

**Application of Guidance to Implement 10 CFR 72.48 (NEI-96-07 Appendix B) - Examples of Potential  
Realistic Activities Reviewed through the 72.48 Process  
Attachment 4 – Example 3 - Removal of Helium Leak Test of Canister fabrication welds**

**Proposed Activity**

Remove the requirement in the FSAR to perform a helium leak test on the Dual-Purpose Canister (DPC) shell welds and the shell to baseplate welds that are performed after fabrication. These welds will be referred to as the fabrication welds going forward. This proposed activity does not change the design or construction of the DPC, including welding and non-destructive testing and pressure testing of the DPC required by ASME III, Subsection NB, as clarified by approved alternatives in the CoC.

**NRC Approved Licensing Basis**

CoC, TS and Approved Contents

*The CoC does not include requirements for leak testing DPC shell welds or fabrication welds in the shop. The CoC includes a commitment to the ASME Section III, Subsection NB Code for DPC design, fabrication, inspection, and testing, with certain NRC-approved alternatives. ASME III, NB-6000 requires pressure testing of the DPC after final closure welding. The technical specifications only require helium leakage testing in the field after the vent and drain port cover plate welds are complete, but not of the DPC lid-to-shell.*

Safety Evaluation Report

*The SER states that the DPC's confinement function is verified through hydrostatic testing, helium leak testing, and weld examinations. It further states that a fabrication helium leak rate test is performed on the canister shell weld and shell to baseplate weld to ensure a maximum helium leakage rate. This helium leak rate test is performed in accordance with ANSI N14.5-1997 and confirms that the amount of helium lost from the canister over the approved period will not result in a degradation of the canister's performance of the heat transfer or confinement functions. The SER states that the helium leak rate test provides the NRC with reasonable assurance that no credible leakage would occur from the final closure welds of austenitic stainless steel canisters.*

FSAR

*The FSAR describes a helium leak test of the DPC pressure boundary shop welds during fabrication.*

*It is noteworthy for this example that the DPC, while it is the Part 72 storage confinement boundary, it is not the Part 71 containment boundary. The containment function for transportation is provided by the overpack in which the DPC resides during transport.*

Applicable Regulations

*There is no regulation requiring a helium leak rate test of any SSC, nor is there any requirement for a helium leak rate test to confirm the cask's ability to perform any safety function.*

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72.162, Test Control

“The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish a test program to ensure that all testing, required to demonstrate that the structures, systems, and components will perform satisfactorily in service, is identified and performed in accordance with written test procedures that incorporate the requirements of this part and the requirements and acceptance limits contained in the ISFSI, MRS, or spent fuel storage cask license or CoC.”

72.232, Inspections and Tests

“(c) The certificate holder and applicant for a CoC shall perform, and make provisions that permit the NRC to perform, tests that the Commission deems necessary or appropriate for the administration of the regulations in this part.”

72.234, Conditions of Approval

“(a) The certificate holder and applicant for a CoC shall ensure that the design, fabrication, testing, and maintenance of a spent fuel storage cask comply with the requirements in § 72.236.”

“(f) The certificate holder shall ensure that written procedures and appropriate tests are established prior to use of the spent fuel storage casks.”

72.236, Specific Requirements for Spent Fuel Storage Cask Approval and Fabrication

“(l) The spent fuel storage cask and its systems important to safety must be evaluated, by appropriate tests or by other means acceptable to the NRC, to demonstrate that they will reasonably maintain confinement of radioactive material under normal, off-normal, and credible accident conditions.”

**72.48 Applicability Determination**

*{72.48 applies if Yes is answered to the first question and No is answered to last two questions}*

[NEI B4.1.1]: Does the proposed activity require a change to the ISFSI, cask design or procedure in the FSAR that is more than an editorial change (B4.1.3) and is not a managerial procedure (B4.1.4)?

Response: Yes. The removal of this fabrication shop helium leak test is a change to the cask FSAR that is not editorial or administrative.

[NEI B4.1.1 1<sup>st</sup> bullet]: Does the proposed activity require a change in the CoC, including appendices?

Response: No. Neither the CoC, nor the appendices, describe the shop helium leak test for the canister shell weld or shell to baseplate weld.

[NEI B4.1.1 2<sup>nd</sup> bullet]: Does a different regulation provide more specific criteria for accomplishing the proposed activity?

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Response: No.

Conclusion: 72.48 applies and the proposed activity must be screened. The change to a test than verifies the as-fabricated cask meet the approved design also requires review of the requirements for an adequate test program and quality assurance.

It is noted that independent of the conclusions from the 72.48 review the CoC holder still needs to address the question as to the appropriateness of deleting the DPC fabrication shop helium leakage test in the context of meeting the regulations requiring an adequate test program (10 CFR 72.236) for the spent fuel cask and quality assurance (10 CFR Subpart L). In particular, 10 CFR 72.236(l) states: “ The spent fuel storage cask and its systems important to safety must be evaluated, by appropriate tests or by other means *acceptable to the NRC*, [emphasis added] to demonstrate that they will reasonably maintain confinement of radioactive material under normal, off-normal, and credible accident conditions.” This variant of the example demonstrates how CoC holders and licensees must ensure that all proposed activities continue to meet the regulations as part of the design control process, not only in applying the 72.48 process.

**72.48 Screening**

{72.48 evaluation is required if Yes is answered to any of the following questions}

1. [NEI B4.2.1.1]: Does the proposed activity involve a change to an SSC that adversely affects a cask FSAR described design function? [NEI Page 36 footnote, and page 38]: Does the proposed activity involve an alteration to a design basis limit for a fission product barrier?

Response: Yes. The FSAR-described design functions are confinement and decay heat removal. Per 72.48 guidance Sections B4.2.1 and B4.2.1.1, this proposed change *adversely affects design function by eliminating a* test that validates the as-fabricated condition meets the design basis. Thus, a potential fabrication defect could go undetected, possibly resulting in the as-fabricated cask not being able to perform the FSAR described design function. Further supporting this conclusion is the language in the NRC’s SERs that DPC helium leakage testing was relied upon to verify the DPC’s confinement function.

2. [NEI B4.2.1.2]: Does the proposed activity involve a change to a procedure that adversely affects how cask FSAR described SSC design functions are performed or controlled?

Response: No. This proposed activity pertains to a fabrication shop test for the DPC hardware. Per 72.48 guidance Section B4.2.1.2, it does not involve a procedure used to perform or control a design function.

3. [NEI B4.2.1.3]: Does the proposed activity involve an adverse change to an element of a cask FSAR described evaluation methodology, or use of an alternative evaluation methodology, that is used in establishing the design bases or used in the safety analyses?

Response: No. The helium leak rate test is to confirm that the as-fabricated cask meets the NRC approved design. Per 72.48 guidance Section B3.10, a method of evaluation is the calculational

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framework used for evaluating behavior or response of the ISFSI facility, cask design, or an SSC. The change (i.e. helium leak rate test) is not an element of the method of evaluation, but rather it is a test, which is not part of the calculational framework. Therefore, this proposed activity does not involve a change to a method of evaluation, and the method used is identical to that for the original configuration as described in the FSAR.

4. [NEI B4.2.2]: Does the proposed activity involve a test or experiment not described in the cask FSAR, where an SSC is utilized or controlled in a manner that is outside the reference bounds of the design for that SSC or is inconsistent with analyses or descriptions in the cask FSAR?

Response: No. This proposed activity involves a fabrication shop leakage test performed before the spent fuel cask is placed into service. Per 72.48 guidance Section B3.14, a test or experiment is defined as any SSC utilized or controlled in a manner which is either outside the reference bounds of the design bases as described in the UFSAR, or inconsistent with the analyses or descriptions in the UFSAR. This proposed activity meets neither of those criteria.

5. [NEI B4.2.2]: Does the proposed activity result in the CoC/TS needing to be changed?

Response: No. The CoC and appendices were reviewed and fabrication shop leakage testing of the DPC is neither addressed directly in the form of a technical specification or other requirement, nor addressed indirectly through a commitment to a code or standard.

Conclusion: A 72.48 evaluation is required. One or more “yes” answers to the screening questions indicates a 72.48 evaluation is required to be performed. In this case, only Screen question 1 was answered ‘yes’, therefore, only evaluation questions 72.48(c)(2)( i-vii) are applicable.

**72.48 Evaluation**

*{Prior NRC approval is required if Yes is answered to any of the following questions}*

[NEI B4.3 2<sup>nd</sup> para]: “Criteria (c)(2)(i—vii) are applicable to activities other than changes in methods of evaluation. Criterion (c)(2)(viii) is applicable to changes in methods of evaluation. Each activity must be evaluated against each applicable criterion.”

Since only Screen question 1 was answered ‘yes’, then only the first 7 evaluation questions in 72.48 are applicable.

Question 1: [NEI 96-07 B4.3.1] Does the change result in more than a minimal increase in the frequency of an accident previously evaluated in the UFSAR?

Response: No. The conduct of a fabrication shop leak test does not involve operation of the spent fuel cask. Thus performing the test or not has no effect on any accident initiators described in the cask FSAR.

Question 2: [NEI 96-07 B4.3.2] Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of a system structure, or component (SSC) important to safety previously evaluated in the UFSAR?

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Response: No. The SSC involved is the DPC and the relevant design functions are decay heat removal and confinement. The FSAR describes the DPC pressure boundary as “leaktight,” and no effluents are assumed to leak from the DPC. Helium leakage in the approved cask design was previously thought to be incredible based, in part, on the performance of a shop helium leak test to verify the confinement design function, and therefore this is not a previously evaluated malfunction. (However, leakage may result in a new malfunction and/or a malfunction with a different result, which will be addressed in question 6.) This proposed activity does not change the design or construction of the DPC, including welding and non-destructive testing and pressure testing of the DPC required by ASME III, Subsection NB, as clarified by approved alternatives in the CoC.

Question 3: [NEI 96-07 B4.3.3] Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the UFSAR?

Response: No. The radiological consequences (dose to the public) of the accidents described in the cask FSAR, to the extent there are any, remain the same. The design of the DPC, the amount of DPC helium backfill, materials of construction, welding, and the source term of the allowed contents are unchanged by this proposed activity. Therefore, any offsite dose consequences based on these parameters would remain the same.

Question 4: [NEI 96-07 B4.3.4] Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the UFSAR?

Response: No. There are no malfunctions with radiological consequences (dose to the public) described in the cask FSAR. The design of the DPC, the amount of DPC helium backfill, and the source term of the allowed contents are unchanged by this proposed activity.

Question 5: [NEI 96-07 B4.3.5] Does the change create a possibility for an accident of a different type than any previously evaluated in the UFSAR?

Response: No. The proposed activity does not alter the operation of the spent fuel cask or how it is prepared for storage. Removal of the helium leak test is not an initiator of any accident and no new failure modes are introduced. Thus, there is no creation of an accident of a different type than previously described in the cask FSAR.

Question 6: [NEI 96-07 B4.3.6]: Does the proposed activity create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the UFSAR?

Response: Yes, because a test that verifies the as-fabricated cask meets the approved design is being eliminated, and the SER states that the test was relied upon by the NRC to provide adequate assurance. The SSC involved is the DPC and the relevant design functions are decay heat removal and confinement. Eliminating the fabrication test would no longer ensure that the as-fabricated cask is able to perform the design basis functions. Specifically, this would introduce the potential for a fabrication defect to go undetected, possibly resulting in the as-fabricated cask not being able to perform the FSAR described design functions. An unanticipated loss of helium from the DPC could cause the DPC to fail to perform both of these

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design functions in the manner (for confinement) and to the degree (for decay heat removal) described in the cask FSAR. This new malfunction of loss of DPC pressure boundary integrity would create a result different than that currently described in the cask FSAR. The FSAR describes the DPC pressure boundary as “leaktight,” and no effluents are assumed from the DPC that would result in dose to workers or the public. This malfunction was previously thought to be incredible based, in part, on the performance of a shop helium leak test to verify the confinement design function. A malfunction that breaches the DPC confinement boundary would have a different result in the form of some amount of effluent dose to workers or the public, compared to the zero effluent dose currently described in the cask FSAR.

Question 7: [NEI 96-07 B4.3.7] Does the change result in a design basis limit for a fission product barrier as described in the UFSAR being exceeded or altered?

Response: No. The fission product barriers are the fuel cladding and the canister confinement boundary. The proposed change involves only a test that verifies the as-fabricated cask meets the approved design. Therefore, elimination of the test does not alter the approved design basis limits, only whether the as-fabricated cask has been demonstrated to perform to those limits. The design basis limit for confinement, namely the leakage rate of the canister confinement boundary, is unchanged. There is no change to an analysis, design code, or other change that would alter or exceed any design basis limit for a fission product barrier. The DPC stress limits, design pressure, and design temperature all remain the same.

Question 8: [NEI 96-07 B4.3.8] Does the activity result in departure from a method of evaluation described in UFSAR used in establishing the design bases or safety analyses?

Response: Not applicable. The helium leak rate test is to confirm that the as-fabricated cask meets the NRC approved design. Per 72.48 guidance Section B3.10, a method of evaluation is the calculational framework used for evaluating behavior or response of the ISFSI facility, cask design, or an SSC. The change (i.e. helium leak rate test) is not an element of the method of evaluation, but rather it is a test, which is not part of the calculational framework. This proposed activity does not involve a change to a method of evaluation, and the method used is identical to that for the original configuration as described in the FSAR.

Conclusion: Prior approval from the NRC is required for eliminating the fabrication helium leak rate test, because the test was relied upon by the NRC, in the SER, to provide reasonable assurance that the as-fabricated cask performed the design functions. This activity, therefore, requires prior NRC approval because the activity results in the possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the UFSAR (Question 6).

**Additional Considerations**

The following variations to the main example demonstrate how small changes in the specific conditions can result in different conclusions from the 72.48 review.

**Variant 1 – SER is silent on the Helium Leak Test**

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The SER does not include a discussion that the helium leak rate test was relied upon by the NRC to determine that there is reasonable assurance that no credible leakage would occur. The CoC Holder is proposing to replace the fabrication helium leak test with an alternative test (not eliminate as in the main example).

*Since the NRC did not rely on the helium leak rate test to determine there is reasonable assurance that no credible leakage would occur, then the actual test performed to verify the as-fabricated cask meets the approved design can be changed without prior NRC approval. In the original example, the answer to question 6 was “yes” because the test was eliminated entirely, thus there was no verification that the as-fabricated cask meets the approved design. However, if the CoC holder were to replace the test with an equivalent test capable of verifying the as-fabricated cask meets the approved design (in this case capable of detecting helium leakage to the levels of the maximum allowable leakage rate), and the NRC did not rely on the helium leak rate test to provide reasonable assurance, then the answer to question 6 would be no. Specifically, the new test provides the same level of assurance that the as-fabricated cask meets the approved design. It is noted that, even if replacing the test passed 72.48, the CoC Holder would still have to evaluate the change in test type as to whether the new test meets the adequate test program and quality assurance program requirements.*