

August 8, 2003

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Stop P1-137  
Washington, DC 20555-0001

Ladies and Gentlemen:

ULNRC-04884

**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL  
IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP  
RECIRCULATION AT PRESSURIZED-WATER REACTORS"**



Attached is the Union Electric Company (AmerenUE) response to U.S. Nuclear Regulatory Commission (NRC) NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors", dated June 9, 2003. This response addresses Option 2 of NRC Bulletin 2003-01 which requires a description of any interim compensatory measures that have been or will be implemented until an evaluation of the Emergency Core Cooling and Containment Spray Systems recirculation functions has been completed. Callaway Plant coordinated preparation of this response with the other participants in the Strategic Teaming and Resource Sharing (STARS<sup>1</sup>) alliance.

If you have any questions concerning this matter, please contact me at (573) 676-8659, or Mr. David Shafer at (314) 554-3104.

Very truly yours,

A handwritten signature in black ink that reads "Keith D. Young".

Keith D. Young  
Manager - Regulatory  
Affairs

BFH/

- Attachments: I Affidavit  
II Response to NRC Bulletin 2003-01  
III List of Commitments

<sup>1</sup> STARS consists of six plants operated by TXU Generation Company LP, AmerenUE, Wolf Creek Nuclear Operating Corporation, Pacific Gas and Electric Company, STP Nuclear Operating Company and Arizona Public Service Company.

*Handwritten:* A103

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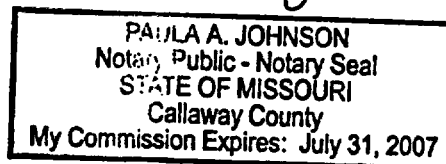
STATE OF MISSOURI     )  
                              )     S S  
COUNTY OF CALLAWAY   )

Keith D. Young, of lawful age, being first duly sworn upon oath says that he is Manager, Regulatory Affairs for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Keith D. Young  
                              Keith D. Young  
                              Manager, Regulatory Affairs

SUBSCRIBED and sworn to before me this 8<sup>th</sup> day  
of August, 2003.

Paula A. Johnson



**Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"**

This Callaway Plant response addresses Option 2 of the Requested Information in NRC Bulletin 2003-01. This response discusses: 1) interim compensatory measures that have been implemented, 2) interim compensatory measures that will be implemented, 3) measures discussed in the bulletin that will not be implemented and the justification for not implementing them, and 4) implementation schedule for planned interim measures and basis for concluding that their implementation is not practical until a later date.

**1) Interim compensatory measures that have been implemented**

- **Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere**

Callaway Plant Emergency Operating Procedure ECA-1.1, "Loss of Emergency Coolant Recirculation," step 28 provides guidance on adding makeup water to the Reactor Coolant System (RCS) from alternate sources. The alternate sources listed include:

- Normal RCS makeup to the Volume Control Tank (VCT) per procedure OTN-BG-00002, "Reactor Makeup Control and Boron Thermal Regeneration System"
- Normal RCS makeup to the Refueling Water Storage Tank (RWST) per procedure OTN-BG-00002, "Reactor Makeup Control and Boron Thermal Regeneration System"
- Recycle Holdup Tanks to the RWST per procedure RTS-HE-00120, "Transfer of Recycle Holdup Tank to Refueling Water Storage Tank or Fuel Transfer Canal"
- Fire Protection System header via drain to containment recirculation sump
- Essential Service Water (ESW) System via drain to containment recirculation sump

In addition, a Standing Order has been established to increase the administratively controlled minimum Refueling Water Storage Tank (RWST) level to a nominal level of 97%. This administratively controlled RWST level assures capacity above the Technical Specification 3.5.4.2 minimum required volume of 394,000 gallons (93.6%), and is also above the current low alarm level of 95.3% (400,674 gallons).

- **Ensuring containment drainage paths are unblocked**

Procedure OSP-SA-00004, Visual Inspection of Containment for Loose Debris, has been revised by a Temporary Change Notice (TCN) to modify the section of the procedure defining items that are considered Loose Debris. The procedure change ensures that loose pieces of NUKON insulation are classified as Loose Debris.

- **Additional plant specific interim compensatory measures:**

An Operations Information Report (OIR) has been submitted as required reading to Operations Department Control Room personnel to provide them with information associated with NRC Bulletin 2003-01. The OIR describes the reasons for the bulletin and interim compensatory measures taken and planned at Callaway plant as

a result of the bulletin. The OIR also raises Operator awareness of instrumentation that may provide indications of potential sump blockage.

## **2) Interim compensatory measures that will be implemented**

- **Operator training on indications of and responses to sump clogging**

Licensed Operator Continuing Training (LOCT) will be conducted for the licensed operators starting in the next available operator training cycle and is scheduled for completion by December 31, 2003. The training will include a sump blockage simulator scenario and provide information on indications of and responses to sump clogging.

- **More aggressive containment cleaning and increased foreign material controls**

The foreign material exclusion requirements and cleaning requirements for the Callaway Plant containment building are included in procedure APA-ZZ-00801, "Foreign Material Exclusion", and procedure OSP-SA-00004, "Visual Inspection of Containment for Loose Debris".

Procedure OSP-SA-00004 provides a definition of loose debris and provides acceptance criteria that the visual inspection prior to entry into Mode 4 from Mode 5 is considered satisfactory when all accessible areas of containment are found with no loose debris. Similarly the visual inspection after an entry into containment during Modes 1 through 4, and after establishing containment cleanliness during Mode 5, is considered satisfactory when all affected areas in containment are found with no loose debris.

Increased emphasis will be placed on containment cleanliness by implementing more aggressive containment cleaning practices. Prior to plant restart following the next refueling outage (Refuel 13), scheduled for the spring of 2004, inspections will be performed and more aggressive cleaning will be conducted to improve the level of cleanliness in general areas and other targeted areas of containment. The cleaning scope for Containment Housekeeping crews will be expanded from the normally accessed and cleaned general areas and work areas. A work document has been generated and will be planned to accomplish additional inspections and cleaning during Refuel 13, as required, on targeted horizontal surfaces that are not usually accessed (e.g. cable tray covers, tops of shield walls, areas under the refuel pool, etc.). Debris identified during the inspections that could be transported to the recirculation sumps post accident will be removed. The scope of debris to be removed during cleaning will include small materials such as latent fiber and particulate to help reduce the probability of recirculation sump blockage.

In addition, procedural controls will be developed to maintain the more aggressive cleanliness and/or foreign material exclusion (FME) controls in containment during subsequent refuel outages. These administrative controls will be established prior to December 31, 2004 which is prior to the scheduled date for Callaway Plant Refuel 14 in the fall of 2005.

- **Ensuring containment drainage paths are unblocked**

Procedure OSP-SA-00004, "Visual Inspection of Containment for Loose Debris", is performed for cleanliness inspection in containment as discussed above. The purpose of this inspection is to control the quantity of loose debris in containment in order to prevent transport of the loose debris to the containment recirculation sumps in the event of a loss of coolant accident (LOCA). The performance of this procedure during the specified times provides assurance that the containment drainage paths to the containment recirculation sumps are not currently blocked.

A review of applicable Callaway plant drawings and calculations has been performed and no significant chokepoints or accumulation areas have been identified beyond those that have been previously considered and evaluated in plant containment flooding calculations.

Refuel pool screens are installed over the two 10-inch refueling pool drain pipe inlets located in the lower refueling pool cavity during Modes 1 through 4. These refuel pool screens are installed to prevent debris from blocking flow through the refuel pool drains following a postulated high-energy line break requiring recirculation. The refueling pool screens are removed during Modes 5 and 6 during refueling outages to allow installation of blind flanges to accommodate refueling pool flooding for fuel handling activities. The stainless steel screens are of a rectangular box configuration and due to their separation and configuration would not be subjected to significant blockage from any credible source.

The Callaway plant containment building does contain radiation barrier doors at the four entrances into the secondary shield walls. These radiation barrier doors are normally locked during power operation to prevent unauthorized entry into a high radiation area (Ref. Technical Specification 5.7.2). These steel framed doors are constructed using a woven wire mesh screen in a nominal 1" diamond mesh pattern. The doors have varying side and bottom clearances to adjacent walls or structures. These radiation barrier doors should not be credible debris blockage locations due to the clearance around and through the mesh door and the wide separation between the four entry door locations. Removal of these doors is not currently being considered since Callaway takes credit for these doors to provide positive restriction of personnel access to high radiation areas inside the secondary shield wall during power operation.

To increase the assurance that the containment drain paths are unblocked, procedure OSP-SA-00004 will be revised prior to October 31, 2003, adding a step to verify that the refueling pool drain pipe screens are not blocked with any debris, and a step to verify that the radiation barrier doors at the four entrances into the secondary shield wall are not blocked with debris.

The work document associated with installation of the refueling pool drain pipe screens will also be revised by October 31, 2003 to ensure that after removal of the refueling pool drain flanges an inspection is performed to ensure no debris or blockage exists in the associated refueling pool drain pipe.

- **Ensuring sump screens are free of adverse gaps and breaches**

Procedure OSP-EJ-00003, "Containment Recirculation Sump Inspection", is used when restoring the recirculation sumps to operation following a plant outage. This procedure inspects the containment recirculation sumps to verify the suction inlets are not restricted by debris and that the sump components show no evidence of structural distress or corrosion as required by Technical Specifications SR 3.5.2.8 and SR 3.5.3.1. This inspection is believed to be sufficient to identify any existing sump screen damage, gaps or breaches. The plant work control and corrective action programs provide the mechanism to report and repair any subsequent damage to the screens during maintenance or other containment activities.

Although existing inspections appear to be sufficient, a detailed visual inspection of accessible screen surface areas will be conducted prior to plant restart following the next refueling outage. The work documents for the screen inspections will be scheduled for the next refueling outage in the spring of 2004 or during any Mode 5 shutdown prior to the spring 2004 refueling outage, whichever comes first. This schedule will ensure that the inspection is performed at the first available time that the sump enclosures are not required to be Operable and thus can be opened for inspection. The detailed inspections will be performed to confirm that the sump enclosure boundaries formed by the middle screens, gratings, and miscellaneous structural steel have no openings that are larger than 1/2", or for boundaries formed by the inner screens, gratings, and miscellaneous structural steel that there are no openings larger than 1/8".

- **Additional plant specific interim compensatory measures:**

Training plans will be developed for outage contractor and plant personnel with unescorted access to the radiological controlled area (RCA) to increase awareness of the issues related to containment sump screen blockage and the importance of containment cleanliness. This training will be conducted before the beginning of the next refueling outage scheduled in the spring of 2004.

NRC Bulletin 2003-01 information will be conveyed to the plant engineering staff through Engineering Support Program (ESP) training. This training will raise engineer awareness of the more aggressive containment cleanliness requirements, the potential for recirculation sump blockage, and actions being taken to address the concerns. This training will be conducted during the first quarter of 2004, to be completed before the beginning of the next refuel outage scheduled in the spring of 2004.

A training plan will be developed for the Technical Support Center (TSC) engineering staff of the Emergency Response Organization to provide guidance on the parameters which would indicate that recirculation sump screen blockage may be developing and what mitigating actions should be considered. This training will be conducted during the first quarter of 2004.

**3) Measures discussed in the bulletin that will not be implemented and the justification for not implementing them**

- **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)**

Plant specific changes to the Callaway Emergency Operating Procedures (EOPs) that take pre-emptive operator actions to shut off one train of Emergency Core Cooling System (ECCS) and/or Containment Spray System (CSS) will be considered after the Westinghouse Owners Group (WOG) program has been completed to evaluate the generic impact of the changes. A schedule for Callaway implementation of changes, if required, will be established after the extent of WOG recommended changes, if any, are received.

For larger LOCAs that require ECCS injection flow and CSS spray, pre-emptive operator actions to stop pumps or throttle flow solely for the purpose of delaying switchover to containment sump recirculation will not be implemented until the impact of the changes can be evaluated on a generic basis for the following reasons:

Operator actions to stop ECCS or CSS pumps or throttle flow may result in conditions that are either outside of the design basis safety analyses assumptions or violate the design basis safety analyses assumptions (single failure). This would result in the potential for creating conditions that would make the optimal recovery more challenging (e.g., stopping containment spray impacts containment fission product removal).

These actions would be inconsistent with the overall WOG Emergency Response Guideline (ERG) philosophy. The WOG ERGs are symptom-based procedures that provide for the monitoring of plant parameters and prescribe actions based on the response of those parameters. To avoid the risk of taking an incorrect action for an actual event, the WOG ERGs do not prescribe contingency actions until symptoms that warrant those contingency actions are identified.

These actions would be inconsistent with the current operator response using the WOG ERGs that have been established through extensive operator training. The expected operator response is based on the optimal set of actions considering both design basis accidents and accidents outside the design basis. The WOG ERG operator response is not limited to a specific accident progression in order to provide optimal guidance for a wide range of possible accidents.

To be effective in delaying the switchover to containment sump recirculation, operator actions to stop ECCS or CSS pumps must be taken in the first few minutes of an accident. This introduces a significant opportunity for operator errors based on other actions that may be required during this time frame. Any new operator actions to stop ECCS or CSS pumps, when modeled in the



Probabilistic Risk Assessment (PRA), are likely to result in increased risk due to operator error.

Based on the philosophy adopted in the current WOG ERGs, to take actions based on plant symptoms, it is more appropriate to address actions to "delay RWST inventory depletion" once the loss of recirculation capability is diagnosed. Any generic changes to the WOG ERGs will be evaluated as part of an Owners Group program.

**4) Implementation schedule for planned interim measures and basis for concluding that their implementation is not practical until a later date.**

The LOCT training will be conducted in the next available classes that are not already filled with necessary training topics for the control room staff. The next available operator training class is scheduled for October - December 2003.

A work document to implement containment cleanliness inspections and more aggressive cleaning will be performed during the next scheduled refueling outage (i.e. Refuel 13). Refuel 13 is scheduled for the spring of 2004 and is the next available opportunity for performing inspections and cleaning considering factors such as dose, heat stress, scaffolding construction, etc.

Procedural controls will be developed to maintain the more aggressive cleaning strategy for subsequent refuel outages. These procedural controls will be developed and issued by December 31, 2004, thus ensuring that the procedural controls are in place prior to Refuel 14 which is scheduled for the fall of 2005.

Procedure revisions to increase assurance that the containment drainage paths are unblocked will be completed by October 31, 2003 in conjunction with internal plant commitments for work document planning associated with the next scheduled refueling outage. This will ensure the discussed inspections are completed prior to plant restart following the next refuel outage which is scheduled for the spring of 2004.

The work document revision to add an inspection to ensure the refueling pool drain pipe is not blocked will be completed by October 31, 2003. This will ensure this added inspection is performed during Refuel 13 and subsequent outages.

The detailed inspections to provide assurance that the recirculation sump screens are free of adverse gaps and breaches will be performed prior to plant restart following the next refueling outage which is scheduled for the spring of 2004, or at the next available opportunity associated with a Mode 5 shutdown. The inspection is not scheduled earlier since the detailed inspections would require entry within the sump enclosure rendering the sumps and associated ECCS system inoperable for the duration of the inspection.

Outage contractors and plant personnel with unescorted access to the RCA will be trained to increase awareness of the issues in NRC Bulletin 2003-01 prior to Refuel 13 which is scheduled for the spring of 2004. This will raise personnel awareness of the sump blockage concerns associated with inadequate containment cleanliness prior to performing tasks in the containment building during the refuel outage.

Similarly, the engineering staff will be trained on the information in NRC Bulletin 2003-01 in the spring of 2004, prior to Refuel 13. This is the next available ESP training slot that is not filled with other training information and will help raise engineering awareness of the containment sump blockage issue just prior to performing containment building work activities associated with Refuel 13.

A training plan will be developed for the engineering staff assigned to the technical support center with radiological emergency response plan (RERP) duties. The training will discuss available parameters to identify potential sump blockage and recommended mitigating actions. The training will be conducted during the first quarter of 2004 to allow for incorporation into the next RERP technical support staff retraining cycle.

**LIST OF COMMITMENTS**

The following table identifies those actions committed to by AmerenUE in this document. Any other statements in this document are provided for information purposes and are not considered commitments. Please direct questions regarding these commitments to Mr. David E. Shafer at (314) 554-3104.

<b>COMMITMENT</b>	<b>Due Date/Event</b>
Accessible sump screen surfaces will be inspected to confirm that the sump enclosure boundaries formed by the middle screens, gratings, and miscellaneous structural steel have no openings that are larger than 1/2", or for boundaries formed by the inner screens, gratings, and miscellaneous structural steel that there are no openings larger than 1/8".	During any Mode 5 outage prior to the spring, 2004 refueling outage or prior to plant restart following the spring, 2004 refueling outage, whichever comes first.
Procedure OSP-SA-00004, "Visual Inspection of Containment for Loose Debris", will be revised as follows: <ul style="list-style-type: none"><li>• add a step to verify refueling pool drain pipe screens are not blocked with debris</li><li>• add a step to verify that the radiation barrier gates at the four secondary shield wall entrances are not blocked with debris</li></ul>	October 31, 2003.
The work document associated with installation of the refueling pool drain pipe screens will be revised to ensure an inspection is performed to ensure no debris or blockage exists in the refueling pool drain pipe.	October 31, 2003.
Callaway Plant will conduct Licensed Operator Continuing Training on indications of and responses to sump clogging. The training will include a simulator scenario.	December 31, 2003.
Callaway Plant will develop and conduct training for the Technical Support Center engineering staff of the Emergency Response Organization to provide guidance on the parameters which would indicate that recirculation sump screen blockage may be developing and what mitigating actions should be considered.	Completed in the first quarter of 2004.
Callaway Plant will develop and conduct training for contractor and plant personnel with unescorted access to the RCA to increase awareness of the issues related to containment sump screen blockage and the importance of containment cleanliness.	Prior to the spring 2004 refueling outage.

<b>COMMITMENT</b>	<b>Due Date/Event</b>
Callaway Plant will conduct training for the engineering staff to raise awareness of more aggressive containment cleanliness requirements, the potential for recirculation sump blockage, and actions being taken to address Bulletin 2003-01 concerns.	Prior to the spring 2004 refueling outage.
A work document will be planned and performed to accomplish additional inspections and cleaning, as required, on targeted horizontal surfaces that are not usually accessed.	During spring 2004 refuel outage.
Procedural controls will be developed to maintain a more aggressive cleaning strategy for subsequent refuel outages (for refuel outages after refuel 13).	December 31, 2004.