



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

August 18, 2008

David Lochbaum  
Director, Nuclear Safety Project  
Union of Concerned Scientists  
1825 K Street NW, Suite 800  
Washington, D.C. 20006-1232

**SUBJECT: RESPONSE TO YOUR LETTER DATED JUNE 30, 2008, CONCERNING NRC  
SPECIAL INSPECTION REPORT FOR RHRSW (RESIDUAL HEAT REMOVAL  
SERVICE WATER) VALVE DAMAGE AT BROWNS FERRY**

Dear Mr. Lochbaum:

The purpose of this letter is to provide information involving the observations and questions posed in your letter to Mr. Leonard D. Wert, dated June 20, 2008. Your specific questions associated with Browns Ferry Nuclear Plant - NRC Special Inspection Report 05000259/2008009, 05000260/2008009, and 05000296/2008009 are addressed in the Enclosure to this letter.

NRC Region II staff and management conducted a detailed review of the subject inspection report, the questions raised in your letter, and our associated inspection activities. We noted that your letter contrasted the overall quality of the subject inspection report with the Brunswick Steam Electric Plant NRC Special Inspection Report No. 05000325/2007011 and 05000324/2007011. Our review indicated that the subject inspection report did not fully communicate a number of inspection activities that were actually completed. As such, the report did not provide sufficient information to clearly support some of our conclusions. I have taken actions to strengthen the report review process in the Division of Reactor Projects and will continue to monitor our performance in this area. Thank you for calling this matter to my attention.

I hope that the additional information presented in the Enclosure adequately addresses your questions and concerns regarding the degraded residual heat removal service water valves discussed in NRC Special Inspection Report 05000259/2008009, 05000260/2008009, and 05000296/2008009. If you have additional questions concerning this matter please contact Mr. Eugene Guthrie at (404) 562-4662 or [Eugene.Guthrie@nrc.gov](mailto:Eugene.Guthrie@nrc.gov).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document

D. Lochbaum

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Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-room/adams.html> (the Public Electronic Reading Room).

Sincerely,

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Leonard D. Wert, Director  
Division of Reactor Projects

Docket Nos.: 50-259, 50-260, 50-296  
License Nos.: DPR-33, DPR-52, DPR-68

Enclosure: As stated

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**Response to D. Lochbaum Letter Dated June 30, 2008, Concerning  
NRC Special Inspection Report for Residual Heat Removal Service Water Valve  
Damage at Browns Ferry**

Letter Attachment Section: Credit for Doing Less Now Than Was Unacceptable Before

- Q1. Stem-to-disc separation of valve 3-FCV-23-46 in 2000 resulted in B priority PER 35419 with a root cause evaluation. The exact same degradation of this same valve from the exact same cause in 2008 resulted in C priority PER 141137 with neither an apparent cause or root cause evaluation.
- a) Was TVA right in 2000 by requiring a root cause evaluation or right in 2008 by not requiring one?
  - b) Was TVA right in 2000 by assigning Priority B or right in 2008 by assigning Priority C?
- A1 Problem Evaluation Report (PER) 35419 contained a statement that management review had resulted in upgrading the C level PER to level B. The licensee's corrective action program allowed such discretion. Which level was required by their corrective action program was not the focus of the special inspection. The special inspection scope involved the adequacy of the licensee's actions to identify, evaluate and resolve the technical issues surrounding the failures. Inspection of the proper implementation of the corrective action program is normally conducted as part of the routine baseline inspection program, specifically, Inspection Procedure (IP) 71152, "Identification and Resolution of Problems." The inspection objectives of IP 71152 include: "To allow for follow-up of previous identified compliance issues (e.g., NCVs (non-cited violations));" and, "To determine whether licensees are complying with NRC regulations regarding corrective action programs." In September 2008, the biennial Problem Identification and Resolution inspection is scheduled to be conducted at Browns Ferry. Inspection of the licensee's implementation of their corrective action program, including the RHRSW valve issues, will be performed as part of that activity and the results will be documented in the associated inspection report.
- Q2. Why did the NRC reduce the severity of its enforcement action for this violation based in part on TVA having entered the finding into the corrective action program, which was documented by the NRC's special inspection as doing significantly less in response to the same problem than TVA did in its original deficient response?
- A2 Under the Reactor Oversight Process (ROP), the Agency's disposition of a violation or finding is based primarily upon the safety significance of the issue as determined by the Significance Determination Process (SDP). The 2008 equipment failures resulted in the valves being able to perform their safety functions, although the valves were in a degraded condition. Additional details on the valves' ability to perform their safety function are provided in A4 under "Credit for Non-Reviewed Design and Licensing

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Bases Document – 1.” The inspectors used Inspection Manual Chapter (IMC) 0609, Significance Determination Process, Attachment 04, “Phase 1 – Initial Screening and Characterization of Findings,” to determine the safety significance of the equipment failures. IMC 0609, Attachment 04, “Table 4a -Characterization Worksheet for IE, MS, BI Cornerstones,” indicates for mitigating systems that, if the answer to the question “Is the finding a design or qualification deficiency confirmed not to result in loss of operability or functionality” is Yes, then screen as Green. For violations of very low safety significance, (Green), Section VI.A.1 of the NRC Enforcement Policy states:

“violations associated with green SDP findings are normally dispositioned as NCVs...the NRC will close these violations based on their being entered into the licensee’s corrective action program.”

Thus, because the 2008 violation was of very low safety significance and the licensee had entered the issue into their corrective action program, the violation was appropriately dispositioned as an NCV in accordance with the NRC’s Enforcement Policy.

In 2000, the NRC determined that the stem-disc separation condition was of very low safety significance and the licensee had entered the violation into their corrective action program. The 2000 violation had also been dispositioned, in accordance with the NRC’s Enforcement Policy, as an NCV.

Letter Attachment Section: Credit for Non-Reviewed Design and Licensing Bases Document – 1

- Q1 How could the NRC inspectors evaluate whether TVA was maintaining and operating the subject valves within applicable design and licensing basis requirements without looking at any of the documents containing said design and licensing basis requirements?
- A1 The NRC staff routinely uses Technical Specifications, the Final Safety Analysis Report (FSAR) and system design bases documents in their preparation for and during the conduct of inspections. The inspectors used the following documents to determine the valves’ functions, design basis, and licensing basis:
1. Technical Specifications and Bases 3.7.1, Residual Heat Removal Service Water (RHRSW) System and Ultimate Heat Sink (UHS), Amendment 214
  2. FSAR Section 10.9, RHR Service Water System, BFN-22
  3. BFN-50-7023, General Design Criteria Document for the Residual Heat Removal Service Water System, Revision 12

Not including these references in the inspection report was an oversight.

- Q2 How could the NRC inspectors determine the required functions of the valves without examining any of the documents that specify those functions?

- A2 See A1 above.
- Q3 How could the NRC inspectors or their colleagues determine the safety implications of impaired valve operation without reviewing any of the documents that contain the safety analyses, and associated assumptions and margins, for the valves?
- A3 The design functions were determined from the documents referenced in A1 above. The inspectors reviewed the licensee's functional evaluation and surveillance test data to independently assess whether or not the valves with stem-to-disc separation could perform their required open and close functions. Based upon no loss of function to open and close, the safety significance was determined using Attachment 04 to IMC-0609, Significance Determination Process, as discussed in the inspection report.
- Q4 The valves have safety functions to close under certain conditions and open under other conditions. How did the NRC establish that valves with stem-to-disc separation can open and close when and as needed?
- A4 Operation of the valves under accident conditions would be similar to that which occurred during normal system operations. The valves' safety function in the open direction is to allow sufficient service water flow through the valves to support proper operation of the residual heat removal heat exchangers during an accident. The wear at the stem and disc connections and wear of the disc guides indicated that the stem-to-disc separation had existed for an extended period of time, including during past periodic flow testing. Successfully meeting the flow acceptance criteria in the periodic flow tests demonstrated that the necessary flow rate to meet their design function was available through the valves. The valves were able to perform their open safety function because, when the stem had been raised to the open position, flow through the globe valves lifted the disc off the seat, i.e., the globes floated up to open the valves.

The valves' safety function in the close direction is to allow isolation of a residual heat removal heat exchanger in the event of a tube leak to limit off site releases during an accident. The valves were able to perform their close safety function as supported by the fact that no abnormal operation of the residual heat removal service water (RHRSW) keep fill system was noted. (If the valves were not properly seating, the keep fill system would have indicated such through different operating characteristics.) Further support for the proper operation of these valves in the close direction was the fact that two of these valves were recently successfully utilized as pressure boundaries for pressure drop tests used to verify integrity of the residual heat removal heat exchanger tubes.

Letter Attachment Section: Credit for Non-Reviewed Design and Licensing Bases Documents – 2

- Q1 Did the NRC inspectors, either individually or collectively, review PER 143502?
- A1 Both inspectors reviewed PER 143502.

- Q2 If PER 143502 was reviewed by the NRC why was it omitted from the list of documents reviewed by the NRC?
- A2 PER 143502, dated May 2, 2008, was provided to the NRC after the onsite inspection exit was conducted on May 2, 2008. The PER was written to specifically address the NCV of 10 CFR 50 Appendix B, Criterion XVI, which had been discussed during the exit. Reference to PER 143502 was included in the inspection report to document that the licensee had entered the issues associated with the NCV into their corrective action program. Omission from the documents reviewed list was an oversight.
- Q3 If PER 143502 was not reviewed by the NRC, did the NRC rely on rumor and supposition from TVA as the basis for its belief that PER143502 existed and to what it allegedly contained?
- A3 The inspectors reviewed PER 143502 before the inspection report was issued.

Letter Attachment Section: Credit for Non-Implemented Corrective Actions

- Q1 Does the NRC have any expectations that TVA might just actually correct the known-to-be-deficient valves before they break again?
- A1 For NCVs of very low safety significance, the NRC expects the licensee to address NCVs in accordance with their corrective action program. Section VI.A of the NRC's Enforcement Policy states that :

“A Non-Cited Violation (NCV) is the term used to describe a method for dispositioning a Severity Level IV violation or a violation associated with a finding that the Reactor Oversight Process's SDP evaluates as having very low safety significance (i.e., green). Dispositioning violations in this manner does not eliminate the NRC's emphasis on compliance. Licensee actions will be taken commensurate with the established priorities and processes of the licensee's corrective action program. The NRC inspection program will provide an assessment of the effectiveness of the corrective action program.”

As discussed in the initial section of this enclosure, we will inspect implementation of the corrective action program in our IP 71152 inspection planned for September 2008.

- Q2 Why did the NRC credit unimplemented corrective actions?
- A2 The violation was determined to be of very low safety significance (Green) using the SDP and was entered into the licensee's corrective action program. NRC Enforcement Policy Section VI.A.1 states that:

“violations associated with green SDP findings are normally dispositioned as NCVs...the NRC will close these violations based on their being entered into the licensee's corrective action program. At the time a violation is closed in an inspection report, the licensee may not have

completed its corrective actions or begun the process to identify the root cause and develop action to prevent recurrence. Licensee actions will be taken commensurate with the established priorities and processes of the licensee's corrective action program. The NRC inspection program will provide an assessment of the effectiveness of the corrective action program."

As discussed in the initial section of this enclosure, we will inspect implementation of the corrective action program in our IP 71152 inspection planned for September 2008.

Q3 If TVA once again fails to implement corrective actions for this recurring problem (i.e., if the valves suffer vibration-induced damage again), will the NRC once again issue a non-cited violation?

A3 The NRC Enforcement Manual provides guidance on the use of adequacy of corrective actions and recurring problems when dispositioning issues. Section 2.9.a.2 specifically states that "Whether the licensee takes prompt and extensive corrective actions" are factors that do not affect significance. Furthermore, Section 2.9.b.1 states that "the significance of a violation should not be increased simply because the violation is repetitive."

The NRC will inspect the circumstances surrounding any future failure of these valves and will disposition those failures in accordance with the NRC's Enforcement Policy. Factors normally considered include whether or not the valves could perform their safety functions (were they operable or inoperable), duration of an inoperability and previous type of enforcement, if any, taken.

Under the ROP, items are dispositioned on their actual or potential actual consequences. It is not possible to pre-determine the significance of an issue because the exact circumstances surrounding an issue are not known. Thus, it is not possible to determine in advance an issue's appropriate disposition, even if it was to occur again. For example, if a vibration-induced valve failure would result in greater than Green significance, i.e., greater than of very low safety significance, the NRC would normally issue a Notice of Violation.

#### Letter Attachment Section: Credit for Unsupported Root Cause Evaluations

Q1 Without information on RHR shutdown cooling operating times for the three units, how did the NRC forge a connection between vibration-induced damage to the valves from RHR shutdown cooling operation?

A1 The inspectors were provided graphs showing the time each valve operated at low flow and total operating time. The Unit 2 and Unit 3 data were for the periods January 1, 2001, through April 22, 2008, and September 9, 2003, through April 22, 2008, respectively. Unit 1 was excluded from this evaluation based upon its recent restart. However, the link between vibration-induced damage and shutdown cooling operation was largely based upon the following:

1. Vibration data at various flow rates through a RHRSW valve showed that vibration was most pronounced at low flow conditions, the condition experienced during shutdown cooling. The test was witnessed by the inspectors.
2. Interviews with plant personnel revealed that the vibration of the valves during shutdown cooling was generally greater than that during other evolutions such as quarterly flow testing.
3. The observed damage to the valve-disc assembly and the valve body was consistent with cavitation damage. Cavitation was greater at low flow conditions.

Your letter's attachment stated that "(NRC) believes replacing the vulnerable valves on Units 2 and 3 with the heavier valves installed on Unit 1 will fix the problem." The inspection report actually states that "completing that replacement should further reduce the vulnerability of the valves to vibration-induced damage."

Q2 How is NRC's unsupported guess in 2008 substantially different from TVA's equally unsupported guess in 2000 via PER 35419?

Furthermore, your letter's attachment states that "the NRC's "root cause determination" is merely a guess."

A2 The report statement "the damage had actually been caused by a combination of two factors" was concerning the immediate or apparent cause, vibration at shutdown cooling and valve vulnerability to damage which is based upon the three items in A1 above. It was not a root cause. The licensee is performing a root cause to address recurrence.

Letter Attachment Section: Inconsistent Conclusions Regarding Operating Experience

Q Would NRC care to correct its inconsistent assessment of operating experience?

Furthermore, your letter's attachment states that "either TVA responded inadequately to adequately provided operating experience or TVA responded adequately to inadequately provided operating experience."

A Operating experience generally informs the licensee of equipment failure modes or conditions that might occur at their facility. Applicable regulatory positions associated with operating experience includes 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," (Maintenance Rule). Maintenance Rule paragraph (a)(3) requires that licensee's periodic evaluations "take into account, where practical, industry wide-operating experience" and preventing failures is "appropriately balanced with minimizing unavailability." NRC Enforcement Manual Section 7.11.1.c, "Issues that are not violations of 10 CFR 50.65 (a)(3)," paragraph 2(c) states that "the words of the rule, 'where practical, take into account industry-wide operating experience,' were not intended to force compliance with industry practices, but rather were intended to require licensees to consider industry experience as an information source for conducting evaluations." Furthermore, Information Notices specifically state that the NRC expects that recipients will review the information for

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applicability to their facilities and consider actions, as appropriate, to avoid similar problems. Information Notices are not requirements.

The inspectors verified that the licensee was aware of the external operating experience, as well as their own internal operating experience concerning vibration inducing damage to equipment. The inspectors verified that, based upon operating experience, the licensee had taken steps to ensure personnel were aware of the potential for vibration-induced damage to occur. The licensee had modified inspection procedures to look for signs of vibration-induced damage. Furthermore, as stated in inspection report Section 4OA3.2.b, "the licensee had made changes to address the damage states that had the greatest significance (broken motor leads and lugs and slippage of the anti-rotation collar)." Thus, the licensee had responded to their own and external operating experience. Failure to preclude similar problems with vibration induced damage associated with either internal or external operating experience was a deficiency in the implementation of the licensee's corrective action program and was not indicative of a deficiency in their review of operating experience. The inspectors' conclusion that no deficiency was noted in the licensee's operating experience program is considered as valid. Thus, no inconsistent assessment among the inspection report's conclusions exists.

The NRC has established an Operating Experience Branch in the Office of Nuclear Reactor Regulation to systematically collect, communicate, and evaluate domestic and international reactor operating experience, and apply the lessons learned. NRC special inspection reports are included in this evaluation. Although at this time, the threshold for a generic communication, such as an Information Notice is not met, the information is entered into a database from which evaluations for future generic communications are performed.