OCT 10 1968

Peter A. Morris, Director, Division of Reactor Licensing
THRU: Roger S. Boyd, Assistant Director for Reactor Projects, DRL

Original signed by:
Roger S. Boyd

NINE MILE POINT PLANT EMERGENCY CONDENSER ISOLATION VALVES AND HIGH PRESSURE COOLANT INJECTION CAPABILITY - DOCKET NO. 50-220

This memorandum summarizes our review of the subject items in preparation for the scheduled October 16, 1968, meeting with Niagara Mohawk Power Corporation (NMPC).

I. Fact Summary

A. Isolation Valves External to the Drywell

1. Problem similar to Oyster Creek except feedwater lines are included

2. PSAR for Nine Mile Point includes a criterion that would allow it to place valves external to drywell (Oyster Creek did not)

3. Safety Analysis has not been provided although it was requested

B. High Pressure Coolant Injection System

1. As for Oyster Creek, additional protection needed for small break portion of break spectrum for Nine Mile Point

2. Applicant agrees with (1), but proposes only offsite power source--claims grid of ultra high degree of reliability

3. Position taken on Oyster Creek consistent with all ECC systems--adequate power sources with either onsite or offsite power

4. Extent of credit for Niagara Mohawk's grid as being equivalent to onsite and offsite sources controverted by staff

5. Oyster Creek facility provided an onsite power source (third diesel generator). Two diesel generators adequate to power feedwater chain to prevent fuel clad heatup and perforations from 0 to 0.135 ft^2 in break area (all electrical systems)

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6. Nine Mile Point system uses main turbine driven feed pump. Two additional startup pumps are electrical. Equivalent fix per Oyster Creek would not be sufficient to drive these pumps--at best the Oyster Creek fix would drive one set of pumps (FW + condensate and booster) injection flow 3800 gpm compared to Oyster Creek of 5000 gpm

7. Oyster Creek fix would give protection over a significant part of spectrum for Niagara Mohawk

II. Isolation Valves External to the Drywell

As in Oyster Creek for the isolation condenser, isolation valves in these lines on Nine Mile Point (NMP) were installed external to the drywell. The difference between Oyster Creek and Nine Mile Point is that the feedwater lines also are involved on Nine Mile Point as well as the condenser lines. Because we do not have the applicant's safety evaluation of the consequences of a failure in the valves, we cannot comment on the specific details. However, because of the similarities between the Oyster Creek and Nine Mile Point plants, we believe that the safety evaluation provided for the Oyster Creek Emergency Condenser Isolation Valves is applicable to Nine Mile Point. We will, however, need the results of a safety evaluation for the effects of failures in the feedwater isolation valves. In any case, it is apparent that the management position established for Oyster Creek would most likely affect Nine Mile Point. Our review of the PSAR on NMP indicates that the applicant did indicate that certain isolation valves could be placed only external to the containment.

III. High Pressure Coolant Injection Capability

Our review of the Nine Mile Point emergency core cooling system has paralleled the Oyster Creek review. The initial proposal for NMP as outlined in the FD&SAR did not provide for emergency high pressure coolant injection capability that would be independent of electrical power sources; i.e., onsite and offsite. The consequences of small ruptures of the primary system were high fuel clad temperatures (about 2300°F) and many perforations (about 40% of the core). Similar results obtained on the Oyster Creek plant led to the requirement for a high pressure coolant injection system. As for the case of Oyster Creek, we considered that the high pressure coolant injection system is an engineered safety feature and should be designed to Class I requirements. In addition, as with the other core cooling systems, required power from either an onsite or offsite power source should be available.

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Niagara Mohawk has proposed to improve its ECCS by providing high pressure coolant injection; however, system design features unique to NMP have led to questions principally in regard to AC power source requirements. In the NMP plant, feedwater is pumped to the vessel via a turbine-driven feedwater pump. Two 1/4 size motor-driven feedwater pumps are provided; however, they are not used during normal operation. In contrast, the Oyster Creek plant employed all electrically-driven pumps in the feedwater chain.

The applicant has recently modified the design to:

(1) allow for automatic actuation of the motor-driven pumps whenever the plant trips off the line and offsite power remains available, and

(2) energize the control rod drive pumps from the emergency bus capable of operation from either onsite or offsite power.

As a result of these changes some improvement in the capability to cope with small primary system ruptures resulted. The performance capability of the system is noted in the following table:

	Break Area (ft^2)	Peak Fuel Clad Temperature (°F)	Fuel Rod Perforation (%)
1. Auto Relief &	.002 to .05	2300	40
Core Spray	.05 to 0.1	2000 - 2300	40
(onsite power)	0.1	1800 - 2000	40
2. Feedwater & Core			
Spray (offsite	0 to 0.135	600	0
power required)	0.135	600 - 2100	0 to 42

As indicated by the results in the above data, the consequences of a break in the primary system are diminished with high pressure coolant injection capability offered by the feedwater system. However, this system requires a large AC power source which is only available presently via the external grid system.

Niagara Mohawk proposed that because of its high degree of reliability of its offsite power system, an independent onsite power source is not necessary. Our evaluation as given in a memorandum from V. Moore to R. S. Boyd, dated October 3, 1968, indicates that a basis for special credit to be given to the NMP offsite power system is not apparent.

[illegible]

At a recent meeting with NMP, a comparison of the Nine Mile Point design to Oyster Creek was volunteered by the applicant. It was concluded by the applicant that the same fix as incorporated into the Oyster Creek design would not be incorporated into the Nine Mile Point design. This assumes that the proposed Oyster Creek FWCI is the minimum capability with respect to break spectrum coverage that would be acceptable to us. It is not clear that this is so. Based on our estimates of the performance capability that could be provided by incorporating the Oyster Creek fix (adding another diesel) the design offers desirable features that may make the system acceptable to us. An exact reproduction of the Oyster Creek system for NMP would be available with a continuous supply of offsite power. A requirement for an equivalent onsite source would be costly and beyond considerations of reasonable and practical measures.

A summary of the Oyster Creek and Nine Mile Point designs with regard to capability of the feedwater system and power requirements is given in the attached table.

Original signed by
Robert L. Tedesco

Robert L. Tedesco, Chief
Reactor Project Branch 2
Division of Reactor Licensing

Attachment:
As stated above

cc: F. Schroeder
S. Levine
R. DeYoung
V. Moore
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R. Ireland
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DATE ▶	10/10/68	10/10/68				

FEEDWATER SYSTEM COMPONENT

AND LOAD REQUIREMENTS

	OYSTER CREEK (no fuel failure $\sim$.15ft^2 $T_c < 2000°F$)		NINE MILE POINT (no fuel failure $\sim$.15ft^2 $T_c < 2000°F$ for 7800 gpm)		
	Total Number of Components Avaliable for System Operation	Required for HPCIS (5000 gpm)	Total Number of Components Available for System Operation	Required for HPCIS 3800 gpm	Required for HPCIS 7600 gpm
PUMPS					
FW (main)	2	1	2	1	2
Cond. Booster	0	0	3	1	1
Cond. Feed	2	1	3	1	1
D/G No.	2	2	1	–	–
D/G (hp)	3120 ea	3120 ea	3120	–	–
LOADS (hp)					
FW (main)	–	4000	–	2500	5000
Cond. Booster	–	0	–	$<$ 1500	1500
Cond. Feed	–	1000	–	$<$ 1000	1000
TOTAL		5000		5000	7500