

General Information or Other (PAR)

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PART-21 DRY CASK CANISTER DOCUMENTATION LOST

"TN identified and documented in Supplier Finding Report 2007-111 that our fabricator, GE-Hitachi Nuclear Energy Americas (GHNEA), had provided inadequate fabrication records resulting in a nonconforming condition relative to the possibility of undocumented Temporary Weld Attachments (TWAs) to the confinement boundary of a loaded NUHOMS 32PTH Dry Shielded Canister (DSC) at Surry Power Station.

"This condition involves a lack of documentation for use of qualified welders, approved welding procedures, approved weld filler material and compatible TWA base material, as well as a lack of the required liquid penetrant surface examination report subsequent to TWA removal. Such documentation is required per Article NB-4435 of the ASME B&PV Code Section III, which is a design feature embedded in the Technical Specifications for the NUHOMS HD license.

"Based on the preliminary evaluation, it is concluded the subject DSC is capable of performing its design functions involving the structural integrity of the confinement boundary, heat removal, shielding and criticality control associated with the safe storage of spent nuclear fuel."

Four DSCs were shipped (three to Surry and one to North Anna) with insufficient documentation. The documentation for one of the Surry canisters was subsequently found. Of the remaining three DSCs, one at Surry, was loaded with spent fuel.

1819
NRR



E-25623
September 26, 2007

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Notification of a Failure to Comply under the Provisions of 10CFR21

Reference: Transnuclear Letter E-25576 to U. S. Nuclear Regulatory Commission, Evaluation of a Deviation for Notification under the Provisions of 10CFR21, dated 9/19/07.

To Whom It May Concern:

The purpose of this letter is to inform the staff of a condition identified by Transnuclear, Inc. (TN) as a failure to comply with the license conditions for Certificate of Compliance for Spent Fuel Storage Casks, No. 1030 including Appendix A, NUHOMS[®] HD System Generic Technical Specifications, thereby requiring notification under the provisions of 10CFR21. Specifically, TN identified and documented in Supplier Finding Report 2007-111 that our fabricator, GE-Hitachi Nuclear Energy Americas (GHNEA), had provided inadequate fabrication records resulting in a nonconforming condition relative to the possibility of undocumented Temporary Weld Attachments (TWAs) to the confinement boundary of a loaded NUHOMS[®] 32PTH Dry Shielded Canister (DSC) at Surry Power Station (DSC S/N DOM-32PTH-001-C).

This condition involves a lack of documentation for use of qualified welders, approved welding procedures, approved weld filler material and compatible TWA base material, as well as a lack of the required liquid penetrant surface examination report subsequent to TWA removal. Such documentation is required per Article NB-4435 of the ASME B&PV Code Section III, which is a design feature embedded in the Technical Specifications for the NUHOMS[®] HD license. Therefore, the nonconforming TWAs constitute a Code violation such that the subject loaded canister is not compliant with the NUHOMS[®] HD Technical Specifications. Therefore, TN has determined the failure to comply is reportable under the notification provisions of 10CFR21. In accordance with TN procedural requirements, the initial date of discovery was established as 9/7/2007, resulting in the referenced correspondence. Further information obtained on 9/24/07 resulted in a positive reportability determination.

The background, basis for continued use of the affected loaded canister, safety significance, regulatory implications, corrective actions taken to date and future corrective actions are discussed in Attachment I to this letter. We are progressing with the evaluation and expect to have it completed within the prescribed sixty (60) days defined in 10CFR21.21(a)(1). If for any reason we cannot complete the evaluation within sixty days, we will provide the interim notification required by 10CFR21.21(a)(2).

Any questions you may have regarding this matter should be directed to Steven C. White, Director Corporate Quality Assurance at 410-910-6870.

Very truly yours,

Tara Neider
President – Transnuclear Inc.

c: J. Sebrosky (NRC) J. Bondre J. Boshoven
R. Grubb S. Petras S. White

Background

Transnuclear (TN) review of a Final Document Package (FDP) for a recently fabricated canister identified a missing nondestructive examination (NDE) report for a temporary welded attachment (TWA). Subsequent review determined NDE records were not included in other FDPs involving four delivered and certified canisters, two of which are loaded with spent fuel at Surry Power Station. TN Supplier Finding Report (SFR) No. 2007-111 documents the identified condition. The missing records have been located for one of the loaded canisters; however, at this time records have not been located for the second loaded canister, which is the subject of this 10CFR21 report.

Temporary attachments are routinely used in fabrication to rig and fixture parts or control distortion during welding operations. During the fabrication process temporary welded attachments have been utilized on the shell OD both above and below the DSC inner bottom cover location to control shell wall distortion during welding of the inner bottom cover plate to the shell ID. The subject TN SFR identified several instances of missing NDE reports associated with TWAs which had documented weld maps and weld control records. TN's fabricator, GE-Hitachi Nuclear Energy Americas (GHNEA) performed an investigation and extent of condition for all TWAs utilized in 32PTH DSC fabrication and determined through collective interviews with their production staff that the fabrication process consistently utilized distortion control tabs as a standard practice for all shells fabricated to date, even for cases where no weld documentation was evident (Reference 1).

These investigation results prompted TN to notify the NRC and Dominion that a potentially undocumented set of TWAs was installed on DSC S/N DOM-32PTH-001-C, currently loaded with spent fuel at the Surry Power Station (Reference 2). Although no documentary evidence has been retrieved to support the use of distortion control tabs for the subject canister, specialized NDE techniques were utilized to make a positive determination regarding use of such distortion control tabs on three other DSCs currently located at the fabricators facility subject to the identical documentation issue. Therefore, based on fabricator staff interviews in conjunction with confirmatory NDE, it is highly likely that distortion control tabs were utilized on the inaccessible loaded unit.

Basis for Continued Use of Noncompliant DSC

Regarding continued use of the subject noncompliant canister, during the same interviews conducted with GHNEA production personnel supporting the conclusion that distortion control tabs were utilized on the subject DSC shell, the following statements were provided (Reference 1). The welders all insisted that they understood the TWA process and that weld maps and weld control records were consistently generated for all TWAs. They concluded that the documentation of such was most likely lost sometime after removal of the TWA or otherwise discarded.

Although no documentary evidence exists, the fabricator's welding program including weld filler material control has been continually in place during the timeframe of interest such that there exists high confidence that the welders available to perform the TWA work were qualified to the applicable procedures, would have utilized appropriate approved welding procedures, would have drawn out the approved weld wire specified by the welding procedures, and would have utilized compatible attachment material.

Experience to date for documented welding activities indicates that the fabricator's welding program is consistently satisfactory regarding these attributes. In fact, inspections performed on five DSC shells with known use of distortion control tabs indicate satisfactory VT and PT results. The weld procedures and materials typical for these TWAs are commonplace in the shop (Type 304 stainless steel to stainless steel welding) with no historical indication of any inferior welding or unsatisfactory NDE results associated with previously documented TWAs.

Therefore, it is arguable from the preponderance of the programmatic and physical evidence provided that the undocumented TWAs would have been of acceptable quality with no apparent defects remaining

Attachment I to TN Letter E-25623

subsequent to their removal. However, due to the lack of documentary evidence that a PT examination was actually performed, TN has evaluated the potential that a defect could have been introduced through the TWA welding process as discussed in the following assessment.

The base material of the shell is SA-240 Type 304 austenitic stainless steel plate which has exceptional toughness and is not susceptible to weld induced cracking, especially due to surface welds (i.e., TWAs utilize fillet welds). Furthermore, the weld filler material utilized exclusively for stainless steel welding on the 32PTH fabrication project is dual certified to a low carbon specification (i.e., 308/308L material classification containing .04% maximum carbon), which reduces the possibility of carbide precipitation in the grain boundary and essentially eliminates any potential for cracking in the grain boundary of the welds. However, if a defect were to be introduced due to the welding process, it would most likely be in the form of porosity or pin holes limited to the weld pool volume and/or heat affected zone (HAZ), but not project beyond the HAZ into the unaffected base material.

Therefore, in order to quantify the size of the most limiting defect that could have been introduced, TN is currently pursuing testing of representative weld mockups intended to mimic the undocumented TWAs to quantify the typical depth of fusion of the weld pool and associated HAZ. TN will then evaluate the effects of an assumed surface crack equal to the depth of the HAZ to demonstrate that even with the local loss of section strength, the calculated shell stresses would be maintained within the applicable ASME Code allowable design values.

Even assuming the shell wall has a crack depth which projects beyond the minimum design value of .490", the effect would be localized and significant margin exists for the nominal DSC shell thickness of .500". The minimum wall thickness for design pressure is only a fraction of the nominal thickness and prior evaluations for localized wall thinning support local reductions in the order of 20% with no adverse effect on the confinement boundary structure for design loading.

Regarding confinement boundary leak tight integrity, the TWA removal would have occurred prior to fabrication tests involving a pressure test performed per ASME Section III, Article NB-6300 to a nominal test pressure of 23 psig, and a helium leak test performed per ANSI N14.5 with a leakage acceptance criterion of 1×10^{-7} atm cc/sec He. Therefore, the leak tight aspect of the confinement boundary is assured simply due to the sequence of fabrication and testing.

Safety Significance/Extent of Condition

Based on the preliminary evaluation provided herein, it is concluded the subject DSC is capable of performing its design functions involving the structural integrity of the confinement boundary, heat removal, shielding and criticality control associated with the safe storage of spent nuclear fuel. The nonconforming condition is limited to an ASME Code and Technical Specification noncompliance with no adverse effect on the credited DSC design functions.

Regarding extent of condition, TN has established that the fabrication requirements for TWAs were properly articulated in the governing fabrication specification and that the fabricator had a satisfactory program in place for performing and documenting such TWAs. The apparent cause of the undocumented TWAs is a lack of understanding on the part of the personnel directing and performing the fabrication and inspection activities regarding the documentation requirements for TWAs. Therefore, the extent of condition is limited to this particular fabricator (i.e., GHNEA).

Regulatory Implications

It is noted that the Technical Specifications do not direct specific action for ASME Code noncompliance. Rather, Section 4.0 of the NUHOMS[®] HD Generic Technical Specifications acknowledges that the Codes and Standards with alternatives invoked in Section 4.4, "provide the bases for design, but are not inherently suited for description as Limiting Conditions for Operations". Therefore, a limited exception to the ASME Code requirement of Article NB-4435 will be requested for the affected canisters as discussed below in the planned corrective actions.

Attachment I to TN Letter E-25623

Corrective Action

The following corrective actions have been completed.

- TN's fabricator has performed a root cause investigation into the issue and developed appropriate internal corrective actions.
- Facility wide stand downs were conducted by TN's fabricator with all production and QC personnel to discuss the issue and reinforce the mandatory documentation requirements for TWAs, as well as non-standard or non-routine work practices.
- TN's fabricator has performed an exhaustive record retrieval campaign to document actual work performed (e.g., retrieve duplicate copies of original records).
- TN's fabricator has incorporated the routinely performed TWAs into their fabrication travelers to better ensure all paperwork and NDE is properly captured. Previously, satisfactory controls were specified outside of the fabrication traveler. However, a lack of documentation and/or missed NDE for TWAs might not have been readily identifiable through a typical record review.

The following corrective actions are planned.

- TN will perform an extent of condition for prior canisters fabricated by GHNEA.
- TN will be performing a structural analysis to demonstrate satisfactory margins to design allowable values for the affected canister, assuming a crack depth equivalent to the HAZ of a typical TWA.
- TN in coordination with our client Dominion, plans to submit per 10 CFR 72.4 a request for exception to the ASME Code requirements as delineated in Section 4.4.4 of the NUHOMS® HD Technical Specifications. The request will be limited to the subject Unit and those fabricated Units which have undocumented TWAs (6 units total).

References

1. GE-Hitachi Nuclear Energy Americas letter to Transnuclear, dated 9/18/07 regarding use of temporary welded attachments.
2. Transnuclear Letter E-25576 to U. S. Nuclear Regulatory Commission, Evaluation of a Deviation for Notification under the Provisions of 10CFR21, dated 9/19/07.