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2-110-09

Director of Nuclear Reactor Regulation
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Subject: Arkansas Nuclear One - Unit 1 & 2
Docket No. 50-313 and 50-368
License No. DPR-51 and NPF-6
Meeting With NRC on Service Water, Steam Generator Level and Bolting Concerns on 10/22/80
(File: 0510.5, 2-0510.5)

Gentlemen:

As a result of the October 22, 1980, meeting between AP&L and the NRC concerning service water problems (ANO-1&2), steam generator level problems (ANO-1) and some bolting concerns (ANO-1&2), certain commitments were made. This letter serves as documentation of these commitments and responses as follows:

A. The NRC stated that, based on AP&L's presentation and past correspondence on service water problems, no immediate NRR actions are required on ANO-2.

B. As AP&L stated in the meeting, the ANO-1 Technical Specifications will be modified during the upcoming refueling outage to cover similar surveillance and chlorination procedures as ANO-2. Presently, and until AP&L implements the modified ANO-1 Technical Specifications on reactor building coolers, a procedural means will be used to assure increased frequency of surveillance of service water flow to the reactor building coolers similar to ANO-2 commitments.

C. The bolting concerns are addressed item by item below:

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1. Concerning the Terry turbine stud failures at ANO-1, Mr. Bob Herman of the NRC and Mr. Daniel Spond of AP&L discussed the NRC independent failure analysis report and the AP&L failure analysis report on the failed studs. The NRC report concluded that the studs were AISI 1215 not A193-B7 as stated in IE Information Notice No. 80-29. The failure apparently occurred by brittle transgranular fracture (cleavage).

   Mr. Spond explained that the AP&L report, which was completed by the Southwest Research Institute, concluded that the failed studs were resulfurized low carbon steel and that the failure mechanism was brittle fracture. Mr. Spond explained that the studs were initially identified as A193-B7 by mistake and that Terry Corporation later informed AP&L that the studs were C1117 material. Because both reports suggest the occurrence of water hammer as the initiating event, Mr. Herman asked AP&L to inspect any turbine structural or pressure boundary component of low toughness that may also have been damaged.

   In a followup telephone call on October 31, 1980, Mr. Spond informed Mr. Herman that AP&L will inspect the ANO-1 Terry turbine shell casing (gray cast iron) during the refueling shutdown commencing in January, 1981. This inspection will include both visual and magnetic particle examination of the shell casing in the area of the holddown bolts. The governor valve body (A216 Gr WCB) and the turbine holddown bolts (A449) are made from materials of good impact properties. These items should not require further testing or inspection. Mr. Herman said that this inspection plan was acceptable.

   Mr. Spond stated that AP&L replaced the failed inlet flange studs with A193-B7 studs. The valve bonnet studs and the steam ring studs, both of which were identified by Terry Corporation as C1117, were also replaced by A193-B7 studs.

   Terry Corporation has informed AP&L that ANO-1 is the only nuclear unit with this type of turbine unit. Thus, there are not any generic implications.

2. The problem at Rancho Seco concerning 400 Series bolting in Anchor Darling valves, as explained in INPO/NSAC Report 80-3, was intergranular corrosion failure of ASTM A193 (416) studs in Anchor Darling valves. The cause of the corrosion was attributed to improper heat treatment and/or an environmentally-induced phenomenon such as stress corrosion cracking.

   Anchor Darling has informed both the NRC and AP&L that only one valve at ANO has the 416 studs. This valve is 2CV4960, a non-safety related valve in the Chemical Volume and Control System of ANO-2. Mr. Bob Herman of the NRC requested that AP&L perform field hardness tests on the Type 416 studs in this valve. In a subsequent telephone conversation on October 31, 1980, Mr. Spond informed Mr. Herman that AP&L has to procure a field hardness tester before these tests can be performed. AP&L is presently considering the purchase of this equipment and will notify the NRC when the final resolution is reached.

3. The ANO-1 steam generator manway bolting cracking experience was discussed between Mr. Bob Herman of the NRC and Mr. Dan Spond of AP&L. Ultrasonic and magnetic particle testing on July 22, 1980, detected three cracked studs in the lower manway of the "A" OTSG. All studs in the "A" and "B" generator manways were inspected by both UT and MT except for the studs in the lower "B" generator manway which was not opened. The stud material is AISI 4340. Two of the cracked studs were shipped to SWRI for analysis. SWRI does not yet have any results to report.

   The third stud was sent to the Babcock & Wilcox Lynchburg Research Center for analysis. AP&L received the B&W failure analysis report on October 30, 1980. Mr. Spond discussed the contents of the report with Mr. Herman via telephone on October 31, 1980. The report states that the failure was a crack that extended from a thread root inward to a maximum depth or approximately 0.24 inches. The crack was detected by both UT and MT examination. The crack appears to have initiated and propagated by primarily a transgranular mode. B&W believes that the cracking mechanism is very similar to the mechanism proposed for the Oconee stud failures. B&W also believes that the cause of failure may be the MoS_2 (Molykote) lubricant which breaks down at operating temperatures in the presence of water. At present, B&W is evaluating an alternative lubricant and is developing a procedure for removing the Molykote residue. Also, B&W is considering a revision to the heat treatment of the bolts. AP&L expects to receive B&W's recommendation by the end of November, 1980. AP&L will inform the NRC of SWRI's report when it is completed.

D. The ANO-2 FSAR has a discrepancy between the flow values given for service water to the containment cooling units in Figure 6.2-11 and Figure 9.4-5. Both of these values are incorrect and an analysis has been performed to assure that the 1250 gpm flow per group in the Technical Specification is acceptable. The FSAR update now in process will correct the errors in Figures 6.2-11 and 9.4-5.

E. The following surveillance, inspections and modifications will be performed to detect service water system degradation and ensure continued operability:

   1. The Unit 1 Reactor Building cooling units will be tested every two weeks during operation above cold shutdown to ensure that adequate service water flow through the coolers exists. Since no flow measurement devices exist presently, we are monitoring differential pressure from service water supply to return in a specific alignment which duplicates a baseline test run following cleaning of the cooling units. Additionally, service water bay chlorination is performed concurrently whenever service water temperature is between 60°F and 80°F. Flow measurement devices will be added during the next refueling.

   2. The Unit 2 Containment cooling units will be flow tested and chlorinated as required by Technical Specification 3/4.6.2.3. The results of these tests will be trended to ensure degradation is detected.

3. Since no significant fouling or plugging of other heat exchanger units in the Unit 1 service water system has been detected, frequent inspection is not considered to be necessary. However, inspection and/or testing of a representative sampling of these heat exchangers will be performed during the refueling outage which is now scheduled for the 1st quarter of 1981.

4. Due to the fact that the Unit 2 HPSI pump seal coolers and bearing coolers were found to have their service water supply lines plugged with silt and corrosion products, they will be checked for flow during the regular monthly Section XI testing. This check will involve visually verifying service water flow through vents downstream of the coolers with the service water supply valve open and the return valve closed. Additionally, the effect of little or no service water flow through the HPSI pump bearing and seal coolers is presently being evaluated. Upon completion of this test and evaluation, AP&L will notify the NRC of the results. Other Unit 2 service water coolers also showed evidence of fouling. These coolers include the auxiliary building shutdown heat exchanger room coolers, the LPSI pump seal coolers, the containment spray pump seal coolers and the HPSI pump room coolers, and they will be flow checked and/or inspected for cleanliness in January, 1981. These coolers, as well as a representative sample of all Unit 2 service water heat exchangers, will be tested and/or inspected during the next refueling outage which is now scheduled for the 2nd quarter of 1981.

5. Review of the Unit 1 and Unit 2 service water systems is presently underway to identify design changes which will be made during upcoming refueling outages to facilitate inspection of coolers and to add new differential pressure and/or flow measurement devices. Also, evaluation of piping arrangements is underway which is aimed at reducing restrictions or internal pipe irregularities in small pipe (2½" and under). AP&L will also consider replacing small carbon steel pipe with stainless to reduce the corrosion potential and the addition of flanges/unions to facilitate removal and inspection in the future. The results of this review and definition of our planned modifications should be complete in December, 1980 for Unit 1 and by February, 1981 for Unit 2.

6. The Unit 1 and Unit 2 service water bays will be inspected (and cleaned if necessary) during the 1981 refueling outages. It is expected that inspection/cleaning will be repeated during all subsequent refueling outages unless design modifications are made which make these inspections unnecessary.

F. AP&L is also developing a long term plan for improving the service water system. This plan includes the following:

1. Evaluation of the entire service water system to determine the potential for overall system design improvements.

2. Evaluation of component compatibility with present service water chemistry and a determination of the effect on materials of additional chlorination. Present chlorination levels are consistent with industry practice and, therefore, require no additional materials compatibility evaluations.

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3. Development of flushing and cleanout hardware modifications.

4. Evaluation of the change out of specific service water components depending on the results of items 1 and 2, above.

5. Evaluation of the overall program to ensure effective Asian clam control.

AP&L is presently negotiating with an outside consultant to assist with the overall evaluation. The schedule is to have a preliminary assessment of the system by January 1, 1981. The scope and schedules of any recommended modifications will follow after this.

The above addresses all the concerns expressed by the NRC in our October 22, 1980, meeting and is presented to document AP&L's responses. Please contact us if additional clarification is needed.

Very truly yours,

David C. Trimble

David C. Trimble
Manager, Licensing

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