

07-216-91

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT NUCLEAR STATION UNIT #2

OPERATING PROCEDURE

PROCEDURE NO. N2-OP-9

REVISION 03

CONDENSER AIR REMOVAL

Approved By:
R. B. Abbott for
J. L. Willis

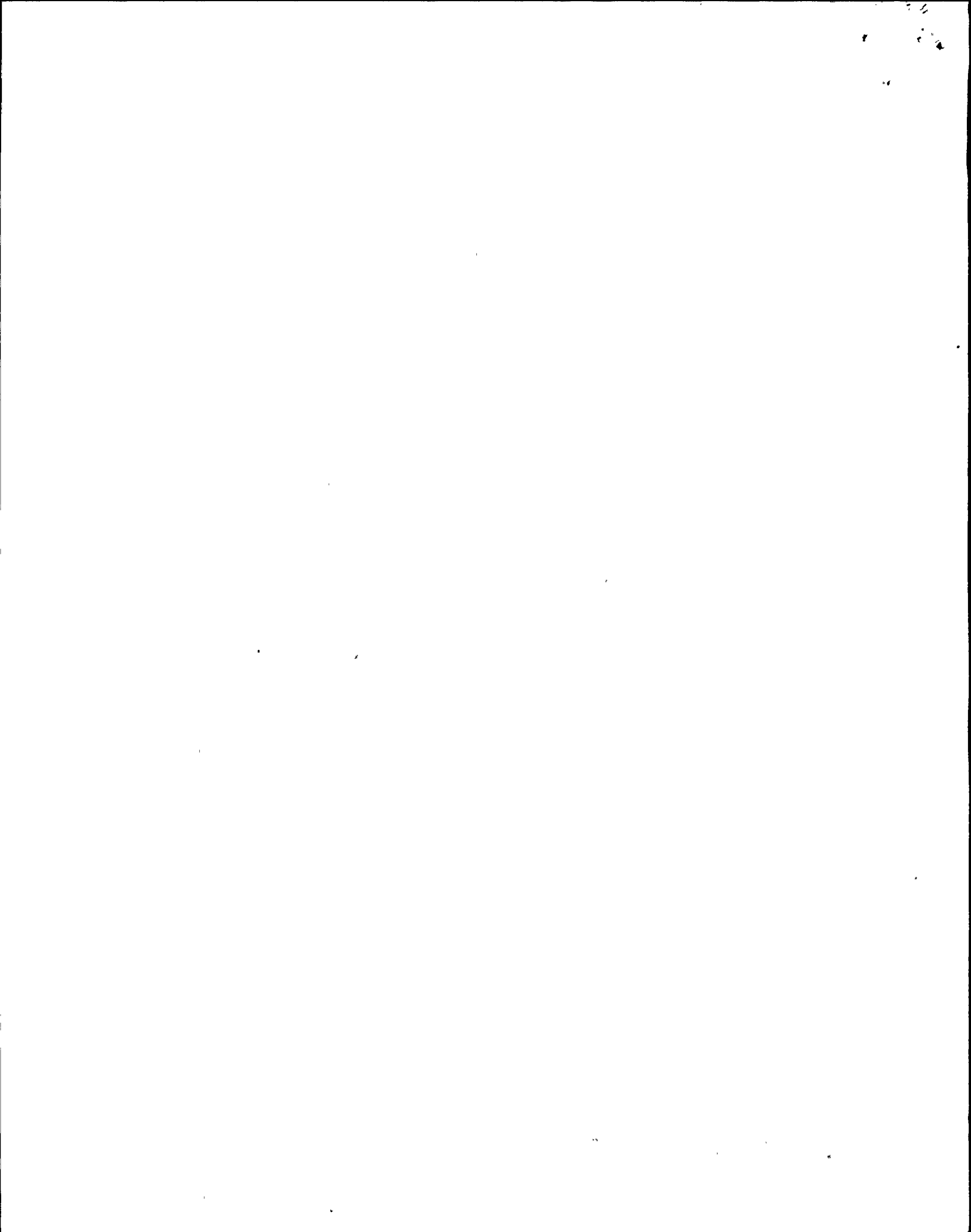
RB Abbott
FOR INFORMATION ONLY
General Superintendent, Nuclear Generation

8/30/89
Date

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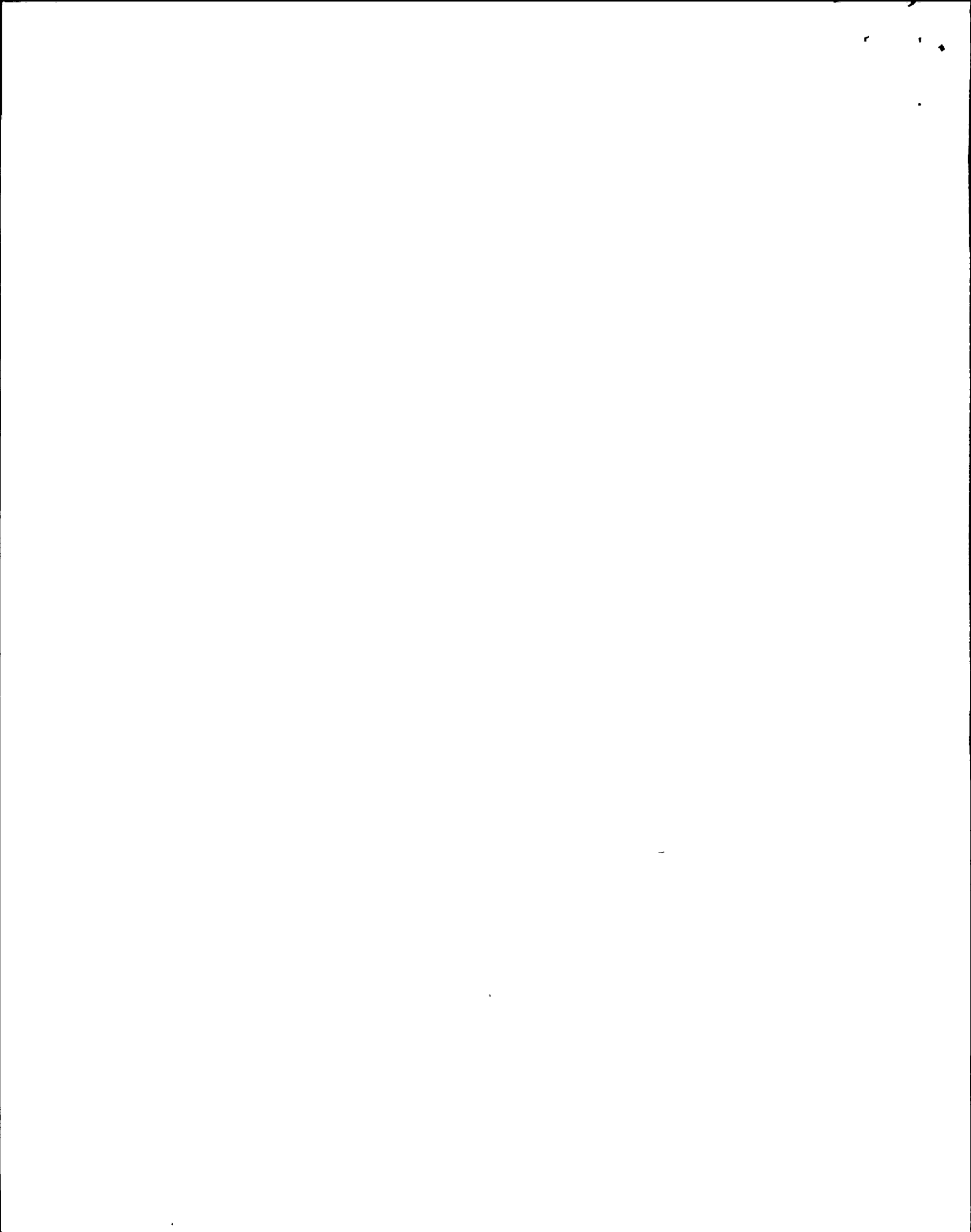
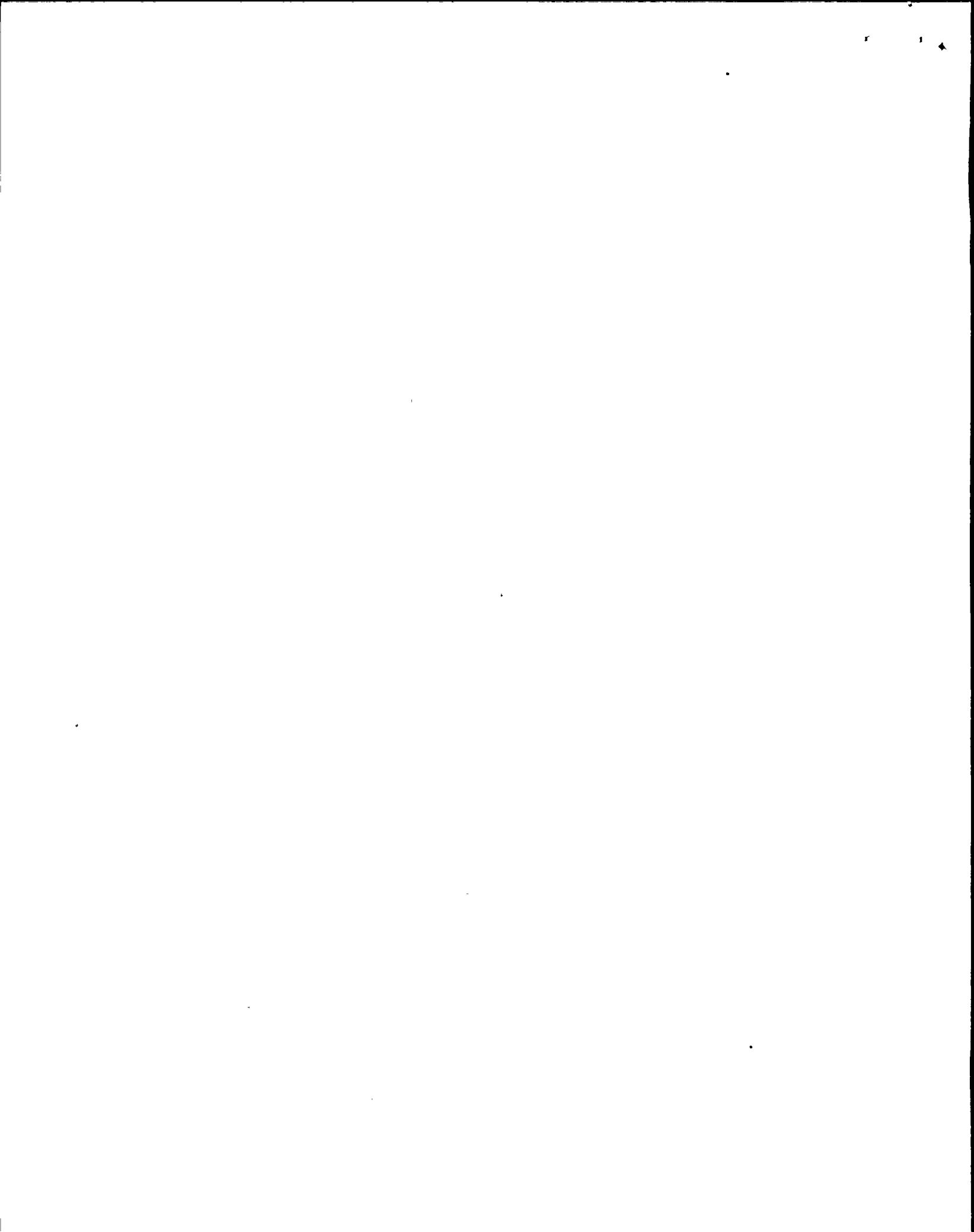


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A. REFERENCES AND COMMITMENTS

1.0 Technical Specifications

1.1 Section 3/4.3.7.10, Radioactive Gaseous Effluent Monitoring Instrumentation.

1.2 Section 3/4.11.2, Gaseous Effluents

2.0 Licensee Documentation

2.1 Final Safety Analysis Report (FSAR)

2.1.1 Section 10.4.2 Main Condenser Air Removal System

2.1.2 Table 14.2-33 Condenser Air Removal System

3.0 Licensee Documentation

3.1 Nine Mile Point 2 Licensing Issues

3.2 Safety Evaluation #90-145 (EOP-Rev 04 SER takes credit for actions of Section H.2.0) | TCN-25

4.0 Standards, Regulations, And Codes

4.1 ANSI/ANS 3.2

5.0 Regulatory And Industry Guidelines

5.1 Reg Guide 1.33

6.0 Technical Information

6.1 Flow Diagrams

6.1.1 FSK-5-1.0 Condenser Air Removal-Fundamental

6.1.2 FSK-5-1A thru 1B Condenser Air Removal

6.1.3 FSK-3-9.0 Auxiliary Steam-Fundamental

6.1.4 FSK-3-9A thru 9B Auxiliary Steam

6.1.5 FSK-31-4A thru 4F Offgas System

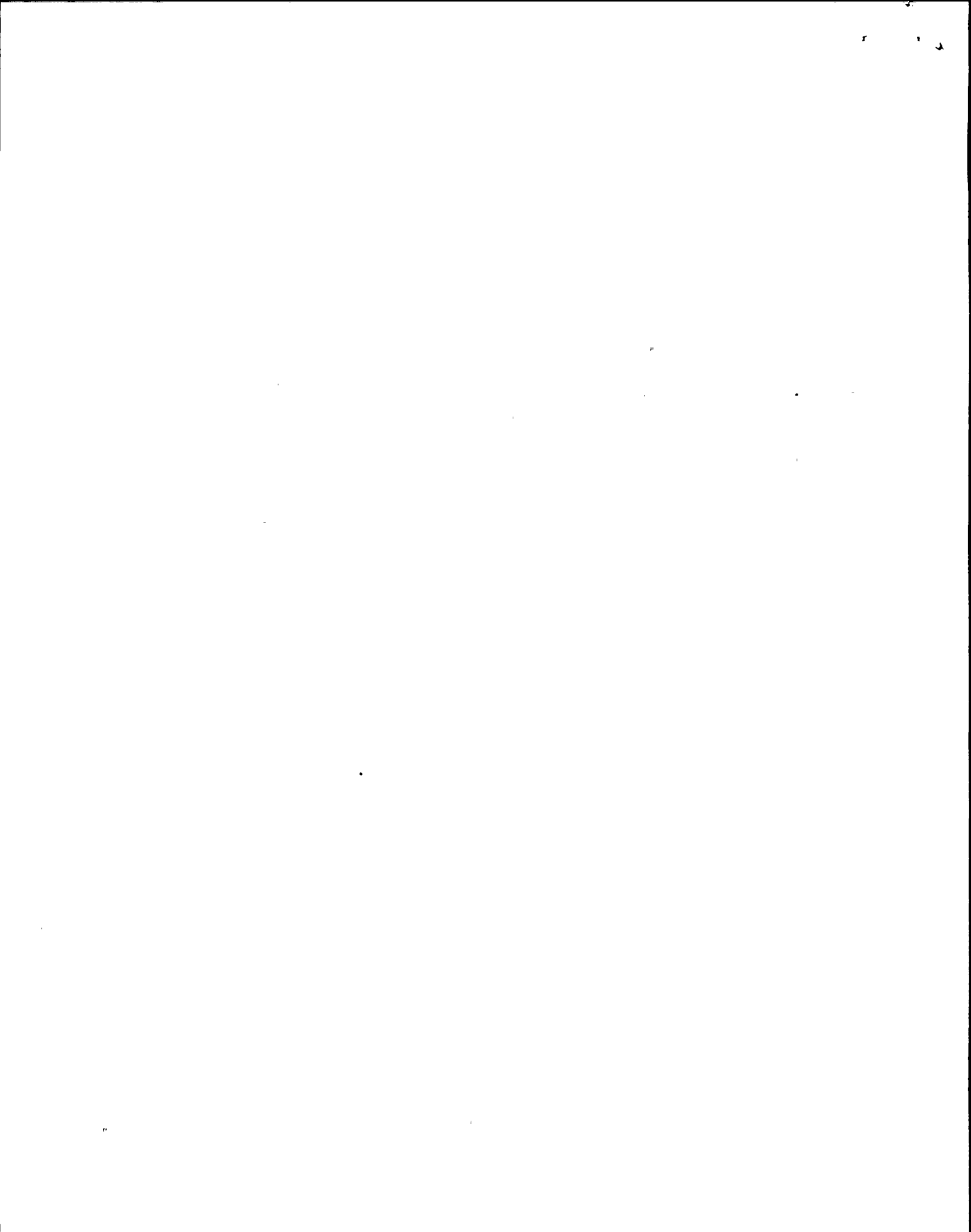
6.2 Electrical Diagram

6.2.1 ESK-6ARC01 Cond Air Removal Pump A

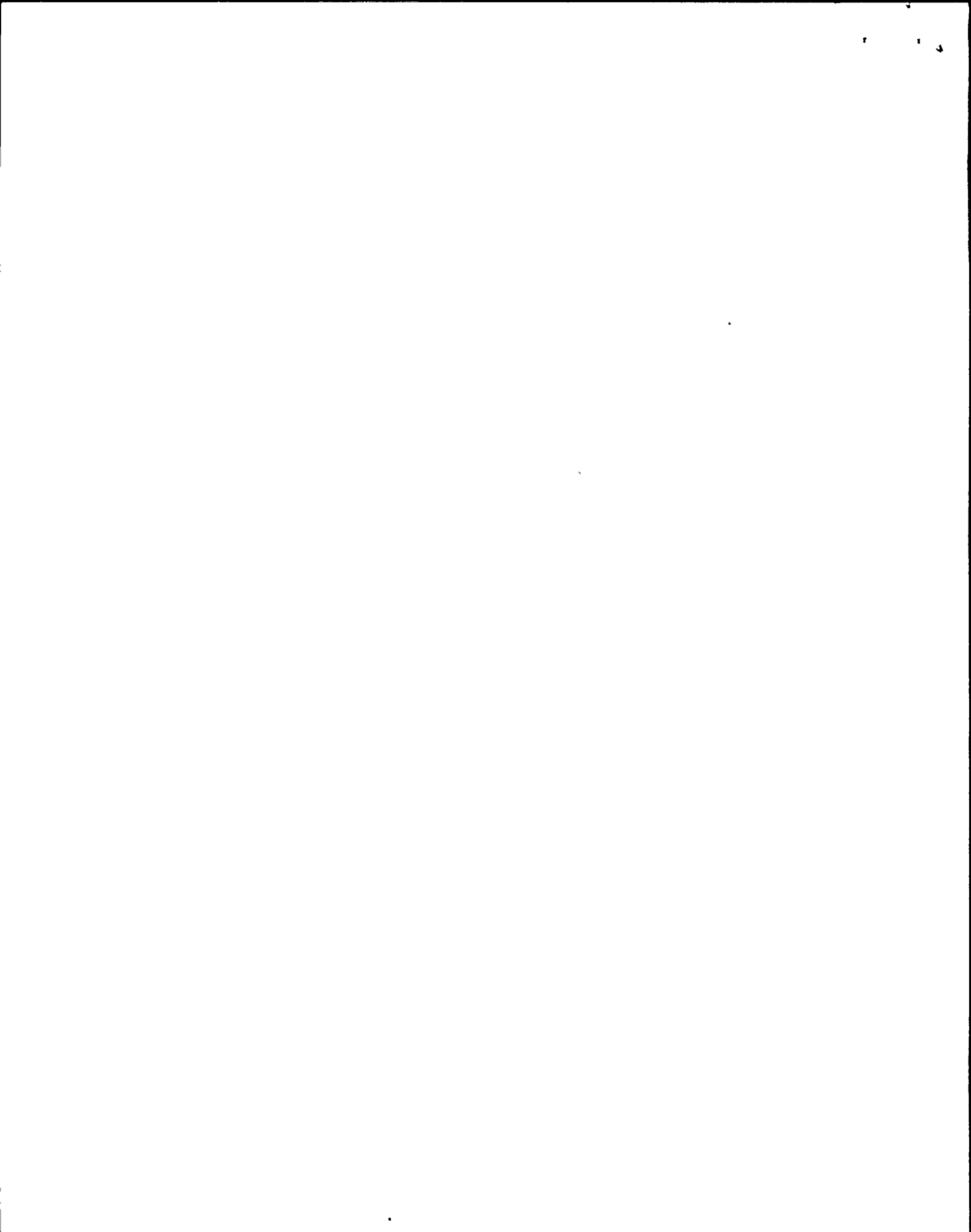
6.2.2 ESK-6ARC02 Cond Air Removal Pump B

6.2.3 ESK-6ARC03 Seal Recirc Water Pumps

6.2.4 ESK-6ARC04 and 05 Condenser Vacuum Breakers



- 6.2.5 ESK-6ARC06 Pre-cooler Inlet Valves
- 6.2.6 ESK-7ARC01 thru 7ARC05 Cond Air Removal Isol Valves
- 6.2.7 LSK-5-1A thru 1F Condenser Air Removal
- 6.3 Instruction Manual
 - 6.3.1 Installation and Operation Nash Main Condenser Exhaust System Model AT-3004E 2.150-5002
- 7.0 Commitments
- 7.1 None



B. System Description

The purpose of the Condenser Air Removal System is to establish and then maintain a high vacuum (greater than 28.5 inches Hg. Vac.) in the Main Condenser. It does this by continuously removing air and non-condensable gases from the Main Condenser.

The Condenser Air Removal System consists of two sub-systems. The hogging system is used to establish a vacuum in the condenser during startup. The Steam Jet Air Ejectors (SJAE's) are used to maintain the vacuum during normal plant operations

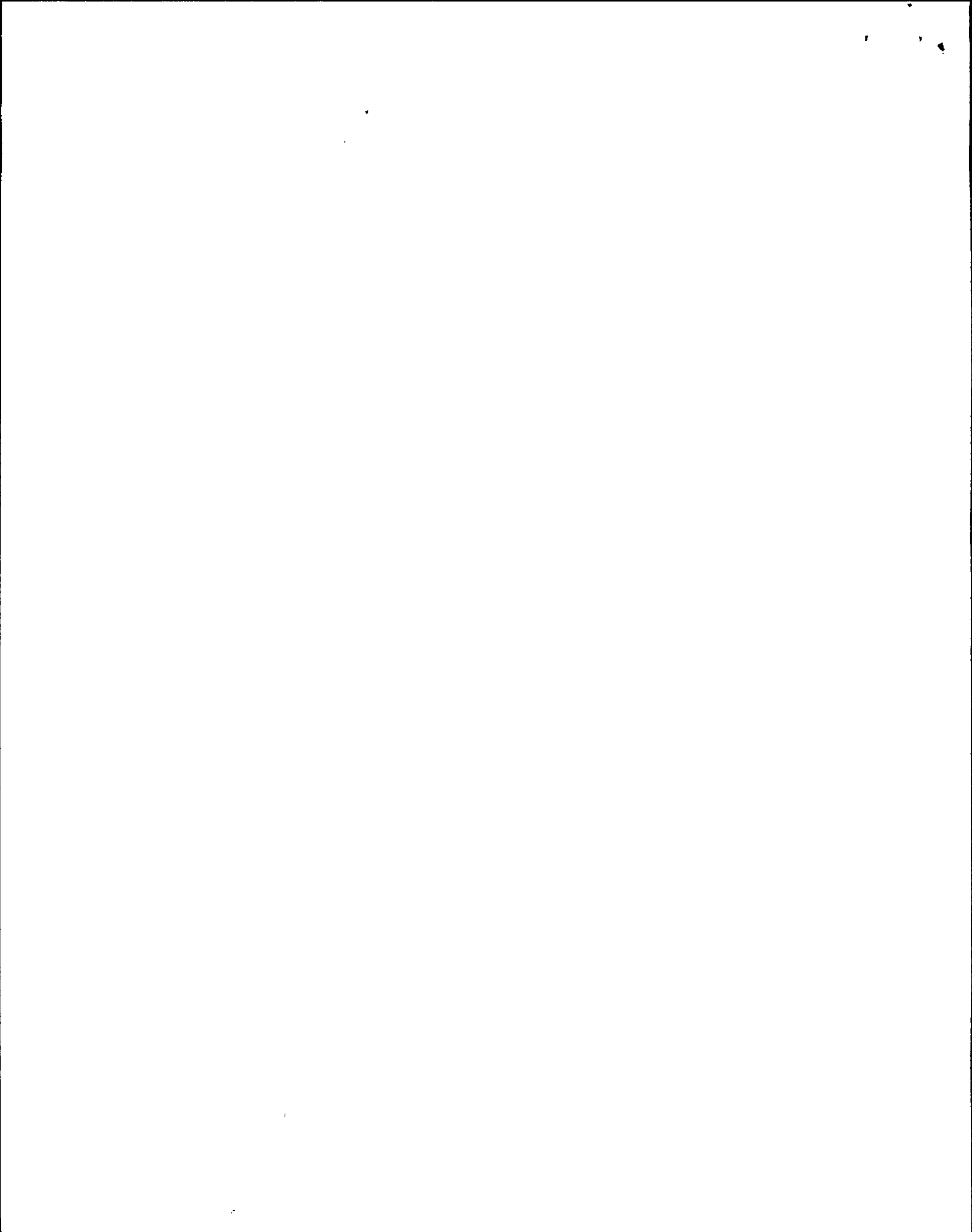
The hogging system consists of two hogging pumps, two seal water pumps and all the piping valves and instrumentation required to reduce condenser pressure from atmospheric to approximately 23 in Hg. Vacuum. With both vacuum pumps in operation, a condenser vacuum of 23 in Hg, Vac. can be drawn in approximately two hours. One vacuum pump can establish condenser vacuum in approximately four hours.

The SJAE system consists of two, 100% trains. Each train consists of a pre-cooler, two 2-stage SJAE's, an Intercondenser and all associated piping, valves and instrumentation. The system is designed to remove the O_2 and H_2 produced by the radiolytic dissociation of reactor coolant, condenser air in leakage and the water vapor added to the system during normal operation and increase condenser vacuum to greater than 28.5 Hg, Vacuum.

Driving steam is supplied to the SJAE's from the Auxiliary Steam at 125 psig and 345°F. The SJAE's are designed to deliver air, water vapor, non-condensable gases and dilution steam to the off-gas system at 1 psig.

Each of the condensers has two air take off lines each with a 10 inch air-operated butterfly valve. All six air take off lines combine into a single header that can be directed to either the hogging system or the SJAE's. The hogging pump air inlet valve opens when the pumps start and closes when the pumps are shutdown. The SJAE inlet valve closes when the hogging pump starts and opens when the hogging pumps are shutdown if the valve control switch is in AUTO..

Each condenser is equipped with a motor operated vacuum breaker to allow for rapid pressurization of the Main Condenser.



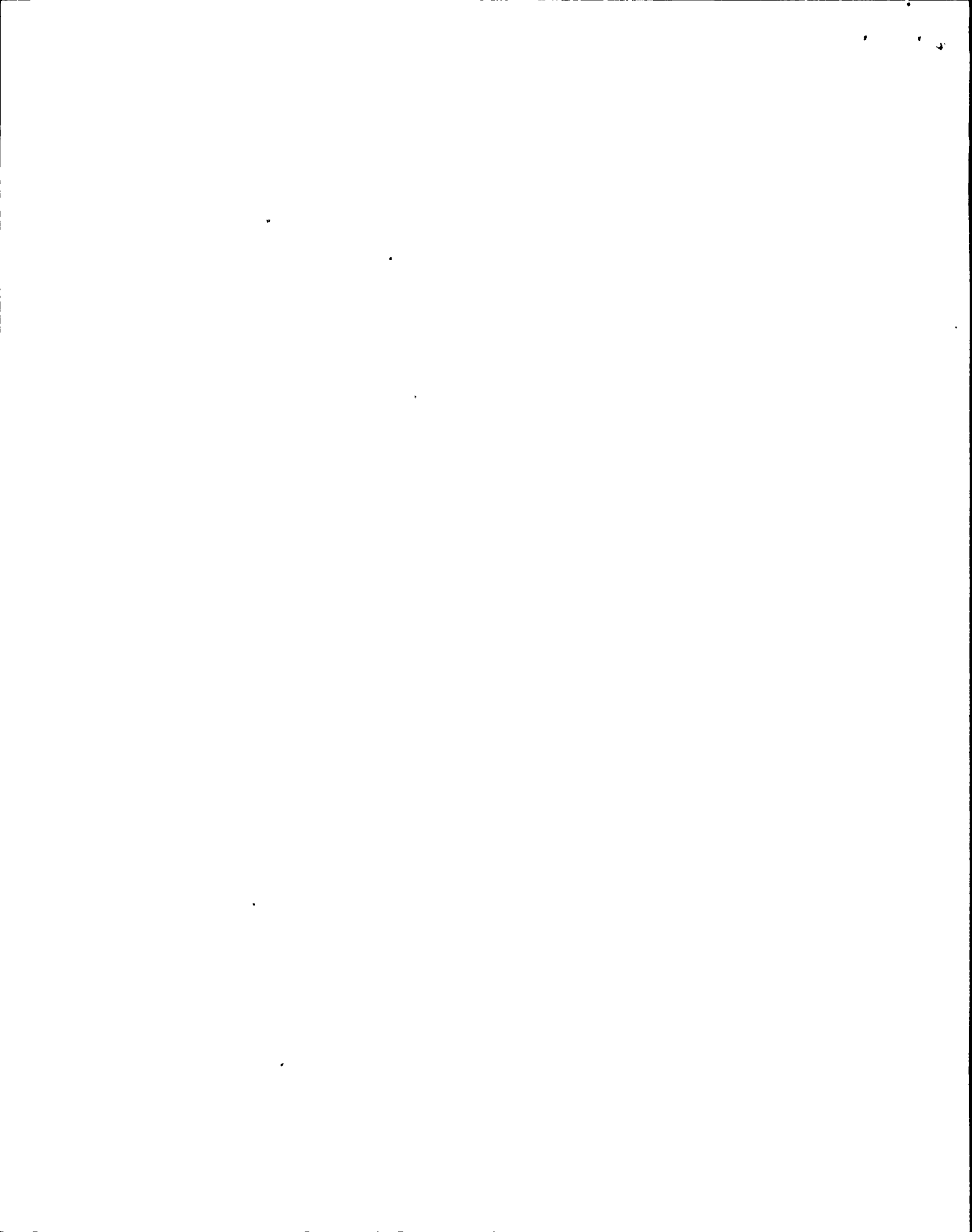
C. OPERATING REQUIREMENTS

- 1.0 Normal AC Distribution per N2-OP-71
- 2.0 Service Water per N2-OP-11
- 3.0 Auxiliary Steam and Gland Seal System per N2-OP-25
- 4.0 Main Steam System per N2-OP-01
- 5.0 Condensate System per N2-OP-03
- 6.0 Instrument and Service Air per N2-OP-19
- 7.0 Off-gas System per N2-OP-42
- 8.0 Circulating Water per N2-OP-10A
- 9.0 Makeup Water Treatment per N2-OP-15
- 10.0 Radiation Monitoring per N2-OP-79

D. PRECAUTIONS AND LIMITATIONS

- 1.0 Observe standard precautions for handling radioactive material including the use of finger rings for monitoring extremity dose and observe ALARA practices to minimize radiation exposure and spread of contamination. Obtain RWP as necessary.
- 2.0 Do not operate the Condenser Air Removal Vacuum Pumps 2ARC-PIA(B) with Reactor Power greater than 5% rated APRM average indicated power. The plant exhaust stack is not detonation proof and at powers greater than 5% it is possible for the hydrogen generation rate to produce explosive concentrations in the system.
- 3.0 The Vacuum Pumps should not be started immediately following a Reactor Scram. The discharge from these pumps is not treated by the off-gas system prior to discharge.
- 4.0 Burning, grinding and welding should not be performed in the vicinity of the components of the Condenser Air Removal System as potentially explosive concentrations of hydrogen may exist in these areas.
- 5.0 Do not operate the Condenser Air Removal Vacuum Pumps without seal water available.
- 6.0 Do not operate the Main Turbine with Condenser Vacuum below the Low Vacuum Alarm Point (24.6" Hg) and Turbine load less than 30% (345 MWE).

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E. STARTUP PROCEDURE

- 1.0 Filling the Condenser Air Removal System Loop Seals
- 1.1 Close the following Loop Seal Block Valves, if open:
 - 1.1.1 2ARC-V36 (Pre-cooler E2A Loop Seal Block Valve)
 - 1.1.2 2ARC-V35 (Pre-cooler E2B Loop Seal Block Valve)
 - 1.1.3 2ARC-V37 (Intercondenser E3A Block Valve)
 - 1.1.4 2ARC-V38 (Intercondenser E3B Block Valve)
- 1.2 Fill the Pre-cooler and Intercondenser Loop Seals as follows:
 - 1.2.1 Connect a hose to the nearest CNS header and route to the Loop Seal to be filled.
 - 1.2.2 Remove the pipe cap from the loop seal fill connection.
 - 1.2.3 Open the CNS header block valve and flush the CNS header to the nearest floor drain until the water appears clear.
 - 1.2.4 Fill the loop seal with clean CNS water.
 - 1.2.5 Close the CNS header block valve.
 - 1.2.6 Replace the fill connection pipe cap.

NOTE: Loop Seal block valves will be opened in the appropriate section of the startup procedure.

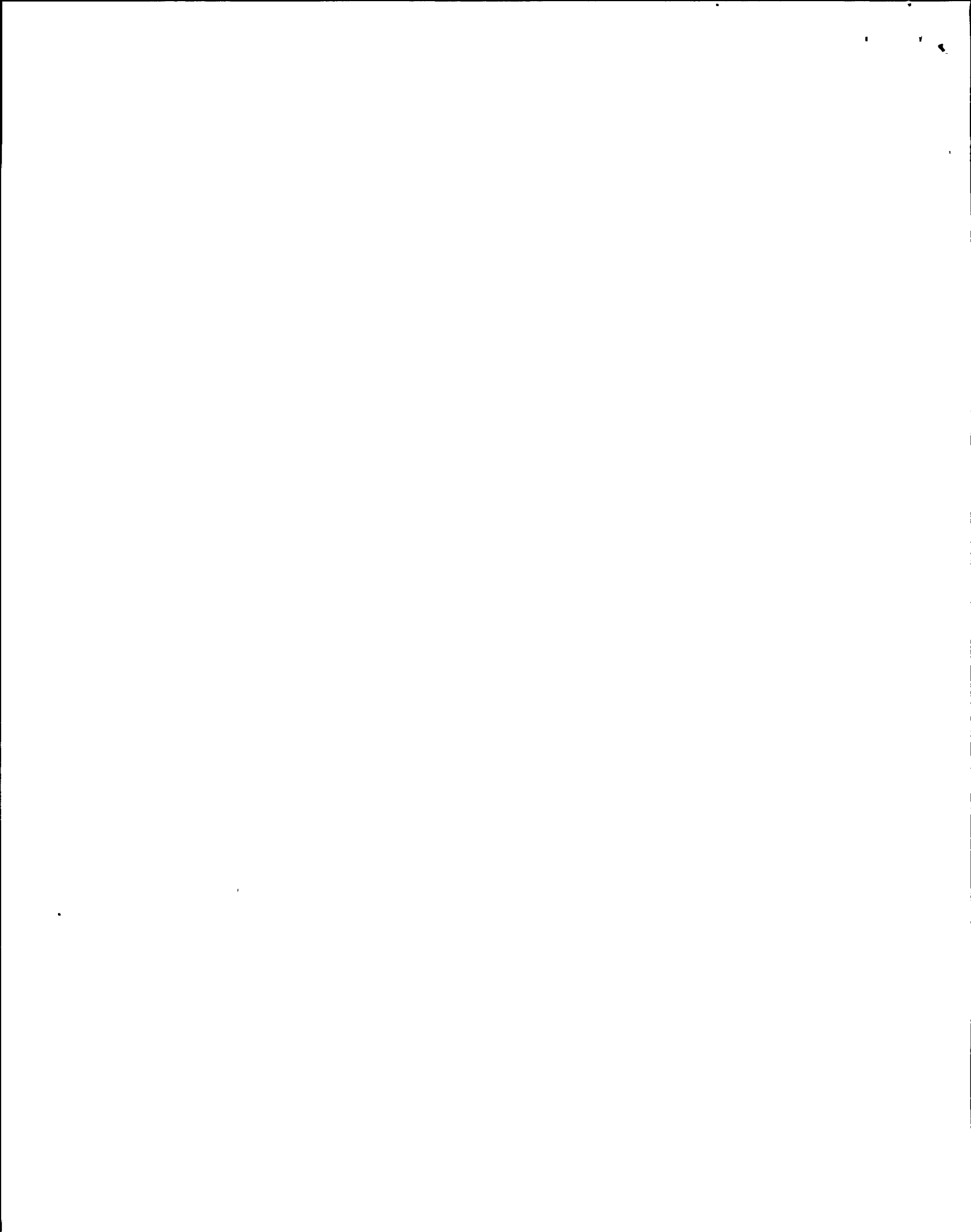
 - 1.2.7 Repeat Steps 1.2.1 through 1.2.6 for each Pre-cooler and Intercondenser loop seal as required.
- 1.3 Fill the loop seal upstream of 2ARC-AOV104 as follows:
 - 1.3.1 Close valve 2ARC-V50.
 - 1.3.2 Close valve 2ARC-V44.
 - 1.3.3 Remove the pipe cap from the loop seal fill connection.
 - 1.3.4 Pour clean CNS water into the fill connection until the loop seal is full.

3



E. STARTUP PROCEDURE (Cont)

- 1.3.5 Replace the fill connection pipe cap.
 - 1.3.6 Open valve 2ARC-V50.
 - 1.3.7 Open valve 2ARC-V44.
- 2.0 Starting the Mechanical Vacuum Pumps/Establishing Initial Condenser Vacuum
- 2.1 Complete the electrical lineup per Attachment 2.
 - 2.2 Complete the valve lineup per Attachment 1.
 - 2.3 Locally verify the following for each Vacuum Pump:
 - 2.3.1 Proper oil level as indicated by the pump oil sight glass.
 - 2.3.2 Proper water level (approximately 25.5 inches) in the Vacuum Pump separator as indicated by the sight glass (2ARC-LG9A and 9B).
- NOTE: It may be required to throttle closed the Hogger suction valves to prevent exceeding maximum amps of 185. (V3A, B)
- 2.4 At P851, verify that the following Main Condenser Vacuum Breakers are closed:
 - 2.4.1 2ARC-MOV5A
 - 2.4.2 2ARC-MOV5B
 - 2.4.3 2ARC-MOV5C
 - 2.5 At P851, place the control switch for valve 2ARC-AOV104 in "CLOSE".
 - 2.6 At P851, place the control switch for valve 2ARC-AOV105 in "AUTO".
 - 2.7 Verify that the loop seal upstream of valve 2ARC-AOV104 has been filled per Section 1.3 of this procedure.
 - 2.8 At P851 "OPEN" 2SWP-HV98A(B) for the vacuum pump to be started.



E. STARTUP PROCEDURE (Cont)

- 2.9 At P851, place the control switch for the Condenser Air Removal Vacuum Pump 2ARC-P1A(B) in the "START" position. Verify the following:
- 2.9.1 Valve 2ARC-AOV105 opens.
 - 2.9.2 The associated seal water pump 2ARC-P2A(B) starts.
 - 2.9.3 The vacuum pump P1A(B) starts.
 - 2.9.4 Main Condenser Vacuum begins to increase as indicated by 2CNM-PI45A, B and C on P851.

2.10 At P851 "OPEN" 2SWP-HV98A(B) for the second pump if it is to be started.

2.11 If the second pump is to be started then place its control switch in the "START" position. Verify the following:

- 2.11.1 The vacuum pump starts.
- 2.11.2 The associated seal water pump 2ARC-P2A(B) starts.

NOTE: Condenser Vacuum will stabilize in approximately 2 hours with 2 pumps in operation or 4 hours with 1 pump in operation.

2.12 Verify that Main Condenser Vacuum stabilizes at approximately 23 inches Hg (7 inches Hg, Abs.).

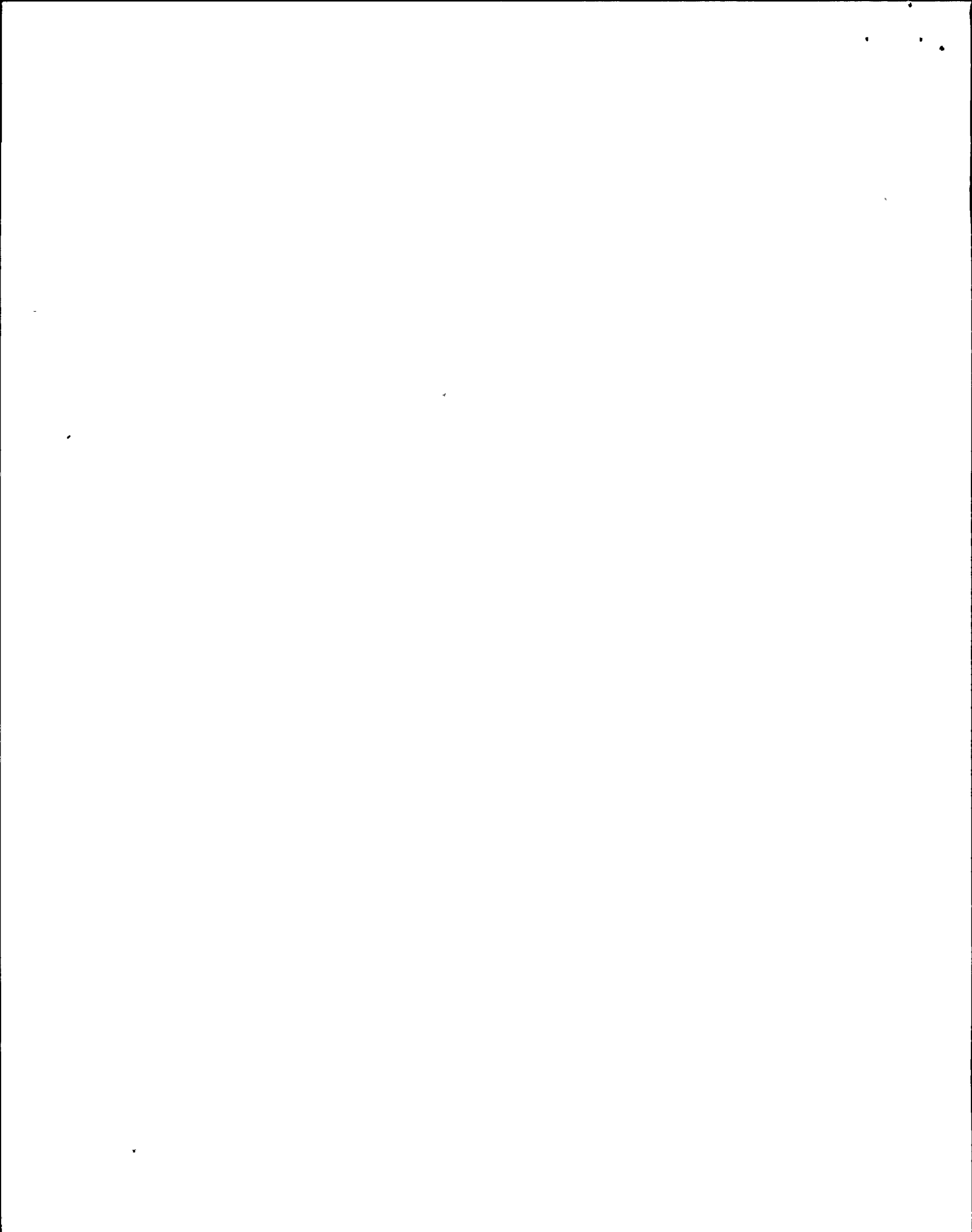
3.0 Placing the Steam Jet Air Ejectors (SJAE's) in Service

NOTE: Only one SJAE train will be placed in service for normal operation.

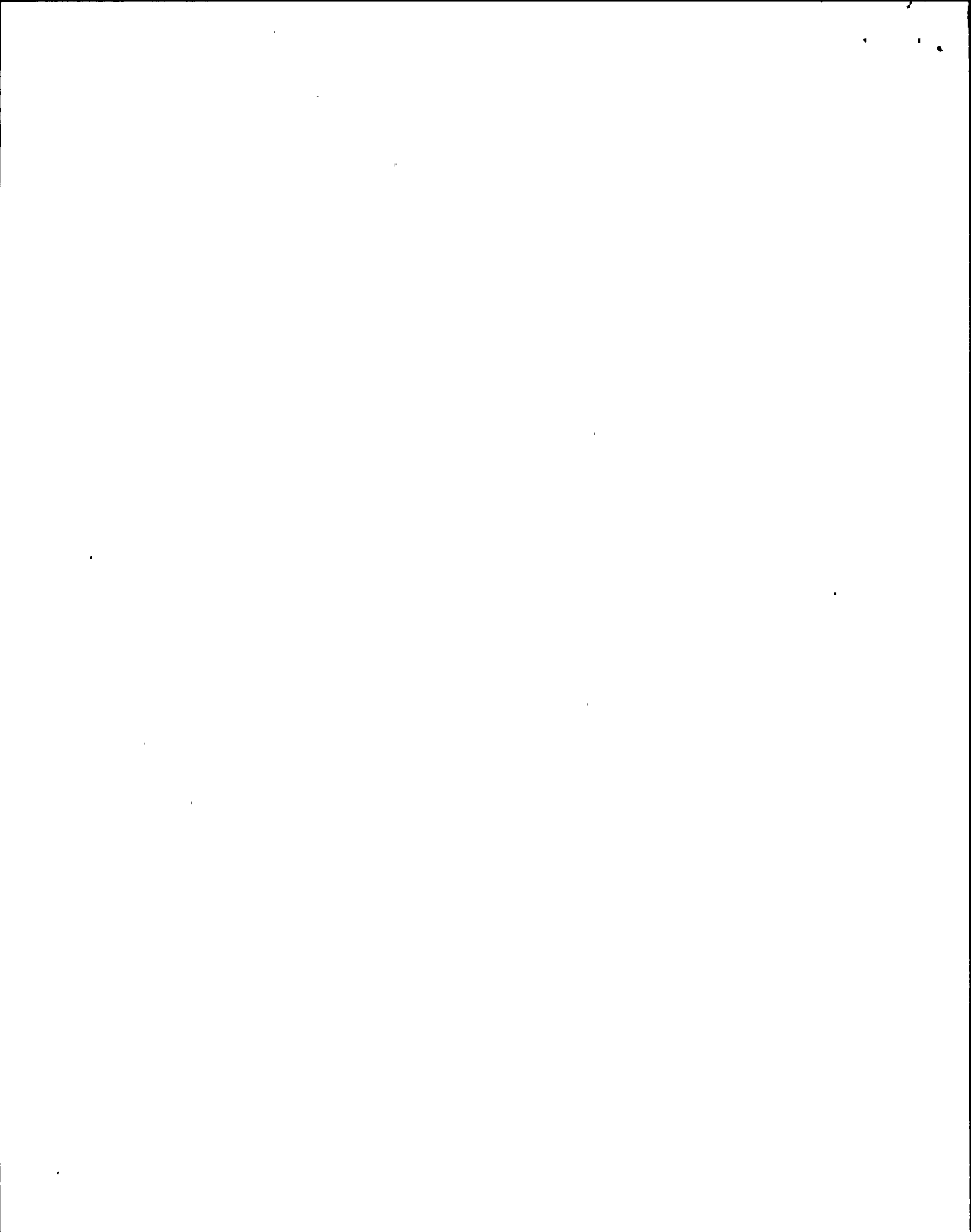
3.1 Verify the following:

- 3.1.1 The Condenser Air Removal System is in operation maintaining a Main Condenser Vacuum of 23 inches Hg as indicated by 2CNM-PI45A, B and C on P851.
- 3.1.2 The Off-gas System is lined up and ready to support SJAE operation per N2-OP-42.
- 3.1.3 The Main Steam System is in operation and available to supply driving steam to the SJAE's per N2-OP-01. Main Steam line pressure is approximately 900 psig, per N2-OP-101A.
- 3.1.4 Check 2SWP-V277B(A) and 2SWP-V274B(A) open.
- 3.1.5 Check 2CNM-MOV64B(A) and 2CNM-MOV65B(A) open.

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- 3.2 Ensure that pressure controllers 2ASS-PIC107 and 2ASS-PIC139 are set to control SJAE inlet pressure at approximately 125 psig.
- 3.3 Ensure that valve 2ASS-AOV147 is closed (P851).
- 3.4 Open valve 2ASS-MOV148 at P851, if closed.
- NOTE: The following steps place the B Train SJAE's in service for normal operation. If it is desired to place the A Train in service instead of the B Train, the procedure is the same except that the "A" valves are opened instead of the "B" valves.
- 3.5 Locally open 2ARC-V13B (Air Ejector Train B Discharge Isolation Valve).
- 3.6 Shut manual valves:
- 3.6.1 2ASS-V31 (isolation valve downstream of 2ASS-PV107)
- 3.6.2 2ASS-V36 (isolation valve downstream of 2ASS-PV139)
- 3.7 Open 2ASS-V82B (auxiliary steam supply block valve).
- 3.8 Open the SJAE steam supply strainer blowdown valves 2ARC-HV16B and HV17B by placing the control switches momentarily to "OPEN" position in SJAE Room.
- 3.9 At P851, open 2ASS-MOV152, (steam supply to SJAE).
- 3.10 Slowly throttle open 2ASS-HCV151 (PV107 and PV139 bypass) and monitor pressure indicators 2ASS-PI122.
- 3.11 When 2ASS-PI122 indicates about 125 psig, open 2ASS-V36.
- 3.12 Throttle close 2ASS-HCV151 and check that 2ASS-PV139 controls pressure.
- 3.13 Shut 2ASS-HCV151, (PV107 and PV139 bypass).
- 3.14 Open 2ASS-V31, (PV107 isolation valve).
- 3.15 Open 2ARC-V23B (steam supply to secondary jet J2B-1).
- 3.16 Open 2ARC-V24B (steam supply to secondary jet J2B-2).



E. STARTUP PROCEDURE (Cont)

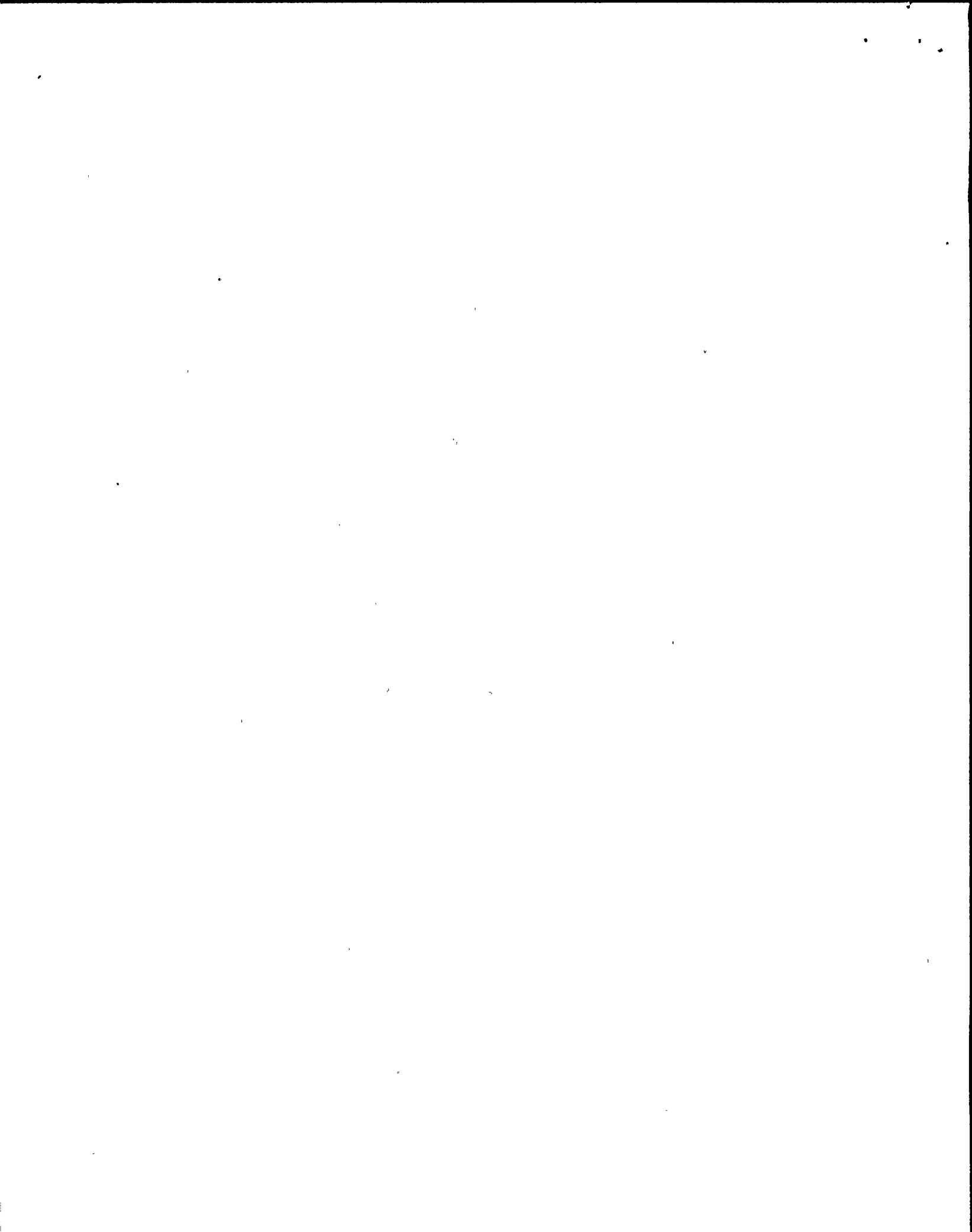
- 3.17 Shut 2ARC-HV16B by placing the control switches momentarily to "CLOSE".
- 3.18 Shut 2ARC-HV17B by placing the control switch momentarily to "CLOSE".
- 3.19 Open 2ARC-AOV104 on P851 by placing control switch to "OPEN" position.
- 3.20 Open 2ARC-V75B (the 2ARC-MOV15B bypass) in SJAE Room.

NOTE: Primary jet steam supplies should be throttled open simultaneously at approximately equal rates, to preclude reverse flow through the non-operating jet.

CAUTION

Maintain Off-Gas Inlet Pressure Between 13.5 TO 16 PSIA And Maintain Temperature Above 220°F While Placing First Stage Steam Jets Into Service.

- 3.21 Place the first stage SJAE on line as follows:
 - 3.21.1 Open 2ARC-V21B, the Steam Supply to Primary JET J1B-1.
 - 3.21.2 Open 2ARC-V22B, the Steam Supply to Primary JET J1B-2.
- 3.22 Verify that condenser vacuum continues to increase as indicated by Pressure Indicators 2CNM-P145A, B and C on P851.
- 3.23 Perform the following while placing the first stage steam jets into service:
 - 3.23.1 Verify that Offgas inlet pressure on P851 is between 13.5 and 16 psia.
 - 3.23.2 Verify that the Offgas inlet temperature on Offgas Panel 20FG IPNL122 is above 220°F.
 - 3.23.3 If the parameter listed in 3.23.1 and 3.23.2 cannot be achieved, then close the primary jet steam supplies:
 - a. 2ARC-V21B
 - b. 2ARC-V22B

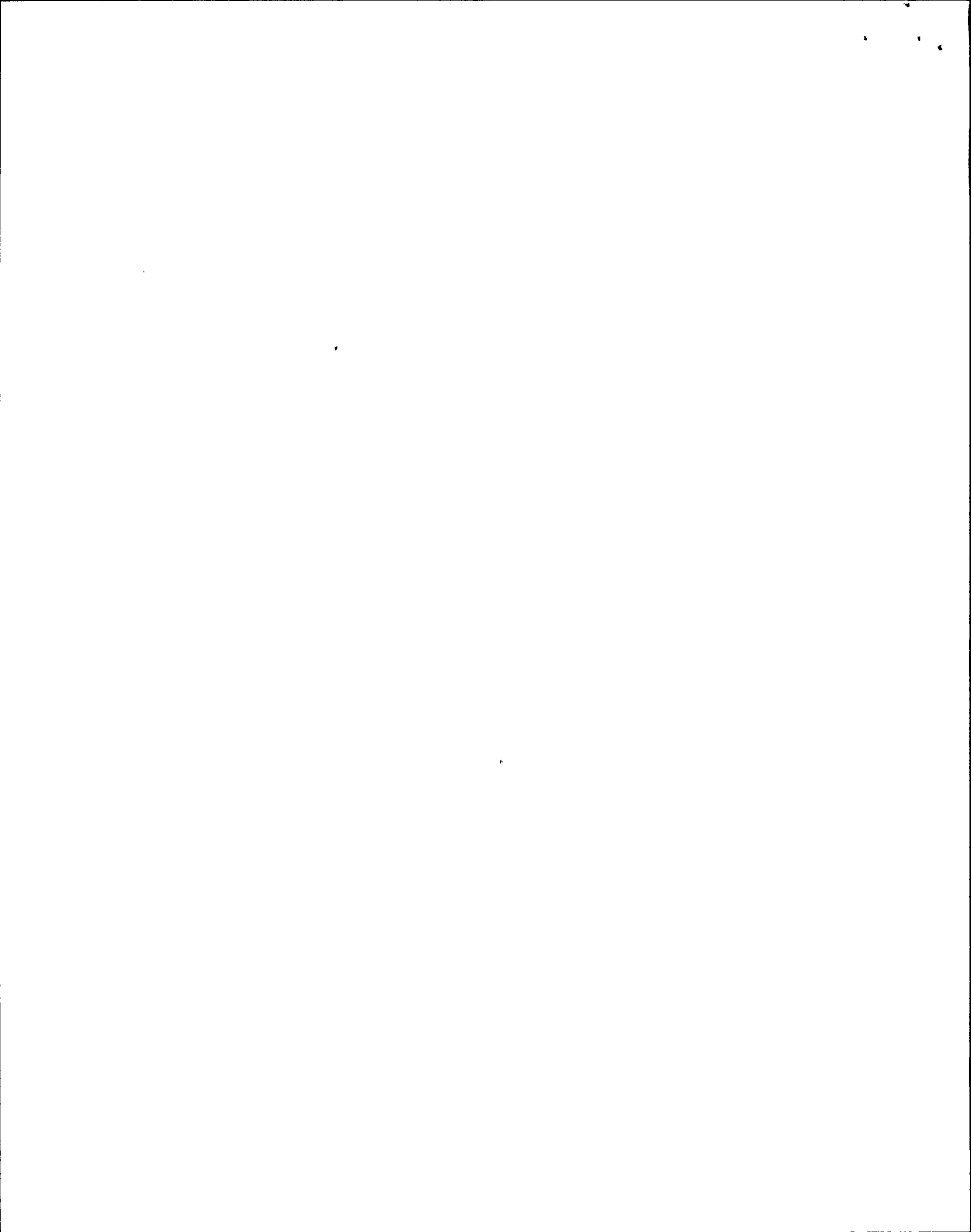


E. STARTUP PROCEDURE (Cont)

NOTE: The following steps will open the loop seal block valves. Closely monitor Main Condenser Vacuum during this operation.

- 3.24 While monitoring Main Condenser Vacuum on 2CNS-PI45A, B and C on P851, slowly open the Pre-cooler E2B Loop Seal Isolation Valve 2ARC-V35. If condenser vacuum begins to decrease, close valve 2ARC-V35 for 15 to 20 minutes to allow the loop seals to fill and then re-open the valve.
- 3.25 While monitoring Main Condenser Vacuum on 2CNS-PI45A, B and C on P851, slowly open the Intercondenser E3B Loop Seal Isolation Valve 2ARC-V38. If condenser vacuum begins to decrease, close valve 2ARC-V38 for 15 to 20 minutes to allow the loop seals to fill and then re-open the valve.
- 3.26 When condenser vacuum has improved, secure the Condenser air Removal Pumps 2ARC-P1A and 2ARC-P1B by placing their control switches on P851 in the "STOP" position. At P851, verify that the following occurs:
- 3.26.1 P1A and P1B stop.
 - 3.26.2 Valve 2ARC-AOV105 closes.
 - 3.26.3 Seal water pumps 2ARC-P2A and P2B stop.
 - 3.26.4 Place 2ARC-AOV104 control switch to "AUTO".
- 3.27 Close 2SWP-HV98A(B) at P851 for the vacuum pumps that are stopped.
- 3.28 Observe pressure indicators 2CNS-PI45A, B and C on P851 and insure that Main Condenser Vacuum begins to increase. If condenser vacuum begins to decrease (pressure increase) then restart one of the Vacuum Pumps 2ARC-P1A or P1B to maintain a vacuum. Valve AOV105 will open and valve AOV104 will close.
- 3.29 Open 2ARC-MOV15B (Precooler E2B Inlet Isolation Valve).
- 3.30 Shut 2ARC-V75B (2ARC-MOV15B Bypass in the SJAE Room).
- 3.31 Continue to monitor Condenser Vacuum and verify that it stabilizes at approximately 28.5 inches Hg Vacuum (1.5 inches Hg, absolute).

3



F. NORMAL OPERATION

NOTE: Normally the B SJAE train will be in service and will require minimal operator actions other than periodic operator checks.

1.0 Periodic Operator Checks

1.1 With the Condenser Air Removal Pumps in service, periodically check the following:

1.1.1 Main Condenser Vacuum (2CNM-PI45A, B and C on P851) approximately 23 inches Hg (7 inches Hg, Abs).

1.1.2 Service water temperature to the seal cooler Heat Exchangers is less than 125°F (local temperature indicators 2SWP-TI506, 2SWP-TI28A and/or 2SWP-TI28B).

1.1.3 Separator water level (2ARC-LG9A and 9B) approximately 25.5 inches.

1.1.4 Proper operation of the seal water pumps.

1.1.5 Vacuum Pump Current is approximately 185 Amps (P851).

1.2 With the SJAE's in service, periodically check the following:

1.2.1 Proper driving steam pressure (125 psig) to the SJAE's (2ASS-PIC207 and 2ASS-PIC139 on 2CES-RAK230).

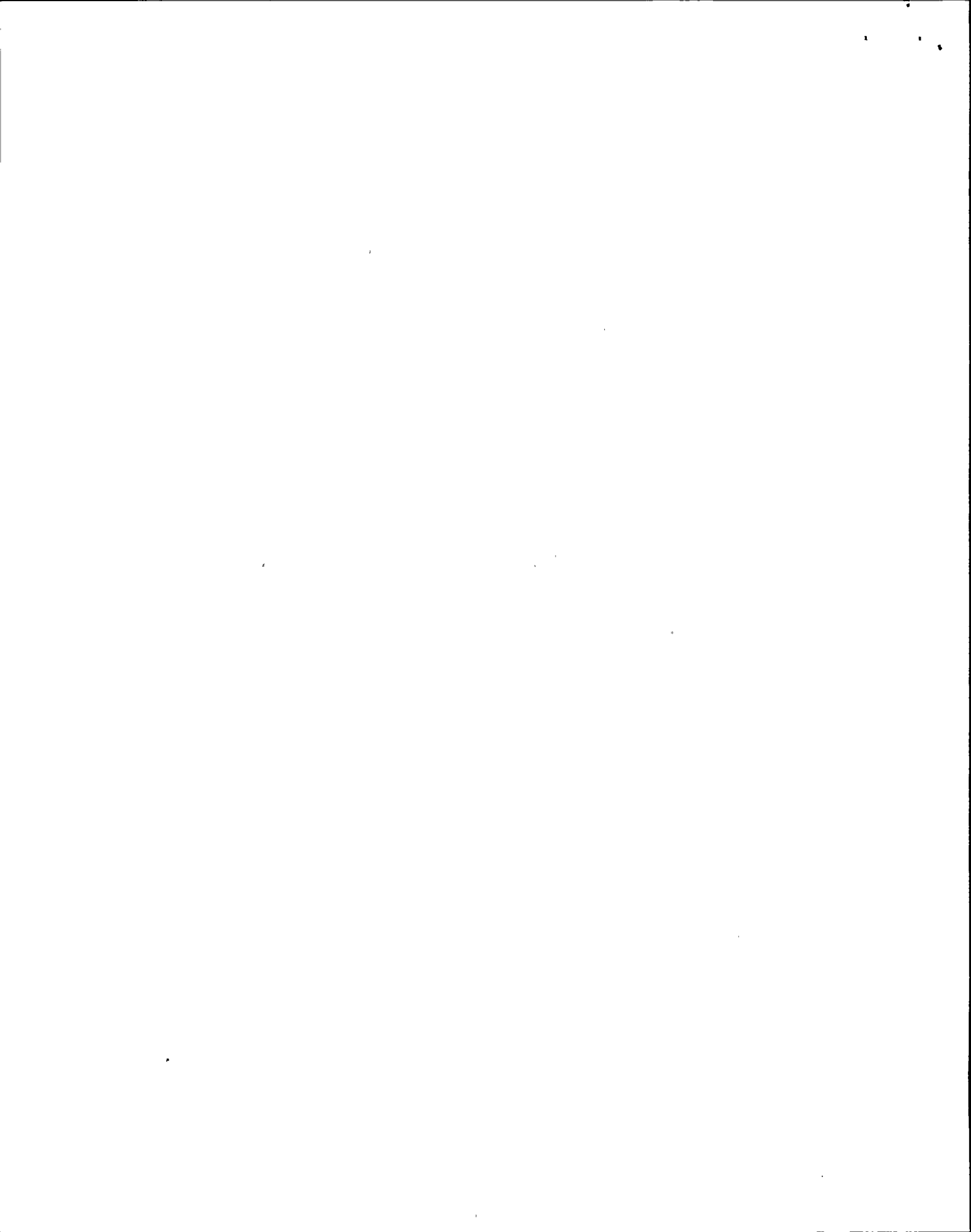
1.2.2 Main Condenser Vacuum (2CNM-PI45A, B and C on P851) approximately 28.5 inches Hg (1.5 inches Hg, Abs).

2.0 Changing SJAE Trains

NOTE: The B Train SJAE are assumed to be in service with the A Train in standby. If the A Train is in service, the procedure is the same except that the "A" and "B" suffixes are changed.

2.1 Verify that Pre-cooler E2A and Intercondenser E3A Loop Seals have been filled per the appropriate section of this procedure.

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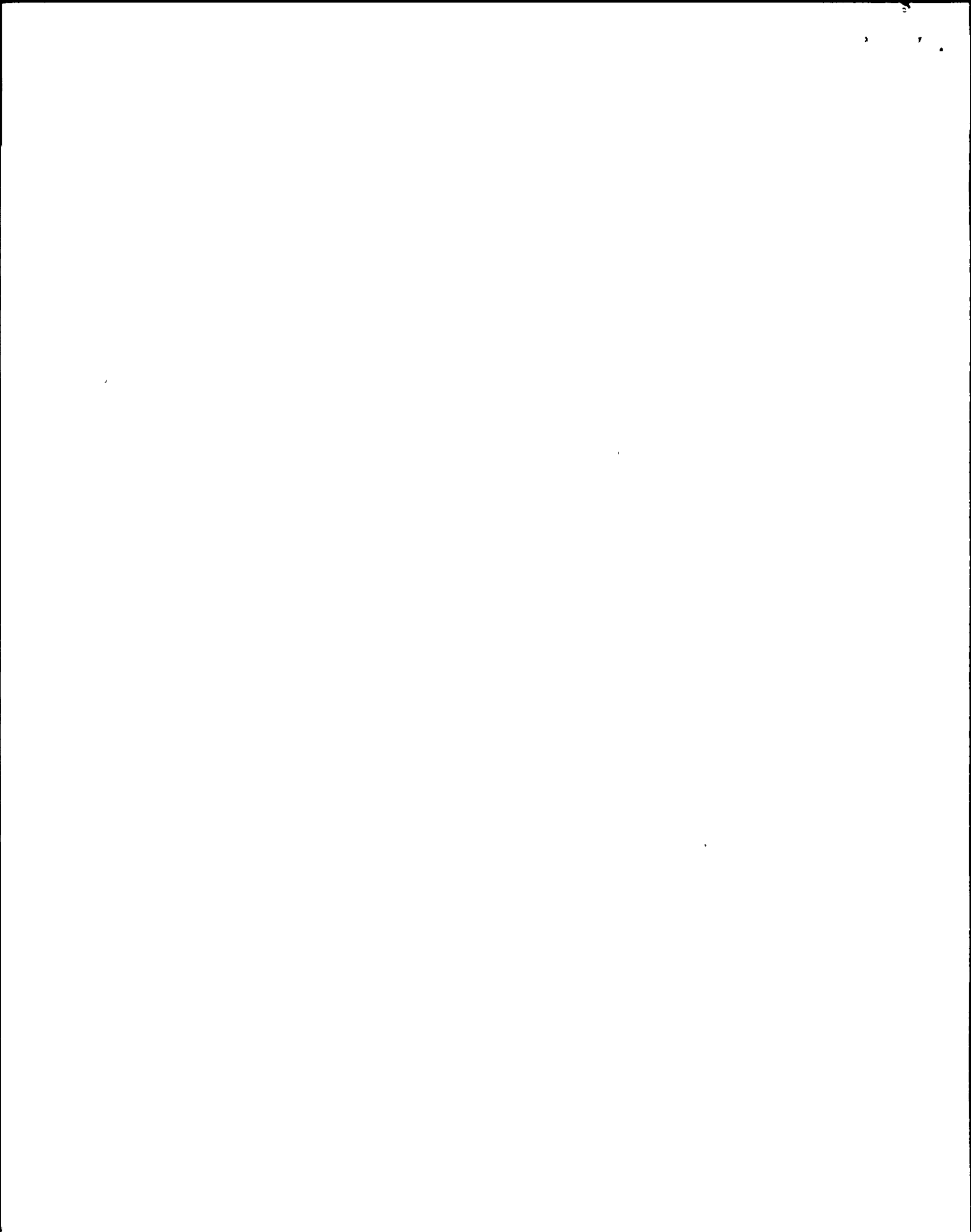


F. NORMAL OPERATION (Cont)

CAUTION

Monitor Main Condenser Vacuum As Indicated By Locally Mounted Pressure Indicators 2CNM-PIX45A(B)(C), PIY45A(B)(C) Or Control Room Indicators 2CNM-PI45A(B)(C) On P851 As Valves On The Standby SJAE Train Are Opened. During Performance of Steps 2.3 through 2.17.

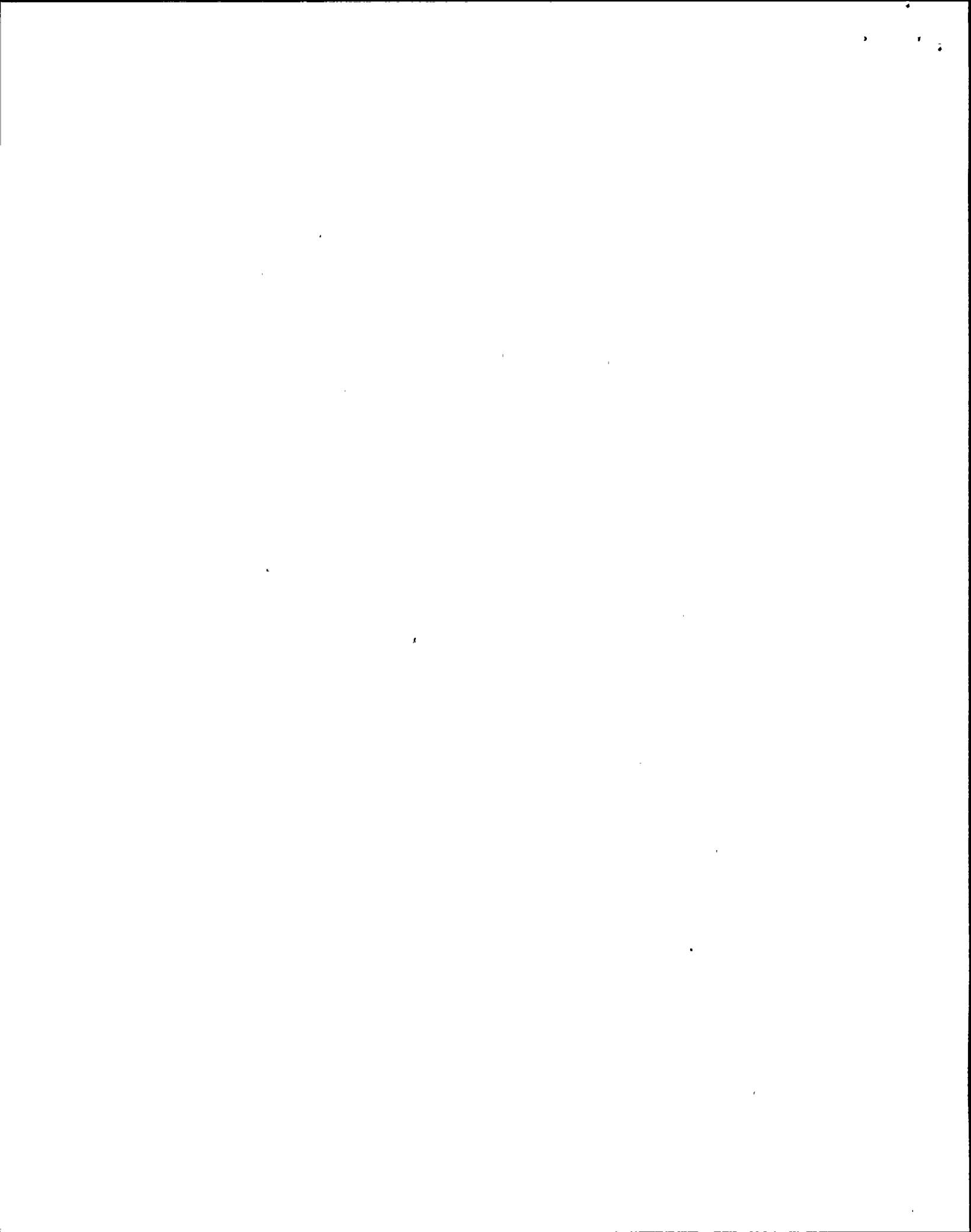
- 2.1.1 Verify open 2CNM-MOV64A/B air ejector intercondenser 3A/B inlet isolation.
 - 2.2 If Condenser Vacuum Begins Decreasing, Then Reclose The Last Valve Opened And Determine The Cause Of The Decrease In Vacuum Before Continuing.
 - 2.3 Open 2ARC-V13A (the A SJAE Train discharge valve).
 - 2.4 Open 2ASS-V82A (the A Train SJAE driving steam inlet valve).
 - 2.5 Open the SJAE's steam supply strainer blowdown valves 2ARC-HV16A and HV17A by placing the locally mounted control switches in the "OPEN" position. After approximately 1 minute, close valves 2ARC-HV16A and 2ARC-HV17A by placing the control switches in the "CLOSE" position.
 - 2.6 Open 2ARC-V23A (the Steam Supply to Secondary JET J2A-1).
 - 2.7 Open 2ARC-V24A (the Steam Supply to Secondary JET J2A-2).
 - 2.8 When pre-cooler vacuum has stabilized, open Pre-cooler E2A Inlet Isolation Valve 2ARC-MOV15A by placing its control switch on P851 in the "OPEN" position.
- NOTE: Primary jet steam supplies should be throttled open simultaneously at approximately equal rates, to preclude reverse flow through the non-operating jet.
- 2.9 Open 2ARC-V21A (the Steam Supply to Primary JET J1A-1).
 - 2.10 Open 2ARC-V22A (the Steam Supply to Primary JET J1A-2).



F. NORMAL OPERATION (Cont)

NOTE: Monitor Main Condenser Vacuum as indicated by 2CNM-PI45A, B and C on P851 while closing the B SJAE Train inlet valve.

- 2.11 While monitoring Main Condenser Vacuum, close the Pre-cooler E2B Inlet Isolation Valve 2ARC-MOV15B by placing its control switch on P851 in the "CLOSE" position. If Main Condenser Vacuum begins decreasing, then re-open valve 2ARC-MOV15B. Ensure proper valve lineup for the A SJAE Train per table 1 and reperform this step.
- 2.12 If Condenser Vacuum remains stable, close 2ASS-V82B, the B Train SJAE driving steam inlet valve.
- 2.13 Close 2ARC-V21B (the Steam Supply to Primary JET J1B-1 Valve).
- 2.14 Close 2ARC-V22B (the steam supply to Primary JET J1B-2 Valve).
- 2.15 Close 2ARC-V23B (the Steam Supply to Secondary JET J2B-1).
- 2.16 Close 2ARC-V24B (the Steam Supply to Secondary JET J2B-2).
- 2.17 Close 2ARC-V13B (the Air Ejector Train B Discharge Isolation Valve).
- 2.18 While monitoring Main Condenser Vacuum as indicated by 2CNM-45A, B and C on P851, slowly open the Pre-cooler E2A Loop Seal Isolation Valve 2ARC-V36. If Condenser Vacuum decreases, then reclose 2ARC-V36 for 15 to 20 minutes to allow the loop seal to fill and then re-open the valve.
- 2.19 While monitoring Main Condenser Vacuum as indicated by 2CNM-45A, B and C on P851, slowly open the Intercondenser E3A Loop Seal Isolation Valve 2ARC-V37. If Condenser Vacuum decreases, then reclose 2ARC-V37 for 15 to 20 minutes to allow the loop seal to fill and then re-open the valve.
- 2.20 Close valve 2ARC-V35.
- 2.21 Close 2ARC-V38.
- 2.22 Verify closed 2CNM-MOV64A/B for train removed from service.



G. SHUTDOWN PROCEDURE

1.0 Shutdown Of The Condenser Air Removal System

NOTE: The SJAE's should be secured to show Rx cooldown or while the Rx has positive pressure control (I.E. a partially open bypass valve) during a Rx shutdown.

1.1 Ensure that main steam line pressure has decreased to approximately 900 psig per N2-OP-101C.

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1.2 If the condenser vacuum pumps 2ARC-P1A(B) are to be placed in service, verify the following:

1.2.1 The control switch for valve 2ARC-AOV104 on panel P851 is in "AUTO".

1.2.2 The control switch for valve 2ARC-AOV105 on panel P851 is in "AUTO".

1.2.3 Proper oil level as indicated by the pump oil sight glass on each pump.

1.2.4 Proper water level of approximately 25.5 inches in the vacuum pump separator as indicated by sight glasses 2ARC-LG9A and LG9B.

CAUTION

Reactor Power Must Be Less Than 5% Rated Prior To Starting The Vacuum Pumps To Ensure That An Explosive Mixture Of Hydrogen Is Not Allowed To build Up In The Plant Exhaust Stack.

1.3 At P851 "OPEN" 2SWP*HV98A(B) for the vacuum pump to be started.

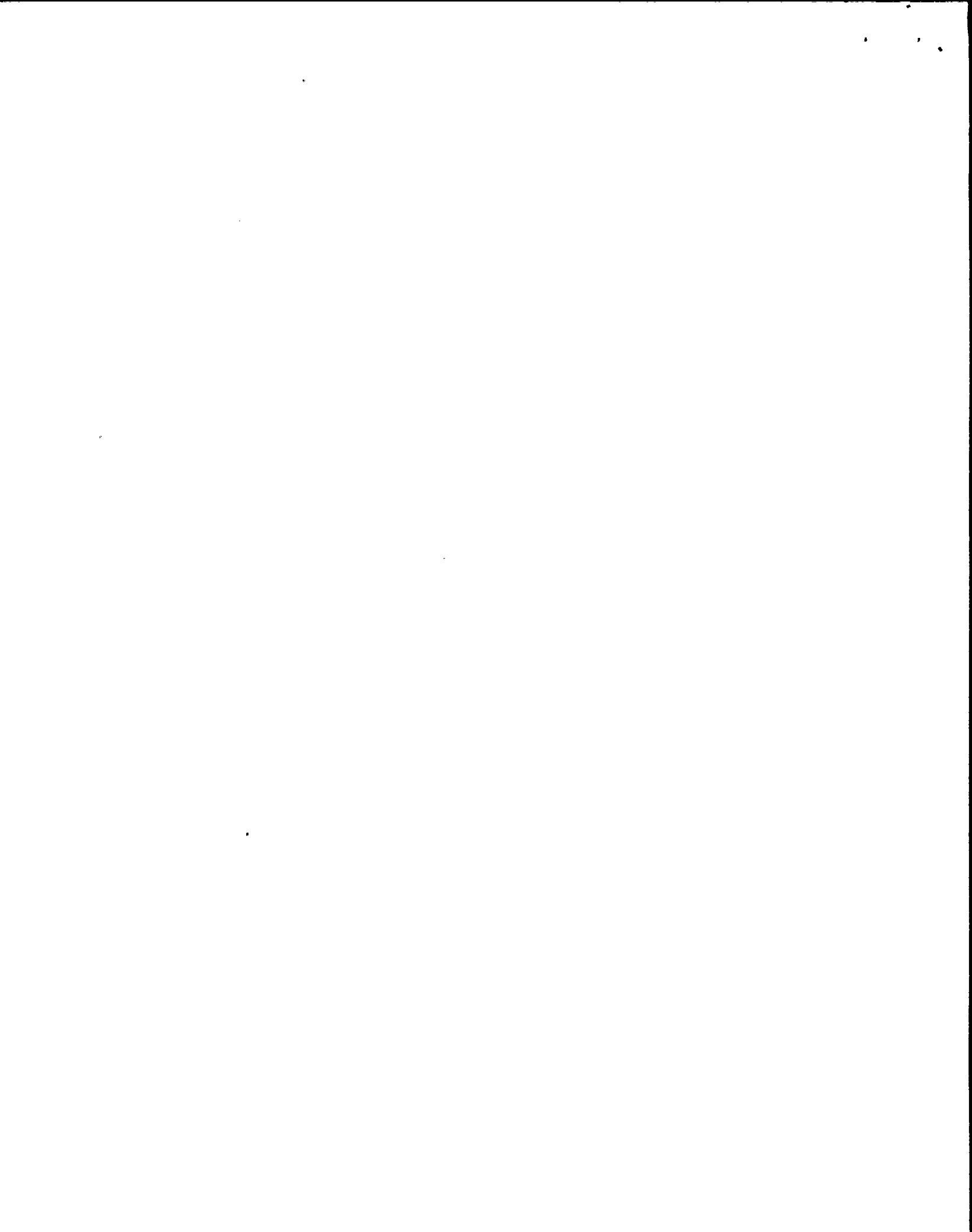
1.4 Start one vacuum pump 2ARC-P1A(B) by placing its control switch on P851 in the "START" position. Verify the following:

1.4.1 Pump 2ARC-P1A(B) starts.

1.4.2 The associated seal water pump 2ARC-P2A(B) starts.

1.4.3 Vacuum pump inlet valve 2ARC-AOV105 opens.

1.4.4 Off-gas Inlet Valve 2ARC-AOV104 closes.



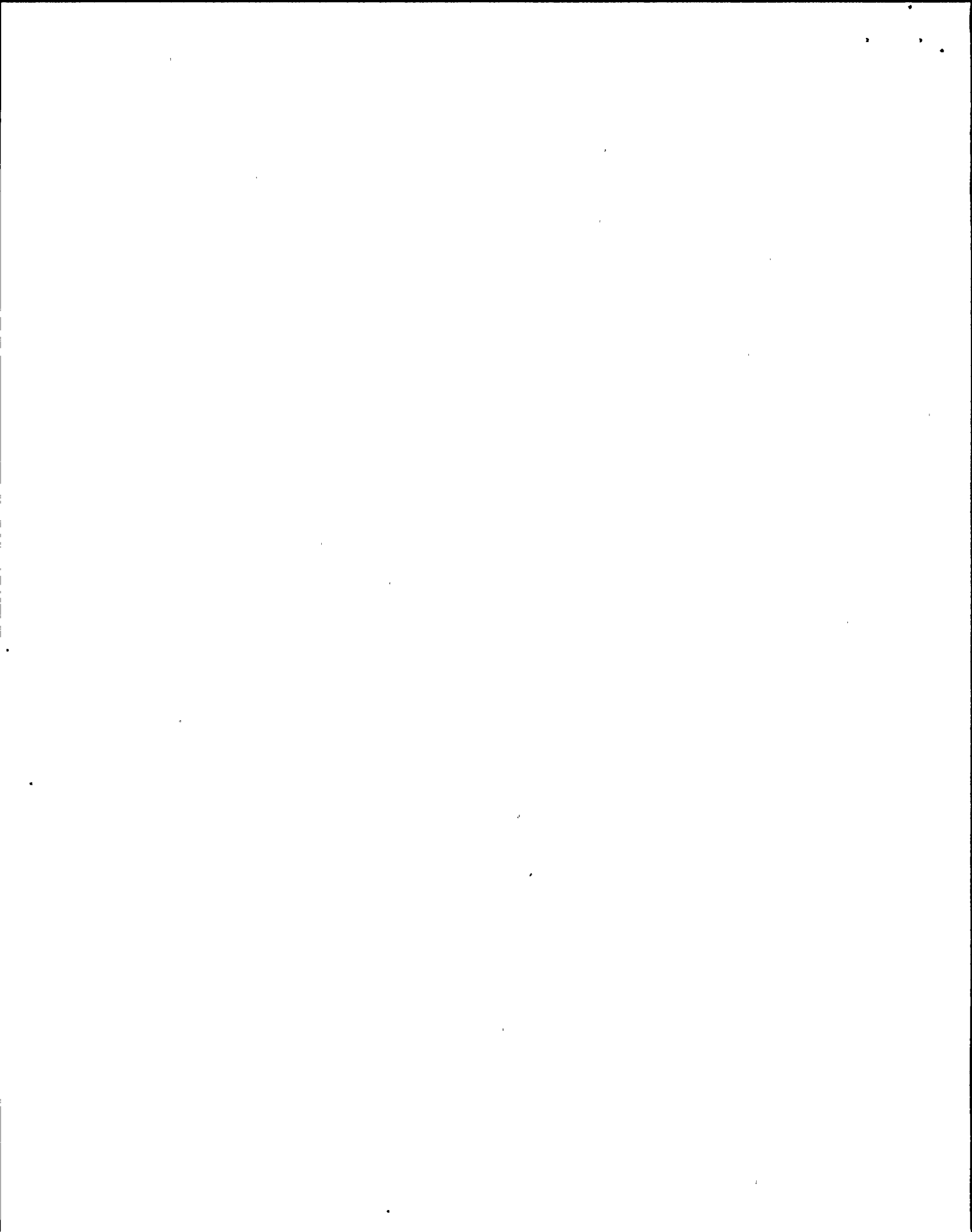
G. SHUTDOWN PROCEDURE (Cont)

- 1.5 At P851 "OPEN" 2SWP-HV98A(B) for the second pump if it is to be started.
- 1.6 Start the second vacuum pump, if desired, by placing its control switch on P851 in the "START" position: Verify the following:
 - 1.6.1 Pump 2ARC-P1A(B) starts.
 - 1.6.2 It's associated seal water pump 2ARC-P2A(B) starts.
- 1.7 Close the following valves to secured "B" SJAE TRAIN ("A" TRAIN VALVES IN BRACKETS)
 - 1.7.1 2ARC-V21B(A)
 - 1.7.2 2ARC-V22B(A)
 - 1.7.3 2ARC-V23B(A)
 - 1.7.4 2ARC-V24B(A)
 - 1.7.5 2ARC-V82B(A)
 - 1.7.6 2ARC-MOV15B(A) at P851
 - 1.7.7 2ARC-V13B(A)
 - 1.7.8 2ARC-V35(36)
 - 1.7.9 2ARC-V38(37)
- 1.8 Close 2ASS-MOV152 (The main steam to auxiliary steam block valve) by placing its control switch on P851 to close, it is a throttleable valve.

NOTE: If a Rx Scram has occurred and cooldown rate is a concern Step 1.8 may be performed before Step 1.7.
- 1.9 Shutdown the Off-gas System per N2-OP-42.
- 1.10 When condenser vacuum is no longer required or when directed by N2-OP-101C, shut down the condenser vacuum pumps 2ARC-P1A(B) as follows:
 - 1.10.1 At panel, P851, place the control switch for valve 2ARC-AOV104 in the "CLOSE" position.
 - 1.10.2 At panel P851, place the control switch for the pump to be shutdown in the "STOP" position. Verify that pump 2ARC-P1A(B) and its associated seal water pump 2ARC-P2A(B) stops.

*2

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G. SHUTDOWN PROCEDURE (Cont)

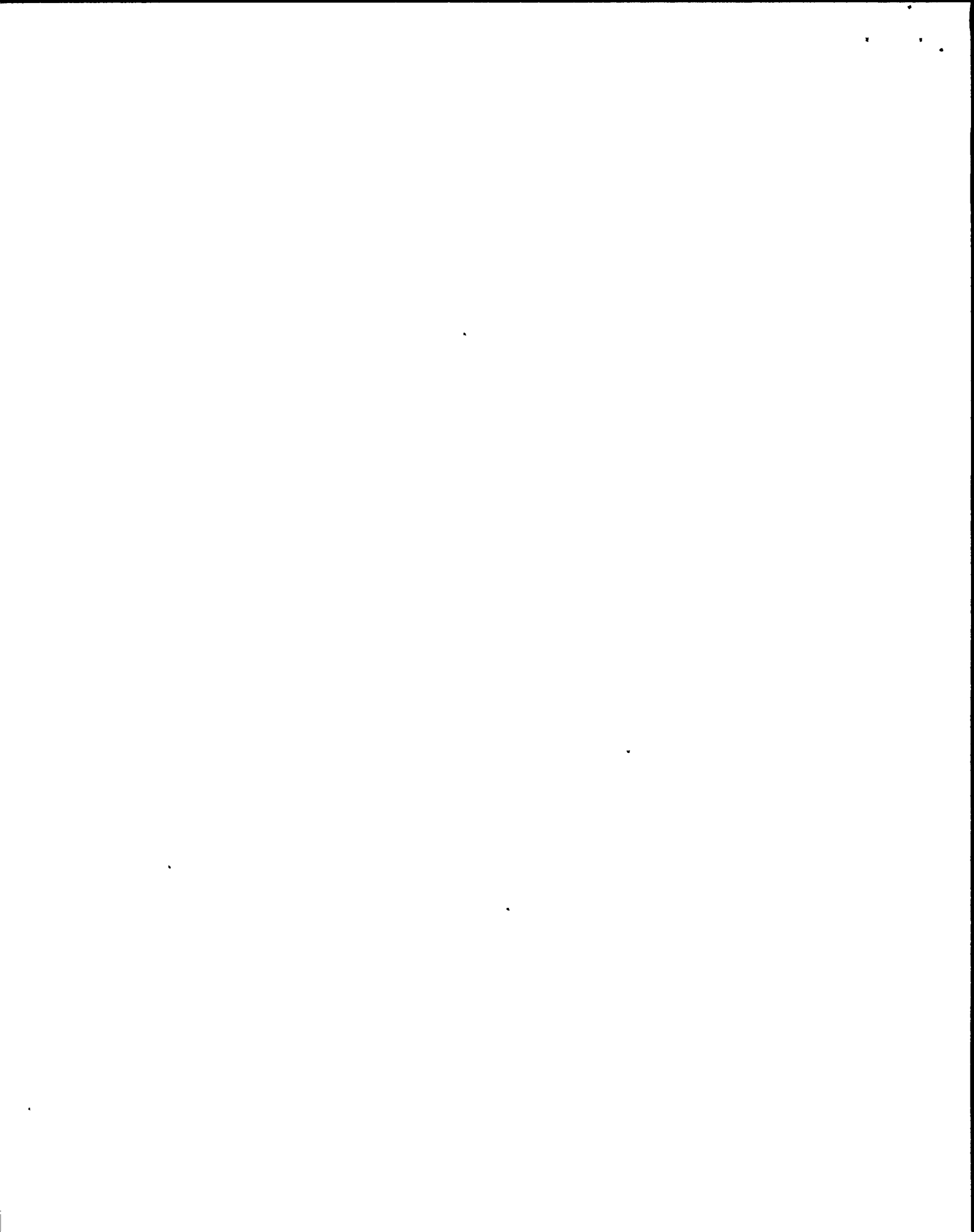
- 1.10.3 At panel P851, place the control switch for the second pump 2ARC-P1A(B) in the "STOP" position. Verify that pump 2ARC-P1A(B) and its associated seal water pump 2ARC-P2A(B) stops and the Vacuum Pump Inlet Valve 2ARC-AOV105 closes.
- 1.10.4 At P851 "CLOSE" 2SWP-HV98A(B) for the vacuum pumps stopped.
- 1.11 When directed to do so by N2-OP-101C, break condenser vacuum by opening the Vacuum Breakers 2ARC-MOV5A, B, and C by placing their control switches on P851 in the "OPEN" position.

H. OFF NORMAL PROCEDURE

1.0 Manual Regulation of Steam Pressure to the SJAE's

NOTE: This section assumes that Pressure Indicating Controllers 2ASS-PIC107 and/or PIC139 or Pressure Control Valves 2ASS-PV107 and/or PV139 have failed.

- 1.1 Slightly open valve 2ASS-HCV151 to provide a steam flow path to SJAE's with the pressure control valves isolated.
- 1.2 Fully close 2ASS-V31 to isolate 2ASS-PV107.
- 1.3 Fully close 2ASS-V36 to isolate 2ASS-PV139.
- 1.4 Throttle valve 2ASS-HCV151 until SJAE inlet pressure is stable at approximately 125 psig as indicated by 2ASS-PI122 on P851 or 2ASS-PI7A(B) on 2CES-RAK230.
- 1.5 Continue to monitor SJAE driving steam inlet pressure on 2ASS-PI122 or 2ASS-PI7A(B). Adjust 2ASS-HCV151 as required to maintain SJAE inlet pressure at approximately 125 psig.



H. OFF NORMAL PROCEDURE (Cont)

2.0 Loss of Condenser Vacuum

NOTE: This section assumes a slow, steady increase in Main Condenser Pressure. As condenser vacuum decreases, the following automatic actions occur:

- 1. Main Turbine Trip 22.1" Hg Vac.
- 2. MSIV Closure 8.5" Hg Vac.
- 3. Turbine Bypass Valve Closure 7.0" Hg Vac.

A Reactor Scram will occur concurrently with the Turbine Trip if power is greater than 30% or with the MSIV closure if the mode switch is in RUN.

If the Condenser Air Removal System or Off-gas System fails there is only a short period of time to recover. The time available is dependant on several variables such as Reactor Power, Condenser Load, Circulating Water Flow Rate and Circulating Water Temperature. At 100% power, a turbine trip will occur approximately 5 minutes after a loss of the ARC or OFG systems.

CAUTION

Do Not Place The Condenser Air Removal Pumps 2ARC-P1A Or P1B In Service In An Attempt To Restore Or Maintain Condenser Vacuum. The Discharge Of These Pumps Are Not Treated By The Off-Gas System And Plant Release Rates May Be Exceeded If These Pumps Are Placed In Operation During Or Immediately Following High Power Operation.

NOTE: Steps 2.1 and 2.2 may be performed concurrently.

- 2.1 Verify proper circulating water flow rate and temperature. Place an additional Circulating Water Pump in service per N2-OP-10A if appropriate.
- 2.2 Check for any Condenser Air Removal or Off-gas annunciators at panel P851. If any Off-gas annunciators are alarming, refer to N2-OP-42 for response. If any ARC annunciators are alarming, refer to the appropriate section of this procedure. Concurrently with the response to any alarms, begin reducing condenser load by reducing reactor power per N2-OP-101D Section H.1.0. This should be accomplished as follows:

2.2.1 Notify the SSS and Analyst.

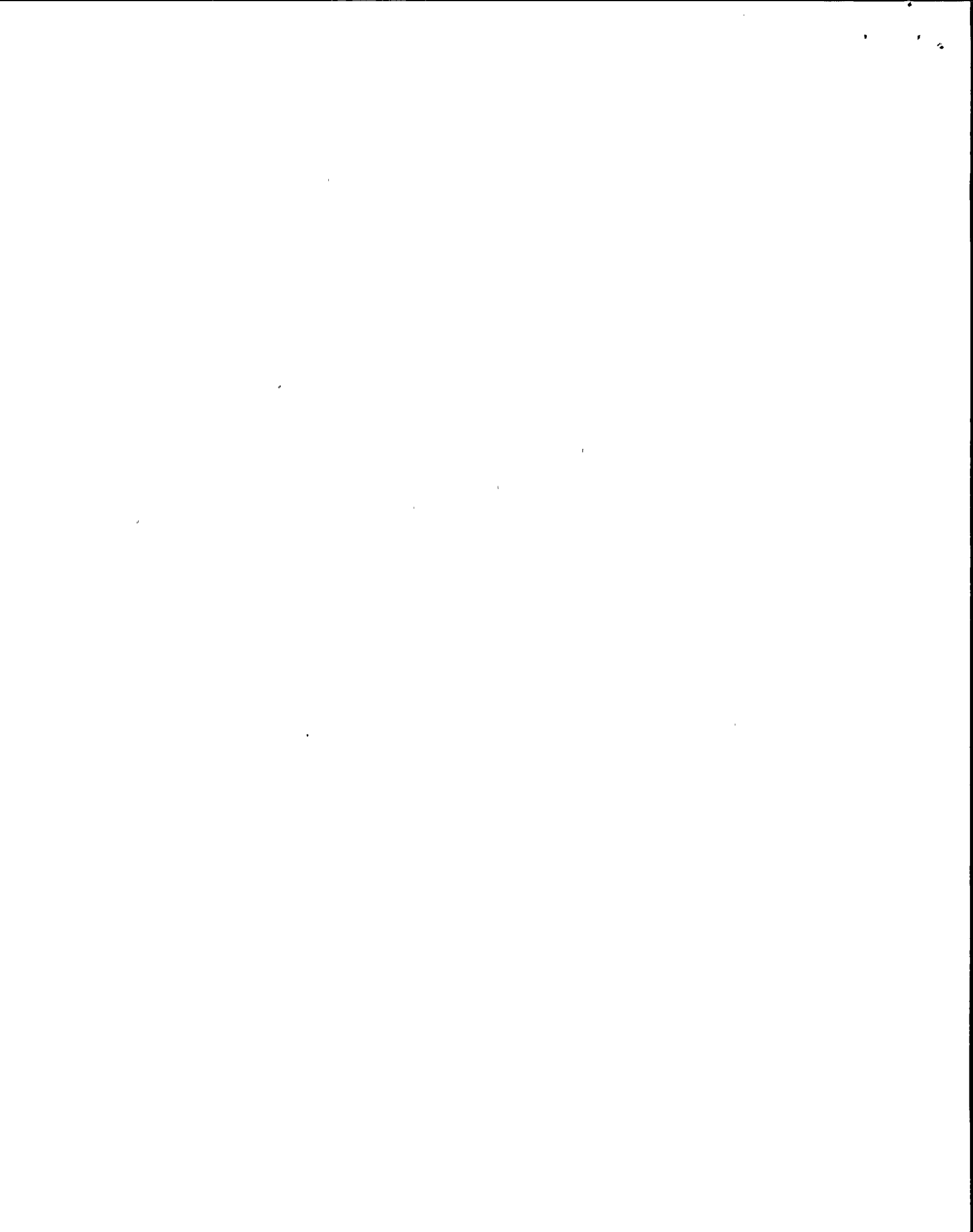
*1



H. OFF NORMAL PROCEDURE (Cont)

NOTE: The power decrease may be terminated when Condenser Vacuum stabilizes or begins to increase. Maintain the reactor at that power level until the cause of the vacuum decrease has been corrected.

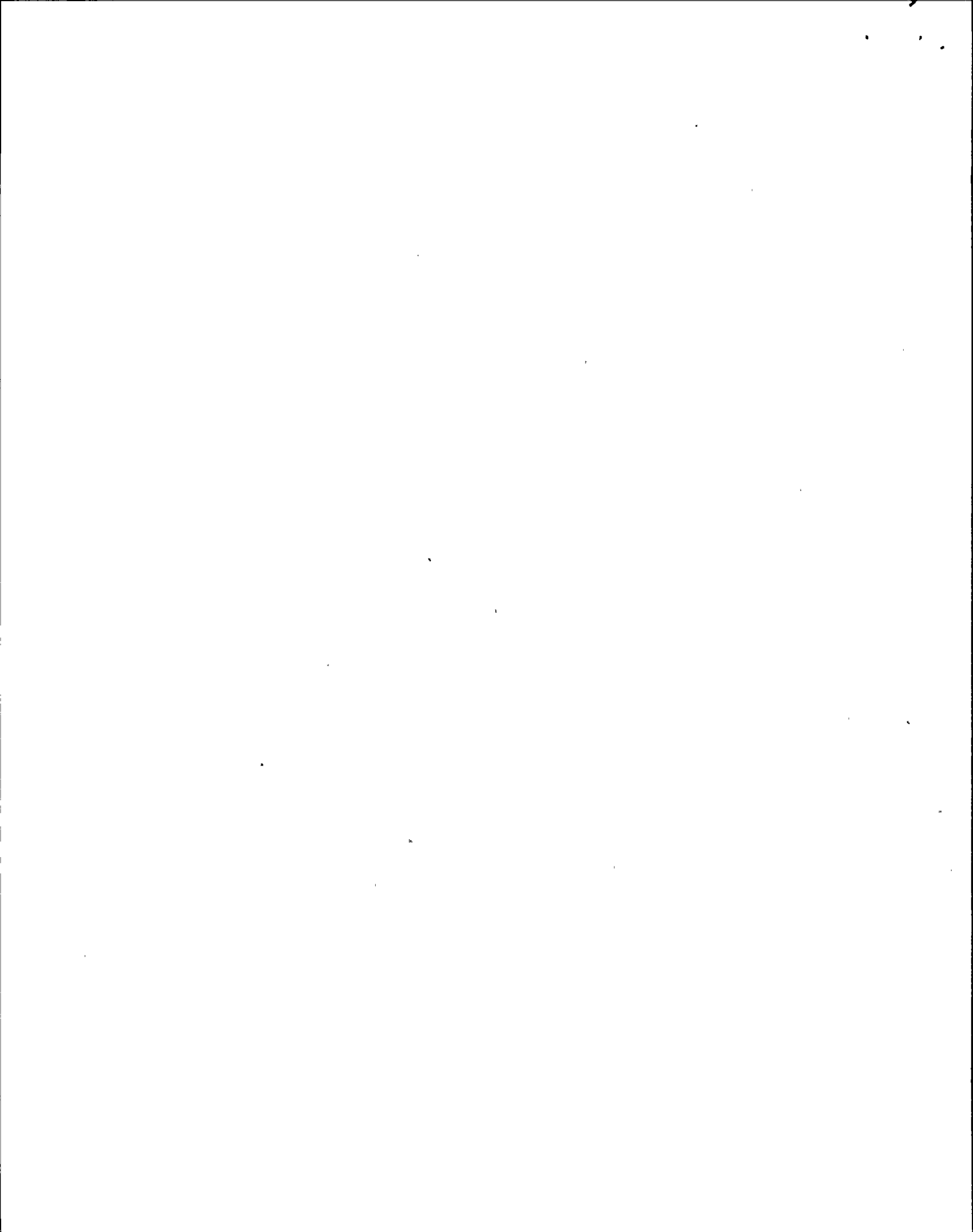
- 2.2.2 Begin reducing reactor power by reducing reactor recirc flow per N2-OP-101D Section H.1.0. Refer to plant Technical Specifications for possible LCO's and applicable actions associated with recirc flow rate reduction. (SER 90-145) | TCN-25
- 2.2.3 If further power reduction is required, continue N2-OP-101D Section H.1.0.
- 2.2.4 If Condenser Vacuum falls below the Low Vacuum Alarm Point (24.6" Hg) and Turbine load is less than 30% (345 MWE); manually trip the Turbine per N2-OP-21 Section H.5.0.
- 2.3 If a turbine trip occurs, refer to N2-OP-21 for the appropriate actions.
- 2.4 If a reactor scram occurs, refer to N2-OP-101C.
- 2.5 If an MSIV isolation occurs, refer to the appropriate Emergency Operating Procedure.
- 3.0 This step has been deleted. | TCN-24



H. OFF NORMAL PROCEDURE (Cont)

TCN-24

- 4.0 Use Of The Hoggers For Hotwell Ventilation
- 4.1 Ensure condenser vacuum breakers ARC-5A, 5B or 5C are open if possible or manways are open on the condenser to be ventilated.
- 4.2 Line up ARC-P1A or P1B or both as per Section E 2.3.
- 4.3 Close the following valves:
- 4.3.1 ARC-AOV104
- 4.3.2 ARC-MOV15A
- 4.3.3 ARC-MOV15B
- 4.4 Open ARC-AOV105 or place in auto.
- 4.5 Open ARC-25A, B and C, (ARC-26A, B and C air suction).
- 4.6 Open SWP-HV98A or SWP-HV98B for Hogger being started.
- 4.7 START ARC-P1A or ARC-P1B.
- NOTE: To limit pump amps to < 185 throttle the suction of the Hogger or Hoggers being used. Continued use of the ARC pump at > 200 amps could result in over heating or damage.
- 4.8 For added ventilation, start the standby Hogger per Steps 4.6 and 4.7.
- 4.9 Monitor Hogger operation on normal rounds after initial startup checks.



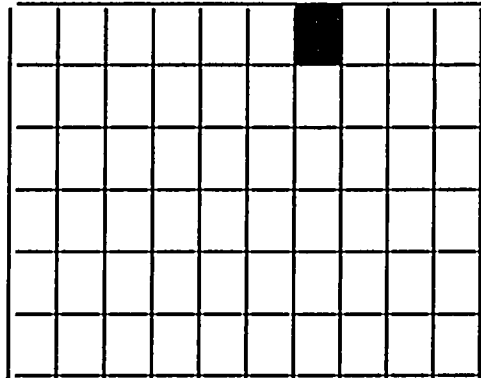
I. PROCEDURE FOR CORRECTING ALARM CONDITIONS

1.0 851307 Air Ejectors Auxiliary Steam Supply Flow Low

Reflash: Yes

AIR EJECTORS
AUX STM SPLY
FLOW LOW

851307



851307

1.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	ASSFC01	AIR EJCTR 2A AUX STM FLO	2ASS-FSLX6A AND 2ASS-FSLX6B
			Setpoint 9300 lb/hr

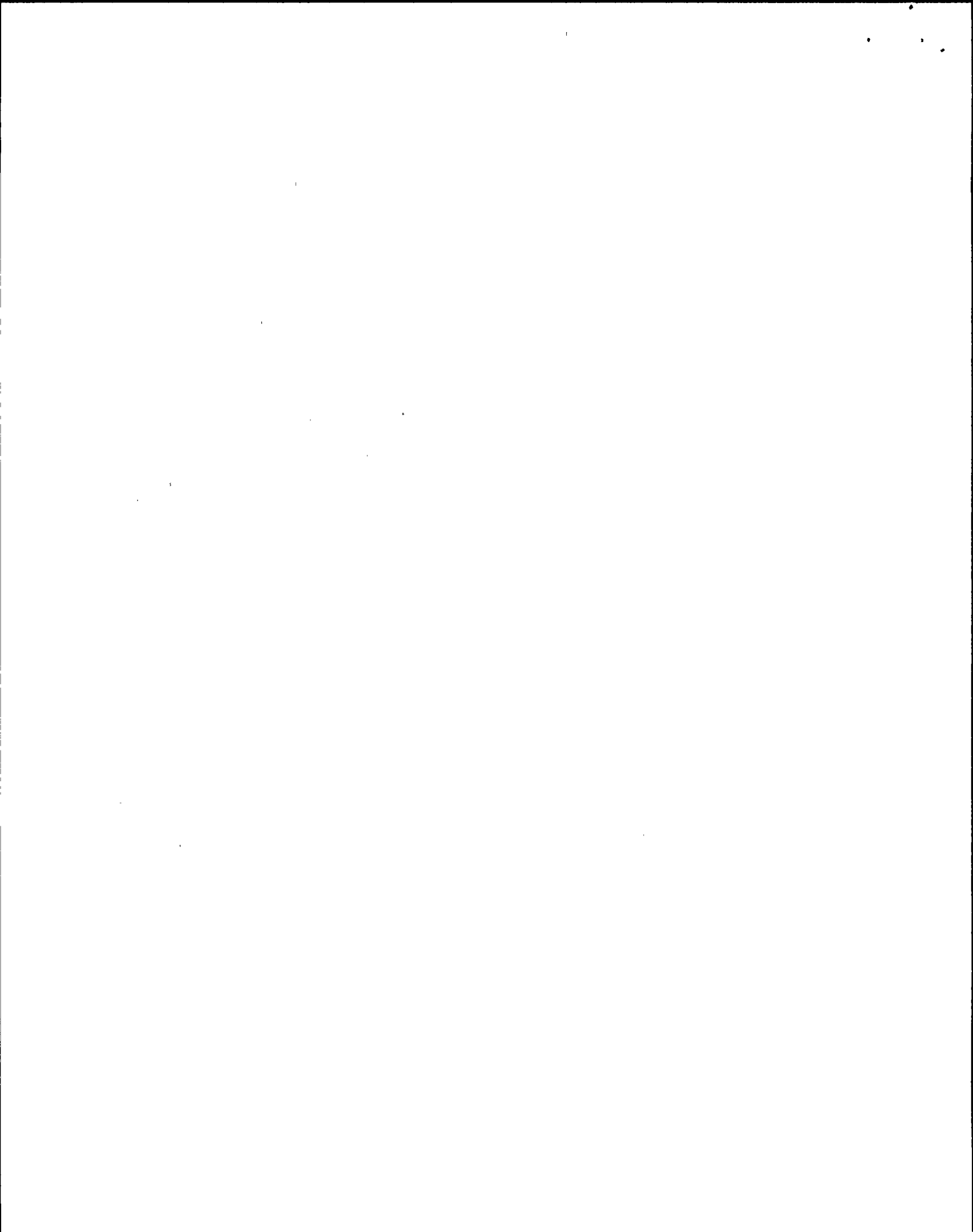
TCN-26

1.2 Automatic Response

NONE

1.3 Corrective Action

- a. Verify proper Main Steam Lineup to the Auxiliary Steam System.
- b. Verify proper setpoint (125 psig) for pressure controllers 2ASS-PIC107 and 2ASS-PIC139 on 2CES-RAK230 and proper operation of pressure control valves 2ASS-PV107 and 2ASS-PV139.
- c. If pressure controllers and/or pressure control valves have failed, manually control SJAE driving steam per the appropriate section of this procedure.

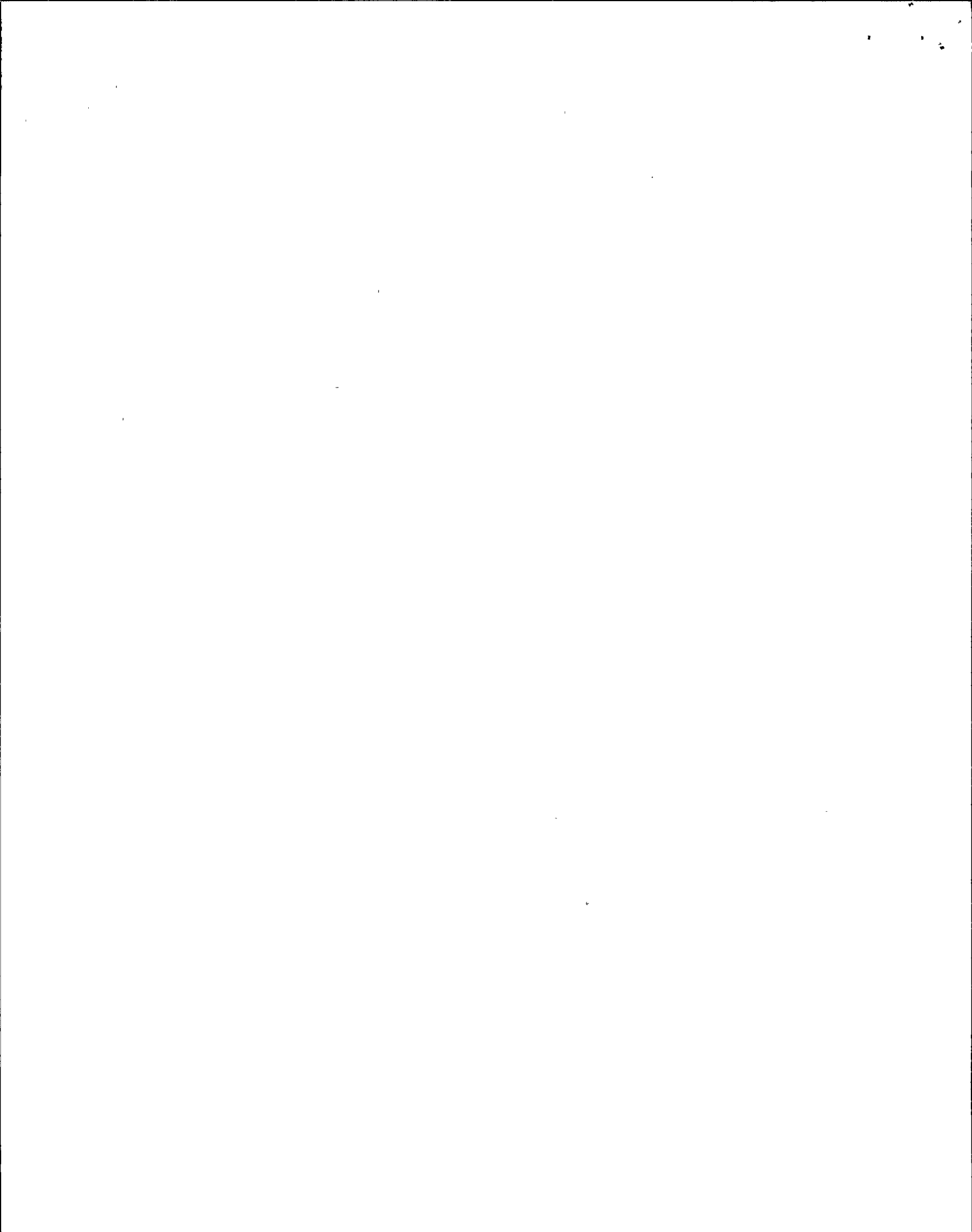


I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

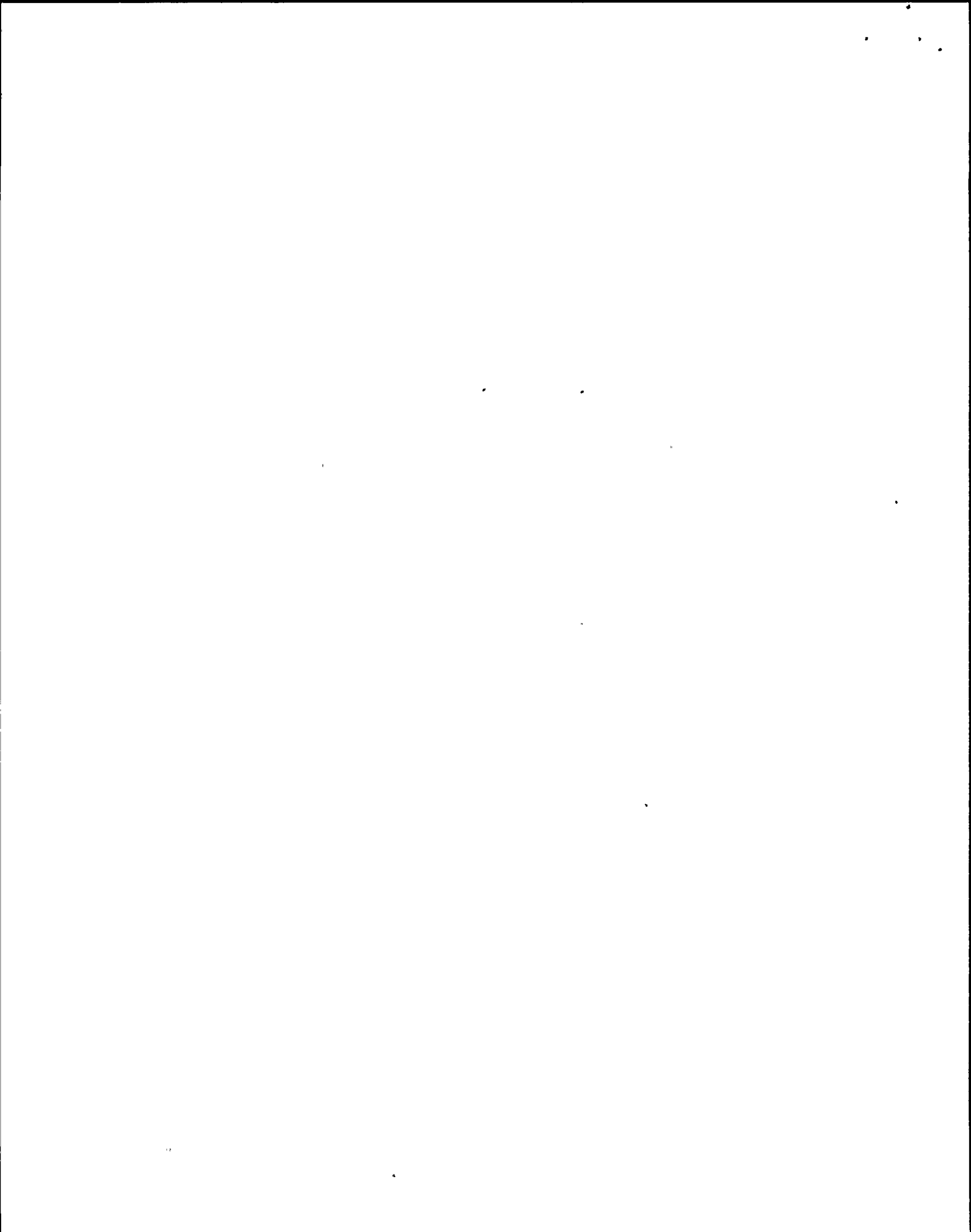
NOTE: Driving Steam to the 2nd stage SJAE's provides dilution for the process gases. If flow cannot be restored to the SJAE's, a shutdown of the Offgas system will be required. Refer to Section H.2.0 of this procedure. | 3

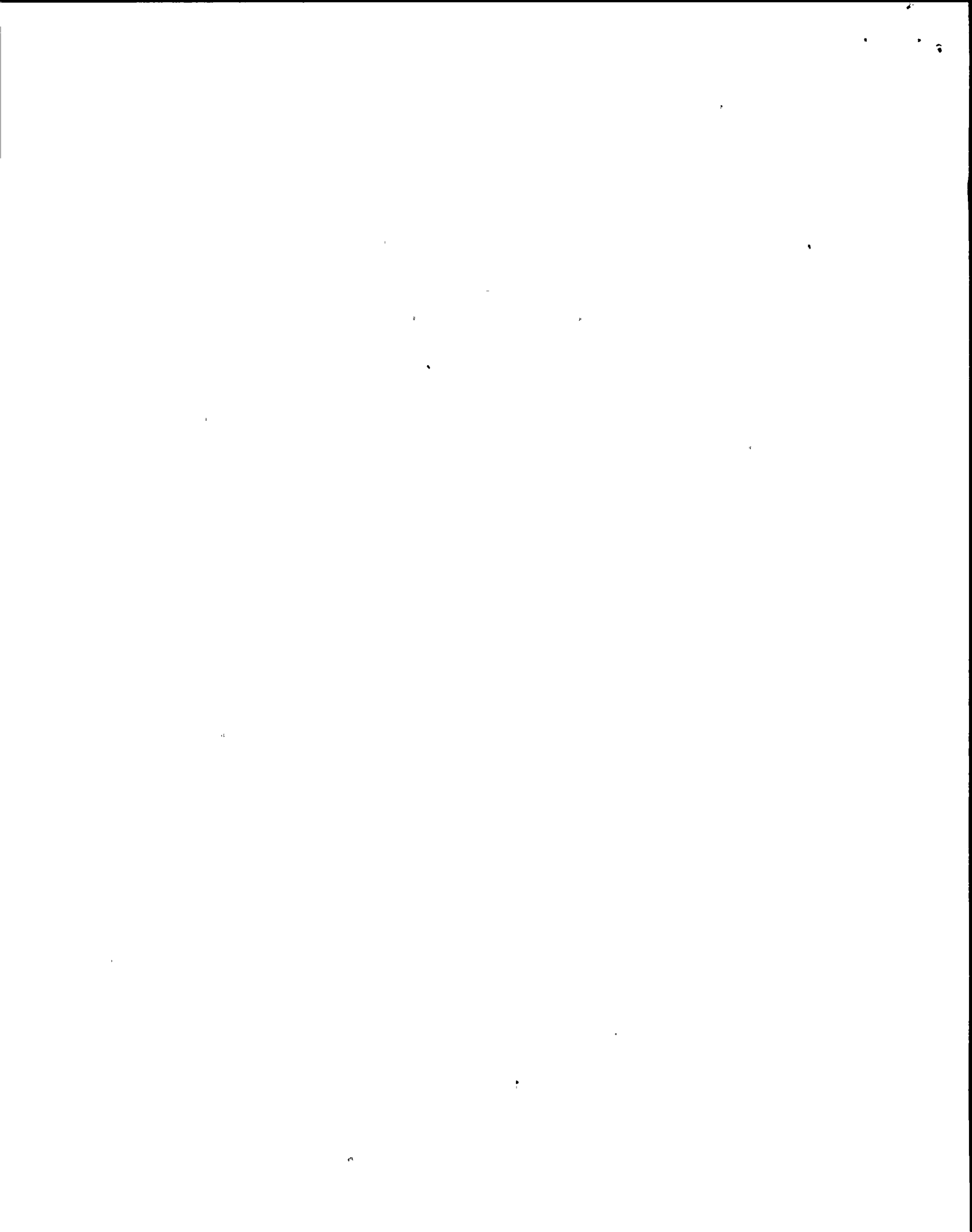
d. Place the backup SJAE train in service and shutdown the operating train per the appropriate section of this procedure.

e. If driving steam flow cannot be restored and offgas H₂ concentration begins increasing or vacuum begins decreasing, consideration should be given to beginning an orderly plant shutdown per N2-OP-101C. | 3







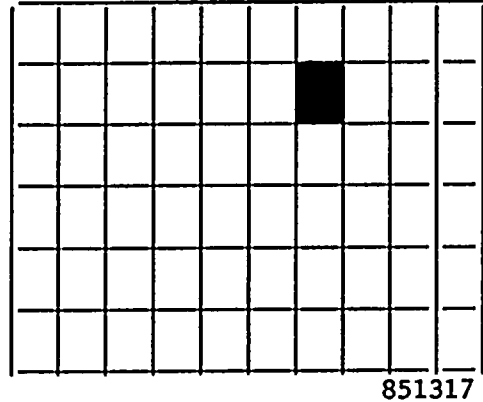


I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

5.0 851317 Air Ejector 2A/2B Inlet Steam Header Pressure High/Low

Refresh: No

AIR EJECTOR 2A/2B INL STM HDR PRESS HI/LO 851317
--



5.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	ASSPC01	AIR EJCTR INL STM HDR PR	2ASS-PSL122 2ASS-PSH122

Setpoint - High 149 psig
Low 115 psig

5.2 Automatic Response

NONE

5.3 Corrective Action

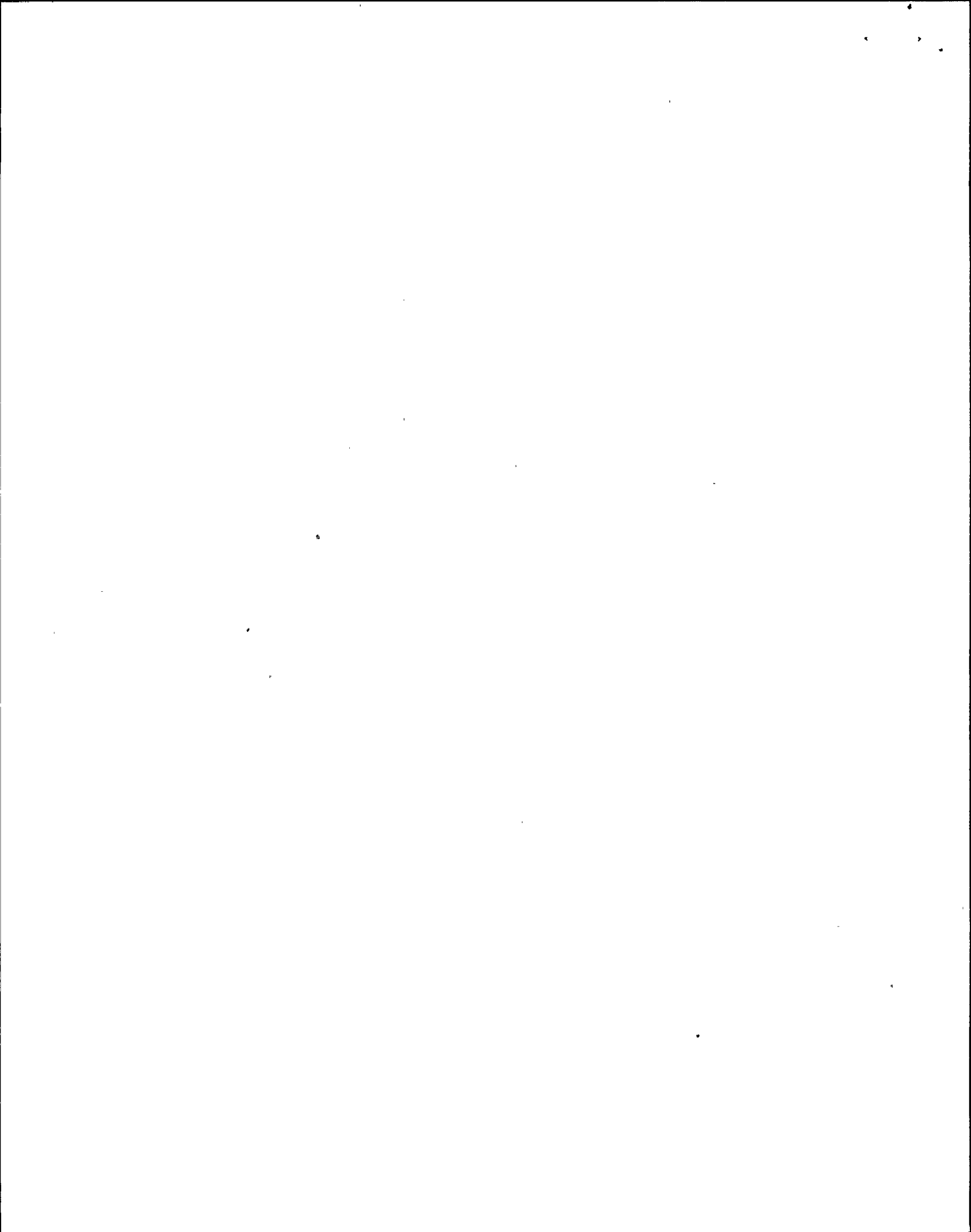
- a. Determine whether pressure is high or low by checking pressure indicator 2ASS-PI122 on panel P851.

NOTE: High header pressure is an indication that at least one of the pressure control loops 2ASS-PIC139/PV139 or 2ASS-PIC107/PV107 has failed open. Since 2ASS-PV139 and 2ASS-PV107 are in parallel, the pressure control valve in the loop that is operating properly will be closed.

- b. If steam inlet header pressure is high, locally perform the following:

1. At 2CES-RAK230, verify proper service air pressure to both 2ASS-PIC139 and PIC107 by checking that the control air supply pressure gauge on the pressure regulators indicate approximately 125 psig.

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I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

2. At 2CES-RAK230, check the controller output air pressure gauge for both 2ASS-PIC139 and 2ASS-PIC107. Valves 2ASS-PV139 and 2ASS-PV107 are air-to-close type valves. If one controller output is very low, then that control valve is open. Determine which valve is fully open.
3. Verify proper controller setpoint of approximately 125 psig. Adjust as required.
4. If the failed controller has a proper setpoint and control air is proper, then isolate the failed controllers associated pressure control valve as follows:
 - a. Close valve 2ASS-V36 for 2ASS-PV139.
 - b. Close valve 2ASS-V31 for 2ASS-PV107.
5. Verify that the other pressure control valve re-opens to control pressure at approximately 125 psig as indicated by 2ASS-PI7A(B) on 2CES-RAK230 or 2ASS-PI122 on P851.

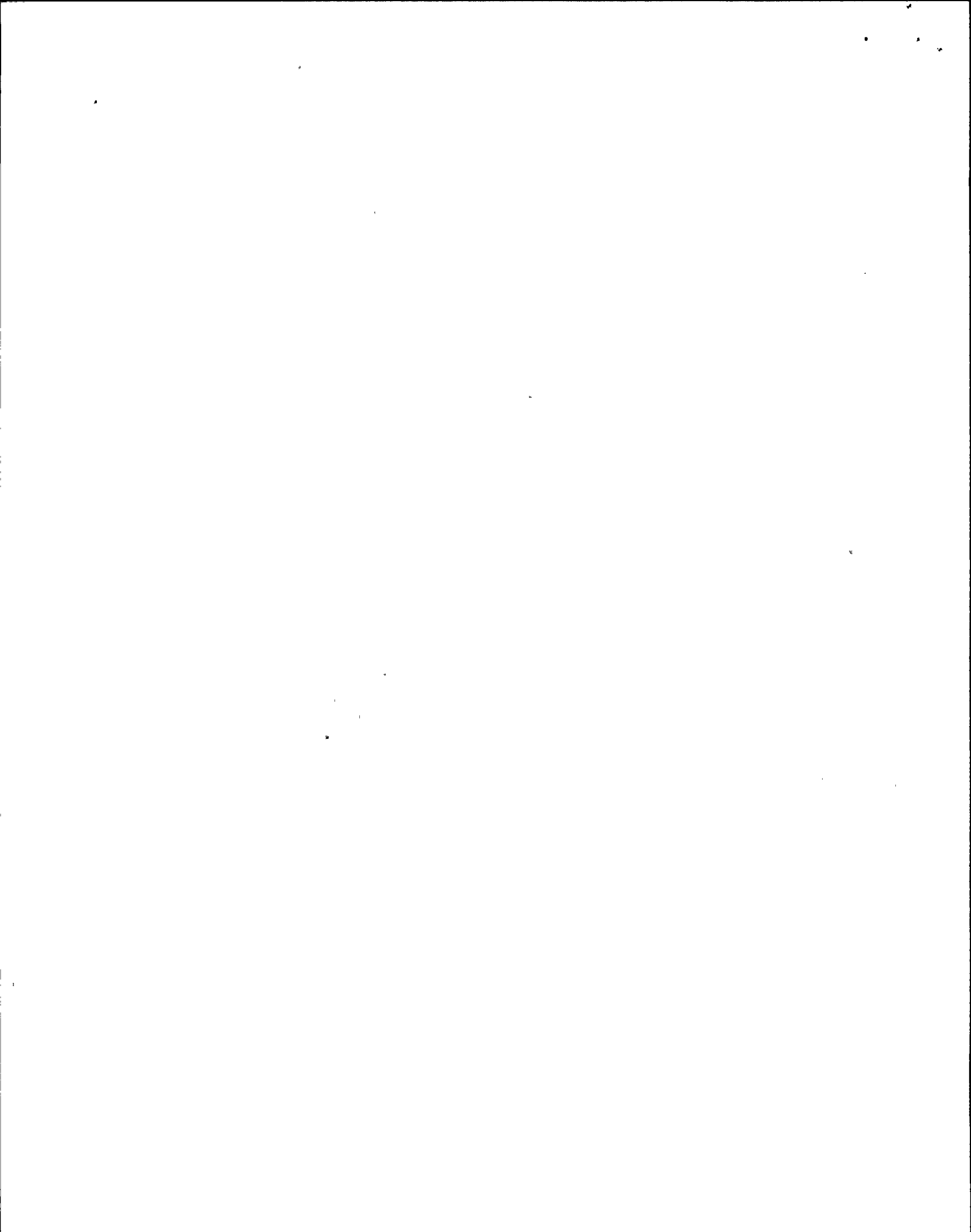
NOTE: Low header pressure is an indication that both pressure control loops have failed low or both pressure controllers have improper setpoints. This annunciator will also be energized during normal plant shutdown when main steam pressure drops below 125 psig.

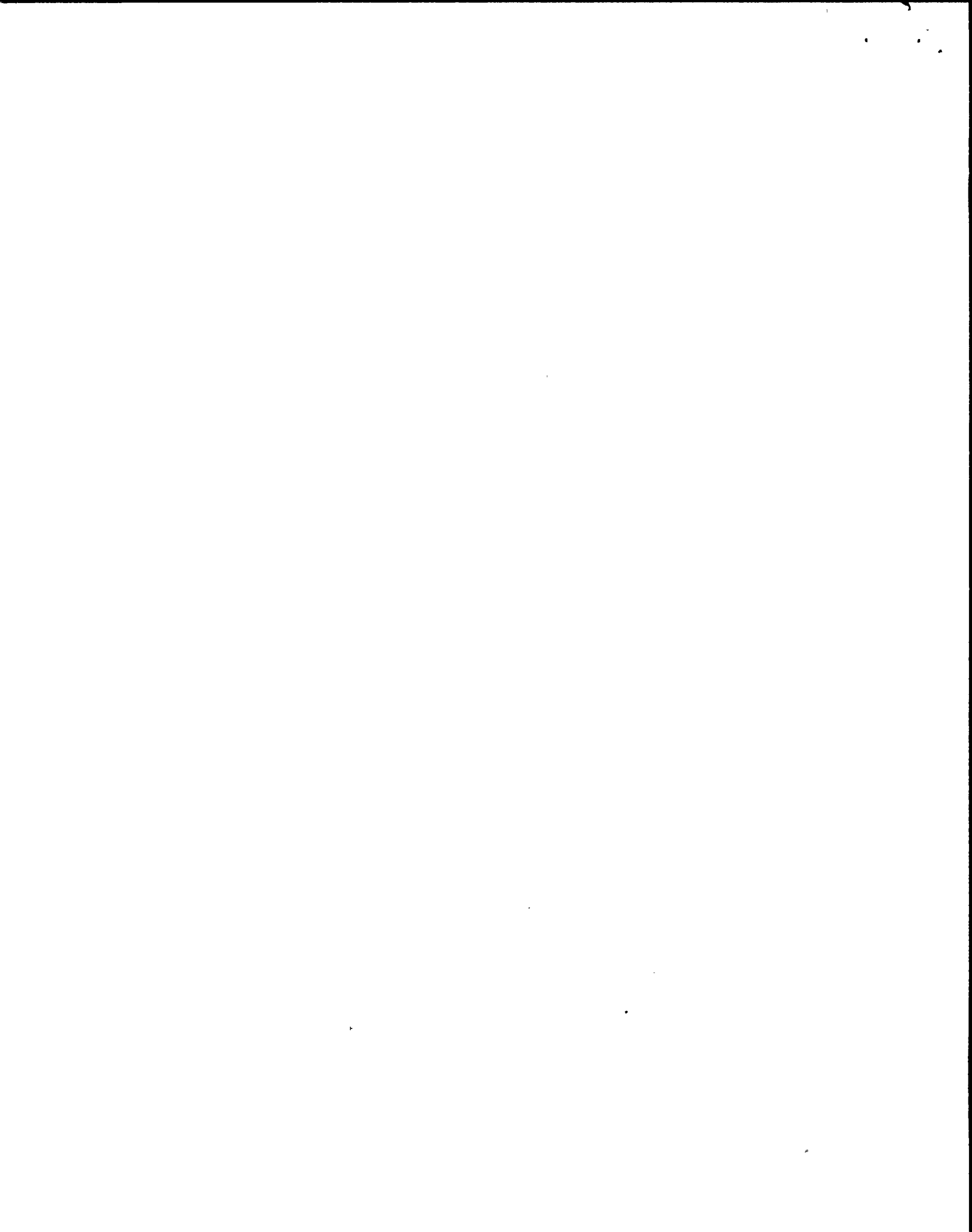
- c. If header pressure is low, locally perform the following:
 1. Monitor Main Condenser Vacuum on 2CNM-PI45A, B, C on P851. If condenser vacuum begins to decrease, manually increase SJAE supply pressure per the appropriate sections of this procedure.
 2. At 2CES-RAK230, verify that the setpoint for controllers 2ASS-PIC107 and 2ASS-PIC139 is approximately 125 psig. Adjust as required.
 3. At 2CES-RAK230, check that the control air pressure regulator gauge indicates approximately 25 psig for both pressure controller 2ASS-PIC107 and 2ASS-PIC139. Adjust as required.
 4. Verify that valves 2ASS-V31 and 2ASS-V36 are open.



I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

5. Check SJAE steam supply lineup per the applicable sections of Table 1.
6. Manually control SJAE driving steam pressure per the appropriate sections of this procedure.
7. If steam pressure cannot be returned to normal or if 2nd stage SJAE steam flow drops below normal, consideration should be given to beginning an orderly plant shutdown per N2-OP-101C.





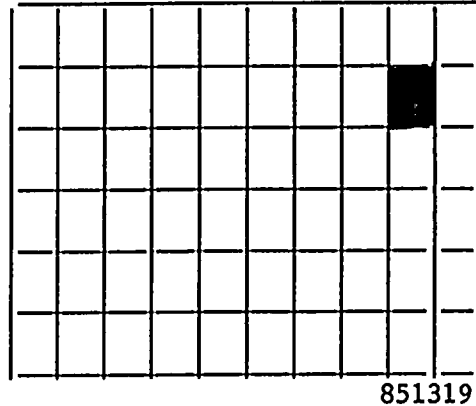
I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

7.0 851319 Condenser Air Removal Pump 1A/1B Seal Water Flow Low

Reflash: Yes

CNSR AIR REM
PUMP 1A/1B
SL WTR FLOW
LOW

851319



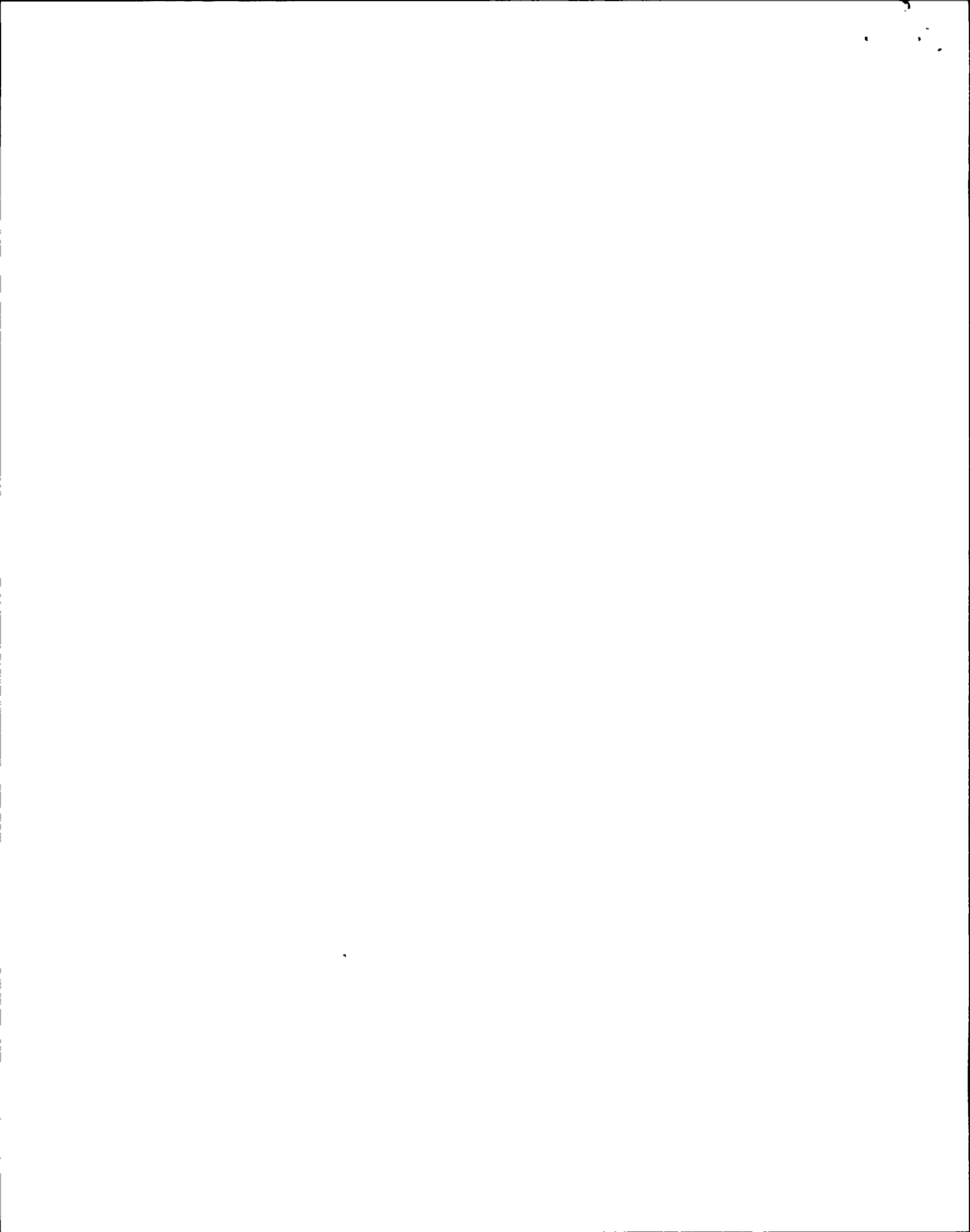
7.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	ARCFC01	2ARC-P1A SL WTR FLOW	2ARC-FS8A
	ARCFC02	2ARC-P1B SL WTR FLOW	2ARC-FS8B
			Setpoint 10 gpm

7.2 Automatic Response

- a. The associated condenser air removal pump 2ARC-P1A(B) trips after a 10 second time delay.

7.3 Corrective Action

- a. Determine which ARC Vacuum Pump 2ARC-P1A(B) has tripped by observing the pump status lights on P851.
- b. Verify proper level in separator 2ARC-SP1A (B) by observing the local level gauges 2ARC-LG9A (B).
- c. Check proper operation of the seal water pump (i.e., attempt to verify that the seal water pump had been operating properly.
- d. Determine the cause of the low flow condition and correct.
- e. Place the condenser Air Removal System in service as required.



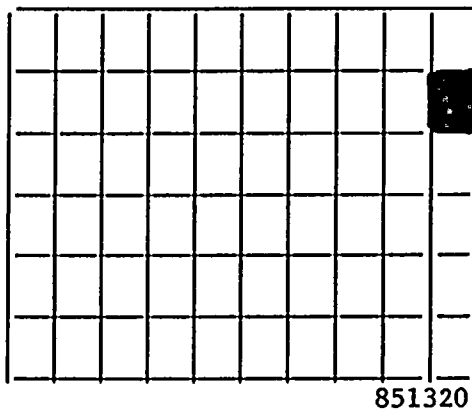
I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

8.0 851320 Condenser Air Removal Pumps Separator Tank 1A/1B Level High

Reflash: Yes

CNSR AIR REM
PUMPS
SEP TK 1A/1B
LEVEL HIGH

851320



8.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	ARCLC01	CNSR AIR REM TK SP1A LVL	2ARC-LS22A
	ARCLC02	CNSR AIR REM TK SP1B LVL	2ARC-LS22B

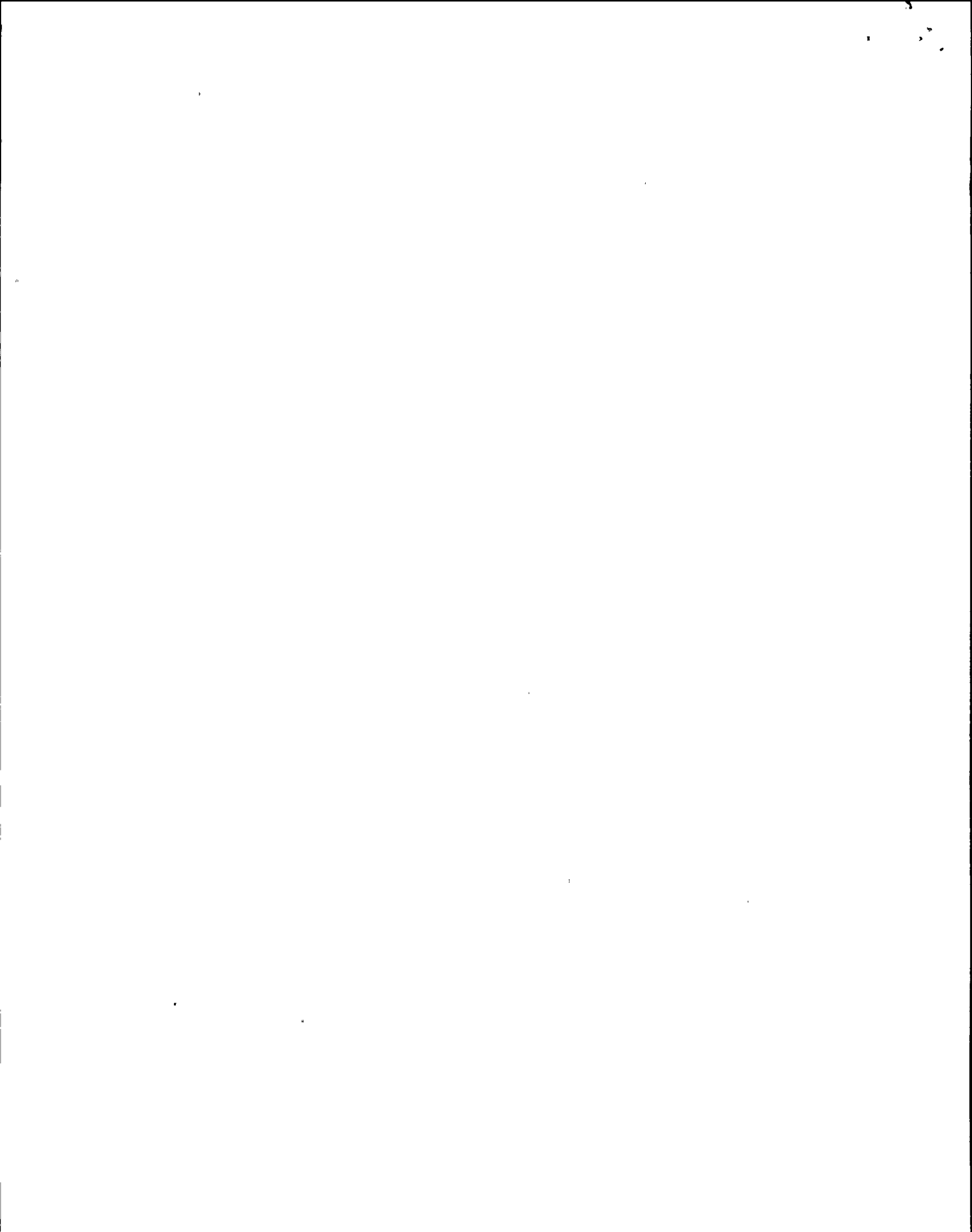
Setpoint - 28.5"

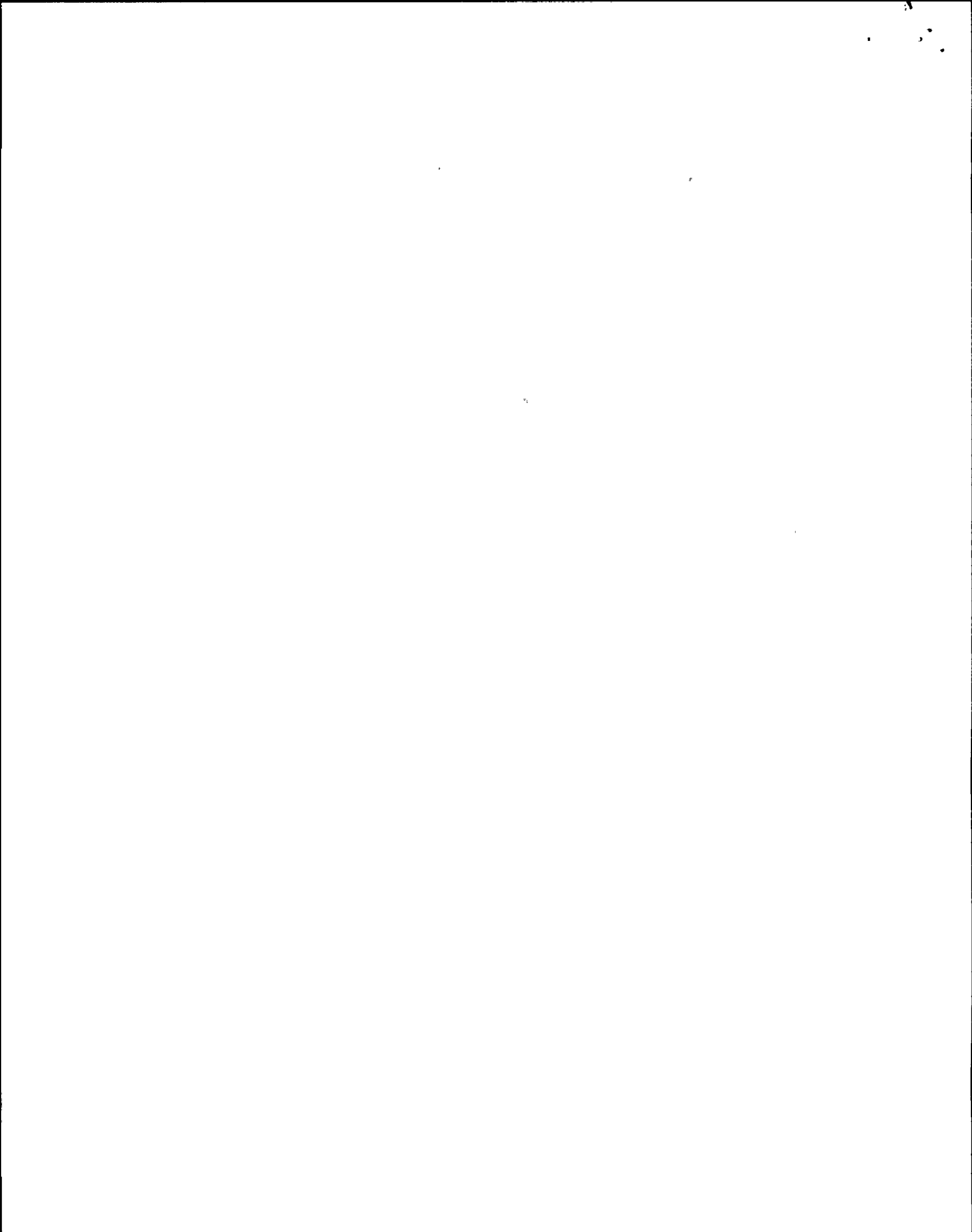
8.2 Automatic Response

NONE

8.3 Corrective Action

- a. Determine which separator tank has the high level by checking the computer points.
- b. Verify that valve 2ARC-SOV18A(B) is closed.
- c. Dispatch an operator to the separator tank 2ARC-SP1A(B) to manually open valve 2ARC-V4A(B) to drain the tank to within the normal range. When level returns to the normal range, close valve 2ARC-V4A(B).





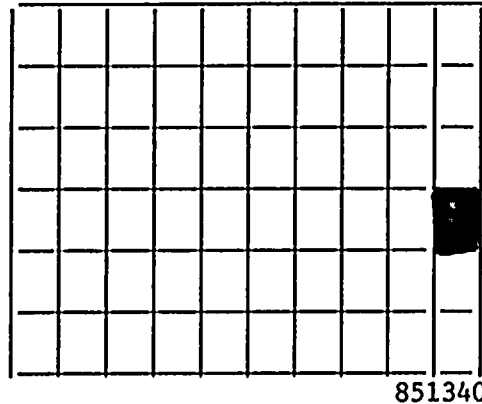
I. PROCEDURE FOR CORRECTING ALARM CONDITIONS (Cont)

10.0 851340 Condenser Air Removal Recovery Tank Level Hi-Hi/Lo-Lo

Reflash: Yes

CNSR AIR REM
RECOVERY TANK
LEVEL
HI-HI/LO-LO

851340



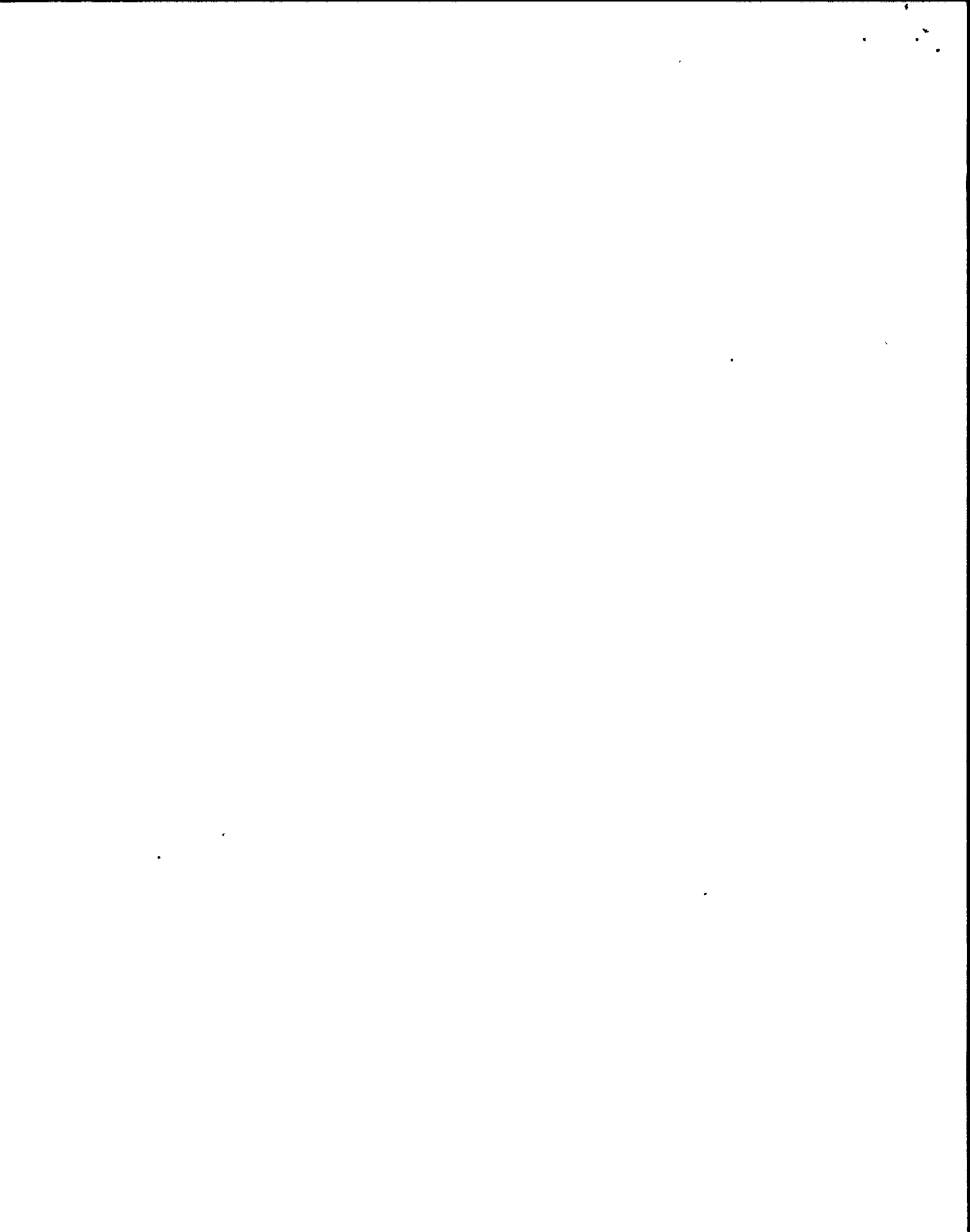
10.1	<u>Computer Point</u>	<u>Computer Printout</u>	<u>Source</u>
	ARCLC05	RECOVERY TK 2ARC-TK1 LVL	2ARC-LS108 Setpoint - 8 inches
	ARCLC06	RECOVERY TK 2ARC-TK1 LVL	2ARC-LS110 Setpoint - 16 inches

10.2 Automatic Response

NONE

10.3 Corrective Action

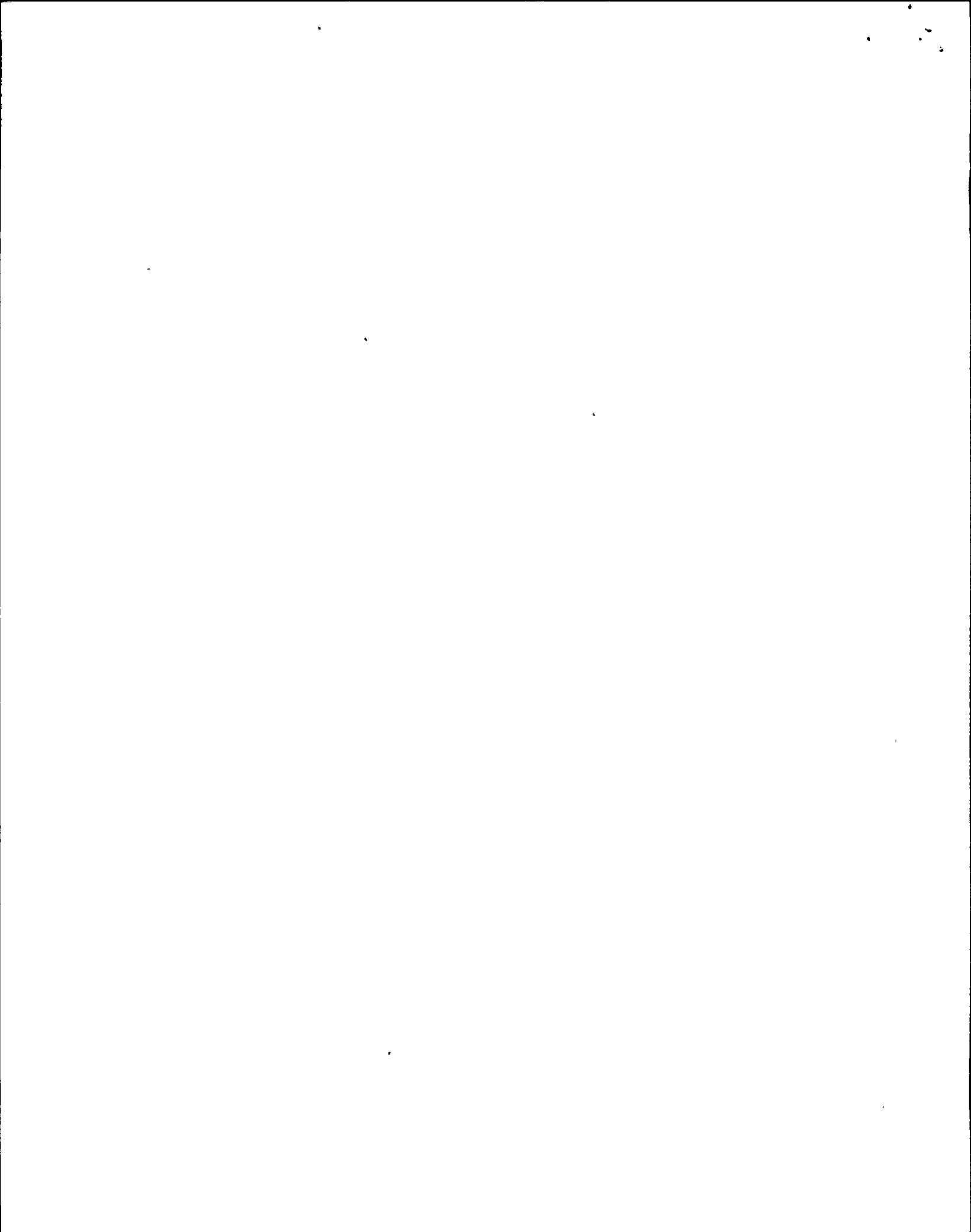
- a. Check the computer points to determine whether tank level is high or low.
- b. If recovery tank level is high, verify locally that valve 2ARC-SOV111 is open and 2ARC-P4 is running. If not, verify 2ARC-V81 and V82 are open and then operate 2ARC-SOV111 and 2ARC-P4 from the locally mounted control switch.
- c. If recovery tank level is low, verify locally that valve 2ARC-SOV111 is closed. If not, then close the valve using the locally mounted control switch.



ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-MOV5C	CNSR 1C Vacuum Breaker	C				
2ARC-HV25C	CNSR 1C Suct Isol.	0				
2ARC-HV26C	CNSR 1C Suct Isol.	0				
2ARC-V45	ARC Suction HDR Vent	CC				
2ARC-HV25B	CNSR 1B Suct Isol	0				
2ARC-HV26B	CNSR 1B Suct Isol	0				
2ARC-MOV5B	CNSR 1B Vacuum Breaker	C				
2ARC-HV25A	CNSR 1A Suct Isol	0				
2ARC-HV26A	CNSR 1A Suct Isol	0				
2ARC-MOV5A	CNSR 1A Vacuum Breaker	C				
2ARC-V47	ARC Suction Hdr Vent	CC				
2ARC-V50	Air Ejector Suct Line Loop Seal Inlet Isol Valve	0				
2ARC-AOV104	Air Ejector Inlet Isol	0				
2ARC-V46	Air Ejector Inlet Hdr Vent	CC				
2ARC-MOV15B	Precooler E2B Inlet Isol	*C *0				C for Startup 0 for Operation

POSITION CODES: 0 = Open L = Locked I = Installed
 C = Closed T = Tagged (Danger) NG = Not Gagged
 V = Throttled CC = Closed and Capped A = Auto



ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

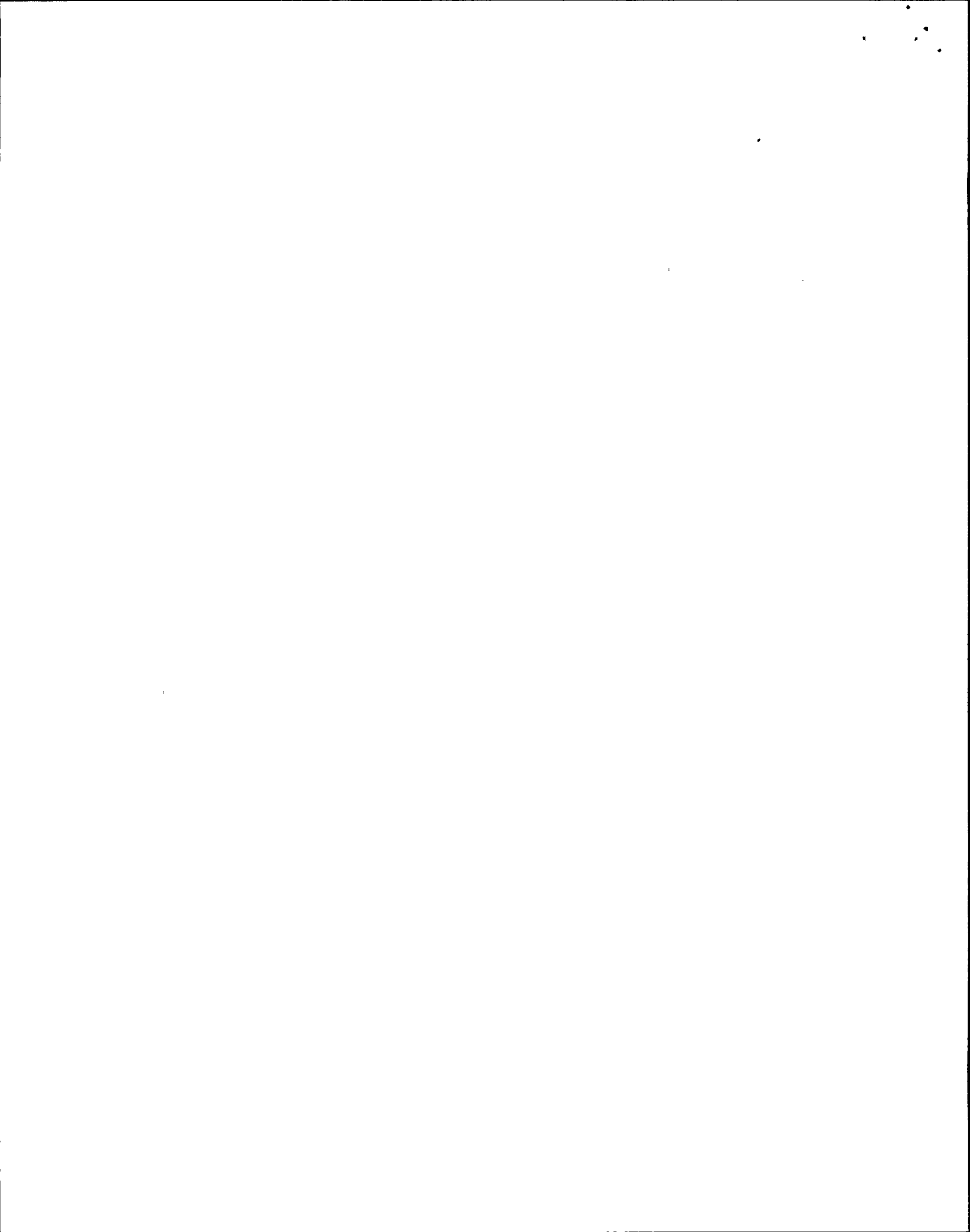
PROCEDURE NUMBER N2-OP-9		PROCEDURE TITLE CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V25B	Preclr E2B Inlet Line Test Connection	CC				
2ARC-V21B	Steam Supply to Primary JET J1B-1	C				Both 21, 22, 23, 24 Valves are Shut for Startup then the 'B' Valves will be opened as per procedure to line up the "B" Train.
2ARC-V22B	Steam Supply to Primary JET J1B-2	C				
2ARC-HV16B	Steam Strainer 1B Blowdown Isol	C				
2ARC-V23B	Steam Supply to Secondary JET J2B-1	C				
2ARC-V24B	Steam Supply to Secondary JET J2B-2	C				
2ARC-HV17B	Steam Strainer 2B Blowdown Isol	C				
2ARC-SV19B	Inter Condenser E3B Safety Valve	NG				
2ARC-V14B	Air Ejector Train B Discharge Check	I *				TCN-23

POSITION CODES: O = Open L = Locked I = Installed
 C = Closed T = Tagged (Danger) NG = Not Gagged
 V = Throttled CC = Closed and Capped A = Auto

*NOTE: Check valve 2ARC-V14B internals removed per Plant Mod. #88MX040.

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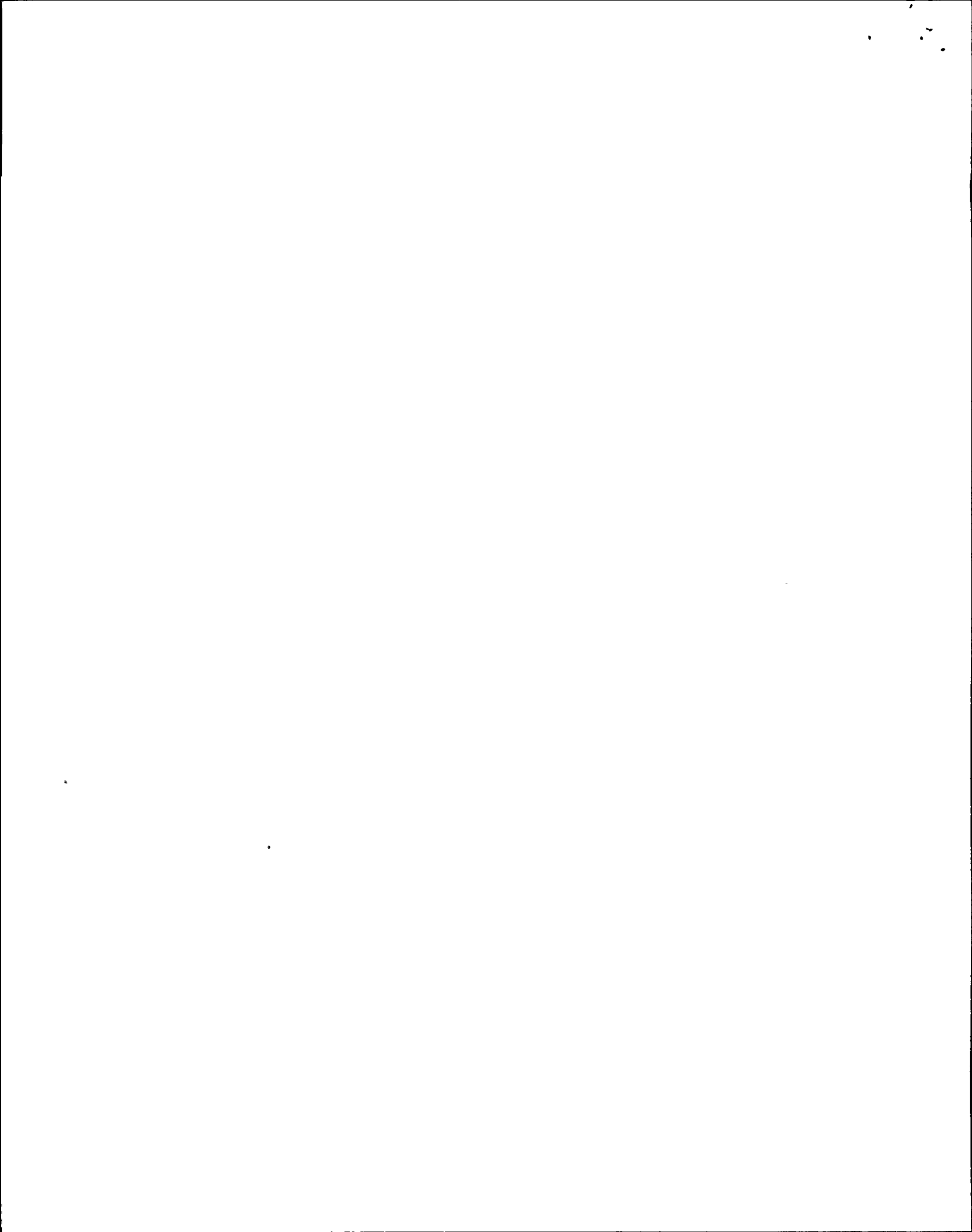
TCN-23



ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V13B	Air Ejector Train B Discharge Isol	O				
2ARC-V26B	Air Ejector Train B Disch Line Test Connection	CC				
2ARC-V25A	Preclr E2A Inlet Line Test Connection	CC				
2ARC-V21A	Steam Supply to Primary JET J1A-1	C				All 21, 22, 23, 24 valves are shut for Startup then the "B" train will be placed in service and per procedure the "B" valves will be opened.
2ARC-V22A	Steam Supply to Primary JET J1A-2	C				
2ARC-V23A	Steam Supply to Secondary JET J2A-1	C				
2ARC-V24A	Steam Supply to Secondary JET J2A-2	C				
2ARC-HV16A	Steam Strainer 1A Blowdown Isol	C				

POSITION CODES: O = Open L = Locked I = Installed
 C = Closed T = Tagged (Danger) NG = Not Gagged
 V = Throttled CC = Closed and Capped A = Auto



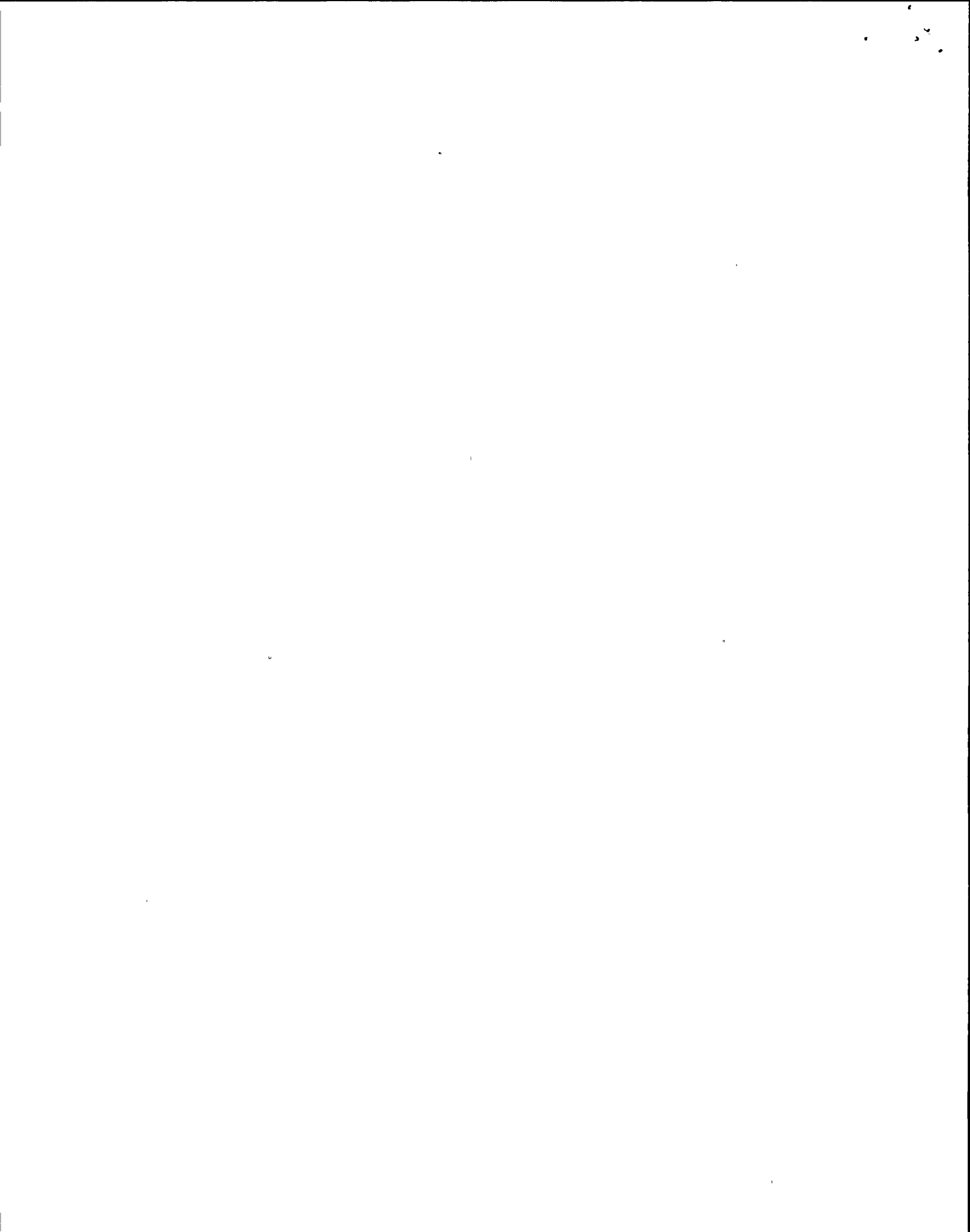
ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER N2-OP-9		PROCEDURE TITLE CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-HV17A	Steam Strainer 2A Blowdown Isol	C				
2ARC-MOV15A	Pre-Cooler E2A Inlet Isol	C				
2ARC-SV19A	Intercondenser E3A Safety Valve	NG				
2ARC-V14A	Air Ejector Train A Discharge Check	I *				TCN-23
2ARC-V13A	Air Ejector Train A Discharge Isol	C				
2ARC-V26A	Air Ejector Train A Disch Line Test Connection	CC				
2ARC-AOV105	Air Removal Pumps Inlet Isol	C				
2ARC-V3B	Air Removal Pump P1B Suction Isol	O				
2ARC-V10B	Air Removal Pump 1B Suct Line Test Connection	CC				

POSITION CODES: O = Open L = Locked I = Installed
 C = Closed T = Tagged (Danger) NG = Not Gagged
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*NOTE: Check valve 2ARC-V14A internals removed per Plant Mod. #88MX040.

TCN-23

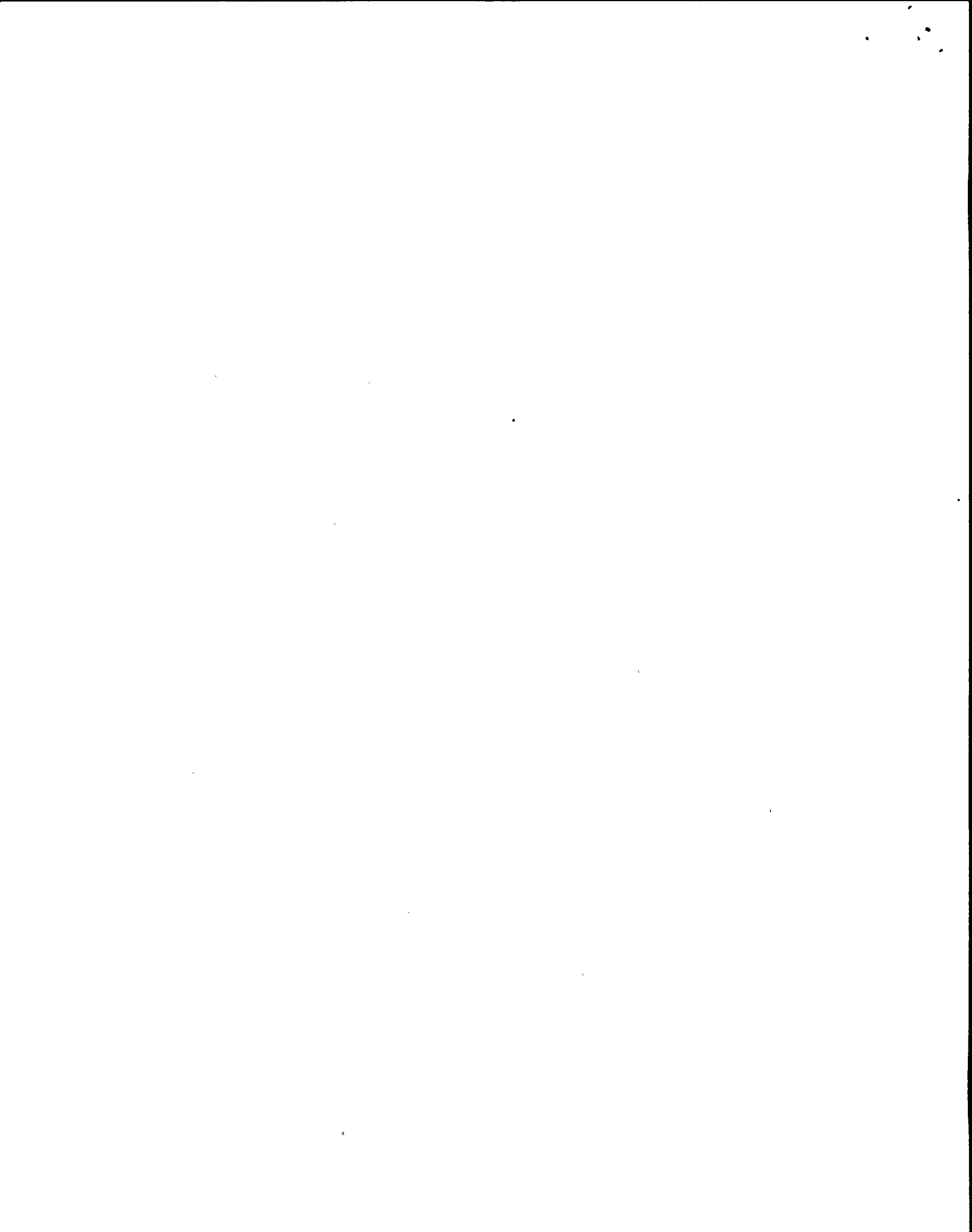


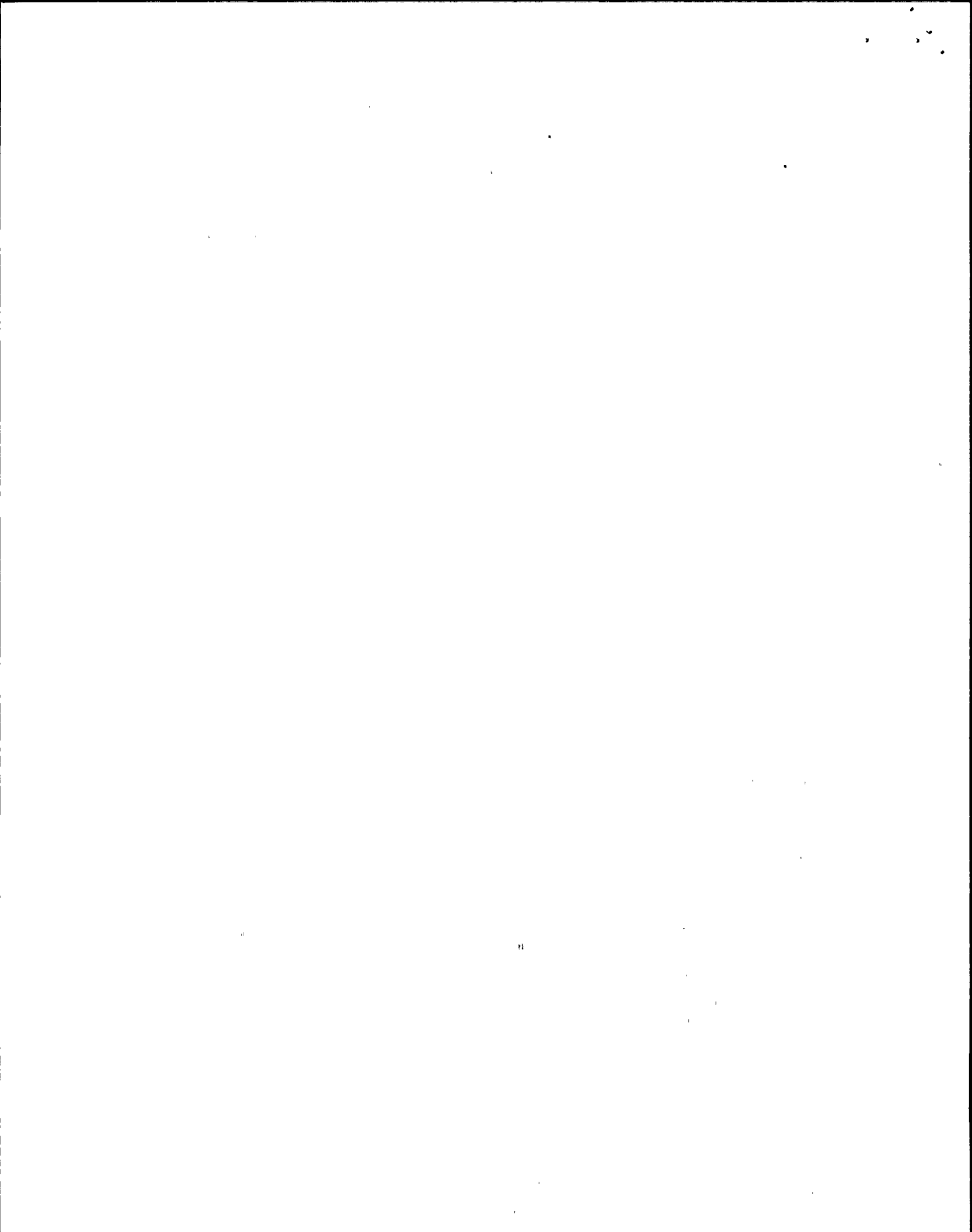
ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V5B	PI12B Inst Root Isol	0				
2ARC-V9B	Air Removal Pump P1B Suction Check	I				
2ARC-V7B	Separator SP1B Gas Outlet Check	I				
2ARC-V11B	Air Removal Pump 1B Disch Line Test Connection	CC				
2ARC-V27B	Separator SP1B Discharge Isol	0				
2ARC-V8B	Makeup Filtered Water to SP1B Manual Isol	0				
2ARC-SOV18B	Makeup Filter Water to SP1B Isol	A				
2ARC-V2003B	SOV18B Bypass Line Isol	C				
2ARC-V4B	Separator SP1B Drain	C				
2ARC-V39	LS 22B Inst Root Isol	0				
2ARC-V40	LS 22B Inst Root Isol	0				

POSITION CODES:	0 = Open	L = Locked	I = Installed
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	V = Throttled	CC = Closed and Capped	A = Auto

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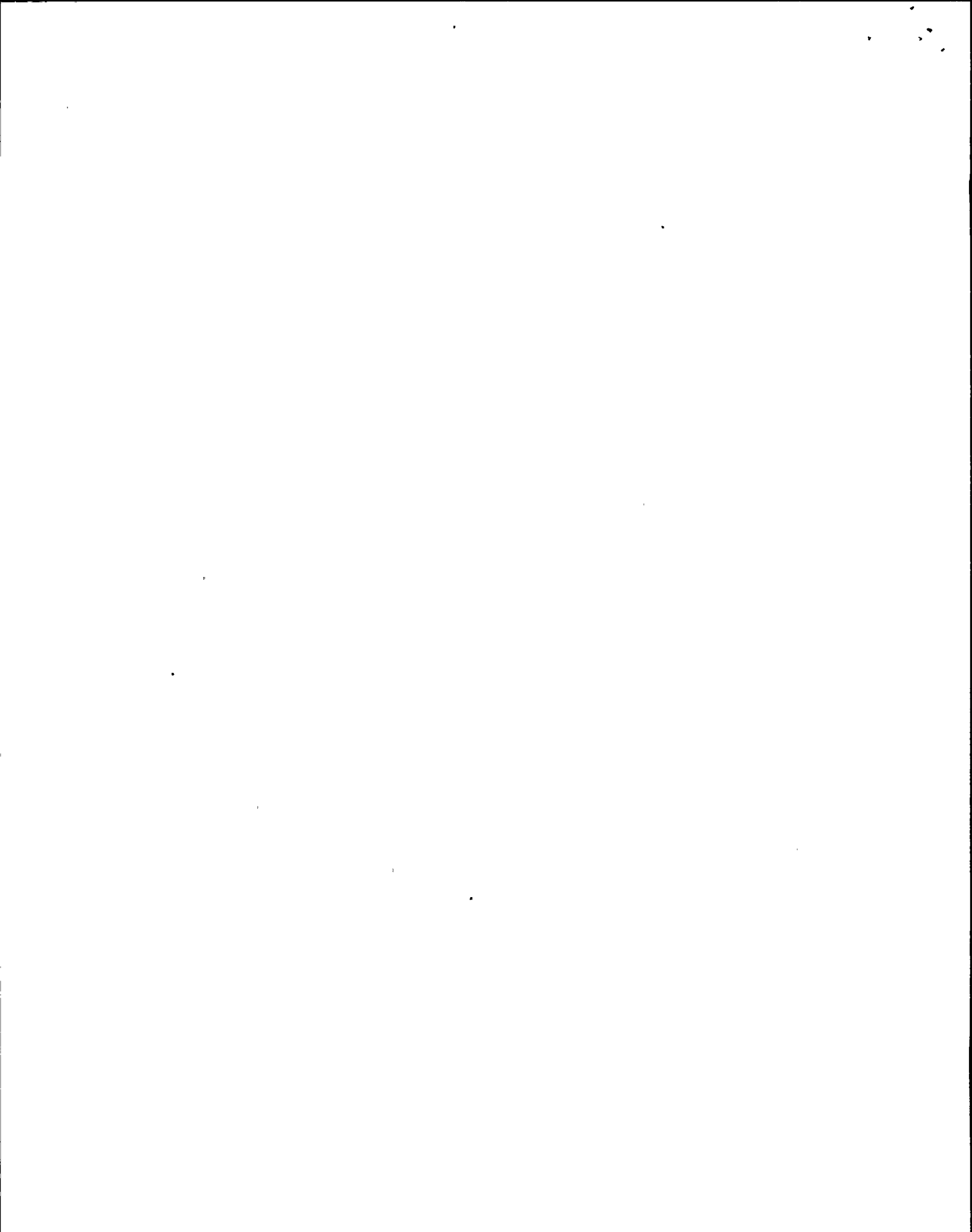


ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V41	LS22A Inst Root Isol.	O				
2ARC-V42	LS22A Inst Root Isol.	O				
2ARC-V36	Pre-Cooler E2A Loop Seal Isol	*C				*Shut during Startup Open during Operation
2ARC-V37	Intercondenser E3A Loop Seal Isol	*C				*Shut during Startup Open during Operation
2ARC-V30A	Pre-Cooler E2A Loop Seal Drain	CC				
2ARC-V31A	Pre-Cooler E2A Loop Seal Drain	CC				
2ARC-V33A	Intercondenser E3A Loop Seal Drain	CC				
2ARC-V35	Pre-cooler E2B Loop Seal Isol.	*C				*Shut for Startup Open for Operation
2ARC-V38	Intercondenser E3B Loop Seal Isol.	*C				*Shut for Startup Open for Operation
2ARC-V30B	Pre-cooler E2B Loop Seal Drain	CC				

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	V = Throttled	CC = Closed and Capped	A = Auto

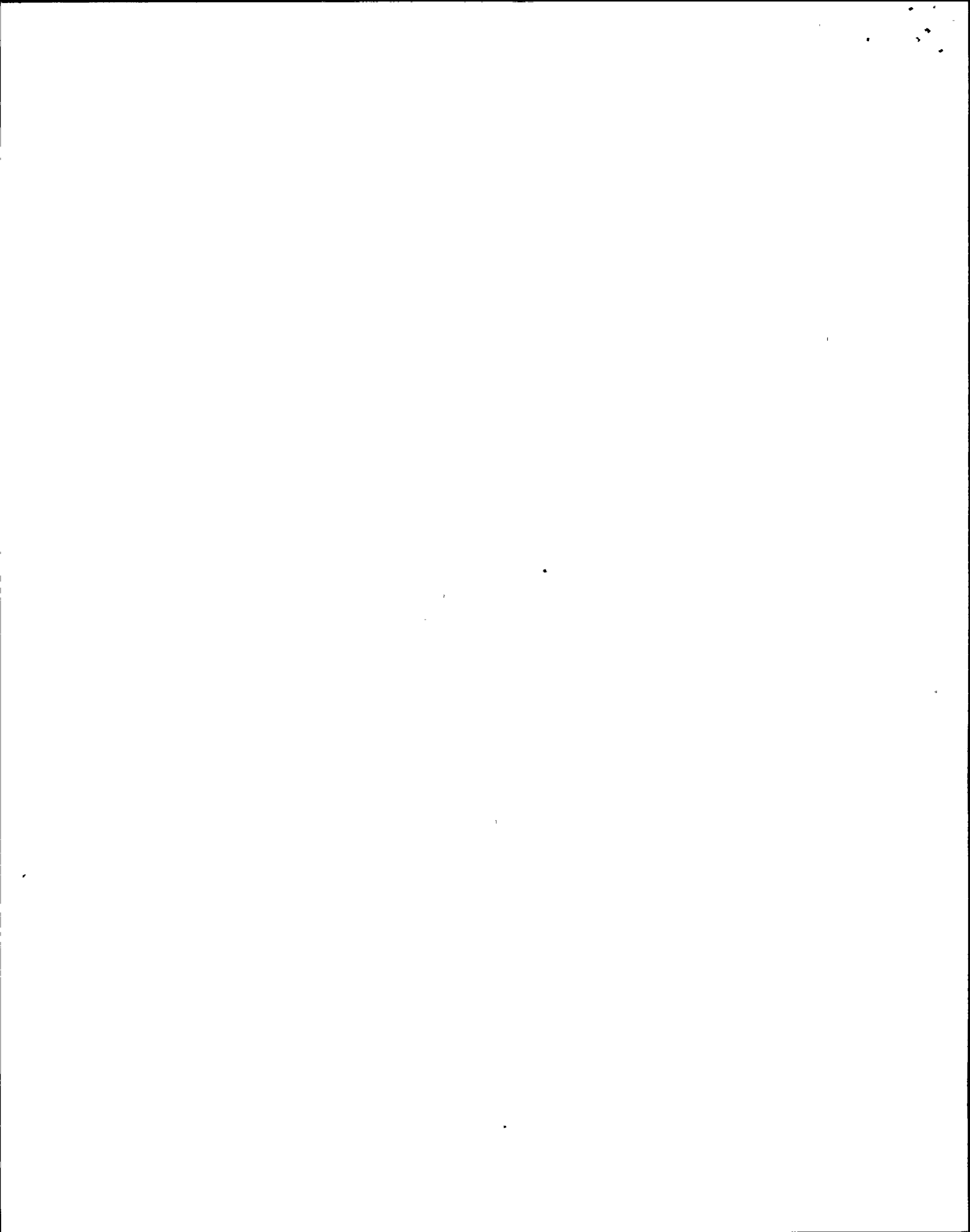
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ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V31B	Pre-cooler E2B Loop Seal Drain	CC				
2ARC-V33B	Intercondenser E3B Loop Seal Drain	CC				
2ARC-V51	Air Ejector Suct Line Loop Seal Drain Isol.	CC				
2ARC-V44	Air Ejector Suct Line Loop Seal Isol.	0				
2ARC-V53	TK 1 Instrument Hdr Root Isol	0				
2ARC-V56	TK 1 Instrument Hdr Root Isol	0				
2ARC-V68	TK 1 Inst Hdr Vent	CC				
2ARC-V63	TK 1 Inst Hdr Drain	CC				

POSITION CODES:	O = Open	L = Locked	I = Installed
	C = Closed	T = Tagged (Danger)	NG = Not Gagged
	V = Throttled	CC = Closed and Capped	A = Auto



ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V60	LS 110 Inst Root Isol	0				
2ARC-V59	LS 110 Inst Root Isol	0				
2ARC-V58	LS 108 Inst Root Isol	0				
2ARC-V57	LS 108 Inst Root Isol	0				
2ARC-V64	LS 108 Inst Drain	CC				
2ARC-V65	LS 108 Inst Vent	CC				
2ARC-V66	LS 110 Inst Drain	CC				
2ARC-V67	LS 110 Inst Vent	CC				
2ARC-V61	LS 111 Inst Vent	CC				
2ARC-V62	LS 111 Inst Drain	CC				
2ARC-V54	LS 111 Inst Root Isol	0				
2ARC-V55	LS 111 Inst Root Isol	0				
2ARC-SOV111	TK 1 Drain Isol	C				

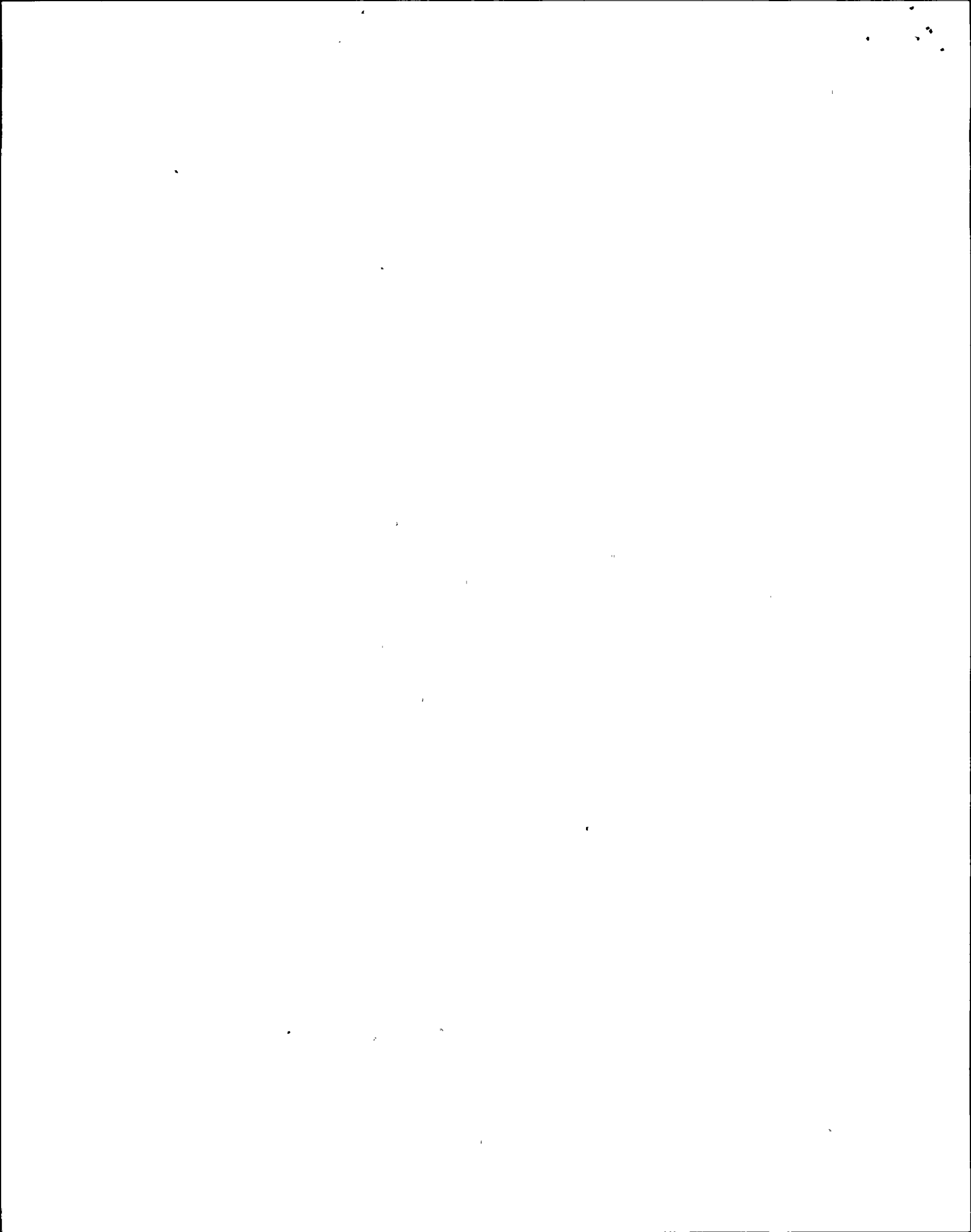
POSITION CODES:

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 V = Throttled

L = Locked
 T = Tagged (Danger)
 CC = Closed and Capped

I = Installed
 NG = Not Gagged
 A = Auto

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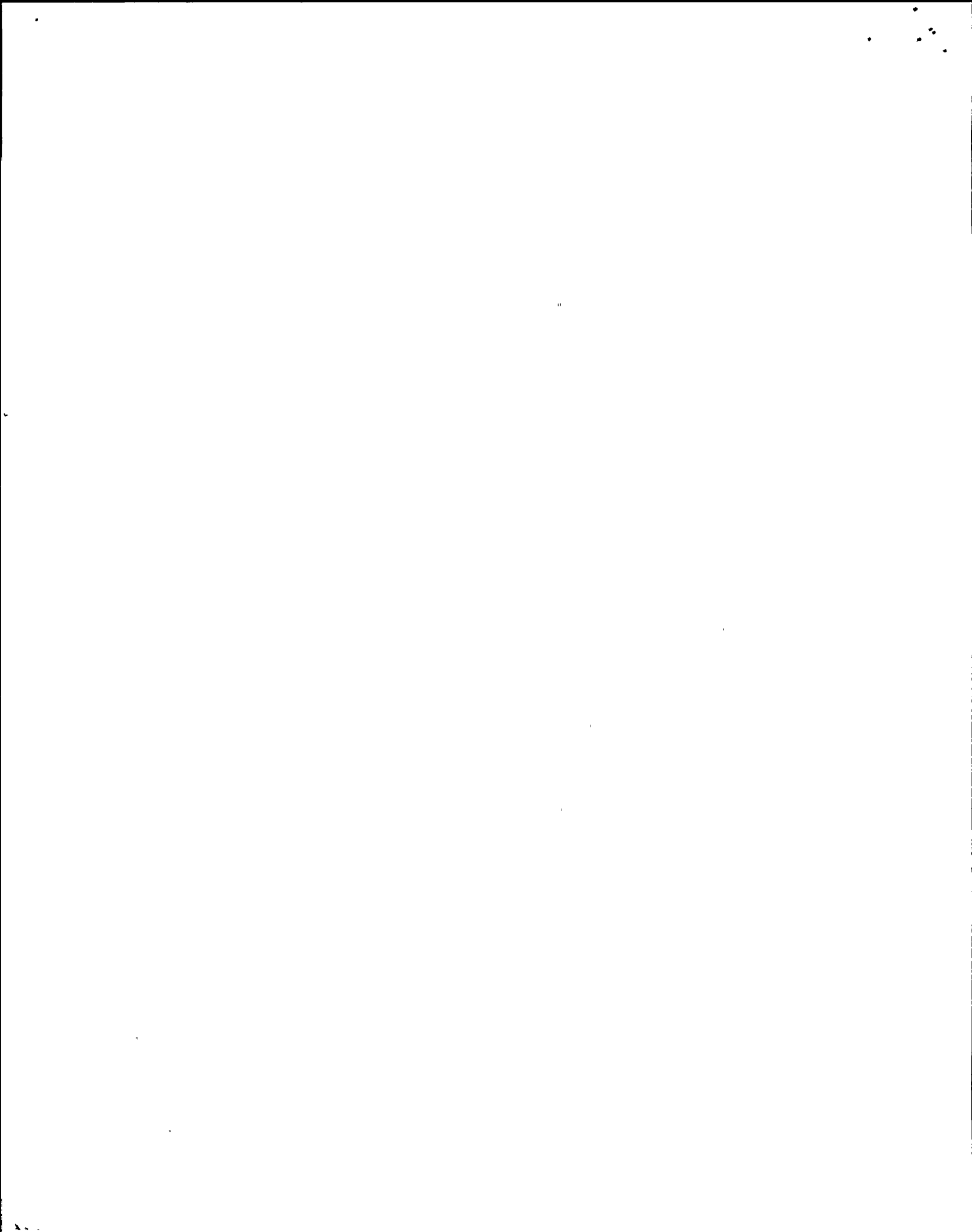


ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V2000B	Air Removal Pump 1B Drain	C				
2ARC-V2001B	Air Removal Pump 1B Drain	C				
2ARC-V2000A	Air Removal Pump 1A Drain	C				
2ARC-V2001A	Air Removal Pump 1A Drain	C				
2ARC-V2007A	LG 9A Isol	O				
2ARC-V2008A	LG 9A Isol	O				
2ARC-V2007B	LG 9B Isol	O				
2ARC-V2008B	LG 9B Isol	O				
2ARC-V2002A	Strainer 2A Drain	CC				
2ARC-V2002B	Strainer 2B Drain	CC				
2ARC-V2005A	FI1A Inst Root Isol	C				
2ARC-V2006A	FI2A Inst Root Isol	C				
2ARC-V2004A	Separator 1A Overflow Line Check	I				
2ARC-V2004B	Separator 1B Overflow Line Check	I				

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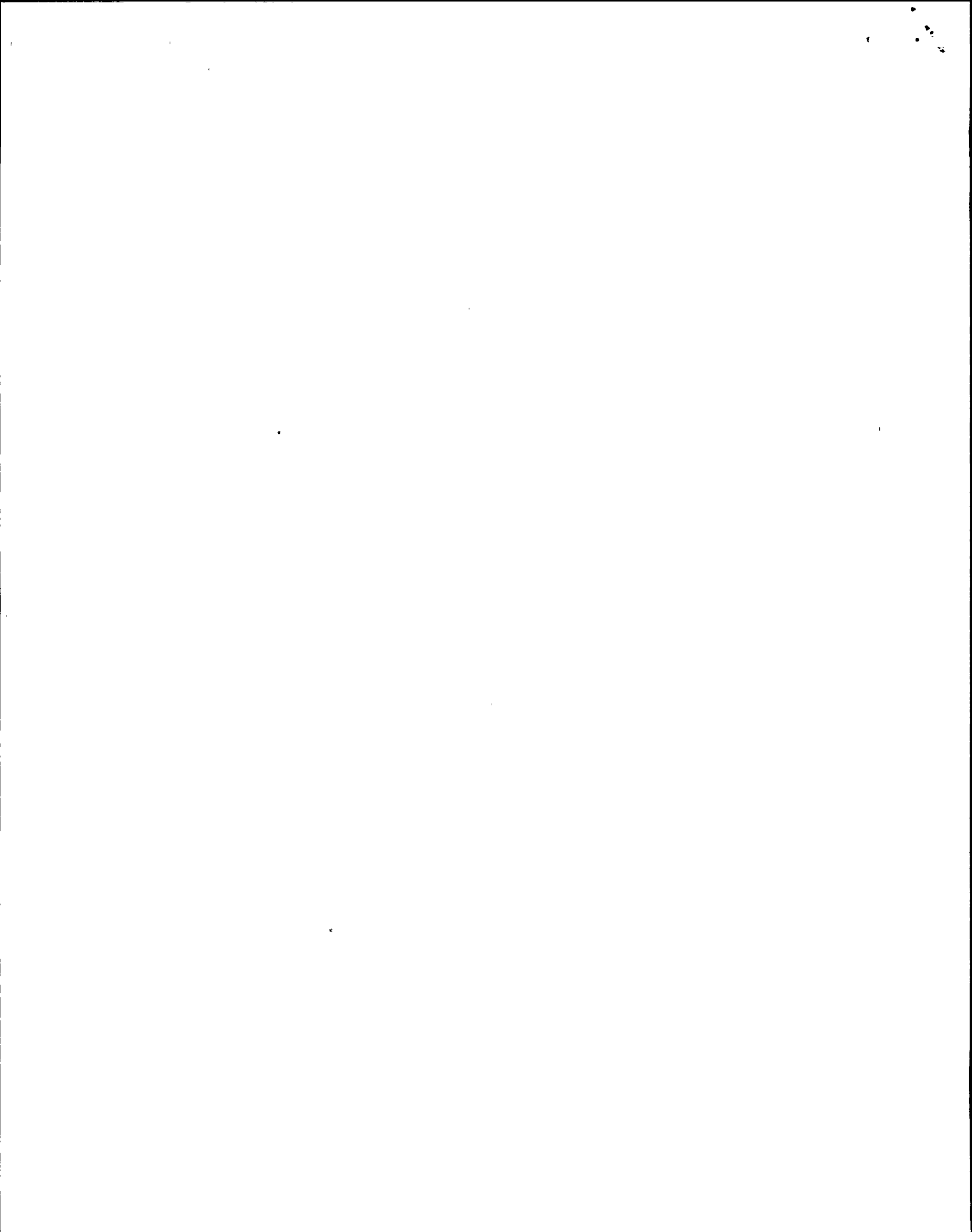


ATTACHMENT 1: SYSTEM VALVE LINEUP SHEET (Cont)

PROCEDURE NUMBER		PROCEDURE TITLE				
N2-OP-9		CONDENSER AIR REMOVAL				
Valve No.	Description	Required Position	ACTUAL POSITION	INITIALS AND DATE	INDEP. VERIF. INIT./DATE	REMARKS
2ARC-V75A	2ARC-MOV15A Bypass	C				
2ARC-V75B	2ARC-MOV15B Bypass	C				
2ARC-V76	2ARC-E3A Test Conn.	CC				
2ARC-V77	2ARC-E3B Test Conn.	CC				
2ARC-V69A	2ARC-J2A-1 Drain	CC				
2ARC-V70A	2ARC-J2A-2 Drain	CC				
2ARC-V69B	2ARC-J2B-1 Drain	CC				
2ARC-V70B	2ARC-J2B-2 Drain	CC				
2ARC-V80	TK1 Drain Check	I				
2ARC-V81	TK1 Drain Isolation	0				
2ARC-V82	P4 Isolation	0				

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POSITION CODES: 0 = Open L = Locked I = Installed
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ATTACHMENT 2: SYSTEM ELECTRICAL LINEUP SHEET

PROCEDURE NUMBER		PROCEDURE TITLE								
N2-OP-9		CONDENSER AIR REMOVAL								
POWER SUPPLY										
COMPONENT NO.	COMPONENT DESCRIPTION	Bus Number	-	Cubical/Breaker	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS/AND DATE	INDEP. VERIF INIT./DATE	REMARKS
2ARC-AOV104	Air ejector isolation valve solenoid	2SCI PNL B101		28		C				
2ARC-MOV15A	Pre-cooler Inlet Valve	2NHS-MCC006A		2A		C				
2ARC-MOV15B	Pre-cooler Inlet Valve	2NHS-MCC006B		16A		C				
2ARC-SOV18A	Make-up water valve (separator/silencer)	2IHS-PNL003		19		C				
2ARC-SOV18B	Make-up water valve (separator/silencer)	2IHS-PNL003		19		C				
2ARC-SOV25A	Air take off valve solenoid	2SCI-PNL-A101		CKT 21		C				
2ARC-SOV25B	Air take off valve solenoid	2SCI-PNL-A102		CKT 15		C				
2ARC-SOV25C	Air take off valve solenoid	2SCI-PNL-A101		CKT 20		C				
2ARC-SOV26A	Air take off valve solenoid	2SCI-PNL-A101		CKT 21		C				
2ARC-SOV26B	Air take off valve solenoid	2SCI-PNL-A102		CKT 15		C				

POSITION CODES: O = Open R = Removed I = Installed
 C = Closed RO = Racked-Out NG = Not Gagged
 T = Tagged (Danger) RI = Racked In A = Auto
 L = Locked

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ATTACHMENT 2: SYSTEM ELECTRICAL LINEUP SHEET (Cont)

PROCEDURE NUMBER	PROCEDURE TITLE									
N2-OP-9	CONDENSER AIR REMOVAL									
COMPONENT NO.	COMPONENT DESCRIPTION	POWER SUPPLY		Cubical/ Breaker	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS/ AND DATE	INDEP. VERIF INIT./DATE	REMARKS
		Bus Number	-							
2ARC-SOV26C	Air take off valve solenoid	2SCI-PNL-A101	-	CKT 20		C				
2ARC-SOV16A	Steam strainer blowdown valve solenoid	2SCI-PNL-A101	-	CKT 21		C				
2ARC-SOV16B	Steam strainer blowdown valve solenoid	2SCI-PNL-A102	-	CKT 15		C				
2ARC-SOV17A	Steam strainer blowdown valve solenoid	2SCI-PNL-A101	-	CKT 21		C				
2ARC-SOV17B	Steam strainer blowdown valve solenoid	2SCI-PNL-A102	-	CKT 15		C				
2ARC-P1A	Air removal pump	2NJS-US 8A	-	5C		RI				
2ARC-P1B	Air removal pump	2NJS-US 8B	-	11C		RI				
2ARC-P2A	Seal water recirc. pump 2A	2NHS-MCC006A	-	2C		C				
POSITION CODES:	O = Open	R = Removed		I = Installed						
	C = Closed	RO = Racked-Out		NG = Not Gagged						
	T = Tagged (Danger)	RI = Racked In		A = Auto						
	L = Locked									

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ATTACHMENT 2: SYSTEM ELECTRICAL LINEUP SHEET (Cont)

PROCEDURE NUMBER	PROCEDURE TITLE		POWER SUPPLY		REQUIRED	ACTUAL	INITIALS/	INDEP. VERIF	
N2-OP-9	CONDENSER AIR REMOVAL		Bus	-	Cubical/	POSITION	POSITION	AND DATE	INIT./DATE
COMPONENT NO.	COMPONENT DESCRIPTION	Number	Breaker	LOCATION	POSITION	POSITION	AND DATE	INIT./DATE	REMARKS
2ARC-P2B	Seal water recirc. pump 2B Breaker	2NHS-MCC006B	16C					C	
2ARC-MOV5A	Condenser vacuum breaker vlv	2NHS-MCC006A	2B					C	
2ARC-MOV5B	Condenser vacuum breaker vlv	2NHS-MCC006B	16B					C	
2ARC-MOV5C	Condenser vacuum breaker vlv	2NHS-MCC006C	11A					C	
2ARC-AOV105	Air removal isolation valve solenoid	2SCI PNL B101	28					C	
2ARC-FS8A	Vacuum P1A Seal Water Flow Switch	2SCA-PNL301	4					On	
2ARC-FS8B	Vacuum P1B Seal Water Flow Switch	2SCA-PNL301	17					On	
2ARC-H1A	Vacuum P1A Motor Heater	2SCA-PNL301	4					On	
2ARC-H1B	Vacuum P1B Motor Heater	2SCA-PNL301	17					On	
2ARC-LS31A	SP1A Level Switch	2IHS-PNL003	19					On	

POSITION CODES: O = Open
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 T = Tagged (Danger)
 L = Locked
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10

ATTACHMENT 2: SYSTEM ELECTRICAL LINEUP SHEET (Cont)

PROCEDURE NUMBER	PROCEDURE TITLE								
N2-OP-9	CONDENSER AIR REMOVAL								
POWER SUPPLY									
COMPONENT NO.	COMPONENT DESCRIPTION	Bus Number	Cubical/Breaker	LOCATION	REQUIRED POSITION	ACTUAL POSITION	INITIALS/ AND DATE	INDEP. VERIF INIT./DATE	REMARKS
2ARC-LS31B	SPIB Level Switch	2IHS-PNLO03	19		On				
2ARC-LS111	Recovery Tank TK 1 Level Switch	2IHS-PNLO03	17		On				
2ARC-SOV111	Recovery Tank TK 1 Level Control Valve	2IHS-PNLO03	17		On				
2ARC-P4	Recovery Tank TK1 Level Control Pump	2IHS-PNLO03	17		On				

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