INDIANA & MICHIGAN ELECTRIC COMPANY

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May 16, 1986
AEP:NRC:0966

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
RESPONSE TO IE BULLETIN NO. 85-03

Mr. James G. Keppler, Regional Director
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

This letter and its attachment respond to Mr. James M. Taylor's letter of November 15, 1985 entitled "IE Bulletin No. 85-03: Motor-Operated Valve Common Mode Failures During Plant Transients due to Improper Switch Settings."

The attachment to this letter contains a status report which addresses the preliminary information requested in the bulletin under part (e) of "Actions for All Holders of Operating Licenses or Construction Permits."

We plan to perform the actual valve testing during the next refueling outage and/or subsequent startup for each unit. Furthermore, we anticipate forwarding to you, within 60 days of completion of the entire program, a written report which summarizes these activities. Should unforeseen problems significantly change this schedule, we will notify you accordingly.

Currently, refueling outages are scheduled in April 1987 for Unit 1 and in February 1988 for Unit 2. Since the completion of testing for Unit 2 will exceed the two-year deadline of November 15, 1987 called for in the bulletin, we are requesting relief from this requirement.

Very truly yours,

M. P. Alexich
Vice President
5/16/86

MPA/rjn
Attachment

8605270226 20pp

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
G. Bruchmann
NRC Resident Inspector - Bridgman

STATUS REPORT

IMPLEMENTATION PLAN TO ADDRESS IE BULLETIN 85-03

FOR THE DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2

TABLE OF CONTENTS

I. <u>Background</u>

On November 15, 1985, the NRC Office of Inspection and Enforcement issued IE Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings." The purpose of the bulletin was to "request licensees to develop and implement a program to insure that switch settings on certain safety-related motor-operated valves (MOVs) are selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves during both normal and abnormal events within the design basis."

The bulletin originates, in part, from the Davis-Besse event of June 9, 1985. During this event, normally open motor-operated auxiliary feedwater valves failed to reopen on either an automatic or manual signal from the main control room after they were inadvertently closed during the event. Subsequent troubleshooting activities at Davis-Besse after the event concluded that the cause of the MOV failures was improper settings of the torque bypass switch in each valve's control circuit.

Bulletin 85-03 focuses on the MOVs in two systems: the high pressure coolant injection system and the emergency feedwater system. The bulletin requires the following six actions:

(a) Determine the maximum differential pressure across the subject MOVs. Document the valve design basis.

(b) Using the differential pressures from (a), establish the correct motor operator switch settings.

(c) Demonstrate valve operability by testing the valve at maximum differential pressure, where feasible. Where not feasible, provide justification.

(d) Revise the switch setting procedures, as necessary.

(e) Submit a written report documenting (a) and containing a program schedule to address (b) through (d).

(f) Submit a final report upon program completion.

The purpose of this letter is to provide a status report as requested in action (e) of the bulletin.

II. Status Report

(a) For the D. C. Cook Nuclear Plant, the following system perspectives were used to identify those motor-operated valves (MOVs) to be addressed in this program.

The MOVs included for the high pressure coolant injection (HPI) system were identified as follows:

1. MOVs in those portions of the Emergency Core Cooling System (ECCS) down to but not including the accumulator injection system. Safety injection (SI) and Chemical and Volume Control System (CVCS) are included; residual heat removal (RHR) is not included.

2. MOVs in those portions of the above included systems necessary to establish flowpaths from the Refueling Water Storage Tank (RWST) to the Reactor Coolant System (RCS).

3. MOVs in only those portions of the ECCS required during the cold leg injection phase, up to but not including the transfer to recirculation injection from the containment sump after the RWST empties.

The MOVs included for the Emergency Feedwater System, termed the Auxiliary Feedwater (AFW) System at the Cook Plant, were identified as follows:

1. MOVs used to establish a flowpath from the AFW safety-grade water source (or its backup) to the steam generators.

2. MOVs used to establish a steam delivery flowpath to the AFW turbine to enable turbine-driven AFW pump to start.

The specific valves identified using these perspectives are noted in Tables I and II which follow. Justifications for the maximum operating differential pressures and figures which locate the valves on various system schematics are also included for further clarity.

(b) Based on the results of action (a), it was concluded that the original design torque switch settings are valid. Plant procedures for setting all affected switches will be reviewed and revised, if necessary, to ensure that all switches are set correctly.

(c) Each valve will be stroke-tested, to the extent practical, to verify that the setting determined from action (b) has been properly implemented, even if testing with differential pressure cannot be performed. Where necessary to accomplish the objective of this test, procedures will be developed and implemented to stroke-test the appropriate valves at the highest practical differential pressure. The testing of each valve will be evaluated on an individual basis to weigh the consequences of failure against the practical difficulties of the test. In those cases where practical

and where consequences of valve failure are high, stroke-testing at the highest practical differential pressure will be incorporated into periodic surveillances. For the remaining valves, this stroke test will be a one-time test. In those cases where testing cannot be reasonably performed at the maximum differential pressures identified in item (a), justification for such cases will be documented with an alternative method for verifying the correct switch settings.

(d) Procedural controls for setting switches are currently in place. The design torque switch settings have been reviewed and determined to be correct. Existing plant procedures for setting motor operator switches will be reviewed, and where appropriate procedural enhancements will be added. Furthermore, an evaluation of state-of-the-art MOV testing systems will be performed and an appropriate test system will be chosen. Procedural revision will be completed to accommodate the test system selected prior to the next refueling outages (1987 for Unit 1 and 1988 for Unit 2). The actual valve testing will be performed during the 1987 (Unit 1) and 1988 (Unit 2) refueling outages or their subsequent startups.

III. TABLES

These tables present the details requested in action (a) of IE Bulletin 85-03. The tables include the valves involved as well as their respective differential pressures. The justifications noted for the maximum operating differential pressures are explained in the Table Justifications section of this report.

Table I	HPI Valve delta Ps
Table II	AFW Valve delta Ps

TABLE I
HPI VALVE ΔPs

MOV	Valve Number	Design ΔP(psi) Close	Design ΔP(psi) Open	Maximum Operating ΔP(psi) Close	Maximum Operating ΔP(psi) Open	Justification for Max Operating ΔP
Safety Injection Pump Suction from RWST	IMO-261	200	200	200	25	Open - 2 Close - 1
CVCS Pump Suction from RWST	IMO-910,-911	200	200	200	25	Open - 3 Close - 3
CVCS Pump Suction from VCT	QMO-451,-452	200	200	100	100	Open - 4 Close - 4
SI Pump Cross-Connect	IMO-270,-275	1750	1750	1750	1750	Open - 5 Close - 5
SI Pump Discharge Isolation	ICM-260,-265	2750	2750	0	1750	Open - 6 Close - 7
SI Pump Discharge to Cold Leg	IMO-316,-326	1700	1700	200	1750	Open -14 Close -15
CVCS Normal Discharge Isolation	QMO-200,-201	2750	2750	2750	2750	Open - 8 Close - 8
BIT Inlet Isolation	IMO-255-,256	2750	2750	0	2750	Open - 9 Close - 7
BIT Outlet Isolation	ICM-250,-251	2750	2750	0	2750	Open - 9 Close - 7
SI Pump Miniflow	IMO-262,-263	2750	2750	1750	1750	Open -11 Close -10
CVCS Pump Miniflow	QMO-225,-226	2750	2750	2750	2750	Open -13 Close -12

TABLE II
AFW VALVE ΔPs

MOV	Valve Number	Design ΔP (psi) Close	Design ΔP (psi) Open	Maximum Operating ΔP (psi) Close	Maximum Operating ΔP (psi) Open	Justification for Max Operating ΔP
Turbine-Driven Pump Discharge Flow Control	FMO-211,-221 -231,-241	1200	1200	1365	1240	Open - 1 Close - 2
Motor-Driven Pump Discharge Flow Control	FMO-212,-222 232,-242	1200	1200	1335	1430	Open - 3 Close - 2
Mechanical Trip and Throttle	QT-506	1190	1190	1097	1097	Open - 4 Close - 4
Suction from Essential Service Water	WMO-744,-753 -754	150	150	105	105	Open - 5 Close - 5
Steam Admitting Valves	MCM-221,-231	758	758	600	0	Open - 6 Close - 7

IV. TABLE JUSTIFICATIONS

This section details the justifications for maximum operating differential pressures referenced in Tables I and II.

JUSTIFICATION FOR MAXIMUM OPERATING ΔP GIVEN IN TABLE I

1. This valve must be able to close to isolate the RWST from the discharge of the RHR pumps during the recirculation mode of operation, as a precautionary measure in the event of backleakage through check valve SI101. For this scenario, the ΔP across IMO-261 could be as high as the RHR pump discharge head ~200 psig.

2. This valve is normally open and would have to be reopened only in case of inadvertent closing. In that case, the valve must be able to open against a full RWST head of water, approximately 25 psig.

3. IMO-910 and 911 are normally closed and must open to transfer suction of centrifugal charging pumps from the VCT to the RWST. Maximum valve ΔPs are the same as for IMO-261

4. These valves must close on an "S" signal; the maximum ΔP across the valve is defined by the volume control tank at its design pressure (relief valve setpoint) of 75 psig plus elevation head of the VCT above the valves. This is estimated to be ~100 psig.

5. Must be able to move to allow realignment of ECCS to recirculation mode, and for ECCS train separation. Delta-P could be as high as 1750 psig ~ equal to miniflow head of safety injection pump.

6. Pump testing on miniflow circuit, ΔP is determined by the miniflow head of safety injection pump ~1750 psig.

7. Valve is only closed when pump is not operating; no flow - no ΔP.

8. These valves must be able to isolate the RCS from the CVCS, with a maximum possible ΔP of the shutoff head of the centrifugal charging pumps ~2750 psig.

9. Given a miniflow test of the centrifugal charging pumps, the BIT isolation valves must be able to open with a ΔP ~ equal to the charging pump shutoff head.

JUSTIFICATION FOR MAXIMUM OPERATING ΔP GIVEN IN TABLE I

10. Valves must close to isolate miniflow so that high pressure injection switchover to recirculation may proceed. In the worst case, the ΔP will be equal to safety injection pump maximum discharge pressure ~1750 psig.

11. Similar to 10, except valve must be able to open during miniflow testing of the safety injection pump.

12. Valves must close to ensure adequate high pressure injection flow (on "S" signal) against miniflow ΔP ~2750 psig.

13. Valves must be able to be opened in the event of repressurization of the RCS.

14. Valves are locked open. However, assuming inadvertent closing, the valves would have to open against S.I. pump maximum discharge pressure ~1750 psig. Since the "open" torque switch is not wired, open torque switch setting is inconsequential. The Limitorque operator has ample thrust capacity to open valve with a ΔP of 1750 psi.

15. Valves must close for switchover from cold leg to hot leg injection with RHR pump discharge pressure.

JUSTIFICATION FOR MAXIMUM OPERATING ΔP GIVEN IN TABLE II

1. Maximum ΔP during valve opening would occur during steam generator filling when pump is at minimum flow and steam generator pressure is minimum for AFPT operation, namely 310 psig. Motor operator capability has been demonstrated during numerous start-ups.

2. To perform its safety function, valve must close following a line break downstream of valve. In this case, the maximum valve closing ΔP is as shown. The capability of the valves to close against pump discharge pressure up to 1430 psig has been demonstrated during steam generator filling operations. Therefore, even though the original torque switch settings were based on a design ΔP of 1200 psi, they have been shown to be adequate by actual valve operation.

3. Maximum ΔP during valve opening occurs during steam generator filling when pump is at minimum flow and steam generator pressure is zero. Since the "open" torque switch is not wired, the "open" torque switch setting is meaningless. The motor operator has adequate thrust capability to open the valve at this ΔP as evidenced during numerous filling operations.

4. This normally closed valve may have to open or close against maximum steam generator pressure; i.e. 1097 psig (lowest safety valve setting +3% accumulation).

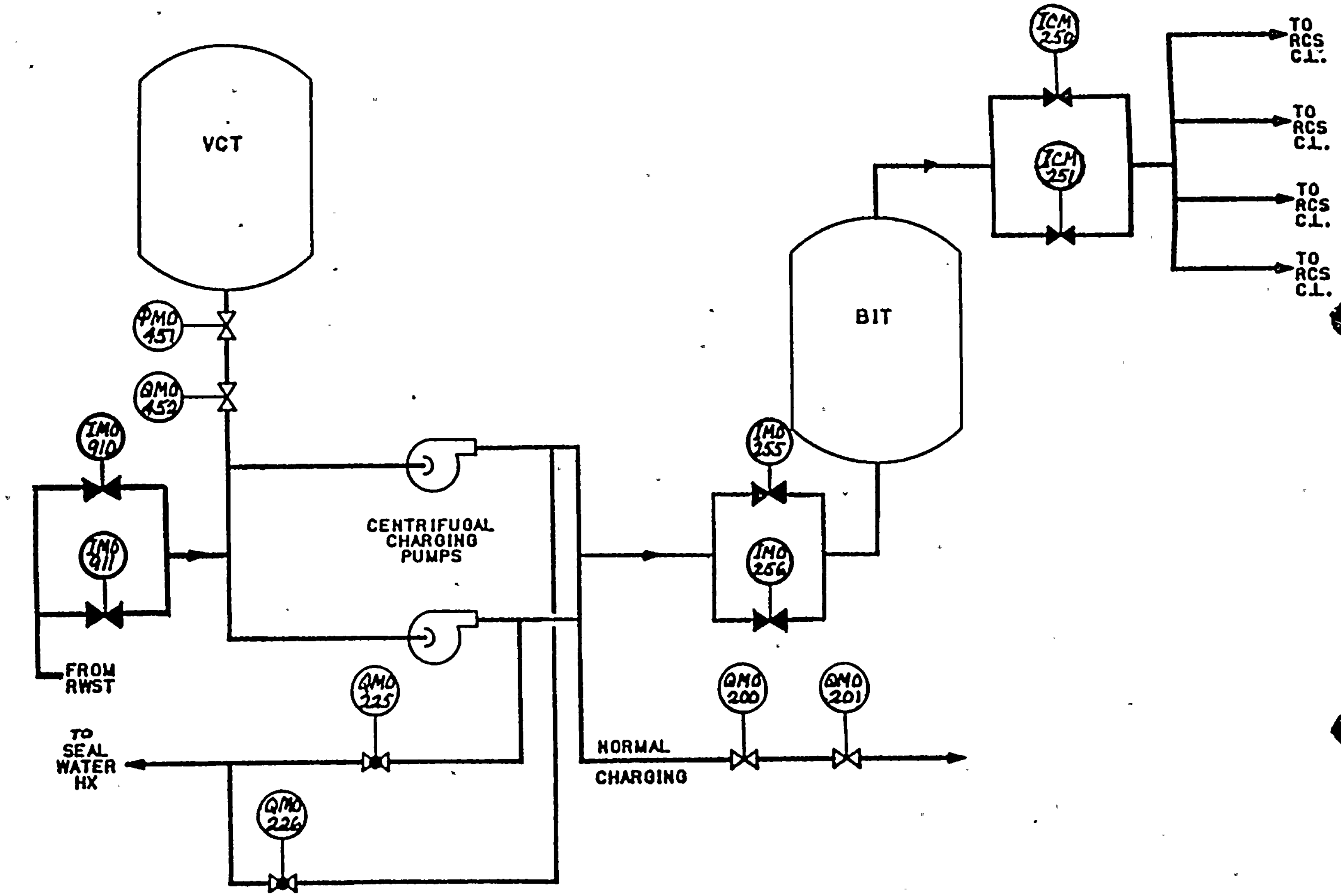
5. The maximum valve ΔP is essential service water pump shutoff head.

6. Valves are opened with no ΔP prior to plant start-up. They remain open during plant operation.

7. Maximum ΔP occurs during steam line break downstream of valve. Operator action to close valve would occur following low steam generator pressure alarm at 600 psi.

V. FIGURES

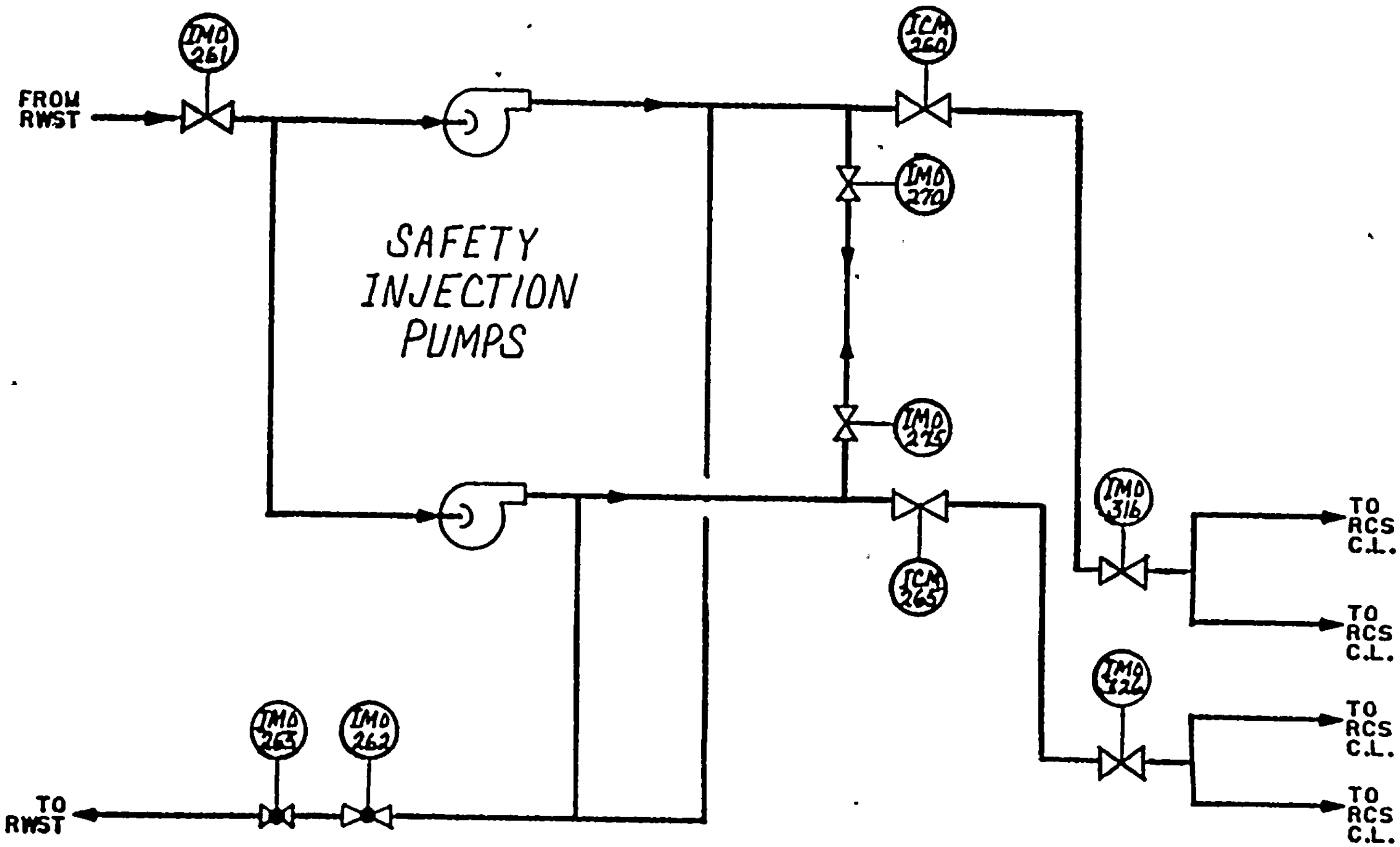
This section contains various schematic diagrams which locate the valves listed in Tables I and II.



D. C. COOK PLANT UNITS 1 & 2

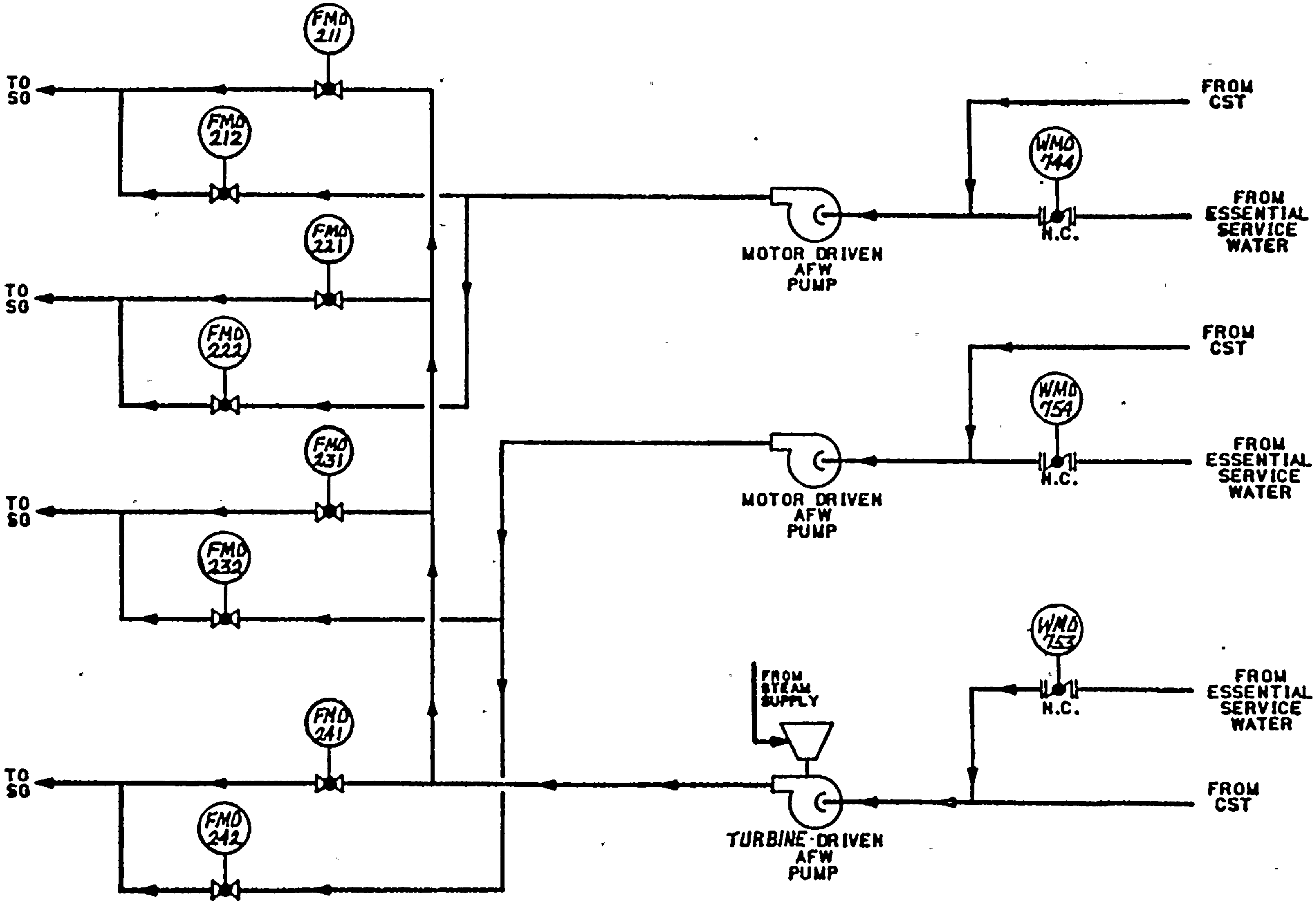
SCHEMATIC DIAGRAM OF ECCS - CHARGING SYSTEM PORTION

Fig. 1



D. C. COOK PLANT UNITS 1 & 2
SCHEMATIC DIAGRAM OF ECCS - SAFETY INJECTION SYSTEM PORTION

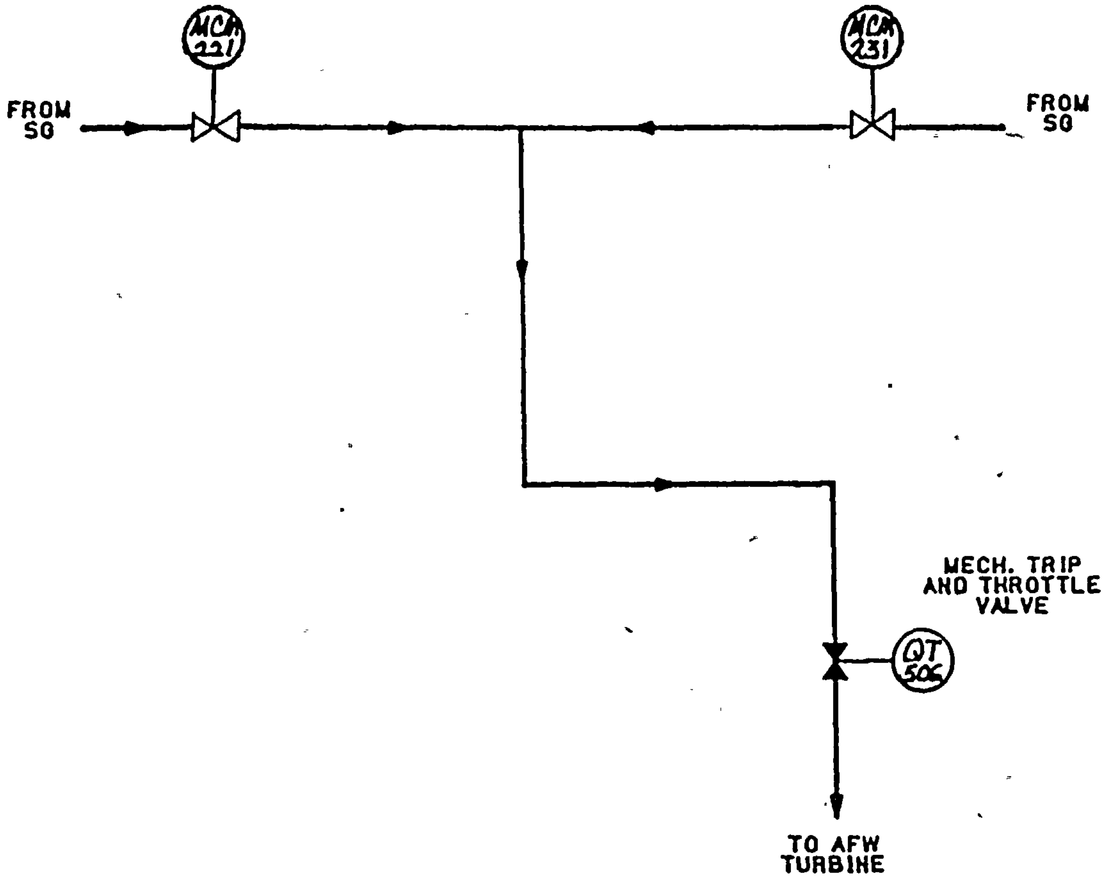
Fig. 2



D. C. COOK PLANT UNITS 1 & 2
SCHEMATIC DIAGRAM OF AUXILIARY FEED WATER SYSTEM

Fig. 3

ATTACHMENT TO AEP:NRC:0966



D. C. COOK PLANT UNITS 1 & 2

SCHEMATIC DIAGRAM OF STEAM SUPPLY TO AUXILIARY FEEDPUMP TURBINE

Fig. 4

STATE OF OHIO

COUNTY OF FRANKLIN

M. P. Alexich, being duly sworn, deposes and says that he is the Vice President of Licensee Indiana & Michigan Electric Company, that he has read foregoing response to IE Bulletin 85-03, AEP:NRC:0966, and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

Milton P. Alexich

Subscribed and sworn to before me this *16th* day of *May*, 1986.

Eileen M. Lodge
(Notary Public)

EILEEN M. LODGE
NOTARY PUBLIC - STATE OF OHIO
MY COMMISSION EXPIRES MAY 7, 1987