U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPE.. TIONS

REGION I

RO Inspection Report No.: 50-219/73-04 Docket No.: 50-219

Licensee: Jersey Central Power & Light Co. License No.: DPR-16

Oyster Creek Priority: _____

_____ Category: C

Location: Forked River, New Jersey

Type of Licensee: 1930 MWt, BWR

Type of Inspection: Special

Dates of Inspection: March 13, 1973

Dates of Previous Inspection: Special - February 13-16, 1973
Routine - November 9-10, 12, 13 & 20, December 7-8, 1972

Principal Inspector: _____ 3/23/73
F. S. Cantrell, Reactor Inspector Date

Accompanying Inspectors: None _____
Date

_____ _____
Date

Other Accompanying Personnel: None

Reviewed By: D. L. Caphton 3/23/73
D. L. Caphton, Senior Reactor Inspector Date

SUMMARY OF FINDINGS

Enforcement Action

A. Paragraph 3.3.C.2 of the Technical Specifications specifies, "The pump ... an idle recirculation loop shall not be started unless the temperature of the coolant within the idle recirculation loop is within 50°F of the reactor coolant temperature."

Contrary to the above requirement, the B recirculation pump was started on March 10, 1973 with a temperature differential of 117°F between the coolant within the idle recirculation loop and the reactor coolant temperature.

B. Paragraph 6.2.A of the Technical Specifications states in part, "Detailed written procedures with appropriate check off lists and instructions will be provided for the following conditions; 1. Normal startup, operation, and shutdown of the complete plant and of all systems and components involving nuclear safety of the plant....4. Preventive or corrective maintenance operations which could have an effect on the safety of the reactor." Paragraph 6.2.C of the Technical Specifications states, "Standing instructions to the operating staff shall require that the procedures identified in A.....above are to be followed in conducting activities identified therein."

Contrary to the above requirements, the B and D recirculation loops were removed from service to replace the brushes on the MG sets and returned to service without the use of written procedures. The procedure for operating the nuclear steam supply system (No. 301) as modified by a temporary procedure change, dated December 18, 1970, requires, in part, shutting down to recover an idle loop if the differential between the loop and the reactor exceeds 50°F.

Licensee Action on Previously Identified Enforcement Items

Not inspected.

Design Changes

Not inspected.

Unusual Occurrences

The B recirculation loop was returned to service on March 10, 1973 with a differential temperature of 117°F between the temperature of the reactor coolant and the temperature of the coolant in the idle loop. The APRM recorders in the same reactor quadrant as the B recirculation loop showed that the flux increased approximately 17% when the pump was restarted.

Other Significant Findings

A. Current Findings

1. Operations

The plant was operating at 1880 MWt with one recirculation loop valved out prior to reducing power to approximately 1550 MWt to individually remove the B and D recirculation loops from service on March 10, 1973. Following replacement of the brushes on the MG sets, power was returned to 1880 MWt. The stack release rate was 125,000 uCi/sec.

2. Operating Logbooks

The transient associated with returning the idle loop to service on March 10, 1973 was not noted in either the Shift Foreman's Log or the Control Room Log.

B. Status of Previously Reported Unresolved Items

Not inspected.

Management Interview

The exit interview was conducted with Mr. McCluskey on March 13, 1973.

A. Scope and Findings of the Inspection

1. The inspector stated that two violations of Technical Specifications were found during the review of the abnormal occurrence involving the restarting of the B recirculation pump as follows:

a. The B recirculation pump was restarted with the temperature differential between the idle recirculacion loop and the reactor coolant temperature greater than 50°F.

b. The B and D loops were isolated and returned to service without the use of procedures or without the operating personnel reviewing the procedures prior to performing the operation. This is evident by the fact that the procedure requires the temperature differential to be less than 50° and that if the temperature differential is greater than 50°, the temporary change to the operating procedure (No. 301) dated December 18, 1970, requires the plant to be shut down to reclaim the idle loop.

2. The transient associated with this event was not recorded in either the Shift Foreman's Log or the Control Room Log. The inspector stated that these logs are supposed to provide a history of plant operation, and as such, abnormal occurrences and unusual conditions should be recorded in these logs. The inspector stated that the failure to record this event in either log supported the inspector's position during previous discussions that the content of these particular logs did not provide a reasonably complete record of significant events at Oyster Creek. The inspector further stated that it was his position that the information recording requirements for the Shift Foreman's Log required a step increase. The licensee's representative agreed that this event should have been recorded in the Log and stated that this matter had been discussed with shift personnel and would again be re-emphasized to operating personnel.

3. The inspector stated that the Technical Specifications require written procedures for operation and maintenance of the reactor. The inspector stated that he would not take the position that a detailed check list was required to remove or return a recirculation loop to service; however, this was an evaluation that Jersey Central should make as a part of their investigation of this abnormal occurrence. This matter should be a part of each investigation of an abnormal occurrence. The licensee's representative stated that the Operating Procedure for the recirculation loops was being revised to provide more definitive instructions for the operator. He stated that the Jersey Central investigation of this event would include an evaluation of the greater use of check sheets in performing operations at the plant.

4. The inspector stated in his discussion of the procedural requirement to shut the plant down prior to reclaiming an idle loop if the temperature differential exceeded 50°F, some of the operating personnel did not consider this a necessity. The inspector pointed out that the Technical Specifications permit a temporary procedure change if the temporary procedure change does not change the intent of the procedure. A temporary procedure change to permit reclaiming the idle loop without shutting the plant down would not be considered within the intent of the procedure. The licensee's representative stated that the plant could have continued to operate on three recirculation loops and that it would not have been necessary for operating personnel to make a decision prior to holding a meeting of the Plant Operations Review Committee to approve a procedure change.

5. During a subsequent telephone conversation, Region I was informed that General Electric had provided information to show that an analysis of the stress in the recirculation nozzle of a similar reactor vessel had been made using a 400° temperature change over a 26 second period. The results of this analysis showed that the stresses were within design limits. The licensee indicated that this would be included in the written report to the Directorate of Licensing concerning this event, which would be issued within 10 days.

6. In response to questioning about corrective action on matters identified in a letter from J. P. O'Reilly to Jersey Central dated March 7, 1973, the licensee representative stated that all of the radioactive material areas, radiation areas and high radiation areas have been properly identified, and all drums of radioactive material have been stored in shield facilities. Jersey Central is evaluating how to lock high radiation areas in accordance with Technical Specification requirements. The shipment of radioactive waste drums is continuing, but the back-log is essentially unchanged. Jersey Central is evaluating bids for outside help in preparing waste drums for shipment and in cleaning up the Radioactive Waste Building. The licensee's representative stated that he was currently working with the JC Manager of Nuclear Generation preparing Jersey Central's reply to the March 7, 1973 letter.

DETAILS

1. Persons Contacted

T. J. McCluskey, Station Superintendent
J. T. Carroll, Operations Supervisor
J. L. Sullivan, Technical Supervisor
E. J. Growney, Technical Engineer

2. Recirculation Pump Started with Greater Than 50°F Temperature Differential

The B recirculation loop was returned to service on March 10, 1973 by opening the discharge valve, restarting the B recirculation pump and closing the bypass valve. At the time of this action, there existed a differential temperature of 117°F between the temperature of the reactor water and the loop water. Technical Specifications paragraph 3.3 prohibits restarting an idle loop unless the temperature of the coolant within the idle recirculation loop is within 50°F of the reactor coolant temperature.

The B recirculation loop had been removed from service to replace brushes on the MG set that supplies power to the recirculation pump motor at 12:30 AM on March 10, 1973 by closing the pump discharge valve, opening the bypass around the discharge valve, and de-energizing the MG sets. Opening the bypass valve permits backflow through the recirculation loop and normally maintains the coolant temperature in the loop within approximately 10°F of the reactor coolant temperature, however, operating personnel did not consider the effect of continued operation of the cleanup system on idle loop temperature. The clean up system is fed from the B loop, upstream of the suction valve, and discharges to the B loop, downstream of the discharge valve. With the loop discharge valve closed and the bypass valve open, the colder water from the clean up system backflowed through the bypass valve gradually lowering the temperature of the water in the recirculation pump and the temperature of the feedwater to the clean up system. The recorder for the recirculation loop temperature showed that the B loop temperature dropped approximately 117°F while the loop was isolated and increased the same amount when the pump was restarted approximately 2 hours later (Attachment 1). The recorders for the average power range monitors (APRM) in the same quadrant as the B recirculation loop showed that the flux increased approximately 17% when the pump was restarted (Attachments 2 and 3). This flux increase is attributed to the associated increase in recirculation flow when the recirculation pump was restarted, and to a negative moderator temperature coefficient. Rod block alarms were received when the pump was restarted, but the flux increase was less than that required to initiate a high flux scram. The narrow range reactor pressure recorder showed a pressure surge of 4-5 psig at the time the B recirculation pump was restarted.

Subsequent to the above, the D loop was isolated and returned to service without the above effects. (Attachment 4)

a. Safety Analysis

Starting an idle recirculation loop with a 375°F differential was analyzed in the Facility Description and Safety Analysis Report (FD&SAR) for the resulting nuclear transient (for 1600 MWt). This event was not re-analyzed in the application to increase power to 1930 MW and the event was not analyzed for the Oyster Creek vessel with respect to the stresses or strains created in the recirculation nozzle by starting a loop with the temperature differential in excess of 50°F. In a subsequent telephone conversation, a licensee representative stated that General Electric supplied information to show that a stress analysis had been made on a boiling water reactor vessel for restarting the recirculation loop with a 400° differential temperature over a period of 26 seconds. This analysis showed only skin stresses that are easily accountable for by fatigue analysis. The licensee's representative further stated that this information would be included in the report to be submitted to the Directorate of Licensing.

b. Procedures

Reactor Operating Procedure No. 301, entitled "Nuclear Steam Supply System", provides instructions for operating the recirculation loops. Section 3.02 of Procedure 301, entitled "Prerequisites", Steps 2.E.2, specifies (sic) "pump filled with water same temperature as pumps (check reactor water temperature)". A temporary procedure change dated 12/18/70 requires a shutdown to recover an idle loop if the differential between the loop and the reactor exceeds 50°F. This caution note was also added to Section 3.1, "Placing Recirculation Pump in Operations" via a Temporary Procedure Change dated 12/18/72 as follows: "If temperature differential between the loop and the reactor is greater than 50°F, the reactor will have to be shutdown and cooled down to recover the loop."

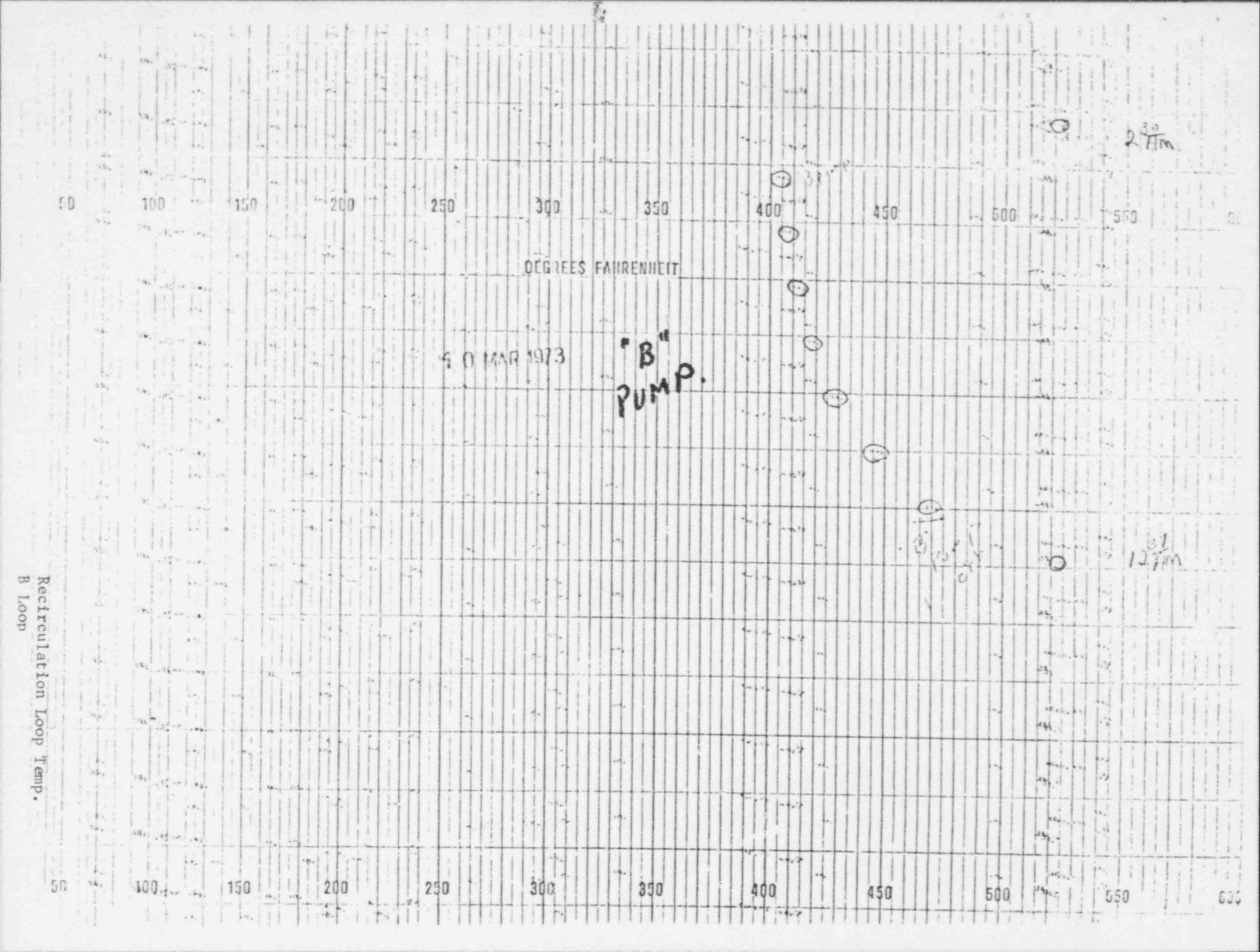
Technical Specifications paragraph 6.2.a requires "Detailed written procedures with appropriate check off lists and instructions shall be provided for the following conditions; 1. Normal startup, operation and shutdown of the complete plant and all systems and components involving nuclear safety of the plant.... 4. Preventive or corrective maintenance operations which could have an affect on the safety of the reactor." Technical Specification 6.2.C requires in part, "Standing instructions to the operating staff shall require that the procedures identified in A....above are to be followed in conducting activities identified therein." No check list was available which was specifically applicable to the job of removing and returning a recirculation loop to service. From the events that transpired, it was apparent that the operating procedure (No. 301) was not reviewed prior to removing and returning the recirculation loops to service, nor was the procedure used as a guide for this operation.

At the time of the inspection, the licensee was in the process of revising and updating procedure No. 301; however, the revised procedure had not been reviewed by the Plant Operations Review Committee, a requirement of the Technical Specifications. The inspector was informed that the licensee planned to present this procedure to the PORC for review and approval at the next meeting.

3. Stack Release Rates

The inspector reviewed data sheets, recorder charts and laboratory analyses to determine the effect of plant operations on the stack release rate. From the recorded release rates and from a review of plant operations, it appears that any change in plant operations causes a temporary increase in the stack release rate, i.e., increased power, removal of rods, reduced power, increased recirculation flow, etc. Normally the effect is temporary for a few hours; however the stack release rate has increased from an average of about 40,000 uCi/sec during the latter part of January after the plant was returned to power from the December 29, 1972 to January 10, 1973 outage, to in excess of 100,000 uCi/sec during March. Based on laboratory analysis of the stack release rate, this rate has varied from 108,748 uCi/sec to 137,539 uCi/sec. Based on an analysis March 12, 1973, stack release rate was 124,963 uCi/sec.

In response to a question, a licensee representative stated that Jersey Central planned to sip the core during the forthcoming refueling outage (starting the weekend of April 14, 1973) in an effort to locate and remove the leaking fuel assemblies.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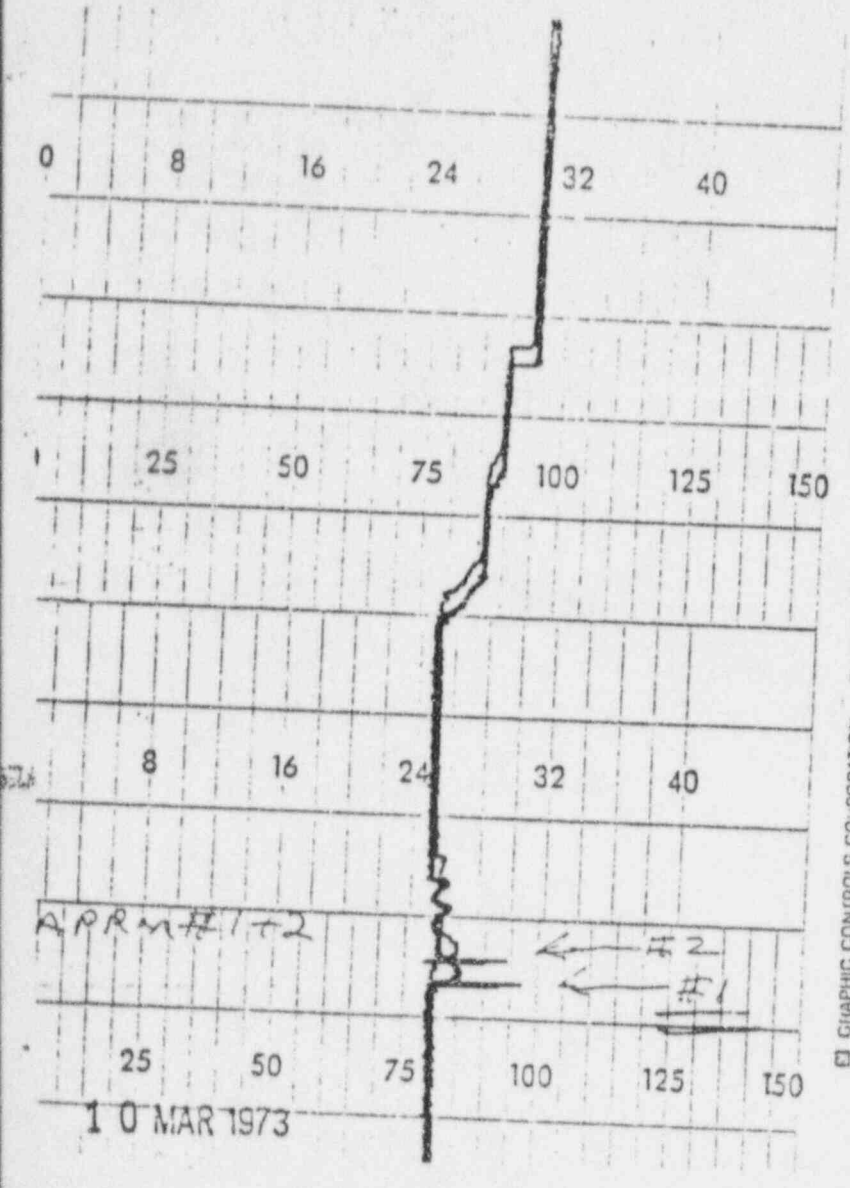
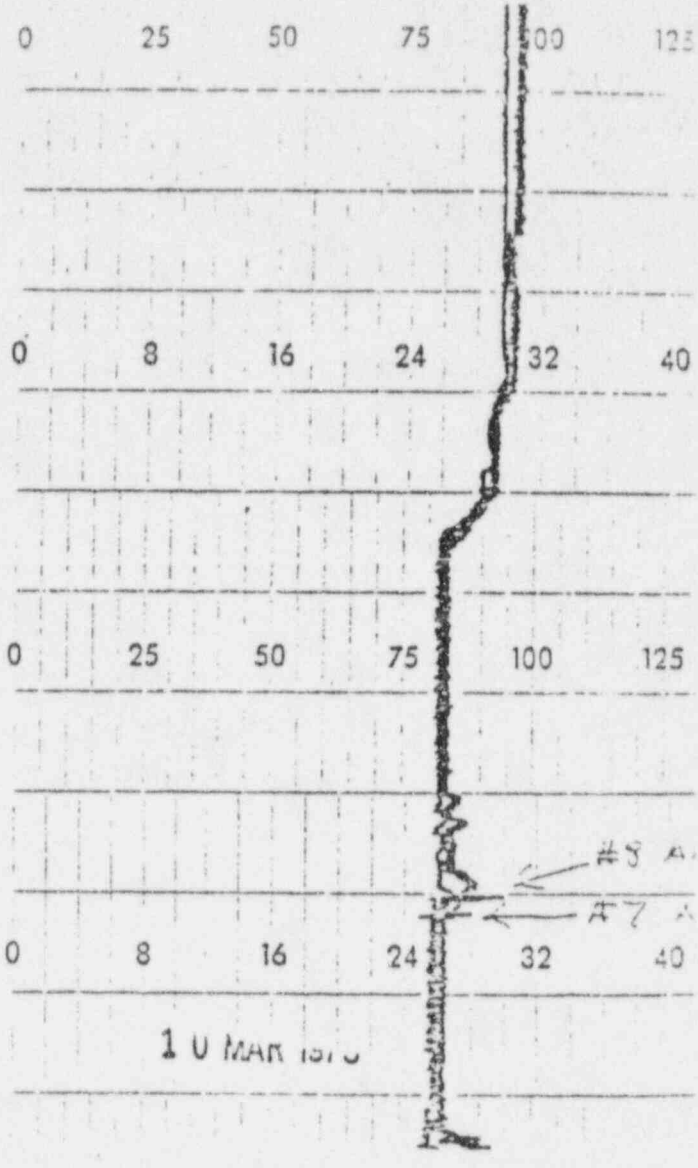
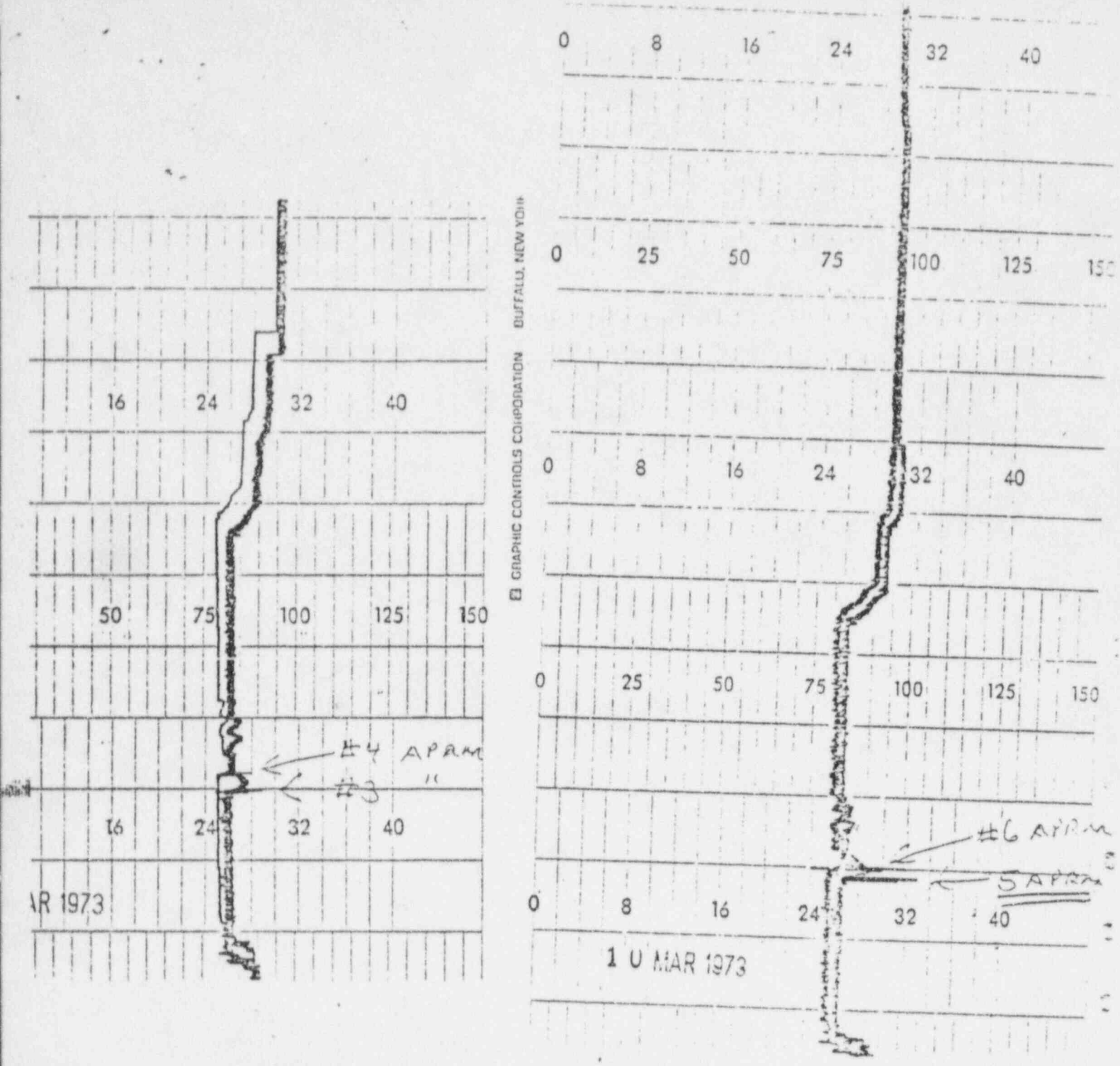




GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

Average Power Range Monitor Charts
Attachment No. 2



Average Power Range Monitor Charts
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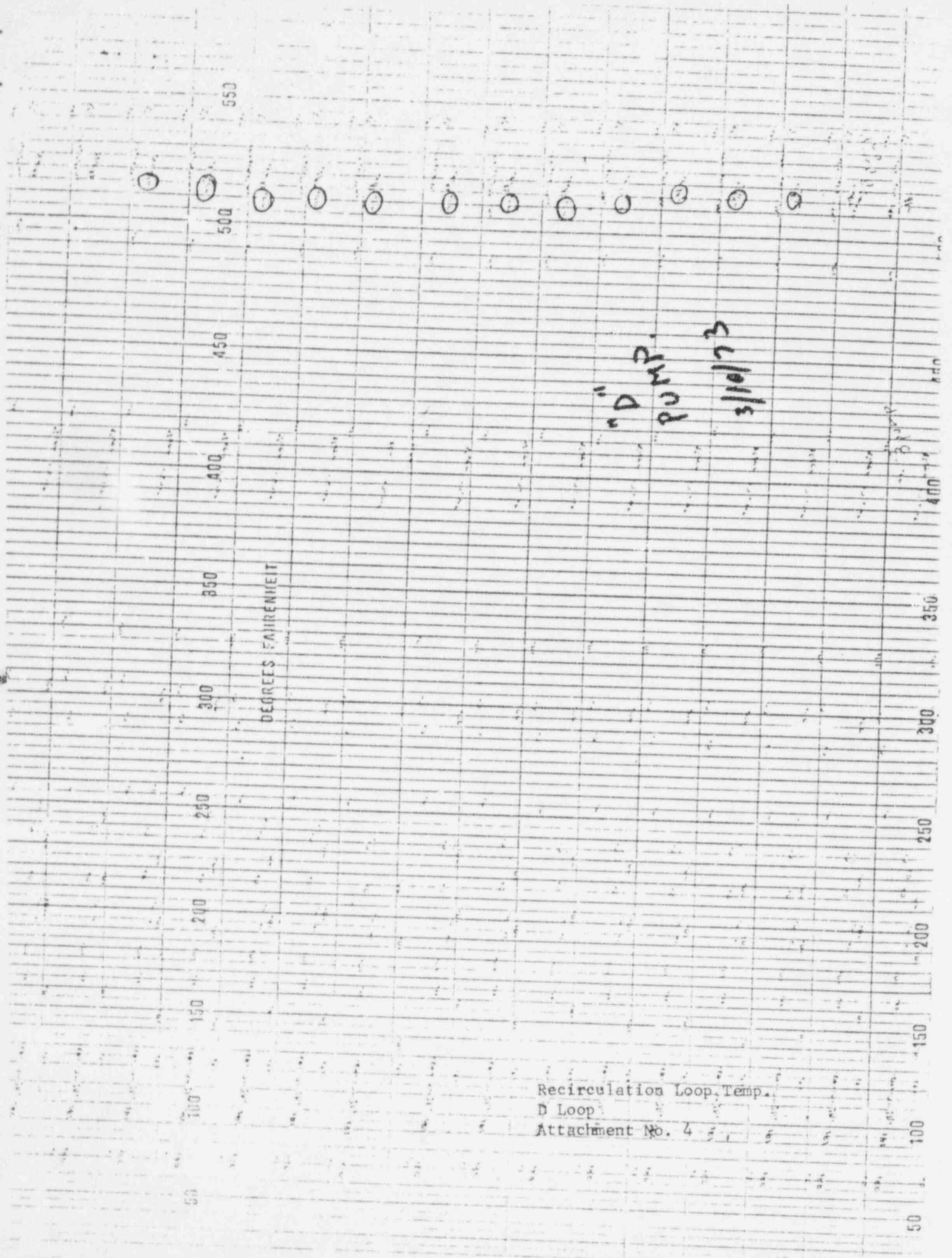

Recirculation Loop Temp.
D Loop
Attachment No. 4

Jersey Central Power & Light Company

50-219

MADISON AVENUE AT PUNCH BOWL ROAD • MORRISTOWN, N.J. 07960 • 539-6111

March 29, 1973

Mr. Robert J. Schemel, Chief
Operating Reactors Branch #1
Directorate of Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Schemel:

In accordance with your letter dated January 17, 1973, the following information was assembled regarding the corrective action taken to avoid a reoccurrence of incidences of the nature reported to the AEC on April 20, 1972 and October 6, 1972.

Reactor Building Ventilation System Circuitry Modification

As was reported on April 20, 1972, a Limiting Condition for Operation was violated when a circuit malfunction prevented the reactor building supply dampers from shutting regardless of the operation of the supply fans. It was discovered that this malfunction would occur every time one of the three supply fan circuit breakers was "racked out". This happened because a "racked out" breaker would supply a "fan running" signal to each of the twenty supply damper's logic circuits. Since the three "fan running" signals fed a series OR circuit, one racked out breaker and two deenergized fans would create the logic to allow the dampers to remain open.

On August 29, 1972, a circuit modification was implemented which corrected the above situation. Now a "racked out" fan sends a "fan stopped" signal to a parallel OR circuit. For a supply damper to remain open, it is now necessary for at least one fan to be running.

Liquid Poison Pump Circuitry Modification

The problem with the control circuitry for these pumps is similar to that discussed above. Whenever one pump's breaker was "racked out", the other pump was rendered inoperable. The control circuit has a feature which will not allow both pumps to run simultaneously. Originally, this was implemented by having a normally closed auxiliary switch from the A pump's starter in the B pump's starting circuit (and vice versa). When the A pump was started, the auxiliary switch would open and thereby prevent the B pump from being energized. Because the auxiliary

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switch was mounted to the circuit breaker frame, its contacts in the standby pump's starting circuit were physically removed when the breaker was racked out. This simulated one pump operating and subsequently locked out the standby pump.

On December 20, 1972, both pump circuits were modified as follows: An interposing relay mounted to the control cabinet was added to each control circuit. These relays are normally deenergized and have normally closed contacts which function as interlocks for the standby pump. The auxiliary switches have been removed from the pump starting circuits and have been changed to normally open contacts which control the interposing relay. When a pump is started, its auxiliary switch closes and causes the interposing relay to energize. This, in turn, opens the contacts in the standby pump's starting circuit and thereby prevents it from starting. If a breaker is racked out, it has no affect on the state of the interposing relay. Therefore, the operability of the standby pump is not affected.

In addition to the above modifications, an investigation was conducted for all Engineered Safeguards Systems which could possibly exhibit failures similar to those discussed above. Specifically, the study concentrated on racking out a breaker of a component and its affects on other redundant components in the system. The study was completed on December 1, 1972 and revealed no additional problem areas.

Regarding your request for a proposed Technical Specification change, we do not feel it to be warranted. The Technical Specifications at present delineate the action to be taken if redundant safeguard system equipment is rendered inoperable. Recently we have issued a Standing Order which requires the testing of a redundant system immediately after its counterpart is rendered inoperable or found to be inoperable. Since these meet the intent of your request, no changes to the Technical Specifications are deemed necessary.

Very truly yours,

Donald A. Ross

Donald A. Ross
Manager, Nuclear Generating Stations

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