

April 24, 2007

MEMORANDUM TO: Harold Chernoff, Chief,
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Michael L. Scott, Chief */RA/*
Safety Issue Resolution Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation

SUBJECT: MILLSTONE 2 DRAFT OPEN ITEMS FROM STAFF AUDIT OF
CORRECTIVE ACTIONS TO ADDRESS GENERIC LETTER 2004-02

Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" (GL 2004-02), requested that all pressurized-water reactor (PWR) 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. Dominion Nuclear Connecticut, Inc. (DNC), the licensee, has conducted an evaluation of recirculation sump performance for the Millstone Nuclear Power Station, Unit No. 2, and is conducting significant modifications, including installation of new recirculation sump strainers.

The staff conducted a detailed audit of the new sump design and associated analyses, evaluations, testing and modifications for Millstone 2 the week of January 22, 2007. This audit was an in-process "snapshot" of DNC'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 PWR licensee corrective actions to address 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 DNC GL 2004-02 corrective actions. That conclusion will be reached when the licensee's final GL 2004-02 response (expected by December 31, 2007) is reviewed. That response will respond to the audit report open items as well as generic requests for additional information issued to the licensee in 2006, and will describe the finalized GL 2004-02 corrective actions for Millstone 2.

Docket No: 50-336

Enclosure:
As stated

CONTACT: Leon Whitney, SSIB/DSS
(301) 415-3081

Joe Golla, PGCB/DPR
(301) 415-1002

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OFFICE	DSS/SSIB	BC:DSS/SSIB
NAME	LWhitney	MScott
DATE	4/12/07	4/24/07

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Draft Open Items for January 2007 Audit of Millstone Unit 2
Corrective Actions for Generic Letter 2004-02

February 28, 2007

Open Item: Justify Coatings Visual Assessment

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.

Open Item: Justify Condition of Zinc Primer

The licensee has not performed any in-situ testing or analysis to confirm the acceptability of bare zinc primer after degraded/blistered topcoat is removed.

Open Item: Evaluate Coating Leaching and Coating Transformation

The licensee needs to evaluate the contribution of coatings to chemical effects by: (1) leaching constituents that could form precipitates or affect other debris (e.g., increase aluminum corrosion rates); and (2) changing due to the pool environment (i.e., the potential for some of the coatings to transform into a material that causes high head loss).

Open Item: Complete Downstream Effects Analysis (currently in draft)

The Millstone 2 review of downstream effects related to GSI-191 is in the process of being completely re-performed. The licensee needs to complete a comprehensive downstream effects evaluation.

Open Item: Quantify Pump Seal Leakage

The licensee needs to evaluate additional pump seal leakage into the Safeguards Room due to wear or abrasion. The licensee may need to reassess alarm, alarm response and room environmental analyses after the additional seal leakage is quantified.

Open Item: Complete Characterization and Properties Analysis of ECCS Post-LOCA Fluid

The licensee is revising their characterization and properties analysis of ECCS post-LOCA fluid. Their intent is to take credit for the small-scale testing at AECL and credit for system debris depletion due to break location and hold-up in the vessel. This evaluation needs to be completed.

Open Item: Complete System Depletion Calculations

System depletion calculations were included as part of the draft downstream evaluation package. It was stated that these calculations are being revised and have not yet been accepted by the licensee. These calculations need to be completed.

Open Item: Complete Pump Performance and Operation Downstream Evaluation

The draft downstream evaluations for pump performance and operation are being re-performed and need to be completed.

ENCLOSURE

Open Item: Complete Evaluations of ECCS Pump Hydraulic Degradation, Total Developed Head and Flow Due to Internal Wear

The licensee needs to evaluate ECCS pump hydraulic degradation, total developed head, and flow due to internal wear.

Open Item: Justify Ranges of Pressures and Flows for Pump Internal Wear Rate

The licensee needs to justify the range of pressures and flows used to evaluate pump internal wear rates as adequate to predict degradation or assess operability (e.g., minimum flow per EOP and pump run-out operating conditions).

Open Item: Justify Use of Three-Body Wear Model for Pump Internals

The licensee's draft evaluation utilizes a three-body, abrasive wear model for pump internals. The industry standard model for internal, non-impeller wear is two-body. The licensee needs to justify use of the three-body model or use the two-body model.

Open Item: Justify Use of API 610 for Existing Pumps

The draft evaluation utilizes the acceptance criteria contained in American Petroleum Institute Standard (API) 610 for pump vibration. API 610 applies to "new" pumps. The licensee needs to justify the conclusion that the existing pumps are as good as "new."

Open Item: Conduct ECCS Assessment

The licensee needs to perform an overall assessment of ECCS operation considering the results of the various draft component downstream evaluations.

Open Item: Evaluate One LPSI Pump Failure to Stop

One LPSI pump "failure to stop" upon recirculation actuation could cause the flow rate through the sump, the break, and the containment to be significantly higher than current value for the new system maximum design flow rate. The licensee is re-evaluating the LOCA worst-case single failure assumption. If this single failure assumption is proved to be credible and within the design basis, higher flow rates through the ECCS would need to be accounted for. The licensee would then need to re-address its strainer design, transport analysis, head loss testing and related evaluations such as NPSH margin.

Open Item: Evaluate Chemical Effects

Licensee evaluation of chemical effects at Millstone 2 is just beginning. The licensee has not conducted any chemical effects tests to date, and the licensee's approach to evaluating chemical effects is being developed. The licensee needs to evaluate chemical effects.

Open Item: Evaluate Effect of Sump Water Temperature on NPSH Margins

The NPSH Margins calculation requires that the fluid temperature be selected. The licensee selected 212°F as the sump water temperature, a value at the upper limit of the stated range of temperature likely to be encountered. The licensee needs to justify its choice of sump water temperature in determining NPSH Margins.

Open Item: Evaluate Dissolved Gas as Mechanism for Pump Cavitation

Containment sump water may contain dissolved air which, if released from solution, would accumulate as gas bubbles within the flowing ECCS system. Air may be released from solution as it flows from the containment sump through the piping system where the pressure decreases along the flow path to an ECCS pump. Upon reaching an ECCS pump this air could cause degradation of pump performance if the general volume fraction of the released air exceeds 2%. The licensee needs to evaluate this effect.

Open Item: Analyze SBLOCA NPSH Margin

NPSH margins calculations have not been performed for the SBLOCA conditions. The licensee needs to evaluate the NPSH margins for these conditions.

Open Item: Complete Debris Generation/ZOI Documentation

The audit team did not have a final debris generation document to review. The document reviewed included change pages that still showed calcium silicate debris generation, a material which had been removed from the LOCA zones-of-influence (ZOIs). The document also discussed debris generated by submergence and the containment sprays, which was deleted from the head loss test debris. The licensee needs to update their debris generation evaluation to reflect the expected plant configuration and debris generation.

Open Item: Evaluate Blocking at Refuel Pool Drain Screen Enclosures

Plant Design Change Request PDCR #2-62-84 for design of the refuel pool drain screen enclosures states that there is a ½" gap at the bottom of the enclosure to allow water to drain to the floor level. The licensee needs to evaluate the potential for large debris to be transported into the refueling cavity from LOCA blowdown and containment spray washdown, potentially blocking the ½" gaps referenced in the PDCR and thereby increasing holdup volume.

Open Item: Evaluate All Significant Water Hold-up Volumes

The licensee needs to evaluate all locations for potentially significant water hold-up in the calculation for minimum sump water level. Some examples of hold-up volumes that would be expected to be accounted for are: water transiting to the containment pool, sloped floors, containment spray piping (normally dry), the refueling cavity, and the internals of equipment/ductwork in the sump pool which may become flooded.

Open Item: Screen Modification Package

The screen modification package (DCR, 10 CFR 50.59) was developed based on a number of documents which are undergoing revision. In some cases, these revisions could affect overall conclusions within the modification package (e.g., revisions associated with the chemical effects evaluation, the downstream effects evaluation and structural considerations). The licensee should revise the screen modification package based on the revised supporting documentation.