spent Fuel Storage Installation (ISFSI) (10 CFR 72.3) - A complex designed and constructed for the interim storage of spent nuclear fuel, solid reactor-related GTCC waste, and other radioactive materials associated with spent fuel and reactor-related GTCC waste storage.
**Intended Function** – An in-service safety function of a component or subcomponent that directly or indirectly:

- provides criticality control of the spent fuel
- provides heat removal from the spent fuel
- maintains the confinement boundary
- provides radiation shielding
- provides structural support, functional support, or both to an SSC that is important to safety.

SSC intended functions are derived from the safety analyses described in the ISFSI or DCSS UFSAR.

**Not Important to Safety** – An item, function, or condition related to the ISFSI, or its activities, that does not meet the definition of “Important to Safety.”

**Operating Plant Site** – A nuclear plant site with at least one operating reactor.

**Overpack** – A storage cask used for housing a canister containing SNF at an ISFSI. An overpack may be sealed or ventilated.

**Plant (or Plant Site)** – A current or former nuclear generating station that has SNF stored on site and has, or had one or more reactors on the site.

**Shutdown Reactor** – A reactor that has permanently ceased operating. A shutdown reactor may be located on an operating plant site or a shutdown plant site.

**Shutdown Plant Site** – A nuclear plant site where all reactors have permanently ceased operating.

**Specific License** – A license granted by the NRC to a specific entity to construct and operate an Independent Spent Fuel Storage Installation at a specific geographic location in response to an application submitted for review in accordance with 10 CFR 72.

**Spent Nuclear Fuel (SNF) (10 CFR 72.3)** – Fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year’s decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. SNF includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.

**Surrogate** – A DCSS or other ISFSI SSC that has been determined by the licensee or CoC holder to provide applicable monitoring or inspection information for other similarly situated components based on its geographic location, length of service, and other criteria deemed appropriate by the stakeholders.
Time-Limited Aging Analysis (TLAA) (10 CFR 72.3) - A specific licensee or CoC holder calculation or analysis that has all of the following attributes:

- involves SSCs within the scope of license or CoC renewal
- considers the effects of aging
- involves time-limited assumptions defined by the current operating term (for example, 40 years)
- was determined to be relevant by the licensee or CoC holder in making a safety determination
- involves conclusions or provides the basis for conclusions related to the capability of the SSCs to perform their intended functions
- is contained or incorporated by reference in the licensing basis.

Tollgate – A requirement included in a renewed ISFSI license or CoC, and associated FSAR for the licensee to perform and document an assessment of the aggregate impact of aging-related DCS operational experience, research, monitoring and inspections at specific points in time during the renewed operating period.

Tollgate Assessment – A written evaluation, performed by licensees at each tollgate, of the aggregate impact of aging-related DCS operational experience, research, monitoring, and inspections on the intended functions of in-scope DCS SSCs. Tollgate assessments are intended to include non-nuclear and international operating information on a best-effort basis. Corrective or mitigative actions arising from tollgate assessments are managed through the corrective action program of the specific or general licensee and/or the cask vendor (CoC holder).

Transfer Cask - A metal cask used to provide temporary shielding and structural protection for the spent fuel canister during fuel loading in a spent fuel pool and during transfer of the loaded canister to or from the storage overpack or transportation cask. The transfer cask has lifting trunnions to permit engagement with other components such as a transfer trailer and cask handling crane lift yoke.

Updated Final Safety Analysis Report (UFSAR) (10 CFR 72.48) – FSAR (as updated) means:

- For specific licensees, the Safety Analysis Report for a facility submitted and updated in accordance with 10 CFR 72.70.
- For general licensees, the Safety Analysis Report for a spent fuel storage cask design, as amended and supplemented.
- For CoC holders, the Safety Analysis Report for a spent fuel storage cask design submitted and updated in accordance with 10 CFR 72.248.

The above definition of UFSAR for general licensees requires additional clarification. For general licensees, the UFSAR is owned and maintained by the CoC holder for the cask design(s) used at the ISFSI. Therefore, the UFSAR that forms the basis for 10 CFR 72.48 changes for the general licensee means the UFSAR revision used to load the particular serial number cask(s) and place them into storage at the ISFSI, as revised by any applicable 10 CFR 72.48 changes. Once the casks loaded under a particular cask UFSAR are placed into service at a generally licensed ISFSI, the UFSAR revision and 10 CFR 72.48 changes applicable to a given serial number cask
remain constant unless a significant safety issue requires implementing a change to a previously loaded cask, or the general licensee chooses to apply a later CoC amendment and associated UFSAR revision to previously loaded casks pursuant to 10 CFR 72.212(b)(4). Because of this unique situation for general licensees, not all casks in service at the same ISFSI may have the same licensing basis.
GUIDANCE FOR OPERATIONS-BASED AGING MANAGEMENT FOR DRY CASK STORAGE

1 INTRODUCTION

1.1 PURPOSE

The purpose of NEI 14-03 is to complement the 10 CFR 72 license and Certificate of Compliance (CoC) renewal review guidance in NUREG-1927, “Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance [5],” Section 3.0, “Aging Management Review” and Section 1.4.4, “Application Content.” NEI 14-03 is needed because there is currently a limited amount of operational and research data available on aging mechanisms that could affect dry cask storage (DCS) structures, systems and components (SSCs). In addition, the industry determined it would be beneficial to develop additional clarifying guidance for the format and content of renewal applications.

Some DCS component aging mechanisms are well-known and a great deal of information is available from power plant experience (e.g., concrete and bolted connections exposed to the environment). However, some postulated aging mechanisms, while well-understood from a scientific standpoint, have not been observed to have affected important-to-safety SSCs at operating ISFSIs. Therefore, there is insufficient operating data to predict whether or not they might occur or, if they do, to model their specific behavior when extending the storage life of a DCSS.

Furthermore, there may be some DCS component aging mechanisms that are not yet known due to the relatively short time periods the storage systems have been in service (less than 30 years nationwide as of this writing). These factors make it difficult to develop, at the time of the renewal application submittal, Time-Limited Aging Analyses (TLAAs) and Aging Management Programs (AMPs) for all in-scope SSCs that address the maintenance of intended safety functions through the end of the renewed operating period. Two items of particular interest in this regard are High Burnup (HBU) fuel performance and stainless steel DCS canister integrity, especially with respect to potential Chloride Induced Stress Corrosion Cracking (CISCC). NEI 14-03 is designed to direct the development of operations-based Aging Management Reviews (AMRs) and Aging Management Activities (AMAs) for DCSSs that incorporate future operating experience, research, monitoring, and inspections in a “learning” manner.

1.2 BACKGROUND

Title 10 of the Code of Federal Regulations, Part 72 (10 CFR 72) provides the regulatory requirements for the independent storage of spent nuclear fuel, high-level waste and greater-than-class C waste outside of the spent fuel pools at nuclear power plants. Storage of spent nuclear fuel in spent fuel pools at nuclear power plants is governed by the reactor’s Part 50 license. 10 CFR 72 offers two types of licenses for the storage of spent nuclear fuel and other related materials at an Independent Spent Fuel Storage Installation (ISFSI): specific and general. A specific license must be used for an ISFSI not co-located on a site governed by a 10 CFR 50 NRC license. Either a specific or a general Part 72 license may be used for an ISFSI co-located on a site governed by a 10 CFR 50 NRC license. A Part 50 license may govern a site with one or
more operating reactors or a site with all reactors permanently shut down (i.e., a “possession-only” license).

A Part 72 specific license, as its name suggests, is a stand-alone license applicable to one ISFSI at one geographic location. The licensing basis for a specific ISFSI license includes the special nuclear materials license, (including license conditions and technical specifications) and an associated Updated Final Safety Analysis Report (UFSAR). The licensing and design bases for a specific ISFSI license address only the facility, location, storage system design, and material to be stored at that ISFSI. There is one licensee for each 10 CFR 72 specific license. A Part 72 specific license may be renewed by the licensee for a term of up to 40 years beyond its initial term by submittal of a renewal application and approval by the NRC. There is no limit on the number of times a Part 72 specific license may be renewed. Renewed specific ISFSI licenses must include aging management requirements.

A Part 72 general license is granted by rule (10 CFR 72.210) to any holder of a 10 CFR Part 50 license for the operation of an ISFSI on the site of the reactor governed by that Part 50 license. General licensees must meet all of the conditions of the general license enumerated in 10 CFR 72.212 plus any regulations applicable to general licensees as listed in 10 CFR 72.13. One of the key general license conditions requires the licensee to use an NRC-certified cask design at the ISFSI. Upon approval of a cask design, the NRC issues a certificate of compliance (CoC) to the applicant (usually the cask vendor), who becomes the CoC holder as defined in 10 CFR 72. The CoC holder then issues and maintains a UFSAR for the cask. The CoC for the approved cask design, including all approved amendments thereafter is listed in 10 CFR 72.214, “List of Approved Spent Fuel Storage Casks.”

General licensees may use any certified cask design (or more than one) at the ISFSI. The term of the general license is tied to the term of the CoC and begins for each licensee when the first cask is deployed at the ISFSI and ends when the last cask is removed from the ISFSI. Within the overall general license ISFSI term, each cask has its own general license term that begins when that cask is placed into service at the ISFSI. A Part 72 general license is renewed for the ISFSI and each cask if and when the CoC (including amendments) for that cask is renewed. A cask CoC may be renewed for up to 40 years beyond its initial term by submittal of a renewal application by the CoC holder (or by a user of that cask if the CoC holder does not submit it) and approval by the NRC. There is no limit on the number of times a Part 72 CoC may be renewed, thus renewing the associated users’ general licenses. Renewed CoCs and associated UFSARs will include aging management program requirements for the general licensees to implement.

1.3 **Applicable Regulations and Guidance**

The following regulations and staff review guidance are applicable to ISFSI and cask licensing:


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[1] The term “cask” is used in this guidance generically, as it is in the 10 CFR 72 regulations, to apply to all types of dry spent fuel storage technologies (i.e., vertical, horizontal, ventilated, bolted lid, etc.)
1.4 Scope

The scope of NEI 14-03 is to complement NUREG-1927 [5], the NRC standard review plan governing the review of ISFSI license and dry cask storage system (DCSS) CoC renewal applications. NEI 14-03 is intended to provide guidance to specific licensees and CoC holders for addressing operations-based aging management in their renewal applications and to expand on the format and content guidance in NUREG-1927 for these applications. NRC endorsement of NEI 14-03 will also support its use in the staff’s reviews of renewal applications.

NEI 14-03 provides a recommended process for addressing aging management of structures, systems, and components (SSCs) that maintain intended safety functions for storage through the end of the renewed ISFSI license period. The SNF canister and bare fuel cask pressure boundaries perform the confinement function that must be maintained throughout the renewed operating period. The exterior surfaces and components of canisters, casks, and storage modules fall into the realm of aging management because a) they are subject to atmospheric environmental conditions and b) they are readily accessible for inspection to varying degrees.

Not included in the scope of NEI 14-03 are NUREG-1927, Section 1.0, “General Information Review” and Section 2.0, “Scoping Evaluation.” These areas are adequately covered in NUREG-1927 with additional information provided in supporting documents such as Argonne National Laboratory Report FCRD-USED-2013-000294, “Managing Aging Effects on Dry Cask Storage Systems for Extended Long-Term Storage and Transportation of Used Fuel” [6]. Future guidance is also expected, such as the NRC’s planned dry storage aging management program recommendations document.

The stored contents and cask internals are not readily accessible but are also included in the scope of NEI 14-03. However, because these components are not subject to atmospheric environmental effects and are not readily accessible, they are addressed in a unique context. See Section 2.6.1.1 for additional discussion.

NEI 14-03 does not address the details of technical issues or the detailed development of AMPs or TLAAs because these activities are the responsibility of the specific licensees and CoC holders based on the specific storage cask design. See Section 2.3 for additional discussion on the regulatory framework for Part 72 license and CoC renewals. NEI 14-03 is intended to provide guidance for licensee and CoC holders to submit renewal applications that are reasonably consistent in format and content to support efficient NRC review. Guidance pertaining to format and content of applications is found in Section 4 of this document and is intended to complement the guidance in NUREG-1927, Section 1.4.4.

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3 Except for Section 1.4.4, “Application Content.”
NEI 14-03 is also limited to the first renewed operating period of a maximum of up to 40 years beyond the initial term of the license or CoC. Issues pertaining to extended storage beyond the first renewal period are not part of initial renewal applications and are therefore not specifically addressed in NEI 14-03. Even though some of the issues overlap, the knowledge base and expected level of understanding of these issues should be significantly improved after decades more operating experience. That knowledge will be used for subsequent renewal activities, including updated TLAAs and AMPs.

Also, transportation of spent fuel and other cask contents after storage at an ISFSI is outside the scope of NEI 14-03. The industry recognizes the linkage of DCS component aging mechanisms and effects to transportation and the requirements in 10 CFR 71. However, these issues are not directly relevant to renewal of storage licenses and CoCs under 10 CFR 72. While it may be a prudent business practice for licensees to assure the future transportability of stored spent fuel and other cask contents, it is not a regulatory requirement that must be met to assure the safe storage during the renewal period.

1.5 Use of Precedent

As of this writing, three 40-year Part 72 specific license renewals have been granted for ISFSIs using dry storage casks: Surry, Robinson and Oconee. Two additional specific license renewals (Calvert Cliffs and Prairie Island) and one CoC renewal (VSC-24) are currently under NRC review. The Surry, Robinson and Oconee renewals were approved prior to the publication of NUREG-1927 and the cask contents in those renewals only included low burnup fuel.

While these renewal applications may be useful to inform the preparation of future applications, they should not be considered wholly precedent-setting. Technical information, guidance and research made available since these licenses were renewed need to be considered in future license and CoC renewal applications. The Calvert Cliffs, Prairie Island and VSC-24 applications were under review at the time NEI 14-03 was prepared and may serve as more useful precedents.

1.6 Applicability to an Interim Consolidated Storage Facility

Given the persistent delay in the development of disposal capability for spent fuel in the United States, there is a possibility that one or more interim consolidated storage facilities (CSFs) will be designed, licensed and operated to receive and temporarily store spent nuclear fuel and other cask contents until a permanent federal repository is available. The CSF would likely be a 10 CFR 72 specific-licensed facility. At least some of the spent fuel and other contents will arrive at a CSF in canisters or transportable storage casks that have been in ISFSI service for significant periods of time at reactor sites before being transported to the CSF. Thus, a CSF would receive canisters and dual-purpose casks that were stored at the plant sites under the general or specific 10 CFR 72 license for the site ISFSIs, transported to the CSF under 10 CFR 71, and placed back into storage service under a different specific Part 72 license for the CSF.

It is likely that canisters and dual-purpose casks placed into service at a CSF will enter the renewed period of operation either prior to or during their time at the CSF, and would be subject

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4 The licenses for the ISFSIs at Morris and Fort St. Vrain have also been renewed but are not considered germane to this guidance because neither uses casks for storage.
to aging management at the CSF during the initial CSF license term. Therefore, NEI 14-03 would be applicable to a CSF. A CSF license application would need to address aging management of storage canisters and dual-purpose casks that have been in storage for an extended period of time at an ISFSI. These canisters and casks will have already been subject to aging management or will be subject to aging management during the initial CSF license term.

It is worth noting that while some canisters may be subject to aging management immediately upon deployment at a CSF or some short time thereafter, the storage casks and horizontal storage modules (HSMs) may be newly constructed and not subject to aging management until the CSF license is renewed. That is, the time related to aging management applies to the time in service for each individual DCSS and each SSC within the DCSS, and may be different for a particular canister and storage cask or HSM.
2 GUIDANCE

2.1 APPROACH

2.1.1 Summary

The overall approach of NEI 14-03 is to create a broader framework for integrating feedback from DCS operating experience, research, monitoring, and inspections into the management of age-related degradation for in-scope SSCs at Independent Spent Fuel Storage Installations (ISFSIs). This feedback has been, and will continue to be assessed in accordance with licensee and CoC holder corrective action and operating experience programs. NEI 14-03 provides additional guidance to be used in renewal applications that requires licensees to perform aggregate assessments at pre-determined points in time during the renewed operating period at their ISFSIs. These aggregate assessments are also intended to encourage licensees to consider relevant, publicly available information that pertains to DCS aging mechanisms from other appropriate sources, which may include international and non-nuclear facilities. This information should be factored into the implementation of the three primary steps of an aging management review, as appropriate [5]:

1. materials and environments
2. identification of aging effects requiring management
3. activities required to manage the effects of aging
   a. time-limited aging analyses
   b. aging management programs.

2.1.2 Programmatic Hierarchy

The term Aging Management Program (AMP) is used in two contexts here and in NRC’s guidance [5]. A high-level, programmatic AMP is required to be implemented by licensees to operate the ISFSI during its renewed operating period. Like other plant programs, examples of which are included in the Administrative Controls section of a plant’s technical specifications, the high-level AMP is a condition of the license (located in the DCSS CoC for a general licensee) and does not include the details of implementation for the program.

The detailed assessment of aging mechanisms, their effects, and the actions to be implemented to monitor the mechanisms and manage their effects are also referred to as “AMPs.” These types of "implementation AMPs” are details within the high-level AMP that are specific to certain SSCs affected by the aging mechanism. Implementation AMPs are described in the ISFSI or cask UFSAR and ultimately in site procedures which direct personnel actions in the field. See Section 4.2.6 for additional information on the location of aging management information in the ISFSI or DCSS licensing basis documents.
2.1.3 Operations-Based Aging Management

Managing aging mechanisms and effects (both from known and potential unknown causes) in a “learning” manner means ISFSI owners would monitor for both the known SSC degradation mechanisms and the symptoms that would be indicators of a potential unknown SSC degradation mechanism. NEI 14-03 is intended to assist licensees and CoC holders in developing and implementing operations-based aging management reviews with the following attributes:

- safety-focused
- operations-based
- implemented within existing corrective action and operating experience programs
- qualitatively risk-informed based on relevant failure modes and effects
- forward-looking
- proactive
- responsive to condition-based monitoring.

The concept of “tollgates” is introduced with NEI 14-03. Tollgates are periodic points within the renewed operating period when licensees would be required to document an aggregate safety assessment. Licensees will be obligated to comply with tollgate license or CoC conditions approved as part of the license or CoC renewal. Tollgates are an additional set of in-service assessments beyond the normal continual assessment of operating experience, research, monitoring, and inspections on DCS component performance that is part of normal ISFSI operations for licensees during the initial license period as well as the renewal period. See Section 2.6.4 for additional discussion of tollgates.

2.2 Current Licensing Basis

Section 2.3 of NUREG 1927 states:

“The NRC bases a license or CoC renewal on the continuation of the existing licensing basis throughout the period of extended operation and on the maintenance of the intended functions of the SSCs important to safety. The NRC does not intend a license or CoC renewal to be a vehicle for imposing new regulatory requirements. If new safety-related deficiencies are discovered, they must be addressed through the license or CoC amendment process. The renewal process cannot be used to facilitate approval of design changes.”

It is important for the licensee or CoC holder who is preparing a renewal application to understand and be able to document the current licensing or certification basis upon which the renewal application is based. The renewal application for a CoC should recognize the fact that general licensees may use whatever DCSS amendment and associated UFSAR revision they choose, and that some licensees may have more than one such DCSS licensing basis governing their ISFSI. The licensing basis for renewal excludes physical security and emergency planning [1]. The licensing basis for renewal includes:

- the current 10 CFR 72 regulations as they apply to license/CoC renewal
- the specific Part 72 license, as amended
approved exemptions from 10 CFR 72
the initial CoC and all approved amendments the CoC holder desires to renew
the ISFSI or cask UFSAR, as modified by changes authorized under 10 CFR 72.48 and to reflect approved amendments
the versions of codes, standards, and guidance specifically committed to in the license, CoC, and UFSAR (e.g., Regulatory Guides, NUREGs, ISGs, ASME Code, ACI Code, ANSI Standards, ASTM Standards, etc.).

License and CoC renewal is specifically focused on the management of aging mechanisms required to provide reasonable assurance of continued safe storage of the cask contents through the period of renewed operation (up to 40 years).

For CoCs, it is important to discuss the certification basis for each amendment to the CoC that is listed in 10 CFR 72.214 and identify for which of these amendments (if not all of them) renewal is being requested. The NRC will be reviewing each amendment for which renewal is requested by the CoC holder in the CoC renewal application. The certification basis for the initial CoC and for each CoC amendment includes the revision of the UFSAR (including separately revised licensing drawings) and the §72.48 changes applicable to that revision of the UFSAR. The renewal application also needs to specify the effective edition of the 10 CFR 72 regulations that applied to the initial CoC and all amendments for which renewal is being requested. The effects of any differences in the certification basis on the TLAAs and AMPs should be clearly explained in the application.

2.3 DESIGN BASIS ISSUES

The approved licensing basis for the ISFSI or DCSS design as described above is the foundation for the renewal application and is static with respect to the scope of the application and the NRC review. The renewal application is not a re-evaluation of the ISFSI or cask technology, or a vehicle for the applicant to seek non-renewal-related changes to the licensing basis, such as changes to the authorized cask contents, technical specifications or design changes to the ISFSI or cask.

Issues that arise during operations-based aging management program implementation that are design basis rather than age-related issues should be handled in the corrective action program, the 10 CFR 72.48 program, the license/CoC amendment process or the exemption process. If design basis issues are generic in nature, the NRC and the industry should address them through the NRC’s Generic Safety Issue program (NRC Management Directive 6.4 [20]). Such issues may ultimately have an effect on the implementation of aging management activities, but are addressed outside the renewal application. Likewise, emerging design basis issues discovered as a result of industry research or operating events are handled under the licensee or CoC holder corrective action program or, for NRC-identified issues, under the generic safety issue or other appropriate process separate from the review of the renewal application.
2.4 10 CFR 72 LICENSE AND COC RENEWAL REGULATORY FRAMEWORK

NEI 14-03 is administrative in nature and intended for use by Part 72 licensees and CoC holders in developing their license or CoC renewal applications. It complements the NRC staff’s renewal application review guidance in NUREG-1927 by providing information on preparing those applications that is directed specifically to the licensee and CoC holder rather than the NRC staff reviewer. It is one element of a broader regulatory framework that includes technical information and proposed AMP guidance being developed by others, and environmental impact statements and assessments covering storage of spent fuel and other contents at ISFSIs beyond the initially contemplated time periods. Figure 2-1 provides a pictorial representation of this framework with NEI 14-03 shown in the top center of the figure.

Licensees and CoC holders should use the technical information and proposed AMPs developed by EPRI, the DOE, and the NRC to develop the appropriate storage technology-specific and ISFSI-specific TLAAs and AMPs for inclusion in their renewal applications. NEI 14-03 also introduces the concept of tollgates to be included in the renewal applications as described in further detail in later sections. The renewal applications should be prepared and submitted following the guidance in this document and in NUREG-1927 [5].
2.5 Time-Limited Aging Analyses and Aging Management Programs

Aging Management Reviews for degradation mechanisms having known (or well-understood) durations will be handled as they have been historically for power plants. Appropriate Time-Limited Aging Analyses (TLAAs) and Aging Management Programs (AMPs) for in-scope SSCs should be created by the specific licensees and CoC holders for in-scope SSCs as described in NUREG-1927 and the ISFSI or cask licensing basis. The AMPs should be further informed by the NRC’s aging management guidance (when available), the Argonne National Laboratory work [6], and other relevant work that may be produced in the future.

Feedback from DCS operating experience, research, monitoring and inspections will be used as appropriate to perform tollgate assessments and update TLAAs, AMPs and/or licensee aging management implementing procedures based on new information. In particular, aging management pertaining to CISCC, fuel performance and cask internals will be managed in this manner.

2.6 Operations-Based Aging Management

The concept of operations-based aging management is to manage DCS aging mechanisms and timeframes (duration to loss of intended function) that are either not known or not well-understood. Known and potential aging mechanisms will be managed using existing corrective action and operating experience programs with the objective of preventing loss of intended safety functions due to aging effects.

Because some postulated aging mechanisms and/or timeframes for in-scope DCS SSCs are not well-characterized by operating data, aging management should be implemented in a manner that feeds information back in a timely fashion to the licensees who operate the ISFSIs. This feedback will be used to perform corrective actions on DCS components to preclude the loss of safety function over the renewed operating period.

Operations-based aging management programs should include the following attributes for the known and unknown degradation mechanisms and time frames:

- recognition and evaluation (key technical issues)
- storage system inspections
- monitoring and operational inspections
- analysis and assessment
- tollgate assessment
- feedback and corrective actions (mitigation/repair and/or analysis).

2.6.1 Recognition and Evaluation (Key Technical Issues)

A number of stakeholder organizations, including EPRI, the DOE and the NRC have embarked on efforts to identify areas where sufficient technical information is currently not available for DCS aging mechanisms. These so-called “gaps” in technical information are being identified in various reports, including the NRC’s Technical Information Needs (TIN) Report [8] and the
DOE’s Technical Gap Report [18]. The DOE High Burnup Dry Storage Cask Research and Development Project (HDRP) [13] and EPRI’s Extended Storage Collaboration Program (ESCP) [11] are two vehicles already in place to pursue filling those gaps in knowledge.

The mission of EPRI ESCP and technical needs for extended storage of spent nuclear fuel are summarized in [11]. ESCP is, at present, comprised of the following subcommittees:

- fuel/internals
- marine environment
- non-destructive examination
- concrete
- high burnup dry storage cask research and development project
- international

EPRI has issued reports such as DCS Failure Modes and Effects Analysis [9] and the international DCS gap analysis report [10]. These reports are just two current examples that provide information about age related degradation mechanisms applicable to DCS. Continuing research activities by EPRI, DOE, NRC, and others are expected to expand the body of available information pertaining to DCSS aging in the future.

SECY-13-0057 [7] and the NRC’s report on technical issues pertaining to extended storage and transportation [8] identify several material degradation processes for which the level of knowledge is relatively low (i.e., for which operating experience is limited and other supporting information is still in technical development). DOE also is pursuing closure of technical gaps identified in Report DOE FCRD-USED-2011-000136 [18].

Specific Part 72 licensees address only aging mechanisms applicable to the particular ISFSI site. CoC holders, on the other hand, address aging mechanisms that could affect the in-scope SSCs wherever the storage system may be used. The aging management reviews for CoC renewals should be devised to permit the licensee users to identify which of the identified aging mechanisms apply at their particular site and how those mechanisms will be managed to avoid the loss of intended safety function over the renewed operating period.

2.6.1.1 Contents, Cask Internals and Aging Management

The SNF canister and bare fuel cask pressure boundaries perform the confinement function that must be maintained throughout the renewed operating period. The exterior surfaces and components of canisters, casks and storage modules clearly require aging management because a) they are subject to atmospheric environmental conditions and b) they are accessible for inspection to varying degrees. It is understood that yet-to-be developed tools or techniques may be required to perform inspections of canister exterior surfaces, including welds. The cask contents and internals are not part of the cask confinement boundary. However, the cask contents and internals may play roles in maintaining the shielding, heat removal, and criticality control design functions of the DCSS and the fuel cladding (for undamaged fuel) also provides an additional, barrier to fission product release.

5 The High Burnup Dry Storage Cask Research Project is an EPRI-managed, DOE and EPRI co-funded project being implemented at the Dominion North Anna ISFSI.
In addition, there are regulatory requirements that must be met by the cask contents and internals through the renewed operating cycle. Specifically, the fuel cladding (of uncanned fuel) must not undergo gross rupture, and the basket structure (including neutron absorber panels) must maintain its ability to perform its structural, heat removal, criticality control, and any other design functions credited in the cask safety analysis.

2.6.1.2 Addressing Potential Age-Related Degradation of Contents and Cask Internals

The cask contents and the internals of the DCSS cannot practically be inspected in-situ due to radiation levels and difficult accessibility. The storage cavities of the casks are carefully processed in preparation for dry storage, including moisture removal and a final backfill to establish an inert gas environment (typically helium). DCSS designs require maintaining the dry, inert gas environment indefinitely so that these internal components will not corrode during the storage interval. Because these materials are generally inaccessible, a research project was conducted that provided the current basis for ensuring that the internals are not degrading to unacceptable levels during the extended storage period [16, 17]. This research project, however, evaluated lower burnup fuel and the results may not bound the aging characteristics of the high burnup fuel now being placed in dry storage.

Potential aging mechanisms have been postulated that could degrade the performance of SNF, other contents, and other internals of dry storage casks during extended renewal periods. The information needed to evaluate these potential mechanisms and whether they could impact cask internals, however, contains several gaps. Activities are underway to provide information to fill in higher risk gaps, but in some cases they will take several years to complete. The DOE and EPRI are prioritizing research to fill information gaps using a risk-informed approach: degradation mechanisms and modes that have a higher likelihood of occurrence and/or higher health consequences are receiving the most attention.

The HDRP [13] is one such activity that is expected to provide confirmatory data to enhance our scientific understanding of the performance of HBU fuel in DCSS for extended storage intervals. In cases where gaps in knowledge exist and those gaps cannot be addressed prior to the start of a renewed storage period, the tollgate process, as described in Section 2.6.4, has been created to ensure analysis and assessment of licensed storage systems are conducted once that information becomes available and that licensees and CoC holders have processes in place to appropriately evaluate that information as it pertains to DCSSs.

2.6.2 Storage System Inspections

Appendix E of NUREG-1927, “Component-Specific Aging Management” states “This [lead canister] inspection is expected to be performed before submittal of the license renewal application.” It is apparent from the language of NUREG-1927 referring to “license renewal application” that this part of the NRC guidance was written for specific licensees who manage all aspects of their Part 72 license and have the direct authority of activities at the ISFSI to perform lead canister inspections they deem necessary to support the license renewal application.
CoC holders, on the other hand, do not have the authority to require that any general licensee perform these inspections, nor do the Part 72 regulations require general licensees to perform inspections in preparation for CoC renewal. Thus, CoC holders need to develop a strategy as part of their CoC renewal application that addresses the subject of storage system inspections in the aging management portion of the renewed CoC. Once the CoC (and therefore, the general licenses for those using that cask design) is renewed, those inspections become conditions of the renewed general license for those casks.

CoC holders may arrange with one or more of their users to perform storage system inspections before submitting the CoC renewal application. Alternatively, CoC holders can choose to propose in the CoC renewal application that performing a storage system inspection prior to submitting the renewal application is not necessary to demonstrate continued safe storage for some period of time after the initial license period. In this case, the CoC holder needs to provide sufficient technical justification for cask operation into the extended license period and the time frame within which one or more storage system inspections must be performed after the initial license term has expired.

The CoC holder should specify in the renewal application requirements for storage system inspection scope, techniques, timing and acceptance criteria. In particular, the CISCC susceptibility criteria being developed by EPRI [14] should be used to determine the appropriate timing and location of storage system inspections to ensure bounding cases are chosen.

Dry storage system inspection techniques and results from research (e.g., on stainless steel DCS canister CISCC) may not be available at the time of license/CoC renewal, but can be expected to be developed and refined over subsequent years. Licensees and CoCs holder should define the requirements for storage system inspections and tollgates in the renewal applications accordingly. In particular, tollgates should be constructed recognizing that the body of knowledge regarding canister CISCC susceptibility and the state-of-the-art for canister inspection techniques is evolving rapidly.

The timing of initial tollgates should be chosen to be sufficiently early to allow any degradation to be addressed before canister integrity is affected, but sufficiently far out in time to take advantage of anticipated advances in inspection techniques and availability of research results. The scope and frequency of subsequent tollgate assessments should take into account the results of preceding inspections and provide for the application of further advances in inspection technology and scientific understanding.

In the case of CoC renewals covering multiple sites, applicants should initially plan for inspections of at least one DCSS at each site (sequenced in the order in which each site loaded the DCSSs covered by that CoC) but may modify this over time based on the results of inspections conducted earlier in the sequence. For example, the number of canisters to be inspected and use of earlier inspections as surrogates at multiple subsequent sites—obviating the need for inspections at each site—should be considered. This information should be periodically reviewed and applied over time to inform and refine the frequency and nature of future tollgate assessments.
2.6.3 Monitoring and Operational Inspections

Using existing industry standards is desirable for monitoring and inspection techniques, frequency and acceptance criteria. For example, ASME Section XI is one resource that the NRC has accepted for aging management activities at Part 50 power plants. Other consensus bodies such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and the American Concrete Institute (ACI) also produce standards for monitoring and inspection that may be used as appropriate for the aging mechanism or variable being monitored or inspected.

The concept of operations-based aging management recognizes that there may be potential other aging mechanisms due to the fact that relatively little inspection data have been collected thus far. By definition, these aging mechanisms are not attributable to a particular SSC. Therefore, data obtained from monitoring and inspection of SSCs should be evaluated for possible indication of additional aging mechanisms.

2.6.4 Analysis and Assessments

Operations-based aging management has, at its core, the requirement for collecting continual feedback in the form of operating experience, research, monitoring and inspections. Licensee programs already require assessment and actions, as appropriate, of incoming information on a real time basis via the corrective action and operating experience programs. This will not change, but will be reinforced. NEI 14-03 introduces the concept of “tollgates” to assure that future knowledge is always captured as part of this process. Individual conditions and events that could affect the ability of an SSC to perform its intended storage safety function for the duration of the renewed period of operation would be handled via the licensee’s and/or CoC holder’s corrective action program. In addition, confirmatory information showing positive results such as no evidence of specific degradation mechanisms or longer durations for the progression of known degradation mechanisms will also be recognized and assessed at the tollgates. This is not a new concept and is simply an expansion of practices that were used during the initial license term.

2.6.5 Tollgate Assessment

NEI 14-03 introduces the concept of tollgates to be included as part of an operations-based aging management program. The tollgate concept provides a structured way for licensees to pause and formally assess aggregated feedback at specific points in time during the renewed operating period.

Tollgates are requirements, implemented by licensees to formally evaluate the aggregate feedback at points in time during the renewed operating period and perform a safety assessment that confirms the safe storage of SNF and other contents and provides additional confidence for continued safe storage operations. The impact of the aggregate feedback should be assessed by the licensee as it pertains to components at that site’s ISFSI and corrective actions taken when warranted, such as:
- modify TLAAs
- adjust age-related degradation monitoring and inspection programs in AMPs (e.g., scope, frequency)
- perform mitigation activities, e.g., repairs or replacements.

Licensees should share their tollgate assessments with their CoC holder(s), other licensees, and other CoC holders for evaluation of generic applicability and impacts on AMPs and TLAAs. See Section 3.5.

The tollgate concept amplifies the existing practice of continual evaluation of site-specific and industrywide DCS operational experience for impacts on a given licensee’s DCS Aging Management Program. It also offers the opportunity for licensees to seek out other sources of operating experience both beyond the nuclear industry and outside the United States. The obligation for licensees to perform tollgate assessments is a requirement in the renewed license or CoC. Tollgates are a proposed set of milestones at appropriate points in the first renewal period. The tollgate assessments should be described in the renewal application and incorporated in the UFSAR upon approval of the renewal application by the NRC. The requirements for tollgate assessments specified in the renewal application should address the following elements:

- frequency:
  - established from technical basis
  - reflects aging mechanism timing
  - reflects risk significance
  - considers findings from prior tollgate assessments
- content of tollgate assessment:
  - summary of research findings, operating experience, monitoring data, and inspection results
  - aggregate Impact of Findings (including trends)
  - consistency with assumptions and inputs in TLAAs
  - effectiveness of AMPs
  - corrective actions
  - summary and conclusions.

Only a high-level requirement for licensees to perform tollgate assessments is included as a requirement in the license or CoC. This is because licensees and CoC holders need to have the flexibility to take appropriate corrective actions, including modifying AMPs and/or implementing procedures in a timely manner as a result of tollgate assessments (i.e., pursuant to 10 CFR 72.48). This timeliness may not be achievable if a license or CoC amendment is required to implement the needed change to a detail of AMP implementation. Furthermore, general licensees would be under no obligation to adopt the later CoC amendment.
The tollgate frequency may be equally divided over the renewed period of operation or may be irregular, as defined by the specific licensee or CoC holder. Licensees and CoC holders may consider the projected time frames for expected results from applicable research and development programs (e.g., the HDRP and development of canister CISCC susceptibility criteria) in the establishment of tollgate timing, but need not tie the tollgates specifically to these events. This will avoid delaying tollgate assessments if the results of these programs are delayed for any reason. Figure 2-2 provides a pictorial representation of how tollgates fit into the renewed operation of an ISFSI.

Figure 2-2
Pictorial Representation of Tollgates

Tollgates are not, by definition, stopping points for storage operations. No particular action other than performing an assessment is required to continue ISFSI operation through the period of renewed operation. To proceed through a tollgate, the licensee must perform an assessment of aggregated operating experience, research findings, and data from monitoring and inspections to confirm the continued safe storage of the SNF and other contents until the next tollgate is approached and document the results of this assessment. The aggregated OE (including NRC-generated generic communications), research results, monitoring data and inspection findings used in the tollgate assessment are to be reviewed from ISFSIs across the country and across storage technologies.

Internationally-generated DCS operating experience and relevant non-nuclear materials aging degradation data should also be considered in the assessment. The acquisition of non-nuclear and international OE should be considered a best-effort undertaking by licensees and CoC holders. Information should be publicly available, relevant to DCSS aging mechanisms, and published by reliable source such as a peer-reviewed technical publication.
Tollgate assessments will generally result in one of three conclusions:

1. The industry information reviewed confirms the adequacy of current TLAAs and AMPs. Continued safe storage is expected to the next tollgate.

2. Industry information is currently unavailable for a particular potential age-related degradation mechanism. Plans to address the information gap need to be developed and implemented.

3. The industry information reviewed introduces issues not currently managed adequately by current TLAAs and AMPs. Corrective actions are required. This could be as simple as alterations to the TLAAs or AMPs, as appropriate, or could involve additional inspections, mitigation, or repairs.

The tollgate is an obligation of the licensee (via the CoC holder for general licensees) to perform a safety assessment and take appropriate corrective actions, such as repairs or replacements, and to make adjustments to TLAAs, AMPs, and any other monitoring or inspection programs in place to support DCS operations through the first renewed operating period. Licensees are expected to share tollgate assessments with each other and with the designer of the dry cask storage system to factor into future designs and/or future aging management submittals. CoC holders are also expected to share age-related degradation information they generate or acquire that may have cross-technology applicability.

See Section 3.5 for additional guidance on operations-based information aggregation and dissemination.

2.6.6 Feedback and Corrective Action (Mitigation, Repair and/or Analysis)

Feedback received during the renewed operating period from OE, research, monitoring, inspections and tollgate assessments should be processed through the licensee and CoC holder OE and corrective action programs, as appropriate. Licensees and CoC holders will determine appropriate corrective actions, including mitigative, preventive and analysis options to assure continued safe operation through the remaining years of the first renewed operating period. As discussed further in Section 3.5, sharing of OE and close coordination between licensees (both specific and general) and the cask vendors is required to assure there is a clear understanding of the safety implications of any findings for that site, for that storage technology and for consideration of generic applicability across storage technologies. An important element of feedback and corrective actions is an evaluation of the continued validity of TLAAs and effectiveness of AMPs.
2.7 REPORTING

2.7.1 NRC Reporting

Reporting of events and conditions to the NRC for Part 72 specific licensees, general licensees and CoC holders is governed primarily by the 10 CFR 72 regulations. Specifically, 10 CFR 72.74, §72.75, and §72.242 contain the criteria for determining whether an event or condition is reportable to the NRC. (Additional NRC reporting requirements may also be found in the cask CoCs for the general licenses; e.g., reporting of a mis-loaded canister or cask.) The reporting requirements in 10 CFR 72 provide consistent, well understood criteria for determining reportability, the timing of any verbal notifications, and the requirements for timing and content of follow-up written reports.

Part 72 licensees and CoC holders should use these same 10 CFR 72 regulatory requirements to determine if a particular age-related degradation condition or event identified via operating experience, research, monitoring, or inspection is reportable to the NRC. Likewise, the 10 CFR 72 reporting criteria should be used to determine NRC reportability of any conclusions reached in a tollgate assessment.

2.7.2 Other Reporting

Reporting of individual events and conditions so that other licensees and CoC holders are made aware of the issues in a timely manner is an important element of operations-based aging management. Individual events and conditions not rising to the level of NRC reportability based on the criteria in 10 CFR 72 still need to be communicated among licensees and CoC holders in some manner to allow tracking and trending. In fact, an individual event, while not rising to the level of NRC reportability by itself may be indicative of a trend that may be reportable. In addition, while tollgate assessment reports are not required to be submitted to the NRC, they should be made available for NRC inspection.

Licensees of operating reactors typically use the Institute of Nuclear Power Operations (INPO) reporting system. However, the criteria for INPO reports in the DCS arena need to be documented and agreed to by these licensees. Licensees for shutdown reactors and CoC holders are not members of INPO. Therefore, operations-based aging management and the use of tollgates will require licensees, CoC holders, and cask vendor users groups to develop a reporting process for this information. Refer to Section 3.5 for additional guidance pertaining to aggregation, and dissemination of information for licensee use in performing tollgate assessments.

2.8 RECORDS

Age-related degradation information collected by licensees and CoC holders from operating experience, research, monitoring, inspections and tollgate assessments will be maintained as readily retrievable records. Records Management requirements under the licensee and CoC holder Quality Assurance programs provides an appropriate set of requirements for operations-based aging management-related records.
3 IMPLEMENTATION

3.1 SPECIFIC LICENSE

The Part 72 specific license is owned by the licensee and pertains only to the ISFSI at that licensee’s site. Implementation of ISFSI license renewal requirements by specific and general licensees, including aging management activities, will have a strong parallel to implementing operating plant aging management activities. In the case of specific licenses, the licensee owns the TLAAs and AMPs, and can set up appropriate controls for revising them as information is returned from OE, research, monitoring, and inspection activities as well as tollgate assessment performed during the renewal period. Tollgate assessments performed by the specific licensees need to consider feedback from all sources, including general licensees and CoC holders.

3.2 GENERAL LICENSE

The Part 72 general license involves two regulated entities, namely the CoC holder and the general licensee. The CoC holder is responsible for renewing the CoC, including defining generic requirements for ensuring the cask will perform as designed through the renewed operating period. Once a CoC renewal is approved by the NRC, the general licenses for the casks operated under that CoC are also renewed. General licensees are responsible for implementing the requirements, including AMPs, for each cask once the cask has been in service for its initial license term. For example, a general licensee may have deployed casks at their ISFSI over several years in accordance with a single CoC. Aging management requirements must be implemented by the general licensee for each cask at the ISFSI when that cask begins its renewed operating period, based on the initial term of the CoC. This is typically 20 or 40 years after the cask was place in service at the ISFSI. Aging management for the ISFSI as a whole would begin coincident with the timing for the first cask deployed, unless other provisions are specified in the renewed CoC and associated UFSAR.

In accordance with 10 CFR 72.240(b) as long as the CoC renewal application has been submitted in a timely manner—at least 30 days prior to the CoC expiration date—the general licenses for the casks in service remain valid and the casks may stay in service until such time as the NRC has made a determination on the CoC renewal application. This process is known as “timely renewal.”

Once the first cask at a general license ISFSI is in the renewed operating period, the aging management activities and other requirements applicable to the renewed CoC apply. Given the dual nature of the general license, the CoC holder needs to carefully consider the appropriate level of detail and use precise wording in the licensing documents for the generic aging management activities they specify. Implementation details should be appropriately segregated between generic requirements applicable to all casks, generic requirements that can be met through the use of surrogate monitoring or inspections, and requirements for which applicability is determined by each general licensee based on site-specific conditions, time in service, operating practices, and NRC-approved exemptions. The general licensees would need to perform an implementation review to determine applicability of the CoC generic programs, exemptions and incorporation into site implementing procedures.
In an operations-based aging management scheme, it is expected that information obtained from operating experience, research, monitoring, and inspections during the renewal period, particularly at the tollgates, may prompt changes, deletions, or additions to the AMAs. Therefore, the CoC holder should allow the flexibility for licensees and themselves to modify the AMAs in the cask UFSAR by keeping the AMA information in the CoC (and subject to NRC review and approval) limited to programmatic descriptions including key elements of those programs (i.e., tollgates must be established and defined). Implementation details for AMPs, including inspection details and acceptance criteria should be included in the UFSAR, implementing procedures, or other aging management program document under licensee change control. See Section 4.2.6 for additional guidance.

Both CoC holders and general licensees would have the ability to modify the AMAs in the UFSAR under the provisions of 10 CFR 72.48. Any change to an AMA by either entity should be shared among all general licensee users of that cask design for consideration of the same change being made by other licensees or generically by the CoC holder. Generic changes to AMAs made by the CoC holder pursuant to 10 CFR 72.48 would be shared with general licensees in accordance with existing requirements. Site-specific changes made to AMAs by a particular licensee should be shared with the CoC holder who is expected to determine if the change should be adopted on a generic basis.

### 3.3 INTERFACE WITH PART 50 AGING MANAGEMENT PROGRAMS

The majority of the ISFSIs in the United States are co-located on sites with operating reactors. Nearly all of these operating reactors are now, or soon will be, operating under a renewed Part 50 license which requires aging management activities to be performed for the power plant. Aging management for the ISFSI and the casks at co-located ISFSIs are expected to be integrated to an existing site aging management program. Nearly all of the materials and aging mechanisms associated with ISFSIs and DCSSs are also part of aging management programs for operating nuclear plants. Thus, Part 72 aging management programs should be very similar in structure to Part 50 aging management programs to allow efficient integration with the Part 50 program. With this in mind, this guidance has been developed in a manner that is similar to the guidance provided in NEI 03-08 [15], while at the same time recognizing the unique aspects of DCS aging management. The key differences between DCS aging management and operating plant aging management are:

- Direct accessibility to DCS canister exterior surfaces in ventilated DCSSs is problematic due to very high radiation fields and the inability to readily re-locate the radioactive source for canister inspections or mitigation access.
- Small clearances between the DCS canisters and the storage overpacks or modules make in-situ inspections difficult for DCSS in operation.
- The condition of the stored contents and cask internals cannot be directly assessed without opening the canister or cask. Opening a welded canister or bolted cask is not desirable from an operational risk or personnel dose perspective. In addition, opening a cask or canister for no other reason than to inspect the contents and internals was not
anticipated in original cask design or licensing; such an activity would likely require a license or CoC amendment as a test or experiment in accordance with 10 CFR 72.48.

The above differences give rise to the concept of more extensive use of surrogate inspections for DCS aging management than have been historically used for operating reactor aging management. Nevertheless, the AMPs, inspection techniques, and acceptance criteria described in certain operating plant-related documents should be considered first by licensees and CoC holders. Thus, there are several aging management resources that should be considered in developing DCS renewal applications and aging management programs for DCS. See Section 5.4 for a partial listing of these documents.

Except for the shutdown plant sites, licensees will likely be integrating their Part 72 aging management program into their existing (or future) Part 50 aging management program for the operating plant. This approach would be consistent with how Part 72 general licenses use Part 50 programs (e.g., quality assurance, emergency response, etc.) to govern Part 72 activities. Experience from Part 50 license renewals and specific Part 72 license renewals shows a consistency in the location of aging management information in licensing documents and the associated change control processes. This consistency should be maintained for future Part 72 specific license renewals and CoC renewals for general licensees. See Section 4.2.6 for additional guidance.

3.4 IMPLEMENTATION EXAMPLES

3.4.1 Chloride-Induced Stress Corrosion Cracking (CISCC) of Storage Canisters

The types of stainless steel used to fabricate most dry storage canisters and the welds used to fabricate and seal the canisters make them susceptible to CISCC if 1) they are deployed in a ventilated storage cask and 2) the atmospheric conditions for CISCC are present at the ISFSI in which the canister is in service. It is currently not clear if, or when this corrosion may occur on dry storage canisters, when a crack could initiate, and how long it would take a crack to result in a breach of the canister pressure boundary. This issue has been identified by the NRC and EPRI as an area in need of additional research to fully understand the susceptibility of canisters under actual storage conditions [7 - 12].

Recognizing the potential applicability of this phenomenon to DCSS operations after decades of operation, the industry and the NRC initiated Regulatory Issue Resolution Protocol (RIRP) N-10-01 in 2010 to drive resolution of this issue in a cost-effective manner on a schedule that reflects its safety significance [14]. This effort will produce, among other things, a set of CISCC susceptibility criteria and ultimately lead to aging management guidance for addressing this issue through the renewed operating period. Licensees and CoC holders will review the EPRI CISCC aging management program guidance, including susceptibility criteria, when it becomes available and implement the criteria, as applicable.

3.4.2 Fuel Performance and Internals

The performance of the stored fuel and the condition of cask internals after the initial license period and through the first renewed operating period is an issue that should be addressed in the renewal application. These issues can affect the storage system’s ability to allow retrieval of the
SNF and to continue to provide adequate shielding, heat removal, and criticality control through the first renewed operating period. The specific license renewals approved to date relied upon a previous inspection of fuel and internals from a storage cask that had been in service for some time. That inspection [16, 17] provided the technical basis for the NRC to conclude that reasonable assurance exists that cask internals and low burnup spent fuel (average assembly burnup less than 45,000 MWd/MTU) will perform as expected through the renewed operating period with no aging management action required. However, today’s specific license and CoC renewals include cask contents that are thermally hotter and spent fuel that is burned above 45,000 MWd/MTU (known as high burnup (HBU) fuel).

Reasonable assurance exists that HBU fuel can be safely stored and meet all regulatory requirements through the initial license period and for some period of time thereafter. Similar assurance exists for cask internals. This has been confirmed by the NRC’s approval of the storage of HBU fuel and cask designs in the initial licensing process, and the approval of amendments to those licenses and CoCs. Based on the current state of knowledge, it is expected that HBU fuel can also be stored safely and the cask internals will be essentially unchanged through a 60-year period of operation [19]. However, there are postulated physical phenomena unique to HBU fuel cladding in dry storage for which additional data is needed to confirm this assertion.

EPRI is currently conducting a research project [13] to inspect HBU fuel from a cask in storage to confirm that it can be safely stored through the first period of renewed operation. Some of the results of this research are planned to become available later this decade. Licensees and CoC holders are expected to include consideration of the HBU fuel R&D project results when results of the research become available and in tollgate assessments if this issue applies to them.

3.5 **AGGREGATION AND DISSEMINATION OF AGE-RELATED OPERATING EXPERIENCE AND OTHER INFORMATION**

The cornerstone of the operations-based aging management idea in general and the tollgate concept in particular is the collection and assessment of DCS aging-related operating experience, research results, monitoring feedback and inspection data. This information is being generated on a continual basis across all dry storage technologies and at a wide variety of geographic locations nationwide. It should be collected and made accessible to the appropriate parties in a consistent manner that permits tollgate assessments to be performed by the licensees for their specific ISFSI sites and storage technologies. It is not efficient or cost-effective to have each ISFSI licensee seek out and aggregate this information individually. Furthermore, not all entities involved in implementing DCS operations-based aging management currently have access to all of the various information sources for both reporting and retrieving OE and other information. For instance, CoC holders and utilities with no ISFSIs co-located with an operating reactor are not members of INPO, whose reporting system is used by utilities with operating reactors to report significant DCS operating events.

There are a variety of potential solutions to ensure all relevant information is collected in a single clearinghouse and can be made available to all who need it for operations-based aging management and tollgate assessments. Licensees, cask vendors and their users groups should

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6 An initial term of 20 years plus a renewed term of 40 years.
work together, in consultation with other interested parties (e.g., EPRI, the NRC, the DOE) to assure thorough and effective sharing of OE and other information. DCSS users’ groups should designate an aging management OE coordinator from the CoC holder organization or the users’ group membership. The key objectives for this information management process should be to:

- Use existing licensee and CoC holder processes to the extent practicable for collecting and evaluating OE and other information.

- Make information available to, and shared freely among the different storage technology users, ISFSI owners, and cask vendors (with due consideration of proprietary information).

- Initially screen information to determine applicability to DCS aging management. Exclude non-aging management information.

- Further screen aging management information by the affected technology OE coordinator for an extent of condition review to determine potential broader applicability. The information should be categorized by the OE coordinator as potentially DCSS technology-specific, cross-technology applicable, ISFSI location-specific, or region-specific and distributed to other technology OE coordinators for similar evaluations, as appropriate.

Appendix B provides a sample screening form for determining if DCS OE and other information is aging management-related and if it affects one user or is more broadly applicable.

### 3.6 License and CoC Amendments during Review of the Renewal Application

It is likely that during the NRC review of a license or CoC renewal application that the license or CoC will need to be amended or the cask system modified pursuant to 10 CFR 72.48 for reasons unrelated to the renewal. If an amendment is submitted while the renewal application is under NRC review, the amendment should contain a section describing the AMAs associated with that amendment, including any new or revised TLAAs and AMPs.
4 RENEWAL APPLICATION FORMAT AND CONTENT

4.1 EXPERIENCE

Five specific ISFSI license renewal applications involving dry storage casks have been submitted to the NRC, three of which have been approved and two of which are under review. Specific ISFSI licenses are less complex because they address one ISFSI and only the latest ISFSI license amendment and FSAR are active. The precedents for format and content in these five applications as well as the staff review guidance in NUREG-1927 are instructive along with NEI 14-03, which addresses operations-based aging management and tollgates. The experience from these five applications has been considered in preparing NEI 14-03.

Also of interest, the VSC-24 Storage System (CoC 1007) renewal application is the first and only CoC renewal application submitted to the NRC as of this writing. This application followed the guidance in NUREG-1927. The VSC-24 application provides a recommended precedent for CoC renewal applications and has also been considered in the development of NEI 14-03.

It should be noted that the VSC-24 DCSS is no longer being fabricated for use at ISFSIs. The VSC-24 systems that have been loaded contain all low burnup fuel and the canisters are fabricated of carbon steel. Thus, the application contains limited information pertaining to operations-based aging management with regard to CISCC and HBU fuel performance.

4.2 APPLICATION FORMAT AND CONTENT

NUREG-1927 provides basic information on renewal application format and content. The following provides additional guidance to complement NUREG-1927. Both specific license and CoC renewal applications should be organized as follows:

4.2.1 Cover Letter

A brief cover letter should be prepared and signed by an appropriate company authority for the license or CoC that identifies the date of submittal, docket number, the name of the facility or storage technology, the date of expiration for the license or CoC, and include a formal request for renewal of the license or CoC pursuant to either 10 CFR 72.42 (for specific licenses) or 10 CFR 72.240 (for CoCs). The cover letter should be addressed as directed in 10 CFR 72.4 and provide a name and contact information for a person responsible for interfacing with the NRC on matters pertaining to the application and should state whether the application contains any proprietary information. Lastly, the cover letter should clearly, but briefly, identify the information in all enclosures. A “cc” list should be provided indicating others to whom copies of the application were sent directly, e.g., the NRC project manager.

4.2.2 Enclosures

The overall structure of the enclosures should be consistent with NUREG-1927. The applicant may organize the enclosures of the renewal application in any suitable way that is complete, accurate and comprehensive with respect to necessary content and clearly describe the location of all information in the submittal. References used in the application should be cited by edition.
or version and section or page number. If a reference is not readily available in the open literature (e.g., a consensus code or standard, or NRC NUREG), it should be included with the application, pursuant to applicable copyright laws. Proprietary material should be identified and an affidavit requesting withholding pursuant to 10 CFR 2.390 included as appropriate. If proprietary material is included, a non-proprietary version of the document should be provided with the submittal.

The enclosure(s) should begin with a table of contents that includes sections and subsections that align with the sections and subsections in NUREG-1927, which will be used to review the application and provides a template for the NRC’s Safety Evaluation report (SER). These NUREG-1927 sections should be preceded with a background section that describes the ISFSI and/or storage technology, and summarizes the licensing history and current state of use of the cask. For instance, if the casks are no longer being deployed or certain CoC amendments are no longer being used for cask loadings, it is important to include statements to this effect. A regulatory compliance matrix describing where the information is located in the application for each applicable regulation and NUREG-1927 review criterion is recommended. The concept of operations-based aging management and tollgates may be included in the section on aging management reviews or contained in a separate, dedicated section. Separate enclosures (or appendices) should be provided with proposed new information to be added to the ISFSI or cask UFSAR and the proposed license or CoC changes to address aging management during the first renewed operating period.

CoC holders should consider excluding from the renewal scope any amendment(s) that are not part of the current licensing basis for some or all of the casks at the general licensee ISFSIs. For those amendments being renewed, the CoC holder should provide a list of drawings for the licensed components applicable to that amendment (i.e., part of the certification basis). If the latest drawings provide full backwards capability to earlier amendments and the initial certificate, those drawings should be listed with a discussion to that effect.

A suggested format for a renewal application is shown below. Applicants should add subsections, appendices, and attachments as appropriate. The VSC-24 application provides a template for CoC renewal application format and content:

- Section 1: General Information
- Section 2: Scoping Evaluation
- Section 3: Aging Management Review
- Section 4: Aging Management Programs
- Section 5: Drawing List
- Appendix A: Proposed ISFSI/Cask UFSAR Information for Aging Management
- Appendix B: Proposed License/CoC Conditions for Renewed Operation
- List of Tables
- List of Figures
4.2.3 10 CFR 72.48

Over the initial license period of the ISFSI or DCSS, modifications to the ISFSI facility or cask design or procedures may have been implemented under the provisions of 10 CFR 72.48. By definition, modifications to the ISFSI or DCSS design, operation, or safety analyses authorized under the provisions of 10 CFR 72.48 (as opposed to a license or CoC amendment) do not require prior NRC review and approval. CoC holders and licensees are required to submit to the NRC biennially a summary of changes made pursuant to 10 CFR 72.48 and to clearly identify UFSAR changes made under 10 CFR 72.48 in the biennial updates to that document. Thus, it is not required to separately submit the details of each modification authorized by 10 CFR 72.48 as part of the renewal application.

That said, the changes made under 10 CFR 72.48 may affect the component drawings or other FSAR information that is germane to the NRC’s review of the renewal application. Thus, the drawing list and UFSAR information provided to the NRC in the renewal application (for each amendment in the case of a CoC renewal) should reflect all 72.48 changes applicable to that CoC amendment and associated UFSAR revision. At the applicant’s discretion, the biennial §72.48 reports submitted to the NRC to date could be submitted with the application. See Section 4.2.5 for additional discussion of cask UFSARs.

10 CFR 72.48 is also the appropriate regulatory process to be used to modify UFSAR-described TLAAs and AMPs as a result of tollgate assessments or other operations-based aging management feedback received between tollgate assessments. 10 CFR 72.48 provides the appropriate set of public health and safety-based criteria for determining whether the NRC needs to review and approve revised TLAAs and AMPs prior to implementation. 10 CFR 72.48 permits the timely revision to TLAAs and AMPs by licensees and CoC holders in response to information received indicating such changes are appropriate. This approach is also consistent with Part 50 power plant aging management programs, where such information resides in the plant UFSAR and is subject to the change controls in 10 CFR 50.59.

Fabrication deviations that were not generic design changes but were accepted as-is or repaired may have required a 10 CFR 72.48 review. Such deviations should be reviewed and appropriately addressed by the applicant in the context of the renewed operating period and age-related degradation.

4.2.4 Cask UFSARs

Generally speaking, cask UFSARs are not currently developed and maintained such that a single, latest UFSAR revision is applicable to all active CoC amendments. This has resulted in the coexistence of multiple discrete cask licensing bases at many general license ISFSIs, comprised of the applicable CoC amendment under which each group of casks were loaded and the UFSAR revision associated with that amendment. Subsequent UFSAR revisions generally are not adopted by the general licensee unless a later CoC amendment is also adopted. CoC holders should ensure the application is clear when describing the applicability of TLAAs and AMPs to specific amendments and associated UFSAR revisions.
4.2.5 AMP Implementation

The license or CoC renewal application should include technical information supporting the basis for all AMPs organized by the ten elements identified in NUREG-1927. A thorough and well-organized application reduces the likelihood for Requests for Supplemental Information (RSIs) before the NRC’s technical review begins and will minimize the number of Requests for Additional Information (RAIs) during the technical review. Information provided should be of sufficient detail to allow the NRC staff reviewers to gain a deep understanding of the proposed aging management program from the programmatic level to the details of implementation required to make a determination whether to renew the license or CoC. It is recognized that a considerable amount of detailed information will be in the documents that implement and support the application, and that this information is subject to NRC inspection. Therefore, the application should also include the proposed location of the various levels of information for ongoing implementation of aging management activities by the licensee at the ISFSI as described in the subsections below.

4.2.5.1 License or Certificate of Compliance

The license or CoC should contain only high-level information as conditions of the license or CoC that are unlikely to change over the renewed operating period. These conditions would obligate the specific or general licensee to implementing all aging management activities described in the ISFSI or DCSS UFSAR. Changes to these license or CoC conditions will require NRC review and approval. Too much information in the license and, particularly the CoC, will inhibit the ability of licensees and CoC holders to implement changes to AMPs based on information learned from operations-based aging management.

4.2.5.2 ISFSI or DCSS UFSAR

The applicant should include in the ISFSI or DCSS UFSAR summaries of the TLAAs performed, at the same level of detail as the descriptions of the safety analyses included for original licensing. The level of detail in the ISFSI or DCSS UFSAR should be limited to a summary of each AMP with reference to the renewal application for additional information. Changes to aging management information in the ISFSI or DCSS UFSAR, including that incorporated by reference, are subject to review pursuant to 10 CFR 72.48 to determine if prior NRC review and approval is required.

4.2.5.3 AMP Implementing Procedures

AMPs are implemented by licensees in accordance with written procedures developed pursuant to the information in the ISFSI or DCSS UFSAR. In most cases, these procedures will involve monitoring or inspections of in-scope SSCs. They direct personnel on what to look at and what techniques to use. They may or may not have detailed, actionable acceptance criteria extracted from the AMPs as described in the UFSAR. If they do not have actionable acceptance criteria, the subjective criteria for personnel to determine additional assessment or evaluation of a finding is required via the corrective action program should be sufficiently conservative to ensure virtually any unexpected finding is reviewed further. For instance, a corrosion inspection may have a subjective criterion of “any observable corrosion” or a concrete inspection may have a
subjective criterion of “more than normal settlement cracking” for a concrete structure exposed to the atmospheric environment.

Findings from monitoring and inspections would be entered into the site’s corrective action program where a technical assessment would take place and specific, actionable acceptance criteria found in the UFSAR or renewal application would be used to determine any corrective actions required, including changes to the AMPs themselves.

Licensees should have an overarching Aging Management Program document to govern site implementation of aging management consistently. This may be a new document or a revision to an existing program document such as the program document for aging management of a power plant operating under a renewed Part 50 license co-located with the ISFSI. This programmatic document is also an appropriate location for the actionable acceptance criteria for all AMPs that can be referred to when a monitoring or inspection finding is being assessed in the corrective action program.

Changes to AMP implementing procedures and the program document would be subject to review pursuant to 10 CFR 72.48 to determine if prior NRC review and approval is required.
5 REFERENCES

5.1 REGULATIONS


5.2 STANDARDS

2. ANSI N 14.6, “Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4,500 kg) or More.”

5.3 NUREG/CRS


5.4 OTHER


13. High Burn-up Dry Storage Cask Research and Development Project, Final Test Plan, EPRI, Revision 0.


15. NEI 03-08, Guideline for the Management of Material Issues, Nuclear Energy Institute, Revision 1, January 2010.


## APPENDIX A: SAMPLE TOLLGATES

<table>
<thead>
<tr>
<th>TOLLGATE YEAR*</th>
<th>ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A**</td>
</tr>
<tr>
<td></td>
<td>Evaluate information from the following sources and perform a written assessment of the aggregate impact of the information, including but not limited to trends, corrective actions required, and the effectiveness of the AMPs with which they are associated:</td>
</tr>
<tr>
<td></td>
<td>• results, if any, of research and development programs focused specifically on age related degradation mechanisms identified as potentially affecting the storage system and ISFSI site, such as:</td>
</tr>
<tr>
<td></td>
<td>o DOE/EPRI High Burnup Dry Storage Cask Research and Development Project” (HDRP)</td>
</tr>
<tr>
<td></td>
<td>o EPRI Chloride-Induced Stress Corrosion Cracking (CISCC) research</td>
</tr>
<tr>
<td></td>
<td>• relevant results of other domestic and international research (including non-nuclear)</td>
</tr>
<tr>
<td></td>
<td>• relevant domestic and international operating experience (including non-nuclear)</td>
</tr>
<tr>
<td></td>
<td>• relevant results of domestic and international ISFSI and DCSS performance monitoring</td>
</tr>
<tr>
<td></td>
<td>• relevant results of domestic and international ISFSI and DCSS inspections.</td>
</tr>
<tr>
<td></td>
<td>NOTE: Feedback on any of the above should be assessed at the time the issues are identified.</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Evaluate additional information gained from the sources listed in Tollgate 1 along with any new relevant sources and perform a written assessment of the aggregate impact of the information. This evaluation should be informed by the results of Tollgate 1. The age related degradation mechanisms evaluated at this Tollgate and the time at which it is conducted may be adjusted based on the results of the Tollgate 1 assessment.</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Same as Tollgate 1 as informed by the results of Tollgates 1 and 2</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Same as Tollgate 1 as informed by the results of Tollgates 1, 2, and 3</td>
</tr>
</tbody>
</table>

* Based on the year first cask at the ISFSI reaches initial term of service and aging management activities are required.

** Timing of initial tollgate (A), tollgate frequency (B, C, etc.), and total number of tollgates to be determined by specific licensee/CoC holder in the renewal application.
# APPENDIX B: OPERATING EXPERIENCE SCREENING FORM
(May be adapted to address individual user needs)

<table>
<thead>
<tr>
<th>DRY SPENT FUEL STORAGE OPERATING EXPERIENCE AGING MANAGEMENT SCREENING FORM*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. ORIGINATING ORGANIZATION:</strong></td>
</tr>
<tr>
<td><strong>2. DESCRIPTION OF INFORMATION AND IMPACTS ON INTENDED FUNCTIONS:</strong></td>
</tr>
<tr>
<td><strong>3. DOES INFORMATION HAVE POTENTIAL AGING MANAGEMENT IMPLICATIONS? Yes / No (Circle one)</strong></td>
</tr>
<tr>
<td>(Provide brief explanation. If no, skip to Step 6. If yes, continue to Step 4)</td>
</tr>
<tr>
<td>Explanation:</td>
</tr>
<tr>
<td><strong>4. IS THE AGING MANAGEMENT INFORMATION POTENTIALLY APPLICABLE TO OTHERS? Yes / No (Circle one)</strong></td>
</tr>
<tr>
<td>(If no, provide brief explanation and stop. If yes, continue to Step 5)</td>
</tr>
<tr>
<td>Explanation:</td>
</tr>
<tr>
<td><strong>5. DESCRIBE HOW THE AGING MANAGEMENT INFORMATION IS APPLICABLE TO OTHERS</strong></td>
</tr>
<tr>
<td>(e.g., Technology-specific? All dry storage? Regional?)</td>
</tr>
<tr>
<td>Explanation:</td>
</tr>
<tr>
<td><strong>6. WITH WHOM SHOULD THIS INFORMATION BE SHARED?</strong></td>
</tr>
<tr>
<td>Suggestions could include, for example:</td>
</tr>
<tr>
<td>- This DCSS’s CoC holder/designer (site-specific)</td>
</tr>
<tr>
<td>- This DCSS’s users’ group (technology-specific)</td>
</tr>
<tr>
<td>- All DCSS user’s groups (all dry storage)</td>
</tr>
<tr>
<td>- Other unique distribution</td>
</tr>
<tr>
<td><strong>7. NOTES</strong></td>
</tr>
</tbody>
</table>

*This screening does not replace normal site OE and corrective action program processes.*