ENCLOSURE

SAFETY EVALUATION OF THE CONTROL ROD DRIVE RETURN LINE MODIFICATIONS FOR THE JAMES A. FITZPATRICK NUCLEAR POWER PLANT

I. Introduction

Routine inservice inspection of the Control Rod Drive return line (CRDRL) during the current (June 1983) refueling outage for Cycle 6 operation of FitzPatrick resulted in the detection of a through-wall weld defect in the three-inch piping upstream of the vessel penetration. Review of the original construction radiographs revealed a transverse indication at approximately the same position as the discovered crack. Metallographic examination of this joint will be performed after removal of the affected piping to determine the extent and possible cause of this cracking.

As a result of this defect in the CRDRL, the licensee informed the Commission by letter dated July 7, 1983 and elected to perform certain modifications pertaining to the CRDRL that had been previously approved by NRC and originally scheduled by the licensee for the next (1985) refueling outage. The decision to implement a portion of the modification during the current outage as corrective action for the defective weld necessitated several deviations from the approved NUREG guidance. Those deviations are discussed below.

II. Discussion

The licensee is implementing modifications to the CRDRL in accordance with Section 8, Staff Position and Implementation, of NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking," except that:

a) the licensee intends to cap the CRDRL vessel nozzle during the present outage in advance of completing the other modifications required by NUREG-0619, which will be installed in accordance with the previously submitted schedule.

   Since the FitzPatrick plant has demonstrated satisfactory operation of the CRD System since 1977 with the CRDRL isolated, the remaining NUREG-0619 modifications need not be completed at this time and will be performed during the 1985 refueling outage.

b) A final liquid penetrant (PT) examination of the outer 7" of the CRDRL nozzle bore will be performed now. The liquid penetrant examination of the inner 7" of the bore, the blend radius and vessel wall will be deferred and performed from inside the vessel during the refueling outage for Cycle 12, or the next time in-vessel penetrant inspection of the feedwater nozzle/sparger is required by NUREG-0619, Table 2.

Not performing a liquid penetrant examination inside the vessel is considered acceptable based on the following:

1. Previous PT, ultrasonic testing (UT) and visual examinations of the nozzle bland radius and local vessel wall have found no indication of defects. These examinations have confirmed the effectiveness of the thermal sleeve during the short period of time during which the CRDRL was in operation.

2. The plant operated a relatively short period (less than 2 years) with the CRDRL in service.

3. To compensate for the extended period until final PD, the licensee proposes to perform a television visual inspection (less than 1 mil resolution) of the nozzle blend radius and adjacent vessel wall during each refueling outage until the final PT is performed.

c) The licensee proposes not to perform the flow capacity test required by NUREG-0619 when capping the CRDRL vessel penetration during the current outage.

This is justified based on:

1. The flow requirement for a BWR/4 (218" vessel) is only 135 gpm, which is well within the capacity of the CRD System (2 pump operation). Two CRD pump capability was demonstrated during the isolated CRD System testing performed in 1977.

2. Performance of this test to properly demonstrate the desired flowrate, requires heat-up of the vessel to normal pressure and temperature followed by a reactor scram. Intentional scrams of this type are undesirable, and the pumping of large quantities of water past the CRD mechanism seals can significantly contribute to seal failure.

3. This requirement has not been imposed on other plants that have proven an alternate shutdown capability for plant fires. The licensee has significantly upgraded its fire protection separation, mitigation, and alternate shutdown capabilities in recent years. A complete alternate shutdown capability (Appendix R) will be fully operational following the 1985 outage.

III. Evaluation

Each of the three deviations is evaluated below:

a) We have reviewed the licensee's plan to implement a portion of the CRDRL modification originally scheduled to be completed during the 1985

refueling outage. We find that the portion of the modification to be implemented--cut and cap the CRDRL vessel nozzle in accordance with NUREG-0619--would result in a modified Control Rod Drive System equivalent to that previously approved and implemented through the short-term corrective actions, i.e., isolation of the CRDRL. Thus, deferring the remaining modifications until the next refueling outage, as originally scheduled by the licensee, will not adversely affect system operation of the control rod drives and is, therefore, acceptable.

b) We have reviewed the licensee's plan to perform certain liquid penetrant examinations and defer other examinations until later operating cycles. We have also reviewed the licensee's justification for the deferral and proposed compensatory measures. We find that the licensee's compensatory action to perform a visual inspection of the nozzle blend radius and adjacent vessel wall during each refueling outage until the final liquid penetrant examination is performed is acceptable.

c) We have reviewed the licensee's proposal to eliminate the control rod drive makeup pump flow test per Section 8.1 of NUREG-0619. This flow test was required as a result of the Browns Ferry fire of March 22, 1975 where the CRD flow path provided the only water source to the reactor core for a limited time, and the low level event at Oyster Creek where this system once again breifly provided the only water to the core. This was Recommendation (6) of Section 8.1 of NUREG-0619.

The use of the control rod drive system as an emergency makeup system was never a design requirement for this system and is beyond the design basis for any present BWR design. The redundant emergency core cooling systems were designed to meet all applicable staff guidance for emergency vessel makeup functions. The purpose of the control rod drive system is to maintain pressure in the CRD accumulators, drive the control rods in and out of the core, and cool the CRD mechanisms.

It should be noted, however, that removal of the requirements for the flow test does not affect the availability of the CRD flow. We are just eliminating the requirement that the system deliver sufficient flow to keep the core covered following loss of all other inventory makeup systems at 40-minutes after scram. The 40-minutes is an arbitrary time and is not based on the scenario of the Browns Ferry fire or any other specific sequence of events with which we are familiar.

This criterion has proven impossible to meet with the currently installed CRD systems. The CRD system discharge piping was sized based on a maximum pump discharge flow rate of approximately 100 gpm. This flow rate results from the previously indicated design functions of the CRD system. At the increased flow rates necessary to meet the recommendations of NUREG-0619, the piping pressure losses can increase as much as 300% so that the system may not have the capability to meet the vessel makeup

inventory recommendation of NUREG-0619. Even with the CRD return line installed (not capped), the NUREG recommended base case flow rate cannot be met. In summary, design criteria employed when the CRD system performance characteristics were developed did not consider its use as a high pressure reactor vessel makeup source.

In addition, we considered the following factors: Licensee's must now have the capability to reach shutdown conditions following a fire in any area of the plant, including such sensitive areas as the control room and the cable spreading room. This requirement is contained in Appendix R to 10 CFR Part 50. We approved the alternate safe shutdown capability for FitzPatrick in our Safety Evaluation dated April 26, 1983.

As a result of the TMI-2 accident, the operating guidelines are now "symptom oriented" with clear instructions as to what makeup systems are available and in what order they should be used no matter what the initiating event may be. The CRD system is listed in these guidelines as one of the available high pressure makeup systems.

The emergency core cooling system (ECCS) including high pressure core injection (HPCI) and the reactor core isolation cooling (RCIC) system have been upgraded by such features as automatic reset (on the RCIC) and automatic restart (on the HPCI) in order to make these systems more reliable.

As mentioned above, we have reviewed the scenario of the Browns Ferry fire and have concluded that the 40 minute criterion has no special significance in relation to this event. The CRD system was used briefly as the only core inventory makeup system earlier during the fire. The 40 minutes also has no other significance in relation to other events which have occurred or could occur at BWRs.

It is also improbable that a future emergency would affect the same systems as those lost during the Browns Ferry fire or that some other common mode failure would spare the CRD system and fail the entire ECCS.

For these reasons we have determined that a flow test of the CRD system to show agreement with the criterion of Recommendation (6) of NUREG-0619 is not required since the CRD system is still available as a make-up system the CRD system will be required to meet all applicable regulations and the design and procedures have been upgraded so that the original intent of Recommendation (6) is met in other ways. We thus consider that the CRD system is acceptable without the above flow rate demonstration test.

Based on the above, we therefore conclude that the deviations from NUREG-0619 proposed by the licensee are acceptable.

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