



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

DRESDEN NUCLEAR POWER STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-237 AND 50-249

BWR FEEDWATER AND CRD RETURN LINE MODIFICATIONS

1.0 INTRODUCTION

NUREG-0619 summarizes the work performed by the NRC staff to resolve Generic Activity A-10, "The cracking of feedwater and CRD return line nozzles." The triple sleeve sparger configuration recommended by General Electric (GE) is different from previous designs. It protects the feedwater nozzle against the high frequency thermal cycles which are responsible for postulated crack initiation and growth mechanism in nozzles. The removal of cladding results in about a factor of two reduction in cyclic thermal stress at the surface of the metal. It also facilitates interpretation of UT signals by eliminating the interface between the clad and the metal.

NUREG-0619 recommends that the performance of the triple sparger should be monitored for any leakage. A leakage of 1 gpm or less based on a conservative evaluation of test results will limit the initiation and crack growth below ASME allowable depths during the life of a plant.

General Electric suggested some system and procedural changes. The system modification involves rerouting the discharge of the Reactor Water Cleanup System (RWCU) to deliver the flow to each feedwater nozzle. Although NEDE-21821-02 shows that system changes in general do not make a large contribution to delaying crack initiation, it does show that rerouting the RWCU can decrease the usage factor with respect to crack initiation from 0.70 to 0.46. This represents a significant usage factor reduction in those plants where rerouting of the RWCU is feasible.

Commonwealth Edison Company (CECo) has notified the staff that each Dresden unit has three feedwater pumps which are operated independently of each other. Feedwater flow from these three pumps combines in a single 24 inch nominal-diameter line, leading to two full flow feedwater regulating valves, installed in parallel in two 14 inch diameter lines. Also, a 20% capacity valve is located in a 4 inch nominal-diameter bypass line for use during startup. Low flow control, in the 0-20% power range, is accomplished through a globe-type bypass valve, which is air operated. This feedwater supply and low flow control system at the Dresden Units is similar to that used in the Monticello Plant. Thermocouples are installed on the horizontal length of feedwater pipe in the vicinity of one reactor vessel nozzle. The data will be interpreted in terms of amplitude and frequency of nozzle thermal cycling produced during low flow controller operation and will be used for fatigue crack growth analysis. If crack growth criteria are not met, modifications will be implemented.

8311040071 831101  
PDR ADCK 05000237  
PDR  
P

After the clad removal, triple-sleeve spargers were installed in the Dresden Units in order to minimize thermal cycling and lower the probability of either crack initiation or crack growth. In order to verify the feedwater bypass leakage, an on-line leakage monitoring system is installed. Hence, CECO believes that a Reactor Water Cleanup reroute is not justified.

## 2.0 EVALUATION

Dresden Units 2 and 3 had triple-sleeve spargers installed after the removal of the clad material. The rerouting of the RWCU is not planned according to CECO's letter dated February 23, 1981. The CRD return line nozzles were dye-penetrant tested and all are valved out. The inspection of the stainless steel portion of the lines has been made for both units and no crack indications have been found.

The leak monitoring system is installed on the Dresden Units. The system for Dresden 2 is operational and indicating little, if any, leakage. However, startup problems for the system are still present for Dresden 3 and it is CECO's position that leakage data should not be submitted for the units until consistent data is available for both units. The staff believes that the problems for Dresden 3 will be resolved during the current Cycle 9 outage, and that, if the leak rate is maintained less than 1.0 gpm in accordance with NEDE-21821-A, the Dresden units can operate without rerouting the RWCU.

The licensee shall continue to perform routine inspections of the feedwater nozzles and spargers in accordance with the intervals specified in Table 2 of NUREG-0619.

## 3.0 SUMMARY

The staff concludes that, if the leak rate is less than 1.0 gpm in the triple-sleeve sparger, the Dresden Units can operate without the rerouting of the RWCU. The present air-operated low-flow control in the 0-20% power range, accomplished through the globe-type bypass valve, is acceptable.

## 4.0 ACKNOWLEDGEMENT

S. J. Bhatt and R. A. Gilbert have contributed to this evaluation.

Dated: November 1, 1983