Union Electric
Callaway Plant

PO Box 620
Fulton, MO 65251

July 27, 1999

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

ULNRC-4056

Gentlemen:

Ameren UE

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
AMENDED RESPONSE TO GENERIC LETTER 81-07, "CONTROL OF HEAVY LOADS"

References:

1) Generic Letter 81-07, "Control of Heavy Loads", dated December 22, 1980, along with NUREG-0612 enclosure
2) SLNRC 81-48, SNUPPS Response to Generic Letter 81-07 (Phase I), dated June 22, 1981
3) SLNRC 82-33, Final SNUPPS Response to Generic Letter 81-07 "Control of Heavy Loads", dated August 4, 1983
4) SLNRC 84-08, Revision 1 to SNUPPS Report on "Control of Heavy Loads", dated January 27, 1984
5) SLNRC 84-56, Revision 2 to SNUPPS Report on "Control of Heavy Loads", dated March 28, 1984
6) SLNRC 85-19, Revision 3 to SNUPPS Report on "Control of Heavy Loads", dated June 12, 1985
7) NUREG-0830, Supplement No. 3, "Safety Evaluation Report related to the operation of Callaway Plant, Unit No. 1", dated May 1984
8) ULNRC-3894, "Licensee Event Report 98-008-00", dated September 14, 1998

I/O

A001

Attachment I provides an amended response to Generic Letter 81-07, "Control of Heavy Loads", to address corrective action described in Licensee Event Report 98-008-00 which was submitted to the NRC via Reference 8 above. The attachment resolves a discrepancy between earlier submittals of the "SNUPPS Report on the Control of Heavy Loads" and Callaway Plant Technical Specifications regarding Residual Heat Removal (RHR) system operability and protection during Cold Shutdown (Mode 5) and Refueling (Mode 6). The changes to Callaway's response

9908110160 990727
PDR ADOCK 05000483
P PDR

are consistent with the guidance of Reference 1 above, and provide assurance that decay heat removal capability will be maintained in the event of a dropped heavy load.

Please contact Mr. Rick L. Rice at (573) 676-8495 if you have any questions.

M. E. Taylor
Manager, Nuclear Engineering

MET/DSH/DLB/RLR/kkm

Enclosure

AMENDED RESPONSE TO GENERIC LETTER 81-07

Introduction

NRC Generic Letter (GL) 81-07 was issued on December 22, 1980 along with enclosure NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants". Guidance for a Phase I (6-month) response and a Phase II (9-month) response was provided. The Callaway Plant 6-month response (Phase I) was submitted to the NRC under the cover of SLNRC 81-48 dated June 22, 1981 (Reference 2). The Callaway Plant 9-month response (Phase II) was submitted to the NRC under the cover of SLNRC 82-33 dated August 4, 1983 (Reference 3). The Phase II response was re-submitted with additional information in letters SLNRC 84-08 (Reference 4), SLNRC 84-56 (Reference 5) and SLNRC 85-19 (Reference 6).

The NRC reviewed the Callaway Phase I and II responses and found them to be acceptable, as documented in Appendix G and H of Supplement 3 to NUREG-0830 (Reference 7). Callaway was one of five plant sites selected by the NRC to have the Phase II response fully reviewed under a pilot program. Subsequently, Generic Letter (GL) 85-11 informed licensees that, based upon the improvements in heavy loads handling after the implementation of NUREG-0612 (Phase I), further action was not required to reduce the risks associated with the handling of heavy loads. The NRC determined that a detailed Phase II review of heavy loads was not necessary for any additional plants.

Summary of Changes to Callaway's Response

With this submittal, Callaway Plant is providing a change to our Phase II response submitted via SLNRC 82-33, and subsequent revisions, as described above. The change corrects a statement in Section 2.4.1 of the "SNUPPS Report on the Control of Heavy Loads" regarding Residual Heat Removal (RHR) system operability in Modes 5 and 6. The amended response provides clarification that, per Technical Specifications, only one train of RHR is required to be operable during certain conditions in Modes 5 and 6. Information is provided to demonstrate that decay heat removal will be maintained in the event of a dropped heavy load inside the Reactor Building (containment), using the guidance provided in NUREG-0612.

The original Phase II response given in Section 2.4.1 (Specific Analyses in the Reactor Building) regarding the polar crane use during cold shutdown stated that "The plant conditions and operable systems are assumed to be in accordance with the Technical Specifications which require both RHR trains to be operable during Mode 5." Later discussion regarding polar crane use during refueling stated that "Should a heavy load drop impact an operating RHR line or a Class I branch line, the effects would be no more severe than the cases discussed above for the cold shutdown mode". Per Callaway Plant approved Technical Specifications, only one train of RHR is required to be operable in Mode 5 with steam generator primary loops filled and a specified minimum secondary side water level. Likewise, only one train of RHR is required to be operable in Mode 6 with greater than 23 feet of water above the reactor vessel flange. Per this attachment, Section 2.4.1 is revised as shown below to clarify RHR system operability requirements and to describe features which ensure that decay heat removal capability will be maintained per the criteria of NUREG-0612.

Callaway Plant staff has evaluated the effects of a heavy load drop on the plant with only one RHR train operable in Modes 5 and 6. Piping and building structure layout drawings have been reviewed along with normal and off-normal procedures involving RHR system operation. Although intervening floor and wall structures (3 floor levels) would likely prevent most heavy load lifts from causing damage to RCS or RHR piping systems in the lower part of the Reactor Building, no formal analyses have been performed and the floors were all assumed to fail per the original A/E design firm (Bechtel). Some heavy loads of a larger magnitude (reactor coolant pump motor, pump internals, concrete slabs, etc.) will also be lifted throughout the life of the plant and will be carefully planned and executed. However, the same floor failure assumption is utilized as that which was used in the original submittal. Any break of RHR, RCS or other Class I branch piping would result in a non-flashing fluid loss to the containment floor and sumps. Although motor-operated isolation valves in RHR return piping and check valves in RHR supply piping may provide isolation of any fluid leak path for a damaged RHR train, the availability of these components depends on the location of the dropped load. As described below, decay heat removal capability could be lost in Modes 5 and 6 when only one train of RHR is maintained operable and in service. Therefore, administrative controls will be implemented to exclude lifting of heavy loads over piping for a single operable RHR train in the Reactor Building (i.e. safe load paths will be added) except as described later for specially controlled lifts. Manual re-alignment of the suction source for the single operable RHR train may be required to maintain long-term decay heat removal. The RWST or containment recirculation sumps will be available to provide the necessary suction sources if needed, and will be utilized via off-normal operating procedures. The change to Callaway Plant response for the "Control of Heavy Loads" is consistent with the guidance of GL 81-07 and NUREG-0612 (Reference 1).

Amended Section 2.4.1, "SNUPPS Report on the Control of Heavy Loads"

2.4.1 ANALYSES OF THE REACTOR BUILDING

The heavy loads drop analyses for decay heat removal and maintenance of cold shutdown conditions inside the reactor building were performed and resulted in no design changes to the plant. The following discussions describe the analyses of each crane and load drop inside the reactor building.

Polar Crane During Cold Shutdown – The polar crane could be used during cold shutdown to lift any load not directly associated with the reactor coolant pressure boundary inside the containment. The plant conditions and operable systems are assumed to be in accordance with the Technical Specifications which require both RHR trains to be operable during Mode 5 with steam generator primary loops not filled. Only one operable RHR train is required if the loops are filled and at least two steam generators contain a secondary side water level specified in the Technical Specifications. The RHR system is the operating system normally required for the maintenance of cold shutdown conditions. The accumulators have been isolated. The primary system has been cooled to less than 200°F, and the pressure boundary is intact before the postulated drop occurs. Therefore, pipe rupture due to a postulated load drop during cold shutdown will result in non-flashing break flow.

Polar crane heavy load drops outside of the secondary shield wall could damage either of two redundant RHR piping systems, but not both due to physical separation between trains. If both trains of RHR are operable, the damaged train could be secured and the redundant RHR train would be available. For a rupture of the RHR supply line (RCS loop injection), check valves inside the secondary shield wall will restrict alternate train flow through the break location. For a rupture of the RHR return line (RCS loop return), remote isolation of the break could occur via motor-operated valves inside the secondary shield wall if the "B" train power supply is available. Otherwise, RCS fluid would discharge to the containment floor and recirculation sumps. However, decay heat removal capability would still be available since the alternate RHR train would be started and force flow through the reactor vessel core (core barrel design routes inlet flow down the outside and up through the core before exiting the hot leg break location). RHR suction would be aligned to the RWST or recirculation sump via off-normal plant procedures to provide long-term cooling. If only one train of RHR is operable, and in operation, a rupture of its associated supply or return line could result in loss of normal decay heat removal. Although alternate sources of cooling would be available via the ECCS, administrative measures will be taken to exclude lifting of heavy loads over the operable RHR train piping in containment, except as follows. Specially controlled heavy load lifts (i.e. reactor coolant pump motor, pump internals, etc.) may travel over supply piping for the only operable RHR train, so long as the RHR return piping is excluded from the lift area and provided an alternate RHR supply/injection path is identified and available. Protection of the RHR return line will provide adequate time for securing the operating RHR pump if cavitation were to occur due to line breaks in other containment locations. For a break in the supply piping of the only operable RHR train, identification of alternate RHR supply/injection flowpaths will allow for re-alignment of the operable RHR pump discharge piping to the RCS for maintenance of decay heat removal. Therefore, decay heat removal capability will be maintained similar to that described above when both trains of RHR are operable.

Heavy load drops inside of the secondary shield walls could potentially impact RCS loop piping or a Class I branch line, including RHR system piping. If both trains of RHR are operable, the damaged train could be secured and the redundant train RHR would be available. For a rupture of the RHR supply line, check valves inside the secondary shield wall will restrict alternate train flow through the break location unless the break occurs between the RCS piping and the check valve. For a rupture of the RHR return line, remote isolation of the break could occur via motor-operated valves inside the secondary shield wall if the "B" train power supply is available and if the break occurs downstream of the isolation valves. Otherwise, RCS fluid would discharge to the containment floor and recirculation sumps. However, decay heat removal capability would still be available since the alternate RHR train would be started and force flow through the reactor vessel core (core barrel design routes inlet flow down the outside and up through the core before exiting the hot leg break location, and cold leg break location is above the top of the RCS loop piping). RHR suction would be aligned to the RWST or recirculation sump via off-normal plant procedures to provide long-term cooling. If only one train of RHR is operable, and in operation, a rupture of its associated supply or return line could result in loss of normal decay heat removal. Although alternate sources of cooling would be available via the ECCS, administrative measures will be taken to exclude lifting of heavy loads over the operable RHR train piping in containment, except for specially controlled loads as described above for load drop evaluation outside of the secondary shield walls. Therefore, decay heat removal capability will be maintained similar to that described above when both trains of RHR are operable.

In summary, a postulated heavy load drop onto RHR supply or return piping inside containment, and with a single train of RHR operable, could cause the loss of normal decay heat removal. Alternate lineups and core cooling sources would be available to maintain decay heat removal. However, administrative measures will be taken to exclude lifting of heavy loads over the operable RHR train piping in containment, except as described above.

During reduced inventory conditions (RCS water level less than 3 feet below the reactor vessel flange), heavy load lifts over RHR piping in containment will be allowed only when both RHR trains are operable and a single RHR train is in service. This will ensure that both RHR pumps do not fail due to cavitation during a rapid drain down of the RCS. Since both trains of RHR will be operable during reduced inventory conditions, one train will always be available to supply decay heat removal once its suction source has been re-aligned.

Each reactor coolant pump motor and pump internals assembly will be replaced during the life of the plant. The replacement of a pump motor or pump internals assembly will also require removal, storage and re-installation of the concrete access hatch covers over the associated pump. These lifts will involve weights that are much more significant than the typical refueling loads (excluding the reactor vessel head) moved around containment. Heavy load lifts of this nature will be carefully planned and executed, since a drop from the maximum lift height required could cause a significant impact on the RCS components and RHR piping below the operating floor level. Although the consequences of a load drop for any of these heavy load lifts are bounded by the analyses in the preceding paragraphs, lighter loads which are typically lifted in containment are more likely to be stopped by intervening floor and/or wall structures if dropped. In all cases, decay heat removal capability will be maintained.

<u>Polar Crane During Refueling</u> – During refueling, the polar crane is utilized to remove the reactor vessel head. Refer to Section 2.3 above. Should a heavy load drop impact an operating RHR line, RCS loop piping or other Class I branch line, the effects would be no more severe than the cases discussed above for the cold shutdown mode.

For the same reasons described above for the cold shutdown mode, lifting of heavy loads over the operable RHR train piping in containment, when only one train is operable, will be prevented by administrative procedure except for the specially controlled lifts previously described. Likewise, during reduced inventory conditions, heavy load lifts over RHR piping in containment will be allowed only when both RHR trains are operable and a previously described. Likewise, during reduced inventory conditions, heavy load lifts over RHR piping in containment will be allowed only when both RHR trains are operable and a single RHR train is in service. Since both trains of RHR will be operable during reduced inventory conditions, one train will always be available to supply decay heat removal once its suction source has been re-aligned.

Polar Crane During Hot Standby and Hot Shutdown – The polar crane will be used during hot standby and hot shutdown (Modes 3 and 4) to minimize critical path outage times for cold shutdowns and refuelings, and to assist with maintenance that can be performed in a hot plant condition. Planned usage includes activities such as crane inspections, operability checks, and movement of tools and equipment required for the cold shutdown/refueling outage. It is anticipated that most lifts during Modes 3 and 4 will be of light loads and will allow unrestricted movement.

The lifting of heavy loads during Modes 3 and 4 is expected to be infrequent. The significance of the operation and the importance of proper rigging and restricted load movement will be stressed to those involved with heavy load lifts. Both the main and auxiliary hooks are provided with independent and redundant limit switches which precluded the possibility of a two-blocking event. Minimum practical lift heights will be used throughout the load movement process. Certain anticipated heavy load movements have been analyzed, and restricted areas and safe load paths have been defined. These include but are not limited to the hydrogen mixing fans, excess letdown exchanger and reactor coolant drain tank heat exchanger hatches. However, all specific loads and load paths cannot be defined. For these cases, safe load path considerations will be based on comparison with analyzed cases, previcusly defined safe movement areas, and previously defined restricted areas. For example, since integrity of the primary side pressure boundary is important during Modes 3 and 4, the area inside the secondary shield wall will be avoided if practical. In addition, when in Mode 4, if only one train of RHR is operable, the movement of any heavy load over that operable RHR train piping will be prohibited unless previously evaluated.

During Modes 3 and 4, containment integrity will be maintained in accordance with plant Technical Specifications, which allow various combinations of RCS loops and ECCS/RHR trains to be operable. A breach of either the primary or secondary side pressure boundaries will not result in radioactivity releases that are a significant portion of 10 CFR 100 limits. The time of use of the polar crane during these modes is a small percentage of total plant operation time. The time for lifting heavy loads is a still smaller percentage. Postulated load drops would result in consequences that are economic rather than public safety concerns. Therefore, the relative small risk involved, coupled with load path considerations and procedures and training, justifies the use of the polar crane during Modes 3 and 4.

Containment Jib Cranes (HKF03A-D) During all Modes – The containment jib cranes (3-ton capacity) are utilized to remove the hydrogen mixing fans from their bottom skirts. The hydrogen mixing fans are located directly above the reactor coolant pumps on slabs which are removable for access to the reactor coolant pumps. An analysis has been performed to ensure that the removable slabs would not fail. Refer to Appendix A for the worst-case analysis. Jib crane use for the fan or any other load within the jib crane capacity would be enveloped by the preceding discussion for use of the polar crane.

The removable slabs which support the hydrogen mixing fans can only be removed by the polar crane during Modes 5 and 6 under conditions previously discussed in this section. The consequences of a drop of any of the slabs are enveloped by the preceding discussions of polar crane use during cold shutdown.

Secondary Shield Wall Area Jib Crane (HKF05) During Cold Shutdown And Refueling – The jib crane (3-ton capacity) located near the pressurizer will be used during cold shutdown and refueling to handle components located in the pressurizer compartments. The discussions of cold shutdown operation of the polar crane are also applicable to this jib crane. Rupturing of the reactor coolant pressure boundary at the pressurizer during cold shutdown would be no more severe than potential ruptures caused by polar crane drops. Core cooling would not be interrupted. During refueling, the water level of the reactor coolant system is below the pressurizer normal level, and there would be no effect on decay heat removal should a drop breach the pressurizer boundary.

Containment Equipment Hatch Hoist (HKF04A AND B) During Cold Shutdown – The equipment hatch hoist is used to handle the equipment hatch during Modes 5 and 6. A drop of the hatch will not affect safe shutdown or decay heat removal. As required by the technical specifications, the equipment hatch must be secured in place during fuel movement or core alterations.

Containment Building Elevator Auxiliary Monorail and Hoist (HKF31) – This monorail and hoist is shown on Figure 3 between approximately azimuths of 32 and 42 degrees, at Elevation 2023. It may be used during all modes to handle miscellaneous equipment which, if dropped, would not affect safe shutdown or decay heat removal.