January 9, 2008

Ms. Tara Neider
President
Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

SUBJECT: ASME CODE ALTERNATIVE REQUEST, TEMPORARY WELDED ATTACHMENT RECORDS, DOCKET 72-1030 (TAC L24163)

Dear Ms. Neider:

By letter dated Dec 27, 2007, Transnuclear Inc. (TN), the certificate holder, requested relief from certain NUHOMS® HD license Technical Specifications (TS) and ASME Code requirements in regards to the manufacture of seven TN NUHOMS® HD 32PTH Dry Shielded Canisters (DSCs). The affected canisters are serial numbers DOM-32PTH-001-C, DOM-32PTH-002-C, DOM-32-PTH-003-C, DOM-32PTH-004-C, DOM-32PTH-005-C, DOM-32PTH-006-C, and DOM-32PTH-007-C. The seven canisters were manufactured for Dominion Power for use at its Surry and North Anna Independent Spent Fuel Storage Installations (ISFSIs).

The request for relief from the TS and ASME Code requirements involves the absence of documentation for use of certified welders, approved weld procedures, approved weld filler metal, use of compatible Temporary Weld Attachment (TWA) base material (these are temporary construction aids), and lack of liquid penetrant (PT) surface examination subsequent to TWA removal. TN does not suggest that the above deficiencies were committed in fact, but only that the required documentation for the various aspects listed was not properly recorded or maintained.

In the absence of proper quality assurance/quality control documentation, TN has performed several analyses and tests to demonstrate that the proper procedures, materials, etc., were most likely employed or performed. In addition, TN has performed a structural analysis to demonstrate that the consequences of a postulated flaw or flaws in the completed canisters at the locations of the removed TWAs would have no adverse impact upon the ability of the DSCs to perform as required under all design conditions.

There is an exigent need for the DSCs in question. They are needed by Dominion to preserve full core off-load capability at Surry and North Anna nuclear power plants.

The Technical Specifications for the NUHOMS® HD permit use of proposed alternatives to the ASME code, provided that the applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety. NRC staff has reviewed the documentation submitted by TN, and has concluded that the undocumented TWAs, if in fact utilized, would have been acceptable regarding TWA base material, weld filler material, and weld procedure utilized. However, due to the lack of a documented PT report, defects are assumed to have remained subsequent to TWA removal for the areas inaccessible for re-examination. The

additional analyses that TN performed indicate that any defects that remained subsequent to TWA removal do not result in adverse effects on the confinement boundary structure for design loading. Finally, the TWA removal would have occurred prior to the ASME NB-6000 pressure test and helium leak test performed following fabrication and loading, and so the leak tight aspect of the confinement boundary is assured. (See attached Safety Evaluation Report for more detail.) Therefore, this alternative request provides an acceptable level of quality and safety and is approved for the seven listed canisters, only. In addition, TN should submit a corrective action plan to ensure that loss or omission of required documentation does not recur.

If you have any questions regarding this matter, please contact B. Jennifer Davis, of my staff at (301) 492-3371, or bjd1@nrc.gov. Please reference the TAC number above in any correspondence related to this action.

Sincerely,

/RA/
Nader L. Mamish, Deputy Director
Licensing and Inspection Directorate
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1030
TAC L24163

Enclosure: Safety Evaluation Report

cc w/encl: See attached list

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* See previous concurrence.

ASME CODE ALTERNATIVE REQUEST

cc:

Mr. W. Matthew Adams
Surry Power Station
5570 Hog Island Road
Surry, VA 23883-0315

Mr. A. Kenneth Ewell
Surry Power Station
5570 Hog Island Road
Surry, VA 23883-0315

Mr. Mark D. Sartain
North Anna Power Station
1022 Haley Drive
Mineral, VA 23117-0402

Mr. Bobby D. Speckine
North Anna Power Station
1022 Haley Drive
Mineral, VA 23117-0402

Mr. Chris L. Funderburk
Dominion
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. David A. Sommers
Dominion
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. Tom A. Brookmire
Dominion
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. Robert Grubb
Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

Dr. Jayant Bondre
Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

Mr. Donis Shaw
Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, MD 21045

Jack Boshoven
7135 Minstrel Way, Suite 300
Columbia, MD 21045

SAFETY EVALUATION REPORT
FOR ASME CODE ALTERNATIVE REQUEST

1.0 Introduction

By letter dated December 27, 2007, Transnuclear Inc. (TN), the certificate holder, requested relief from certain NUHOMS® HD license Technical Specifications (TS) and American Society of Mechanical Engineers (ASME) Code requirements with respect to the manufacture of seven TN NUHOMS® HD 32PTH Dry Shielded Canisters (DSCs). The affected canisters are serial numbers DOM-32PTH-001-C, DOM-32PTH-002-C, DOM-32-PTH-003-C, DOM-32PTH-004-C, DOM-32PTH-005-C, DOM-32PTH-006-C, and DOM-32PTH-007-C. The seven canisters were manufactured for Dominion Power for use at its Surry and North Anna Independent Spent Fuel Storage Installations (ISFSIs).

The request for relief from the TS and ASME Code requirements involves the absence of documentation for use of certified welders, approved weld procedures, approved weld filler metal, use of compatible Temporary Weld Attachment (TWA) base material (these are temporary construction aids), and lack of liquid penetrant (PT) surface examination subsequent to TWA removal. TN does not suggest that the above deficiencies were committed in fact, but only that the required documentation for the various aspects listed was not properly recorded or maintained.

In the absence of proper Quality Assurance/Quality Control (QA/QC) documentation, TN has performed several analyses and tests to demonstrate that the proper procedures, materials, etc., were most likely employed or performed. In addition, TN has performed a structural analysis to demonstrate that the consequences of a postulated flaw or flaws in the completed canisters at the locations of the removed TWAs would have no adverse impact upon the ability of the DSCs to perform as required under all design conditions.

Due to the configuration of the canisters and the fact that two of the seven canisters are already loaded with spent fuel and in service at the Surry ISFSI, it is not possible to reasonably re-examine each completed canister in all TWA locations. However, five of the seven canisters were examined by several means to the maximum practical extent to determine the former location of TWAs and the actual filler metal used. Each accessible TWA location was also PT examined to verify the absence of any weld defect that remained at the former TWA location in the canister base material. No anomalies were encountered with respect to the location of the TWAs or the type of weld metal employed. One former TWA location was found to have a PT indication of small size.

Consequently, absent a clean PT record, any TWA location was assumed to have a flaw. A flaw tolerance analysis was performed to determine the impact, if any, upon the canister confinement boundary integrity.

Additionally, TN conducted interviews of the fabricator shop personnel who fabricated the DSCs in question. The interview results indicate that the specified QA/QC requirements were in fact followed during the fabrication of the DSCs in question.

Enclosure

There is an exigent need for the DSCs in question. They are needed by Dominion to preserve full core off-load capability at Surry and North Anna nuclear power plants.

2.0 Discussion

For the undocumented TWA applications on the NUHOMS® HD 32PTH DSCs identified above, a nonconformance exists regarding lack of documentation for use of qualified welders, approved weld procedures, approved weld filler material, compatible TWA base material, as well as lack of liquid penetrant (PT) surface examination subsequent to TWA removal. The above documentation is required per Article NB-4435 of the ASME Section III B&PV Code, which is a design feature embedded in the Technical Specifications for the NUHOMS® HD license. Therefore, the assumed nonconformance constitutes a Code violation and therefore the subject DSCs are not compliant with the NUHOMS® HD Technical Specifications.

Regarding acceptability of the nonconforming DSCs, interviews conducted with the production personnel at the fabricator shop verified that distortion control tabs (one form of TWAs) were utilized on the DSC shells. Thus the lack of documentation is verified as opposed to the possibility that TWAs were not used during fabrication.

Other information was verified during the interviews with production personnel. The welders all stated that they understood the TWA process and that weld maps and weld control records were consistently generated for all TWAs. TN's fabricator concluded that the documentation was likely lost or discarded sometime after removal of the TWA. Although no documentary evidence exists, the fabricator's welding program, including weld filler material control has been continually in place during the time frame 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 obtained and used the approved weld wire specified by the welding procedures, and would have utilized compatible attachment material for the distortion control tabs or other temporary construction aids.

Experience to date for other documented welding activities indicates that the fabricator's welding program is consistently satisfactory regarding these attributes. 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 weld quality or unsatisfactory Non-Destructive Evaluation (NDE) results associated with previously documented TWAs.

As part of the mitigation plan for this issue, specialized NDE was performed for undocumented TWAs which were still accessible for inspection, confirming their existence and demonstrating that compatible TWA material and proper weld filler material had been utilized in all areas examined. In summary, a total of five affected shells were examined in the area of the distortion control tabs and four affected inner bottom covers in the area of the fixturing lugs.

The applicant provided a detailed metallurgical report (proprietary) of the methods and results of these examinations. The previous TWA locations were identified and a chemical analysis of the remaining weld deposit was performed using a portable alloy analyzer. The chemical analysis results confirmed the use of an appropriate filler metal for welding type 304 stainless steel.

Although not all TWA areas examined are associated with DSCs included within the scope of the Code alternative request, the results of the examinations are representative of the specific

undocumented applications and therefore provide additional confidence that proper welding was performed for those TWAs which remain inaccessible for re-examination.

Likewise, where accessible, rework of the undocumented PT and UT thickness examinations yielded satisfactory results with one exception where the PT surface examination identified unacceptable indications requiring removal via grinding. Based on the unacceptable indications, it is apparent the initial PT examination most likely had not been performed for that affected canister shell. Therefore, it is concluded that the undocumented TWAs, if in fact utilized, would have been acceptable regarding TWA base material, weld filler material and weld procedure utilized, but due to the lack of a documented PT report, defects are assumed to have remained subsequent to TWA removal for the areas inaccessible for re-examination.

2.1 Flaw Evaluation

For the purpose of evaluation, defects are conservatively assumed to exist at TWA removal locations in the DSC shell and/or inner bottom cover as applicable. Since the defects would most likely be due to porosity in the weld pool or weld shrinkage, the depth of the assumed defect may be characterized based on the extent of the heat affected zone (HAZ) created by the welding process (i.e., the defect would not extend below the HAZ into unaffected base material). Metallurgical investigation of weld coupons representative of TWA welds indicates the typical combined depth of the weld puddle and heat affected zone, measured from the initial plane of the base metal, is no greater than .060", as detailed in the separate proprietary metallurgical report submitted by TN. A defect depth of .060” in the shell wall at the areas of TWA removal is below the minimum design value of .490”. However, the effect would be localized and sufficient margin exists for the nominal DSC shell thickness of .500” as discussed below.

The minimum wall thickness for design pressure is only a fraction of the nominal thickness and an evaluation for localized wall thinning of .060” resulting in a minimum shell thickness of .440” demonstrates that DSC component stresses are maintained below ASME Code allowable design values, such that there is no adverse effect on the confinement boundary structure for design loading. Detailed calculations were provided in a separate proprietary calculation package.

Similarly, a defect depth of .060” in the inner bottom cover at the areas of TWA removal is below the minimum design value of 1.69”. However, the effect would be localized and significant margin exists for the nominal inner bottom cover thickness of 1.75”. In fact, the 1/4” deep counterbore for the siphon pipe in the top surface of the inner bottom cover represents a local reduction in thickness which clearly bounds the assumed defect depth at the TWA removal areas. Such defects would not be expected to enlarge due to the toughness of the austenitic stainless steel base material. Notch effects are also not a concern due to the lack of any significant cyclic design loading.

2.2 Confinement Boundary Integrity

Regarding confinement boundary leak tight integrity, the TWA removal would have occurred prior to the ASME NB-6000 pressure test and helium leak test performed following loading and fabrication. Therefore, the leak tight aspect of the confinement boundary is assured simply due to the sequence of fabrication, loading and testing.

3.0 Conclusion

Based on the above evaluation, the staff finds that the subject DSCs remain capable of performing their design function involving the structural integrity of the confinement boundary under all design conditions.