

August 9, 2007

MEMORANDUM TO: Evangelos C. Marinos, Chief,
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Michael L. Scott, Chief */RA by Ralph Architzel for/*
Safety Issue Resolution Branch
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Office of Nuclear Reactor Regulation

SUBJECT: NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2, DRAFT
OPEN ITEMS FROM STAFF AUDIT OF CORRECTIVE ACTIONS TO
ADDRESS GENERIC LETTER 2004-02
(TAC NO. MC4696 AND MC4697)

Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," requested that all pressurized-water reactor licensees (1) evaluate the adequacy of the emergency sump recirculation function with respect to potentially adverse effects associated with post-accident debris, and (2) implement any plant modifications determined to be necessary. Virginia Electric and Power Company (the licensee) has conducted an evaluation of recirculation sump performance for the North Anna Power Station, and is conducting significant modifications, including installation of new recirculation sump strainers at both units.

The staff conducted a detailed audit of the new sump design and associated analyses, evaluations, testing and modifications for North Anna Power Station during the week of July 16, 2007. This audit was an in-process "snapshot" of the licensee's GL 2004-02 corrective actions, which are to be completed by December 31, 2007. This is one of several audits to be conducted over an approximate two-year period to establish a sample basis to assist in verifying the adequacy of pressurized-water reactor licensee corrective actions, as discussed in GL 2004-02.

This memorandum transmits the draft open items from the audit. These draft open items are subject to change as the audit report is developed, finalized and issued. Please note that the audit report will contain no conclusion as to the overall adequacy of the licensee's GL 2004-02 corrective actions. That conclusion will be reached when the final GL 2004-02 response (which the staff expects to receive by December 31, 2007) is reviewed. That response is expected to respond to the audit report open items, as well as generic requests for additional

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information issued to the licensee in 2006, and will describe the finalized GL 2004-02 corrective actions for North Anna Power Station.

Docket Nos: 50-338 and 50-339

Enclosure:
As stated

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DRAFT OPEN ITEMS FOR JULY 2007 AUDIT OF NORTH ANNA POWER STATION
CORRECTIVE ACTIONS FOR GENERIC LETTER 2004-02
(TAC NOS. MC4696 AND MC4697)

Open Item: Net Positive Suction Head Available Calculation

The calculated net positive suction head available margins for the low head safety injection, inside recirculation spray and outside recirculation spray pumps were non-conservative. The margins for these pumps were overestimated by approximately 0.6 feet of head as a result of an error in the calculation of the static head of liquid.

Open Item: Justification for Time-Dependent Head Loss Assumptions

The licensee assumed that at the beginning of low head safety injection operation in the recirculation mode there would be no debris accumulation on the low head safety injection strainer, and that the strainer head loss due to debris would reach the peak thin bed head loss after a period of time. The licensee needs to provide the basis for these assumptions.

Open Item: Temperature Scaling of Head Loss Test Data

The licensee scaled test head losses to plant sump conditions based only on temperature-driven viscosity variations. Test phenomena driven by differential pressure (e.g., opening of paths through the bed) should be considered as well.

Open Item: Justification for 5D ZOI for qualified coatings in containment

The licensee is using a five pipe diameter zone of influence for qualified coatings in containment, based on a Westinghouse test report currently under NRC review. This item will remain open pending completion of that review.

Open Item: Evaluate Chemical Effects

The licensee's chemical effects analysis was incomplete at the time of the audit. Also, the licensee has not evaluated the contribution of coatings to chemical effects by: (1) leaching constituents that could form precipitates or affect other debris; and (2) changing form due to the pool environment. Since the licensee's integrated chemical effects testing plans have not been completed, the staff could not review the application of the debris bed head loss acceptance criteria to verify that the long-term and short-term acceptance criteria are bounding with respect to intermediate conditions.

Open Item: Downstream Effects Evaluations Preliminary

The licensee's evaluations of the downstream effects of debris on systems and components are preliminary, based in part on the generic methodology of WCAP-16406-P which is under review by the NRC staff. Conclusions and findings of the staff review need to be applied to the North Anna Power Station evaluation of post-LOCA downstream effects.

ENCLOSURE

Open Item: Use of Manufacturer's Pump Performance Curves

The pump performance inputs considered in the preliminary downstream components evaluation were obtained from manufacturer's pump performance curves. The evaluation should consider the use of degraded pump curves or in-service testing curves as these curves better represent actual system operating conditions.

Open Item: Emergency Core Cooling System (ECCS) Minimum and Maximum Operating Points

The preliminary downstream component evaluation did not consider the use of minimum and maximum system operating points; instead, best-efficiency performance values were used. The ECCS operating point values were not referenced back to system bases calculations.

Open Item: Fixed Throttle Valve Setting

The downstream component evaluation did not reference operating procedures or testing history in order to demonstrate high confidence that throttle valves will remain in their fixed position during ECCS operation. Throttle valve fixed position is the basis for assuming the system's hydraulic resistance to be fixed.

Open Item: ECCS Instrument Locations

The evaluation documented that the ECCS instrument locations are adequate because of an assumption of "good engineering practice." This assumption needs to be verified, such as by means of isometrical drawings or an ECCS survey.

Open Item: Overall Downstream ECCS Evaluation

The licensee had yet to perform an overall system evaluation that integrates the results of the downstream components evaluation. The evaluation should address compliance with 10 CFR 50.46, "Long Term Core Cooling."

Open Item: Quantification and Assessment of Downstream Effects That Cause Seal Leakage

The licensee did not quantify seal leakage associated with downstream effects into the Auxiliary Building, nor evaluate the effects on equipment qualification, sumps and drains operation, or on room habitability.

Open Item: Debris Bypass Testing

The licensee had not made a final determination on how the bypass testing data is going to be implemented in the downstream effects evaluation for ECCS and internal vessel components.

Open Item: Downstream Effects-Core Blockage

Although downstream evaluations were in progress during the audit, the licensee has not made any final conclusions as to whether the cores at North Anna Power Station could be blocked by debris following a LOCA, and this area is incomplete.

Open Item: Assessment of Qualified Coatings

The licensee needs to justify that visual assessment techniques can accurately identify degraded qualified coatings in containment, perform physical testing that can be correlated to DBA performance, or assume all of the coatings fail. This will remain an open item pending submission and NRC approval of the Electric Power Research Institute/Nuclear Utility Coatings Council test report.