



**SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION**

1. CERTIFICATE/QUALITY ASSURANCE PROGRAM (QAP) HOLDER:

Orano TN Americas LLC  
7135 Minstrel Way, Suite 300  
Columbia, MD. 21045

2. NRC/REGIONAL OFFICE

Headquarters  
U. S. Nuclear Regulatory Commission  
Mail Stop 3WFN 14C-28  
Washington, DC 20555-0001

REPORT NUMBER(S) 72-1004/2019-202

3. CERTIFICATE/QAP DOCKET NUMBER(S)

72-1004, 72-1021, 72-1027, 72-1029, 72-1030  
and 72-1042

4. INSPECTION LOCATION

Hitachi Zosen Corp. Ariake Works  
Kumamoto, Japan

5. DATE(S) OF INSPECTION

July 22 - 24, 2019

**CERTIFICATE/QUALITY ASSURANCE PROGRAM HOLDER:**

The inspection was an examination of the activities conducted under your QAP as they relate to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your QAP Approval and/or Certificate(s) of Compliance. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the Inspector. The inspection findings are as follows:

- ☐ 1. Based on the inspection findings, no violations were identified.
- ☐ 2. Previous violation(s) closed.
- ☒ 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, to exercise discretion, were satisfied.

2 Non-cited violation(s) was/were discussed involving the following requirement(s) and Corrective Action(s):

I. 10 CFR 72.48(d)(1) requires, in part, that the certificate holder shall maintain records of changes in the facility or spent fuel storage cask design, of changes in procedures, and tests and experiments made pursuant to paragraph (c) of this section. These records must include a written evaluation which provides the bases for the determination that the change does not require a license or Certificate of Compliance (CoC) amendment pursuant to paragraph (c) of this section. Contrary to the above, prior to July 23, 2019, the CoC holder (TN Americas) did not maintain records of changes in the spent fuel storage cask design made pursuant to paragraph (c) of this section [10 CFR 72.48(c)].

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- ☐ 4. During this inspection, certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited in accordance with NRC Enforcement Policy. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11.  
(Violations and Corrective Actions)

**Statement of Corrective Actions**

I hereby state that, within 30 days, the actions described by me to the Inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

TITLE	PRINTED NAME	SIGNATURE	DATE
CERTIFICATE/QAP REPRESENTATIVE	Douglas Brownson, Director Quality Assurance and Safety	<i>Douglas Brownson</i>	10/17/19
NRC INSPECTOR	Marlone Davis, Team Leader Sr. Storage and Transportation Safety Inspector	<i>Marlone F. Davis</i>	10/17/19
BRANCH CHIEF	Chris Bajwa Inspection and Operation Branch	<i>Margie Kotzalas for Chris Bajwa</i>	10/18/19

## SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

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(Continued)

Specifically, TN Americas did not perform a written evaluation which provided the bases for the determination that cracked poison plates for the NUHOMS 32PT did not require a license or CoC amendment pursuant to the regulations in 10 CFR 72.48 paragraph (c)(2). The team noted that the cracked poison plates had a material impact on design function calculations and drawings described in the Final Safety Analysis Report (FSAR). However, the Licensing Review No. 721004-1772 performed to accept this non-conforming condition of cracked poison plates for the Dry Shielded Canister (DSC) fuel basket stopped at a screening within the TN Americas 72.48 program process. The team assessed that TN Americas needed to perform a full evaluation against the eight criteria presented in 10 CFR 72.48 paragraph (c)(2) because the existing analysis in the FSAR no longer enveloped the safety analysis in the FSAR, as updated. TN Americas entered this violation into their corrective action program for resolution.

II. 10 CFR 72.248(a) requires, in part, that each certificate holder for a spent fuel storage cask design shall update periodically, as provided in paragraph (b) of this section, the FSAR to assure that the information included in the report contains the latest information developed.

Contrary to the above, between 2003 through 2019, the certificate holder (TN Americas) did not periodically update the FSAR to assure that the information included in the report contains the latest information developed. Specifically, TN Americas did not update section M.9.1.1 of the FSAR including licensing drawing, NUH-32PT-1003-SAR, with the latest information developed to accept cracked poison plates. The team identified this issue as a part of the review of a Non-Conformance Report (NCR) No. 457-NCR-05. The NCR described 24 of 24 poison plate material used for the NUHOMS 32 PT DSC fuel basket as having cracks that exceeded the acceptance criteria in the procurement design specification. Upon further review, the team discovered that sections in the FSAR and FSAR drawings did not account for the dimensional tolerances for cracks. The cracks in the poison plate material may impact criticality control and heat conduction of the fuel assemblies in the fuel basket. However, TN did not make changes to the FSAR licensing drawings or applicable sections of the FSAR to accept this nonconforming condition. TN Americas entered this violation into their corrective action program for resolution.

The team assessed and dispositioned these violations in accordance with the NRC Enforcement Policy and Manual. The team characterized these violations as Severity Level IV non-cited violations.

## INSPECTOR NOTES COVER SHEET

Licensee/Certificate Holder	Orano Transnuclear (TN) Americas LLC 7135 Minstrel Way, Suite 300 Columbia, MD. 21045
Licensee/Certificate Holder Contact	Mr. Douglas Brownson Director of Quality Assurance and Safety TN Americas LLC 410-910-6520
Docket Nos.	72-1004, 72-1021, 72-1027, 72-1029, 72-1030, and 72-1042
Inspection Report No.	72-1004/2019-202
Inspection Date(s)	July 22 - 24, 2019 August
Inspection Location(s)	Hitachi-Zosen Ariake Works (HZA) Kumamoto, Japan
Inspectors	Marlone Davis, Team Leader, Senior Storage and Transportation Safety Inspector Jon Woodfield, Storage and Transportation Safety Inspector Jeremy Tapp, Storage and Transportation Safety Inspector
Summary of Findings and Actions	During the period of July 22 through 24, 2019, the U.S. Nuclear Regulatory Commission (NRC) conducted a team inspection of the implementation of TN's NRC approved Quality Assurance Program for the fabrication of the NUHOMS 32PTH Dry Shielded Canister (DSC) and subcomponents. The team discussed the preliminary results of this inspection on July 24, 2019 and performed a final exit on September 4, 2019, when the team completed its review and assessment of TN's licensing review No. 721004-1772 for accepting cracked poison plate material. The team identify two violations of NRC requirements because TN Americas did not perform a written evaluation in accordance with 10 CFR 72.48 regulations and did not update the final safety analysis report periodically with the latest information developed. The team dispositioned the violations as Severity Level IV non-cited violations (NCV)s, which was consistent with Section 2.3.2 of the NRC Enforcement Policy.
Lead Inspector Signature/Date	Marlone Davis <i>Marlone F. Davis</i> 10/17/2019
Inspector Notes Approval Branch Chief Signature/Date	Chris Bajwa <i>Margie Kotzalas</i> 10/18/19



## Inspector Notes

On July 22 – 24, 2019, a team of NRC inspectors conducted inspection activities at Hitachi Zosen Corporation, Ariake Works (HZA) to verify and assess Orano Transnuclear (TN) Americas' compliance with *Title 10 of the Code of Regulations* (10 CFR) Part 72 requirements for the design, modification, fabrication, assembly, testing, and procurement of the NUHOMS Dry Shielded Canister (DSC) and subcomponents in Japan. HZA is under contract with TN and Dominion to fabricate important to safety (ITS) Category A, B, and C components and subcomponents of the DSC, including damaged fuel end caps, and a transfer cask. TN is the holder of the certificate of compliance (CoC) and designer of the NUHOMS dry cask storage system (DCSS). TN holds an NRC Quality Assurance Program (QAP) Approval for several CoC storage systems. The CoC associated with this inspection activity is as follows:

Model #	Docket#	Amendment#	FSAR Revision
NUHOMS	72-1004	15	18

Previously, the NRC had conducted four fabrication inspections related to the TN Americas DCSS designs at various facilities and a corporate inspection since the last Hitachi-Zosen (HZ) inspection. These included inspections at Custom Nuclear Fabrication facility in Canonsburg, PA (ML16243A392) in July 2016, Moyock NC (ML17151B025) in April 2017, Larsen & Toubro Limited (L&T) Heavy Engineering Division in India (ML18127A058) in March 2018 and CHT in Kernersville, NC (ML18215A387) in June 2018. The most recent corporate inspection was in March 2019 (ML19148A113). The NRC conducted these inspections to determine if activities involving fabrication and design were in accordance with the requirements of 10 CFR Parts 21, 71, and 72, the applicable CoC, Safety Analysis Report, and TN's NRC-approved QAP.

The purpose of this inspection was to determine whether the NUHOMS (72-1004) 32PT-L125 DSCs, fabricated by an offsite entity and for use at Dominion's Millstone ISFSI, were constructed in accordance with the commitments and requirements specified in the final safety analysis report (FSAR), the NRC's corresponding safety evaluation report (SER), 10 CFR Part 72, and as applicable, the CoC and technical specifications (TS).

The team used the inspection requirements outlined in NRC Inspection Procedure 60852, "ISFSI Component Fabrication by Outside Fabricators". The team observed fabrication activities, reviewed selected procedures and records, and interviewed personnel. The team discussed the preliminary results of this inspection on July 24, 2019, at the completion of the inspection week; however, the team needed additional information to complete the inspection. The team completed the inspection activities on September 4, 2019, after performing an exit meeting with TN. TN had provided the licensing review used to accept a nonconforming condition of cracked poison plate material following bending. The team identified two violations of NRC requirements because: 1) TN Americas did not perform a written evaluation in accordance with 10 CFR 72.48 regulations and 2) TN Americas did not update the FSAR periodically with the latest information developed. The team described the violations in Section 02.02 of this report.

The team dispositioned the violations as Severity Level IV non-cited violations (NCV)s consistent with Section 2.3.2 of the NRC Enforcement Policy. TN acknowledged the information presented and documented the violation in their corrective action program for resolution as corrective action report numbers 2019-345 and 2019-346, respectively.

*INSPECTOR NOTES: AS DESCRIBED BELOW, THE TEAM PERFORMED AND DOCUMENTED APPLICABLE PORTIONS OF 02.01 THROUGH 02.08 OF INSPECTION PROCEDURE (IP) 60852 USED FOR THIS INSPECTION*

**02.01: Determine whether the fabrication specifications are consistent with the design commitments and requirements documented in the Safety Analysis Report (SAR), and, as applicable, the Certificate of Compliance (CoC) or the site-specific license and technical specifications.**

### Design Controls

The team reviewed the fabrication specifications and fabrication drawings against the design and licensing drawings to verify the consistency of material specifications and critical dimensions as well as testing and inspection requirements to determine whether the fabrication specifications were consistent with the design.

Specifically, the team focused on the translation of design commitments and requirements for the important to safety (ITS) Category A, B, and C components of the DSCs from the NUHOMS FSAR, including associated licensing drawings, and subsequently manufacturing plans. The team reviewed the following Hitachi Zosen Corporation, Ariake Works (HZA) quality assurance manual (QAM) procedures and standards associated with design control during fabrication to verify proper implementation. The procedures and standards reviewed are as follows:

- M-10-2, "Design Control," Revision 3
- Q-30-2, "Standard for Control of Request for Design Change, Specification Change and Material Utilization," Revision 1

The team evaluated the design controls that were in place for the transmittal and handling of the design drawing received from TN and how HZA incorporated these into fabrication drawings. Additionally, the team reviewed the purchase order (PO) P2018-0575 and procurement specification NUH32PT-0105 for the supply and fabrication of ten DSCs (Model 32PT-L125) such that the team could verify that all aspects of the design process was verifiable, controlled, and traceable from the onset of the design through the completion of testing and delivery.

Based on the team's review, there were no unexplained discrepancies between the design and fabrication specifications or the design and fabrication drawings. The team noted that HZA captured all requirements from the PO and procurement specifications associated with the design and fabrication of the DSC Model 32PT-L125. The team also discovered that HZA was not providing any design engineering services. The team did not identify any issues of concern in the translation of design information. The team did note that, in most cases, fabrication drawings and check sheets were adequately identified at various work locations with each component, as necessary. The team also noted that the documents reflected the correct revisions, as applicable.

### Documentation Controls

The team reviewed the following procedures and standards for documentation controls:

- M-15-1, "Document Control," Revision 11
- M-80-1, "Quality Assurance Records," Revision 6
- Q-80-1, "Electronic Record Control Standard," Revision 2

- Q-80-2, "Quality Record Control Standard," Revision 0

Overall, the team assessed that HZA followed their procedure for document control and the storage of quality assurance records. Drawings needed for fabrication, including revisions, were automatically sent from TN to the HZA Project Manager.

**02.02 Determine whether corrective actions for identified fabrication deficiencies have been implemented in a time frame commensurate with their significance, and whether nonconformance reports documenting the deficiencies have been initiated and resolved.**

Nonconformance and Corrective Action Controls

The team reviewed sections of HZA QAM No. NQA-001, "Quality Assurance Manual for Nuclear Items," Eighteenth Revision and the Standards that HZA uses to document, track and resolve nonconforming conditions and conditions adverse to quality. The team reviewed the following procedures and standards:

- QAM, Section M-31-1, "Nonconformance Control," Revision 9
- QAM, Section M-32-1, "Corrective Action," Revision 10
- Q-32-1, "Corrective Action Standard," Revision 2

The team reviewed a representative sampling of HZA Nonconformance Reports (NCR)s and Corrective Action Reports (CAR)s since the last inspection in 2016. The reports documented various issues related to 10 CFR Part 72 activities performed by HZA for Orano TN Americas (TN). The team reviewed measures used to keep track of the status of nonconforming items and that HZA completed CARs for identified deficiencies in a technically sound and timely manner. The team also verified that the NCRs and CARs provided a connection to the 10 CFR Part 21 program.

The team sampled seven NCRs which consisted of a variety of component types and suppliers and included a mix of use-as-is and rework component dispositions. The team also sampled five CARs which included both fabrication and general quality program issues. HZA classifies their CARs into either Conditions Adverse to Quality or Significant Conditions Adverse to Quality depending on the significance of the issue.

The team's review of the CARs also included HZA's and TN's corrective actions associated with Example A of the non-cited violation identified during the 2016 inspection (ML16187A007) at HZA, to verify the corrective actions had been adequately completed. Specifically, Example A of the violation was regarding HZA's failure to follow procedures to adequately segregate non-conforming material. CAR no. C-16-C-08 and Supplier Finding Report (SFR) 2016-040 documented HZA's and TN's corrective actions for the violation, respectively. For this issue, where HZA did not adequately segregate grapple ring and transition rail plate non-conforming material, the team determined that HZA segregated the materials as required by the quality standard and retrained the appropriate individuals on the importance of segregation and following the process. In addition, the team noted that HZA performed an extent of condition review and verified that any additional non-conforming material and segregation areas met the applicable quality standard requirements. The team determined the corrective actions in response to Example A of the non-cited violation were adequate and Example A of the violation is considered closed.

As a part of the review of the NCR number (No.) 457-NCR-05, the team discovered that 24 of 24 poison plates material associated with the fabrication of the NUHOMS 32PT DSC fuel basket contained cracks that exceeded the acceptance criteria in the procurement design specification. The cracking occurred in the bended portion of the poison plate material. The team noted that TN proposed to disposition the NCR as “use-as-is,” thus accepting the non-conforming condition of the cracks in the poison plate material. The team requested the associated TN Supplier Nonconformance Evaluation Record to review the engineering evaluation to support the “use-as-is” disposition.

The team reviewed the approved TN SFR 2019-208 and assessed the evaluation from a technical standpoint in both the thermal and criticality areas. Included with the supplier nonconformance evaluation, the team noted that the NCR required a licensing review (LR) and referenced LR No. 721004-1772. The team requested the LR to determine if the “use-as-is” justification was appropriate based on the current licensing drawings and FSAR, but TN stated that the LR was still in progress. Therefore, the team could not review it during the inspection week. Subsequently, following the inspection, TN provided the completed LR No. 721004-1772 to the inspection team for review.

The team reviewed both the NCR No. 457-NCR-05 and the LR No. 721004-1772, which described the nonconforming condition for the cracked poison plate material. The team noted that the 10 CFR 72.48 process would apply since TN decided to accept the condition “as-is” resulting in something different than its as-designed condition. During the review of the LR, the team noted that TN stopped at a screening for the 72.48 process and did not perform a full evaluation against the eight criteria in 10 CFR 72.48 paragraph (c)(2). The team determined that this nonconforming condition adversely affected the design function of the thermal and criticality analyses identified in the FSAR. TN had assessed the impact of cracking in poison plates in the 2003- and 2004-time frame but never incorporated these new analyses into the FSAR, as updated. The team noted that the cracked poison plates had a material impact on the design function of the poison plates (in that it impacted the criticality and thermal analyses calculations described in the FSAR) and the NRC endorsed NEI guidance, NEI 96-07 Appendix B, would have this nonconformance to “screen in” to a full evaluation against the eight criteria. Therefore, the team assessed that this was a violation of NRC requirements related to 10 CFR 72.48(d)(1).

10 CFR 72.48(d)(1) requires, in part, that the licensee and certificate holder shall maintain records of changes in the facility or spent fuel storage cask design, of changes in procedures, and tests and experiments made pursuant to paragraph (c) of this section. These records must include a written evaluation which provides the bases for the determination that the change does not require a CoC amendment pursuant to paragraph (c)(2) of this section.

Contrary to the above, prior to July 23, 2019, the certificate holder (TN) did not maintain records of changes that included a written evaluation that provided the bases for the determination that the change does not require a CoC amendment pursuant to paragraph (c)(2) of this section. Specifically, TN did not perform a written evaluation which provided the bases for the determination that cracked poison plates for the NUHOMS 32PT did not require a license or CoC amendment pursuant to the regulations in 10 CFR 72.48 paragraph (c)(2). The team determined that the violation was more than minor because TN did not perform a 10 CFR 72.48 evaluation when required, which affects the NRC’s ability to perform its regulatory oversight function. The team assessed and dispositioned the violation in accordance with the NRC Enforcement Policy and Manual. The team characterized the violation as a Severity Level IV

non-cited violation. TN entered this violation into their corrective action program for resolution under CAR No. 2019-345.

Upon further review, the team also discovered that Section M.9.1.1, Visual Inspection, of the FSAR as updated stated, in part, that visual examination of all finished absorber plates is done to ensure that they are free of cracks, porosity, blisters, or foreign substances. This section further states, in part, that visual examinations performed at the fabricator's facility to ensure system components conform to the fabrication specifications and drawings. A review of the licensing drawing NUH-32PT-1003-SAR identifies three types of poison plates with no dimensional tolerances for cracks. The poison plates provide the necessary criticality control and a heat conduction path from the fuel assemblies to the canister shell. In discussion with the certificate holder, this has been a recurring issue since 2003; however, TN did not make changes to the licensing drawings or the FSAR as updated. Therefore, the team assessed that this was a violation of NRC requirements related to 10 CFR 72.248(a).

10 CFR 72.248(a) requires, in part, that each certificate holder for a spent fuel storage cask design shall update periodically, as provided in paragraph (b) of this section, the FSAR to assure that the information included in the report contains the latest information developed.

Contrary to the above, between 2003 through 2019, the certificate holder (TN Americas) did not periodically update the FSAR to assure that the information included in the report contains the latest information developed. Specifically, TN did not update Section M.9.1.1 of the FSAR or applicable FSAR licensing drawings with the latest information developed, to accept cracking in poison plates. The team assessed and dispositioned the violation in accordance with the NRC Enforcement Policy and Manual. The team characterized the violation as a Severity Level IV non-cited violation. TN entered this violation into their corrective action program for resolution under CAR No. 2019-346.

For the most part, the team assessed that HZA had an adequate nonconformance control and corrective action program in place to identify, track and resolve quality related deficiencies and deviations. The team noted that when the disposition of an NCR was "use-as-is," TN approval was obtained as necessary. The team determined that HZA appropriately dispositioned the nonconformances reviewed and closed them in a timely manner, in accordance with the QAM. For the CARs reviewed, the team determined that their significance was adequately classified. The team found that the corrective actions taken by HZA were adequate and closed out in a timeframe commensurate with the safety significance of the issue, when possible; however, the team did identify two non-cited violations of NRC requirements as described above.

### **02.03 Determine whether individuals performing quality-related activities are trained and certified where required.**

The team reviewed selected records and interviewed personnel to evaluate if trained and certified individuals were performing quality related activities as required. Specifically, the team interviewed welding personnel to determine how individuals control production welding, the correct weld procedure specification (WPS) for fabrication use, assigning qualified welders, and tracking welder qualifications. The team also witnessed HZA personnel perform magnetic particle nondestructive testing (MT), visual test (VT) and liquid penetrate test (PT). Additionally, the team reviewed the following procedures and standards:

- QAM Section M-06-01, "Indoctrination and Training," Revision 10
- QAM Section M-50-1, "Examination, Inspection and Test," Revision 6



- Q-01-2, "Qualification Standard for Inspector and Test Personnel," Revision 4
- Q-02-4, "NDE Personnel Qualification and Certification Standard," Revision 8

The team noted that the WPS provided for each weld required during fabrication contained appropriate essential and nonessential variables as appropriate. The team noted welder performance qualifications and welder continuities conformed to Section IX of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The team reviewed certificates of the nondestructive examinations (NDE) and personnel qualifications for the VT, MT, and PT for an NDE Level II inspector. The team noted that all the NDE inspectors work for Nichizo Technology Incorporated (NTI) under contract to HZA for inspection services.

NTI personnel performed and documented MT, VT, and PT examinations in accordance with HZA approved procedures. The team also noted that the selected qualified examiners were certified according to the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A. The training included the experience, medical testing, and education for the review of qualified examiners. All certifications were signed off by a VT, MT, and PT Level III inspector. The team also reviewed NDE Level II certifications of other inspectors that perform RT and MSLT (Mass Spectrometer Leak Test) inspections and found all certifications were signed off by a Level III and current.

**02.04 Determine whether the offsite fabricator's personnel are familiar with the specified design, designated fabrication techniques, testing requirements, and quality controls associated with the construction of the DCSS.**

Test and Inspection

The team reviewed the following sections of the HZA QAM and Standards for the testing and inspection requirements associated with DSC fabrication. The procedures and standards are as follows:

- QAM Section M-50-1, Examination, Inspection and Test," Revision 6
- Q-01-2, "Qualification Standard for Inspector and Test Personnel," Revision 4
- Q-01-4, "NDE Personnel Qualification and Certification Standard," Revision 8
- I-10-1, "Weld Visual Inspection Standard," Revision 1
- I-30-1, "Pressure Test Standard," Revision 2
- J-01-1, "Basket Free Path Test Standard," Revision 2
- J-01-2, "Shell Pressure Test Standard," Revision 1
- J-01-3, "Leak Test Standard for Siphon/Vent Port Subassembly," Revision 1

The team observed test and inspection activities including a visual test (VT) and liquid penetrate test (PT) on a completed weld for the key of a DSC grapple ring. The team verified that the Level II NDE inspector performed the VT and PT in accordance with procedure 32PT-T-VT/PT, "Visual Weld Examination and Liquid Penetrant Examination Procedure," Revision 5 and was knowledgeable of the processes and requirements of VT and PT. The team also verified that the inspector used a calibrated light source when performing both the VT and PT inspections. Additionally, the team observed the same inspector perform a VT by remote camera of the DSC basket cell inner welds and a VT of damaged fuel canister top end cap weld.

The team noted that HZA scheduled to perform a helium leak test and pneumatic pressure test on each of the DSC shell assemblies for the Millstone Project. At the time of the inspection,

HZA had completed these tests on four of the eleven DSCs it was fabricating for the Millstone Project. The team did review procedure 32PT-T-HE, "Helium Leak Test Procedure," Revision 1 which provided guidance for performing the test. The team also reviewed procedure 32PT-T-PN, "Pressure Test Procedure," Revision 3 which provided guidance for performing the test. The team noted that the helium leak test is required to be performed prior to the pressure test.

Additionally, HZA expected to perform a basket free path test after personnel assembled each DSC basket and shell. The team was unable to observe any basket free path testing while on-site. The team was only able to review the generic standard J-01-1 used to perform the test.

Overall, the team assessed that all the inspection activities observed were adequately performed by knowledgeable and qualified inspectors and no significant concerns were identified. It should be noted that during some of these inspections, TN had a witness to observe all the inspection activities and sign off on the traveler (check sheet). Although the team was unable to observe actual helium leak, pressure, and basket free path testing, the team determined that after reviewing the test procedures, there was reasonable assurance that all the testing would be adequately performed by knowledgeable and qualified inspectors. The team noted that HZA had extensive experience in performing these tests in the past, based on the previously observed inspection activities at this facility.

**02.05 Determine whether: a) Materials, components, and other equipment received by the fabricator meet DCSS design procurement specifications, and b) The procurement specifications conform to the design commitments and requirements contained in the SAR and, as applicable, the CoC or the site-specific license and technical specifications.**

#### Fabrication Controls

The team reviewed the following sections of the HZA QAM and procedure standards for the procurement, material traceability, and receipt inspection of material used in the DSC fabrication, including damaged fuel end caps.

- QAM Section M-10-1, "Order Control," Revision 7
- QAM Section M-20-1, "Purchase Control," Revision 12
- QAM Section M-20-2, "Control of Purchased Items," Revision 6
- QAM Section M-25-1, "Material Identification and Verification," Revision 4
- Q-20-1, "Procurement Specification Standard," Revision 7
- Q-20-3, "Purchase Order Control Standard," Revision 7
- Q-20-4, "Standard for Procurement Quality Assurance Control," Revision 9
- Q-30-1, "Standard for Dedication of Commercial Grade Items," Revision 7
- F-40-2, "Marking Standard," Revision 3
- F-50-1, "Inventory Control Standard," Revision 0
- P-01-1, "Document Control Standard (Procurement-Vendors)," Revision 4

The team verified that TN used a graded approach for identifying ITS components during design and HZA applied this graded quality level to component and material procurement documents. Specifically, the team reviewed procurement, traceability, and receipt inspection documentation of ITS Category A stainless steel flat plate (ASME SA-240 Type 304) used for making DSC shells. The team reviewed selected drawings and records to verify that the procurement specifications for this material met design requirements, and that HZA maintained traceability throughout the procurement process. Additionally, the team reviewed the receiving inspection

record sheet for the stainless-steel flat plate used to make the DSC cylindrical shells for the Millstone ISFSI Project and noted that it consisted of both a document review and dimensional inspection of the actual plate material. The team also reviewed HZA's process for identifying and providing the status of inspection and receipt activities to assure that items had been designated as acceptable for use.

Overall, the team concluded that HZA had adequate control of the procurement process for the ITS Category A and B components reviewed. The team determined that HZA procured ITS components consistent with design requirements and their implementing procedures. HZA's material traceability, procurement, and receipt inspection controls were adequate. The team determined that the purchase orders were adequate and specified the applicable criteria and requirements including 10 CFR Part 21. Additionally, HZA verified and maintained the traceability throughout the procurement and receipt process. The team determined that HZA purchased the components from vendors currently on the HZA's Qualified Vendors List (QVL).

The team assessed that HZA adequately performed both activities identified above in accordance with the HZA receipt inspection procedures. The team noted that all significant parameters and requirements were verified to the purchase order and industry standards, as applicable. Specifically, the team noted that at receipt inspection, the vendor/supplier certification documents supplied with each procured item, as required by the purchase order, were reviewed to verify they all contained reference to the HZA purchase order and included the same heat or lot for that item on all documents. The team also noted that material status is also maintained by marking fabricated components directly for traceability in combination with the HZA inspector indicating the acceptance of the associated material by appropriately initialing or stamping the document.

#### **02.06 Determine whether DCSS components are being fabricated per approved quality assurance (QA) and 10 CFR Part 21 implementing procedures and fabrication specifications.**

##### Fabrication and Assembly

The team reviewed the following sections of the HZA QAM and Standards for the fabrication processes, cleaning processes, special processes (welding), machining processes, and assembly processes used in DSC fabrication and to verify that they were being properly implemented.

- QAM Section M-30-1, "Process Control," Revision 6
- QAM Section M-40-1, "Heat Treatment Control," Revision 5
- QAM Section M-41-1, "Welding Control," Revision 7
- Q-05-1, "Standard for Administration of Stop Work Authority," Revision 0
- F-10-1, "Welding Materials Control Standard," Revision 3
- F-20-3, "Post-weld Heat Treatment Standard," Revision 3
- F-21-1, "Furnace Qualification Standard," Revision 3
- F-30-1, "Fabrication Sequence Diagram Standard," Revision 2
- F-30-2, "Check Sheet Standard," Revision 2
- F-40-7, "Cleaning Standard," Revision 2
- W-01-1, "Weld Record Form Usage Control Standard," Revision 2

The team specifically reviewed the Millstone ISFSI Project DSC shell assembly fabrication sequence diagram (FSD) (457-FSD-01), basket assembly (457-FSD-03), canister shell parts (457-FSD-02), damaged fuel end cap (457-FSD-04), and a sampling of associated travelers (HZA check sheets) to determine that fabrication of the NUHOMS-32PT-L125 DSC met the requirements of CoC 72-1004. The team also reviewed the HZA master document list for the Millstone Project.

In addition, the team observed fabrication activities that included welding. The team reviewed the welders list (457-L-WL Revision 1) and welding material list for the Millstone Project. The team toured the HZA weld shop and verified the storage of the Millstone Project weld materials and verified the weld materials in storage were on the welding material list. The team then followed the process for welders to receive weld wire in accordance with procedures.

The team observed HZA welder 958 welding on DSC baskets in accordance with procedure 32PT-F-WPS-B, "Welding Procedure for Basket Assembly," Revision 2 and welder 930 welding on damaged fuel containers. The team verified the welders were on the Millstone Project welders list and verified their weld qualification records. The team verified that Welders 930 and 958 both qualified to the correct welding procedure WPS WQ-8T-1 and WPS S-6T-WQT-1, respectively.

Overall, the team determined that fabrication activities along with the associated controls and processes were adequate and no concerns were identified. The team assessed that the master document list was a valuable resource in ensuring that all fabrication activities were performed in the proper sequences with the proper quality inspections. The team noted that in all cases fabrication drawings, check sheets, and WPSs were adequately identified at various work locations and the documents reflected the correct revisions, as applicable. No issues were identified with respect to qualifications and certifications of welding personnel.

#### Non-conforming Material Control

The team reviewed the requirements for the identification and segregation of non-conforming components and toured the facility to verify that the current non-conforming items met the requirements stated in the QAM.

The team noted that the only open NCR was for material located at an offsite facility. The team could not verify the segregation and control requirements implemented for that material. However, the team did verify HZA had a designated segregation area in the shop to use, as necessary, to control non-conforming material.

#### Handling and Storage

The team reviewed the requirements for the handling and storage of quality equipment and materials used for the 32PT DSC fabrication project for Millstone in M-70-1, "Handling, Storage, Shipping and Preservation," Revision 6; 32PT-F-HD, "Handling and Storage Procedure," Revision 4; and NUH-F-HD, "Handling and Storage Procedure," Revision 1. The team found that the procedures reviewed contained adequate controls, including a visual examination record for storage of long-term items. The team verified that 1) stainless steel and carbon steel tools were stored separately and marked and used as appropriate for the current work being performed in the shop; 2) nylon and carbon steel slings and chains were used as appropriate and never carbon steel chains on stainless steel components; 3) all DSC baskets and shells

were covered when vertical and being stored, as required; and 4) all stored materials and components were off the ground and covered, as required.

The team also toured an offsite storage warehouse for five completed DSCs to determine if the storage controls were adequate. The team found that all five DSCs were stored indoors with secured tarps and coverings, the storage area was partitioned by rope, an authorized access list of personnel from both HZA and the offsite warehouse was posted on the rope barrier, and each stored DSC was inspected at least every 2 months as required. No issues were identified by the team regarding handling and storage controls or implementation at HZA or their offsite storage facility.

### Tools and Equipment

The team reviewed selected measuring and test equipment (M&TE) including records and procedures to assure that equipment used in activities affecting quality were properly controlled and calibrated. The team reviewed HZA's QAM Sections M-60-1, "Measuring and Test Equipment Control," Revision 8 and M-60-2, "Gauge Control," Revision 3, which prescribe activities and requirements concerning control and use of M&TE and gauges, that calibration occurs to the applicable national standards, and actions to take when any piece of equipment is found out of calibration. The team also interviewed personnel involved in the checking in and out of M&TE for use on the shop floor, control of out of calibration equipment, and equipment needing periodic recalibration. The temperature and humidity requirements of the calibration lab were also verified to be in accordance with the applicable calibration procedure.

The team compared a sampling of M&TE and gauges used for recent fabrication and testing activities to the applicable QAM requirements and determined overall compliance. The M&TE and gauges selected consisted of thermometers, stopwatch, tape measure, clamp meter, fillet gauge, and basket free path test gauge, in which each were found to be in calibration and had current calibration certificates, as applicable. The team verified that if the calibration had been done at HZA that it was performed per the applicable quality standard. In addition, the team verified that if the reference or master standard that was used to calibrate M&TE at HZA had been sent offsite for calibration, that the calibration service providers were current on HZA's QVL.

The team concluded that the M&TE sections in HZA's QAM being implemented at HZA provided adequate guidance for M&TE calibration and use, and HZA had adequately implemented M&TE calibration, tracking, and use requirements.

**02.07 With regard to fabrication activities, determine whether: a. They are conducted under an NRC-approved QAP (10 CFR 72.140). b. The provisions of 10 CFR Part 21, Reporting of Defects and Noncompliance for reporting defects that could cause a substantial safety hazard have been implemented. c. The fabricator's personnel are familiar with the reporting requirements of 10 CFR Part 21. d. The fabricator has complied with 10 CFR 21.6, "Posting requirements".**

The team reviewed HZA's Standard Q-20-2, "Reporting Standard of Defects and Noncompliances," to evaluate if provisions were in place for evaluating deviations that could cause a substantial safety hazard and if HZA could implement the requirements of the regulation in a timely manner. The team requested a list of Part 21 evaluations and notifications associated with the fabrication of the NUHOMS 32PT-L125 DSC and interviewed personnel to

verify if they were familiar with the implementing procedure Q-20-2. The team also verified that HZA was meeting the posting requirements in accordance with the regulations in 10 CFR 21.6, "Posting requirements".

The team assessed that HZA has provisions in place for evaluating deviations and reporting defects, as required by 10 CFR Part 21. The team noted that HZA did not have any Part 21 reports within the last three years. The team noted that HZA posted Part 21 requirements throughout their fabrication facility.

**02.08 With regard to QA activities, determine whether: a. The fabricator has been audited by either the licensee or CoC holder. b. For selected audits and inspection findings from (as applicable) QA audit or surveillance and/or inspection reports issued in the previous 2 years, the findings were appropriately handled with corrective actions implemented in a time frame commensurate with their safety significance. c. Supervision and QC/QA personnel perform appropriate oversight during fabrication activities.**

The team reviewed the TN and HZA audit programs to determine if TN and HZA scheduled, planned, and performed internal and external audits and surveillances in accordance with their approved implementing procedures. The team selected a sample of audits and surveillances from the time of the last NRC inspection to the present. The selection included the last audit TN performed at HZA and audits from HZA QVL. The team particularly focused on activities related to HZA fabrication of the NUHOMS 32PT-L125 DSC. The team reviewed the audit results to determine if TN identified deficiencies and HZA addressed these deficiencies within their corrective action program. The team also evaluated whether TN provided adequate supervision with QC/QA personnel for appropriate oversight during fabrication activities.

Additionally, the team reviewed applicable procedures and records to determine if individuals performing quality related activities established and maintained training qualifications and certifications. The team selected a random sample of audit personnel records including lead auditors. The team reviewed the following TN and HZA procedures and standards:

- TIP 18.2, "Surveillances," Revision 5
- TIP 2.2, "Qualification and Certification of Audit Personnel," Revision 12
- Q-01-3, "Audit Personnel Qualification Standard," Revision 1
- Q-40-1, "Internal Surveillance Standard," Revision 5

Overall, the team assessed that for the audits and surveillances sampled that TN generally conducted oversight with qualified and certified personnel, scheduled and evaluated applicable quality of HZA's QA program associated with fabrication activities. The team noted that Dominion Nuclear also provided oversight representatives to verify fabrication activities occurring at HZA as applicable. The team assessed that HZA and TN appropriately identified issues and implemented corrective actions in a time frame commensurate with their safety significance when auditors identify findings or observations during audits or surveillances.