NRC FORM 591S PART 1
(8-2002)
10 CFR 2.201

U.S. NUCLEAR REGULATORY COMMISSION

SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. LICENSEE/CERTIFICATE HOLDER	2. NRC/REGIONAL OFFICE
NAC International 3930 East Jones Bridge road, Suite 200 Norcross, GA 30092 REPORT NUMBER(S) 72-1031/2010-201	Division of Spent Fuel Storage and Transportation U. S. NRC M/S EBB-3D-02M Washington, DC 20555-0001

3. LICENSEE/CERETIFICATE NUMBER(S)	4. INSPECTION LOCATION	5. DATE(S) OF INSPECTION
72-1031	Hitachi Zosen Mechanical Corporation (HMC) Ariake, Japan	May 24-28, 2010

The inspection was an examination of the activities conducted under your Nuclear Regulatory Commission (NRC) approved Quality Assurance Program related to compliance with the NRC's rules and regulations with regard to activities subject to 10 CFR Part 71 and 72. 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 violation or nonconformances were identified.

☒ 2. Previous violations(s) or nonconformance(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, NUREG-1600, to exercise discretion, were satisfied.

_____ Non-Cited Violation(s) was/were discussed involving the following requirement(s) and Corrective Actions(s):

☐ 4 During this inspection certain of your activities, as described below and/or attached, were in violation of nonconformance of NRC requirements and are being cited. This for is a NOTICE OF VIOLATION OR NONCONFORMANCE, which may be subject to posting in accordance with 10 CFR19.11.

(Violations, Nonconformances, 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 I made in accordance with the requirements of 10 CRF 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; OR

☐ Written Response requested in 30 days ☐ Yes ☐ No

TITLE	PRINTED NAME	SIGNATURE	DATE
LICENSEE	Howard Smith	Howard Smith	5.28.10
NRC INSPECTOR	Earl Love	Earl Love	05/28/2010

INSPECTOR NOTES COVER SHEET

Licensee/Certificate Holder (name and address)	NAC International (NAC) 3930 East Jones Bridge Road, Suite 200 Norcross, GA
Licensee/Certificate Holder contact and phone number	Howard Smith, Vice President of Quality (678)328-1276
Docket No.	72-1031
Inspection Report No.	72-1031/2010-201
Inspection Date(s)	May 24 – 28, 2010
Inspection Location(s)	Hitachi Zosen Corporation (HZC), Ariake Works, Kumamoto, Japan
Inspectors	Earl Love Robert Temps Clyde Morell
Summary of Findings and Actions	The team performed an inspection of NAC's fabricator, HZC, located in Kumamoto, Japan. The inspection focused on the fabrication of the MAGNASTOR System [a Transportable Canister System (TSC)] for Duke Energy Carolinas, LLC (Duke), McGuire Nuclear Station, Units 1 and 2. The MAGNASTOR System is a canister-based dry cask storage system with a capacity of up to 37 Pressurized Water Reactor (PWR) or 87 Boiling Water Reactor (BWR) spent fuel assemblies. HZC is under contract to NAC for the fabrication of TSCs. The major components of the TSC assembly is the shell, base plate, closure lid, closure ring, and redundant port covers for the vent and drain ports. The team examined and witnessed fabrication, assembly and test activities and reviewed numerous documents such as check sheets (travelers), weld control records, Nondestructive Examination (NDE) reports (e.g., Ultrasonic, Penetrant, Radiographic), helium leak test records of (2) shell assemblies, and commercial grade dedication evaluations. The team observed welding, fabrication, assembly and testing activities including control of special process. Further, the team assessed HZC's compliance to NACs purchase order and procurement specification in the areas of purchased material, Certified Material Test Reports, NDE services, as well as, auditor, welder, and inspector qualifications. Overall, the team concluded that NACs implementation of its QAP for fabrication activities at HZC was adequate. HZC's fabrication processes were assessed to be good, especially, with regard to the quality of workmanship and facility housekeeping practices. No significant findings were identified. The team identified a design discrepancy that constituted a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the Enforcement Policy. See Section 02.06 of this inspection report for further explanations of this issue.
Lead Inspector Signature/Date	Earl Love 6/25/2010 Earl C. Love
Inspector Notes Approval Branch Chief Signature/Date	Marna Stancu Pstrak acting for 6/25/2010 David W. Pstrak

INSPECTOR NOTES: APPLICABLE PORTIONS OF 02.01 THROUGH 02.08 OF IP 60852 WERE PERFORMED DURING THE INSPECTION WITH RESULTS DOCUMENTED BELOW:

Background:

HZC is under contract to NAC for the fabrication of transportable storage canisters (TSCs). The team performed an inspection of NAC's fabricator, HZC, located in Kumamoto, Japan. The inspection focused on the fabrication of the MAGNASTOR System (a TSC) for Duke Energy Carolinas, LLC (Duke), McGuire Nuclear Station, Units 1 and 2.

The MAGNASTOR System is a canister-based dry cask storage system with a capacity of up to 37 Pressurized Water Reactor (PWR) or 87 Boiling Water Reactor (BWR) spent fuel assemblies. The major components of the TSC assembly are the shell, base plate, closure lid, closure ring, and redundant port covers for the vent and drain ports.

02.01: Determine whether the fabrication specifications are consistent with the design commitments and requirements documented in the SAR, and, as applicable, the CoC or the site-specific license and technical specifications.

The team focused on the process that HZC uses to control the translation of vendor supplied design information into controlled HZC procedures and drawings for fabrication activities.

The team noted that the design development process for NAC occurs at its corporate office in Atlanta, GA. The team verified the translation of the intended design at the fabrication level and from the corporate design drawings. During preparation of the inspection, the team identified for a special joint configuration, shown in the design drawings, for the attachment of borated aluminum plates to individual fuel tubes. The team noted that, while the intent of the configuration was explained to a certain extent in the design drawing notes, the actual configuration in the design and fabrication drawings indicated a welded joint; however, it was not a welded joint. Section 02.06 of this inspection report discusses fabrication issues related to this configuration.

The team identified components and materials used on the shop floor for fabrication and traced them back to their associated purchase orders and applicable design drawings. In each case, HZC and NAC staff was able to show that the material samples conformed to the requirements of the associated design drawings. Overall, no concerns were identified in the translation of design information into procurement documents and use of materials in the fabrication process.

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.

The team reviewed procedures at HZC related to their problem identification and corrective action programs. The team held discussions with Quality Assurance (QA) personnel and reviewed selected documents. HZC has procedures for the documentation and resolution of material and fabrication nonconformances through nonconformance reports (NCRs) and also has procedures for addressing higher level issues through the use of corrective action reports (CARs). The team reviewed thirteen (13) NCRs issued to-date against the MAGNASTOR fabrication project. Of the 13 NCRs, six were in open status. The team verified that copies of the open NCRs were attached to the affected components as required by HZC's procedure. Four (4) CARs against the MAGNASTOR project were reviewed. In general, the issues documented in the reports were straightforward and their resolution was assessed to be

appropriate to the nature and extent of the documented problems. Additionally, HZC CARs related to overall NAC fabrication activities, as a result of an April 2010 NAC surveillance, were reviewed with corrective actions still pending on most of the CARs. The NAC surveillance is discussed further in Sections 2.05a and 2.08a of this inspection report.

The team reviewed applicable HZC Part 21 procedures. The imposition of Part 21 requirements in purchase orders, where applicable, was also verified by the team. No concerns were identified.

The team also reviewed NAC's actions at HZC, based on a 2009 Part 21 report issued by Transnuclear, Inc. (who also fabricates casks at HZC), with regard to suspect parts supplied by Hwa Shin Bolt Industries (Hwa Shin), a once approved supplier through HZC's supplier audit process. NAC initiated a Self-Identification Report (SIR) Log No. 09-008, dated October 5, 2009. Based on an extent of condition review, NAC determined that the only component procured from Hwa Shin that could affect NAC fabrication was a Quality Category C washer used in UMS TSCs supplied to one utility. A NAC engineering review concluded that if the washers were not made of stainless steel, and instead were of carbon steel, that there would be no anticipated impact on canister or basket performance during storage or transport conditions. HZC provided subsequent information to NAC that provided reasonable assurance that the washers were made from the material that was specified. NAC also requested two of its fabrication facilities in the U.S. to check if they had used any parts supplied by Hwa Shin. Both fabricators reported that no products from Hwa Shin had been used in NAC components. Overall, NAC's actions in response to the Part 21 report for applicability to NAC fabrication activities appeared timely and appropriate. The team noted that Hwa Shin is no longer an HZC approved supplier and that HZC implemented a new procedure to assist in a program for the detection of counterfeit and fraudulent materials.

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

The team interviewed several HZC personnel to determine their familiarity with specified design, fabrication techniques, testing requirements, and quality controls. Familiarity with the required subject areas were adequate based on responses from the personnel interviewed and on the quality of the work performed and/or as witnessed by the team during the inspection.

The team reviewed a sampled of certification and qualification records for welding personnel. Specifically, the team reviewed HZC's welder/welding operator continuity log from December 1, 2009 to May 1, 2010 and determined that welder/welding operators were appropriately qualified according to ASME Code Section IX requirements. Further, the team verified that welders met the current qualification requirements for the processes they were using on the floor. The team determined that HZC welding personnel were knowledgeable in their respective areas. No concerns were identified.

The team reviewed training and certification records for several Quality Control (QC), Level III and II inspectors, according to the American Society of Nondestructive Testing (ASNT) in the disciplines of Visual Testing (VT), Radiographic Testing (RT), Magnetic Particle (MP), Penetrant Testing (PT), and Ultrasonic Testing (UT). The team determined that these personnel were performing acceptably through review of records attesting to the performance of recent fabrication activities. The training and certification process was adequate based on the sampled items. In addition, the team observed several shop NDE activities including MP examination of welded fuel tubes and a PT of an inner bottom cover to shell weld. In all cases, the NDE personnel demonstrated high proficiency in their understanding of the applicable procedures

and the acceptance criteria. No concerns were identified.

02.05a: Determine whether materials, components, and other equipment received by the fabricator meet DCSS design procurement specifications.
02.05b: Determine whether 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.

The team reviewed procurement procedures, reviewed various approved vendor audits/surveillances, and traced the procurement history of components undergoing fabrication. The purpose of this review was to verify that they were procured from qualified suppliers and met specifications.

As discussed in 02.01 above, the team obtained a sample of materials in use on the shop floor for to evaluate HZC's material procurement process. The team reviewed various HZC Important to Safety, Category A, purchase orders for carbon steel plates (used in basket assembly for fuel tubes and support plates), lifting lugs, bottom plates, weld wire, and upper closure lids. The team noted that HZC imposed appropriate quality and technical requirements. HZC staff traced each of the materials selected back to the applicable purchase order and the associated heat/lot numbers.

The team reviewed commercial grade dedication procedures, plans, and reports applicable to Important to Safety, Category A, material. Specifically, the team reviewed documentation for helium gas (used for leak testing the canister shells) and bolts (used to secure the closure lid). The team noted HZCs documented controls adequately defined the dedication process. The team reviewed identification of critical characteristics for acceptance and verification of characteristics of the material specifications by inspection, test, and source verification. No concerns were identified.

The team reviewed a sample of vendor audit reports conducted by HZC for companies maintained on its qualified vendors list (QVL-10-05, Revision 1). The audits were conducted in accordance with QA administrative procedures and audit checklist formats. The audit checklists were detailed with respect to items and documents reviewed during the audits. As identified in previous NRC inspections, very few findings and observations were noted to be documented in HZC's audit reports. This was an issue also identified by NAC prior to the inspection and addressed in surveillance report (Report 10-S-11, dated April 19, 2010) and that resulted in NAC generating a CAR (10-01) to track HZC's corrective actions for this issue.

The team reviewed qualification and training records of auditors and determined they were in accordance with procedures. The independence of auditors from the areas being audited was also determined to be proper.

Overall, the team concluded that HZC's procurement activities were being performed in accordance with its controlling procedures.

02.06: Determine whether DCSS components are being fabricated per approved QA and 10 CFR Part 21 implementing procedures and fabrication specifications.

The team examined a sample of fabrication specifications, quality plans, engineering drawings, work control procedures, and check sheets (routers) to determine that fabrication of the MAGNASTOR System met the requirements of the CoC. The team observed fabrication activities, special processes, and applicable personnel qualification and certification records to

determine that fabrication satisfied requirements and was accomplished by qualified personnel. Further, the team reviewed a sample of in-process check sheets and examination reports to assess work that had been completed prior to the inspection. The team noted that in all cases, fabrication drawings check sheets, inspection, and welding procedures were adequately identified and that the documents were at their correct revisions at various work locations.

As noted in 02.03 above, the team observed MP of fuel tubes and PT of inner bottom cover to shell weld to assure compliance and to verify the capability of personnel to perform these test and inspection activities. The team reviewed the applicable records of HZC personnel to determine that they were qualified to perform these activities. In addition, the team reviewed examination reports in the areas of helium leak, ultrasonic, and radiographic examinations. No concerns were identified.

The team observed basket assembly fabrication welding activities such as fit-up, tack weld, and welding of mounting plates (side, center, and corner) using manual welding methods. The team reviewed records and verified that welders, weld procedures, and procedure qualification records met applicable ASME Code requirements and were properly qualified. The team reviewed a sample of weld material and base metal material and verified these met applicable ASME Code and NAC fabrication specification requirements. The team reviewed the welding and NDE procedures to determine if the HZC QA Program parameters and the requirements for the training and certification of personnel performing fabrication activities were being implemented. No concerns were identified. From the reviews and observations, the team concluded that the HZC fabrication and inspection activities were being performed in accordance with NAC specifications through the controlling implementing procedures. Fabrication and inspection personnel clearly understood the fabrication process and the procedures used at HZC's facility.

In terms of the design drawing issue discussed in Section 2.01, the team noted a minor drawing discrepancy regarding the process to attach a "post" to the inside of fuel tubes. NAC's Safety Analysis Report (SAR) and HZC's fabrication drawing Nos. 71160-551 and 37MAG-D-30A, respectively, entitled "Fuel Tube Assembly – Magnastor 37 PWR," states that the Gas Tungsten Arc Weld process will be used to affix the weld post to the fuel tube and that the weld joint configuration to be a "plug weld." Initial fabrication on the first lot of assembled fuel tubes complied with that requirement; however, the process was complicated due to the removal of electroless nickel plating in order to make the proper plug weld, as defined by the Welding Procedure Specification (WPS) that was currently in effect. As a result, NAC developed, tested and qualified an alternate "melting" process to form a flared head versus a plug weld. NAC staff explained that the plug weld symbol shown in the aforementioned drawings was to communicate geometry as opposed to defining a weld joint interface and that the intent was to provide structural support to the neutron absorber and retainer to prevent significant movement of the neutron absorber. NAC authorized HZC to continue to fabricate using the qualified melting process. However, on questioning by the inspection team regarding the actual process versus the fabrication drawing "instructions," NAC placed a temporary hold on production using this process pending further review and resolution. Specifically, the team questioned that both drawings, as shown at that time, did not accurately reflect the new process. As a result, NAC and HZC committed to revise their drawings to clarify the intent. The team determined that the discrepancy constituted a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the Enforcement Policy.

The team verified that appropriate procedures were implemented for control of measuring and test equipment (M&TE). The team reviewed various M&TE used on both current and completed work to assess the control and traceability of measuring and test equipment. Specifically, the team reviewed calibration records of X-Ray film density tablet, ultrasonic instrument, basic

calibration block, oxygen monitor, clamp meter, helium leak standard, and various mechanical measuring devices. The team noted appropriate labeling and identification of M&TE, including the person who performed calibration, calibration of M&TE at periodic intervals, use of reference standards traceable to a national standard, and documented "As-Found" / "As-Left" information. No concerns were identified.

02.07: With regard to fabrication activities, determine whether the provisions of 10 CFR Part 21, have been implemented; personnel are familiar with the reporting requirements of 10 CFR Part 21; and compliance with 10 CFR 21.6, "Posting requirements."

The team examined implementing procedure No. Q-20-2, Revision 2, "Reporting Standard of Defects and Noncompliance," observed postings of 10 CFR Part 21 requirements, and interviewed fabrication personnel. The team found the procedure and postings of 10 CFR Part 21 requirements were met. The team noted that these postings were in English and Japanese. The team concluded that the fabricators had adequately implemented 10 CFR Part 21 requirements. Further, the team reviewed document No. 320-QAP, Revision 6, dated 5/28/2010, "Quality Assurance Plan," and noted a requirement that NAC provides to HZC any technical justification for any nonconformance reports requiring "use-as-is" or "repair" disposition.

02.08a: With regard to quality assurance activities, determine whether the fabricator has been audited by either the licensee or CoC holder.

As mentioned in previous sections, the team reviewed a recent NAC surveillance (10-S-11) conducted in April 2010. In addition to the NAC CAR that was opened to document the lack of findings in HZC vendor audits, NAC identified a number of programmatic issues that, as stated in the summary of results, indicated a need for enhancing routine and complete compliance with QA program commitments. The audit was thorough and identified four audit findings and one observation requiring corrective action by HZC.