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ACCESSION NBR: 9705290143 DOC. DATE: 97/05/20 NOTARIZED: NO DOCKET #
FACIL: 50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287

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SUBJECT: Forwards response that confirms completion of requested NRC actions re Confirmation Action Ltr that delineates certain actions as result of Unit leak.

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TITLE: Immediate/Confirmatory Action Ltr (50 Dkt-Other Than Emergency Prepar

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DUKE POWER

May 20, 1997

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Response to Confirmation of Action Letter - Oconee
Units 1, 2, and 3

As a result of a leak in the Reactor Coolant System (RCS), Oconee Unit 2 was shut down on April 22, 1997. The leak was caused by a crack in the pipe to safe-end weld connection at the RCS nozzle for the High Pressure Injection (HPI) System A1 injection line. By letter dated May 5, 1997, the NRC issued a Confirmation of Action Letter (CAL) that delineates certain actions as a result of the Unit 2 leak. In addition, the CAL addresses certain actions related to the subsequent Unit 3 HPI System degradation on May 3, 1997, which delayed entry into cold shutdown.

The May 5, 1997, NRC letter requests that the licensee respond in writing when the actions in the CAL are completed. Please find attached our response that confirms that the requested NRC actions are completed.

Please address any questions to J. E. Burchfield, Jr. at (864) 885-3292.

Very Truly Yours,

B. W. Hampton 280086
for

J. W. Hampton
Site Vice President

Attachment

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Document Control Desk

May 20, 1997

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xc: L. A. Reyes, Regional Administrator
Region II

D. E. LaBarge, Project Manager
Office of Nuclear Reactor Regulation

M. A. Scott, Senior Resident Inspector
Region II

Attachment
Response to Confirmation of Action Letter

The May 5, 1997, NRC Confirmation of Action Letter delineates four actions that must be completed prior to the restart of Oconee Units 2 and 3. Each of these actions is restated and addressed below:

- 1) Determine the cause of the Unit 2 cracked HPI weld, including the failure of your programs (e.g., Generic Letter 85-20 and Bulletin 88-08 augmented inspection) to preclude such an event. Evaluate the findings and implement appropriate corrective actions to prevent recurrence including a response to the NRC questions made available to you on May 2, 1997.

Duke Power has a formal process, referred to as the Failure Investigation Process (FIP), to methodically determine the root cause of an equipment failure. A FIP team was initiated on April 22, 1997, to determine the root cause of the crack in the Unit 2 A1 injection line weld. As a result of this investigation, Duke Power concludes the root cause was an ineffective examination program for HPI nozzle components. The procedures were not specific in identifying all areas which are required to be examined. For example, the procedures did not require an ultrasonic test (UT) of the pipe to safe-end weld, and for radiographic tests the gap between the sleeve and safe-end was inappropriately interpreted as the sleeve end to bottom weld gap.

A related finding was that the examination commitments for the HPI nozzle components were inadequately controlled by the Inservice Inspection (ISI) program. The ASME Section XI ISI Plan permits grace periods for examinations. These grace periods were inappropriately applied to the fixed inspection intervals associated with the augmented inspection plan for the HPI nozzle components.

The failure mechanism for the pipe to safe-end weld was high cycle/low stress thermal fatigue. Flow induced vibration may have contributed to the thermal sleeve failure after it became loose.

Corrective actions associated with the Unit 2 RCS leak were discussed at a May 14, 1997 meeting at the staff's headquarters and a May 16, 1997, restart meeting at Oconee Nuclear Station. These actions include the following:

Completed Corrective Actions

- Replaced the thermal sleeve and safe-end with a new design for the 2A1 HPI normal injection line and examined the other Unit 2 HPI nozzle components.
- Shut down Unit 3 to examine the HPI nozzle components. Based on these examinations, the thermal sleeve and safe-end for the 3A1 HPI normal injection line were replaced with a new design.
- Temporary instrumentation has been installed on the Unit 2 nozzles and is being installed on Unit 3 to monitor temperatures in these lines.
- Guidelines have been implemented, in accordance with a May 3, 1997 Duke letter to the NRC, to carefully monitor RCS leakage rates on Oconee Unit 1.
- NRC commitments were reviewed to identify all augmented inspection requirements and ensure Oconee has complied with these requirements. The augmented examinations recently completed on Units 2 and 3 exceed Generic Letter 85-20 requirements.

Long Term Corrective Actions

- Oconee Unit 1 will be shut down when Units 2 and 3 return to power, but no later than June 14, 1997, to perform appropriate examinations.
- Warming line flows will be evaluated regarding changes that may reduce the effects of thermal stresses.
- Operations procedures will be reviewed to minimize HPI nozzle component stress and fatigue.
- A specific examination procedure and tracking system for augmented examinations will be developed. The improved nozzle component examination program will be submitted to the staff by 30 days prior to the UIEOC17 refueling outage, but no later than September 1, 1997.

In addition, the staff transmitted a request for additional information, dated May 5, 1997, regarding the Unit 2 RCS leak. Oconee responded to this request for additional information in letters dated May 7, 1997 and May 8, 1997.

The initial responses to the request for additional information have been supplemented by Duke letters dated May 9, 1997, May 12, 1997, May 13, 1997, May 16, 1997, and May 19, 1997. Duke Power met with the staff on May 14, 1997 to discuss in detail the Unit 2 RCS leak and the degradation in the Unit 3 HPI System experienced on May 3, 1997. In summary, Duke has thoroughly investigated the information requested in Item 1 of the CAL and has implemented comprehensive corrective actions to support the restart of Units 2 and 3 and the continued safe operation of Oconee Unit 1.

- 2) Determine the cause of the Unit 3 HPI System degradation which delayed entry into cold shutdown on May 3, 1997. Evaluate the findings and implement appropriate corrective actions. Verify Unit 1 letdown storage tank level instrument accuracy weekly, until root cause and corrective actions are implemented.

The 3A and 3B HPI pumps were damaged on May 3, 1997, during a Unit 3 cooldown due to an inaccurate indication of letdown storage tank (LDST) level. A Duke Power FIP team and Significant Event Investigation Team (SEIT) thoroughly investigated this event. As a result of these efforts, Duke has determined two primary causes for the event. First, the design weakness of a common reference leg for LDST level instruments combined with a leaking instrument fitting resulted in an inaccurate indication of LDST level. Second, the control room team did not properly monitor and detect the inaccurate level indications given the existing plant conditions. A contributing cause was the failure to adequately apply available operating experience. The loss of reference leg inventory which led to the inaccurate level indication was caused by scratches on the seating surfaces of the fitting and over torquing of the cap.

The results of Duke Power's investigation of this event were discussed at a public restart meeting at Oconee Nuclear Station on May 16, 1997. Corrective actions discussed at this meeting include the following:

Corrective Actions Prior to Restart:

- Detailed (FIP) and general (SEIT) investigations were completed.
- Support organizations (OSC, TSC) were activated as necessary to assist in completing the Unit 3 cooldown. Activities included restoring the accuracy of the Unit 3

LDST level indication and re-establishing an HPI makeup flow path. The Unit 3 cooldown and depressurization was completed.

- The abnormal procedure for loss of HPI makeup was improved.
- A heightened awareness of monitoring control room instrumentation was established.
- For Unit 1, the LDST reference leg is being verified as full weekly and the reference leg tubing fittings are being checked for leaks each shift. These actions will continue until the LDST level and pressure modifications described at the May 16, 1997 meeting are implemented.
- Modifications on Units 2 and 3 are adding separate reference legs for the LDST level transmitters and adding a redundant LDST pressure transmitter.
- The Unit 3 HPI System is being repaired, flushed, inspected, and tested as required to assure operability.
- Short-term Operations training on the event and the LDST modifications is being implemented.
- The applicability of this event to other tank level instruments has been evaluated.

Long Term Corrective Actions

- Modifications will be implemented on Unit 1 to add separate reference legs for the LDST level transmitters and add a redundant LDST pressure transmitter.
- Applicable procedures will be reviewed and benchmarked and appropriate improvements will be implemented.
- The modification selection process at Ocone will be reviewed in light of this event to assure proper prioritization.
- Operator simulator training on loss of LDST level will be implemented.

- A reliability study of the HPI System will be performed.
- The foreign material and damage inspection work practices for tubing caps and fittings will be improved.
- An action plan will be developed and work practices will be modified to address fittings from different manufacturers.
- The root valve position verification program will be expanded to include critical root valves outside containment where valve position is not self-revealing.
- The removed 3A and 3B HPI pumps will be examined.
- A root cause of the failure to adequately apply operating experience from the 1980s will be performed.

In summary, Duke has thoroughly investigated the information requested in Item 2 of the CAL and has implemented comprehensive corrective actions to support the restart of Units 2 and 3 and the continued safe operation of Oconee Unit 1.

- 3) Implement as a compensatory measure, the enhanced leakage detection and makeup flow guidelines for Unit 1 set forth in your letter of May 3, 1997.

The enhanced leakage detection measures described in Duke's May 3, 1997 letter to the staff have been implemented on Unit 1. In addition, the makeup flow guidelines described in Duke letters dated May 2, 1997, and May 7, 1997 have been implemented on Unit 1. These measures will remain in effect until Unit 1 is shut down for inspections of the injection lines.

- 4) Meet with the NRC to discuss the results of (1) and (2) above, including any impact on the continued safe operation of Unit 1. Obtain concurrence from the Regional Administrator prior to criticality for Units 2 or 3.

Duke Power met at the staff's headquarters on May 14, 1997 to discuss in detail the issues associated with Items 1 and 2 of the CAL. A meeting was also held at Oconee Nuclear Station on May 16, 1997 to discuss Items 1 and 2 of the CAL. At both of these meetings, Duke Power discussed the results

of its investigations of the subject events and the corrective actions that have been and will be implemented. In addition, Duke Power provided its basis for the continued safe operation of Unit 1. Thus, the required meetings of Item 4 in the CAL have been conducted.

In summary, Duke Power confirms that all of the actions required by the May 5, 1997, NRC CAL have been completed. Duke Power has thoroughly investigated these events and concludes that comprehensive corrective actions have been implemented to support the restart of Oconee Units 2 and 3 and the continued safe operation of Oconee Unit 1.