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WILLIAM O. PARKER, JR.
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[illegible]-4083

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December 11, 1981

Mr. J. P. O'Reilly, Director
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-369/81-179. This report concerns T.S.3.7.4, "At least two independent nuclear service water loops shall be operable". This incident was considered to be of no significance with respect to the health and safety of the public.



Very truly yours,

William O. Parker, Jr.

PBN/jfw
Attachments

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
Senior Resident Inspector-NRC
McGuire Nuclear Station





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DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
REPORTABLE OCCURRENCE REPORT NO. 81-179

REPORT DATE: December 11, 1981

FACILITY: McGuire Unit 1, Cornelius, NC

IDENTIFICATION: Reactor Trip of November 11, 1981

INTRODUCTION: On November 11, 1981 the Unit 1 reactor was tripped manually due to a loss of cooling water to the reactor coolant (NC) pump motor coolers. A containment isolation valve, 1RN-253A, had failed closed unnoticeably isolating cooling flow to all of the NC pump motor coolers. The first indication to the control room operators was a high NC pump motor stator winding temperature alarm on pump D. After 1RN-253A was found closed, the circuit breaker controlling the valve was checked and found closed. As other NC pump motor stator winding high temperature alarms were received the operators began a controlled shutdown of the turbine and reactor. The operators began reducing load and raised the levels in S/G's B and D in preparation for tripping the B and D NC pumps. When NC pump B was tripped the power level was 39%. B S/G level was 79%, and D S/G level was 73.1%. Soon after B NC pump was tripped, B S/G level began to decrease because of shrinkage of the water volume. Water level in D S/G began to increase even more rapidly, however, because of the decreasing steam pressure and increasing feedwater flow. Fourteen seconds after the NC pump B trip, the high water level trip on S/G D actuated, tripping the main turbine and feedwater pump A. Reactor power continued to decrease and when it reached 9.2% the operators tripped NC pump D. The operators continued to decrease reactor power and it appeared that cooling water would not be restored to the NC pumps within the time necessary to continue operation of the remaining two pumps. The decision was made to trip the reactor, shutdown the two NC pumps, and establish natural circulation. The reactor was manually tripped with power at 3.5%. The two remaining NC pumps were tripped within the next five minutes and natural circulation was established. After the reactor trip, operators maintained good control of primary and secondary system parameters and no significant transient resulted.

A faulty fuse in the control system for 1RN-253A was located and replaced, and the valve was reopened. Operators continued to recover the unit and restarted NC pump B.

When the incident began, the reactor was operating at 49% power and the Below Bank Rod Test was in progress. Rod H-4 of shutdown bank E was fully inserted and all other shutdown rods were fully withdrawn. All control rods were fully withdrawn except bank D which was withdrawn 200 steps. The turbine generator output was 525 mwe and feedwater pump 1A was operating.

SEQUENCE OF EVENTS

| | |
|---|---|
| 14:37:55:-- | 1RN-253A closed isolating cooling water to the NC pump motors. |
| 15:05:01:-- | NC pump D motor stator winding temperature alarm actuated (297°F). |
| NA | Operators began hunting for the cooling water problems and preparing to shutdown D NC pump. |

15:09:02:-- NC pump B motor stator winding temperature alarm actuated (298°F).

The breaker that controls 1RN-253A was discovered to be closed.

15:11:00:-- NC pump motor stator winding temperatures on B and D pumps had increased to 304°F and 313°F respectively.

15:13:02:-- NC pump motor A stator winding temperature alarm actuated (297°F).

15:15:14:-- NC pump B was tripped. (reactor power 39%)

15:15:28:599 Hi Hi S/G D water level turbine trip actuated.

15:15:28:764 Feedwater pump A tripped.

15:15:28:835 Generator circuit breaker A tripped.

15:15:28:837 Generator circuit breaker B tripped.

15:15:28:-- Main Turbine Electrical Auto Stop actuated.

15:15:42:-- Feedwater isolation valves closed. Auxilary feedwater pumps started automatically and began feeding the SG's.

15:17:36:-- NC pump D was tripped. (reactor power 9.2%)

15:19:08:801 The reactor was manually tripped.

Between 15:20:14 and 15:21:19 NC pump A was tripped.

15:25:15:-- NC pump C was tripped.

Natural circulation cooling of the NC system was established.

15:45:15:235 Reactor trip breaker A was reclosed.

15:45:15:248 Reactor trip breaker B was reclosed.

15:59:12:-- Power was reestablished to the 1RN-253A control system.

15:59:22:-- 1RN-253A was reopened and cooling water flow was reestablished to the NC pump motor coolers.

16:04:21:-- NC pump B was started establishing forced circulation cooling to the NC system.

16:45:09:-- NC pump D was started.

16:49:05:-- NC pump A was started.

16:50:18:-- NC pump C was started.

EVALUATION: 1RN-253A is an air operated containment isolation valve located inside the containment vessel. It is controlled by solenoid valve 1RNSV 2530. A defective fuse in the power supply of 1RNSV 2530 caused it to fail to the "1RN-253A closed" position. The defective fuse (an FNA-3, 3 ampere, slow-blow, plunger fuse manufactured by Bussman) was located and checked, revealing that the fusable link was intact but the wire connecting the link to the end cap had separated from the end cap. There was a small hole in the solder on the end cap from which the wire had separated and the solder was gray in color suggesting a cold solder joint. This type of indicating fuse has been a constant source of problems, although no tests were run on the failed fuses to determine the cause of failure. The fuse used in this circuit is the only one currently specified for this application. Duke Power Company is currently reviewing the fuse problems.

The operators that were filling S/G's B and D prior to shutting down the corresponding NC pumps, failed to anticipate the rapid level increase that resulted in S/G D when NC pump B was tripped. Main Steam pressure decreased following the pump trip causing an increase in the feedwater flow and swelling of the water volume in A, C and D S/G's. Water level in the D-2 model of Westinghouse S/G's is particularly sensitive to pressure and temperature changes which make them difficult to control. The operators wanted a high water level in S/G's B and D to prevent the expected shrink from causing a low level trip when the corresponding NC pumps were tripped.

The turbine trip had little effect on the outcome of the transient because 1RN-253A could not be reopened in time to continue operation of any of the NC pumps. No significant transient resulted from the turbine trip or the reactor trip. This was due in part to the low power levels at which the trips occurred. Natural circulation cooling of the NC system was established and maintained for about 40 minutes without any problems.

CORRECTIVE ACTION: The immediate corrective action was to replace the defective fuse and reopen 1RN-253A. The NC pumps were shutdown to prevent overheating the motor windings. Natural circulation of the NC system was established and maintained while the pumps were off. Duke Power Company is reviewing the problems McGuire has experienced with the Bussman indicating fuses.

SAFETY ANALYSIS: Operators maintained NC system parameters within acceptable limits by establishing natural circulation cooling of the NC system. The core was never in danger of overheating and sufficient pressurizer pressure and level were maintained throughout the event to preclude void formation in any part of the NC system. Safe plant operation and the health and safety of the public were not affected by this incident.