NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

Nine Mile Point Nuclear Station
Unit #1
Post Office Box 32
Lycoming, New York 13093

April 19, 1972

Mr. Donald J. Skovholt
Assistant Director for Reactor Operations
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Skovholt:

Re: Provisional Operating License: DPR-17
Docket No.: 50-220

In our letter of January 20, 1972 to Dr. Peter Morris, we described a problem with the reactor feedwater system of Nine Mile Point Nuclear Station, Unit #1. Although we felt at the time that the problem was understood and proper remedial action initiated, the investigation was continued. These findings did substantiate those set forth in the January 20th letter and we are now able to present a final description of the incident.

On December 31, 1971 at 10:08 am, the Nine Mile Point Nuclear Station, Unit #1 tripped off line as the result of surveillance testing.

Initial Conditions

Steady state operation

MWth - 1752	Reactor pressure - 1015 psi
MWe - 601 (gross)	Steam flow - 6.8 X 10^6 lbs. per hr.

Introduction

Routine surveillance testing of the reactor protection high/low water level sensors was being conducted at the time of the trip. The sensor support was accidently bumped causing each high level trip sensor to operate resulting in a turbine trip. A reactor scram resulted from the turbine anticipatory trip signal because the load was greater than 45%.

How?

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Introduction (cont'd)

Following the reactor scram, the reactor water level decreased rapidly due to void collapse. The feedwater control system responded by overfeeding, as it should, when in the automatic mode. The feedwater system was left in the automatic mode for approximately 20 seconds after the scram, and then switched to the manual mode, because the feedwater flow to the reactor was high in the operator's opinion. Manual action was too slow and excessive feedwater flow continued to the reactor. Feedwater flow was reduced to zero at approximately 2 minutes after water overflowed into the main steam lines. Several operations of the electromagnetic relief valves occurred for approximately 17 minutes after which reactor level was brought under control. The emergency condenser was placed in service to control reactor pressure after the water level was brought under control.

Sequence of Events

10:08:02 am	A turbine trip occurred from an erroneous high reactor water level signal caused by bumping the sensors
10:08:02	Reactor scram from turbine anticipatory
10:08:20 (approx)	Shaft feedwater pump in manual control
10:08:27 (approx)	#12 motor pump in manual control
10:08:30 (approx)	Main steam isolation valve closed
10:08:33	#11 Motor pump in manual control
10:09:30	Reactor level +3 feet above normal
10:10	Reactor pressure 1117 psi
10:10:11	Relief valve 121 open @ ? PSI
10:10:15	Relief valve 121 closed @ ? PSI
10:10:56	Relief valves 111, 112, 122 open @ ? PSI
10:10:59	Relief valve 112 closed @ ? PSI
10:11:00	Relief valves 111, 122 closed
10:12 (approx)	Feedwater flow to zero
10:20	Level under control

Analysis of Data

A turbine trip occurred at 10:08:02 from an erroneous high reactor water level signal caused by bumping the sensors. The sensors were bumped while surveillance testing was being conducted on the sensors. could have been caused by improper valving.

A turbine trip causes a reactor scram from the turbine anticipatory trip if turbine load is greater than 45%. All control system followed the expected transient response characteristic for the first 18 seconds following the scram.

There were three feedwater pumps running in the automatic mode before the trip. Two motor driven pumps were each delivering about 1.5 X 10^6 lbs/hr. and the shaft pump was delivering about 5.2 X 10^6 lbs/hr.

Reactor level response after a scram results in a 3 ft. drop in level due to steam void collapse. The feedwater responds with a large increase in flow. Total flow 20 seconds after the trip was approximately 8.2 X 10^6 lbs/hr. At this time, the shaft pump was placed in the manual mode and 7 seconds later, a motor pump was placed in manual mode. The second motor pump was placed in manual approximately 30 seconds after the scram. The feedwater controls were placed in manual because the operator observed the high flow, which in his judgement required some action. Analysis of data shows that the flow was reducing before the shaft pump was switched to manual, and one of the motor driven pumps flow had reduced to zero before being switched to manual. The total feedwater flow was reduced to zero at approximately 4 minutes after the trip. The first relief valve opened 2 minutes after the trip and stayed opened for 4 seconds. Three more valves opened for (3-4) seconds. Water overflowed into the main steam lines at about the time the first relief valve operated. Feedwater level was brought under control at approximately 12 minutes after the trip.

Cause of the Reactor High Water Level

Investigation of the feedwater system has shown that the control response is adequate to handle the transient after a scram. The decision by an operator to place the system in manual is a judgement decision based on the interpretation of the instrumentation he is observing. Once he has made the decision and goes to the manual mode; he must be extremely dexterous as level varies so rapidly for the first few minutes following the scram that it becomes almost humanly impossible to differentiate the variables and perform the correct manipulations in the required interval. At this time, level was near the +3 feet level, and flow was greater than 6 X 10^6 lbs/hr. Flow was reduced to 2 X 10^6 lbs/hr. at 2 minutes after the scram. Data indicates that overflow of water into the steam lines occurred about 2 minutes after the scram. Some feedwater flow continued for the next 2 minutes before being reduced to zero.

Conclusion

The turbine trip and reactor scram occurred as a result of an accidental bump to level sensors during surveillance testing.

The feedwater response in the automatic mode was normal for the transient conditions that existed.

Placing the feedwater system in manual when fast response is required may cause a level problem if the operator does not pay close attention to the system during the transient.

Corrective Action

A review of expected system response has been given to the operators as part of the continuous educational program. This would help the operator in making the right decision during future trips.

Very truly yours,

P. Allister Burt

P. Allister Burt
General Superintendent,
Nuclear Generation

NIAGARA MOHAWK POWER CORPORATION

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Nine Mile Point Nuclear Station
Post Office Box 32
Lycoming, New York 13093

January 20, 1972

Dr. Peter A. Morris, Director
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Dr. Morris:

Re: Provisional Operating License: DPR-17
Docket No.: 50-220

The second stage of reheat was removed from service at Nine Mile Point Nuclear Station Unit #1 on January 18, 1972. A crack had developed in the drain line from the coil of reheater #112. This heating coil is supplied with primary steam, and condensate from the coil drains by gravity to a receiving tank.

When the crack was located, the second stage reheater was secured. The part having the defect was an 8" schedule 80 seamless weld "tee" ASTM A-234 Grade WPB.

A crack developed at the edge of weld deposit metal and extended about an inch through the heat affected zone in a direction longitudinal to the major axis of the tee.

This system will remain out of service until the turbine is next removed from service when a better appraisal of the cause of the difficulty can be obtained and proper repairs affected.

The next scheduled outage is to commence April 2, 1972.

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RE
JK
JN

Very truly yours,

Dupe of ~~8303020195~~

P. Allister Burt

P. Allister Burt
Station Superintendent

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