NORTHERN STATES POWER COMPANY
MONTICELLO NUCLEAR GENERATING PLANT

REPORT TO
UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF REACTOR LICENSING
LICENSE NO. DPR-22

SIX-MONTH OPERATING REPORT NO. 2
JULY 1, 1971 to DECEMBER 31, 1971

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I. INTRODUCTION

This operating report for the Monticello Nuclear Generating Plant summarizes the six month period from July 1, 1971 through December 31, 1971. It is submitted in accordance with the reporting requirements of the Provisional Operating License DPR-22 and Section 50.59 of 10 CFR 50 as described in the following paragraphs.

Section 6.6.D of Appendix A, Technical Specifications, of the Provisional Operating License DPR-22 for the Monticello Nuclear Generating Plant requires that a routine operating report be submitted to the Director, Division of Reactor Licensing, of the United States Atomic Energy Commission, at the end of each six month period. The reports are required to contain the following information (summarized on a monthly basis):

a. Nuclear

(1) Number of hours the plant was operated.
(2) Number of times the reactor was made critical.
(3) Gross thermal power generated.
(4) Operating histogram, showing the thermal power level of the reactor versus time for the report period.
(5) Equivalent Full Power Hours.

b. Electrical

(1) Gross power generated (in MWh).
(2) Net power generated (in MWh).
(3) Length of time generator was on line (in hours).

c. Shutdowns

(1) Number of scrams and shutdowns.
(2) Duration of down time (in hours).
(3) Reasons for outage.

d. Maintenance (on systems or components designed to prevent or mitigate the consequences of nuclear accidents).

(1) Nature of maintenance: e.g., routine, emergency, preventive, or corrective.
(2) The effect, if any, on the safe operation of the reactor.
(3) The cause of any malfunction for which corrective maintenance was required.
(4) The effects of any such malfunctions.
(5) Corrective and preventive action taken to preclude recurrence of malfunctions.
(6) Time required for completion.

e. Radioactive Liquid Waste

(1) Total curie activity discharged.
(2) Total volume (in gallons before dilution) of liquid waste discharged.
(3) Total volume (in gallons) of dilution water used.

(4) Average concentration (in uc/cc) at outfall of discharge canal.
(5) Maximum concentration released for any consecutive 24 hours during the reporting period, including time and date.
(6) Percentage of annual limit released.
(7) Results of isotopic analyses and estimated curies of each identified nuclide released.
(8) Total curie activity of Tritium discharged.

f. Gaseous Waste

(1) Total curies activity discharged separated into noble gases, iodine, and particulates.
(2) Maximum activity released for any consecutive 24 hours during the reporting period, including time and date.
(3) Percentage of maximum annual limit released and MPC value.
(4) Results of all isotopic analyses and estimated total curies of each identified nuclide released.

g. Solid Radioactive Waste

(1) Total volume (in cubic feet) of solid waste generated.
(2) Gross curie activity involved.
(3) Dates and disposition of the material if shipped off-site.

h. Environmental Monitoring

(1) A narrative summary, including correlation with effluent releases of the results of off-site environmental surveys performed during the report period.
(2) Tabulation of the results of the environmental monitoring program, including a figure showing location of the monitoring stations.
(3) For any samples which indicate statistically significant levels of radioactivity above established background levels, a comparison with applicable 10 CFR 20 limits shall be provided.

Section 50.59, 10 CFR 50, permits the holder of a license authorizing operation of a nuclear reactor to make changes in the facility, changes in procedures, and conduct tests or experiments, provided that the change, test or experiment does not involve a change in the technical specifications or an unreviewed safety question. The licensee is required to report such changes, tests and experiements to the Commission.

In addition to the above requirements this report includes a brief chronological summary of the plant operating history during the report period.

II. CHRONOLOGICAL HISTORY

7/4/71	Completed 100 hour warranty run.
7/5/71	Performed turbine trip test from 100% power. This completed all startup tests.
7/6/71	Completed initial drywell inerting.
7/7/71	High steam flow isolation setpoints set at tested value of 113% of rated steam flow pending development, safety evaluation and review, and AEC approval of procedures for performing tests at 140% of rated flow. Reactor power limited to 90% of rated.
7/14/71	While establishing steam flow to the main condenser following a reactor isolation, the water loop seal at the air ejectors discharge was lost, resulting in off gas being discharged to the turbine building sump. This resulted in the discharge of a small amount of gaseous activity (2000 uci/sec) from the reactor building ventilation stack over a half hour period. Modifications were made to procedures, the air ejector steam supply and the loop seal isolation controls to prevent a recurrence.
7/15/71 to 7/25/71	Outage to remove turbine stop valve and intercept valve startup screens. Replaced filter elements in condensate/demineralizer 'B' and chemically cleaned condensate/demineralizer 'C'.
7/26/71 to 8/7/71	Operated at 90% power.
8/7/71	Reactor scram from condenser low vacuum due to cooling tower return line screens plugging while going to closed circulating water system operation.
8/8/71	Operated at 90% power.
8/9/71	Reactor scram caused by improper opening of sensing line while calibrating condenser vacuum switches.
8/10/71 to 8/20/71	Operated at approximately 90% power, except for brief periods during August 11 and 12 when output varied between 50% and 75% power while conducting tests of the various modes of circulating water system operation.
8/20/71	Reactor scram from APRM Hi-Hi trip caused by sudden increase in No. 11 recirculation pump speed. Replaced faulty control amplifier.
8/21/71	Operated at 40% power.
8/22/71	Reduced power to hot standby to repair flange leak on 12-A Lp drain cooler.
8/23/71 to 8/25/71	Operated at 90% power.

8/26/71 to 9/1/72	Shutdown plant to repair leak on 12-A feedwater heater. While shutdown discovered and repaired leak in generator hydrogen seal. Also replaced filter elements in condensate/demineralizer vessels 'A', 'D', and 'E'.
9/2/71 to 9/5/71	Operated at 90% power.
9/5/71	Low air pressure caused closure of condensate demin outlet valves which in turn caused a low suction pressure trip of the reactor feed pumps. Reactor scram was initiated by low water level sensors. Air compressor loading valve repairs were completed and additional operator training was instituted to prevent a recurrence.
9/6/71	Operated at 45% power while repairing feedwater pump No. 11 inboard seal.
9/7/71 to 9/9/71	Operated at 90% power.
9/9/71	Shutdown plant to test MSIV closure reset circuit. Circuit found satisfactory.
9/11/71 to 9/21/71	Operated at 90% power except for a brief period during 9/15/71 when load decreased to 50% due to a trip of No. 11 recirc pump. After re-connecting a loose wire found in the recirc MG set exciter control circuit, the recirc pump was restarted and power was returned to 90%.
9/22/71	Reduced power to 50% to close 'B' steamline isolation valve and test HPCI system. Test verified that the differential pressure developed by the HPCI steam line flow elbow is affected by flow in 'B' steamline. The HPCI system was demonstrated to operate successfully in both AUTO and MANUAL control with 'B' Steamline MSIV Shut. RHR service water pump No. 12 tripped as a result of a short in the motor. Motor extensively damaged.
9/22/71 to 9/24/71	Operated at 90% power except for a brief period during 9/24/71 when power was decreased to 60% to test the HPCI system.
9/24/71	Plant shutdown while investigating RHR Service Water System flow anomaly. Investigation revealed that the vendor supplied flow orifice calibration data was in error.
9/26/71 to 9/27/71	Operated at 90% power.
9/27/71	Reactor power was reduced to 60% when No. 11 recirc pump field breaker tripped. Cause could not be determined.

9/28/71	Restarted No. 11 recirc pump. Reactor scrammed due to APRM Hi-Hi trip when No. 11 recirc pump speed suddenly increased.
9/29/71 to 9/30/71	Operated at 60% power with one recirc pump in operation while investigation and repair of No. 11 recirc pump speed and excitation controls were in progress.
10/1/71	Completed repairs to No. 11 recirc pump controls, placed it in operation and brought reactor power to 90%.
10/12/71 to 10/13/71	Reduced power to 60% for 12 hours to replace No. 11 feedwater pump inboard seal.
10/16/71	No. 12 RHR Service water pump restored to operable status with rebuilt motor.
10/28/71	Reduced power to 60% for five hours to take No. 12 recirc MG set out of service to replace brushes.
11/10/71	Reduced power to 60% to take No. 11 Recirc MG set out of service due to high vibration.
11/12/71 to 12/31/71	Scheduled Plant shutdown to install new design rotating assembly in No. 12 RFP and perform general maintenance. Testing and inspections performed during the outage revealed that several MSIV's were leaking and several torus baffles had become detached from their supports. The outage was extended to repair the MSIV's and to remove all torus baffles. Other work completed during the outage included modification of the main steam flow restrictors, extension of the main steam relief valves discharge lines, installation of an off gas loop seal low level isolation sensor, replacement of the set pressure adjustment springs for the main steam relief valves, and balancing of No. 11 Recirc MG set.

III. OPERATING DATA

A. Nuclear

Year: 1971	July	Aug.	Sept.	Oct.	Nov.	Dec.
*No. of hours the plant was operated.	490.1	586.2	650.5	745	288	0
**Number of times the reactor was made critical	3	3	5	0	0	0
Gross thermal power generated (MWD)	26,389	32,027	32,299	45,694	16,884	0
***Equivalent Full Power Hours	379	460	464	657	243	0

* The plant is considered to be operating from the initiation of control rod withdrawal to make the reactor critical, until the reactor is returned to the all-rods-in condition.

** This is the number of times the reactor was made critical from an essentially all-rods-in condition. Repeated critical and subcritical operations during operator training exercises are not included.

*** Histograms of power operation are included at the end of this section.

B. Electrical

Month	Gross MWH	Net MWH	Hours Generating
July	218,550	207,498	452
Aug	262,860	247,896	547
Sept	263,270	247,882	582
Oct	377,470	358,534	745
Nov	138,170	129,936	286
Dec	0	-3,220	0

C. Shutdowns

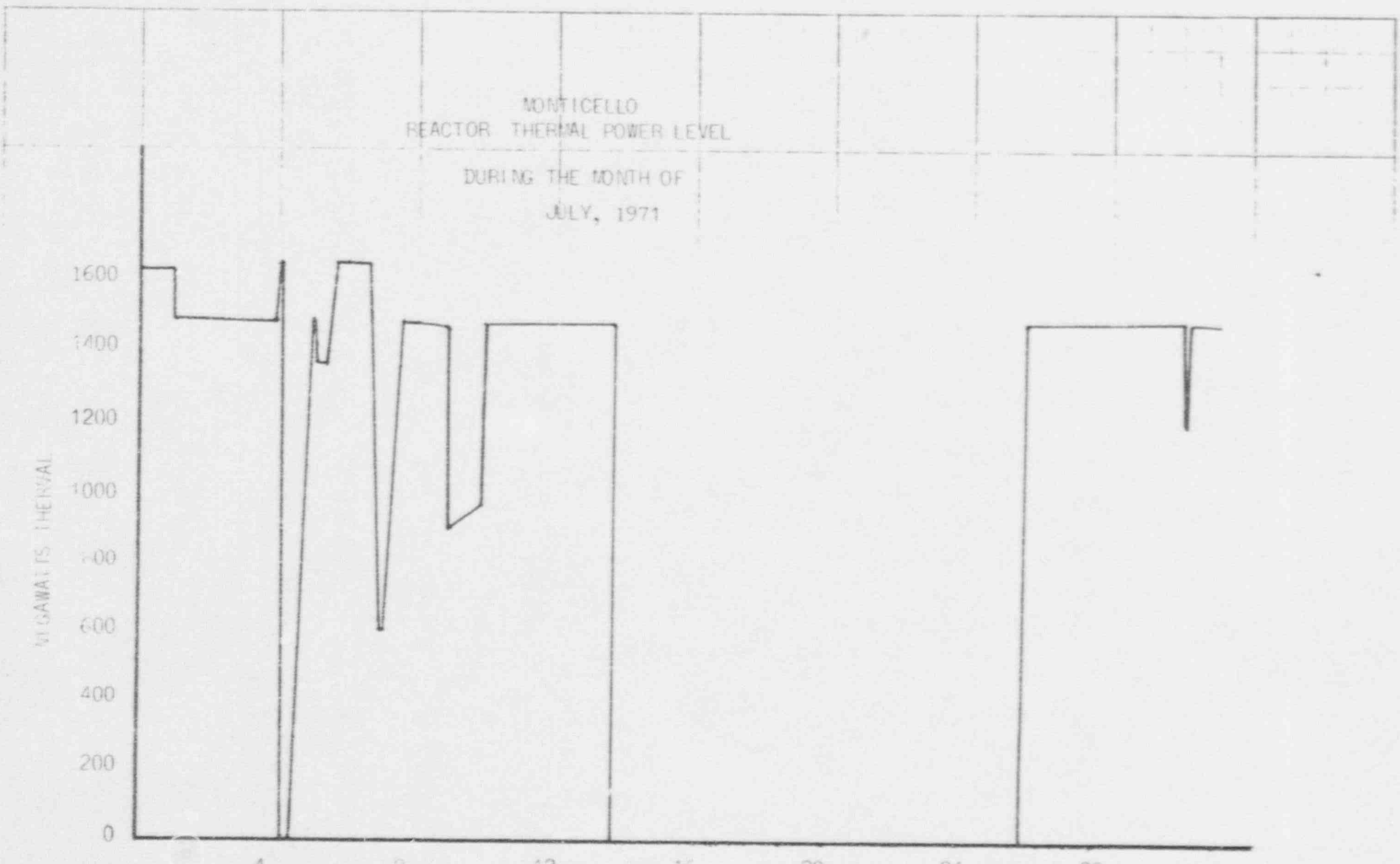
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
No. Shutdowns	3	4	4	0	1	0	12
Hours Shutdown	253.9	157.8	69.5	0	456	744	1681.2
Scrams	2 *	3	2	0	0	0	7

* Includes Planned Scram for Turbine Trip Test.

Shutdown Period	Duration of Down Time, Hours	Reason for Outage
July 1971		
1. July 5, 1971 @ 0115 to July 5, 1971 @ 0749	6.5	Scram. Planned scram from turbine trip test at 100% power.
2. July 14, 1971 @ 1348 to July 15, 1971 @ 0130	11.7	Scram. When a pressure transmitter was valved in service following routine calibration, a pressure surge occurred in the instrument sensing line. The surge tripped the main steam line high flow switches connected to the same line causing a group I isolation. MSIV closure caused the scram.
3. July 15, 1971 @ 1810 to July 25, 1971 @ 1350	235.7	Shutdown to remove startup screens from turbine stop and intercept valves.
August 1971		
1. August 7, 1971 @ 0906 August 7, 1971 @ 1736	8.5	Scram. While going to closed circulating water system operation both circulating water pumps tripped due to low basin water level caused by plugged cooling tower return line screen. The resulting low condenser vacuum caused the scram.
2. August 9, 1971 @ 1316 to August 9, 1971 @ 2320	10.1	Scram. While conducting calibration of condenser low vacuum scram switches, the sensing line was improperly opened to atmosphere resulting in a scram.

Shutdown Period	Duration of Down Time, Hours	Reason for Outage
3. August 20, 1971 @ 2245 to August 21, 1971 @ 0303	4.3	Scram. Reactor recirc. pump No. 11 suddenly increased in speed causing an APRM high-high scram.
4. August 26, 1971 @ 0905 to September 1, 1971 @ 1819	134.9	Shutdown to repair flange leak on feedwater heater 12A. Extended outage to repair generator hydrogen seal leak
September 1971		
1. August 26, 1971 @ 0905 to September 1, 1971 @ 1819 (continued from August)	18.3	see August
2. September 5, 1971 @ 0743 to September 10, 1971 @ 1106	8.8	Scram. Both reactor feedwater pumps tripped on low suction pressure when the condensate demineralizer control valves closed due to low air pressure. Low water level scrammed the reactor. Air compressor unloading valves were repaired.
3. September 9, 1971 @ 2130 to September 10, 1971 @ 1106	13.6	Shutdown to test MSIV closure reset circuit. Circuit found to operate properly.
4. September 25, 1971 @ 0600 to September 25, 1971 @ 1430	8.5	Shutdown while investigating RHR Service Water System flow anomaly. Vendor flow orifice calibration data found to be in error.
5. September 28, 1971 @ 0116 to September 28, 1971 @ 2135	20.3	Scram. Sudden increase in No. 11 recirc pump speed caused an APRM High-High scram.
October 1971		
No Shutdowns		
November 1971		
1. November 12, 1971 @ 2400 to end of Reporting Period	456	Shutdown to replace 12 feedwater pump rotating assembly. Extended outage for maintenance of MSIV's removal of torus baffles and modification of relief valve downcomers. Other work completed during this

Shutdown Period	Duration of Down Time, Hours	Reason for Outage
		outage included replacement of set pressure adjustment springs on the main steam relief valves, installation of an off-gas loop seal isolation switch and control circuitry, and modification of the main steam flow restrictors.
December 1971		
1. All month	744	See November


MONTICELLO
REACTOR THERMAL POWER LEVEL
DURING THE MONTH OF
JULY, 1971
MEGAWATTS THERMAL
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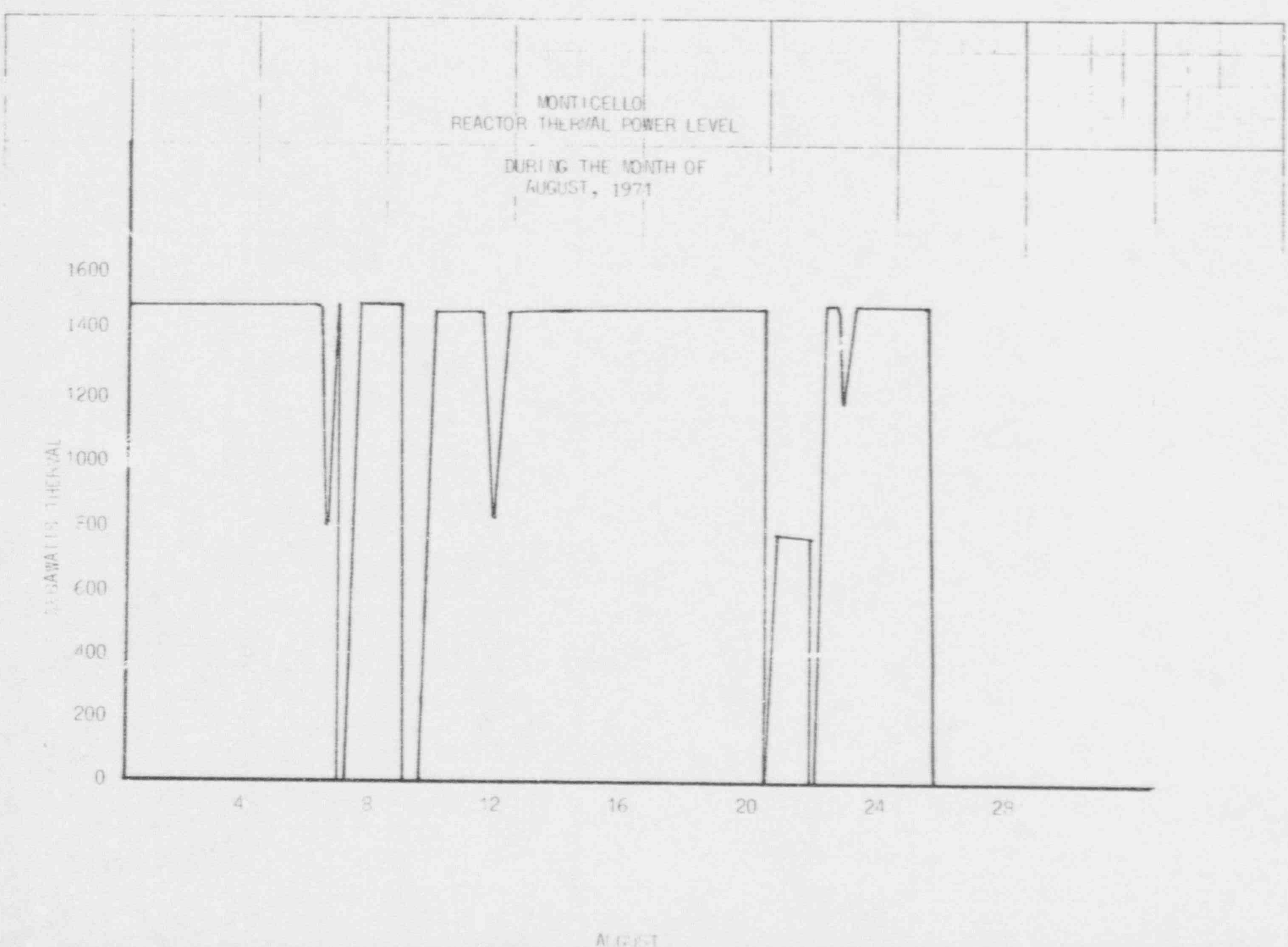
1400
1200
1000
600
400
200
0
4
8
12
16
20
24
28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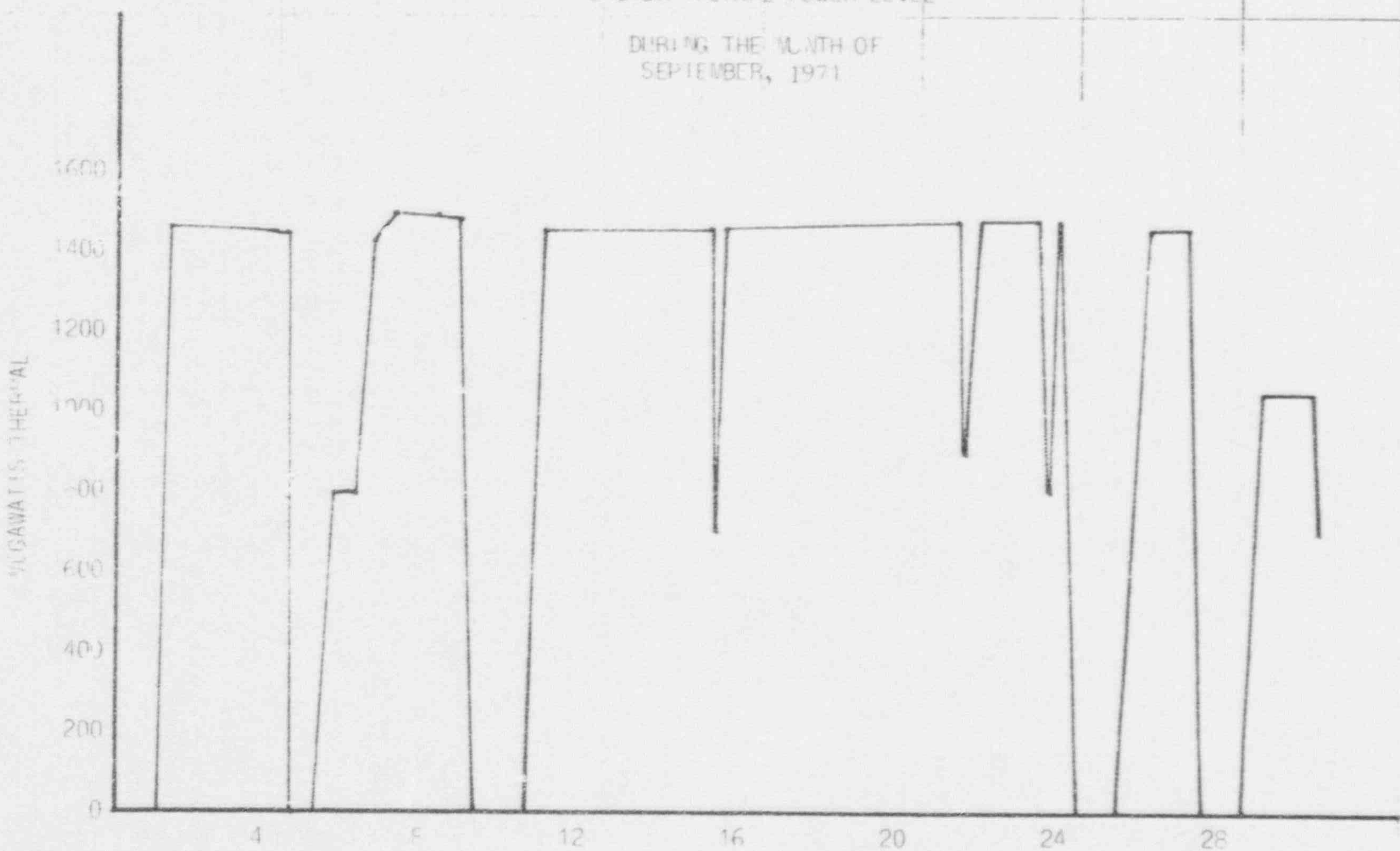
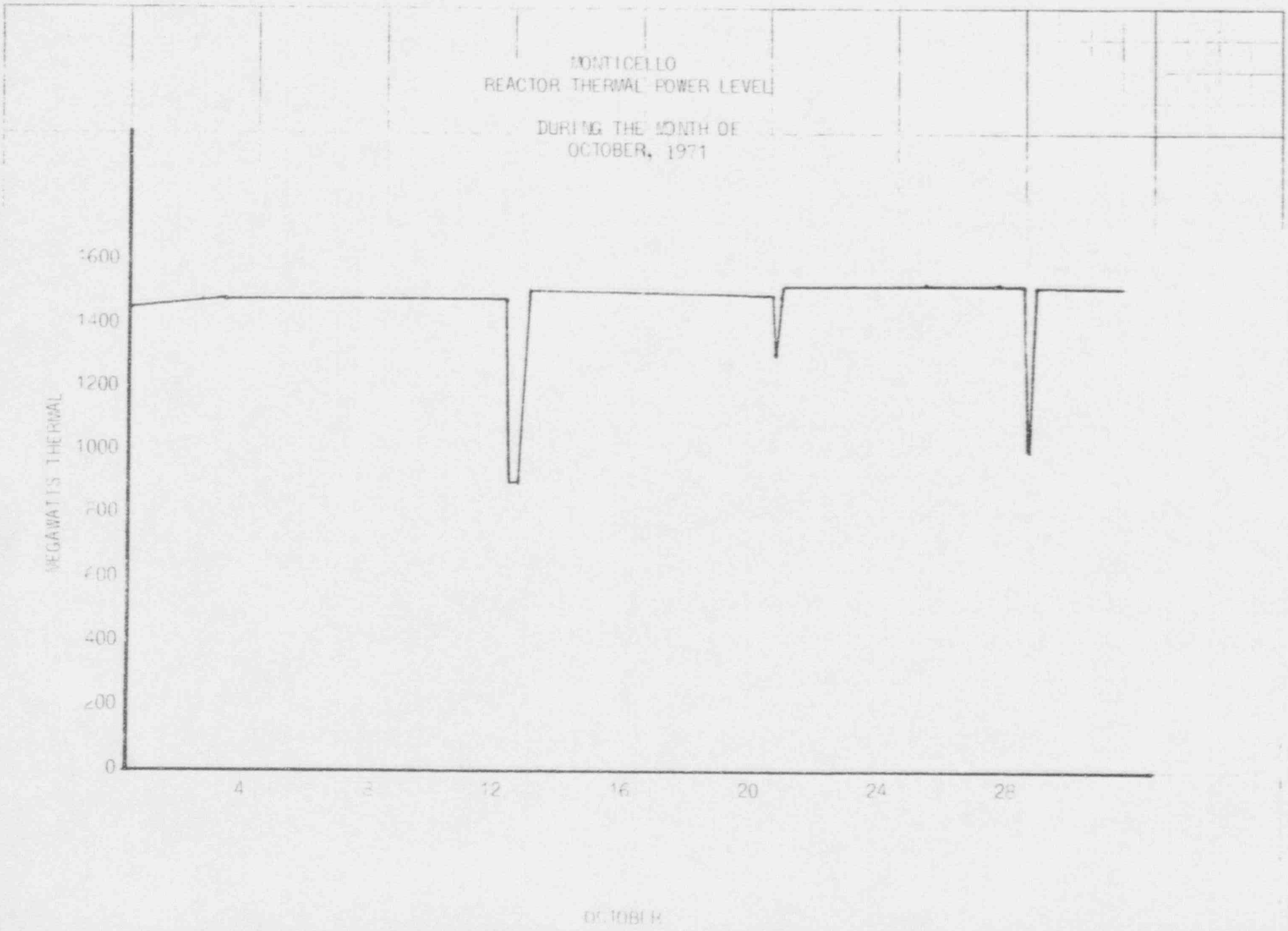
REACTOR THERMAL POWER LEVEL
DURING THE MONTH OF
AUGUST, 1971
1600
1400
1200
1000
600
400
200
0
4
8
12
16
20
24
28

MONTICELLO
REACTOR THERMAL POWER LEVEL

DURING THE MONTH OF
SEPTEMBER, 1971

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REACTOR THERMAL POWER LEVEL
DURING THE MONTH OF
OCTOBER, 1971
MEGAWATTS THERMAL
1400
1200
1000
0
4
12
16
20
24
28

MONTICELLO
REACTOR THERMAL POWER LEVEL
DURING THE MONTH OF
NOVEMBER, 1971
MEGAWATTS THERMAL
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1400
1200
1000
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200
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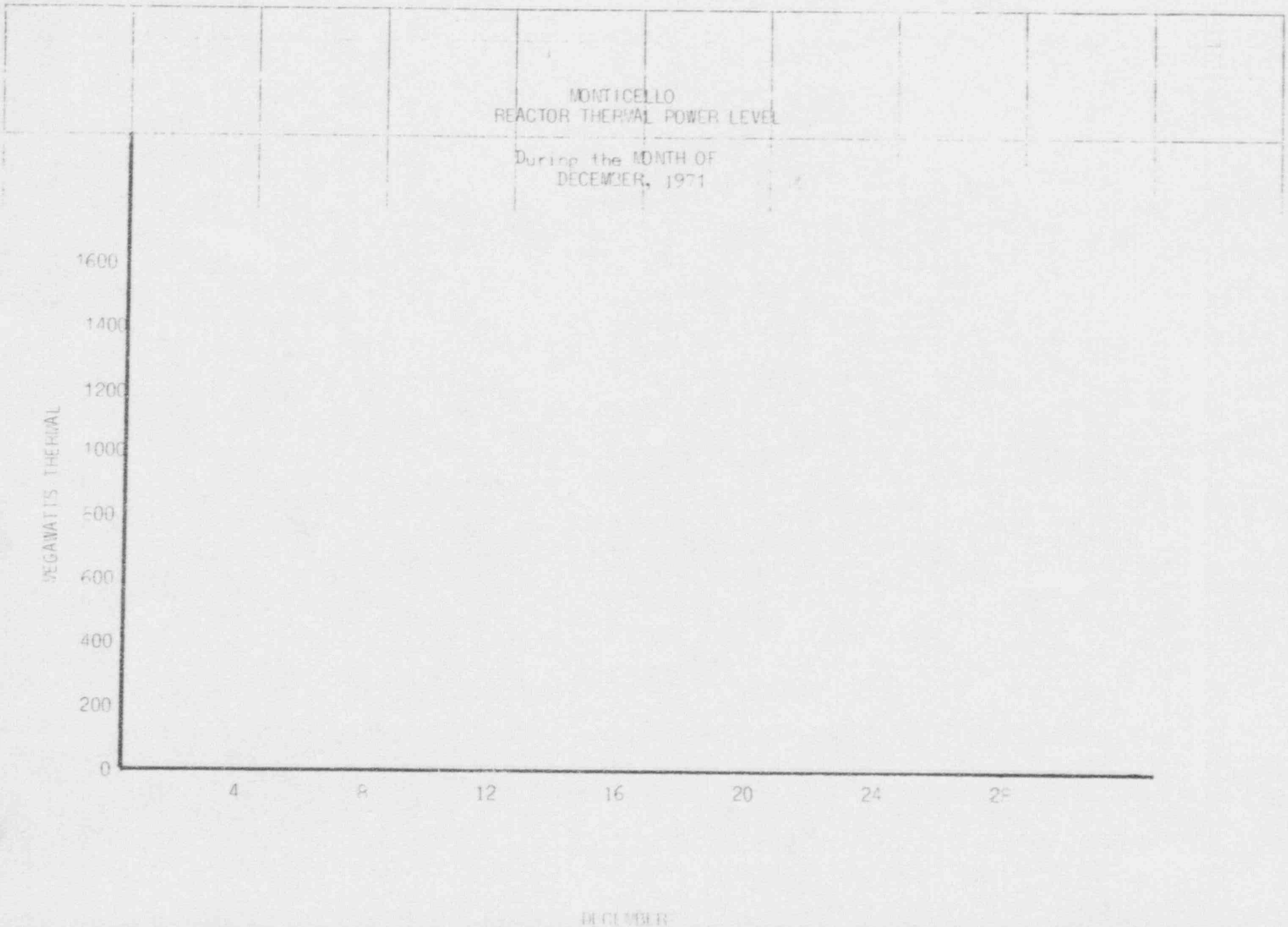
24


MONTICELLO
REACTOR THERMAL POWER LEVEL
During the MONTH OF
DECEMBER, 1971
MEGAWATTS THERMAL
1600
1400
1200
1000
800
600
400
200
0
4
8
12
16
20
24
28
DECEMBER

IV MAINTENANCE

A "Routine Operating Report Maintenance Record" form, containing all of the information required by the Technical Specifications, has been established to facilitate reporting of maintenance work performed on systems or components designed to prevent or mitigate the consequences of nuclear accidents. The forms are completed for each item of maintenance on such systems except routine surveillance testing. This section contains copies of the maintenance record forms for this report period.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Reactor Protection System

2. Date performed: 7/9/71 Time required for completion: 3 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Replaced two High Reactor Pressure scram pressure switches. Removed snubbers from sensing lines for all four High Reactor Pressure Switches.

5. The effect, if any, on the safe operation of the reactor: NONE. The trip logic channels of the instruments were placed in the tripped condition while maintenance was in progress.

6. The cause of any malfunction for which corrective maintenance was required: Probably due to plugged snubbers.

7. The effects of any such malfunctions: Two of the four switches did not trip within required limits. The reactor high pressure scram protection was not defeated, however, since only one failure occurred in each of the two scram logic protection channels.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Manufacturers inspection showed the two switches to meet specifications. The surveillance test frequency was increased for a time sufficient to determine if the problem was still in existence. No further problems experienced since removal of snubbers.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: #11 Diesel Generator

2. Date performed: 7/18-19-20/71 Time required for completion: 20 hours.

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Charted several relay operations during a start of the diesel. Found that the start failure alarm was initiated by relay PFDI Timing out 1/2 second to soon. Adjusted timing of the relay and made a functional test of the diesel.

5. The effect, if any, on the safe operation of the reactor: NONE

6. The cause of any malfunction for which corrective maintenance was required:
Speed sensing relay not operating soon enough.

7. The effects of any such malfunctions: Nuisance alarm.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:
Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: #11 & #12 diesel generators.
2. Date performed: 7/19/71 Time required for completion: 2 days
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐
4. Brief summary of work performed: Performed factory recommended modifications on diesel generator blower bearings.
5. The effect, if any, on the safe operation of the reactor: None, Reactor was shutdown.
6. The cause of any malfunction for which corrective maintenance was required:
7. The effects of any such malfunctions:
8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: No. #13 & #14 RHR pump suction relief valves.

2. Date performed: 7/20/71 Time required for completion: 1 Day

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐

4. Brief summary of work performed: Installed new relief valve springs. Set relief valves at 150 psig.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Core Spray Test Valve MO 1749

2. Date performed: 7/27/71 Time required for completion: 2 Days

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [X] Corrective [ ]

4. Brief summary of work performed:

Removed motor from valve operator. Checked motor on the bench - appeared to be ok.
Run motor on the bench - current normal.

5. The effect, if any, on the safe operation of the reactor:

None, maintenance did not affect system operability.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Off Gas Filter F-3A

2. Date performed: 7/27/71 Time required for completion: 1 Day

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Installed new filter cartridge in off gas filter F-3A to replace previous filter which was damaged by moisture during preap testing. (NOTE: Filter F-3B has been in service during plant operation to date).

5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Leaking loop seal fill valve on off gas line.

7. The effects of any such malfunctions: Damaged filter.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Repaired valve.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Core Spray Test Valve MO 1749

2. Date performed: 8/5/71 Time required for completion: 2 Hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Tightened all loose parts in the limit switch - drive gear assembly and adjusted limit switchs.

5. The effect, if any, on the safe operation of the reactor: NONE, maintenance did not affect system operability.

6. The cause of any malfunction for which corrective maintenance was required: Faulty Installation.

7. The effects of any such malfunctions: Valve would not open.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Drywell Vacuum Breaker Valve 2382 H

2. Date performed: 8/9/71 Time required for completion: 4 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Repaired broken air line to test operator for Valve AO 2382H.

5. The effect, if any, on the safe operation of the reactor: NONE. Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Air line movement during relief valve blowdown to torus caused a 90° copper ell to break.

7. The effects of any such malfunctions: The test operator would not function.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Replaced missing pipe clamps to restrain air li[illegible]vement.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Steamline Drain Isolation Valve MO 2374

2. Date performed: 8/9/71 Time required for completion: 3 Hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Valve failed to open. Found relay 42IF in MCC 31306 was not closing fully. Adjusted air gap, operation satisfactory.

5. The effect, if any, on the safe operation of the reactor: NONE - Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Improper relay adjustment.

7. The effects of any such malfunctions: Prevented valve from reopening.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Reactor Cleanup Isolation Valve MO 2398

2. Date performed: 8-9-71 Time required for completion: 2 hr.

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective X

4. Brief summary of work performed: Wire checked the closing control switch. Found that control wire #15 was inserted so far into the terminal block at MCC 31309 that the wire was secured by the wire insulation. Landed wire so that the copper is secured in the terminal block.

5. The effect, if any, on the safe operation of the reactor: None, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Faulty installation.

7. The effects of any such malfunctions: The valve failed to close on an isolation signal

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: R.P.S. Circuit Breaker 5A-CB1A.

2. Date performed: 8/10/71 Time required for completion:

3. Nature of the Maintenance: Routine [ ] Emergency X Preventive Corrective

4. Brief summary of work performed: Wire had burned off from the load side terminal of the circuit breaker. Cut off charred wire; installed new lug on the wire; cleaned terminal stud of the ACB. Checked system for ground.

5. The effect, if any, on the safe operation of the reactor: None, the reactor was subcritical and all affected systems were in the tripped conditions.

6. The cause of any malfunction for which corrective maintenance was required: The wire connector at the ACB Terminal was not tightened enough to solidly secure the wire. Local heating occurred resulting in eventual burning of the wire.

7. The effects of any such malfunctions: Loss of Power to the A channel of the RPS resulted in a half scram. Loss of power to isolation relays esulted in automatic isolation of reactor building ventilation and therefore, all affected systems went to the "safe" failure mode.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Used a burndy compression lug on the wire and tightened the stud nuts on the ACB terminal.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: RHR system

2. Date performed: 8/20/71 Time required for completion: 2 Hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Adjusted position indicating switches on valves MO 2010 and MO 2008.

5. The effect, if any, on the safe operation of the reactor: None, Maintenance did not affect system operability.

6. The cause of any malfunction for which corrective maintenance was required: Faulty installation.

7. The effects of any such malfunctions: Improper valve position indication.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: RHR - A loop.
2. Date performed: 8/23/71 Time required for completion: 1 day
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐
4. Brief summary of work performed: Installed new springs in relief valves RV-1990 and RV-1992. Set relief valves at 150 psig.
5. The effect, if any, on the safe operation of the reactor: None, the core sprays, containment cooling, deisel generators, and remaining LPCI components were operable during the maintenance period.
6. The cause of any malfunction for which corrective maintenance was required:
7. The effects of any such malfunctions:
8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: HPCI System Steam drain pot level sw. 23-90

2. Date performed: 8-23-71. Time required for completion: 3 hr.

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective X

4. Brief summary of work performed: Rewired leads to level switch from junction box.

5. The effect, if any, on the safe operation of the reactor: None.

6. The cause of any malfunction for which corrective maintenance was required: Wrong type of wire insulation was used. Higher temperature wire insulation is required because of the heat conducted to the level switch.

7. The effects of any such malfunctions: Condensate drain valve SV 2043 was open and condensate drain pot high level alarm was initiated.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Rewired with glass insulated wire.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Plant Protection System

2. Date performed: 9/1/71 Time required for completion: 12 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [X] Corrective [ ]

4. Brief summary of work performed:

Replaced the sixteen Main Steamline High Flow Isolation Switches, (0-200 psid) with lower range units (0-70 psid). This was done to provide instruments with a more appropriate range for the existing dP vs steam flow response.

5. The effect, if any, on the safe operation of the reactor:

NONE, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

Not Applicable.

7. The effects of any such malfunctions:

Not Applicable.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: #12 Diesel Generator

2. Date performed: 9/5/71 Time required for completion: 2 Hours.

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Disassembled air pilot valve 7031 and cleaned.

5. The effect, if any, on the safe operation of the reactor: NONE. Redundant starting system remained operable during maintenance.

6. The cause of any malfunction for which corrective maintenance was required: Piece of dirt between valve seat and disk.

7. The effects of any such malfunctions: In time enough air pressure would build up to engage the starter pinnons and start the diesel.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: NONE

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: ECCS Initiating Low-Low Reactor Water Level Switch

2. Date performed: 9/9/71 Time required for completion: 1 Hour

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Switch failed to operate during routine surveillance test and was, therefore, immediately replaced.

5. The effect, if any, on the safe operation of the reactor: NONE- The ECCS initiation logic controlled by the switch was maintained in the tripped condition while the instrument was out for maintenance.

6. The cause of any malfunction for which corrective maintenance was required: Faulty Mercury switch.

7. The effects of any such malfunctions: Although the switch failed to operate during the surveillance test, the remaining reactor Low-Low Level Switches were functioning and would have initiated the ECCS systems had a low-low level condition occurred.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: HPCI

2. Date performed: 9/21/71 Time required for completion: 1 Day

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐

4. Brief summary of work performed: Installed a new disk in HPCI exhaust rupture element PSD 2038.

5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: RHR Service Water

2. Date performed: 9/23/71 Time required for completion: 18 days

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Removed No. 12 RHR Service Water Pump and motor for motor rebuilding and pump inspection.

5. The effect, if any, on the safe operation of the reactor: NONE, the remaining three RHR service water pumps were operable during the maintenance period.

6. The cause of any malfunction for which corrective maintenance was required: Improper loading of bottom motor bearing.

7. The effects of any such malfunctions: The bearing overheated and seized with a subsequent fire in the motor.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Installed bearing correctly and measured thrust float on the other pumps.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: #12 Diesel Generator

2. Date performed: 9/27/71 Time required for completion: 2 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Disassembled air pilot valve 7031 and cleaned.

5. The effect, if any, on the safe operation of the reactor: NONE, redundant starting system remained operable during maintenance.

6. The cause of any malfunction for which corrective maintenance was required: A piece of dirt between the valve seat and the disk.

7. The effects of any such malfunctions: Air was blowing by and out the valve vent.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Filters were cleaned and air lines were blown clean.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: RX cleanup outlet valve MO 2398

2. Date performed: 9/28/71 Time required for completion: 3 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Removed mechanical interlock and reinstalled properly.

5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Mechanical interlock assembled wrong.

7. The effects of any such malfunctions: Restricted the operation of the Valve Motor Controller

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main Steam Line Monitor B

2. Date performed: 10/7/71 Time required for completion: 2 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed:

Found loose wire on meter. Also a screw in one of the capacitors was too long so that the capacitor was not properly mounting on the circuit board.

5. The effect, if any, on the safe operation of the reactor:
None, Instrument channel in tripped condition during Maintenance.

6. The cause of any malfunction for which corrective maintenance was required:

Vendor assembly errors.

7. The effects of any such malfunctions:

Intermittant downscale spikes.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

All similar monitors checked for same condition and repaired as necessary.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: DPIS-2-118A Main Steamline High Flow Isolation Switch

2. Date performed: 10/13/71 Time required for completion: 1 Hour

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Readjusted actuating mechanism.

5. The effect, if any, on the safe operation of the reactor: NONE. The associated instrument trip logic was placed in the tripped condition while maintenance was in progress.

6. The cause of any malfunction for which corrective maintenance was required: Improper factory adjustment.

7. The effects of any such malfunctions: Would not allow the switch to trip at the desired trip setting repeatedly.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Off Gas Monitor # 1 & 2

2. Date performed: 10/14/71 Time required for completion: 2 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed:

Repaired error in capacitor mounting.

5. The effect, if any, on the safe operation of the reactor:
NONE, Instrument channel in tripped condition during maintenance.

6. The cause of any malfunction for which corrective maintenance was required:
Vendor assembly error.

7. The effects of any such malfunctions:

Intermittent downscale spikes.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main Steam Line Monitor A, C, & D

2. Date performed: 10/14/71 Time required for completion: 3 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed:

Corrected error in mounting capacitors on circuit board. Mounting error caused poor contact to capacitor terminals.

5. The effect, if any, on the safe operation of the reactor:

NONE, Instrument channel in tripped condition during Maintenance.

6. The cause of any malfunction for which corrective maintenance was required:

Vendor assembly error.

7. The effects of any such malfunctions:

Intermittent downscale spikes.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: CV 2394 B HPCI Condensate Discharge to CRW
2. Date performed: 10/20/71 Time required for completion: 2 Hours.
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒
4. Brief summary of work performed: Replaced Solenoid Valve
5. The effect, if any, on the safe operation of the reactor: NONE
6. The cause of any malfunction for which corrective maintenance was required:
   Faulty Solenoid Valve
7. The effects of any such malfunctions: CV 2394B remained open during HPCI operation. This had no effect on HPCI operation since the redundant valve, CV 2394A, was operating properly.
8. Corrective and preventive action taken to preclude recurrence of malfunctions:
   Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: RCIC System Steam Isolation Valve MO 2076

2. Date performed: 10/21/71 Time required for completion: 5 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Cleaned and lubricated valve, adjusted packing and reduced closing torque switch setting.

5. The effect, if any, on the safe operation of the reactor: NONE. The HPCI System was operable during the time that the RCIC system was isolated.

6. The cause of any malfunction for which corrective maintenance was required: Closing Torque setting too high.

7. The effects of any such malfunctions: Valve would not reopen after having been closed while hot and then allowed to cool.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Tests conducted on valve following maintenance verified proper operation.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MOV 2071 (HPCI Test Valve)

2. Date performed: 11/2/71 Time required for completion: 2 Days

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Replaced stem anti-rotation stop and cleaned up stem threads.

5. The effect, if any, on the safe operation of the reactor: NONE - HPCI system remained operable during maintenance work.

6. The cause of any malfunction for which corrective maintenance was required: Overtravel in the closed direction.

7. The effects of any such malfunctions: Damage to stem and stem nut threads.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Reset torque switches and limit switches.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main Steam Line Monitor "A"

2. Date performed: 11/3/71 Time required for completion: 1 1/2 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed:

Replaced capacitors C3, C4 & C5.

5. The effect, if any, on the safe operation of the reactor:

NONE, Instrument channel in tripped condition during Maintenance.

6. The cause of any malfunction for which corrective maintenance was required:

Faulty capacitors.

7. The effects of any such malfunctions:

Intermittent downscale spikes.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Plant Protection System

2. Date performed: 11/13/71 Time required for completion: 12 hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed:

   Replaced the sixteen Main Steam Line High Flow Isolation Switches (0-70 PSID range) with the originally installed switches (0-200 PSID range). The deadband measured during a routine surveillance test was excessive.

5. The effect, if any, on the safe operation of the reactor:
   None, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:
   The source of the problem was later revealed to be jewel bearing contamination.

7. The effects of any such malfunctions:
   The jewel bearing contamination caused excessive deadband in the switch setting.

8. Corrective and preventive action taken to preclude recurrence of malfunctions:
   Replaced the 16 switches and initiated a program to inspect all Barton instruments used on critical systems.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: #12 Diesel generator.

2. Date performed: 11/15/71 Time required for completion: 3 Hours

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [X] Corrective [ ]

4. Brief summary of work performed: Replaced top left air starting motor so the inservice motor could be disassembled and inspected for general condition.

5. The effect, if any, on the safe operation of the reactor: None, Plant was Shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main steam isolation valves.
2. Date performed: 11/15/71 Time required for completion: 2 days
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒
4. Brief summary of work performed: Repaired all leaks in MSIV dashpot piping.
5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.
6. The cause of any malfunction for which corrective maintenance was required: Poorly installed piping.
7. The effects of any such malfunctions: Leakage of dashpot fluid causing decrease in valve closure time.
8. Corrective and preventive action taken to preclude recurrence of malfunctions: Remade all defective joints with teflon tape sealant.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: "D" Main Steam Safety - Relief Valve
2. Date performed: 11/16/71 Time required for completion: 4 Hours
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐
4. Brief summary of work performed: Disassembled valve top works and solenoid for inspection.
5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.
6. The cause of any malfunction for which corrective maintenance was required:
7. The effects of any such malfunctions:
8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-80-A

2. Date performed: 11/16/71 Time required for completion: 2 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Replaced main operating spool valve.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Spool valve sticking.

7. The effects of any such malfunctions: Slow valve closure.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: All air lines and air accumulators were blown clean.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-86-A

2. Date performed: 11/22/71 Time required for completion: 40 days

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Disassembled valve and rebuilt poppet guide and lapped main poppet and pilot valve.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Valve body deformation and worn main poppet guide.

7. The effects of any such malfunctions: Excess valve leakage.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: PS 2-3-52B ECCS Valve Opening Permissive Pressure Switch

2. Date performed: 11/24/71 Time required for completion: 2 Hours

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: A setpoint locking device was installed to keep the trip setting from drifting.

5. The effect, if any, on the safe operation of the reactor: NONE. The associated logic channel was maintained in the tripped condition while the maintenance was in progress.

6. The cause of any malfunction for which corrective maintenance was required: The instrument was not originally purchased with a setpoint locking device. It is believed that the instrument setting drifted as a result.

7. The effects of any such malfunctions: The instrument was found to trip below the desired setting.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: A program was initiated to install setpoint locking devices on all similar instruments.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: All inboard and outboard MSIV.

2. Date performed: 11/30/71 Time required for completion: 14 days

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐

4. Brief summary of work performed: Inspected and dye penetrant checked all MSIV dashpot cushion spuds.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: No. 11 Diesel generator
2. Date performed: 12/7/71 Time required for completion: 6 Hours
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☒ Corrective ☐
4. Brief summary of work performed: Disassembled all tubing and valves in the starting system. Cleaned and lubricated all components. Replaced one section of damaged tubing.
5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.
6. The cause of any malfunction for which corrective maintenance was required:
7. The effects of any such malfunctions:
8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD

(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-86B
2. Date performed: 12/12/71 Time required for completion: 4 days
3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☐
4. Brief summary of work performed: Disassembled valve and lapped main poppet and pilot valve.
5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.
6. The cause of any malfunction for which corrective maintenance was required: Scratches on pilot valve seat.
7. The effects of any such malfunctions: Excessive valve leakage.
8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main steam safety-relief valves A, B, C, D

2. Date performed: 12/13/71 Time required for completion: 2 days

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [X] Corrective [ ]

4. Brief summary of work performed: Changed out main pressure set springs and inspected valve top works.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required:

7. The effects of any such malfunctions:

8. Corrective and preventive action taken to preclude recurrence of malfunctions:

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: Main steam safety valves A & B

2. Date performed: 12/14/71 Time required for completion: 1 day

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Changed out valves.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: It is not unusual for very slight leakage to develop under normal service conditions.

7. The effects of any such malfunctions: Very slight leakage was observed during vessel hydro.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-80D

2. Date performed: 12/17/71 Time required for completion: 18 days

3. Nature of the Maintenance: Routine [ ] Emergency [ ] Preventive [ ] Corrective [X]

4. Brief summary of work performed: Dissassembled valve and lapped main poppet and pilot valve.

5. The effect, if any, on the safe operation of the reactor: NONE, reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Imperfections in valve seating surfaces.

7. The effects of any such malfunctions: Excess valve leakage.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not Applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to
prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-86-D

2. Date performed: 12/27/71 Time required for completion: 10 days

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Disassembled valve and lapped main poppet and pilot valve.

5. The effect, if any, on the safe operation of the reactor: NONE, Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Imperfections in seating surfaces.

7. The effects of any such malfunctions: Excess valve leakage.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

ROUTINE OPERATING REPORT MAINTENANCE RECORD
(Required for systems or components designed to prevent or mitigate the consequences of nuclear accidents)

1. System or Component: MSIV 2-86-D

2. Date performed: 12/27/71 Time required for completion: 10 days

3. Nature of the Maintenance: Routine ☐ Emergency ☐ Preventive ☐ Corrective ☒

4. Brief summary of work performed: Disassembled valve and lapped main poppet and pilot valve.

5. The effect, if any, on the safe operation of the reactor: NONE. Reactor was shutdown.

6. The cause of any malfunction for which corrective maintenance was required: Imperfections in seating surfaces.

7. The effects of any such malfunctions: Excess valve leakage.

8. Corrective and preventive action taken to preclude recurrence of malfunctions: Not applicable.

V. RADIOACTIVE WASTE DATA

A. Liquid Waste

	July	Aug.	Sept.	Oct.	Nov.	Dec.
1. Total Curies Discharged	7.4×10^{-3}	1.38×10^{-4}	5.54×10^{-3}	1.09×10^{-5}	2.4×10^{-4}	7.9×10^{-5}
2. Total Gallons Discharged	20,968	5,125	37,350	4,265	52,330	23,236
3. Total Gallons Dilution	7.6×10^{9}	9.3×10^{9}	1.07×10^{10}	1.09×10^{10}	4.86×10^{9}	4.05×10^{9}
4. Average uci/ml in canal	2.58×10^{-10}	3.93×10^{-12}	1.37×10^{-10}	2.65×10^{-13}	1.3×10^{-11}	5.16×10^{-12}
5. Max. Concentration released in 24 hrs. uci/ml	1.4×10^{-8}	3.43×10^{-9}	2.03×10^{-9}	1.15×10^{-10}	1.02×10^{-9}	8.97×10^{-11}
a. Time, hrs. (duration, minutes)	1805-0004 (359)	1620-1705 (45)	2050-1017 (807)	1350-1425 (35)	1930-2300 (210)	1600-2115 (315)
b. Date	7/20-7/21	8/12	9/1-9/2	10/14	11/19	12/20
6. Percentage of Annual Limit released	2.58×10^{-1}	3.92×10^{-3}	1.37×10^{-1}	2.54×10^{-4}	1.3×10^{-2}	5.16×10^{-3}
7. Total Curies H^3 Discharged	9.16×10^{-3}	3.87×10^{-4}	2.47×10^{-1}	3.22×10^{-4}	3.21×10^{-1}	1.02×10^{-3}

B. Gaseous Waste

	July	Aug.	Sept.	Oct.	Nov.	Dec.
1. Total Curies Discharged						
a. Noble Gases Ci	1,283	16,700	21,100	26,300	9,140	----
b. Iodine^{131} Ci	1.7×10^{-3}	1.7×10^{-3}	1.5×10^{-2}	8.18×10^{-3}	4.62×10^{-3}	4.4×10^{-4}
c. Particulate Ci	2.3×10^{-4}	3.63×10^{-4}	5.37×10^{-4}	8.72×10^{-4}	3.15×10^{-4}	3.32×10^{-4}
2. Percentage of Annual Limit						
a. Noble Gases %	0.28	2.5	3.1	3.8	1.38	----
b. I^{131} +Particulate %	0.253	1.38	1.9	0.58	1.64	0.288
3. Maximum uci/sec. released in 24 hrs.	11,250	14,250	1[illegible],000	14,250	11,500	11
a. Time	0600-0600	0140-0140	0030-0030	1000-1000	0500-0500	1200-1200
b. Date	7/6-7/7	8/8-8/9	9/12-9/13	10/1-10/2	11/9-11/10	12/9-12/10
4. Total Curies H^3 Discharged	6.84×10^{-2}	8.1×10^{-2}	1.37×10^{-1}	2.43×10^{-1}	8.33×10^{-2}	1.1×10^{-2}

C. Results of Isotonic Analysis		July	Aug.	Sept.	Oct.	Nov.	Dec.
1. Radioactive Liquid Waste							
a. Isotope							
I^{131}	Ci	7.1×10^{-3}	3.09×10^{-6}	4.9×10^{-3}	1.34×10^{-6}	2.01×10^{-4}	2.23×10^{-5}
Co^{58}	Ci	1.05×10^{-4}	4.2×10^{-5}	2.56×10^{-4}	8.74×10^{-6}	3.65×10^{-5}	3.10^{-5}
Co^{60}	Ci	2.5×10^{-5}	3.29×10^{-6}	2.10^{-5}	---	1.62×10^{-6}	9.68×10^{-6}
Cr^{51}	Ci	1.35×10^{-4}	7.8×10^{-5}	4×10^{-5}	---	---	6.18×10^{-6}
Cs^{137}	Ci	---	---	---	---	---	1×10^{-5}
2. Gaseous Waste							
a. Noble Gases							
Xe^{138}	Ci	24	349	900	781	358	---
Xe^{87}	Ci	106	2275	2507	2813	1124	---
Xe^{88}	Ci	121	2086	1991	4383	1778	---
Xe^{85m}	Ci	93	1562	1413	1902	762	---
Xe^{135}	Ci	145	3743	4570	5120	1988	---
Xe^{133}	Ci	495	2822	2772	4987	2411	---

	July	Aug.	Sept.	Oct.	Nov.	Dec.
b. Iodine^{131} Ci	(See B.1.b)					
c. Particulate						
Co^{58} Ci	$\leq 3\times10^{-5}$	-	-	-	-	$\leq 10^{-4}$
Co^{60} Ci	-	-	-	-	-	$\leq 10^{-4}$
Ba^{140}-La^{140} Ci	$\leq 10^{-7}$	$\leq 5\times10^{-7}$	$\leq 10^{-6}$	$\leq 10^{-5}$	$\leq 5\times10^{-6}$	-
Sr^{90} Ci	$\leq 10^{-8}$	$\leq 10^{-8}$	$\leq 10^{-7}$	$\leq 10^{-7}$	$\leq 10^{-7}$	$\leq 10^{-8}$
Cs^{137} Ci	$\leq 5\times10^{-8}$	$\leq 5\times10^{-8}$	$\leq 10^{-7}$	$\leq 10^{-7}$	$\leq 10^{-7}$	$\leq 10^{-8}$
Cr^{51} Ci	$\leq 10^{-4}$	-	-	-	-	$\leq 10^{-4}$
D. Solid Waste						
1. Total Volume(Cub. Ft.)	588	1161.3	0	1168.7	0	3115.7
2. Gross Curie Activity	.992	4.86	0	2.11	0	2.05
3. Disposition	All Material was shipped off-site to Sheffield Nuclear Center, Sheffield, Ill.					
4. Dates shipped	7-9-71	8-4-71 8-25-71	-	10-6-71 10-27-71	-	12-3-71 12-6-71 12-7-71 12-8-71

VI. ENVIRONMENTAL MONITORING

Summary

The Environmental Monitoring Program yielded no increases in the levels of radiation due to plant operation during the period of June 30, 1971, through December 31, 1971.

Air particulate was continually monitored with Gelman or Bendix Air Nuclear Samplers at eight locations within a 15-mile radius of the plant site and at the Minnesota Department of Health Building in Minneapolis. All air particulate samples for this study period averaged 0.2 pCi/m^3 of Gross Beta including the data taken from the air sampler located on the roof of the Minnesota Health Department Building. Table 2 shows these results.

Environmental Gamma Exposure (TLD) Off-site and on-site locations (See Maps I and II) during this study period averaged 9.6 mr/4-week period (See Table 7) which is similar to the data accumulated during the pre-operational period and "First Half of 1971" (See Table 1).

Environmental Gamma Exposure (film badges) Exposure at off-site and on-site locations (See Maps I and II) during the study period were reported by the film badge contractor, H S Landauer, Jr., Company as "M" for 4-week periods. This means that less than 10 millirems of gamma radiation was accumulated during each exposure period.

Precipitation or fallout was collected at the on-site nuclear air sampler (See Map II) and at The Minnesota Health Department Building in Minneapolis. No significant difference existed between the data from these two points. (See Table 5)

Raw Milk from four regions was sampled by NSP and an additional area by the Minnesota Department of Health (See Map III) within a ten mile radius of the plant. The average levels of radionuclides analyzed, are similar to the pre-operational data and the "First Half of 1971" (See Table 1)

Mississippi River water sampled daily and composited into weekly samples taken upstream and downstream of the plant (See Map IV) averaged 9 pCi/l of Beta radiation for each area. This is similar to pre-operational and "First Half of 1971" levels. (See Table 1)

Mississippi River Bottom Sediment is sampled each quarter year and analysed for radioactivity. The study periods results averaged 47 pCi/gm of Gross Beta which is similar to pre-operational levels and "first Half of 1971" results. (See Table 1)

Topsoil taken from three fields (See Map VI) growing crops (potatoes and soybeans) and being irrigated with water taken from the Mississippi River downstream from the plant discharge is analysed. The results show an average of 56 pCi/gram of Gross Beta activity. This is similar to the pre-operational and "First Half of 1971" results, (See Table 1).

Well Water is taken from three deep wells and four shallow wells in the plant area. The deep and shallow wells averaged 4 pCi/l each. This is similar to the pre-operational and "First Half of 1971" results. (See Table 1)

Fish taken from the Mississippi River at upstream and downstream locations (See Map IV) averaged 7.6 and 7.3 pCi/gram (dried weight) of Gross Beta. This data compares to fish analyses performed during the pre-operational and "First Half of 1971" periods (See Table 1). The fish analyses data is presented in Table 14.

Additional parameters besides those presented above are Airborne Radioiodine (Table 4), Water taken from five lakes (See Map V) in the area (See Table 10), Lake Bottom Sediment (Table 11), Lake and River Aquatic Vegetation (Table 12), Lake and River Attached Algae (Table 13), Clams (Table 15), Lake and River Aquatic Insects (Table 16), Vegetation from several fields in the downwind area of the plant site (Table 17), and agricultural crop analyses from the river irrigated fields (Table 18). The data presented in these tables are comparable to pre-operational and "First Half of 1971" results with no significant variation.

Conclusion

Effluent release levels were so low that correlation between plant emissions and these environmental parameter results was impossible.

No statistically significant increased levels of radioactivity were found for any of the parameters studied during this report period.

Table #1

SUMMARY

The values are averages of all samples of the parameter taken that period.

	1968	1969	1970	*First Half of 1971	*Second Half of 1971
Air Particulate					
(pCi/m^3) Gross Beta	0.09	0.20	0.20	0.30	0.20
Environmental Gamma Exposure					
(TLD) (mr/4 weeks)	9.8	8.0	9.1	9.5	9.6
Fallout					
(pCi/m^2) Gross Beta	N.S.	20,600	12,000	18,000	13,000
Milk					
(pCi/l) $Cesium^{137}$	21	14	15	13	16
(pCi/l) $Iodine^{131}$	4	4	4	3	4
(pCi/l) $Strontium^{90}$	12	11	9	9	11
Mississippi River Water					
(pCi/l) Gross Beta	11	9	9	12	9
River Bottom Sediment					
(pCi/gm) Gross Beta	30	37	50	59	47
Topsoil					
(pCi/gm) Gross Beta	26	47	54	57	56
Well Water					
(pCi/l) Gross Beta	5	3	7	5	4
Fish					
(pCi/gm) Gross Beta					
Flesh	3.5	11.7	6.5	12.1	7.5
Skeleton	4.0	25.0	11.7	24.1	16.2

*Data collected during 1968, 1969 and 1970 are considered pre-operational and the data under Columns "First Half of 1971 and Second Half of 1971" is operational.

Table 2

AIR PARTICULATE

1971

Sampling Location		Period of Collection	No. of Samples	pCi Gross Beta/meter^3 Maximum	Minimum	Average
Station #1	Clear Lake Substation	July	4	.72	.44	.60
		August	5	.45	.17	.27
		September	4	.24	.08	.12
		October	4	.08	.06	.08
		November	5	.08	.04	.05
		December	4	.09	.07	.08
Station #2	Becker Substation	July	4	.78	.43	.58
		August	5	.43	.17	.27
		September	4	.20	.05	.12
		October	4	.23	.06	.12
		November	5	.06	.04	.05
		December	3	.07	.07	.07
Station #3	Hasty	July	4	.72	.52	.60
		August	5	.44	.16	.29
		September	4	.23	.06	.12
		October	4	.11	.06	.08
		November	5	.06	.03	.04
		December	4	.08	.07	.08
Station #4	Plant Site	July	4	.59	.36	.49
		August	5	.34	.16	.21
		September	4	.20	.06	.12
		October	4	.06	.03	.04
		November	5	.06	.01	.03
		December	4	.02	.01	.02
Station #5	Otsego	July	4	.64	.42	.51
		August	5	.45	.16	.27
		September	3	.15	.08	.11
		October	3	.08	.08	.08
		November	5	.07	.03	.05
		December	4	.09	.07	.08
Station #6	St. Michael	July	4	.84	.29	.59
		August	5	.43	.18	.29
		September	4	.21	.07	.12
		October	4	.10	.07	.08
		November	5	.07	.03	.05
		December	4	.08	.07	.08

Table 2

AIR PARTICULATE

1971

Sampling location	Period of Collection	No. of Samples	pCi Gross Beta/meter^3 Maximum	Minimum	Average
Station #7 Orrock	July	4	.81	.47	.58
	August	5	.39	.18	.26
	September	4	.22	.05	.11
	October	4	.09	.07	.08
	November	5	.09	.03	.05
	December	4	.09	.07	.08
Station #8 Maple Lake	July	4	.69	.51	.60
	August	5	.41	.18	.28
	September	4	.24	.08	.14
	October	4	.09	.07	.08
	November	5	.08	.03	.05
	December	4	.13	.06	.09
Department of Health Building	July	5	.56	.25	.46
	August	4	.30	.18	.24
	September	5	.17	.07	.11
	October	4	.09	.05	.07
	November	4	.08	.04	.05
	December	4	.09	.07	.08

Table 3

AIR PARTICULATE-MONTHLY COMPOSITES

1971

Period of Collection	No. of Samples	pCi/m³									
		^{141}Ce	^{144}Ce	^{134}Cs	^{137}Cs	^{131}I	^{95}Nb	^{103}Ru	^{106}Ru	^{65}Zn	^{95}Zr
Jun	40		.09		<.0040				.067		.053
Jul	32		.17		0.0026				.051		.030
Aug	40		.11		<.0006				.020		.009
Sep	31		.04		<.0005				.016		.006
Oct	32		.02		<.0004				.016		.002
Nov	32	<.0008	.01	0.00014	0.0008	0.010	.0030	<.0004		<.0002	.002
Dec	31	0.0006	.01	<.0003	0.0003	<.007	.0009	0.0008		0.0007	<.001

Table 4

AIRBORNE RADIOIODINE

1971

Sampling Location	Period of Collection	No. of Samples	pCi I^{131}/m^3 Average
Station #1 Clear Lake Substation	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.02
	December	4	<.01
Station #2 Becker Substation	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.02
	December	3	<.01
Station #3 Hasty	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.02
	December	4	<.01
Station #4 Plant Site	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.01
	December	4	<.01
Station #5 Otsego	July	4	<.02
	August	5	<.01
	September	3	<.01
	October	3	<.02
	November	5	<.01
	December	4	<.01
Station #6 St. Michael	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.02
	December	4	<.01

Table 4

AIRBORNE RADIOIODINE

1971

Sampling Location	Period of Collection	No. of Samples	pCi I^{131}/m^3 Average
Station #7 Orrock	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.02
	December	4	<.01
Station #8 Maple Lake	July	4	<.02
	August	5	<.01
	September	4	<.01
	October	4	<.01
	November	5	<.01
	December	4	<.01
Composite of all Stations	July	32	<.002
	August	40	<.001
	September	31	<.001
	October	31	<.001
	November	40	<.003
	December	31	<.001

Table 5

FALLOUT

1971

Sampling Location	Period of Collection	pCi/m²														pCi/l
		^{140}Ba	Gross Beta	^{141}Ce	^{144}Ce	^{134}Cs	^{137}Cs	^{131}I	^{140}La	^{95}Nb	^{147}Nd	^{103}Ru	^{106}Ru	^{90}Sr	^{95}Zr	^{3}H
Minneapolis	Jul		28000		16000		170	<15					5900	89	3000	200
	Aug		9700		3800		50	<15					1700	31	670	500
	Sep		21000		2400		90						1600	12	390	800
	Oct		7250		6600		<65						4300	5	600	600
	Nov		6750		2900		<50						3300	8	110	1400
	Dec	<50	1730	<15	460		24	<30	<20	90	<30	<10		15	40	
Monticello	Jul		31000		16000		200	<15					4300	1.7	2400	
	Aug		12000		3700		120	<15					1500	32	760	1000
	Sep		16000		5500		<60					2300		19	840	900
	Oct		5520		2700		80						1900	11	200	
	Nov	210	3030	140	720	15	37	220	320	140	<2400	260		15		200
	Dec		805		860		<26						120	5	36	1000

Table 6

MILK

Sampling Location	Date of Collection	pCi/liter ^{137}Cs	pCi/liter ^{131}I	pCi/liter ^{90}Sr
Region #1 - North of Plant Site				
Dwinger	7-28-71	31	<4	21
	9-22-71	14	<4	16
	10-20-71	15	<4	21
	11-17-71	11	<3	24
	12-16-71	10	<4	16
Kirchenbauer	7-28-71	33	<3	25
	8-18-71	26	<4	6
	9-22-71	28	<3	36
	10-20-71	16	<5	22
	12-16-71	18	<5	15
Kiffmeyer	11-17-71	13	<4	14
Goener	8-18-71	16	<4	33
Region #2 - Southeast of Plant Site				
Dalman	8-18-71	25	<6	9
Hartzler	7-28-71	19	<3	13
	9-22-71	7	<3	10
	10-20-71	10	<3	8
	12-16-71	16	<3	9
Schremer	11-17-71	12	<3	3
Subra	8-18-71	12	<2	5
Vandergon	7-28-71	17	<2	7
	9-22-71	8	<2	4
	10-20-71	10	<4	3
	11-17-71	11	<5	6
	12-16-71	23	<5	6
Region #3 - West of Plant Site				
Holland	7-28-71	13	<4	6
	8-18-71	16	<2	6
	9-22-71	13	<4	7
	10-20-71	15	<5	6
	11-17-71	9	<4	6
	12-16-71	14	<4	6

Table 6

MILK

Sampling Location	Date of Collection	pCi/liter ^{137}Cs	^{131}I	^{90}Sr
Region #3 - cont.				
Hopkins	7-28-71	18	<4	5
	9-22-71	13	<3	6
	10-20-71	14	<4	6
	11-17-71	14	<5	8
	12-16-71	13	<3	7
Urich	8-18-71	17	<4	10
Region #4 - South of Plant Site				
L. Becker	7-2[illegible]-71	23	<5	8
	8-18-71	17	<3	10
	9-22-71	12	<3	5
	10-20-71	8	<4	6
	11-17-71	14	<4	9
	12-16-71	7	<3	5
Vetsch	8-18-71	21	<5	9
	9-22-71	9	<2	7
	10-20-71	9	<3	7
	11-17-71	15	<4	8
	12-16-71	16	<2	9
Zachman	7-28-71	15	<3	8
Elk River - East of Plant Site				
Barthel	8-24-71	17	<4	6
	11-23-71	16	<4	12
Lakoduk	8-24-71	[illegible]	<3	16
	11-10-71	13	<3	18
Neilson	8-24-71	21	<4	11
	11-10-71	19	<3	18
Nemeth	8-24-71	22	<2	14
	11-10-71	32	<4	21

TABLE 7

GAMMA DOSAGE

mr/4 weeks

Location	Date of Collection							
	7-13-71	8-10-71	9-7-71	10-5-71	11-2-71	11-30-71	[illegible]-71	Average
Station #1	11.0	9.4	10.5	9.9	9.9	10.0	9.4	10.0
Station #2	10.1	8.5	9.8	9.5	-	-	9.6	9.5
Station #3	9.2	8.3	9.9	9.4	9.4	9.2	9.4	9.3
Station #4	10.1	9.1	9.6	10.2	9.2	10.3	9.1	9.7
Station #5	10.1	9.1	9.7	9.6	9.3	9.6	9.1	9.5
Station #6	10.9	9.6	10.6	10.4	10.4	-	10.4	10.4
Station #7	9.2	-	10.0	-	9.2	9.6	-	9.5
Station #8	10.5	9.5	10.4	10.2	10.2	10.3	9.8	10.1
Station #13	-	-	9.5	9.3	9.2	9.3	9.1	9.3
Station #14	9.6	8.4	10.3	9.7	10.3	9.8	10.2	9.8
Station #15	8.7	8.4	9.3	9.4	9.4	9.6	9.0	9.1
Station #16	9.5	8.3	9.8	9.4	9.1	9.1	8.8	9.1
Station #17	10.7	8.9	10.4	9.9	10.0	9.6	9.2	9.8
Station #18	9.5	9.0	9.2	-	9.8	9.7	-	9.4

Table 8

MISSISSIPPI RIVER WATER

	Upstream of Plant		Downstream of Plant		St. Paul Water Intake	
	pCi Beta/l	pCi Cs-137/l	pCi Beta/l	pCi Cs-137/l	pCi Beta/l	pCi Cs-137/l
1	12	<2	15	<2		
					18	<4
1	12	<2	11	<2		
					14	<2
71	10	<5	9	<2		
					19	<3
71	8	<2	9	<2		
					6	<4
1	17	<2	9	<2		
					13	<3
	10	<2	9	<3		
					11	<2
71	7	<2	7	3		
					9	<4
71	8	<3	8	<2		
					10	<2
71	6	<2	9	2		
					11	<3
1	12	<2	8	<2		
					10	<2
1	7	<2	9	<2		
					10	<5
71	8	<2	7	<2		

Table 8

MISSISSIPPI RIVER WATER

Date of Collection	Upstream of Plant pCi Beta/l	Upstream of Plant pCi Cs-137/l	Downstream of Plant pCi Beta/l	Downstream of Plant pCi Cs-137/l	St. Paul Water Intake pCi Beta/l	St. Paul Water Intake pCi Cs-137/l
9-21-71					7	<2
9-21-71 to 9-27-71	6	<2	5	<2		
9-28-71					11	<2
9-28-71 to 10-4-71	6	3	7	<2		
10-5-71					8	<4
10-5-71 to 10-11-71	7	<2	5	4		
10-12-71					8	<2
10-12-71 to 10-18-71	8	<2	8	<5		
10-19-71					9	<2
10-19-71 to 10-25-71	10	<5	9	<4		
10-26-71					9	<2
10-26-71 to 11-1-71	10	<2	11	4		
11-2-71					12	<2
11-2-71 to 11-8-71	9	<6	9	7		
11-9-71					9	<6
11-9-71 to 11-15-71	10	<3	10	<2		
11-16-71					8	<2
11-16-71 to 11-22-71	8	<2	10	<2		
11-23-71					9	<3
11-23-71 to 11-29-71	8	<5	10	<2		
11-30-71					13	<5
11-30-71 to 12-6-71	11	[illegible]	7	<4		

Table 8

MISSISSIPPI RIVER WATER

Date of Collection	Upstream of Plant		Downstream of Plant		St. Paul Water Intake	
	pCi Beta/1	pCi Cs-137/1	pCi Beta/1	pCi Cs-137/1	pCi Beta/1	pCi Cs-137/1
12-7-71					11	<3
12-7-71 to 12-13-71	7	<3	6	<2		
12-14-71					9	4
12-14-71 to 12-20-71	11	2	10	6		
12-21-71					10	<2
12-21-71 to 12-27-71	12	<2	11	<2		
12-28-71					8	<3

Table 9

MISSISSIPPI RIVER WATER
MONTHLY COMPOSITES

1971

Period of Collection	Upstream of Plant		Downstream of Plant		St. Paul Intake	
	pCi ^{3}H/1	pCi ^{90}Sr/1	pCi ^{3}H/1	pCi ^{90}Sr/1	pCi ^{3}H/1	pCi ^{90}Sr
July	700	1.7	700	1.8	300	1.9
August	900	1.7	800	1.8	800	1.6
September	900	1.4	1000	1.5	700	1.4
October	1000	1.7	900	1.2	600	1.5
November	700	1.2	800	1.0	700	0.8
December	700	2.1	800	1.9	800	1.1

Table 10

LAKE WATER

Sampling Location	Date of Collection	pCi/liter Gross Beta	^{137}Cs	^{3}H	^{90}Sr
Bass Lake	8-4-71	14	<2	1000	2.0
	8-30-71	11	<5	900	0.6
	10-6-71	12	<2	900	2.9
	10-[illegible]-71	15	<4	[illegible]	3.1
	11-11-71	10	<5	900	3.0
	12-29-71	12	<4	1300	5.9
Big Lake	7-19-71	20	<2	1200	4.6
	8-4-71	18	<3	1100	5.2
	9-8-71	16	<2	1100	5.1
	10-6-71	27	<2	1700	5.0
	11-10-71	19	<5	1400	5.3
	12-22-71	16	4	1100	4.2
Clitty Lake	7-19-71	38	<2	1200	2.2
	8-4-71	12	<5	1100	2.5
	9-8-71	13	<5	500	2.5
	10-6-71	35	<5	1100	4.3
	11-10-71	11	<2	400	1.7
	12-22-71	13	<3	[illegible]	4.2
Ida Lake	7-19-71	21	<2	[illegible]	4.4
	8-4-71	20	<1	[illegible]	3.6
Bertram Lake	9-8-71	10	<2	[illegible]	1.6
	10-6-71	14	<3	[illegible]	1.1
	11-10-71	12	<5	1100	1.3
	12-22-71	13	<2	900	1.2
Locke Lake	7-19-71	13	<2	800	1.9
	8-4-71	16	<4	1100	2.5
	9-8-71	9	<5	900	2.5
	10-6-71	17	<2	1300	2.1
	11-10-71	14	<5	[illegible]	1.8
	12-22-71	13	<5	[illegible]	0.8
Mud Lake	7-19-71	48	<2	600	2.0
	8-4-71	42	<2	700	2.5
	9-8-71	83	<3	1200	2.1
	10-6-71	25	<3	1200	2.0
	11-10-71	13	<2	400	1.7
	12-22-71	19	<2	600	1.7

Table 11

LAKE & RIVER BOTTOM SEDIMENTS

Sampling Location	Date of Collection	pCi/gram					
		Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Bass Lake	9-30-71	42		0.09		0.02	
Bertram Lake	10-1-71	40	0.[illegible]	0.[illegible]	0.2	0.20	0.04
Big Lake	10-2-71	42		1.10		0.06	
Clitty Lake	10-2-71	50	1.1	0.[illegible]9	0.09	0.44	0.05
Locke Lake	10-1-71	47		0.[illegible]		0.07	
Mud Lake	10-1-71	76		0.39		0.03	
Mississippi River-Upstream	10-9-71	46		0.05		<.01	
Mississippi River-Downstream	10-9-71	47		<.0[illegible]		<.01	

Table 12

LAKE & RIVER AQUATIC VEGETATION

Sampling Location	Date of Collection	pCi/gram Gross Beta	^{144}Ce	^{137}Cs	^{131}I	^{106}Ru	^{90}Sr	^{95}Zr
Mississippi River-Upstream of Plant	7-3-71	110		<0.1			0.48	
	8-19-71	52	11	<0.6	<0.2	5	0.55	1.3
	10-2-71	78	8	<0.5	<0.1	4	0.35	1.0
Mississippi River-Downstream of Plant	7-3-71	100		<0.5			1.10	
	8-19-71	72	7	<0.1	<0.1	4	0.72	1.4
	10-2-71	67	9	1.0	<0.2	4	0.55	1.9
Bass Lake (Control)	8-31-71	61	5	<0.4	<0.1	3	1.10	2.8
Bertram Lake	10-1-71	54	<5	<0.2	<0.2	7	0.17	0.7
	11-11-71	59		<0.5	<0.6		2.10	
Big Lake	8-24-71	80	10	<1.0	<0.2	5	4.20	2.0
	10-2-71	110	<2	<0.2	<0.2	<1	5.30	<0.4
	11-11-71	117		<0.3	.1		40.00	
Clitty Lake	8-24-71	42	6	<1.0	<0.1	3	2.20	<1.0
	10-2-71	97	13	1.3	<0.1	5	5.60	2.5
	11-11-71	44		<0.2	<0.2		2.00	
Locke Lake	8-24-71	42	8	<0.5	<0.1	4	0.72	1.5
	10-1-71	46	<3	<0.3	<0.1	<2	0.30	0.2
	11-11-71	69		<0.3	0.4		1.40	
Mud Lake	8-24-71	29	9	<0.6	<0.2	4	0.58	<.4
	10-1-71	51	<3	<0.3	<0.1	4	0.50	0.8
	11-11-71	24		<0.1	<0.1		0.99	

Table 15

MISSISSIPPI RIVER ATTACHED ALGAE

Sampling Location	Date of Collection	pCi/gram					
		Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Station #1-1400'							
Above Intake	7-9-71	200					
	7-22-71	1[illegible]0					
	8-5-71	98					
	8-19-71	[illegible]					
	9-2-71	12[illegible]					
	9-16-71	[illegible]					
	9-30-71	[illegible]					
	10-14-71	[illegible]					
	10-28-71	77					
Station #2 - 700'							
Above Intake	7-9-71	110					
	7-22-71	100					
	8-5-71	75					
	8-19-71	70					
	9-2-71	110					
	9-16-71	80					
	9-30-71	58					
	10-14-71	62					
	10-28-71	72					
Station #4A - Across							
From Discharge Canal	7-19-71	150					
	7-22-71	86					
	8-19-71	70					
	9-2-71	130					
	9-30-71	59					
	10-14-71	76					
	10-28-71	80					
Upstream Composite-Station #'s							
1, 2 and 4A	7-9-71			<0.5		0.8	
1, 2 and 4A	7-22-71		35	<1.0	14	1.4	10
1 and 2	8-5-71		24	<0.7	14	1.4	5
1, 2 and 4A	8-19-71		25	<1.0	9	2.4	4
1, 2 and 4A	9-2-71		20	<0.6	8	1.7	3
1 and 2	9-16-71		105	<4.0	43	2.3	22
1, 2 and 4A	9-30-71			0.4		1.4	
1, 2 and 4A	10-14-71			0.2		0.9	
1, 2 and 4A	10-28-71			0.8		1.4	

Table 13

MISSISSIPPI RIVER ATTACHED ALGAE

Sampling Location	Date of Collection	pCi/gram					
		Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Station #9 - Oxbow	7-9-71	78		<2.0		<.6	
	7-22-71	130	43	<3.0	26	1.0	17
	8-5-71	120	110	<6.0	60	1.6	13
	8-19-71	83	60	<5.0	50	<0.7	17
	9-2-71	[illegible]	19	[illegible]	21	1.6	4
	9-16-71	83	<20	<3.0	23	1.6	4
	9-30-71	51					
	10-14-71	71		<0.4		1.5	
Station #3 - At Discharge Transect West Bank	7-9-71	130					
	7-[illegible]	95					
	8-[illegible]	92					
	8-19-71	42					
	9-2-71	71					
	9-16-71	87					
	9-30-71	73					
	10-14-71	80					
	10-28-71	71					
Station #3A - At Discharge	7-9-71	160					
	7-22-71	160					
	8-5-71	98					
	8-19-71	85					
	9-2-71	85					
	9-16-71	85					
	9-30-71	77					
	10-14-71	96					
	10-28-71	93					
Station #4 - At Discharge Transect Midstream	7-22-71	210					
	8-5-71	110					
	8-19-71	38					
	9-2-71	51					
	9-16-71	69					
	9-30-71	53					
	10-14-71	65					
	10-28-71	64					

Table 13

MISSISSIPPI RIVER ATTACHED ALGAE

Sampling Location	Date of Collection	pCi/gram Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Station #5 - At Discharge Transect							
East Bank	7-22-71	110					
	8-5-71	90					
	8-19-71	95					
	9-2-71	110					
	9-16-71	106					
	9-30-71	56					
	10-14-71	68					
	10-28-71	57					
Station #6 - 1500' Below Discharge							
West Bank	7-9-71	150					
	7-22-71	120					
	8-5-71	78					
	8-19-71	45					
	9-2-71	110					
	9-16-71	71					
	9-30-71	59					
	10-14-71	74					
	10-28-71	60					
Station #7 - 1500' Below Discharge							
Midstream	8-5-71	120					
	8-19-71	43					
	9-2-71	86					
	9-16-71	67					
	9-30-71	54					
	10-14-71	84					
	10-28-71	58					
Station #8 - 1500' Below Discharge							
East Bank	7-9-71	140					
	7-22-71	120					
	8-5-71	99					
	8-19-71	65					
	9-2-71	54					
	9-16-71	55					
	9-30-71	52					
	10-14-71	77					
	10-28-71	70					

Table 13

MISSISSIPPI RIVER ATTACHED ALGAE

Sampling Location	Date of Collection	pCi/gram Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Station #10 - 3100'							
Below Discharge	7-9-71	130					
	7-22-71	110					
	8-9-71	72					
	8-19-71	-					
	9-2-71	[illegible]					
	9-16-71	10[illegible]					
	9-30-71	55					
	10-14-71	[illegible]					
	10-28-71	56					
Station #11 - 5300'							
Below Discharge	7-9-71	13[illegible]					
	7-22-71	99					
	8-5-71	120					
	8-19-71	76					
	9-2-71	99					
	9-16-71	7[illegible]					
	9-30-71	5[illegible]					
	10-14-71	[illegible]					
Station #12 - 7600'	9-30-71	[illegible]					
Below Discharge	10-14-71	[illegible]					
	10-28-71	[illegible]					
Station #13 - 12000'	9-30-71	1[illegible]					
Below Discharge	10-14-71	30					
	10-28-71	2[illegible]					
Composite of Transect and Downstream Station #'s							
3,3A,6,8,10, &11	7-9-71			[illegible]		0.7	
3,3A,4,5,6,8,10&11	7-22-71		90	[illegible]	1[illegible]	1.1	13
3,3A,4,5,6,7,8,10&11	8-5-71		[illegible]	<0.[illegible]	11	1.[illegible]	6
3,3A,4,5,6,7,8,&11	8-19-71		16	<0.[illegible]	9	1.[illegible]	4
3,3A,4,5,6,7,8,10&11	9-2-71		[illegible]	<0.[illegible]	10	1.7	5
3,3A,4,5,6,7,8,10&11	9-16-71		4[illegible]	1.[illegible]	17	1.4	8
3,3A,4,5,6,7,8,10,11,12&13	9-30-71		14	0.[illegible]	[illegible]	1.2	2
3,3A,4,5,6,7,8,10,11,12&13	10-14-71			0.[illegible]		1.0	
3,3A,4,5,6,7,8,10,12,&13	10-28-71			<0.1		1.6	

Table 13

LAKE AND COMPOSITE MISSISSIPPI RIVER ATTACHED ALGAE

Sampling Location	Period of Collection	pCi/gram Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Upstream of Plant	8-24-71	64	30	<3.0	17	1.7	3
	10-26-71	68		0.[illegible]		2.0	
Downstream of Plant	8-24-71	56	36	<2.0	8	1.5	4
	10-26-71	61		<1.0		2.3	
Bertram Lake	8-24-71	91	18	<1.0	7	4.1	8
	10-26-71	54		<0.3		2.5	
Big Lake	8-24-71	75	40	4.0	<13	12.0	4
	10-26-71	48		2.0		10.0	
Clitty Lake	8-24-71	110	<20	4.0	<14	7.3	4
	10-26-71	62		3.[illegible]		6.4	
Locke Lake	8-24-71	51	15	<0.9	<5	0.8	3
	10-26-71	74		<0.4		1.3	
Mud Lake	8-24-71	52	<2	0.5	<8	0.3	<1

Table 14

FISH

Sampling Location	Type	Date of Collection	Flesh pCi/gram Gross Beta	Flesh pCi/gram ^{137}Cs	Flesh pCi/gram ^{90}Sr	Skeleton pCi/gram Gross Beta	Skeleton pCi/gram ^{137}Cs	Skeleton pCi/gram ^{90}Sr
Upstream	Redhorse, Sucker, and Carp	8-23-71	9.1	.05	.017	20.0	.03	.26
	Carp	9-29-71	7.5	.07	.015	16.0	<.02	2.40
	Redhorse	12-2-71	5.8	.12	.078	24.0	0.02	1.30
	Walleye and Bass	9-10-71	8.9	.10	.004	8.8	.06	1.90
	Black Crappie	10-9-71	6.9	.04	.004	19.0	<.09	7.00
Downstream	Redhorse	9-9-71	8.4	.08	.017	14.0	<.02	2.00
	Carp	9-29-71	7.1	.06	.017	16.0	<.02	2.60
	Redhorse	12-2-71	8.1	.12	.078	29.0	<.01	0.38
	Walleye and Bass	9-9-71	7.4	.08	.002	3.8	.07	1.50
	" " "	9-29-71	5.3	.02	.004	6.7	.06	1.20

Table 15

CLAMS
(Flesh)

Sampling Location	Date of Collection	pCi/gram Gross Beta	pCi/gram ^{137}Cs
Upstream of Plant	August 9 through 23, 1971	4.[illegible]	<.02
Downstream of Plant	August 6 through 9, [illegible]71	4.[illegible]	<.02

Table 16

LAKE & RIVER AQUATIC INSECTS

Sampling Location	Date of Collection	pCi/gram Gross Beta	^{137}Cs	^{131}I	^{90}Sr
Mississippi River - Upstream	8-24-71	4.6	<[illegible]	<.9	<0.4
	10-9-71	<.7	<6	<1[illegible].0	<1.0
Mississippi River - Downstream	8-24-71	4.[illegible]	5	<1.5	0.8
	10-9-71	<.9	<4	<3.0	0.8
Bertram Lake	10-1-71	1[illegible]	<[illegible]	<.8	0.8
Clitty Lake	8-19-71	100	2	<.9	32.0
	10-2-71	66	4	<1.5	19.0
Mud Lake	8-19-71	140	<1	<3.0	16.0
	10-1-71	70	<6	<[illegible].0	11.0
	10-26-71	99	2		25.0

Table 15

CLAMS
(Flesh)

Sampling Location	Date of Collection	pCi/gram Gross Beta	pCi/gram ^{137}Cs
Upstream of Plant	August 9 through 23, 1971	4.3	<.02
Downstream of Plant	August 6 through 9, 1971	4.5	<.02

Table 16

LAKE & RIVER AQUATIC INSECTS

Sampling Location	Date of Collection	pCi/gram Gross Beta	pCi/gram ^{137}Cs	pCi/gram ^{131}I	pCi/gram ^{90}Sr
Mississippi River - Upstream	8-24-71	4.6	<1	<.9	<0.4
	10-9-71	<.7	<6	<12.0	<1.0
Mississippi River - Downstream	8-24-71	4.3	3	<1.5	0.8
	10-9-71	<.9	<4	<3.0	0.8
Bertram Lake	10-1-71	12	<1	<.8	0.8
Clitty Lake	8-19-71	109	2	<.9	32.0
	10-2-71	66	4	<1.5	19.0
Mud Lake	8-19-71	140	<1	<3.0	16.0
	10-1-71	70	<6	<3.0	11.0
	10-26-71	99	2		25.0

Table 17

FIELD VEGETATION

Sampling Location	Date of Collection	pCi/gram				
		Gross Beta	^{144}Ce	^{137}Cs	[illegible]Ru	^{95}Zr
Vegetation Field #1	[illegible]-3-71	75	[illegible]8	<.3	[illegible]	3.7
Vegetation Field #2	[illegible]-3-71	41	17	<.3	[illegible]	2.5
Vegetation Field #3	8-3-71	64	14	<.3	[illegible]	1.9

Table 18

AGRICULTURAL CROPS

Type Sample	Sampling Location	Date of Collection	pCi/gram			
			Gross Beta	^{137}Cs	^{131}I	^{90}Sr
Potatoes	Dechene Potato Co.	8-3-71	[illegible].9	<.005	<.004	.005
	Ewing Potato Co.	8-3-71	[illegible].0	.011	<.005	.004
	Peterson Potato Co.	8-3-71	9.2	.046	<.006	.006
Soybeans	Dechene Potato Co.	9-14-71	0.5	.030	<.020	.075

Table 19

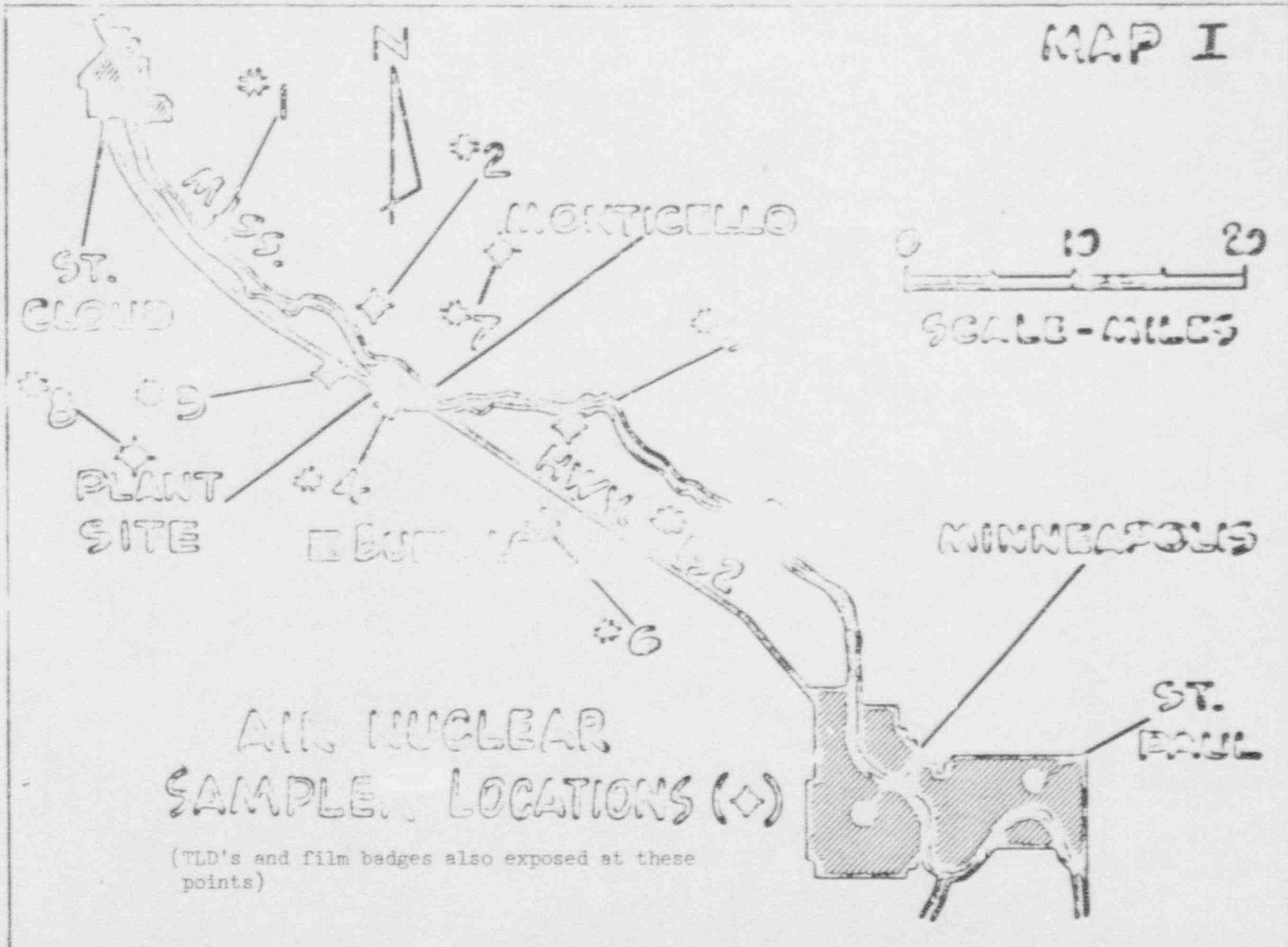
TOPSOIL

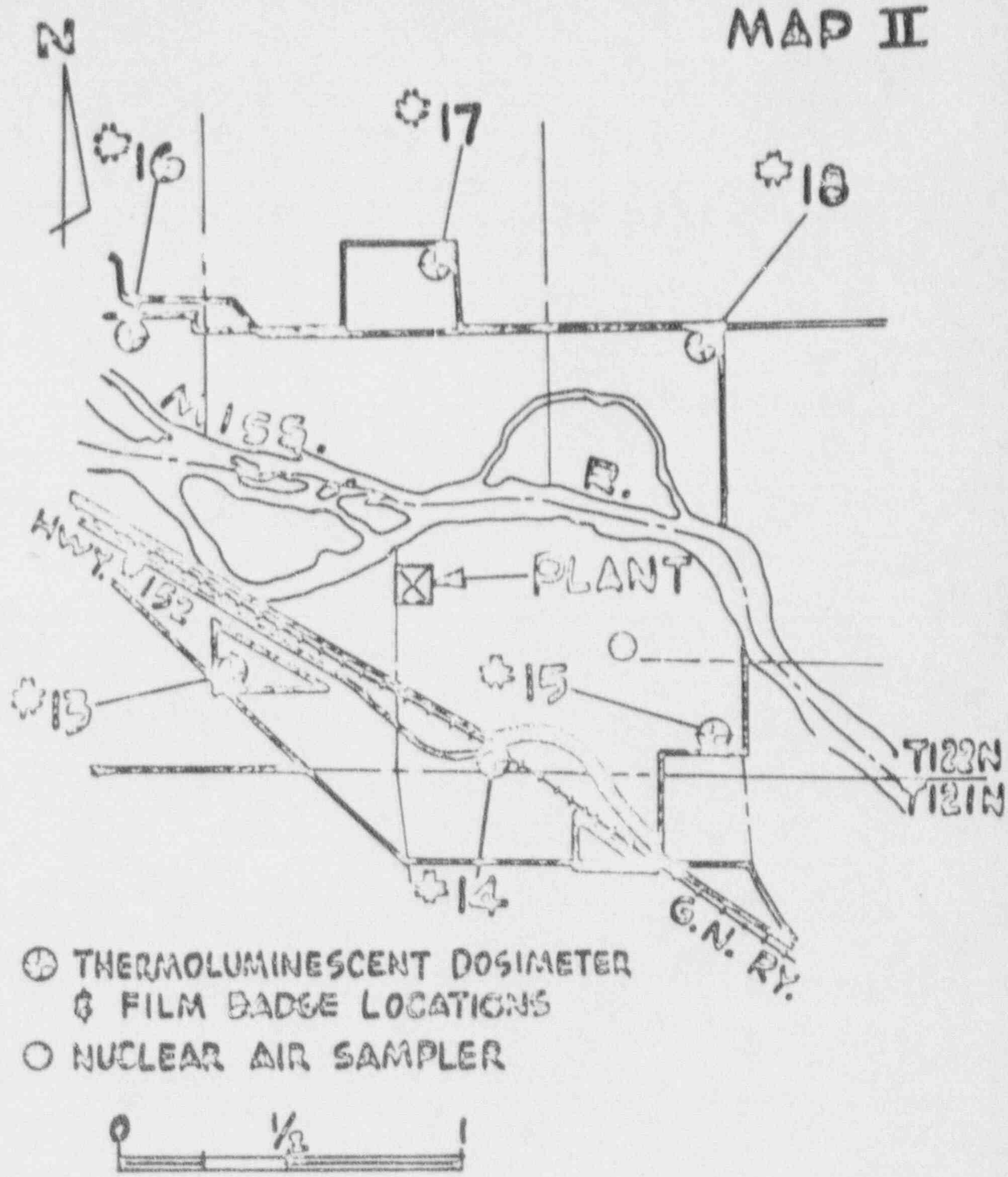
Sampling Location	Date of Collection	pCi/gram					
		Gross Beta	^{144}Ce	^{137}Cs	^{106}Ru	^{90}Sr	^{95}Zr
Vegetation Field #1	8-3-71	60		.17		.16	
Vegetation Field #2	8-3-71	52		.33		.16	
Vegetation Field #3	8-3-71	52		.26		.22	
Dechene Potato Co. (Potato Field)	8-3-71	61		.25		<.01	
	9-14-71	5[illegible]		.40		.19	
Dechene Potato Co. (Soybean Field)	8-3-71	60	1.3		.4	.04	.24
Ewing Potato Co. (Potato Field)	8-3-71	57		.22		.11	
Peterson Potato Co. (Potato Field)	8-3-71	52	1.1	.33	.3	.16	.12

Table 20

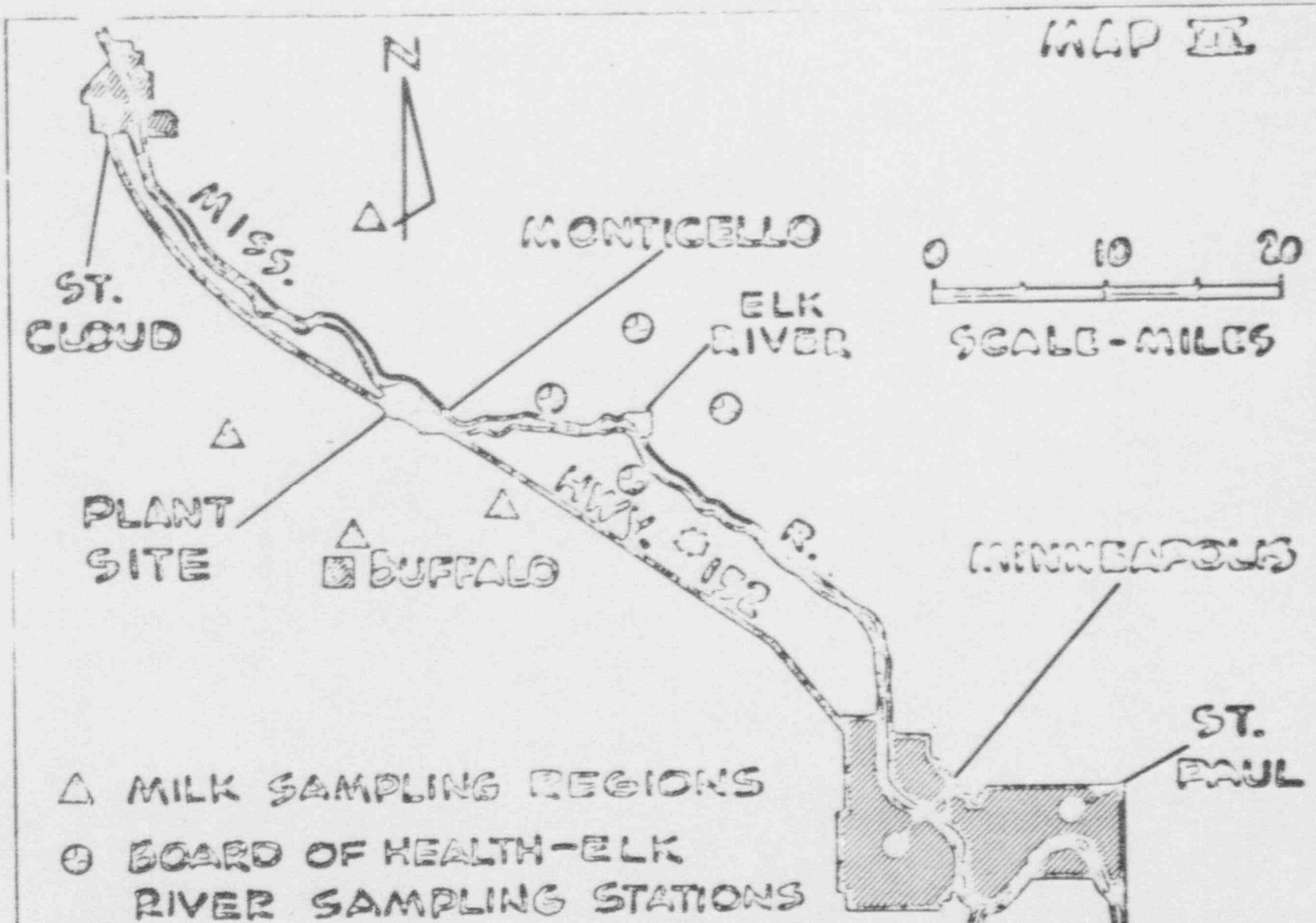
WELL WATER

Sampling Location	Date of Collection	pCi/liter				
		Gross Alpha	Gross Beta	^{137}Cs	^{3}H	^{90}Sr
Gauthier	7-27-71	<3	3	<3	1000	<.10
	10-6-71	<4	4	<2	1300	.23
Schultz	7-27-71	<3	3	<4	700	<.10
	10-6-71	<5	5	<5	1000	.28
Swanson	7-27-71	<3	3	<7	1400	<.10
	10-6-71	<4	2	<2	1800	<.14
Trunnel	7-27-71	<4	<2	<4	400	<.10
	10-6-71	<4	4	<5	1100	.17
Monticello Supply	7-19-71	<4	7	<2	<200	<.10
	8-17-71	<4	4	<2	<200	<.10
	9-8-71	<4	<3	<3	300	<.15
	10-6-71	<5	4	<2	200	<.14
	11-17-71	<3	3	<2	<200	<.10
	12-28-71	3	3	3	<200	<.10
Plant Supply #1	7-20-71	6	8	<2	200	<.10
	8-17-71	<4	4	<2	400	<.12
	9-8-71	<4	6	<2	300	<.13
	10-6-71	<5	9	<2	700	<.12
	11-17-71	<4	4	<2	600	<.10
Plant Supply #2	7-20-71	<4	5	<5	<200	<.10
	8-17-71	<5	6	<5	200	<.11
	9-8-71	<4	7	<2	600	<.12
	10-6-71	<5	6	<5	700	<.13
	11-17-71	<3	4	<5	300	<.10
	12-28-71	<3	3	<2	400	<.10


MAP I
N
SCALE - MILES
0
10
20
ST. CLOUD
MISS.
1
2
3
4
5
6
7
8
MONTICELLO
PLANT SITE
MINNEAPOLIS
ST. PAUL
AIR NUCLEAR
SAMPLER LOCATIONS (◇)
(TLD's and film badges also exposed at these points)



ON SITE MONITORING


MAP VII
N
0 10 20
SCALE - MILES
ST. CLOUD
MISS.
MONTICELLO
ELK RIVER
PLANT SITE
BUFFALO
HWY. 152
R.
MINNEAPOLIS
ST. PAUL
△ MILK SAMPLING REGIONS
⊖ BOARD OF HEALTH-ELK RIVER SAMPLING STATIONS

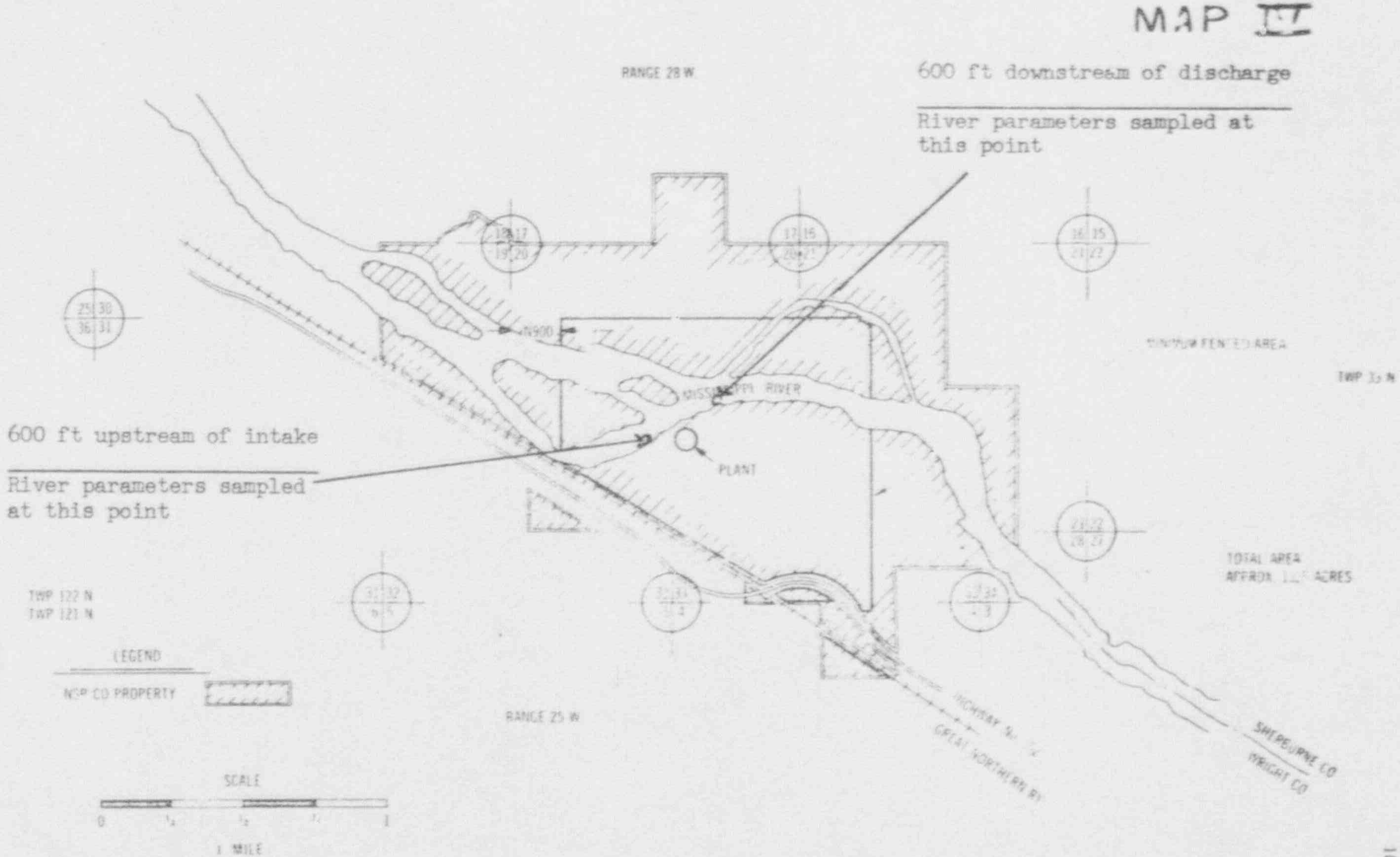
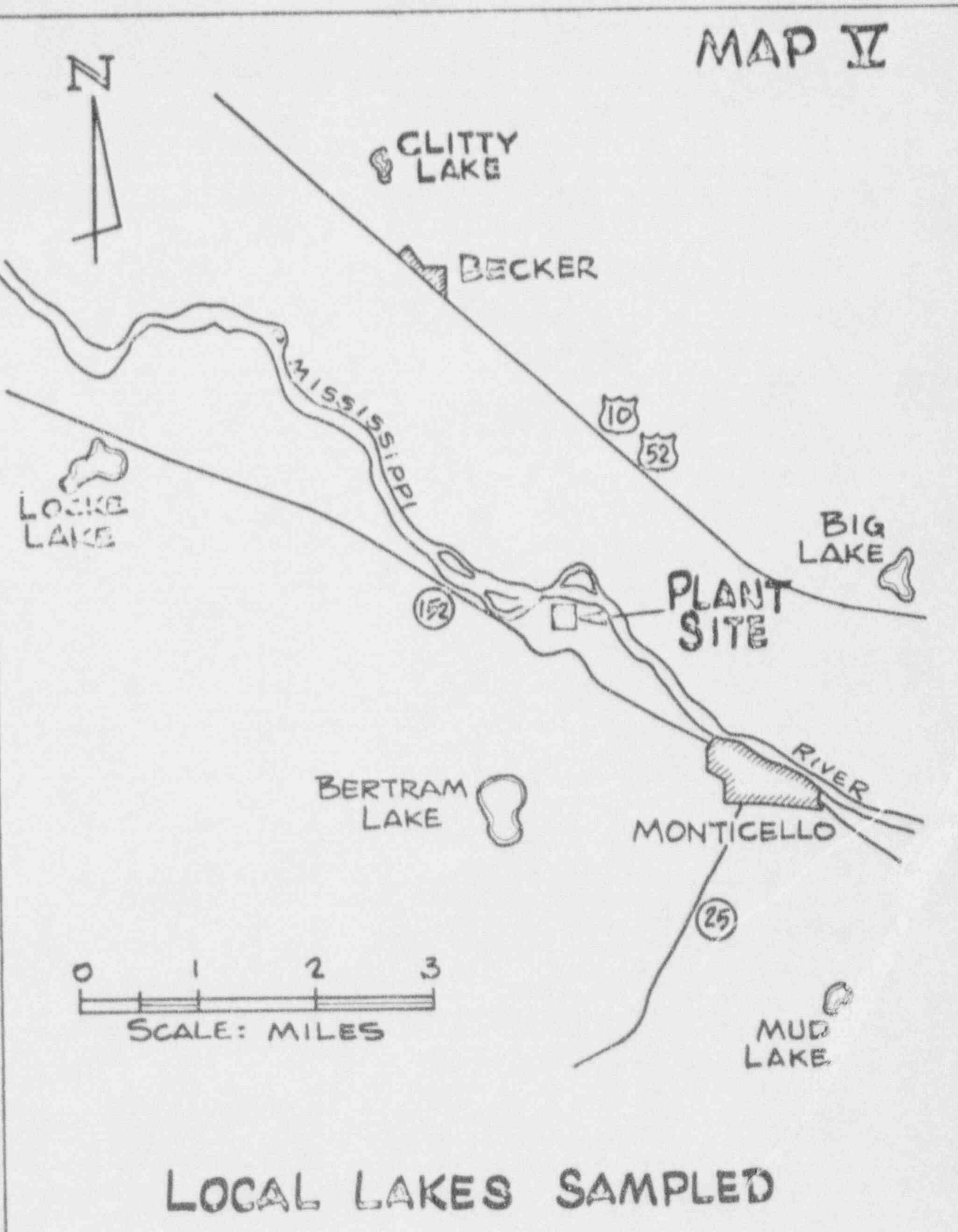


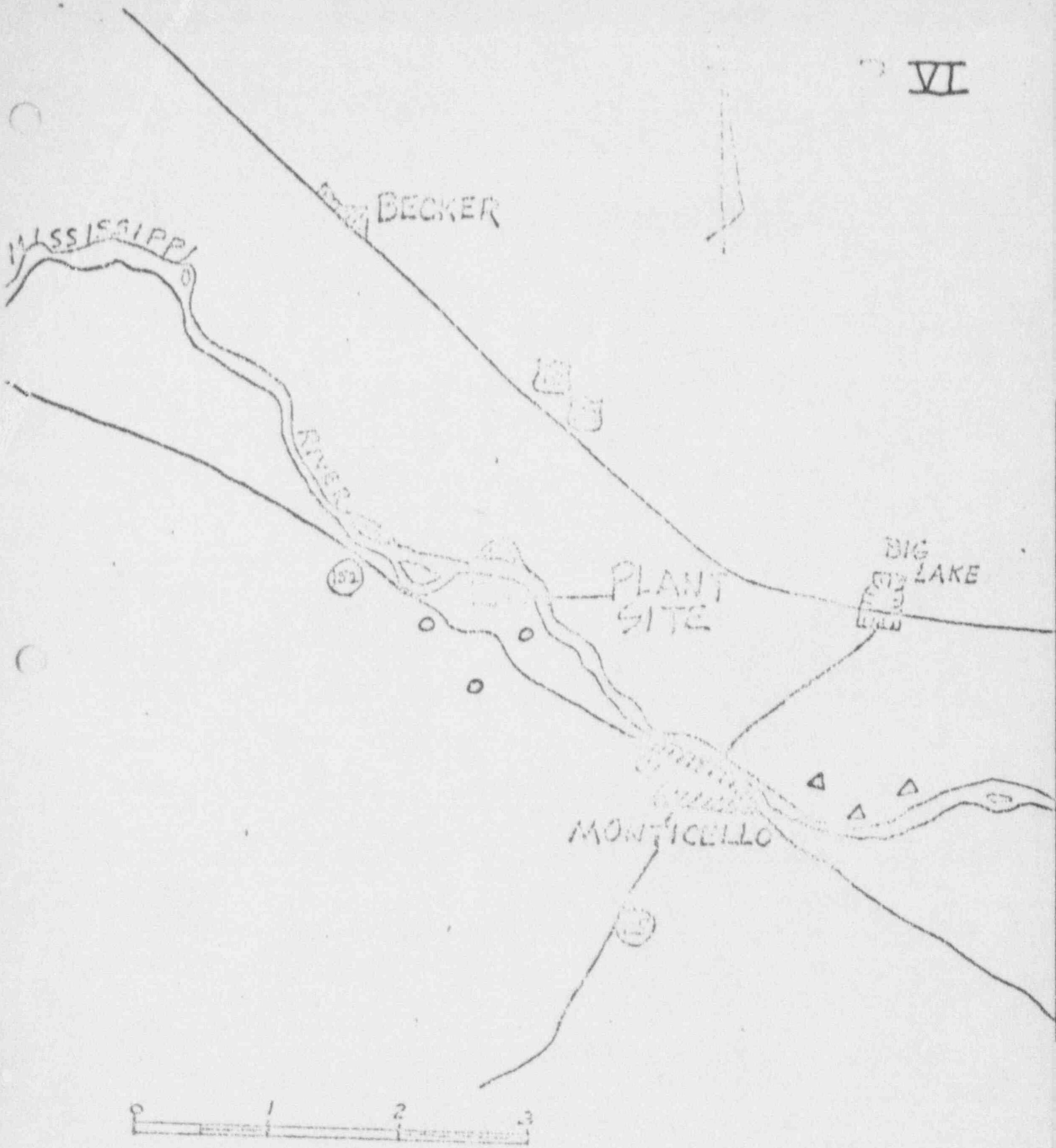
Figure 2-2-2a Property Records Plat Monticello Nuclear Generator Plant Site



MAP V

LOCAL LAKES SAMPLED

VI



TOPSOIL & VEGETATION FIELDS SAMPLED ○
RIVER IRRIGATED FIELDS SAMPLED △

VII. CHANGES, TESTS and EXPERIMENTS

This section describes plant modifications and special tests performed during the past year. However, several major items (such as the removal of torus baffles, extension of relief valve discharge lines, main steam flow restrictor modifications, and testing of the flow restrictors at greater than rated flow) which have been previously covered in separate reports to the AEC, are not included.

Installation of Banana Plugs and Receptacles for the Steam Leak Detection System Temperature Switches associated with the HPCI System (16 switches), RCIC System (16 switches) and the Main Steam Line (16 switches).

The 48 steam leak detection temperature switches were originally connected to local wiring by means of twist-on wire nuts. Each time the switches were removed for calibration, a portion of the connecting wires was removed. To make the switches more easily removable the wire nut connectors have been replaced with in line banana plugs and receptacles.

After the plugs and receptacles were installed the proper reactor protection response to a high temperature was verified for all temperature switches.

Installation of Vacuum Breaker on the Low Pressure Side of the Reactor Vessel Vent Line to Closed Radwaste

A vacuum breaker was installed between the reactor vessel vent valve (XDV-3) and the drywell equipment drain sump to prevent formation of a water seal in the drain line which would result in a vacuum in the vessel when the vessel is cooled below 212° F. (See Figure 1) The vacuum breaker is located after the two isolation valves on the vessel vent line.

Remount HPCI System Level Switches 23-91A and 23-91B

The level switches which transfer the HPCI system suction to the torus on high torus water level were relocated from the torus to the adjacent concrete wall to prevent spurrious trips caused by torus vibration. An orifice was also installed in the lower sensing line to damp out vibration induced waves in the torus. (See Figure 2)

Core Spray System Injection Valves - 450 psi Interlock

The control logic for the Core Spray System Injection valves (MO 1751 and MO 1753 in "A" loop and MO 1752 and MO 1754 in "B" loop) was modified to permit single valve operability tests with reactor pressure below 450 psi. The original valve control circuit would open both valves when the inboard isolation valve control switch was operated with reactor pressure below 450 psi. The control circuit change consisted of removing wires from the inboard isolation valves control switches (MO-1751 and MO-1752) contacts 2 and 2T which energized the Valve Open Permissive relay (14A-K13A) when reactor pressure was greater than 450 psi. This opened both the inboard and outboard isolation valves for the affected Core Spray System (See Figure 3). With the above change completed, the valves can be opened, one at a time, through the 1 and 1T contacts of

their control respective switches. The operation of the valve control circuits during automatic core spray initiation is unaffected.

RCIC System Exhaust Piping Vacuum Breaker Installation

A solenoid operated vacuum breaker was installed on the exhaust piping of the RCIC turbine to prevent a steam/water hammer in the steam exhaust piping after system shutdown. The steam/water hammer was caused by condensing the residual steam in the exhaust line after the turbine shutdown, and thereby drawing torus water into the evacuated exhaust line. When the system is shutdown and steam supply valve MO 2078 is closed, the vacuum breaker opens for three minutes to break vacuum in the steam exhaust piping (See Figure 4).

The vacuum breaker solenoid valve is dc operated from the 125 V DC battery supply system. This permits valve operation during loss of off site power and is consistent with the RCIC electrical design philosophy. Upon loss of power or solenoid failure (open circuit) the valve fails closed.

If the vacuum breaker solenoid valves should fail open during RCIC operation, a small amount of exhaust steam, at 8 psig, could be discharged to the RCIC room atmosphere. Primary containment integrity would still be satisfied as there are two check valves on the RCIC turbine exhaust line before it enters the torus. The escaping steam would be monitored by the reactor building exhaust plenum radiation monitors. The steam leak detection alarm and isolation temperature switches, located approximately eight feet above the vacuum breaker line would alarm at 175° F and shut the RCIC steam supply valves at 200° F.

Moisture Separator Control System Modification

The moisture separator level control system was modified to automatically open the moisture separator drain tank dump valves to prevent turbine trip and subsequent reactor scram caused by high moisture separator water level. The changes listed below were made to all four moisture separator level control systems (See Figures 5a and 5b).

1. An instrumentation standpipe was installed to cover the range of the moisture separator drain tank high water level alarm and the mositure separator high water level turbine lockout relay trip.

2. A ten second delay was added to the moisture separator high water level trip.

3. The second set of contacts for the moisture separator high water level switch was connected to open the moisture separator drain tank dump valve.

4. The moisture separator drain tank high water level alarm switch was connected to open the moisture separator drain tank dump valve.

5. A differential pressure switch was installed between the top of the moisture separator and the top of the moisture separator drain tank. The switch trips the moisture separator drain tank dump valve when high pressure in the drain tank causes water to backup into the

the moisture separator.

The effect of these changes was to make the moisture separator level control system more responsive to sudden plant power level transients.

Pressure Wave Sensors on Main Steam Line

Six pressure sensors were temporarily added to the main steam lines between the MSIV's and the turbine control valves to measure pressure variations during plant transients. Pressure sensors were added as shown in Figure 6. The instrumentation was removed at the completion of the startup test program.

Modification of the Reactor Recirculation Pumps Seal System

The reactor recirculation pump seal systems were modified to prevent thermal shocking the seals following pump trips with the reactor at rated temperature. Two modifications were made:

1) An air operated shutoff valve was installed in the recirculation pump controlled seal leakoff line. The valve will automatically close on pump trip and thus prevent hot reactor water from being forced through the seals.

2) A continuous seal injection system was installed to provide a cooling water supply to the lower seal cavity. The injection system is supplied from the Control Rod Drive Hydraulic System (See Figure 7).

The air operated shutoff valve was designed to fail open on loss of air pressure and loss of electrical power, thereby assuring continued seal cooling and lubrication.

With a recirc pump isolated, the seal injection system could pressurize the pump casing and the piping between the isolation valves. Relief valves have therefore been provided in each seal injection line.

Connections are provided for leak rate testing the check valves on either side of primary containment.

Pressure Module Connections to Reactor Pressure Instrumentation

A temporary pressure module was tapped into eight existing reactor instrumentation lines. The purpose of the module, consisting of two pressure differential transmitters and associated valving, was to measure pressure drops in the recirculation system not measured with existing plant instrumentation. The following instrument lines were tapped:

Instrument Line	Pressure
DPT 2-111B (low)	Recirc Pump Suction
DPT 2-111B (high)	Recirc Pump Discharge
DPIS 2-129 A (low)	Jet Pump End Riser
DPT 2-3-65 (low)	Downcomer

Instrument Line	Pressure
DPT 2-3-62 (high)	Below Core Plate
DPT 2-3-62 (low)	Above Core Plant
DPIS 14-43 A	Core Spray Sparger
DPIS 2-129 C (low)	Jet Pump Middle Riser

The pressure module connections were removed after the completion of the startup test program.

RCIC and HPCI Systems Control Circuit Modification

The RCIC and HPCI systems control circuits were modified to automatically perform the following whenever the respective steam admission valves are opened (See Figure 8):

1) Close the steamline drain valves, CV 2046 A and B for the HPCI system and CV 2082 A and B for the RCIC system.

2) Transfer the condensate pump discharge from closed radwaste to the respective RCIC or HPCI pump suction by closing CV 2394 A and B for the HPCI system and CV 2898 and CV 2899 for the RCIC system.

Prior to this change the above operations were performed automatically only when the systems were automatically initiated. During the manual mode of operation of the systems, the operations had to be performed manually.

The changes do not affect the automatic operation of the HPCI and RCIC systems.

Reactor Relief Valves Modifications

The reactor relief valves (4 valves) were modified to decrease the closing time of the valve and to reduce the pressure reset band. The change involved increasing the size of the orifices in the second stage and main pistons. The work was performed under the direction of a Manufacturers representative. The change does not alter the relief setpoint.

Modification of the Recirculation System of the Reactor Feedwater Pumps

The reactor feedwater pumps recirculation system was modified to provide greater recirculation flow and better control. The recirculation lines were increased from 6" to 8" to provide a higher minimum flow. The size of the holes in the recirculation spargers in the condenser were increased from 3/8" to 1/2" to accommodate the higher flow rate. New flow control valves and associated controls were installed in the recirculation lines to replace the on-off type originally supplied. The controllers in the recirculation line now have proportional band and reset and are set to control total flow through each pump at a minimum of 3000 gpm. The new recirculation control valves are of the "drag" type and take the full pressure drop. The restriction orifices provided with the original system were removed. A start permissive interlock was added which requires that the recirculation valve be open before the associated feedwater pump can be started.

Modification of the Reactor Recirculation System Valves Closing Control Circuit

The closing circuit for reactor recirculation system valves (pump suction, discharge, discharge bypass and loop cross tie) was modified to prevent over-torquing the valves into the seat(which can later result in failure of the valves to open). The contact in parallel with the torque switch was changed from a contact which is closed for 5% of the closing stroke to a contact which is closed for 95% of the closing stroke (See Figure 9). The contact opens at 95% of the closing stroke allowing the valve to torque into the seat. Removal of the torque switch from the closing circuit during 95% of travel allows the torque switch setting to be maintained at a low value, just sufficient for proper valve seating. Previously, it was necessary to set the torque switches high enough for the normal fluctuation in torque that occurs during the valve stroke. Upon receipt of an LPCI initiation; the recirc system valves must close to properly select the injection loop. The modification to the valves provides greater reliability. The valve motor overload contacts are the only contacts which can interrupt the closing signal.

Modification of the Scram Discharge Volume

The scram discharge volume was increased to provide 3.34 gallons of free volume available per drive (405 gal) during a reactor scram. This modification was made to provide additional margin to accommodate the normal over-piston water during a scram plus stop-piston seal leakage. As the CRD mechanism stop piston seals wear with drive use, the leakage of reactor water across these seals during a scram increases. The increased scram discharge volume will accommodate the normal scram water from a CRD plus the maximum stop piston seal leakage with which a drive would still be operational.

Addition of Pulsation Snubbers to the Sensing Line of the Main Steamline High Flow Isolation Switches

The sensing lines of the sixteen main steamline high flow switches (DPIS 2-116 A thru D, 2-117 A thru D, 2-118 A thru D, and 2-119 A thru D) were fitted with self cleaning, pin-type, pressure snubbers to reduce the differential pressure fluctuations observed during power operation. The snubbers are located between the differential pressure switch and the associated instrument valve manifold such that the snubbers are included each time pressure is applied to the instrument for test and/or calibration. Following snubber installation, all of the instrument sensing lines were tested by applying pressure directly to the lines while verifying movement of the instrument pointer to insure that the snubbers did not block the sensing lines.

Deletion of SBGT Heater SCR Control Circuitry

To provide more reliable operation of SBGTS air heaters E-34A-1 and E-34B-1, the heater SCR control circuitry was replaced with contactors which energize the electric heaters when the proper minimum flow has been detected by the existing flow switch (See Figure 10). Previous experience had shown that the heater SCR control circuit was not needed since full power to the heaters is required to maintain adequate heating of the incoming gas.

Modifications of the Off-Gas Loop Seal and Loop Seal Isolation Valve CV-1534 Control Circuit

A level switch was added to the off-gas loop seal to close the loop seal isolation valve (CV-1534) on loss of the water seal. Also a manual switch was added to allow the control room operator to manually close the loop seal isolation valve. (See Figures 11 and 12) The addition of the level switch and the manual control switch does not affect the operation of the isolation logic from the Off-Gas radiation monitors. If CV 1534 fails in the closed position, water will collect slowly in the off-gas line, giving the operator ample time to take corrective action. If the level switch fails to trip on low level in the loop seal, CV 1534 can still be closed using the handswitch.

Air Ejector Steam Pressure Control Valves Interlock with Air Ejector Suction Isolation Switch HS-1084

An interlock was provided on control room switch HS 1084 (Air Ejector Suction Isolation) which partially closes the air ejector steam supply valves (PCV-1242 and PCV-1243) when the switch is in the CLOSED position (See Figure 13). This interlock was added to provide a means for preventing a sudden air ejector flow surge when the main steam lines are repressurized following an isolation. Prevention of air ejector flow surges insures that the water loop seal on the off-gas discharge line is maintained. With the air ejector steam supply valves partially closed, the surge in air ejector steam flow which occurs if the main steamlines are rapidly repressurized is not great enough to cause loss of the loop seal.

Installation of a Switch to Bypass the "RUN Mode" Interlock on the Primary Containment Purge and Vent Valves

A key locked switch was installed to bypass the "RUN Mode" interlock on the primary containment purge and vent valves, AO 2377, AO 2378, AO 2381, AO 2383 and AO 2386. These valves are normally interlocked with the mode switch such that they cannot be opened when the reactor is in the RUN Mode (See Figure 14). Opening of these valves is necessary for inerting or de-inerting.

The bypass will be used only when inerting or de-inerting the primary containment. It in no way affects a group 2 isolation signal to the purge and vent valves.

Modification of the Reactor Recirculation System Cross-Tie Valves MO-65A and B Opening Circuit

The "seal-in" contacts were removed from the opening circuits of the reactor recirculation system crosstie valves MO-65A and MO-65B. This allows the operator to open the valves in small increments and thereby prevent sudden flow increases.

The LPCI System interlocks to the cross-tie valves are not affected by this modification.

Addition of Test Jacks to Plant Instruments

Test jacks were added to plant instrumentation associated with the reactor protection system and emergency core cooling system to facilitate testing and calibration. The test jacks are wired in parallel with switch contacts and are mounted on local junction boxes to provide access during testing. All of the test jacks are capped when not in use and are identified with permanently mounted tags inscribed with the associated instrument and switch numbers. Test jacks were provided for the instruments listed in Table 1.

Additional Reactor Level Instrumentation

Additional temporary reactor level instrumentation was added to existing plant instrumentation to allow testing of a prototype water level transmitter. The prototype level transmitter was installed in parallel with Feedwater Control System level transmitter 6-52B. A differential pressure transmitter was installed in parallel with level instrument LITS 2-3-59B to monitor the Yarway level column differential. The output of the two additional level instruments is sent to a high speed six channel recorder (See Figures 15 and 16).

The instruments will be removed at the conclusion of the test.

Addition of a Seal-in Circuit for the Air Ejector Suction Valves Isolation Control Circuits

A seal-in circuit was added to the air ejector suction valves isolation control circuit. The modification included the addition of a GE HFA relay at control room panel C-07, and the addition of a reset pushbutton on the bench board of C-07 (See Figure 17). The operator must now manually reset the isolation after the initiating signals are cleared. An annunciator (7B13) is used to alarm the seal-in condition. The additional components are highly reliable and are the same type as those used in the reactor protection system.

Reactor Building Vent Fan Indication

Additional indicating lights for reactor building vent fans were provided on the control room and local panels. The original design did not provide indication for vent fans that were tripped by local magnetic contactors. Red indicating light were added for the following units:

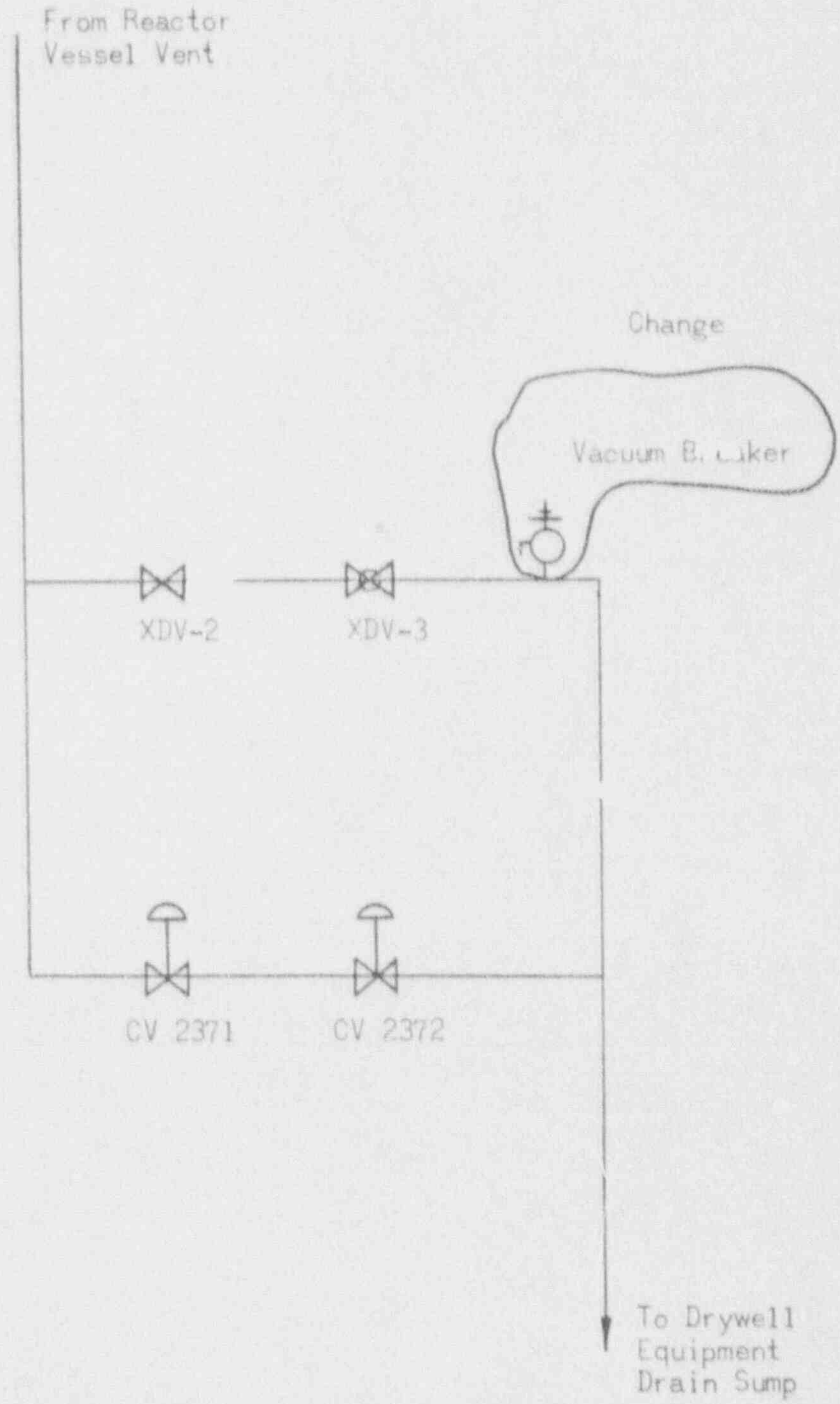
V-AC-10A	V-AC-10B	V-AH-4A
V-AH-4B	V-EF-24	V-EF-28
V-EF-10		

Core Flow Distribution Measurements

Following fuel loading and prior to installation of the vessel head, the flow distribution through selected fuel assemblies was measured. The flow test was conducted at atmospheric pressure and ambient temperature. Individual fuel bundle flow at the exit of the selected fuel bundles located symmetrically in the inner zone of the core was measured with a specially fabricated flow

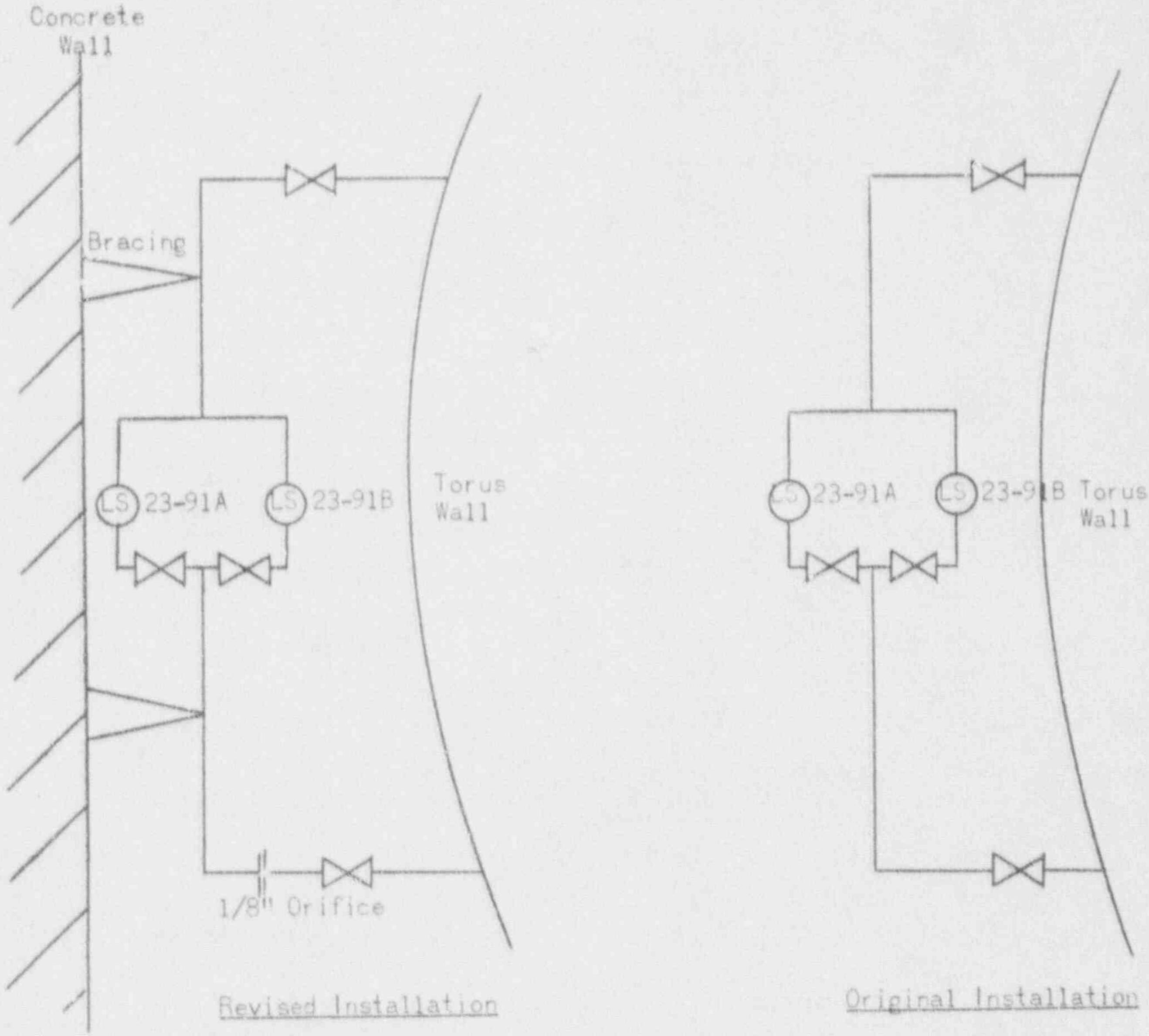
measuring device.

Flow distributions for three core flow rates with symmetric operation of the recirculation pumps were determined. A complete description of the test and test results is given in General Electric Licensing Topical Report titled "Core Flow Distribution in a Modern Boiling Water Reactor as measured in Monticello (NEDO-10299)."



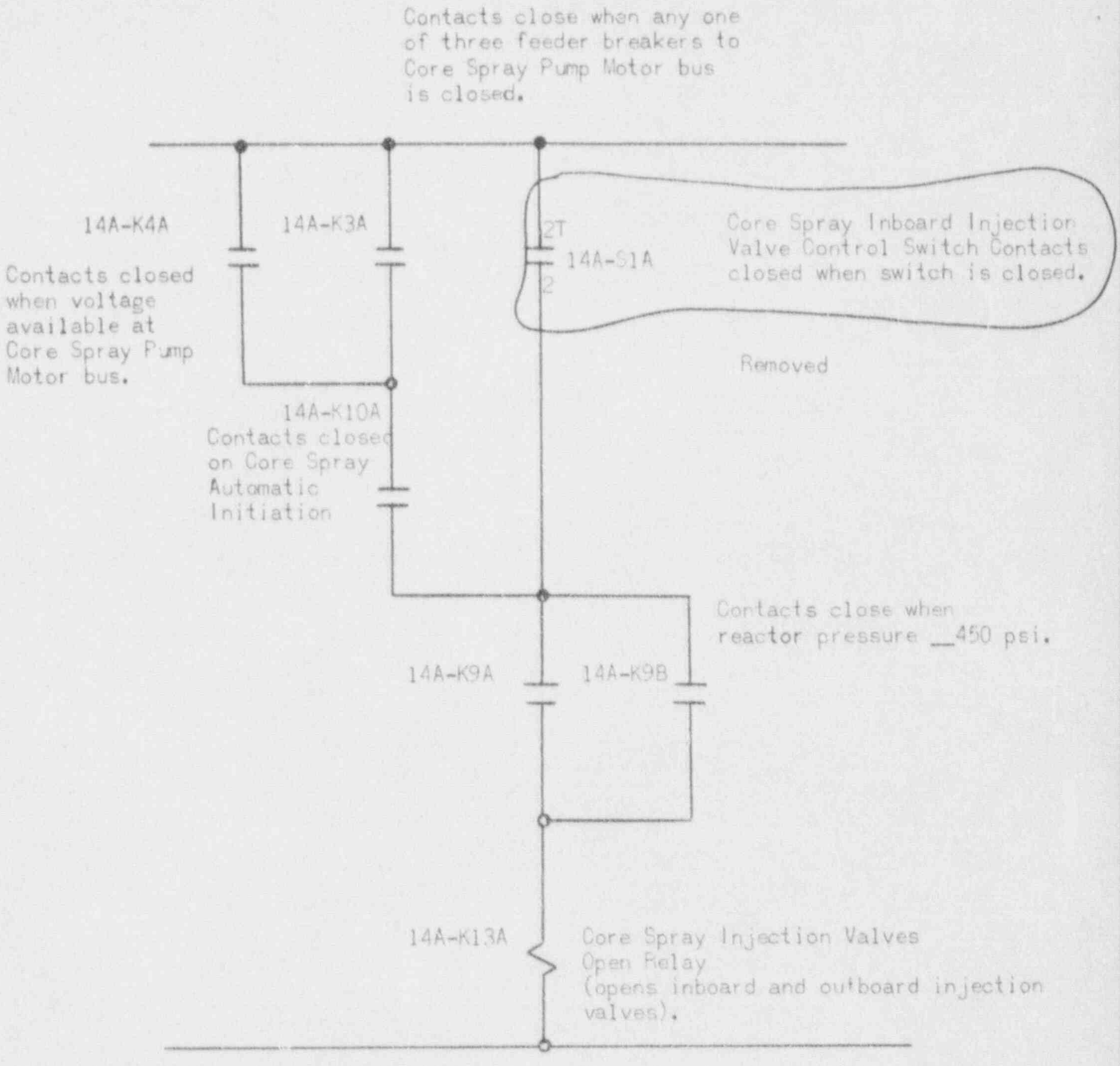
Installation of Vacuum Breaker on the Low Pressure Side of the Reactor Vessel Vent

Figure 1



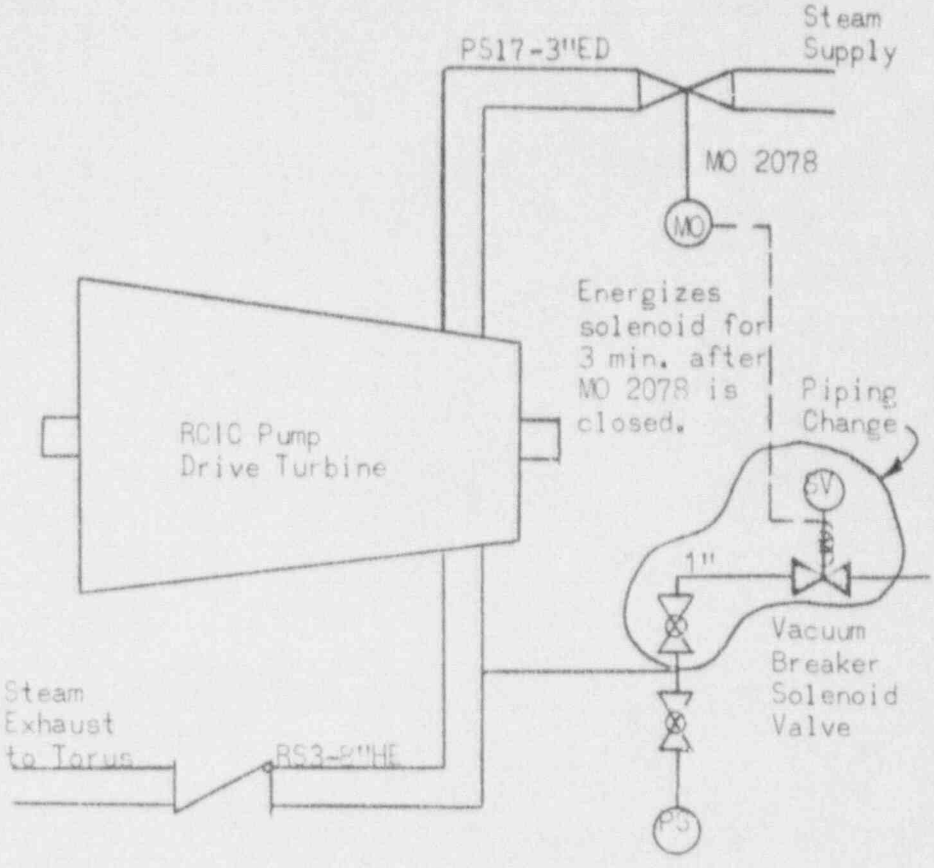
Remount of HPCI System Level Switches

Figure 2

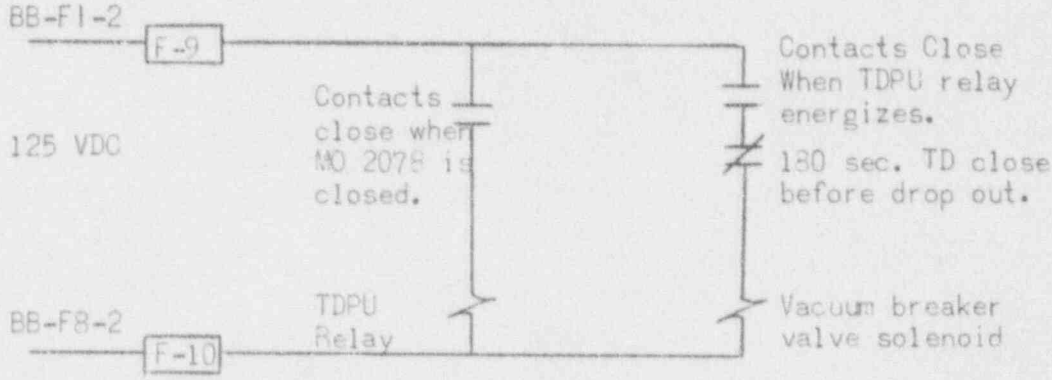


Core Spray Injection Valves - 450 psi Interlock

Figure 3



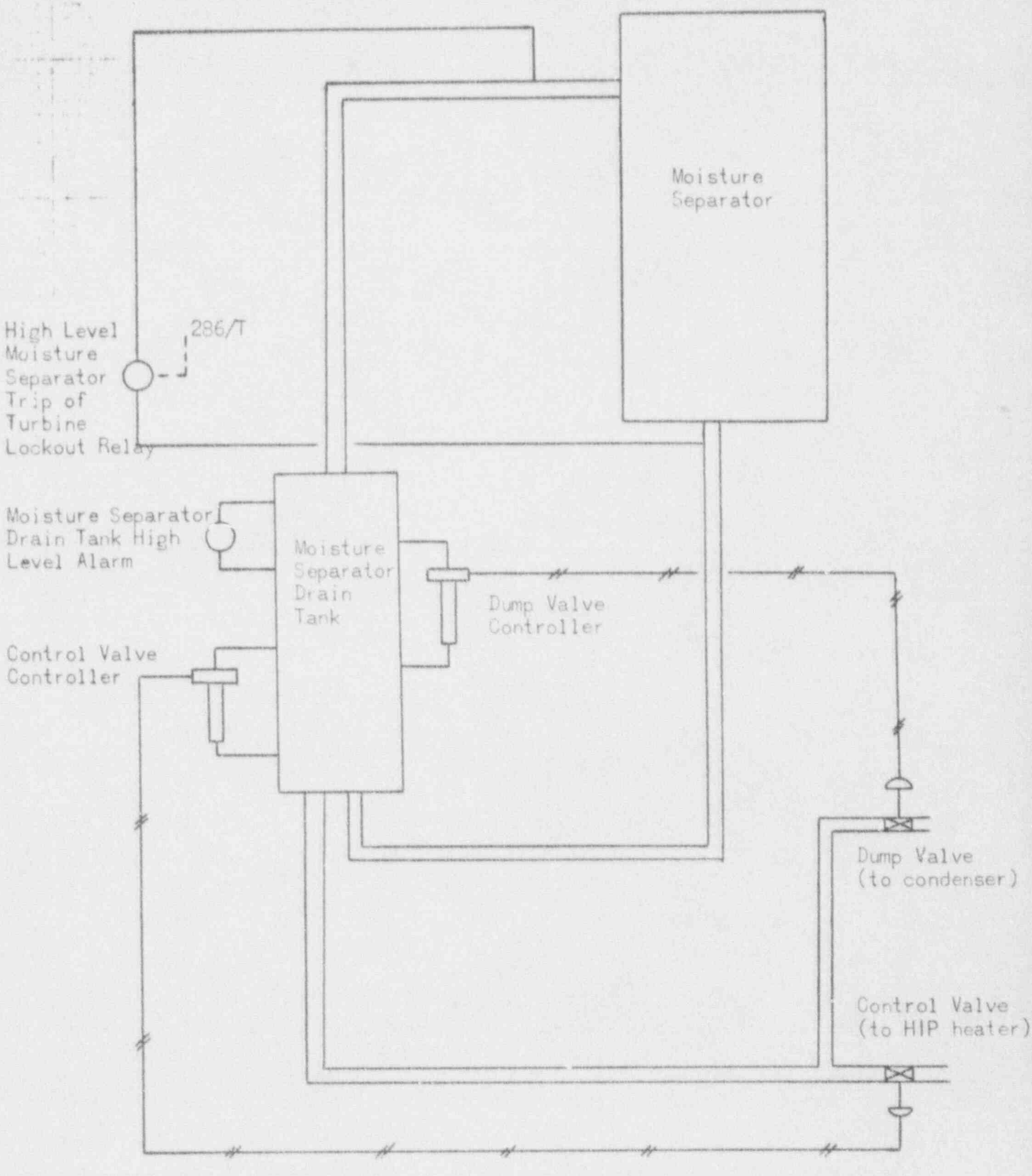
Vacuum Breaker Connection



Electrical Changes

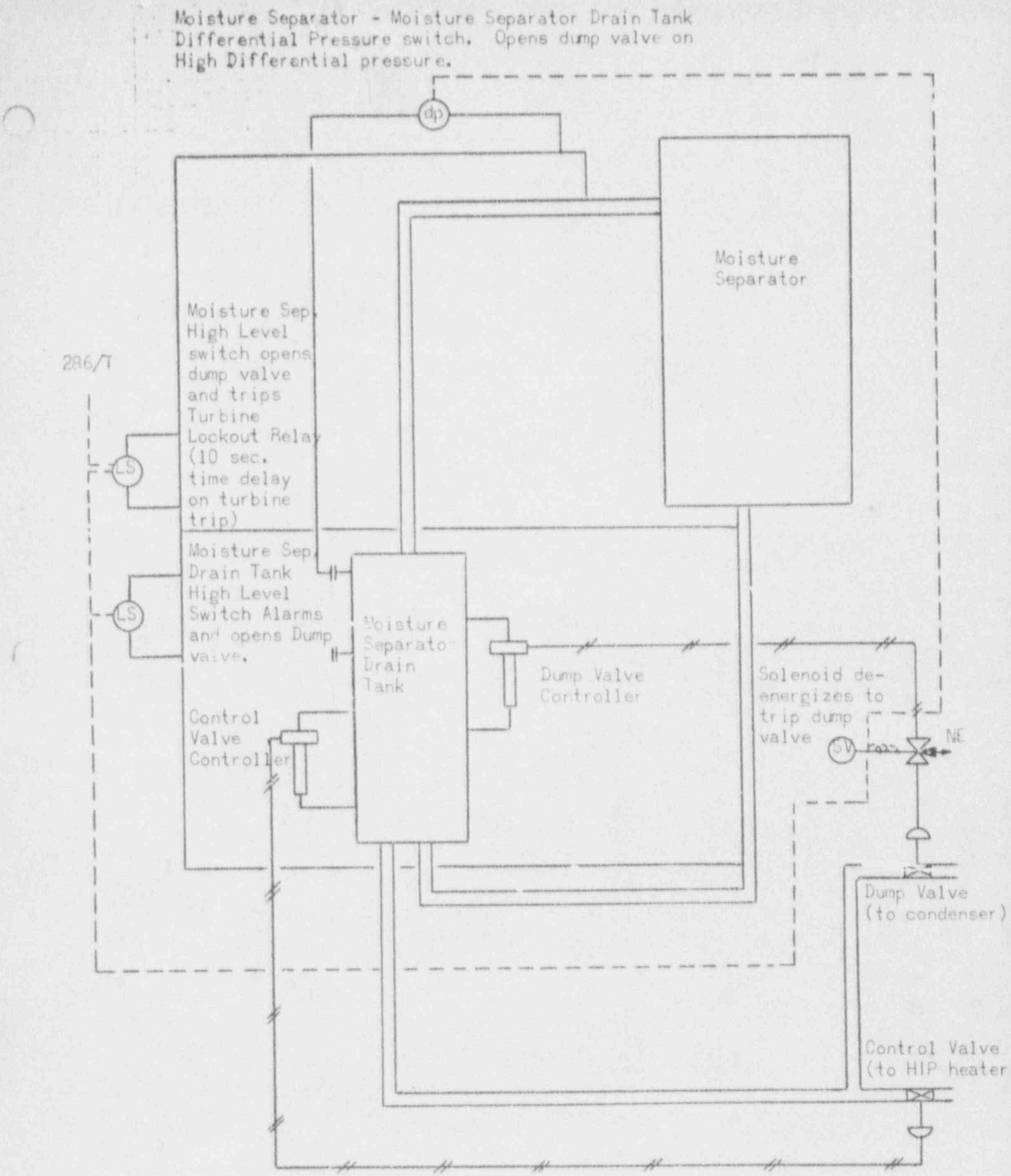
RCIC System Exhaust Piping Vacuum Breaker

Figure 4



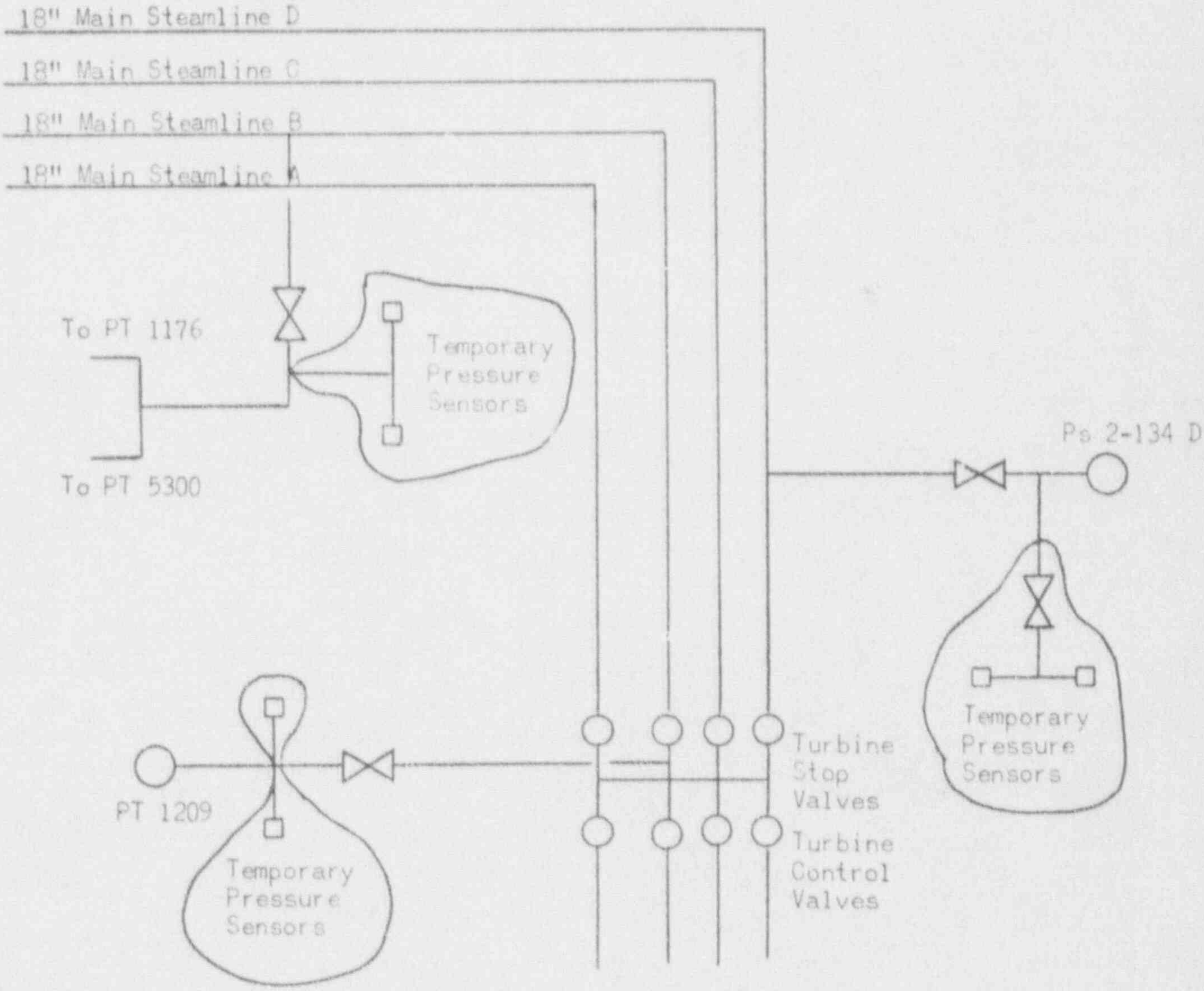
MOISTURE SEPARATOR CONTROL SYSTEM (Original)

Figure 5a.



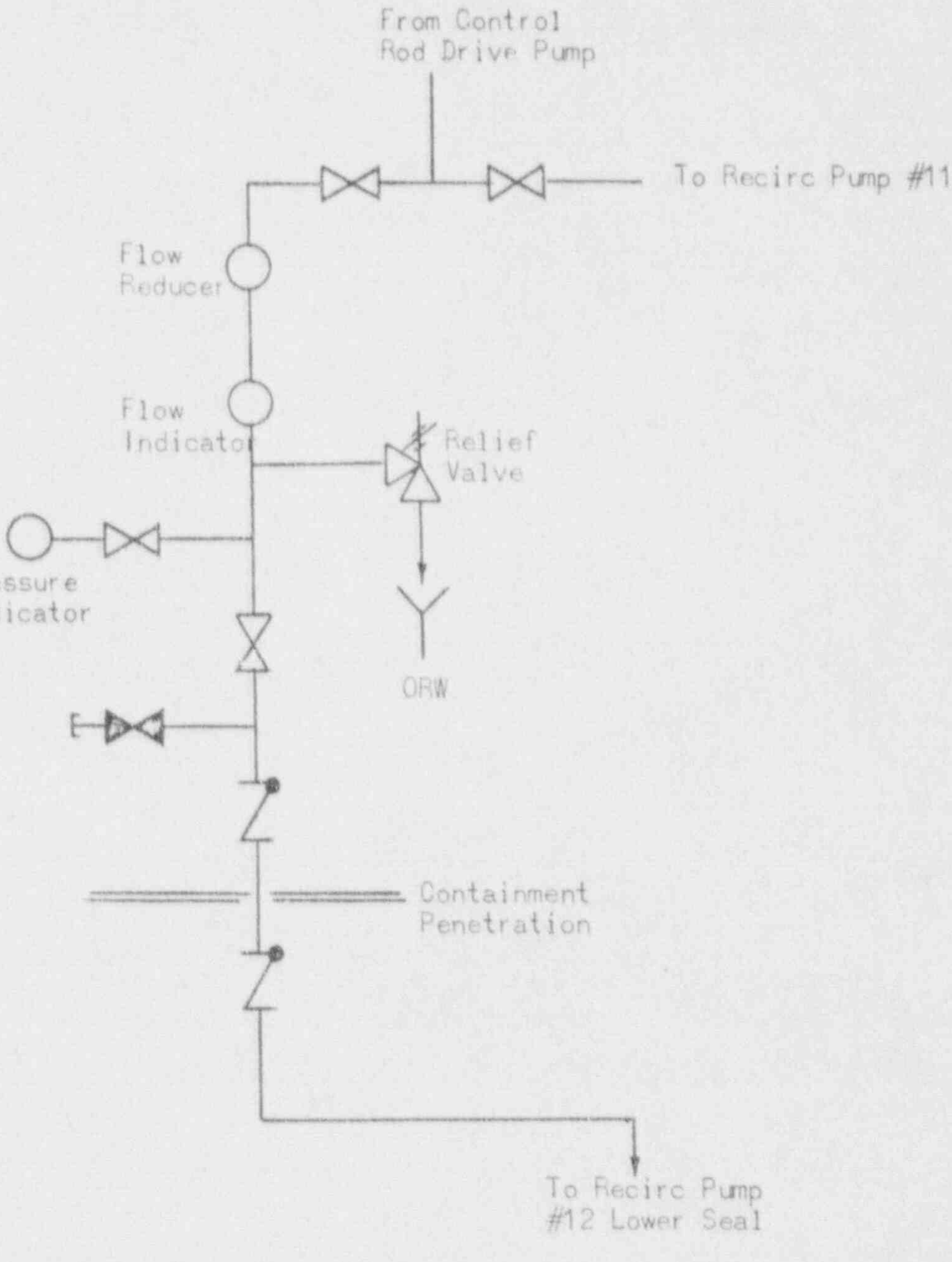
MOISTURE SEPARATOR CONTROL SYSTEM (Modified)

Figure 5b



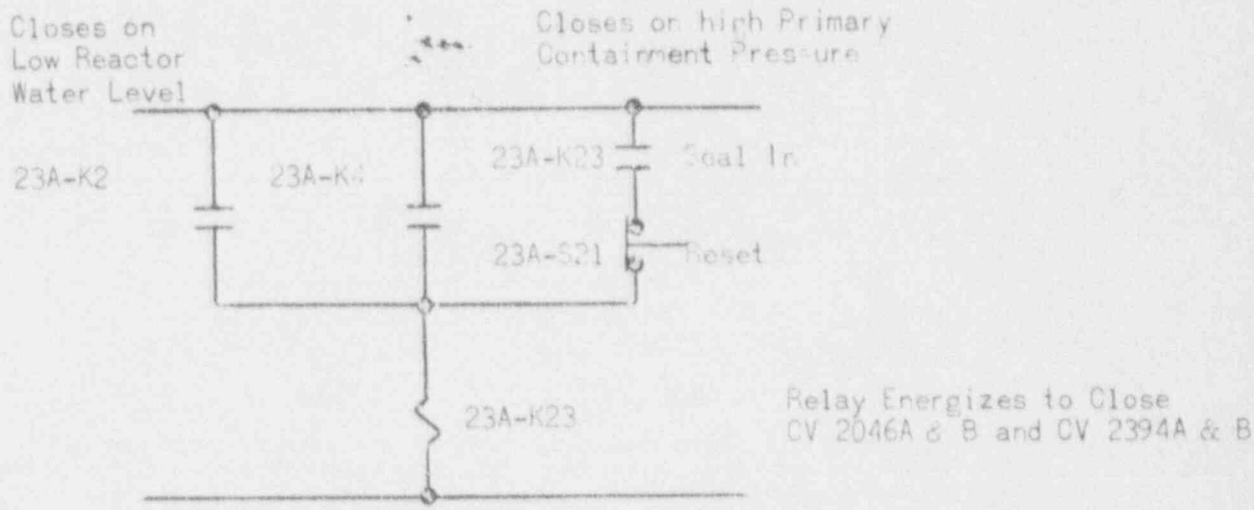
TEMPORARY PRESSURE SENSORS

Figure 6

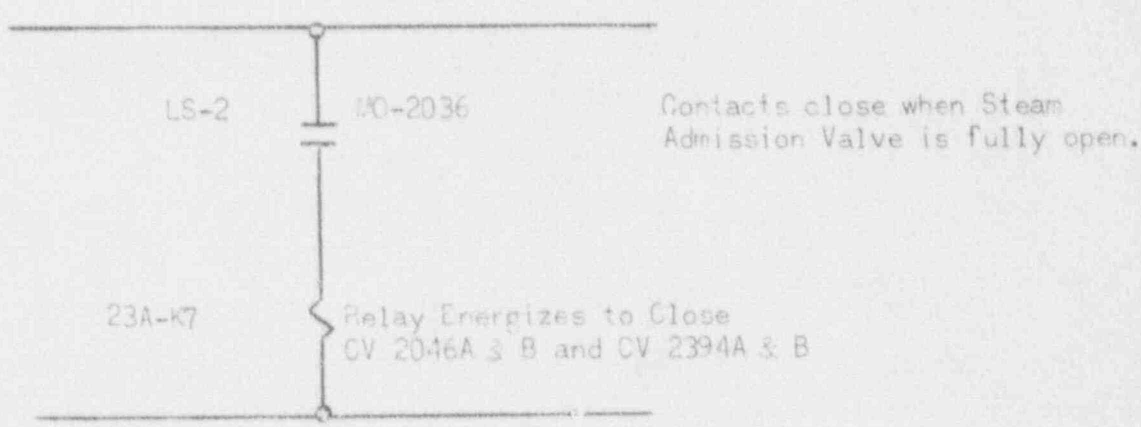


Reactor Recirculation Pump Seal Injection System

Figure 7



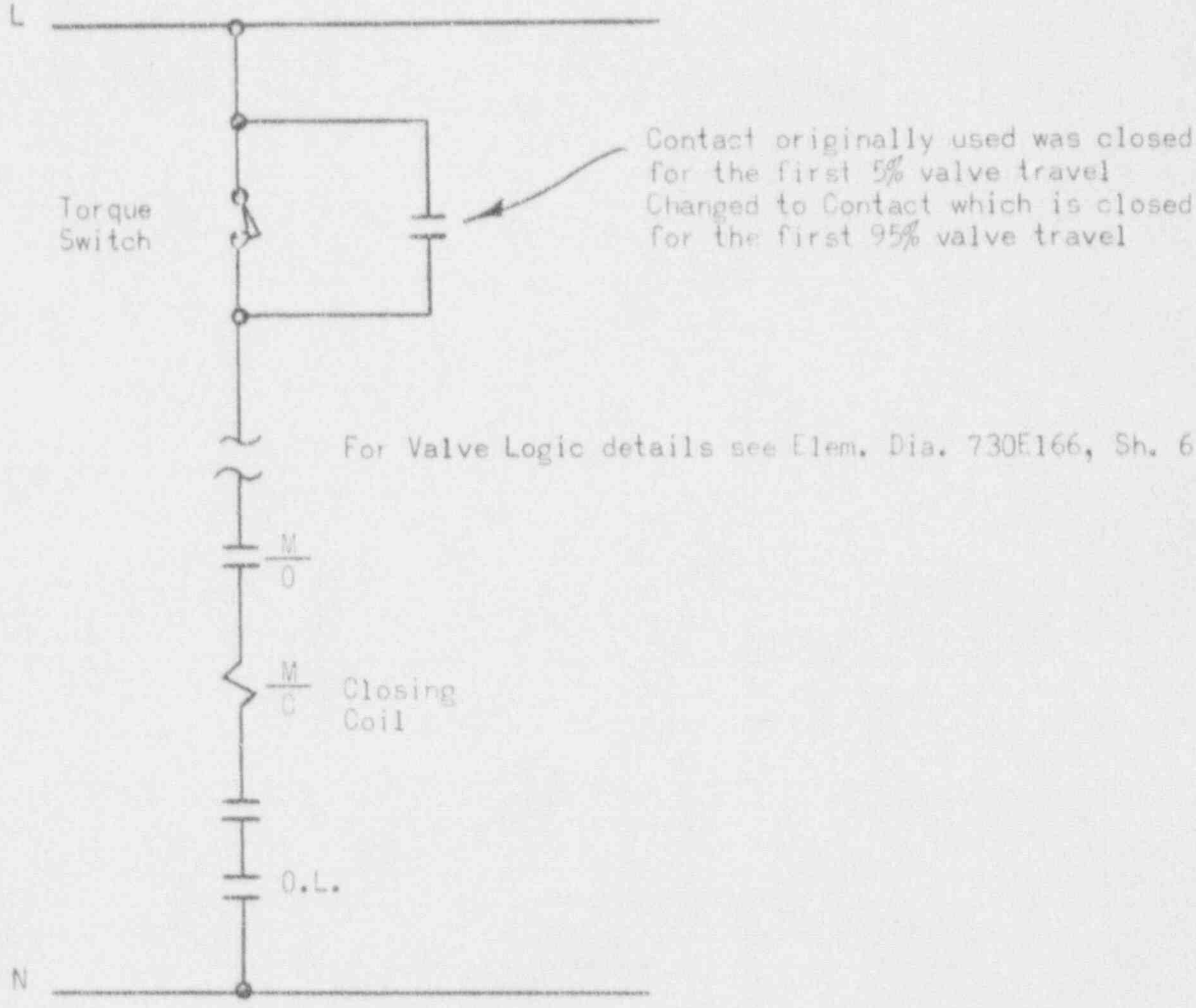
Original Control Circuit



Modified Control Circuit

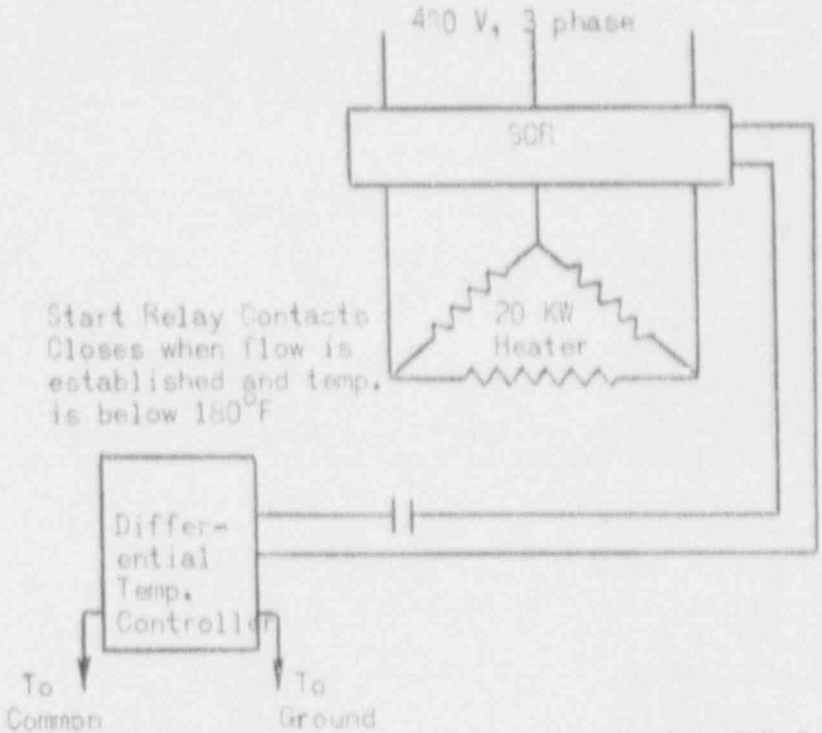
HPCI System Control Circuit Changes
(Identical changes were made in RCIC Control Circuit)

Figure 2

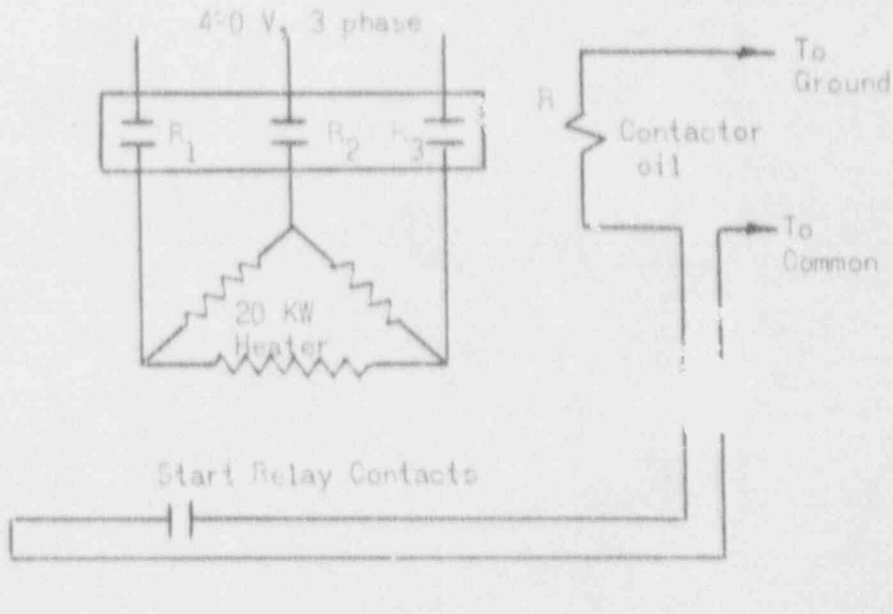


Modifications to Reactor Recirculation System
Valves MO-53A & B, 43A & B, 54A & B and 65A & B

Figure 9

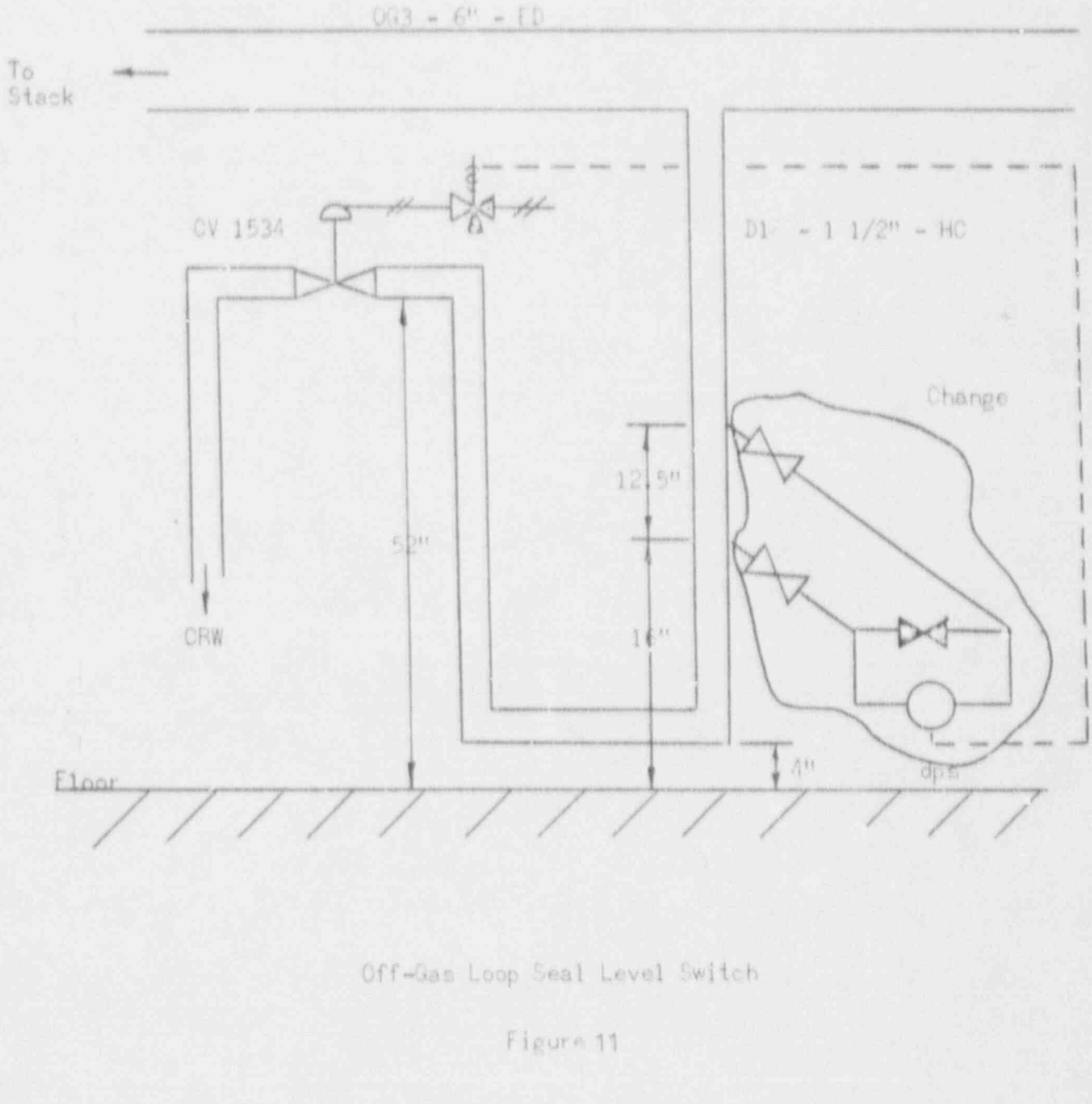


Original Air Heater SCR Control Circuit



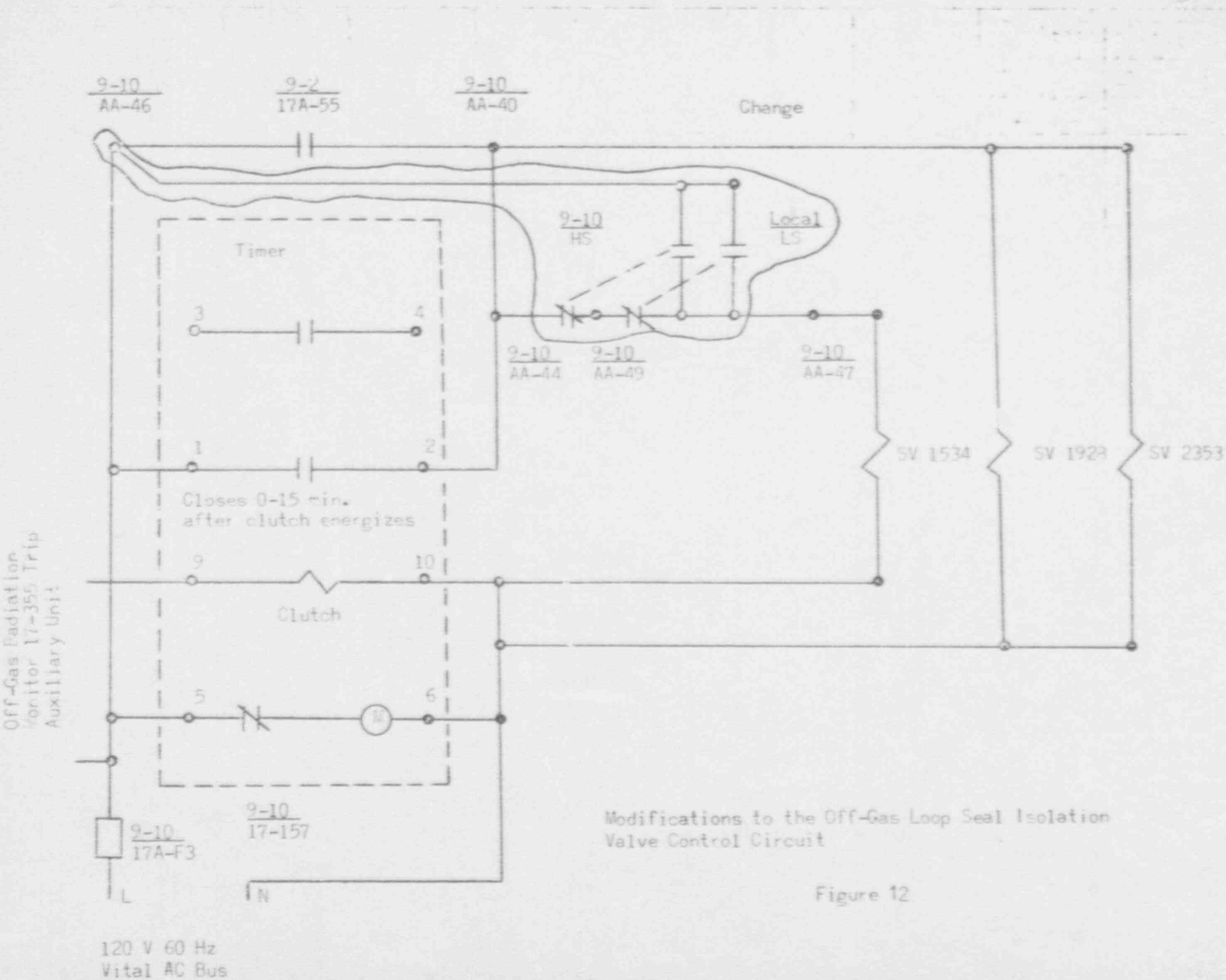
Modified Air Heater SCR Control Circuit

Figure 10



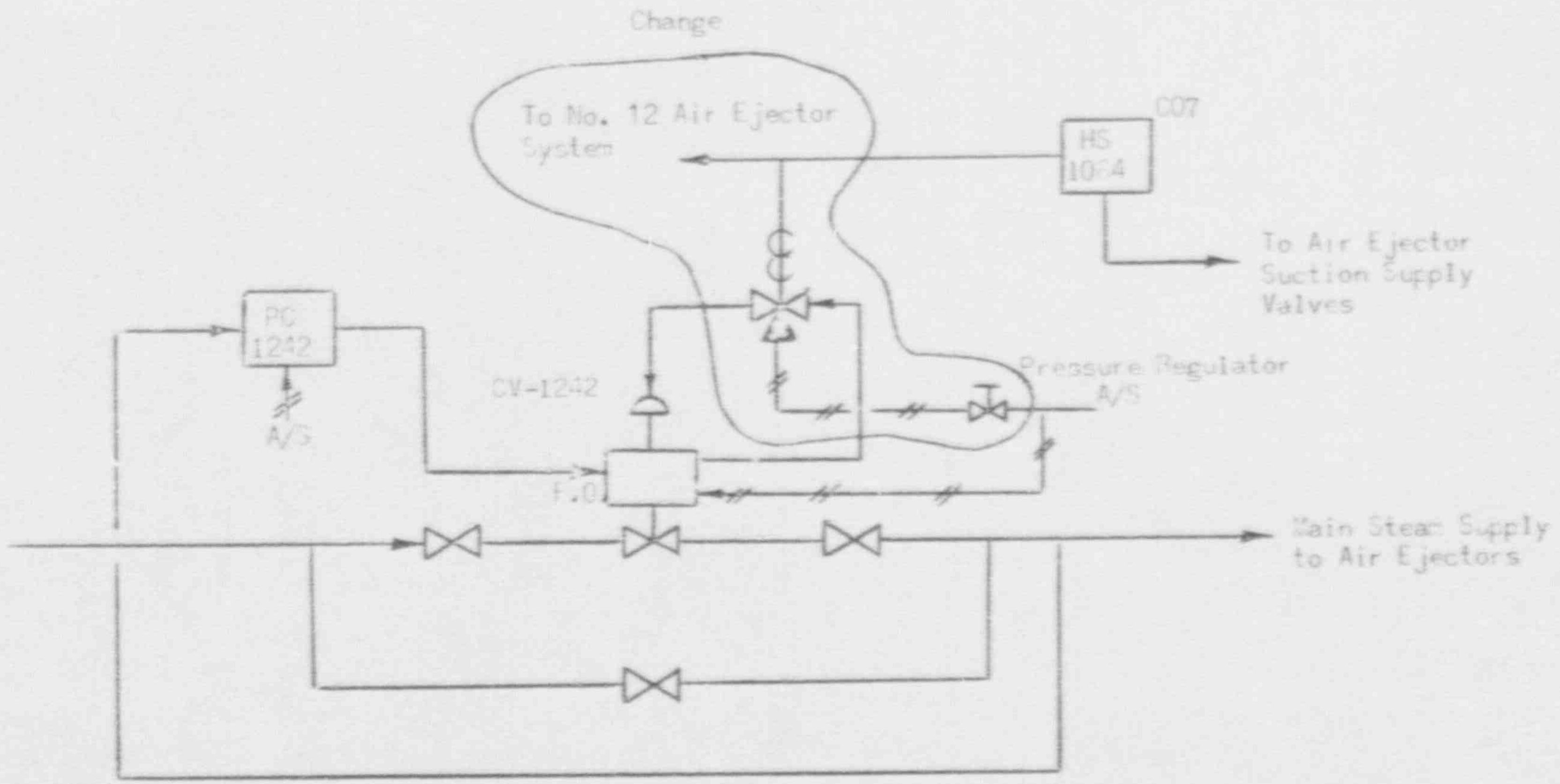
Off-Gas Loop Seal Level Switch

Figure 11



Modifications to the Off-Gas Loop Seal Isolation Valve Control Circuit

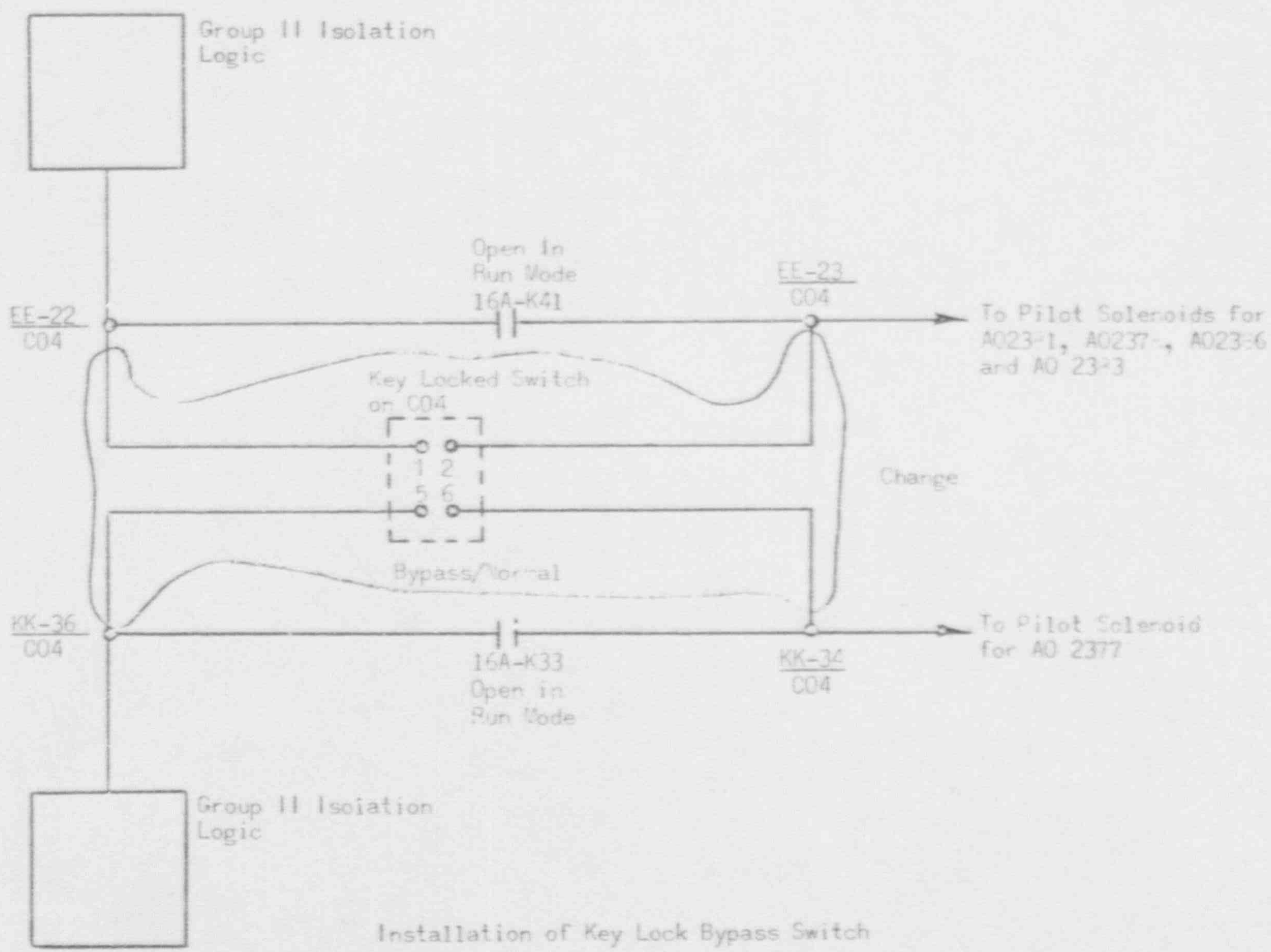
Figure 12



(Schematic Shown For No. 11 Air Ejector System Only)

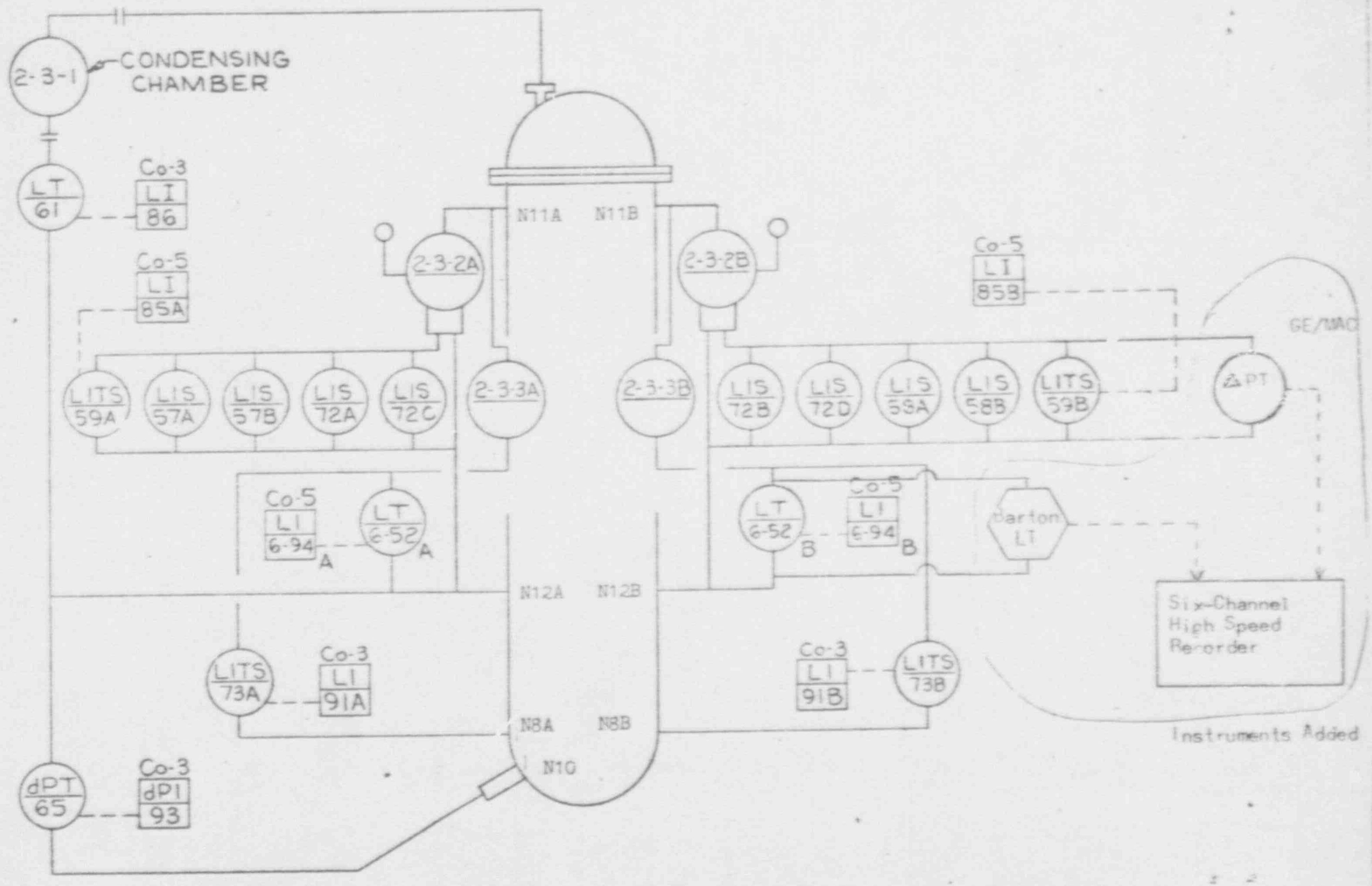
Modifications to Air Ejector Pressure Control Systems

Figure 13



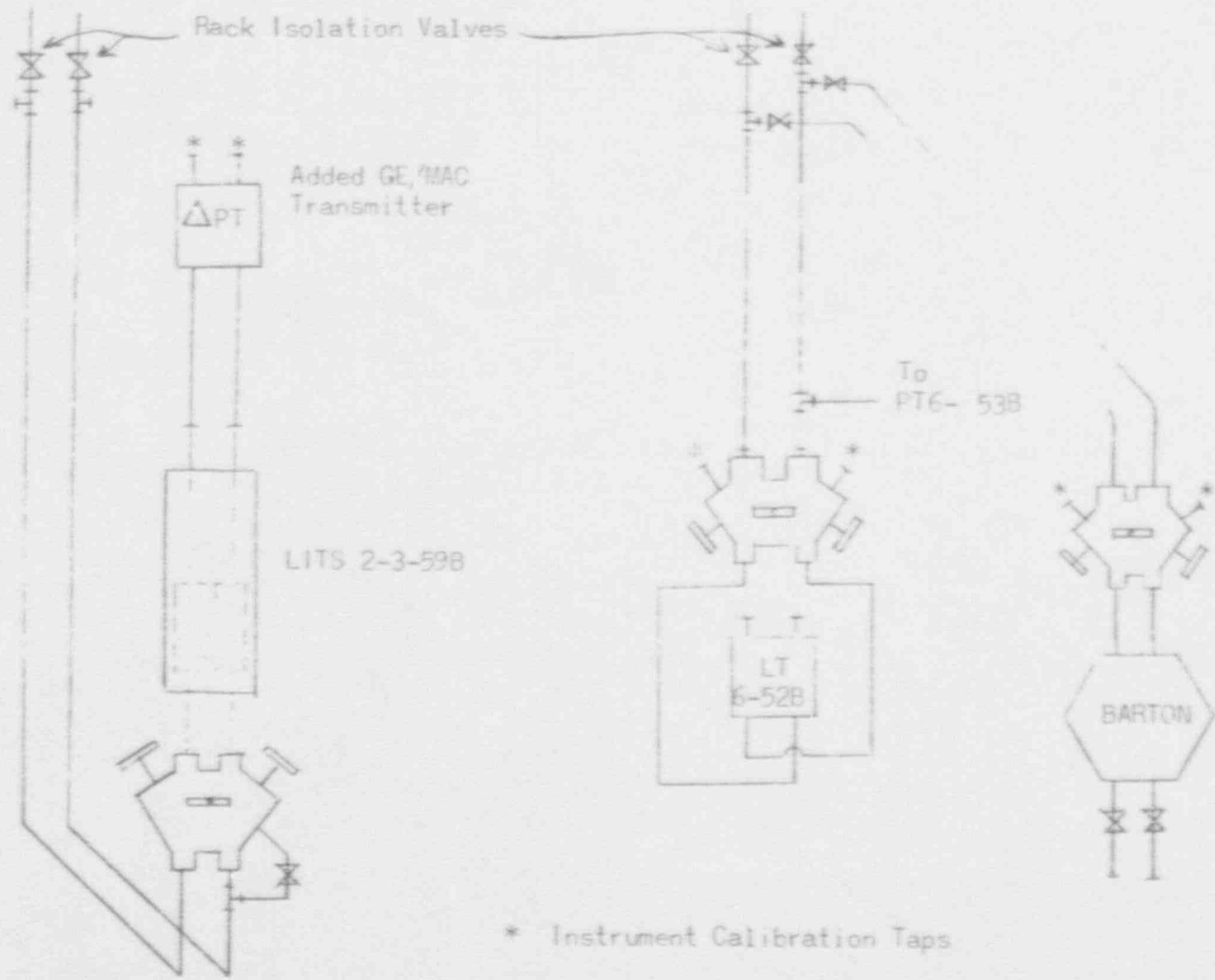
Installation of Key Lock Bypass Switch

Figure 14



RX VESSEL LEVEL INSTRUMENTATION

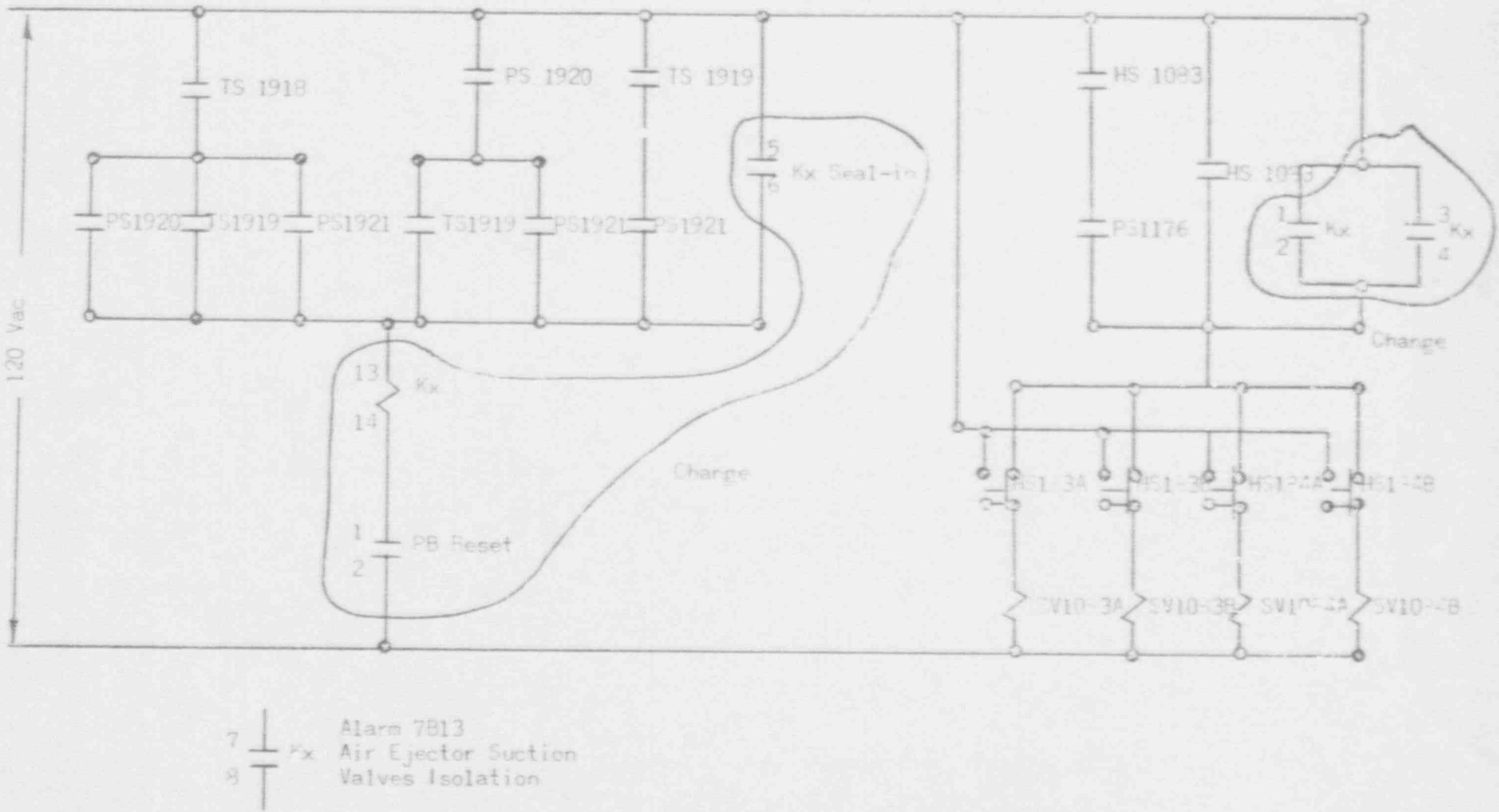
Figure 15



* Instrument Calibration Taps

Temporary Reactor Level Instrumentation

Figure 16



Seal-In Circuit For Air Ejectors Suction Valve Isolation

Figure 17

TABLE 1

INST. NO.	DESCRIPTION	PANEL	J BOX	TERMINALS SW 1	SW 2	SW 3	SW 4
PS 2-3-55 A	Rx H.P. Scram (115 VAC)	C-55	JB 107A	AA9/AA10	SPARE		
B		C-55	JB 107B	KK2/KK3	SPARE		
C		C-56	JB 112A	BB2/BB3	SPARE		
D		C-56	JB 112B	KK2/KK3	SPARE		
PS 5-12 A	Drywell HP Scram (115 VAC)	C-55	JB 108G	RR2/RR3			
B		C-55	JB 108H	UU2/UU3			
C		C-56	JB 113F	PP2/PP3			
D		C-56	JB 113G	RR2/RR3			
LIS 2-3-57 A	Rx Lo Level Scram (115 VAC)	C-55	JB 107A	BB5/BB6	BB7/BB8	SPARE	SPARE
B		C-55	JB 107B	LL5/LL6	LL7/LL8	SPARE	SPARE
LIS 2-3-58 A		C-56	JB 112A	AA5/AA6	AA7/AA8	SPARE	SPARE
B		C-56	JB 112B	LL5/LL6	LL7/LL8	SPARE	SPARE
LIS 2-3-72 A	ECCS Initiation ON (125 VDC)	C-55	JB 108B	FF7/FF8	FF5/FF6	FF3/FF4	FF1/FF2
B	Rx Low Level	C-56	JB 113E	JJ7/JJ8	JJ5/JJ6	JJ3/JJ4	JJ1/JJ2
C		C-55	JB 108C	HH7/HH8	HH5/HH6	SPARE	SPARE
D		C-56	JB 113B	FF7/FF8	FF5/FF6	SPARE	SPARE
PS 2-3-51 A	Rx Press. - (115 VAC)	C-55	JB 107A	AA2/AA3	SPARE		
B	Condenser Vacuum	C-55	JB 107B	KK9/KK10	SPARE		
C	And Steam Iso. Intks	C-56	JB 112A	BB9/BB10	SPARE		
D		C-56	JB 112B	KK9/KK10	SPARE		
PS 10-100 A	Drywell H.P. Init. (125 VDC)	C-55	JB 108F	PP1/PP3	SPARE		
B	Auto Blowdown	C-56	JB 113E	MM1/MM3	SPARE		
C		C-55	JB 108F	QQ1/QQ3	SPARE		
D		C-56	JB 113E	NN1/NN3	SPARE		
PS 10-101 A	Drywell H. P. Init. (125 VDC)	C-55	JB 108E	NN1/NN3	NN5/NN7		
B	ECCS - C.S. & RHR	C-56	JB 113K	VV-1/VV3	VV4/VV6		
C		C-55	JB 108J	VV-1/VV3	VV5/VV7		
D		C-56	JB 113J	TT-1/TT3	TT4/TT6		

TABLE 1

INST. NO.	DESCRIPTION	PANEL	J BOX	TERMINALS SW 1	SW 2	SW 3	SW 4
PS 2-3-52 A	RX Press-Core Spray & RHR	C-55	JB 108B	EE2/EE3	EE5/EE6		
B	Valve Permissive (125 VDC)	C-56	JB 113B	EE2/EE3	EE5/EE6		
PS 2-3-53 A	ECCS Pump Start Permissive	C-121B	* C-121B	EE 21/EE 22	EE21/EE22	* SWITCHES TO BE TERMINATED AT THESE LOCATIONS.	
PS 2-3-53 B	" " " " (125 VDC)	C-122B	* C-122B	EE27/EE28	EE29/EE30		
DPIS 13-83	RCIC Hi Steam Flow	C-122C	C-122C	GG 4/GG 5	GG1/GG3	THESE SWITCHES	
DPIS 13-84	(125 VDC)	C-122C	C-122C	GG11/GG12	GG 8/GG 10	WIRED IN PARALLEL.	
DPIS 23-76 A	HPCI Hi Steam Flow	C-122C	C-122C	HH1/HH3	HH4/HH5	USE ONLY ONE	
B	" " " " (125 VDC)	C-122C	C-122C	JJ4/JJ5	JJ1/JJ3	JACK PER	
DPIS 23-77 A	HPCI Hi Steam Flow	C-122D	C-122D	AA4/AA5	AA7/AA8	INSTRUMENT.	
B	" " " " (125 VDC)	C-122D	C-122D	BB4/BB5	BB7/BB8		
DPIS 14-43 A	Core Spray Top Header D/P (Annun)	C-121B	C-121B	CC27/CC28	SPARE		
B	Core Spray Bottom Header D/P	C-121B	C-121B	CC29/CC30	SPARE		
DPIS 2-116 A	Main Steam Flow Hi D/P A. (115 VAC)	C-126	JB 113A	CC1/CC2	SPARE		
B	" " " " "	C-126	JB 113B	DD1/DD2	SPARE		
C	" " " " "	C-126	JB 113C	EE1/EE2	SPARE		
D	" " " " "	C-126	JB 113D	FF1/FF2	SPARE		
DPIS 2-117 A	Main Steam Flow Hi D/P B. (115 VAC)	C-126	JB 113A	CC4/CC5	SPARE		
B	" " " " "	C-126	JB 113B	DD4/DD5	SPARE		
C	" " " " "	C-126	JB 113C	EE4/EE5	SPARE		
D	" " " " "	C-126	JB 113D	FF4/FF5	SPARE		
DPIS 2-118 A	Main Steam Flow Hi D/P C. (115 VAC)	C-126	JB 113E	JJ1/JJ2	SPARE		
B	" " " " "	C-126	JB 113F	KK1/KK2	SPARE		
C	" " " " "	C-126	JB 113G	LL1/LL2	SPARE		
D	" " " " "	C-126	JB 113H	MM1/MM2	SPARE		
DPIS 2-119 A	Main Steam Flow Hi D/P D. (115 VAC)	C-126	JB 113E	JJ4/JJ5	SPARE		
B	" " " " "	C-126	JB 113F	KK4/KK5	SPARE		
C	" " " " "	C-126	JB 113G	LL4/LL5	SPARE		
D	" " " " "	C-126	JB 113H	MM4/MM5	SPARE		
DPIS 2572	Sup. Chamber Vac. Breaker D/P	LOCAL	LOCAL	WIRE NUTS			
DPIS 2573	" " " " "	935' EAST	SMALL BOX	WIRE NUTS			

TABLE 1

INST NO.		DESCRIPTION	PANEL	J BOX	TERMINALS SW 1	SW 2	SW 3	SW 4
PS 2-134	A	Main Steam Low Press Iso. (115 VAC)	C-210	NONE	INTERNAL	SPARE		
	B	" " " " "	C-210	"	"	SPARE		
	C	" " " " "	C-210	"	"	SPARE		
	D	" " " " "	C-210	"	"	SPARE		
PS 5-11	A	Main Cond. Low Vac. Scram (115 VAC)	SW Turb Flr	"	"			
	B	" " " " "	" " "	"	"			
	C	" " " " "	" " "	"	"			
	D	" " " " "	" " "	"	"			
PS 10-105	A	RHR Pump 3A Disch. AC Intr. (125VDC)	C-129A	C-129A	CC1/CC2			
	B	RHR Pump 3B Disch " "	C-129B	C-129B	CC1/CC2			
	C	RHR Pump 3C Disch " "	C-129A	C-129A	CC4/CC5			
	D	RHR Pump 3D Disch " "	C-129B	C-129B	CC4/CC5			
	E	RHR Pump 3A Disch " "	C-129A	C-129A	AA10/AA11			
	F	RHR Pump 3B Disch " "	C-129B	C-129B	AA11/AA12			
	G	RHR Pump 3C Disch " "	C-129A	C-129A	AA12/AA13			
	H	RHR Pump 3D Disch " "	C-129B	C-129B	AA13/AA14			
PS 14-44	A	Core Spray Pump Disch "A" (125VDC)	C-129A	C-129A	BB4/BB5			
	B	Core Spray Pump Disch "B"	C-129B	C-129B	AA15/AA16			
	C	Core Spray Pump Disch "A"	C-129A	C-129A	AA8/AA9			
	D	Core Spray Pump Disch "B"	C-129B	C-129B	AA9/AA10			
PS 7110		Control Valve Fast Closure Scram	FRONT STAND	NONE	INTERNAL			
PS 7111		Control Valve Fast Closure Scram	" "	"	"			
PS 7112		Control Valve Fast Closure Scram	" "	"	"			
PS 7113		Control Valve Fast Closure Scram	" "	"	"			

TABLE I

INST. NO.	DESCRIPTION	PANEL	J BOX	TERMINALS SW 1	SW 2	SW 3	SW 4
PS 13-87 A	RCIC Low Steam Press (Cont)	25-1B	25-1B	BB1/BB2	SPARE	ALL FOUR	
B	Isolation	25-1B	25-1B	BB3/BB4	SPARE	SWITCHES TIED	
C	MO 2075 - 2076	25-1B	25-1B	BB1/BB2	SPARE	TO SAME	
D		25-1B	25-1B	BB3/BB4	SPARE	TERMINALS	
PS 23-68 A	HPCI Turb. Steam (Cont)	C-214	C-214	BB3/BB 4	SPARE	ALL FOUR	
B	Iso Valve Auto	C-214	C-214	BB1/BB2	SPARE	SWITCHES	
C	Closure Interlock	C-214	C-214	BB3/BB4	SPARE	TO SAME	
D		C-214	C-214	BB1/BB2	SPARE	TERMINALS	
DPIS 2-136 A	Recirc Pump A D/P (125 VDC)	C-73	C-73	AA9/AA10	SPARE		
-137 A	RHR Loop Selection	C-73	C-73	BB1/BB2	SPARE		
-138 A		C-73	C-73	BB5/BB6	SPARE		
-139 A		C-73	C-73	BB9/BB10	SPARE		
DPIS 2-136 B	Recirc Pump B D/P (125 VDC)	C-74	C-74	AA9/AA10	SPARE		
-137 B	RHR Loop Selection	C-74	C-74	BB1/BB2	SPARE		
-138 B		C-74	C-74	BB5/BB6	SPARE		
-139 B		C-74	C-74	BB9/BB10	SPARE		
DPIS 2-129 A	Recirc Riser D/P (125 VDC)	C-121B	C-121B	DD7/DD8	SPARE		
B		C-122B	C-122B	DD7/DD8	SPARE		
C		C-121B	C-121B	DD14/DD15	SPARE		
D		C-122B	C-122B	DD16/DD17	SPARE		
PS 10-119 A	Drywell Pressure (125 VDC)	C-55	JB 108J	WW1/WW3	SPARE		
B	Suto Stop Signal	C-56	JB 113K	UU4/UU6	SPARE		
C	For Containment Spray	C-55	JB 108J	VV8/VV10	SPARE		
D		C-56	JB 113K	VV7/VV8	SPARE		
PS 2-3-49 A	LPCI Recirc Loop (125 VDC)	C-121B	C-121B	DD25/DD26	SPARE		
B	Select Permissive	C-122B	C-122B	EE22/EE23	SPARE		
PS 2-3-50 A		C-121B	C-121B	EE25/EE26	SPARE		
B		C-122B	C-122B	EE8/EE9	SPARE		

TABLE 1

INST. NO	DESCRIPTION	PANEL	J BOX	TERMINALS SW 1	TERMINALS SW 2	TERMINALS SW 3	TERMINALS SW 4
PS 2-128 A	Rx Recirc Close (Annuc)	C-122B	C-122B	EE15/EE16	EE17/EE19		
B	RHR Iso. Valve	C-122B	C-122B	FF2/FF3	FF4/FF6		
LIS 2-3-59 A	Close Main Turb Stop Valves(115VAC)	C-55	JB 103A	DD3/DD4	DD1/DD2	SPARE	SPARE
B	Restore FW to Level Control	C-56	JB 113A	DD3/DD4	DD1/DD2	SPARE	SPARE
PS 2-102	Rx Head Seal Press	C-55	JB 116	TT1/TT2	SPARE		
PS 10-122 A	RHR Hx Out Hi (Annuc)	C-129A	C-129A	CC11/CC12	SPARE		
B	Press. Alarm	C-129B	C-129B	CC11/CC12	SPARE		
PS 10-92 A	RHR Water to (Annuc)	C-129A	C-129A	BB10/BB11	SPARE		
B	Service Water D/P	C-129B	C-129B	BB10/BB11	SPARE		
DPIS 3-202	CRD Filter D/P	CRD Inst.	Local Box	Wire Nuts			