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50-269/270/287

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SUBJECT:
PROPOSED MODIFICATION OF THE HIGH PRESSURE INJECTION SYSTEM AT SUBJECT
FACILITY WHICH IS INTENDED TO EFFECTIVELY MITIGATE SMALL BREAK LOCA

PLANT NAME: OCONEE - UNIT 1
OCONEE - UNIT 2
OCONEE - UNIT 3

REVIEWER INITIAL: XRS
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DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

July 14, 1978

TELEPHONE: AREA 704
373-4083

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. Reid, Chief
Operating Reactors Branch #4

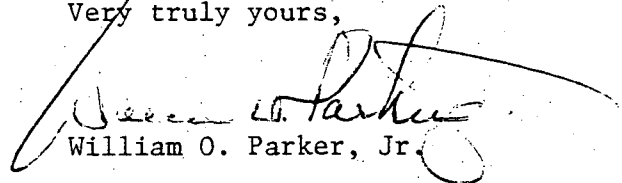
Reference: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Mr. Case:

My letters of April 14, 1978 and April 21, 1978 addressed the problem with the previous ECCS performance analysis of small breaks of Oconee reactors and advised you of interim corrective actions implemented to assure acceptable ECCS performance during small break LOCA's, including those at the pump discharge. Subsequently, on May 15, 1978, an analysis of the ECCS cooling performance calculated in accordance with the B&W Evaluation Model for operation of Oconee units with operating procedures described in my letter of April 21, 1978, was submitted. The purpose of this letter is to advise you of our proposed modification of the high pressure injection (HPI) System of Oconee Units 1, 2 and 3. The proposed modification is intended to effectively mitigate small break LOCA's with minimum operator action.

The proposed modification is described in the attachment to this letter. In order that we may initiate the engineering evaluation, final design and procurement of material and equipment and schedule the field installation of the modification, we request that the NRC review of this proposed modification be completed as soon as possible. It is expected that this modification can be implemented for each unit during the applicable refueling outage that occurs after six months following the NRC approval of the modification.

Very truly yours,


William O. Parker, Jr.

PMA:scs
Attachment

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1/1

O C O N E E N U C L E A R S T A T I O N

U N I T S 1 , 2 A N D 3

PROPOSED MODIFICATION
OF
HIGH PRESSURE INJECTION SYSTEM

July 14, 1978

OCONEE NUCLEAR STATION
UNITS 1, 2 AND 3
PROPOSED MODIFICATION OF HIGH PRESSURE INJECTION SYSTEM

I. Introduction

In April, 1978, a problem was identified with regard to the ECCS performance analysis of small break LOCA's for Oconee class reactors. The previous small break ECCS performance analysis for Oconee class reactors, as documented in BAW-10052, considered the pump suction as the limiting break location for small breaks. The analysis of these breaks was performed assuming that only one train of the high pressure injection (HPI) system was operable and was shown to be adequate to provide the necessary core cooling. Recently, however, it has been determined that the limiting break location for small breaks is the pump discharge of the reactor coolant cold legs and not the pump suction, as was assumed in the BAW-10052 analysis. The analysis of a spectrum of small breaks at the pump discharge showed that for these breaks just one train of HPI flow is insufficient to maintain the core covered with fluid without any cladding excursion. Therefore, the re-analysis of small breaks (at the pump discharge), as documented in Reference 1, has been performed assuming HPI flow equivalent to 350 gpm at a reactor coolant system pressure of 600 psig to the three intact reactor coolant cold legs (70 percent of 500 gpm total HPI flow), and this flow was shown to be adequate to control the small break transients to within acceptable consequences. But, with the existing arrangement of the Oconee HPI system this amount of flow can be attained only when two HPI pumps and the two associated HPI flow paths are operable.

Each of the Oconee units has three HPI pumps normally available, and all three pumps are automatically started when the Engineered Safeguards (ES) signal is actuated. The flow discharged from these pumps is injected into the reactor coolant system through two independent injection lines, each branching into two smaller lines, and terminating into the reactor coolant cold legs between the pump discharge and the reactor vessel nozzle. Thus, under normal design conditions HPI flow by two pumps through two injection paths, adequate to provide the necessary flow into the core during small break events, is available. There exists, however, two postulated failure modes of the HPI flow trains-- (1) failure of HPI pump "C" and (2) failure of the ES valve (HP-26 or HP-27) in the injection line-- which could render one HPI train inoperable. To assure that two HPI trains are available, as required by the recent analysis of small break LOCA's⁽¹⁾, the Oconee Emergency Operating Procedures were revised to require operator action outside the control room to establish flow in applicable HPI flow trains. In order to eliminate operator action outside the control room and to effectively mitigate the consequences of small break LOCA's, a modification of the HPI system as described in the following section will be implemented.

II. Description of Proposed Modification

The proposed modification consists of installing a cross-connect line between the A and B HPI discharge lines downstream from the ES valves

(HP-26 and HP-27) and another tie-line connecting this cross-connect line and the HPI pumps B-C discharge header with isolation valves, as shown in Figure 1. The isolation valves HPI-X and HPI-Y (temporary designations) will be manually-controlled, electrically-operated valves (EMO valves) capable of being manipulated from the control room. The operators of these valves will be powered by a source of power supply independent of that supplying power to the HPI-A and HPI-B flow trains.

III. Evaluation

The proposed modification will assure that two HPI trains (two pumps and the two associated flow paths) will be available during design conditions involving worst case single failure. The single failure analysis of the HPI system shows that for all postulated single failure conditions the HPI system with the proposed modification will be capable of supplying HPI flow by two HPI pumps through two injection paths.

The ECCS performance analysis of small breaks at the pump discharge, documented in Reference 1, is performed assuming that HPI flow through one train is available at the time of the transient and that the HPI flow through the other train is established at 10 minutes following the ES actuation (total HPI flow of 500 gpm at 600 psig). The HPI flow through each train is 440 gpm at 600 psig for Oconee units. Therefore, the modified HPI system more than adequately satisfies the ECC flow requirements of small break LOCA's.

The proposed modification is a passive system during normal operation of the plant, and utilization of the modified flow lines is required only in the event of a small break LOCA and a simultaneous failure of one of the existing flow trains. The proposed modification would not increase the maximum flow by the HPI system but would only increase the minimum available flow. It is considered that the proposed modification would not adversely affect the performance of systems important to safety.

IV. Operator Action

The only operator action required for the modified HPI system is the opening of the isolation valves HPI-X and HPI-Y following an ES actuation. The allowable time to accomplish this function is ten minutes. Since the controls for these valves will be located within the control room, the operator can accomplish this function promptly and easily.

Reference 1 - Duke Power Company Letter to NRC (from W. O. Parker, Jr. to Edson G. Case), May 15, 1978.

FIGURE 1
 OCONEE NUCLEAR STATION
 PROPOSED MODIFICATION OF HPI SYSTEM

