

February 12, 2003

EA-01-277

Mr. Robert D. Quinn  
President and Chief Executive Officer  
BNFL Fuel Solutions Corporation  
2105 South Bascom Avenue  
Suite 160  
Campbell, CA 95006

SUBJECT: NRC OFFICE OF INVESTIGATION (OI) REPORT NO. 4-1999-066 AND  
NOTICE OF NONCONFORMANCE

Dear Mr. Quinn:

This refers to the investigation conducted by the U.S. Nuclear Regulatory Commission (NRC) Office of Investigations (OI) between December 2, 1999, and July 3, 2001. The investigation was conducted, in part, to review the circumstances surrounding the coatings qualification testing conducted by British Nuclear Fuels, Ltd. (BNFL), Fuel Solutions (BFS) for the Portland General Electric Company (PGE). The coating was to be used by PGE to coat the interior surfaces of spent fuel storage casks to be stored at the Trojan Nuclear Plant. A factual summary of the OI report is attached.

During this investigation, the NRC substantiated that the quality assurance manager at BFS was aware that the coatings qualification testing was not adequate and failed to take appropriate action to report this information. Further, the NRC determined that the BFS quality assurance manager was aware that BFS and March MetalFab, Inc., quality assurance procedures were not properly implemented. In addition, the NRC determined that the implementation of your Quality Assurance (QA) program failed to meet certain NRC requirements.

As a result of the failure to adhere to your QA program, the applicant for a license (PGE) you were working for was found to be in violation of NRC requirements regarding submittal of complete and accurate information to the NRC and for failure to establish measures to control a multi-assembly sealed basket (MSB) that did not conform to its design basis. The applicant for a license submitted your report, SNC (Sierra Nuclear Corporation) 213-03-27, Rev. 1, "TranStor Coatings Qualification Program Report," dated August 18, 1998, to NRC in support of their application for a specific license under 10 CFR Part 72. Your report concluded that a coating that had not been adequately tested successfully completed the qualification program, thus meeting all design basis and regulatory requirements. This information was material to NRC in that it prevented NRC from properly assessing the adequacy of the coating requirements during the review of the license application and development of the license conditions. The second violation addresses the licensee's failure to control the MSB after identifying that the MSB did not conform to the design basis documented in the Independent Spent Fuel Storage Installation Safety Analysis Report. In this case, the coating on the MSB generated volatile organic compounds during a washdown with demineralized water.

As a result of the subject investigation, the NRC is issuing a Notice of Nonconformance to BFS for not ensuring that your QA program and procedures were adhered to. The specific findings and references to the pertinent requirements are identified in the enclosure of this letter.

Please provide us within 30 days from the date of this letter a written statement in accordance with the instructions specified in the enclosed Notice of Nonconformance. We will consider extending the response time if you can show good cause for us to do so.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction. If you have any questions regarding this request, please call me at 301-415-8500.

Sincerely,

/RA/  
John D. Monninger, Chief  
Licensing Section  
Spent Fuel Project Office  
Office of Nuclear Material Safety  
and Safeguards

Enclosures: 1) OI Factual Summary  
2) Notice of Nonconformance

February 12, 2003

As a result of the subject investigation, the NRC is issuing a Notice of Nonconformance to BFS for not ensuring that your QA program and procedures were adhered to. The specific findings and references to the pertinent requirements are identified in the enclosure of this letter.

Please provide us within 30 days from the date of this letter a written statement in accordance with the instructions specified in the enclosed Notice of Nonconformance. We will consider extending the response time if you can show good cause for us to do so.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction. If you have any questions regarding this request, please call me at 301-415-8500.

Sincerely,

/RA/  
John D. Monninger, Chief  
Licensing Section  
Spent Fuel Project Office  
Office of Nuclear Material Safety  
and Safeguards

- Enclosures: 1) OI Factual Summary  
2) Notice of Nonconformance

**Distribution:**

NRC File Center PUBLIC NMSS R/F SFPO R/F  
JLuehman, OE BSpitzberg RIV RLewis, SFPO CMiller, SFPO  
DBroadus, IMNS RO'Connell, SFPO JDixon-Herrity, OE HJMcGurran, OGC  
NJensen, OGC PJoukoff, OI GHornseth, SFPO

C:\ORPCheckout\FileNET\ML030430182.wpd

**ML030430182**

OFC	SFPO		SFPO		SFPO				
NAME	CRegan		EZiegler		JMonninger				
DATE	2/ 11 /2003		2/ 11 /2003		2/12 /2003				

C = COVER E = COVER & ENCLOSURE N = NO COPY OFFICIAL RECORD COPY

**FACTUAL SUMMARY**  
**OFFICE OF INVESTIGATIONS REPORT NUMBER 4-1999-066**

The U.S. Nuclear Regulatory Commission's (NRC) Office of Investigations (OI) Report No. 4-1999-066 involves a review of the circumstances surrounding qualification testing of a coating conducted by Sierra Nuclear Corporation (SNC) for the TranStor spent fuel storage casks and the determination of whether employees of Portland General Electric's (PGE) Trojan Nuclear Plant and/or PGE's subcontractor, British Nuclear Fuels, Ltd. Fuel Solutions (BFS), were aware that the qualification testing was inadequate. The testing was conducted in support of an application by PGE to store spent fuel at the Trojan Nuclear Plant in accordance with 10 CFR Part 72. The coating was used on the internal surfaces of a metal storage cask. During the testing of the coating, SNC was purchased by BFS. OI was unable to substantiate that employees of PGE's Trojan Nuclear Plant were aware that the coatings qualifications testing conducted by SNC was inadequate.

Report No. SNC 213-03-27, Revision 1, "TranStor Coatings Qualification Program Report," was submitted to NRC on August 28, 1998, to support the statement in Table 4.2-15 of the Trojan Independent Spent Fuel Storage Installation Safety Analysis Report (SAR), "PWR Basket and Overpack Coating Criteria," that no generation of volatile organic compounds or flammable gases be allowed from the coatings. Report No. SNC 213-03-27 incorporated the findings stated in Report No. NWT 582, "Impact of Boric Acid Immersion and Elevated Temperature Exposure on Carbon Steel and Stainless Steel Coating Candidates for Sierra Nuclear Corporation Fuel Cask Applications," August 1998. Section 3 of NWT 582 documented that after 24 hours of exposure to a test solution, a gas generation rate of 2 to 3 bubbles per second and a yellow precipitate were observed.

Section 2 of SNC 213-03-27 states that the coatings applied to SNC basket internals and the external portions of the shells are considered important to safety. Section 2.4 of that report states that this qualification program was performed under the control of the SNC Nuclear Quality Assurance Program (QAP), which has been approved by the NRC and meets the requirements of 10 CFR Part 72, Subpart G. Section 4.1.1 of SNC 213-03-27 states no significant off-gassing or precipitate, including corrosion products, were observed during boric acid testing.

In July 1999, PGE attempted to load the first cask with spent fuel. During loading operations, the coating failed, resulting in spent fuel pool turbidity and the generation of hydrogen gas. Eventually the cask had to be unloaded and removed from the spent fuel pool.

The following QAP procedures from the SNC Nuclear QAP were applicable to the fabrication of the coupons, but were not implemented as required:

- QAP 3.3, "Specification, Selection and Qualification of Items and Services for Structures, Systems and Components Designated as Important to Safety," Revision 3, was not followed. The responsible engineer (RE) failed to define the critical characteristics and necessary inspections and tests to be performed during receipt inspection of the test coupons as required by Section 3.0. Consequently, no receipt inspection of the test coupons was performed. The Vice President (VP) Quality Assurance/Quality Control (QA/QC) failed to assure that QAP 3.3 was implemented as required by Section 4.0. This was evident in that an applicable classification Category was not assigned as required by Steps

5.1.1 and 5.1.2. Further, the RE did not generate specifications to define the design criteria to be satisfied by March MetalFab, Inc. (MMI). Critical characteristics were not identified and verified as required by Step 5.1.3. Documents were not prepared identifying those criteria to be used for acceptance of the coupons or specifying check points during the work process or upon completion which required compliance with criteria and must be verified by QA/QC as required by Step 5.1.7. NWT 582 did not document the qualification of the coupons by receipt inspection or testing as required by Step 5.4. Last, SNC did not retain any QA records for fabrication of the coupons as required by Section 6.0. No information regarding the fabrication of the coupons was received by BFS, from MMI, until June 15, 1999.

- QAP 4.1, "Review of Important to Safety Purchases," Revision 2, was not followed. SNC Purchase Order (PO) 97-028, which required controlled coupon fabrication by MMI, was tracked on an Important to Safety Status Review Log, but a QA Review Check List was not utilized at the discretion of the VP QA/QC. Although the VP QA/QC signature on the PO signifies that an adequate review was performed as required by Step 3.2, an adequate review was not completed in that there was no review to determine whether the work under PO 97-028 required verification and acceptance criteria such as receipt inspection, and hold or witness points in the manufacturing process was performed. Further, no source and receipt inspections were pre-planned even though the SNC Approved Supplier List in effect at that time stated that work by MMI required "continuous surveillance," as required by Step 3.5.
- QAP 9.0, "Control of Special Processes," Revision 1, was not followed. The QA Manager did not identify in PO 97-028 that the application of the coating was a special process nor implement any special controls (e.g., approval of personnel qualifications, surveillances of activities, and control of fabrication parameters) as required by Sections 1.0 and Section 3.0.
- QAP 17.0, "Quality Records," Revision 6, was not followed. No quality records were retained regarding fabrication of the coupons as required by Section 4.0. No information regarding the fabrication of the coupons was received by BFS, from MMI, until June 15, 1999.
- QAP 15.0, "Nonconforming Materials, Parts, Components or Services," Revision 5, was not followed. Neither SNC nor MMI issued a nonconformance report to document the dry film thickness measurements being thicker than allowed by the coating Product Data Sheet (PDS) as documented in the Certificate of Compliance for the coupons or to document that the coupons were cured for a time and temperature in excess of that listed in the coating Product Data Sheet as required in Section 3.2.
- QAP 4.0, "Procurement Document Control," Revision 4, was not followed. The VP QA/QC failed to assure that QA approved inspection procedures and instructions were specified for all inspections as required by Step 2.5 or that the appropriate controls, as required by the Approved Suppliers List, were implemented for Quality Level II as required by Steps 2.7, 3.1, 3.2, 3.3, 3.4, and

3.11. PO 97-028 did not contain requirements for reporting and approving of nonconformances. MMI later stated to the NRC that nonconformances had occurred during the curing of the coupons that were not documented in accordance with Step 3.12. PO 97-028 did not contain any mandatory hold points in the supplier's inspection instructions or check lists where SNC or its customer could verify compliance with the contract requirements as required by Step 3.13. PO 97-028 did not include administrative controls appropriate for the scope of work, such as technical/quality requirements applicable to the work, requirements for SNC to review/approve personnel qualifications, and procedure training as required by Step 3.20.

- QAP 7.1, "Supplier Evaluation," Revision 5, was not followed. SNC did not perform an annual performance evaluation of MMI in 1997 or in 1998. MMI's continued placement on the Approved Suppliers List was contingent upon successful performance reviews in accordance with Step 3.10.
- QAP 7.3, "Receipt Inspection," Revision 2, was not followed. No receipt inspection was performed on the coupons at the completion of the work by MMI. Receipt inspection of safety related items is mandatory per Section 2.0.

## NOTICE OF NONCONFORMANCE

BNFL Fuel Solutions Corporation

Based on the results of an U.S. Nuclear Regulatory Commission (NRC) investigation conducted between December 2, 1999, and July 3, 2001, the NRC determined that certain activities were not conducted in accordance with NRC, licensee, and vendor requirements as follows:

- A. 10 CFR 72.146, "Design Control," states in part that a certificate holder or applicant for a certificate shall establish measures to ensure that applicable regulatory requirements and the design basis, as specified in the Certificate of Compliance (CoC) application, are correctly translated into specifications, drawings, procedures, and instructions. 10 CFR 72.146 further states that measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety.

BNFL Fuel Solutions Corporation and its predecessor, Sierra Nuclear Corporation (SNC), were under contract with Portland General Electric Company to supply the TranStor dry cask storage system for the Trojan Nuclear Power Plant Independent Spent Fuel Storage Installation. Activities under that contract associated with the design of the TranStor dry cask storage system were to be performed in accordance with the Sierra Nuclear Corporation Quality Assurance Program.

During fabrication of test coupons to support the TranStor dry cask storage system from October to December 1997, the Sierra Nuclear Corporation Quality Assurance Program implemented the following Quality Assurance Procedures (QAP) to establish measures to ensure that applicable regulatory requirements and the design basis, as specified in the application, were correctly translated into specifications, drawings, procedures, and instructions; and to ensure that measures were established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety.

- QAP 3.3, Rev. 3, dated June 18, 1997, "Specification, Selection and Qualification of Items and Services for Structures, Systems and Components Designated as Important to Safety."
- QAP 4.1, Rev. 2, dated June 18, 1997, "Review of Important to Safety Purchases."
- QAP 9.0, Rev. 1 dated October 5, 1992, "Control of Special Processes."
- QAP 17.0, Rev. 6, dated June 19, 1997, "Quality Records."
- QAP 15.0, Rev. 5, dated September 6, 1995, "Nonconforming Materials, Parts, Components or Services."
- QAP 4.0, Rev. 4, dated June 25, 1997, "Procurement Document Control."

- QAP 7.1, Rev. 5, dated June 23, 1997, "Supplier Evaluation."
- QAP 7.3, Rev. 2, dated November 7, 1995, "Receipt Inspection."

Contrary to the above, SNC did not implement the QA procedures as follows:

- QAP 3.3, was applicable to fabrication of the coupons but was not properly implemented.
  - The Responsible Engineer did not define the critical characteristics and necessary inspections and tests to be performed during Receipt Inspection of the test coupons as required by Section 3.0 of QAP 3.3. Consequently, no Receipt Inspection of the test coupons was performed.
  - The Vice President (VP) of Quality Assurance/Quality Control (QA/QC) did not assure that QAP 3.3 was implemented as required by Section 4.0. This is evident in that a classification Category of A (critical operation such as unsafe geometry compromising criticality control) or B (major impact on safety such as the failure of an item in conjunction with the failure of an additional item, could result in an unsafe condition) was not assigned as required by Steps 5.1.1 and 5.1.2 of QAP 3.3.
  - The Responsible Engineer did not generate specifications which defined design criteria to be satisfied by March MetalFab, Inc. (MMI). Critical characteristics were not identified and verified as required by Step 5.1.3 of QAP 3.3.
  - Documents were not prepared identifying those criteria to be used for acceptance of the coupons. Documents were not prepared specifying check points during the work process or upon completion, which required compliance with criteria and verification by QA/QC as required by Step 5.1.7 of QAP 3.3.
  - Report NWT-582, "Impact of Boric Acid Immersion and Elevated Temperature Exposure on Carbon Fiber Steel and Stainless Steel Coating Candidates for Sierra Nuclear Corporation Fuel Cask Applications," did not contain qualification of the coupons by receipt inspection or testing as required by Step 5.4 of QAP 3.3.
- QAP 4.1, was applicable to fabrication of the coupons but was not appropriately implemented. Specifically, while Purchase Order (PO) 97-028 was tracked on an Important to Safety Status Review Log, a QA Review Check List was not utilized at the discretion of the VP QA/QC. This is evidenced by the following:
  - The PO did not utilize a QA Review Check List; however, the VP QA/QC may waive use of the check list. In either case, the VP QA/QC signature on the PO signified that an adequate review was performed as required by Step 3.2 of QAP 4.1. However, by not using the QA Review Check List, the VP QA/QC did not perform an adequate review of the work to be



performed under PO 97-028. Specifically, the VP QA/QC did not review whether the work required verification and acceptance criteria such as receipt inspection, and hold or witness points in the manufacturing process.

- SNC did not pre-plan any source and receipt inspections even though the SNC Approved Supplier List in effect at that time stated that work by MMI required “continuous surveillance,” as required by Step 3.5 of QAP 4.1.
- QAP 9.0, was applicable to fabrication of the coupons but was not implemented. SNC did not identify in PO 97-028, the application of the coating as a special process nor implement any special controls (e.g., approval of personnel qualifications, surveillances of activities, and control of fabrication parameters) as required by Sections 1.0 and Section 3.0 of QAP 9.0.
- QAP 17.0, was applicable to fabrication of the coupons but was not implemented. SNC did not retain quality records regarding fabrication of the coupons as required by Section 4.0 of QAP 17.0. BFS did not obtain any type of records in accordance with QAP 17 until June 15, 2000, when it was faxed a Certificate of Compliance from MMI.
- QAP 15.0, was applicable to fabrication of the coupons but was not implemented. SNC and MMI did not issue a nonconformance report for dry film thickness (DFT) measurements being thicker than allowed by the Xylar Product Data Sheet (PDS) as documented in the Certificate of Compliance for the coupons. In addition, SNC and MMI did not initiate a nonconformance report to document that the coupons were cured for a time in excess of that listed in the Xylar PDS.
- QAP 4.0 was applicable to fabrication of the coupons but was not implemented. SNC did not assure that QA approved procedures and instructions were specified for all inspections. In addition, SNC did not assure that the appropriate controls, as required by the Approved Suppliers List, were implemented for Quality Level II as required by Steps 2.7, 3.1, 3.2, 3.3, 3.4, and 3.11 of QAP 4.0.
- QAP 7.1 was applicable to fabrication of the coupons but was not implemented. SNC did not perform an annual performance evaluation of MMI in either 1997 or 1998. MMI’s continued placement on the Approved Suppliers List was contingent upon successful performance reviews as required by Section 3.10 of QAP 7.1.
- QAP 7.3 was applicable to fabrication of the coupons but was not implemented. SNC did not perform receipt inspections of the coupons at the completion of the work by MMI. Receipt inspection of safety related items was required by Section 2.0 of QAP 7.3.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 with a copy to the Chief, Licensing Section, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards within 30

days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each nonconformance: (1) the reason for the nonconformance, or if contested, the basis for disputing the nonconformance, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further noncompliances, and (4) the date when your corrective action will be completed. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection, described in 10 CFR 73.21.

Dated this 12TH day of February 2003.