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January 31, 1980

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2-010-28

Director of Nuclear Reactor Regulation
ATTN: Mr. Darrell G. Eisenhut, Acting Director
Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Lessons Learned Implementation
(File: 1510.3, 2-1510.3)

Gentlemen:

Our letter of January 18, 1980, documented Arkansas Power and Light Company's methods of compliance with the Category A Lessons Learned requirements of NUREG-0578. On January 21-23, 1980, an implementation team visited the Arkansas Nuclear One site to survey our compliance methods. During that site visit, several verbal requests for additional information were received. Our letter of January 29, 1980, provided a partial response to those requests. Enclosure 1 of this letter provides the remainder of that requested information and the remaining Category A Lessons Learned items (Item 2.1.3.b for ANO-1 and 2) referenced in our January 18, 1980 letter. The attachment of our January 29, 1980, letter is provided as Enclosure 2 for your convenience.

Very truly yours,

Donald A. Rueter
for David C. Trimble
Manager, Licensing

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Enclosures

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Item 2.1.1 - Emergency Power Supply

ANO-2

Question - What is the basis for pressurizer heater size and time to initiate? Is this based on actual heat loss conditions? Is it conservative?

Response

The 150KW of pressurizer heater capacity powered from an assured power source will ensure, for 588,000 BTU/hr ambient losses, that RCS subcooling margin will be maintained $\geq$ 20°F for a period of 45 hours following loss of offsite power. This time period includes a period of 1/2 hour at the beginning of the transient in which the heaters are unavailable.

Actual heat losses from the pressurizer, from startup testing data, is 596,000 BTU/hr. or 8,000 BTU/hr greater than that assumed above. However, this 8,000 BTU/hr increase in losses would only require a 2.345KW increase to offset this loss increase and, therefore, will have little impact on the 45 hours calculated above.

This calculation is conservative in that actual heat losses would decrease during the transient as RCS pressure and temperature decreased, thereby heater capacity would more closely approach the pressurizer ambient losses and hence prolong the time to reach 20°F margin to saturation.

Item 2.1.4 - Diverse Containment Isolation

ANO-2

Question - Provide justification for not using a diverse containment isolation signal for Category 2 valves. Identify valves which can and cannot be opened.

Response

All of the systems listed in Category 2 are closed loop cooling systems for essential equipment (i.e., Containment Coolers and Reactor Coolant Pump Coolers). All of the items are needed for a "normal" orderly cooldown following receipt of a CIAS. Since the introduction of a CIAS does not necessarily follow a LOCA situation, the equipment needed for "normal" orderly shutdown should be left in service. Only when a LOCA condition is verified by a high building pressure, should the equipment operation be degraded to isolate the containment. Also, none of the above items have direct contact with the reactor coolant such that non-isolation would allow contaminated fluid to escape unless the integrity of the closed loop system was also violated. For the above reasons, Category 2 items do not require modification to the Containment Isolation System.

Of the valves listed in Items 2 through 21 of our January 18, 1980 response only those valves listed in Items 7, 19, and 20 will have the capability of being opened while a CIAS is present. These valves have the capability for manual override of the CIAS so that valve positioning may take place by manual action. The remaining valves listed in Items 2 through 21 are not able to be repositioned until the CIAS is no longer present, the signal has been reset, and the valve handswitch has been manipulated to effect a change from the valves closed position.

Item 2.1.6.a - Systems Integrity for High Radioactivity

ANO-1 & 2

Question - Describe or outline the preventive maintenance program. Identify in procedures leakage limits at which action will be taken to reduce leakage.

Response

In addition to the performance of periodic leak tests every 18 months, plant procedures will be revised by February 10, 1980, to indicate that trouble reports should be used to report indications of leakage such as boric acid accumulations, increased readings on ventilation stack monitors and airborne activity in particular areas. Also, the periodic leak tests will be performed using specific plant procedures which will specify levels of leakage above which corrective action should be taken.

The leakage test data for ANO-1 will be provided as soon as testing is completed, but no later than February 15, 1980. The ANO-2 leakage tests data is presented herein.

SYSTEM	INITIAL LEAKAGE	FINAL LEAKAGE
Waste Gas System	No Discernible Leakage	
Liquid Radwaste	2.3 cc/min	2.3 cc/min.
Low Pressure Injection	72.06 cc/min.	71.06 cc/min.
High Pressure Injection	7.81 cc/min.	7.81 cc/min.
Chemical & Volume Control	2.82 cc/min.	0.88 cc/min.
Reactor Bldg. Spray	518.06 cc/min.	367.9 cc/min.

Item 2.1.6.b - Design Review of Plant Shielding

ANO 1 & 2

Question - Identify and describe any minor changes that will be incorporated into the plant. What is your best estimate of what you can do by January 31, 1980?

Response

From our previous submittal, we noted that the major contributors of high radiation doses in the reactor auxiliary buildings are the makeup (ANO-1) and volume control (ANO-2) tanks. Because the radiation levels are too high to allow access in vital areas like the sample room, decay heat pump rooms and certain areas of the control room using the criteria set forth by NUREG-0578, our efforts are centered around reducing levels from the makeup tank/volume control tank areas.

Presently, in the event of high letdown line radiation levels, an alarm will sound in the respective control room. Per technical specification requirements, we shutdown within 72 hours (ANO-1) or 54 hours (ANO-2) if a prescribed limit of I-131 DE (3.5 μCi/gm, ANO-1; 1.0 μCi/gm, ANO-2) is reached. The next step is to determine the cause of the activity and correct it. Therefore, by existing procedures and equipment, we will maintain the activity levels in the makeup tank/volume control tank within acceptable limits for access to vital areas. The value of activity in the makeup tank that would limit access on ANO-1 in the sample room to less than two hours and still meet GDC-19 would be approximately 6000 μCi/gm. The value would be higher for ANO-2 before problems would arise. Therefore, in the short-term we are well prepared to avoid a situation that might limit access to vital areas even with a non-mechanistic type fuel failure.

Also, portable shielding will be purchased and remain on-site for use in areas to reduce personnel exposure to acceptable values.

Item 2.1.8.a - Post-Accident Sampling

ANO - 1 & 2

Question - Furnish specific items that will be completed in the short and long-term.

Response

An on-going evaluation is being made to minimize sampling volumes and thus exposure in taking a sample of primary coolant liquids or gases. Portable shielding will be purchased and remain on-site for use in areas that may necessitate shielding to reduce personnel exposure to acceptable values. Our procedures will be reviewed and revised, if necessary, to lower exposure when taking samples and analyzing them. These short-term fixes will depend on equipment lead times. We currently expect lead times to be 3-4 months based on vendor contact.

By March 31, 1980, a modified sampling system will be proposed which will minimize the postulated radiation dose to personnel and still maintain capability of obtaining meaningful samples.

Question - How will a representative RCS sample be obtained for both the short and long-term?

Response

Current procedures will be used for obtaining a representative RCS sample for both short and long-term unless very high radiation levels are detected in the letdown line of the affected unit. In this case, an RCS sample will be taken, using procedures outlined above, from the most representative sample point available.

New RCS sampling points will be included in the description of the modified sampling system if they are required to obtain a representative sample. Long-term sampling system modifications will be proposed by March 31, 1980.

Question - Provide an outline of procedures to obtain samples and make measurements in the interim (not limited to RCS).

Response

Interim procedures for obtaining a containment air sample will emphasize the use of health physics coverage, minimum volumes and short stay-times. A containment hydrogen analysis may be obtained from areas near the north or south piping penetration rooms. Since post-accident radiation levels are expected to be much lower in the area of the south penetration room, interim procedures will specify the use of the hydrogen analyzer in this area. RCS samples will be obtained using procedures outlined above.

Item 2.1.8.b - Increased Range of Radiation Monitors

ANO-1 & 2

Question - Provide an outline for the procedure to be used in obtaining iodine samples on releases from plant vents.

Provide justification for the adequacy of the H_2 purge system noble gas monitor (ANO-1 only).

Response

The basic mechanism for measuring iodine and noble gas releases from plant vents is via hardware such as described under Item 2.1.8.b of our January 18, 1980 submittal. This system is being installed on the auxiliary building vents during the January-February 1980 outages of both units. A similar system will be installed on the hydrogen purge system of Unit 1. Its installation is expected to be completed by May 1, 1980. In this system, iodine is collected in a sample cartridge. The cartridge is then transported to the counting facility for analysis.

Item 2.1.8.c - Improved Iodine Instrumentation

ANO 1 & 2

Question - Expand on methods for in-plant Iodine analysis.

Response

ANO currently has a compute based gamma spectrometer with GeLi detector that can be dedicated to air samples during an accident. Sample collection and count times will, in an accident situation, be minimized so that a rapid analysis can be made to determine if Iodine concentrations are above or below MPC.

Additionally, we are ordering two dual unit single channel analyzers which can be used to analyze air samples for Iodine during an accident. The air samples will be collected by systems consisting of a regulated sample pump, particulate filter, and Iodine sample cartridge. 2" x 2" NaI detectors will be used to count the samples.

These two additional systems are expected to be available for use on-site by May 1, 1980. Our present plans are to locate one of the analyzers in the Control Room and one in the Technical Support Center.

Item 2.1.3.b - Inadequate Core Cooling Instrumentation

ANO - 1 & 2

We have completed our investigations into the various means proposed by our NSSS vendors for detecting inadequate core cooling. Our evaluation included reactor water level indication. The following information summarizes the results of these studies:

a. The investigation showed the existing instrumentation could detect inadequate core cooling. The hot and cold leg RTD's along with pressure indication will indicate whether the RCS is subcooled or saturated. This determination will lead to operator actions designed to return the RCS to a subcooled condition. Should these actions be ineffective, the incore thermocouples or the hot leg RTD's indicating superheated temperatures for the existing RCS pressure will privide a positive indication that the core is partially uncovered and inadequately cooled. Those indications would lead to subsequent operator actions designed to depressurize the RCS to reach the low pressure injection system setpoint in order to reflood the core region. These operator actions will recover the core and begin to recover RCS inventory. The existing instrumentation will show when the core is recovered by a decrease in incore thermocouple readings.

b. A water level measurement across the core may not be an unambiguous indication of core cooling during core uncovery due to frothing which will provide heat transfer over a region not defined by the measured water level. Further, since the core heat source is non-uniform, proper temperature compensation of the indicated water level is not feasible.

We conclude, therefore, that a reactor water level indication will not provide an unamiguous indication of inadequate core cooling. We further conclude that existing instrumentation and procedures adequately satisfy the intended purpose of maintaining the reactor core in a coolable geometry.

Item 2.1.1 - Emergency Power Supply

ANO-1

Question - What is the basis for pressurizer heater size and time to initiate? Is this based on actual heat loss conditions? Is it conservative? Why do B&W and CE positions differ?

Response

B&W has recommended at least 126 KW of pressurizer heaters be available from an assured power source within two (2) hours after loss of off-site power to establish and maintain natural circulation at hot standby conditions. The number of pressurizer heaters was determined by taking into account the following:

1. The loss through the pressurizer insulations. The surface areas of the insulation was calculated and an average heat flux of 80 BTU/hr ft^2 was assumed on the outside surface area. This resulted in an approximate heat loss of 96,000 BTU/hr.

2. The loss through the uninsulated pressurizer areas around the horizontal heater bundles was calculated and resulted in an approximate heat loss of 50,000 BTU/hr.

3. B&W's experience has shown that the insulation heat losses account for only 20 to 40% of the total losses. Therefore, it was recommended that a minimum factor of 2.5 be applied to the sum of the accounted losses. This results in an additional heat loss of 219,000 BTU/hr.

Thus the total calculated heat loss from the system is 365,000 BTU/hr or 107 KW. Due to the grouping of the heaters, the value of 126 KW was selected.

The time for establishing the heaters was determined by the amount of heat losses from the pressurizer and the initial water level in the pressurizer.

Actual measured heat losses with the RCS maintained at an average temperature of 535^{o}F and pressure of 2155 psig have been measured. In July 1974, 169.9 KW was the measured value for heat loss. Following pressurizer insulation modification, heat losses were again measured under the same conditions in November 1975, and determined to be 82.75 KW. Therefore, 126 KW is shown to be a conservative value.

Also, as can be seen from the above discussion, pressurizer insulation design plays a significant role in the amount of pressurizer heaters needed to maintain natural circulation. Therefore, one would reasonably expect calculated values to be different between the C.E. and B&W units.

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ANO-2

Question - Provide justification for the capability of the diesel generator to accept 150 KW of pressurizer heaters.

Response

We have assumed worse case (i.e., main steam line rupture and maximum diesel generator loadings) to determine the diesel generator loads of 2856 KW (i.e., 2706 KW plus 150 KW of pressurizer heaters). The 2856 KW loading represents 6 KW more than the 2850 KW continuous rating but does not exceed the 2000 hour rating of 3100 KW (See Section 8.3.1.19 of the ANO-2 FSAR). Table 8.3-1 of the ANO-2 FSAR shows many loads required only for a short time (such as 8 hours, 12 hours, and 1 day) which will reduce the actual continuous loading further. Also, the total loading of the diesel generator assumed a motor efficiency of only 90%. Actual test efficiencies have been found to be above this value. For example, the service water pump efficiencies are 91.5%, 92.5%, and 93% at 2/4, 3/4 and 4/4 loads. This one instance will allow a reduction in actual loads of more than 6 KW.

Item 2.1.3.b - Instrumentation for Detection of Inadequate Core Cooling

ANO-1 & 2

Question - What is the alarm setpoint for the saturation meters?

Response

When 30°F margin to saturation is reached, based on saturation meter calculations, an alarm will annunciate in the control room.

Item 2.1.4 - Diverse Containment Isolation

ANO-1

Question - Provide justification for not using a diverse containment isolation system for systems 3-8.

Response

All of the systems listed as items 3 through 8 are closed loop cooling systems for essential equipment (i.e., control rod drives, reactor building coolers, reactor coolant pumps, letdown heat exchangers and seal water heat exchangers). All of the items are needed for a "normal" orderly cooldown following receipt of an ES signal. Since the introduction of an ES signal does not necessarily follow a LOCA situation, the equipment needed for "normal" orderly shutdown should be left in service. Only when a LOCA condition is verified by a high building pressure should the equipment operation be degraded to isolate the containment. Also, none of the above items have direct contact with the reactor coolant such that non-isolation would allow contaminated fluid to escape unless the integrity of the closed loop system was also violated. For the above reasons, Items 3 through 8 do not require modification to the Reactor Building Isolation System.

Item 2.5.a - Dedicated H_2 Control Penetrations

ANO-1

Question - Describe changes to be made on the H_2 purge service water system. When will these be completed?

Response

Solenoid valves will be added to the seal water supply lines to the hydrogen purge inlet and outlet fans so that manual valve alignment will no longer be necessary. The valves will be operable from the control room in the same panel as other hydrogen purge controls. Installation will be completed at the first available outage of sufficient duration.

ANO-2

Question - Correct the error in January 18, 1980 letter which states the ANO-2 Operating License is based of hydrogen recombiners and a hydrogen purge system.

Response

Only the redundant, safety-grade, in-containment hydrogen recombiners are listed in the ANO-2 Technical Specifications as being required to be operable for post-LOCA hydrogen control. While a hydrogen purge system is installed, no credit for its operation is assumed.