

NRC FORM 699  
(9-2003)

U.S. NUCLEAR REGULATORY COMMISSION

DATE  
07/22/2010

**CONVERSATION RECORD**

TIME  
3:30 PM

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU  
See Below

TELEPHONE NO.  
888-847-6588

TYPE OF CONVERSATION  
 VISIT  
 CONFERENCE  
 TELEPHONE  
 INCOMING  
 OUTGOING

ORGANIZATION  
Calvert Cliffs, TN

SUBJECT  
Calvert Cliffs ISFSI LAR #9, Discussion of draft structural RAI #2

SUMMARY (Continue on Page 2)

Participants

NRC- John Goshen, Ata Istar

PNNL - Nicholas Klymyshyn

Calvert Cliffs - Pat Furio, John Massari, Lloyd Wenger

Transnuclear (TN) - Peter Shih, Raheel Haroon, Sue Buyaskas

Conference call to discuss NRC staff draft structural RAIs on the end drop and side drop events for CE 14X 14 fuel with 52,000 MWD/MTU burnup loaded in NUHOMs 32P dry storage canisters. It has been determined by the staff that the TN supplied calculations -

Calculation No. NUH32P+.0203, R 0, (Transfer Cask Impact onto the Concrete Pad LS-DYNA Analysis (80 inch end drop)

Calculation No. NUH32P+.0204, "Fuel End Drop Analysis for NUH32+ Using LS-DYNA, Proprietary Version, Revision 0. are not acceptable and can not be used to provide an acceptable regulatory review.

The staff has reviewed the CC and TN supplied calculations provided in CC's license amendment request #9 dated June 15, 2009, and requests additional information on them. The referenced calculations are-

Calculation No. NUH32P+.0201, "NUHOMS@ 32P CE14X14 Fuel Cladding Strength Under Accident Side Drop Conditions," Revision 1, December 8, 2008

Calculation No. NUH32P+.0202, "End Drop Structural Evaluation of CE14X14 PWR Fuel Assembly in a 32P+DSC," Revision 1, December 8, 2008.

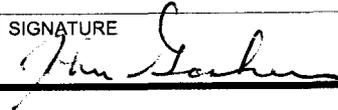
The draft RAIs are attached below:

**Continue on Page 2**

ACTION REQUIRED  
None

NAME OF PERSON DOCUMENTING CONVERSATION  
John Goshen

SIGNATURE



DATE  
07/22/2010

ACTION TAKEN  
NA

TITLE OF PERSON TAKING ACTION

SIGNATURE OF PERSON TAKING ACTION

DATE

**CONVERSATION RECORD (Continued)****SUMMARY (Continue on Page 3)**

3-1 In its June 15, 2009, amendment application (LAR-9) Constellation Energy cited the approved NUHOMS® 32PTH Dry Storage Canister (DSC) design, Docket 72-1030, as a precedent for the Calvert Cliffs NUHOMS -32P DSC. The NRC reviewed and approved the NUHOMS® HD Storage System for Combustion Engineering 14X14 fuel for storage of fuel up to 60,000 MWd/MTU. However, it appears that the NUHOMS® 32PTH1 system approved as part of the Standardized NUHOMS® Horizontal Modular Storage System, Docket No. 72-1004, Amendment No. 10, may be a more appropriate precedent for LAR-9. Constellation Energy should clarify the specific system it is using as a precedent and provide a difference evaluation between the analyses used to support the previously approved systems, and Transnuclear, Inc. calculations NUH32P+.0201 and NUH32P+.0202.

This information is required to evaluate compliance with 10CFR72.122.

3-2 Provide a copy of Transnuclear Calculation No. 972-179, Rev. 0, "TN-68 High Burnup Cladding Mechanical Properties." Transnuclear has taken substantial data from this calculation to support the two structural calculations. The staff requires this reference to verify the design information used in the analyses.

This information is required to evaluation compliance with 10CFR72.122.

3-3 Provide a copy of Transnuclear Calculation No. 1095-20, Rev. 1, "Maximum Operating Pressures, Storage and Transfer." Transnuclear has taken substantial data from this calculation to support the two structural calculations. The staff requires this reference to check the design information used in the analyses.

This information is required to evaluation compliance with 10CFR72.122.

3-4 In LAR-9 Constellation Energy provided new calculations to support the request to load fuel with up to 52,000 MWd/MTU burnup. It is not clear that these calculations are meant to supersede the design basis for 47,000 MWd/MTU fuel previously supplied as part of the original licensing basis. Constellation needs to provide this clarification.

This information is required to evaluation compliance with 10CFR72.122.

3-5 Justify the deviation from the SFST-Interim Staff Guide (ISG) 11, rev.3 regarding the following structural evaluations of 14X14 fuel assemblies subjected to side and end drop cases:

Referring to Section 4.0 of NUH32P+.0201, Rev. 1 and +.0202, Rev. 1, both of these reports state that the "reduction in outside diameter (OD) and thickness of cladding is based on the formation of oxides" as consistent with the ISG11, rev 3. However, it appears that in the ANSYS analyses, a nominal OD of 0.4334 inch and a nominal thickness of 0.0252 inch were considered for pipe elements (PIPE16 and PIPE20).

Based on the oxide layer of 125 microns, the nominal OD and nominal thickness of cladding should have been reduced by 0.00281 inch. The absorbed oxide thickness in the cladding OD should be considered as "wastage" adding no capability of load-bearing.

If the applicant is committing to using the guidance provided in ISG-11, rev. 3, then it is incumbent on the applicant to apply the guidance correctly when calculating the stress in the cladding by using the "effective cross sectional properties of cladding," as stated in ISG-11, rev. 3.

This information is needed to determine compliance with 10CFR72.122.

**Continue on Page 3**

## CONVERSATION RECORD (Continued)

SUMMARY (Continue on Page 4)

3-6 The single pin evaluation methodology presented in NUH32P+.0201, Rev. 1 and +.0202, Rev. 1 includes some assumptions that are not necessarily conservative:

Additional transient dynamic analysis of the cladding that includes the following features may be performed: zero damping, internal pressure, realistic grid and spacer lateral motion. Each feature is discussed below:

6.a.) Zero Damping: 5.2 Section 4.0 of NUH32P+.0202, Rev. 1, -- Eliminate all stiffness damping from the analyses. Taking credit for the damping effect of fuel in the cladding is a non-conservative assumption. It is standard engineering practice to include the mass of fuel in cladding but to ignore any mechanical benefits the spent fuel might offer. Excessive damping can artificially reduce peak cladding stress and strain.

6.b.) Internal Pressure: Ignoring internal pressure is not always a conservative assumption. While internal pressure can stabilize a fuel pin against lateral deflections it can also exacerbate plastic strains when they occur. ANSYS pipe elements (PIPE16, PIPE20) can not capture this type of nonlinear effect so a different choice of element type will be needed to represent the cladding.

6.c.) Realistic Grid Spacer Lateral Motion: Considering no lateral deflection constraints at the spacer grids do not match the reality of the fuel assembly structure. Some amount of lateral deflection is possible at the spacer grids, either through gross relative motion of the spacer grids within the basket compartment or through deflection against the leaf springs. Replace the lateral deflection constraint with something more realistic, such as the spring representation used in Reference 2.15 of NUH32P+.0202, Rev. 1.

This information is needed to determine compliance with 10CFR72.122.

3-7 Strain Rate Correction Effect: In Section 4.0 of NUH32P+.0201, Rev. 1 and +.0202, Rev. 1, the cladding material yield strength is increased to account for a 0.5s<sup>-1</sup> strain rate in the impact calculations. Justify this strength increase based on the calculated cladding response.

This information is needed to determine compliance with 10CFR72.122.

3-8 Describe orthogonal impact orientations in NUH32P+.0201, Rev. 1 and +.0202, Rev. 1: Do these cases represent possible accidental drop conditions, or were they chosen to bound a more limited subset of possible impacts? If perfectly perpendicular or horizontal drops are not potential impact cases, describe the realistic bounds of impact in terms of drop height and impact angle.

This information is needed to determine compliance with 10CFR72.122.

Additional RAIs were discussed and determined to not be outside the scope of this license amendment request.

The NRC staff asked TN why they provided new Calculation No. NUH32P+.0203, R 0, (Transfer Cask Impact onto the Concrete Pad LS-DYNA Analysis (80 inch end drop) as supplemental information since it appeared that it was never the intent of this amendment request to revise the design and regulatory basis of the NUHOMS 32PTH DSC established and approved in amendments 6 and 7. TN stated that they had apparently misunderstood the intent of several NRC staff comments in previous conference calls on this subject. The staff referred TN and CC to the January 11, 2010, record of conversation, and told TN that anytime there was confusion on staff intent, their licensing project manager should contact the NRC project manager to provide clarification. The NRC asked TN and CC if they believed they would have any challenges providing acceptable answers to the staff RAIs in a reasonable time period. TN and CC stated that they did not see any problems, but would contact the NRC as soon as possible if something came up. The NRC stated that the formal RAI letter would be issued the week of August 2.

Continue on Page 4

**CONVERSATION RECORD (Continued)**

SUMMARY

Docket No. 72-8

TAC No. L24350

File Location - G:\SFST\Calvert Cliffs ISFSI\Amend 9\RAI2\CC RAI #2 ROC 7 222 10.pdf

Distribution : by email, - Eric Benner, Chris Regan, Ata Istar, Jennifer Davis, Sue.BUYASKAS@transnuclear.com, peter.shih@transnuclear.com, Furio, Patricia.Furio@cengllc.com