

July 11, 2006

MEMORANDUM TO: David Terao, Chief
Plant Licensing Branch IV
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: GENERIC LETTER 2004-02 "POTENTIAL IMPACT OF DEBRIS
BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN
BASIS ACCIDENT AT PRESSURIZED WATER REACTORS"
EXTENSION REQUEST APPROVAL FOR FORT CALHOUN

The Safety Issue Resolution Branch (SSIB) has reviewed and evaluated the information provided in Omaha Public Power District's (OPPD) June 9, 2006, revised request for extension to the GL 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors" completion date of December 31, 2007, for sump clogging plant modifications for Fort Calhoun Station (FCS). SSIB has determined that it is acceptable to extend the completion date for the FCS permanent sump strainer hardware modifications until the completion of the Spring 2008 FCS refueling outage, scheduled to begin by May 1, 2008. Attached to this memorandum are the results of the SSIB evaluation of this matter. Please note the suggested 30-day grace period for FCS Spring 2008 outage commencement at the end of the attachment. If you have any questions, please contact Leon Whitney of SSIB. Please provide Joe Golla and Leon Whitney with a copy of any correspondence with the licensee regarding this matter.

Docket No.: 50-285

Attachment As stated

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Fort Calhoun GSI-191/GL 2004-02 Extension Request Approval

In a November 18, 2005 letter the Omaha Public Power District (OPPD) requested an extension to the completion date for corrective actions at Fort Calhoun Station (FCS) taken in response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors." The extension was requested until the Spring 2008 refueling outage, beyond the December 31, 2007 GL 2004-02 compliance date. In an April 10, 2006 letter to OPPD, the NRC denied the OPPD request noting that "OPPD did not commit to any new, focused interim compensatory measures to mitigate post-LOCA sump pool calcium phosphate levels (e.g., removal or sequestration of either the trisodium phosphate (TSP) pH buffer or the large amount of calcium silicate insulation remaining after the Fall 2006 outage); nor did OPPD commit to installing a temporary strainer larger than the existing one."

In a June 9, 2006 revised request for an extension to the completion date for FCS corrective actions taken in response to GL 2004-02, OPPD stated that it had continued to actively pursue resolution of Generic Safety Issue (GSI) 191 relating to emergency core cooling system (ECCS) and containment spray system (CSS) sump clogging, and had identified candidate pH buffer materials that could mitigate the chemical effects from the combination of trisodium phosphate (TSP) and calcium silicate insulation as identified in Information Notice 2005-26 and Information Notice 2005-26 Supplement 1. However, OPPD stated that full resolution of issues associated with chemical and downstream effects, which may affect the size of the permanent replacement strainers, remained incomplete.

OPPD further stated that it had conducted testing of (candidate) sump strainer configurations using FCS-specific debris loadings and, as a result of a number of unresolved issues associated with this testing, some of the testing would have to be repeated. This testing would not be completed in time to support design and installation of permanent replacement sump strainers during the Fall 2006 refueling outage (the only outage remaining until the December 31, 2006 GL 2004-02 compliance date). Therefore, OPPD stated it was revising its GL 2004-02 item 2(b) supplemental response (documented in a letter dated August 31, 2005) and requesting an extension for permanent sump strainer hardware modifications until the FCS Spring 2008 refueling outage scheduled to begin by May 1, 2008.

OPPD stated that mitigative measures to be completed during the FCS Fall 2006 refueling outage will be:

- Replacement of the TSP with an alternate pH buffer which reduces the risk for sump screen blockage caused by formation of chemical precipitates (under a separate license amendment request or LAR);
- Installation of two interim strainer modules (one per train) with approximately 1100 square feet of total surface area;
- Removal of the automatic start feature for one containment spray (CS) pump (under a separate LAR);
- Installation of debris exclusion devices on reactor cavity and refueling cavity drain lines;

ATTACHMENT

- Installation of reactor vessel spacer rings to reduce water hold-up in the upper cavity;
- Replacement of approximately 823 cubic feet of calcium silicate insulation in conjunction with the replacement of the existing steam generators, pressurizer and reactor vessel head. OPPD stated that this represents removal of approximately 62% of the calcium silicate insulation inside the biological shield wall that may fall within the zones of influence of a LOCA, and that the replacement material would be reflective metal insulation (RMI) where dimensions are known in advance, and that low density fiberglass (Thermalwrap) would be used elsewhere;
- Replacement of the calcium silicate insulation with low density fiberglass (Thermalwrap) on the pressurizer spray line to eliminate generation of calcium silicate debris from the small break loss-of-coolant accident that presents the greatest risk of debris generation and transport;
- Removal of approximately 7041 square feet (35%) of unqualified coatings.

OPPD stated that the mitigative measures already in place, with a new latent debris monitoring enhancement to be completed by the end of the 2006 FCS refueling outage, are:

- Operator procedural guidance and training for core cooling and containment integrity as discussed in OPPD's NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-water Reactors" responses dated August 8, 2003 and June 11, 2004, including:
 - Various combinations of high pressure safety injection (HPSI) pump and containment Spray (CS) pump shutdowns and throttling to allow for maximum debris settling and minimize pump cavitation (relying ultimately on containment air coolers for atmospheric control and heat removal, while maintaining core cooling and coverage with one HPSI pump), and
 - Refill of the safety injection refueling water storage tank (SIRWT) with borated and demineralized water so that safety injection can be continued if suction via the containment sump strainers is lost, until the containment is filled to the top of the reactor coolant system (RCS) hot legs while maintaining reactivity control (equipment is aligned for shutdown cooling prior to submergence). Core cooling would be provided by HPSI pump flow and the water outside of the reactor vessel.
- NRC approval of the leak-before-break principle at FCS:
- Containment cleanliness actions (housekeeping and foreign material exclusion [FME] programs) as documented in Bulletin 2003-01;
- Revised surveillance procedures to provide specific guidance for inspection of containment sump screens to ensure no adverse gaps or breaches, with Quality Control verification;

- New latent debris collection procedure validated during the 2005 FCS refueling outage (20 samples throughout containment leading to a calculated total latent debris load for comparison with values used in the FCS debris generation and transport analysis - OPPD stated that this procedure will be fully implemented prior to the completion of the FCS Fall 2006 refueling outage).

OPPD outlined the FCS plan to address outstanding technical issues relative to the resolution of GSI-191 as follows:

- Replacement of the TSP pH buffer with an alternate buffer will largely eliminate post-LOCA sump pool chemical effects from calcium phosphate production;
- A significant reduction of the screen approach velocity during recirculation would be achieved by the Fall 2006 refueling outage through interim strainer module installation, removal of auto-start of one CS pump, and implementation of procedural guidance and training to secure and throttle ECCS and CSS pumps. With the interim strainer modules in place, approach velocities would be on the order of 0.01 ft/sec to 0.02 ft/sec, so that only small fines of suspended fibrous insulation and particulates would be transported to the sump strainers. OPPD stated that based on information provided in NUREG/CR-6808, "Knowledge Base for the Effects of Debris on PWR Emergency Core Cooling Sump Performance, February 2003," a significant fraction of this suspended material would settle to the floor of the containment before reaching the strainer; and
- Head loss testing has shown adequate net-positive suction head (NPSH) margin for the CS pumps and HPSI pumps with the replacement 1500 square foot strainer, and that scaling that test data to the 1100 square feet of available interim strainer surface also resulted in adequate NPSH margin for these pumps.

The NRC has confidence that OPPD has a plan that will result in the installation of final GSI-191 modifications that provide acceptable strainer function with adequate margin for uncertainties. Further, the NRC has concluded that OPPD has put mitigation measures in place to adequately reduce risk for the requested short extension period, and it is therefore acceptable to extend the completion date for the FCS permanent sump strainer hardware modifications for Generic Letter 2004-02 until the completion of the Spring 2008 FCS refueling outage, scheduled to begin by May 1, 2008. Should OPPD elect to begin the outage more than 30 days after May 1, 2008, OPPD will need to provide the NRC additional justification for further delay in completing corrective actions for GL 2004-02.