DUKE POWER COMPANY
STEAM PRODUCTION DEPT.
GENERAL OFFICES
422 SOUTH CHURCH STREET
CHARLOTTE, N. C. 28242

P. O. BOX 33189

TELEPHONE: AREA 704
373-4011

August 6, 1982

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Re: McGuire Nuclear Station Unit 1
Docket No. 50-369

Dear Mr. O'Reilly:

Please find attached Reportable Occurrence Report RO-369/82-58. This report concerns T.S.3.1.1.4, "The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be greater than or equal to 551°F." This incident was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H. B. Tucker, Vice President
Nuclear Production

PBN/jfw
Attachment

cc: Director
Office of Management and Program Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Records Center
Institute of Nuclear Power Operations
1820 Water Place
Atlanta, Georgia 30339

Mr. P. R. Bemis
Sr. Resident Inspector
McGuire Nuclear Station

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DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION
REPORTABLE OCCURRENCE REPORT NO. 82-58

REPORT DATE: August 6, 1982

FACILITY: McGuire Unit 1, Cornelius, NC

IDENTIFICATION: The Unit 1 Reactor Coolant (NC) System Average Temperature (T_{ave}) Dropped Below 551°F With The Reactor Critical

DESCRIPTION: During a unit shutdown on June 24, 1982, T_{ave} dropped below 551°F for seven minutes with the reactor power between 10^{-5} and 10^{-7} amperes (less than 1% power). The plant was being shutdown following the successful completion of the Loss of Offsite Power Test and in preparation for a long outage. Some unusual conditions existed because of the test setup and because of preparations to place the steam generators (S/G's) in a laid up condition. Steam demand was too high to allow a reactor shutdown without an excessive cooldown rate. Heat loads included leaking main steam (SM) to moisture separator reheater (MSR) control valves, leaking steam drains, high blowdown and leaking feedwater regulating valves. These heat loads coupled with the fact that the operating auxiliary electric boiler was having conductivity problems (which lowered output) meant that reactor power of about 1% was necessary to maintain T_{ave} at 557°F. Since reactor power was balanced by steam demand without the aid of steam dump, the automatic steam bypass to condenser valves were closed. The control operator, not realizing that no automatic decrease in steam loads would compensate for reactor shutdown, directed a nuclear equipment operator (NEO) in training to step-in the control rods to obtain a power level of 10^{-8} amperes (which is below the point of adding heat).

As reactor power decreased, T_{ave} and pressurizer level began to drop rapidly. The control operators began to decrease letdown in an attempt to preserve pressurizer level. Once the operators in charge of the control rods realized that a rapid cooldown was in progress, they withdrew the rods to stabilize the plant. "Balance of plant" operators began isolating unnecessary steam drains, MSR's and S/G blowdown. During this time, they also swapped feedwater alignment from the main S/G nozzles to the auxiliary (upper) S/G nozzles. During the transient, Pressurizer level dropped to 17%,letdown was automatically isolated, and the pressurizer heaters locked out. T_{ave} dropped to a minimum of 546°F and then rose to 560°F where it stablized. Once the excess steam loads were isolated or swapped to auxiliary steam (AS) and the problems with the electric boiler were corrected, the shutdown was completed without further incident.

The operators attempted to shutdown the reactor before steam loads had been swapped to AS and before feedwater had been alighed to the upper nozzles. Specifically, the control operator attempted to shutdown the reactor without a corresponding drop in steam loads. Thus this incident was the result of Personnel Error.

EVALUATION: The main contributing factor to the excessive steam loads apparently is the feedwater alignment to the S/G's. Aligning the feedwater to the upper nozzles (auxiliary nozzles) increases the back pressure on the feedwater regulating valves and decreases the leakage (auxiliary nozzles are located at a higher elevation than the main nozzles). Realignment normally takes place when the turbine load drops below 244 MWe, but this point was passed while the plant was running back during the test.

Once the plant was stabilized at the lower power level, operators failed to correct the alignment before shutting down the reactor. The day shift operators began shutting down the plant immediately following the turbine overspeed test and subsequent trip. They turned over control of the plant to the evening shift during the shutdown. Day shift operators felt that the feedwater alignment was adequately covered during the turnover. The evening shift control operator may have been aware of the feedwater alignment but did not have sufficient time to change it before the incident began. The alignment was corrected during the recovery effort.

A number of factors could account for excessive steam loads such as those experienced in this incident. A stuck open MSR regulating valve or leaking steam drains alone or in combination would have had the same result. The control operator, shutting down the reactor from low power levels, must analyze the steam load situation before removing reactor heat. He should insure that SM-bypass-to-the-condenser valves are open and the controls in automatic before driving in the control rods.

In this incident the control operator and NEO had full control of the shutdown because the turbine had already been shutdown, and the steam load variations were well within the capability of control rod movement. They also had total control of the speed of the shutdown. Had they driven the control rods in more slowly, they could have watched the response of T_{ave} and reacted sooner to the drop in temperature.

SAFETY ANALYSIS: Operator reaction to the low NC temperature and pressurizer level were prompt and correct. Automatic isolation of NC letdown also helped limit the drop in pressurizer level. The cooldown and shrinkage of NC water volume were never outside the capability of the charging system so the reactor was not endangered. The health and safety of the public were not affected by this incident.
CORRECTIVE ACTION: A note will be added to the controlling Procedure For Unit Shutdown cautioning the operators to insure that sufficient excess steam loads exist, as indicated by open SM to condenser bypass valves, to allow a reduction in reactor power below 1%.

This incident will be covered with all operating personnel through crew meetings. They will be instructed to stop major plant evolution during turnovers, whenever time is available, to insure that the in-coming shift is fully prepared to operate the plant. They will be specifically reminded to predict the effects of their actions on plant systems to insure that the end results will be satisfactory.