SAXTON NUCLEAR EXPERIMENT CORPORATION
GENERAL PUBLIC UTILITIES SYSTEM
JERSEY CENTRAL POWER & LIGHT COMPANY
NEW JERSEY POWER & LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY
METROPOLITAN EDISON COMPANY

Telephone: Area 215 635-2737

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March 29, 1965

Mr. Eber A. Price, Director
Division of State & License Relations
U.S. Atomic Energy Commission
Washington, D.C. 20545

Reference: Your Letter SLR:JR 50-146 of January 14, 1965

Dear Mr. Price:

This letter is in reply to the reference letter in which you state "It appears that certain of your activities were not conducted in full compliance with condition 4.3 of your license". We have assumed that you have reference to condition 3.B since AEC Facility License No. DPR-4 has no condition 4.B and it is 3.B which incorporates the technical specifications into the license.

Your understanding is correct that Saxton does not consider the continued operation of the plant with valve MIC-27 in the failed shut condition to be in non-compliance with the technical specifications. We also fully agree with you that the basic point of concern here should be not the interpretation of the specifications but rather one of determining the true implications of an inoperable charging system to the safety of the plant. During the period following the failure of the valve to open Saxton considered safety implications first and then reviewed the pertinent technical specifications to ensure that continued operation would not be in non-compliance.

Enclosure 1 to this letter is a safety analysis of the particular operation in question pertinent to the subject of possible non-compliance during the specific eleven hour period on October 13, 1964.

Enclosure 2 to this letter is a safety analysis of a hypothetical charging system failure under the worst credible reactor plant conditions. In this analysis it is concluded that the safest action to follow after a charging system failure is to continue plant operation at power while repairing the charging system.

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[illegible] appropriate, [illegible]
[illegible] beginning [illegible]
[illegible] immediate [illegible]
[illegible] actions. [illegible]

Sincerely,

W. H. Law[illegible]
General M[illegible]

Enclosure 1

Safety Analysis of Continued Operation of Reactor Plant on 13 October 1962 with Valve HC-27V Failed Shut

1. Narrative

At 4:30 AM on 13 October 1962 the Saxton reactor operating personnel unsuccessfully attempted to open the charging system valve HC-27. This valve is located inside the reactor containment vessel and is not accessible for maintenance while the reactor is in operation. Operations personnel made the decision to continue the steady state reactor power operation until management was notified of the abnormal condition. A management decision was made to continue reactor power operation and allow maintenance personnel to repair the valve electrical circuitry, if that were the failure. It was approximately 10:30 AM when maintenance personnel had come to a definite conclusion that the trouble was inside the containment vessel and that a reactor shutdown would be required in order to repair the valve. At this time a management decision was made to continue operation until late afternoon to complete a phase of the reactor test being conducted, and then to shut down the reactor to repair the valve. At 3:20 PM reactor power level was decreased to commence shutting down the reactor. After reactor shutdown repairs to the valve operator were effected promptly.

2. Purpose of Charging System

The charging system has the following three primary uses:

(a) Intermittent operation for charging make-up water for volume control.

(b) Intermittent operation for purification system operation.

(c) Intermittent operation for normal addition of concentrated borated water.

3. Safety Significance of Inoperable System

(a) Intermittent operation for charging make-up water for volume control:

(1) System leak rate at time of valve failure was 1.2 gallons per hour.

(2) Time available before make-up water would be needed for normal operation was approximately 4 days.

(3) Alternate system for make-up water - safety injection system. If there developed a leak of such magnitude that make-up was necessary before the charging system could be made operable the safety injection system would be used.

(4) Conclusion - The charging system was not required for volume control for continued safe operation of the plant.

(c) Uncontrolled operation for purification:

(1) Experience has shown that the Saxton reactor plant can operate for months without a need for operation of the purification system.

(2) Conclusion - The charging system was not required for purification for continued safe operation of the plant.

(d) Intermittent operation for normal addition of concentrated boric acid:

(1) The normal concentration at the time of valve failure was 349 ppm.

(2) The reactor cold shutdown capability at the time of valve failure was 7% (does not take credit for Xenon).

(3) Alternate system for introducing boron in an emergency - safety injection system. If sufficient boron had not already been in the system, safety injection from the 40,000 gallon storage tank which was borated to 4000 ppm could have been used. (Feed by way of safety injection system and bleed if necessary via the letdown system or the power operated relief valve).

(4) Conclusion - The charging system was not required for the addition of concentrated boric acid for continued safe operation of the reactor plant.

4. Conclusions

The reactor plant was operated in accordance with sound engineering and safety considerations and in full compliance with the technical specifications in the license. It should be pointed out that the real point of contention is a difference in judgment between the AEC and Saxton personnel on how long operation should have been allowed to continue. Saxton did shut the reactor plant down 2 days prior to the scheduled shutdown date. This early shutdown was initiated solely because Saxton personnel believed that it was the conservative thing to do even though in their judgment there existed no emergency and no urgency, if anything, the test being performed. The test was permitted to continue until a logical stopping point was reached before shutting the reactor down.

were initially no boron in the system that it would not be necessary to inject boric acid for at least four hours after the loss of flow accident had occurred. Supplement #1 to change request #6 went further by assuming that the charging system was out of service and showed that the safety injection system could be used to borate the reactor.

A further analysis of this loss of flow accident shows that from a charging system standpoint it is safer to have the accident occur from an at power condition than from a reactor hot shutdown condition. This is true because the reactor decay heat would lengthen the time before it would be necessary to add boron and the Xenon present provides additional shutdown margin and would lengthen the time before it would be necessary to add boron.

To summarize, when considering the loss of coolant flow accident it is safer to keep the reactor plant at power and repair an inoperative charging system than to shut the plant down to conduct repairs to the charging system.

5. Uncontrolled Heat Extraction by Steam Plant Valve or Rupture

From a charging system standpoint it would be safer to have this accident while at power rather than with the reactor shutdown. If the uncontrolled heat extraction were within the ability of the reactor to maintain main coolant temperature without an overpower scram it would be an incorrect action to shut down the reactor immediately. The first action should be to attempt to stop the uncontrolled heat extraction by shutting the steam generator main steam stop valve, the steam generator blowdown valves and the feed valve (all remotely operated from the reactor control room). If the heat extraction could not be stopped by this action it would stop shortly thereafter as the steam generator steamed dry.

If the same accident were to occur from an unborated hot shutdown condition or if the accident were severe enough to cause an overpower scram from unborated power operation an uncontrolled cooldown would be a more serious accident. In this case if cooldown could not be stopped the safety injection pumps should be turned on, the pressurizer heaters should be turned off, pressurizer spray valve opened and pressurizer power operated relief valve should be opened intermittently to lower main coolant system pressure. By these actions boron would be introduced rapidly into the reactor to give shutdown margin. No credit can be taken for the charging system in this severe accident because of the small charging rate of the system and the time delays necessary to send a man off to manually valve in boric acid to the charging system. The accident would be over before boric acid could be introduced into the reactor by the charging system.

To summarize, the charging system has not been described as an emergency safety device and it would give no additional protection in this severe but unlikely accident. When considering the uncontrolled heat extraction accident from a charging system standpoint it is safer to keep the reactor plant at power while repairing an inoperative charging system than to shut the plant down to conduct repairs to the charging system.

6. Conclusions

In each case considered, the severity of the accident analyzed is not increased by continued operation of the reactor plant. To the contrary, in two of the four cases the accident would be less severe from power operation than from the hot shutdown condition.

MEMO ROUTE SLIP
Form AEC-93 (Rev. May 14, 1947)

See me about this.	For concurrence.	For action.
Note and return.	For signature.	For information.

TO (Name and unit)	INITIALS / DATE	REMARKS
REGION I		R-3 O'Reilly [illegible] Moseley [illegible] Carlson
TO (Name and unit)	INITIALS / DATE	REMARKS 5/11 [illegible]
TO (Name and unit)	INITIALS / DATE	REMARKS

FROM (Name and unit)	REMARKS
From CO - Hdqrs.	THE ATTACHED ENCLOSURES 1 & 2 SHOULD HAVE BEEN SUBMITTED WITH ENFORCEMENT LTR DTD 1/14/65, TO SAXTON NUCLEAR EXPERIMENTAL CORP, SAXTON, PENN. DOCKET 50-146
PHONE NO. / DATE 4/7/66	

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO 16-77649-1