HLWYM HEmails

From: Thomas Wilt
Sent: Tuesday, February 06, 2007 10:01 AM
To: David Pickett; Biswajit Dasgupta; Asadul Chowdhury; Osvaldo Pensado; Lane Howard; Yi-Ming Pan
Subject: RE: Feedback on SFPO comments
Attachments: SFST-Comments-TAD-Spec-Rev0-1-3-2007.wpd

Here are the SFPO comments in case you don't have them

Tom

-----Original Message-----
From: David Pickett [mailto:dpickett@cnwra.swri.edu]
Sent: Tuesday, February 06, 2007 8:47 AM
To: twilt@cnwra.swri.edu
Subject: RE: Feedback on SFPO comments

Please remind me: Where can I see them?

-----Original Message-----
From: Thomas Wilt [mailto:twilt@cnwra.swri.edu]
Sent: Tuesday, February 06, 2007 8:36 AM
To: twilt@cnwra.swri.edu; achowdhury@swri.edu; 'Yiming Pan'; dpickett@cnwra.swri.edu; 'Lane Howard'; 'Osvaldo Pensado'
Subject: Feedback on SFPO comments

Everyone

I am touching base with everyone to see if anyone has comments on the SFPO comments.

Supposedly the letter is supposed to be complete on February 9.

Thank You

Tom

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 896

Mail Envelope Properties (001701c749ff$9e889db0$c0c8a281)

Subject: RE: Feedback on SFPO comments
Sent Date: 2/6/2007 10:01:02 AM
Received Date: 2/6/2007 10:01:03 AM
From: Thomas Wilt

Created By: twilt@cnwra.swri.edu

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"David Pickett" <dpickett@cnwra.swri.edu>
Tracking Status: None
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SFST Comments On DOE Preliminary TAD Specification, Revision B.

The SFST has performed a cursory review of Revision B to the "Preliminary Transportation, Aging, and Disposal Canister System Performance Specification" issued by DOE in November 2006. SFST shares these comments with HLWRS as part of our collaborative process to exchange technical information about DOE's proposed new approach of using a standardized TAD canister. This information will help ensure that potential regulatory uncertainties will be minimized in future NRC certification and licensing actions of the TAD canisters and overpacks under 10 CFR Parts 71, 72, and 63. These comments primarily address potential regulatory challenges with respect to the regulatory requirements and typical acceptance criteria for dual purpose canisters certified under Part 71 and 72 standards.

SFST believes that some comments may apply directly to DOE for consideration in future development and clarification of their specifications, while others are more appropriate for internal consultation to ensure that common, technical challenges are identified early-on and addressed as appropriate in respective licensing arenas.

Section 1.1. Purpose

(1) DOE should clarify that the DOE TAD specifications only apply to performance needs derived by the licensing requirements of 10 CFR 63. Vendors and users (i.e. purchasers) will be required to demonstrate the TAD design meets requirements and performance criteria for actual on-site storage and transportation under 10 CFR Part 71 and 72.

Section 1.2. TAD Description

(1) DOE should clarify that the TAD canister itself in not considered an "approved content," but rather an integral component of a storage or transportation system certified under 10 CFR Part 71 & 72. The TAD vendor will be required to demonstrate that the TAD canister loaded with approved SNF contents can adequately perform under these requirements in separate licensing actions.

Section 1.2.9 Storage Overpack

(1) DOE should clarify that the Storage Overpack <u>at purchaser sites</u> provides functions <u>for some</u> operating and accident conditions analogous to the Aging Overpack. The Aging Overpack specifications appear to meet other additional requirements (e.g, such as F-15 impact and 100-year marine environment) that are typically not required for NRC storage certification under 10 CFR Part 72.

Section 1.3 Definitions & Glossary

(1) DOE should clarify that the TAD-SPEC definitions may not be consistent and/or apply to regulatory definitions of the same terms that may be used under Part 71 & Part 72 (e.g. accidents, off-normal, important to safety, etc..) Vendors and users who certify and operate the TAD under Part 71 & 72, must meet the regulatory definitions and associated acceptance criteria defined within the regulation.

Section 3.1.1 TAD Canister General

(1) DOE should clarify that the TAD canister is intended to be a component of an integrated system that could be approved by NRC under Part 72 for storage, under Part 71 for transportation, and under Part 63 for aging and disposal at a repository. The first sentence confuses the issue by implying that NRC will certify one system for storage, transportation, aging and disposal.

Section 3.1.1(5&6) General PWR & BWR Characteristics

(1) DOE should clarify the maximum burnup specification of 80 GWD/MTU in terms of an assembly average or peak rod burnup. This clarification may influence the source term of the fuel important which is important in demonstrating the thermal, cladding, shielding, and containment performance of the TAD-overpack designs under Part 71 & 72.

(2) DOE should clarify the maximum initial enrichment specification of 5 percent initial enrichment as a fuel assembly average, maximum planar, nominal, and/or other clarifying enrichment value. This clarification may influence the effective fissile content within individual fuel assemblies, which is important in demonstrating the criticality performance of TAD-overpack designs under Part 71 & 72.

(3) DOE should clarify wether it expects TADs must be designed to contain fuel with extreme-burnup at 80 GWD/MTU with a 5 year cooling time, or allow for multiple burnup and cooling time combinations that fall within burnup and cooling time bounds in the TAD Specs. Because of thermal and shielding limitations in current dual purpose canister designs, past practices for cask vendors have involved specification of a set of burnup & cooling time combinations to demonstrate compliance under Part 71 and Part 72. Typical storage and transportation cask systems to date have been typically limited to individual fuel assembly powers of about 1.0 to 1.5 kW, with total canister powers of approximately 24 - 35 kW. (An assumed 80 GWD/MTU fuel assembly would have a power of about 2.5 kW at 5 years, and require an additional 10-15 years to reach a 1.5 kW level.)

(4) SFST will need to prepare for potential technical challenges with extreme burnups at 80 GWD/MTU, and engage the vendor industry on how they would address these issues during Part 71 and 72 licensing phases of the TAD. NRR has not yet licensed fuel for burnups up to 80 GWD/MTU for reactor operations, nor has SFST certified a dual-purpose systems to store maximum burnups of 80 GWD/MTU. Three technical challenges have been recognized for high burnup fuel (e.g. greater than 45 GWD/MTU) with respect to performance in Part 71 transportation and Part 72 storage configurations. These include fuel cladding properties (e.g. embrittlement); cladding behavior during normal and accident conditions (e.g. thermal failure and mechanical loads); and uncertainties in radionuclide source terms predictions. SFST has multiple User Needs with Research to clarify material properties, failure criteria, and source term uncertaintities associate with high burnup fuel.

Section 3.1.1(15&16) General Service Life in Harsh Marine Environment.

(1) DOE should clarify the bases for a 100-year marine environment and potential acceptance criteria for demonstrating this performance.

SFST notes there is presently little to no data showing that Type 316 stainless will perform in such an environment. In fact, the Japanese Competent Authority has identified preliminary studies that indicate failure of other steel types in such environments. To address this potential uncertainty, SFST has a User Need with Research to determine the susceptibility of the stainless to chloride induced SCC at cask storage temperatures.

Section 3.1.3 Thermal

(1) DOE should clarify if there are limitations on thermal cycling during loading operations which involve thermal transients in the cladding during vacuum drying operations.

SFST has implemented review guidance to its staff in SFPO-ISG-11, that describes acceptance criteria for thermal cycling and cladding stresses. During loading operations, repeated thermal cycling (repeated heatup/cooldown cycles) may occur but should be limited to less than 10 cycles, with cladding temperature variations that are less than 117F to assure cladding integrity.

SFST also notes some vendors are trending towards helium drying systems versus vacuum drying systems, in part to meet thermal cycling criteria for higher burnup fuel.

Section 3.1.6(1) Containment Leak Testing

(1) DOE should clarify if they expect loading utilities to affirmatively leak test bare TAD canisters to a 1 x 10-7 cm^3/sec leak-tight standard as defined by ANSI N14.5-97.

For dual purpose casks, utilities have informed SFST on many difficulties in performing such a sensitive test on large canisters in a high-radiation industrial environment. Such issues include difficulties in detecting minute helium molecules leaking in an open air environment from a large canister weld area. For storage, canister leak tests are performed at lower sensitivities (e.g. 10-4). For transportation, the overpack is the containment barrier that is generally tested for leakage, not the canister.

SFST also notes it has implement review guidance to its staff in SFPO-ISG-18, that describes acceptance criteria for testing canisters for leak-tightness.

Section 3.1.6(4) Containment Vacuum Drying

(2) DOE should clarify with alternate technologies may be acceptable for drying TAD canisters. SFST has not approved vacuum drying for some current dual-purpose canister designs at high burnups and/or high heat loads. SFST also notes some dual-purpose vendors are trending towards helium drying systems (versus vacuum drying systems), in part to meet thermal cycling criteria for higher burnup fuel at high decay heats, and also to preclude operational difficulties associated with vacuum drying in some canister designs.

Section 3.3.2(3) Structural

(1) SFST notes that military aircraft impact is not evaluated as part of the certification process for dual-purpose casks under Part 72. This will represent a new area of analyses for current dual-purpose vendors who may design TAD aging designs to meet specifications.

SFST has significant experience with the evaluation of F-16 impacts as part of the PFS licensing proceedings, including sensitivities of overpack design features to certain impact parameters, and evaluation of commercial aircraft impacts as part of on-going security assessments. Given this may be a new and rather complex field of study, NRC should consider if acceptance criteria for impact analyses should be developed for potential TAD vendors. SFST will be happy to collaborate with HLWRS as necessary.

Section 3.3.2(1) Structural Seismic

(1) SFST notes that, comparing the prescriptive ground motions to licensing experience with the Diablo Canyon HI-STORM 100S deployment, it's worth to note that the aging overpack anchorage interface shown in the specs drawing could be misleading. This is because:

a. The hold down plate and keeper clip assembly may readily fail in prying action due to large uplifting force associated with the 16 equally spaced 2-inch diameter anchor bolts, and

b. Each anchorage bolt is to be coupled with a 2-1/2 inch diameter by 83 inch long steel bar embedded in the 7'-6" thick concrete pad.

Section 3.3.2(2) Structural Leakage Rate

(1) DOE should clarify the use and verify the consistency of specifying “leak tightness” standards in some specifications while specifying fractional volume release rates in other specifications. Leak-tight has a well established definition under ANSI-N14.5 as being tested to a sensitivity of 1×10^{-7} cm^3/sec. This volume & pressure dependent ANSI definition of leak tight may be inconsistent with the volume-independent fraction release rates.

Section 3.3.2(3) Structural Leak Rate

(1) SFST notes that acceptance criteria for dual-purpose canisters has traditionally been <u>no failure</u> under credible accident loadings. This specification for aircraft and other Part 63 accidents indicates that failure is acceptable if leakage rate meets a maximum limit. It is not clear what method can be used to assess the actual failure size of yielded steel or welds to determine a resultant leak rate.

Other Issues?

Item (2) - Does the maximum weight limitation accommodate all fuel types currently in use in the industry?