ARKANSAS POWER & LIGHT COMPANY

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SUBJECT: Arkansas Nuclear One - Units 1 & 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Response to Additional Questions
Regarding Implemention of GL 88-17

Gentlemen:

During a conference call with several Region IV personnel on June 14, 1989, two questions were raised with respect to AP&L's actions in response to Generic Letter 88-17 (Loss of DHR). Specifically, the questions related to the capabilities of the RCS level instrumentation used when ANO-1 is in DHR operation. This topic was the subject of a letter of clarification, dated June 12, 1989 (1CANØ689Ø7), of our required 60- and 90-day responses to GL 88-17. My understanding of the two questions and our responses follows:

1. What measures are AP&L taking to assure the common lower tap of the RCS level instruments does not result in misleading indication?

Assurance that a blockage of the common lower tap on the "B" loop RCS level instrumentation will not go undetected is provided by use of the permanently installed tygon tube level indication, which is procedurally required to be continuously monitored during draining operations and periodically during steady state DHR operation. The procedure governing RCS draining operations is being changed to require a specified acceptable level correlation between the tygon tube ("A" RCS loop) and hot leg level indications ("B" loop). This change will be completed before the 1R9 refueling outage, or prior to draining below an RCS level of 375' (ANO-1 defined reduced inventory level).

Although complete independence between the "B" loop instruments is not available in the current design due to the shared lower level sensing tap, only a few feet of common piping exist. It is unlikely that plugging or some other failure mechanism would affect this common portion, and if it did occur it would be detectable by failure of the indication to respond when initially draining the RCS during shutdown prior to entering reduced inventory DHR operation.

2. Do the existing RCS level instruments, particularly the wide range transmitter, have adequate accuracy and reliability to prevent operation at RCS levels below our GL 88-17 committments?

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The existing instruments provide the required level of accuracy. The wide range instrument must be calibrated prior to draining to RCS levels below 375'. A maximum error of approximately 6.4 inches RCS level has been shown, using the latest revision to the "B" loop wide range instrument error calculation with 6-month drift allowances, when using the SPDS computer display. The "B" loop narrow range instrumentation has the required level of accuracy, when read on the SPDS display, without special recalibration. Appropriate procedures are being revised to require recalibration of the wide range level instrument before draining to an RCS level of 375', and to require use of the SPDS for indication of "B" loop RCS level. Additionally, use of the most conservative RCS level indication will be required. These changes will be completed before 1R9, or before draining below 375' level.

Instrument errors are unacceptably high for absolute RCS level verification when read from the ICC mimic level display, due to LED bargraph resolution; it is therefore used for general information only in reduced inventory operation. Therefore, SPDS level indication is used as mentioned above. As stated in our 60-day response, until revisions of procedures are complete, we will evaluate any required draindown below GL 88-17 defined "reduced inventory conditions", and establish interim measures to meet the intent of GL 88-17.

Recalibration of the "B" loop wide range instrument will resolve related accuracy or reference leg concerns. This recalibration, coupled with procedural level monitoring requirements, satisfactorily resolves the accuracy and reliability issues raised in the ANO internal memos which were previously reviewed by the Region IV inspectors.

NRC letter dated June 7, 1989 (ØCNAØ68ØØ6) transmitted comments on AP&L's response to GL 88-17 with respect to expeditious actions (60-day response). The letter stated that our response appeared to meet the intent of GL 88-17, and contained six staff observations for our consideration, to assure ourselves that the expeditious actions were fully addressed. While a response was not requested, AP&L is providing the following for information and clarification. The six observations and our responses follow:

1. You have not provided specific information for procedures controlling reactor coolant system (RCS) draining but state that the procedures are being revised. These revisions are to satisfy the intent for containment closure within the guidelines provided in GL 88-17. In some plants, the quick closure of the equipment hatch is achieved by the installation of a reduced number of bolts. If you plan to use less than the full compliment of bolts for sealing the equipment hatch, then you first should verify that you can make a proper seal of the periphery mating surfaces to meet the closure criteria. You have not presented any times for containment closure. Generic Letter 88-17 states that "containment penetrations including the equipment hatch, may remain open provided closure is reasonably assured within 2.5 hours of initial loss of DHR." This time will be less if there are vent areas totaling greater than one square inch in the cold leg (see Section 2.2.2 of GL 88-17).

The ANO-1 procedure governing RCS draining is being revised to assure the RCS is not intentionally drained to a level lower than four inches below the top of the flow area of the hot legs. This is an actual RCS level of 370'8". Considering the Hot Leg Level Measurement System (HLLMS) instrument accuracy discussed in response to question 2 above (6.4"), a lower limit of 371'2" indicated level has been placed in the procedure by temporary change.

Maintenance of indicated RCS levels above 371'2" will preclude the need for containment closure procedures and administrative controls. This level will provide a sufficiently low level to allow performance of reasonably anticipated maintenance activities (i.e. RCP seal replacement, OTSG tube plugging, etc.). However, the procedure will also be revised to identify the requirement for containment closure capabilities for any RCS draindown below an indicated level of 371'2". Should experience dictate the need for draining the RCS below 371'2", appropriate procedures and administrative controls will be established to comply with GL 88-17. Since the 1R8 refueling outage, ANO-1 has not drained the RCS below a level of 375'0" (i.e. reduced inventory).

The criteria for containment closure with respect to the equipment hatch for ANO-2 is defined by Technical Specification 3.9.4 as requiring four bolts holding the hatch in place. The associated maintenance procedure requires maintenance personnel to tighten the four bolts to pull the hatch O-ring onto the sealing surface. During the 2R7 refueling outage, a test will be performed to verify that this procedure results in adequate sealing of the hatch.

A form in the ANO-2 procedure governing RCS draining operations maintains a listing of actions necessary to accomplish containment closure within 45 minutes. This was developed as committed in our response to expeditious action (2)(a) of GL 88-17.

2. Your addressing of containment closure is cursory and no information is provided regarding how you will keep track of and control the many potential openings (piping, electrical, hatches) which will have to be closed simultaneously. We assume your procedures and administrative controls will address this topic.

As discussed in response to comment 1 above, ANO-1 does not anticipate the need to drain to RCS levels requiring implementation of containment closure provisions. Should this become necessary, however, appropriate actions will first be implemented.

The ANO-2 form, mentioned above, which is maintained by control room personnel, provides a listing of actions necessary to accomplish containment closure. This form includes a listing of all breached containment penetrations, the closure method required for each, the name and phone number of the individual on shift responsible for closure of each penetration.

3. You state that procedures are being revised to require operation of two independent core exit thermocouples (CETs) when in mid-loop condition. Your response is vague in some details. For Arkansas Nuclear One, Unit 1 (ANO-1) it is not clear if in addition to the periodic recording of the thermocouples that the readings may be automatically and continuously

monitored and alarmed in the control room. This would appear to be possible as the thermocouple leads remain in their normal location at the bottom of the core with the head off. For ANO-2, you state that "when indications that are not automatically monitored and alarmed are used, provisions will be made for periodically checking and recording temperatures." We can not discern if you are planning to use automatic monitoring and alarms for ANO-2 or just periodic checking and recording. For a system which is monitored by an operator in the control room, the need for frequent logging only arises for the case of loss of residual heat removal (RHR).

The ANO-1 procedure governing DHR and LTOP system control has been revised to require operator logging of independent CETs once per hour when the RCS level is below 390'. Also, two trains of CETs are required by this procedure to be operable when the RCS is drained below 375'0" (1.5' above "reduced inventory" conditions).

Average CET temperatures are displayed in digital form on the ICC display in the ANO-1 control room. Additionally, numerous CETs are input to the SPDS computer. These CETs are utilized in preconfigured displays and are individually accessible for operator-configured trends. They are not alarmed at this time, however, variable setpoint alarms are planned for implementation during 1R9 as part of ANO's programmed enhancements (see our 90-day response to GL 88-17).

ANO-1 presently has 24 environmentally qualified CETs (6 per core quadrant) input to the Inadequate Core Cooling Monitoring and Display System (ICCMDS) and the SPDS computer (via link with the ICCMDS computer). In addition, 9 CETs are available directly to the SPDS computer. This was not clear in our 90-day response on this topic, where we indicated the availability of 32 qualified CETs on the SPDS. The total number of CETs available is in excess of the 4 per core quadrant minimum required by NUREG-0737, Item II F.2, Attachment 1.

Since CETs are a part of the incore detector strings and enter through the lower part of the reactor vessel on B&W plants, reactor vessel head work can proceed without disconnecting of the detectors. This design should facilitate maximum availability of the CETs. However, because of the arrangement of the incore detector tank and cable routing, these detectors must be disconnected and withdrawn prior to flooding of the fuel transfer canal. Procedures to maximize availability of the CETs have not been fully evaluated at this time in that the next scheduled reactor vessel head removal CET disconnect is not planned until early 1990. This evaluation will be completed prior to that time.

For ANO-2, RCS temperature is required to be recorded every 15 minutes when in reduced inventory operation. As committed in our 90-day response to GL 88-17, a high CET temperature alarm is planned for implementation during 2R8.

4. You state that "ANO-1 and 2 logs are being revised as required to provide for periodic recording and checks of at least two independent continuous RCS water level indications during DHR operation." You state that ANO-1 has hot leg level indication for both RCS loops. However, no details are given about the type of level indicator, or if the level indications have alarms and where the reference legs are located. You state that ANO-2 has

a refueling level indication consisting of delta-P instrumentation between the 'A' hot leg and the pressurizer. In addition, you state that both plants have temporary tygon tubing level instrumentation. When two instruments are in place, care should be taken to resolve any discrepancy between the two measurement systems. Also, the pressure of the reference leg should approximate the pressure of the void in the hot leg or be compensated to obtain the correct level value.

The available RCS level instrumentation for ANO-1 was described in greater detail in our previous correspondence (1CAN068907) dated June 12, 1989, as well as in the previous ICCMDS submittal referenced in our GL 88-17 responses. This letter provides detail of the plumbing arrangement, power supplies, and use of these instruments with respect to GL 88-17.

ANO-1's tygon tube level indicator is often referred to as the "temporary tygon tube." This is a misnomer in that all parts of this level indicator are permanently installed as depicted on the RCS P&ID (SAR Figure 4-1, Sheet 2). The instrumentation consists of stainless steel sensing lines connected to the cold leg and the hot leg and routed to a valve manifold. Stainless tubing is then routed to the top and bottom of the vertical section of tygon tubing. The tygon tubing is mounted to a stainless backing plate which has permanently scribed elevation level markings. This system has provided reliable level indication for a number of years.

Current procedures require continuous monitoring of this instrument during draining evolutions and periodic monitoring (approximately 4 hour intervals) during steady state conditions. Integration of the use of this instrument into the applicable procedures, its permanent installation, and availability of both narrow and wide range hot leg level indication for comparison and trending provide adequate level information to meet the intent of GL 88-17.

Presently, a low level alarm is provided at an RCS level of 370'6" from either the "A" or "B" loop lower narrow range level instruments. As part of ANO-1's programmed enhancements, this alarm has been evaluated and action initiated for a setpoint change, operator adjustable setpoint capability, and use of "B" loop wide and narrow range inputs due to the flow induced error on the "A" loop.

The ANO-2 procedure governing RCS draining operation requires determination of the cause of any level error before draining below a point 25" above the level associated with reduced inventory, and further requires increased monitoring of shutdown cooling flow until the level discrepancy is resolved.

The appropriate procedures for each unit are also being changed to require use of the most conservative RCS level indication. These changes will be completed by the next respective outage requiring reduced inventory operations.

5. Walking the tygon tube following installation to verify lack of kinks or loop seals is necessary. Experience shows that periodic walkdowns are needed after installation. We recommend daily walkdowns when the tygon tube is in use, with an additional walkdown immediately prior to its being placed in use. You have not discussed how the tygon tube readings will be monitored. If the readings are only monitored in the containment, then observations should be recorded at an interval no longer than 15 minutes during normal conditions and provisions should be provided for immediate communication of water level values to an operator in the control room if significant changes occur.

ANO-1's tygon tube level instrument and its use are described in response to comment 4 above. We believe that due to its permanent installation, periodic walkdowns are not required. This instrument is used to supplement the narrow and wide range level instruments provided in the control room. The 'B' loop levels are recorded each hour and the tygon tube level is recorded at approximately four hour intervals during steady state conditions. During draining evolutions, the tygon tube is monitored continuously and a local phone and radios are available for communications with the control room. Use of the tygon tube provides reasonable assurance a blockage of the common lower tap on the 'B' loop level instruments will not go undetected and result in a loss of decay heat removal capabilities. The associated procedure is being changed to require a walkdown of the tubing when it is placed in service to verify proper connection and operation. This change will be complete by the next refueling outage, or prior to the next RCS draining operation.

The ANO-2 procedure which provides instructions for placing the RCS level transmitter and tygon tubing in service includes steps for checking the condition of the tubing for leaks, kinks, loop seals, air bubbles and being properly secured. The tygon tubing level is recorded every 15 minutes when in reduced inventory. As with ANO-1, operators in containment have hand-held radios available for communicating with the control room. The associated procedure is being changed to require daily walkdowns of the tygon tubing until appropriate modifications are completed to certain portions of the tubing. This procedure change will be complete before the next use of the tygon tubing.

6. You have not stated the use of any vent opening on the hot side of the RCS to relieve RCS pressurization. The removal of a pressurizer manway or steam generator manway can be used as a means to provide RCS venting. We note that relatively large hot side openings in the RCS, such as a pressurizer manway, can still lead to a pressure of several psi. The large steam flow in combination with flow restrictions in the surge line and lower pressurizer hardware may lead to pressurization. Calculations should be performed to verify the effectiveness of the opening.

This comment appears to relate to expeditious action (7) of GL 88-17 which, due to internal vent valves and other differences, is not applicable to B&W plants. Adequate venting of the RCS does apply to ANO-1 with respect to the head and flow capabilities of pumps used to ensure independent makeup capability. A calculation was performed by AP&L to determine various flowrate and equilibrium pressures for loss of DHR events. The appropriate procedure has been revised based upon the results of this calculation to allow use of the reactor building spray pumps for alternate makeup capability.

The ANO-2 procedure governing RCS draining operations is being changed to require the pressurizer manway to be removed or require that one steam generator secondary level be maintained above 330" to allow reflux boiling decay heat removal capability. This procedure change will be completed before 2R7, or the next drain down to reduced inventory conditions. AP&L recognized the potential for RCS pressurization and inventory loss with cold leg openings. Removal of the pressurizer manway, or maintaining an adequate steam generator level, will minimize this RCS pressurization and inventory loss. Additionally, as described in our GL 88-17 60-day response, adequate alternate injection capability is required prior to any RCS draining operations. A calculation, similar to that for ANO-1, is being performed to determine various flowrate and equilibrium pressures for loss of DHR events on ANO-2.

As stated in our 90-day response, AP&L is performing appropriate plant-specific analyses of loss of DHR to further enhance procedures and training. This effort was originally expected to be complete by April 1, 1989. The ANO-1 effort is complete; as mentioned above, some results have already been incorporated into appropriate procedures. The ANO-2 portion of the analyses is substantially complete, incorporation of the results into the appropriate procedures will be complete by 2R7 or the next drain down to reduced inventory conditions.

As part of our continuing review of the loss of DHR issue, potential reliability enhancements to the ANO-1 DHR system have been identified and described to the NRC by LER 88-014 (DHR cooler outlet valves) and during the November 18, 1988 meeting with NRR (ACI study, additional improvements). These efforts are consistent with those recommended by programmed enhancement (4) of GL 88-17. These improvements, along with other actions initiated in response to GL 88-17, will continue to receive management attention to assure appropriate resolution.

The above additional information should be sufficient to address your remaining questions regarding the implementation of GL 88-17 recommendations at ANO.

Very truly yours,

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and Assessment

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