your energy partner
OPPD
Omaha Public Power District

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U. S. Nuclear Regulatory Commission
Document Control Desk
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References:
1. Docket No. 50-285
2. NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003.

SUBJECT: Fort Calhoun Station Unit No. 1, 60 Day Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"

The U. S. Nuclear Regulatory Commission (NRC) issued NRC Bulletin 2003-01 (Reference 1) to inform licensees of the potential for additional adverse effects due to debris blockage of flow paths necessary for Emergency Core Cooling System (ECCS) and Containment Spray System (Containment Spray) recirculation and containment drainage. These additional adverse effects were based on NRC-sponsored research that identified the potential susceptibility of pressurized-water reactor (PWR) recirculation sump screens to debris blockage in the event of a high energy line break (HELB) that would require ECCS and Containment Spray operation in the recirculation mode.

All licensees were requested to provide a response within 60 days of the date of the NRC Bulletin to either: 1) State that the ECCS and Containment Spray recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the NRC Bulletin and are in compliance with 10 CFR 50.46(b)(5) and all existing applicable regulatory requirements (Option 1), or 2) Describe any interim compensatory measures that have been or will be implemented to reduce the risk which may be associated with the potentially degraded or nonconforming ECCS and Containment Spray recirculation functions until an evaluation to determine compliance has been completed (Option 2).

After reviewing the options provided within the Bulletin and additional clarification provided by the Staff during the June 30, 2003 public meeting, Omaha Public Power District (OPPD) will be implementing appropriate compensatory actions as described in Option 2.

Attachment 1 to this letter contains OPPD's response to Option 2 of the requested information in Bulletin 2003-01. Attachment 1 also provides a list of commitments made in this letter.

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I declare under penalty of perjury that the foregoing is true and correct. (Executed on August 8, 2003)

If you have any questions or require additional information, please contact Dr. R. L. Jaworski at (402) 533-6833.

Sincerely,

Richard P. Clemens
Division Manager
Nuclear Assessments

RPC/TRB/trb

Attachment: 1. Omaha Public Power District (OPPD), Response to NRC Bulletin 2003-01

c: T. P. Gwynn, Acting NRC Regional Administrator, Region IV
A. B. Wang, NRC Project Manager
J. G. Kramer, NRC Senior Resident Inspector

ATTACHMENT 1

Omaha Public Power District (OPPD)
Response to NRC Bulletin 2003-01 for Fort Calhoun Station Unit No. 1 (FCS)

This response addresses Option 2 of the Requested Information in NRC Bulletin 2003-01. The following information is formatted to follow the six possible interim compensatory measures discussed in the Bulletin.

1. Operator and staff training on indications of and responses to sump clogging

1a. OPPD will perform additional Operator training on the identification of the symptoms indicative of a degraded sump during a Loss of Coolant Accident (LOCA). Simulator training will be implemented to reinforce awareness of the onset of conditions indicating sump blockage and pump cavitation.

Following transition to the Recirculation mode of operation, plant procedures presently require monitoring of critical equipment performance parameters every 10 minutes. These parameters include High Pressure Safety Injection (HPSI) and Containment Spray Pump Flows, Core Exit Thermocouple Temperature, and Reactor Vessel Level. Additional guidance will be provided to monitor for indications such as erratic pump motor amperage which may be the first signs of incipient HPSI or Containment Spray pump cavitation.

1b. OPPD will develop procedural guidance and training for responding to sump clogging. The Emergency Procedure Guidelines currently do not include an optimal recovery strategy or guidance that specifically addresses a set of symptoms indicative of a clogged containment sump screen following Recirculation Actuation Signal (RAS) initiation. This situation is not considered within the current design basis. If it were to occur, the operators would transition from the LOCA Optimal Recovery Guideline (EOP-03) to the Functional Recovery Procedure (EOP-20) and continue to monitor/restore the Safety Functions. In parallel, the Emergency Response Organization (ERO) would be called upon to provide recommendations using guidance in the Severe Accident Management Guidelines (SAMGs).

The SAMGs provide guidance to support mitigation of a severe accident once it is determined by the Technical Support Center (TSC) Site Director that the event is outside of design basis and Emergency Operating Procedures (EOPs) may no longer be adequate to control the event. Currently, the SAMGs list actions to be considered if it is not possible to establish recirculation via the Emergency Core Cooling System (ECCS) sump. These actions include use of Containment Cooling Units in lieu of one or more Containment Spray Pumps, reduction of Reactor Coolant System (RCS) injection flow to meet minimum heat removal requirements, and replenishment of Safety Injection and Refueling Water Tank (SIRWT) inventory from any available water source.

OPPD is developing procedural changes to incorporate these generic guidelines for responding to LOCA with containment sump clogging. The primary actions being evaluated include:

- Securing pumps not required to maintain reactor pressure vessel (RPV) core coverage. The Control Room operators would continue to monitor operating pumps for indication of cavitation.
- Establishing the minimum required HPSI flow from the SIRWT, after it is refilled or during filling, to maintain the core water level during Long Term Core Cooling. Flow may be established using either SI-2A or SI-2B if either is available. If both pumps have failed, SI-2C will have been preserved by securing it pre-RAS as described in Item 2 below. The current licensing basis assumes one HPSI pump has sufficient capacity to maintain core water level.
- Establishing the limiting injection water volume.
- Switching back and forth between the containment sump and the SIRWT to allow time for debris to settle while minimizing the addition of water to maintain the core water level during Long Term Core Cooling.
- Continuing to monitor Combustion Engineering Owner's Group (CEOG) developments for response to sump blockage. Any additional actions recommended by the CEOG will be evaluated for implementation as appropriate.

COMMITMENT

1a. OPPD will perform additional Operator training on the identification of the symptoms indicative of a degraded sump during a LOCA.

COMPLETION DATE **September 5, 2003**

COMMITMENT

1b. OPPD will develop procedural guidance and associated training for responding to sump clogging.

COMPLETION DATE **March 26, 2004.**

This schedule permits adequate time to evaluate the effects of the proposed actions, develop the required procedures, training and supporting analysis to implement the described changes, with consideration for Engineering and Operations constraints imposed by planning and support for the upcoming Refueling Outage which begins September 12, 2003. OPPD believes that implementing the changes described above will have a positive effect from a PRA risk perspective. However, there is a recognized need to proceed cautiously. The effects of shutting off pumps in response to the "symptoms" of sump plugging and proceeding with changes to the EOP and SAMGs prior to completion of CEOG programs evaluating the generic impact of the changes introduces a risk potential. The actions listed

above are the primary actions being evaluated. Some or all of the actions will be implemented as deemed appropriate.

2. **Procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently)**

2a. OPPD is evaluating changes to the EOPs to secure HPSI pump SI-2C pre-RAS (if operator resources are available, or shortly after RAS) if pumps SI-2A and SI-2B are confirmed operable. Shutting off SI-2C pump early in the event will delay the switchover to containment sump recirculation and ensures one pump is available if the other pumps are damaged due to failure of the sump screen to filter out the debris.

The current OPPD design basis requires only one HPSI pump to be operable on each associated 4160V engineered safety bus. This operability requirement is based upon the assumption that one pump has sufficient capacity to maintain the RPV core water level for Long Term Core Cooling. HPSI pumps SI-2A and SI-2B have dedicated independent, engineered safeguards power supplies from respective safeguards buses. HPSI pump SI-2C is manually transferable between either 4160V bus if required.

2b. OPPD will evaluate operating with one Containment Spray pump (stopping one or two pumps) prior to the receipt of a recirculation actuation signal if operator resources are available or shortly after RAS. Shutting off one or two of the Containment Spray pumps pre-RAS will delay the switchover to containment sump recirculation. Shutting off one or two Containment Spray pumps shortly after RAS will delay containment sump plugging.

Three Containment Spray pumps start on a simultaneous high containment pressure and pressurizer low/low pressure signal. Containment Spray is credited with operating for five hours post-LOCA to support the OPPD radiological dose calculations established for implementing alternate source term methodology. Operation with one pump satisfies this methodology. The FCS licensing basis credits only one of the three pumps to limit the containment pressure to below the design value without taking credit for the air coolers or the cooling capacity of the safety injection system.

Preliminary reviews indicate this change is a complex change and will require regulatory approval in addition to engineering analysis, procedure development, training and EOP flow chart changes. A manual operator action will be required to stop two of the three pumps. If a single active failure occurs that results in failure of the operating pump, a manual action will be required to restart one of the two pumps that were previously shut off. Therefore, this change is expected to require regulatory approval for substituting manual actions for automatic actions. In addition, Technical Specification 2.4(1) requires all three Containment Spray pumps to be operable.

OPPD believes that implementing the changes described above will result in a positive effect from a PRA risk perspective. However, there is a recognized need to proceed cautiously. The effects of shutting off pumps early in an event can have a negative safety benefit.

Operator actions to stop Containment Spray pumps will be prioritized with other critical operator actions in response to the event but are expected to be completed prior to RAS or as soon thereafter as practicable. The long-term benefit will be:

- Flow through containment sump screens will be significantly reduced. Flow to one sump will be reduced to only that of the operating HPSI pump with a corresponding reduction in approach velocity and debris accumulation. This action should preserve one sump strainer and extend the available time for recirculation.
- One or two Containment Spray pumps will be preserved in the event the operating pump becomes degraded due to debris intrusion or sump screen blockage.

COMMITMENT

2a. OPPD will evaluate shutting off one HPSI pump (SI-2C) pre-RAS (if operator resources are available or shortly after RAS). The operational change will be implemented or the technical basis for the decision not to implement the change will be documented.

COMPLETION DATE **March 26, 2004**

The schedule permits adequate time to complete reviews of existing procedures, analyses and licensing basis documentation, and incorporate requisite changes into procedures and associated operator training curriculum, with consideration for Engineering and Operations constraints imposed by planning and support for the upcoming Refueling Outage, which begins September 12, 2003.

COMMITMENT

2b. OPPD will evaluate operating with one Containment Spray Pump (stopping one or two pumps) prior to the receipt of a recirculation actuation signal if operator resources are available or shortly after RAS. The License Amendment Request will be submitted for NRC approval or the basis for the decision not to implement the change will be documented.

COMPLETION DATE **May 21, 2004.**

This schedule permits adequate time to evaluate the effects of the proposed actions, develop the required procedures, training and supporting analysis to support this change. OPPD believes that implementing the changes described above will have a positive effect from a PRA risk perspective. However, there is a recognized need to proceed cautiously. The effects of shutting off pumps with minimal industry guidance introduces a risk potential. OPPD will continue to monitor guidance provided by the CEOG for input into evaluating this change in addition to considering shutting off a whole train of ECCS.

3. **Alternate sources to refill the SIRWT or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere**

The SAMGs currently provide guidance to supply borated and unborated water to the SIRWT from alternate sources when normal sources are not available. OPPD will incorporate guidance into the EOPs to use one or more available sources for refilling the SIRWT immediately post-RAS. The various sources under consideration are the normal make-up, Demineralized Water System, Fire Protection System, and Spent Fuel Pool. Water sources will be prioritized by flow rate and methods to maintain boron concentration and water quality.

Water chemistry requirements for additional injection water will be established to ensure fission product removal, shutdown margin, and post-accident equipment qualification criteria have been adequately considered.

COMMITMENT

3. OPPD will develop procedural guidance for refilling the SIRWT immediately post-RAS.

COMPLETION DATE **March 26, 2004**

This schedule permits adequate time to evaluate the effects of the proposed actions, develop the required procedures, training and supporting analysis to support this change, with consideration for Engineering and Operations constraints imposed by planning and support for the upcoming Refueling Outage which begins September 12, 2003. OPPD believes that implementing the changes described above will have a positive effect from a PRA risk perspective.

4. **More aggressive containment cleaning and increased foreign material controls**

OPPD will provide more aggressive containment cleaning and foreign material / debris control during the September 2003 Refueling Outage. This will primarily be accomplished by establishing a high awareness of the issue. The following actions are in place or are planned to improve containment cleanliness and foreign material / debris control in containment:

- A "Make It Happen Manager" has been assigned to ensure effective implementation of new containment cleanliness methods.
- New guidance will be added to FCSG-22 "Guideline for Outage Planning and Execution". Specific guidance will be provided for the basement area during the outage when the containment sumps are required to be available.
- Personnel will be assigned cleaning duties inside containment.
- Periodic cleanliness walkdowns will be performed by operations, engineering and the containment coordinators.

- Radiation Protection has developed a detailed Plan for containment decontamination during the upcoming September 2003 Refueling Outage. The Plan includes use of scrub brushes, mops, hoses and a high pressure washer with HEPA prefilters in the floor drains to minimize debris that could pass down to the sump. In addition to pressure washing the Upper Cavity and Generator Bay areas, and Upper Guide Structure and Walkway, cable trays, walls and piping throughout containment will be thoroughly wiped down under the direction provided within the Plan.
- Training will be provided to FCS site personnel to provide a heightened awareness of containment cleanliness requirements

COMMITMENT

4. OPPD will provide more aggressive containment cleaning and foreign material / debris control during the September 2003 Refueling Outage.

COMPLETION DATE **November 21, 2003**

The upcoming Refueling Outage is scheduled to begin September 12, 2003. Implementation actions will be completed by the end of the Refueling Outage. The completion date allows time for close-out of outage related work scope.

5. Ensuring containment drainage paths are unblocked

a) OPPD will perform a walk-down of containment during the upcoming Refueling Outage beginning September 12, 2003. Temporary equipment remaining in containment will be evaluated by OPPD Engineering to ensure storage locations do not obstruct potential containment drainage paths.

b) OPPD will walk-down sub-compartment doors within containment to confirm that none interfere with containment drainage. (Current Radiation Protection data indicates Restricted High Radiation Area doors in containment are chain link with 5" gaps at the bottom.) If a potential obstruction is identified, the benefit of removing or modifying individual sub-compartment doors to eliminate potential drainage path obstructions will be evaluated. Since Restricted High Radiation Area barriers are controlled under Technical Specification 5.11, changes, if required, may require NRC approval of a License Amendment.

COMMITMENT

5. OPPD will perform a walk-down of containment during the upcoming Refueling Outage and verify drainage paths are unblocked. A Condition Report will be generated for conditions that are questionable and may require further evaluation, such as sub-compartment doors.

COMPLETION DATE **November 15, 2003**

The upcoming Refueling Outage is scheduled to begin September 12, 2003. Implementation actions will be completed by the end of the Refueling Outage. The completion date allows time for close-out of outage related work scope.

6. **Ensuring sump screens are free of adverse gaps and breaches**

OPPD is revising surveillance procedures IC-ST-AE-3833 and IC-ST-AE-3834 to provide specific guidance for inspection of containment sump screens to ensure no adverse gaps and breaches exist. In addition, the procedures will now require Quality Control verification for this inspection.

COMMITMENT

6. OPPD will verify the containment sump screens are free of adverse gaps and breaches during the September 2003 Refueling Outage.

COMPLETION DATE **November 15, 2003**

The upcoming Refueling Outage is scheduled to begin September 12, 2003. Implementation actions will be completed by the end of the Refueling Outage. The completion date allows time for close-out of outage related work scope.

COMMITMENT SUMMARY

ITEM	COMMITMENT DESCRIPTION	DATE
1a.	OPPD will perform additional Operator training on the identification of the symptoms indicative of a degraded sump during a Loss of Coolant Accident (LOCA).	September 5, 2003
1b.	OPPD will develop procedural guidance and associated training for responding to sump clogging.	March 26, 2004
2a.	OPPD will evaluate shutting off one HPSI pump (SI-2C) pre-RAS (if operator resources are available or shortly after RAS). The operational change will be implemented or the technical basis for the decision not to implementing the change will be documented.	March 26, 2004
2b.	OPPD will evaluate operating with one Containment Spray Pump (stopping one or two pumps) prior to the receipt of a recirculation actuation signal if operator resources are available or shortly after RAS. The licensing amendment will be completed or the basis for the decision not to implement the change will be documented.	May 21, 2004
3	OPPD will develop procedural guidance for refilling the SIRWT immediately post-RAS.	March 26, 2004
4	OPPD will provide more aggressive containment cleaning and foreign material / debris control during the September 2003 Refueling Outage.	November 21, 2003
5	OPPD will perform a walk-down of containment during the upcoming Refueling Outage and verify drainage paths are unblocked. A Condition Report will be generated for conditions that are questionable and may require further evaluation, such as sub-compartment doors.	November 15, 2003
6	OPPD will verify the containment sump screens are free of adverse gaps and breaches during the September 2003 Refueling Outage.	November 15, 2003