ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

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GINNA STATION
UNIT #1
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DATE :-

TIME :-

PROCEDURE NO. E-1.2 REV. NO. 18

LOSS OF REACTOR COOLANT

TECHNICAL REVIEW

PORC 12/3/79

J C Bodine
Q/C REVIEW

12-3-79
DATE

APPROVED FOR USE

fn J C Moon
PLANT SUPERINTENDENT

12-3-79
DATE

QA X NON-QA ____ CATEGORY 1.0 THIS PROCEDURE CONTAINS 22 PAGES

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E-1.2

LOSS OF REACTOR COOLANT

1.0 SYMPTOMS:

1.1 Refer to Section 1.0 of E-1.1 if not already performed.

2.0 IMMEDIATE OPERATOR ACTIONS:

2.1 Refer to section 2.0 of E-1.1 if not already performed.

3.0 SUBSEQUENT OPERATOR ACTIONS:

CAUTION: The diesels should not be operated at idle or minimum load for extended periods of time. If the diesels are shut down, they should be prepared for restart.

3.0.1 Monitor RWST level closely. If RWST level decreases rapidly such that the RWST low level alarm appears imminent, go directly to step 3.6.

CAUTION: Do not rely upon S/G or Pressurizer level indication after any event where a high energy line break has occurred inside of containment. An erroneous level indication will be caused by reference leg heatup and possible boiling as a result of increased CV temperature and/or changes in S/G pressurizer pressures. Basis for this is shown in tables 1-4 and figures 1-4, attached.

If S/G and pressurizer levels are maintained between 85% and 25%, this will ensure an actual water level is present.
NOTE: At a CV temperature of 300°F, CV pressure will be over 52 psig. The following tables show the maximum and minimum levels at graduated levels of temperature during post accident conditions which will ensure an actual water level exists somewhere between the level taps.

PRESSURIZER			S/G (NARROW RANGE)	
Min. Level % of Span	Max. Level % of Span	C.V. TEMPERATURE (°F)	Min. Level % of Span	Max. Level % of Span
10%	85%	150	5%	95%
14%	85%	200	10%	95%
19%	85%	250	13%	95%
24%	85%	300	17%	95%
30%	85%	350	22%	95%
37%	85%	400	27%	95%

NOTE: The process variables referred to in this Instruction are typically monitored by more than one instrumentation channel. The redundant channels should be checked for consistency while performing the steps of this Instruction.

NOTE: The pressurizer water level indication should always be used in conjunction with other specified reactor coolant system indications to evaluate system conditions and to indicate manual operator actions.

3.1 As the water in the refueling water storage tank decreases under the action of the safeguards pumps, check that sump "B" water level instrumentation indicates an increase in water level in the sump. If a sump "B" water level increase is not evident then a re-evaluation of the symptoms in E-1.1 must be conducted unless step 3.2 below applies.

3.2 Regulate the auxiliary feedwater flow to the steam generators to restore and/or maintain an indicated narrow range water level. If narrow range water level increases in an unexplained manner in one steam generator verify other potential S/G Tube Leak Symptoms, if valid go to E-1.4, Steam Generator Tube Rupture.

NOTE: Monitor the primary water supply (Condensate Storage Tank) for the auxiliary feedwater pumps and upon reaching a low level, switch over to an alternate water supply source. (procedure T-41E).

3.3 Close all pressurizer power operated relief valves and backup isolation valves.

3.4 Check for SI termination criteria by:

CAUTION: Ensure that containment isolation is maintained, i.e., not reset until such time as manual action is required on necessary process streams.

3.4.1 IF reactor coolant pressure is above the shutoff head of the safety injection pumps

3.4.2 AND safety injection flow to the Reactor Coolant System is zero

3.4.3 THEN attempt to reestablish the reactor coolant pressure to greater than 2000 psig and pressurizer water level to greater than 50% of span

3.4.3.1 BY Resetting safety injection, and

3.4.3.2 Establishing full charging flow.

CAUTION: Subsequent to this Step, should loss of offsite power occur manual safety injection initiation will be required to load the safeguards equipment onto the diesel powered emergency busses.

3.4.4 Safety Injection can be terminated IF:

3.4.4.1 Reactor coolant pressure is greater than 2000 psig and increasing, AND

3.4.4.2 Pressurizer water level is greater than 50% of span, AND

3.4.4.3 The reactor coolant indicated subcooling is greater than 50°F per subcooling meters AND

NOTE: As a backup to the subcooling meters, the average of thermocouples (points 11, 15, 18, 19 & 20) may be used with pressurizer pressure and the attached saturation curve to verify 50°F subcooling.

3.4.4.4 Water level in at least one Steam Generator > 25% in the narrow range to assure that the U-tubes are covered.

THEN:

3.4.4.5 Stop all SI and RHR pumps

3.4.5 Following termination of safety injection place all safety injection pumps in standby mode and maintain operable safety injection flowpaths.

CAUTION: If reactor coolant pressure drops below the low pressurizer pressure setpoint for safety injection or pressurizer water level drops below 20% of span following termination of safety injection flow or the reactor coolant system is < 50°F subcooled, THEN MANUALLY REINITIATE safety injection to ensure core cooling. Go to Section 3.0 fo E-1.1 to reevaluate the event.

3.4.6 Reset containment isolation by performing the following:

3.4.6.1 Place CV Sump A pumps in pull-stop position

3.4.6.2 Place all containment isolation (T signal) valve switched in the closed position and manually reset containment isolation by use of key switch. (Refer to Automatic Actions in Section 4 of E-1.1 for Containment Isolation Valve numbers)

3.4.6.3 If outside power has been lost, close bus tie breaker 14 to 13 and/or 16 to 15 and restart instrument Air Containment Compressors as necessary.

3.4.6.4 Open the Instrument Air Containment Isolation valve.

3.4.7 Reestablish normal makeup and letdown (if letdown is unaffected) to maintain pressurizer water level in the normal operating range and to maintain reactor coolant pressure at values reached when safety injection is terminated. Ensure that water addition during this process does not result in dilution of the reactor coolant system boron concentration.

3.4.8 Reestablish operation of the pressurizer heaters (refer to O-8.1, "Restoration of Pressurizer Heaters to Maintain Natural Circulation at HSD," if no RCP's are running). When reactor coolant pressure can be controlled by pressurizer heaters alone, return makeup and letdown to pressurizer water level control.

3.4.9 Verify that RCS temp is $\geq$ 50°F subcooled per subcooling meters.

NOTE: As a backup to the subcooling meters the average of thermocouples (points 11,15,18,19 & 20) may be used with pressure pressure and the attached saturation curve to verify 50°F subcooling.

3.4.9.1 If 50°F indicated subcooling is not present then attempt to establish 50°F indicated subcooling by steam dump from the steam generators to the condenser or the atmosphere.

CAUTION: If steam dump is necessary, reduce the steam generator pressure 200 psi below the lowest steam safety valve setpoint and maintain a reactor coolant cooldown rate of no more than 50°F/HR, consistent with plant make-up capability.

3.4.9.2 If 50°F indicated subcooling cannot be established or maintained, then manually reinitiate safety injection. Go to Section 3.0 of E-1.1 to re-evaluate the event.

3.4.10 Perform a controlled cooldown to cold shutdown conditions using Normal Cooldown Procedures if required to effect repairs. Maintain subcooled conditions (at least 50°F indicated subcooling) in the reactor coolant system. If subcooled conditions cannot be maintained, go to step 3.5.

3.5 If the conditions for terminating safety injection in Step 3.4 are not met start or maintain necessary safety injection pumps operating. If any safeguards equipment is not operating, attempt to operate the equipment from the control room or locally. Effect repairs if necessary. If reactor coolant pressure is above the low head safety injection pump shut-off head, manually reset safety injection so that safeguards equipment can be controlled by manual action. Stop the low head safety injection pumps and place in the standby mode.

CAUTION: Whenever the reactor coolant pressure decreases below the low head safety injection shutoff head, the low head safety injection pumps must be manually restarted to deliver fluid to the reactor coolant system.

3.6 Stop ALL Reactor Coolant Pumps after the high head safety injection pump operation has been verified and when the narrow range reactor coolant pressure is $\leq$ 1715 psig.

CAUTION: If reactor coolant pumps are stopped, the seal injection flow should be maintained.

NOTE: The conditions given above for stopping reactor coolant pumps should be continuously monitored throughout this instruction:

3.7 In the case of a break characterized by reactor coolant pressure quickly decreasing below steam generator pressure, go to step 3.8. In case of a break characterized by a slowly decreasing reactor coolant pressure or stabilized reactor coolant system pressure above the lowest steam system safety valve setpoint, (1085) psig, the following additional manual actions should be taken to aid the cooldown and depressurization of the reactor coolant system:

3.7.1 If the main condenser is in service, open at least one main steamline isolation valves or bypass valves and transfer the steam dump control to steam header pressure control and dump steam to the condenser to lower the reactor coolant temperature and consequently the reactor coolant pressure.

3.7.2 If the main condenser is not in service, dump steam to the atmosphere with the steam relief valves to lower the reactor coolant temperature and consequently the reactor coolant pressure.

CAUTION: Reduce the steam generator pressure 200 psi below the lowest steam system safety valve setpoint and maintain a reactor coolant cooldown rate of no more than 50°F/HR, consistent with plant make-up capability.

NOTE: If RWST low level alarm is not imminent, then consideration should be given to performing a preliminary evaluation of the plant status in Steps 3.10 and 3.11.

3.8 Perform the following:

3.8.1 Check for break in high head safety injection line by observing flow on F.I. 924 (A pump to B loop) and F.I. 925 (B pump to A loop). If a break has occurred in a high head injection line, the flow meter reading in the corresponding header may be constant and substantially higher than in the other.

PRECAUTION: Stopping flow to the high flow rate line may not be wise, however, because the same indication of unbalanced flow could be caused by a check valve failing to open completely. Therefore, no action should be taken unless the operator is firmly convinced that his actions will not aggravate the accident condition.

3.8.1.1 With no flow on FI 924 and no pressure on PI 922 secure "A" SI pump and close MOV-871A.

3.8.1.2 With no flow on FI 925 and no pressure on PI 923 secure "B" SI pump and close MOV-871B.

3.8.2 Check for break in Low Head Safety Injection by observing flow on F.I. 626. A flow reading above 200 gpm when the reactor coolant system is above 170 psig, may be an indication of a leak in one of the two Low Head Injection Lines or the RHR Return Line to the Loop either inside or outside containment. If large leaks are observed in the RHR or SI systems outside containment, action should be taken to provide core delivery and minimize radiation exposure. In the case of the two low head injection line inside containment it may be difficult to detect if one line is spilling to containment without getting to the vessel; so unless the operator is firmly convinced that a realignment is necessary to provide core delivery and his action will not aggrevate the accident condition he should not realign the systems.

NOTE: By exercising HCV-624, and HCV-625, and by watching the corresponding indication on FI-626, the operator could detect failure location, isolate it, and use an alternate path for recirculation.

3.8.3 Reset SI signal when either MOV-825A or MOV-825B, Safety Injection Pumps suction from RWST, is open.

PRECAUTION: If loss of off-site power occurs during the INJECTION PHASE of SI after the SI signal has been reset, manually push SI button again to restart the required engineered safeguards equipment on the Emergency Diesel Generators.

3.8.4 When the refueling water storage tank low level alarm is actuated at 31%, stop one safety injection pump and one containment spray pump.

3.8.5 Stop auxiliary feedwater flow to the steam generators when the level has increased to 40%.

3.8.6 If a charcoal filter high temperature alarm is actuated, open the charcoal filter dousing valves 875A, B or 876A, B.

3.8.7 Restore Service Water Flow to both component cooling water heat exchangers, if lost, by opening MOV 4616 and 4735 for "A" Hx, and MOV 4615 and 4734 for "B" Hx, and start both component cooling water pumps.

3.8.7.1 Ensure that the component cooling system's supply and return lines associated with containment users are isolated from the outside portion of the system by closing or ensuring closed the following remote operated C.I. valves.

3.8.7.2 Close supply lines
MOV 817 (Common CC supply to Containment)
MOV 749A (CC supply to "A" RCP)
MOV 749B (CC supply to "B" RCP)
MOV 813 (CC supply to Reactor Support Coolers).

3.8.7.3 Close return lines
MOV 759A (CC return from "A" RCP)
MOV 759B (CC return from "B" RCP)
AOV 745 (CC return from Excess Letdown Heat Exchanger)
MOV 814 (CC return from Reactor Support Cooler)
NOTE: Valves 813 and 814 isolate automatically

3.8.8 Ensure that component cooling flow is established to the residual heat exchangers by opening MOV-738A and MOV 738B CCW from RHR Heat Exchanger.

3.8.9 Verify that component cooling low flow alarms to the residual heat removal, containment spray and safety injection pumps are not actuated.

3.8.9.1 Alarm A-9 RHR Pump Cooling Water Outlet low flow.

3.8.9.2 Alarm A-14 Safety Injection Pumps Cooling Water Outlet low flow.

3.8.9.3 Alarm A-6 Containment Spray Pumps Water Outlet low flow.

3.8.10 Determine by PR-420 if reactor coolant system pressure will permit recirculation without the use of a high head injection pump (system pressure below 140 psig).

3.8.11 If spray additive has been actuated during the injection phase and spray additive tank level is higher than 40% or if containment pressure is > 30 psig, prepare to initiate recirculation with containment spray.

3.8.12 At 10% in RWST, stop the operating safety injection, containment spray and residual heat removal pumps, proceed to the recirculation phase.

3.8.13 Recirculation Phase

Important: THE SWITCHOVER SHOULD BE COMPLETED AS RAPIDLY AS POSSIBLE (WITHIN 5 MINUTES), SINCE DURING THIS TIME THE CORE IS NOT RECEIVING ANY ADDITIONAL EMERGENCY COOLING WATER.

PRECAUTION: If at any time during the Recirculation Phase of the accident offsite power is lost, start at the beginning of the Recirculation Phase of this procedure and reverify and start equipment as necessary after Emergency Diesel Generators tie into their respective buses.

3.8.14 Verify the valve status and align valves as follows for recirculation using the RHR pumps.

VERIFY THAT THE FOLLOWING MOV VALVES ARE CLOSED:

826A	Boric Acid Storage Tank to Safety Injection Pumps
826B	Boric Acid Storage Tank to Safety Injection Pumps
826C	Boric Acid Storage Tank to Safety Injection Pumps

826D	Boric Acid Storage Tank to Safety Injection Pumps
857A	RHR Pumps to Safety Injection Pumps & Containment Spray Pumps
857B	RHR Pumps to Safety Injection Pumps & Containment Spray Pumps
857C	RHR Pumps to Safety Injection Pumps & Containment Spray Pumps
1813A	RCDT Pump Suction from Sump B
1813B	RCDT Pump Suction from Sump B
700	RCS to RHR pump suction
701	RCS to RHR pump suction
720	RHR Discharge to RCS
721	RHR Discharge to RCS

CLOSE THE FOLLOWING MOV'S AND AOV'S

*896A, B RWST to SI Pumps

NOTE: To close 896 A or B the D.C. power hold switch labeled 896A or B "KEY SWITCH" must be placed in the "ON" position. After placing valve in proper position return key switch to "OFF".

*897	SI Pumps Recirculation to RWST
*898	SI Pumps Recirculation to RWST
*704A	RHR Pump "A" Suction Cross-Tie
*704B	RHR Pump "B" Suction Cross-Tie

VERIFY THAT THE FOLLOWING MOV VALVES ARE OPEN:

852A	RHR Discharge to Reactor Vessel
852B	RHR Discharge to Reactor Discharge
878B	Safety Injection Pump Discharge Loop B Cold Leg
878D	Safety Injection Pump Discharge Loop A Cold Leg
851A	RHR Pump Suction from Sump B Inside Containment
851B	RHR Pump Suction from Sump B Inside Containment
1815A	1C Safety Injection Pump Suction Valve
1815B	1C Safety Injection Pump Suction Valve
825A	Safety Injection Pumps Suction from RWST
825B	Safety Injection Pumps Suction from RWST

3.8.15 *OPEN THE FOLLOWING MOV:

3.8.15.1 850A and 850B RHR Pump Suction From Sump B Outside Containment

3.8.16 Low Head Recirculation

3.8.16.1 Start 1A and 1B residual heat removal pumps.

3.8.16.2 Check flow meter FI-626 to ensure that low head recirculation is adequate. If FI reading is not at least 400 gpm, switch to high head recirculation. Refer to Step 3.8.18.

3.8.16.3 Close MOV 856, RWST to RHR Suction. To operate MOV 856, AC power must be restored at the motor control center (breaker 10C MCC 1C).

3.8.16.4 The following could be indications of passive failure in the low head recirculation path:
Abnormal flow on FI-626.
Flow on FI-931A or FI-931B.
High water level alarm in auxiliary building sump.
High radiation level alarms in the auxiliary building.

NOTE: By exercising HCV-624, and HCV-625, and by watching the corresponding indications on FI-626, FI-931A and FI-931B, the operator should detect the failure location, isolate it, and use an alternate path for recirculation.

3.8.16.5 Within 20 hours, line up one safety injection pump to recirculation flow as follows:

3.8.16.5.1 Open valves 857B and C if 1A RHR Pump is running or 857A if 1B RHR Pump is running.

3.8.16.5.2 Start one SI pump 1A or 1B or 1C to establish recirculation flow to the loop through MOV 878Bor D, safety injection to Loop A or B cold legs.

3.8.16.5.3 Check the recirculation flow on FI924 and FI925.

3.8.16.5.4 Place all containment isolation (T signal) valve switches in the "closed" position, and place CV A Sump Pumps in Pull stop position and manually reset containment isolation by use of key switch. (Refer to E-1.1, "Safety Injection System Actuation," for containment Isolation Valve numbers).

Note: Weekly, sample recirculation loop fluid by opening AOV-959 to determine solution boron concentration and pH and make necessary adjustments.

3.8.17 Low Head Recirculation with Spray

3.8.17.1 Start 1A and 1B residual heat removal pump.

3.8.17.2 Open valves MOV-857B and MOV-857C if the 1A residual heat removal pump is running or open MOV-857A if the 1B residual heat removal pump is running.

3.8.17.3 Start one spray pump and verify MOV discharge valves are open.

3.8.17.4 Close MOV 856, RWST to RHR suction. To operate MOV 856, AC power must be restored at the motor control center (breaker 10C MCC 1C).

3.8.17.5 Verify that HCV-836A or HCV-836B NaOH addition to Containment Spray Pump Disharges are open. There should be at least a 5 gpm reading on FI-930.

NOTE: If low head recirculation with containment spray pump(s) is necessary, do not also run the safety injection pump(s).

3.8.17.6 When the spray additive tank level reaches 40% and containment pressure is less than 30 psig, HCV-836A and 836B may be closed and the containment spray pump(s) may be stopped.

NOTE: Spray should be regulated during recirculation to ensure tht diverting recirculation flow to spray will not deprive the ECCS of sufficient flow to ensure core flooding. This can be done by monitoring FI-626 (at least 400 gpm) and regulating valves 860 A,B,C,D.

NOTE: Spray must be resumed if containment pressure at any time approaches 30 psig with all available fan coolers in operation.

3.8.17.7 Within 20 hours, start one safety injection pump 1A or 1B or 1C to establish recirculation flow to the loop through MOV 878B or D, safety injection to Loop A or B cold legs.

3.8.17.7.1 Check the recirculation flow on FI 924 and FI 925.

3.8.17.7.2 Place all containment isolation (T signal) valve switches in the "closed" position, and place CV A Sump Pumps in Pull Stop position and manually reset containment isolation by use of key switch. (Refer to E-1.1, "Safety Injection System Actuation," for Containment Isolation Valve numbers).

NOTE: Weekly, sample recirculation loop fluid by opening AOV-959 RHR sample to determine solution boron concentration and pH, make necessary adjustments.

3.8.18 High Head Recirculation

3.8.18.1 Flow path using the residual heat removal pumps.

Open valves MOV-857 A,B,C RHR to Safety Injection and Containment spray suctions.

3.8.18.2 Start residual heat removal pumps and safety injection pumps, 1A and 1B, to establish recirculation flow to both loops through valve MOV-878B, and MOV-878D, Safety Injection to Loop A and Loop B Cold Legs.

3.8.18.3 Check the recirculation flow on FI-924 and FI-925.

3.8.18.4 Close MOV 856, RWST to RHR suction. To operate MOV 856, AC power must be restored at the motor control center (breaker 10C MCC 1C).

3.8.18.5 Place all containment isolation (T signal) valve switches in the "closed" position, and place CV A Sump Pumps in Pull Stop position, manually reset containment isolation by use of key switch. (Refer to E-1.1 "Safety Injection System Actuation," for Containment Isolation Valve numbers).

3.8.18.6 Within 20 hours, the RCS should be depressurized to the point that the RHR low head flow path could be used for recirculation.

NOTE: Upon loss of instrument air operation of the pressurizer PORV's using the RCS overpressurization Nitrogen system can be achieved if

1). RCS pressure is ≥ 435 psig and
2). There is ≥ 200 psig of Nitrogen available from overpressurization storage tanks (normally at aproximately 700 psig)

are satisfied.

CAUTION: One operator will have to be on the back of the board turning key switches as instructed below while another operator is watching pressure indication from the front of the control board.

To open PCV 431C:

1). Turn "PC 431 SV8619B" to Arm
2). Turn "Surge TK V802B SV8616B" to open

To open PCV 430:

1). Turn "PC430 SV8619A" to Arm.
2). Turn "Surge TK V802A SV8616A" to open.

These steps will open respective PORV until 1 of the 2 valves in the train is closed.

If Nitrogen supply runs low, tanks can be refilled using procedure S29.2. This will require reset of CV isolation.

3.8.18.7 When low head recirculation has been established, stop all but one safety injection pump.

NOTE: Weekly, sample recirculation loop fluid by opening AOV-959 to determine solution boron concentration and pH and make necessary adjustments.

3.8.19 Daily, sample H_2 to ensure that no dangerous (> 4 volume percent) buildup occurs as a result of the LOCA.

3.9 If containment spray has been actuated, and if the containment pressure is reduced to nominal operation containment pressure, reset containment spray. Spray pumps should be shut-off and placed in the standby mode with operable flow paths.

3.9.1 A water head equivalent to 25 psi above containment pressure should be maintained above the A & B Containment Spray Pump Discharge Check Valves 862A and 862B. Pressure is indicated by PI933A and PI933B located in vicinity of the pumps.

NOTE: If you are not sure of the above water head and do not want to send operator to check, perform the following step to fill lines.

3.9.1.1 To ensure that this water head remains during the design basis accident (D.B.A), the containment spray pump discharge MOV valves are to be maintained closed if the pumps are not in service.

A Spray Pump	MOV 860A
	MOV 860B
B Spray Pump	MOV 860C
	MOV 860D

NOTE: In the event that fluid must be made up to either of these lines during the recirculation phase of the D.B.A. it will be necessary to align the RHR Pump Discharge to the common suction line for the spray pumps.

A RHR Pump	MOV 857B
	MOV 857C
B RHR Pump	MOV 857A

If the "A" Spray Header needs fluid - open, then close MOV 860A or MOV 860B.

If the "B" Spray Header needs fluid - open, then close MOV 860C or MOV 860D.

Momentarily opening either of the parallel pump discharge valves for the spray header of concern will restore the fluid head above the check valves.

3.10 Periodically check auxiliary building area radition monitors for detection of leakage from ECCS during recirculation. If significant leakage has been identified in the ECCS, attempt to isolate the leakage. The operator must maintain recirculation flow to the RCS at all times.

3.11 While the plant is in the recirculation mode, plant operators should make provisions for an evaluation of equipment in the plant. This evaluation should include the primary safeguards equipment e.g., RCS pumps and valves, emergency diesels, continment fan coolers, etc. and support equipment e.g., ECCS HVAC equipment, diesel fuel supply, diesel start air supply, sampling of RCS for boron concentration and fuel damage, sampling of containment atmosphere, sampling of recirculation sump, etc. Adjust recirculation sump pH, if required.

3.12 Continue to implement the recirculation mode of cooling.

3.13 Recovery procedures for the particular event must be developed and implemented to effect plant return to service.

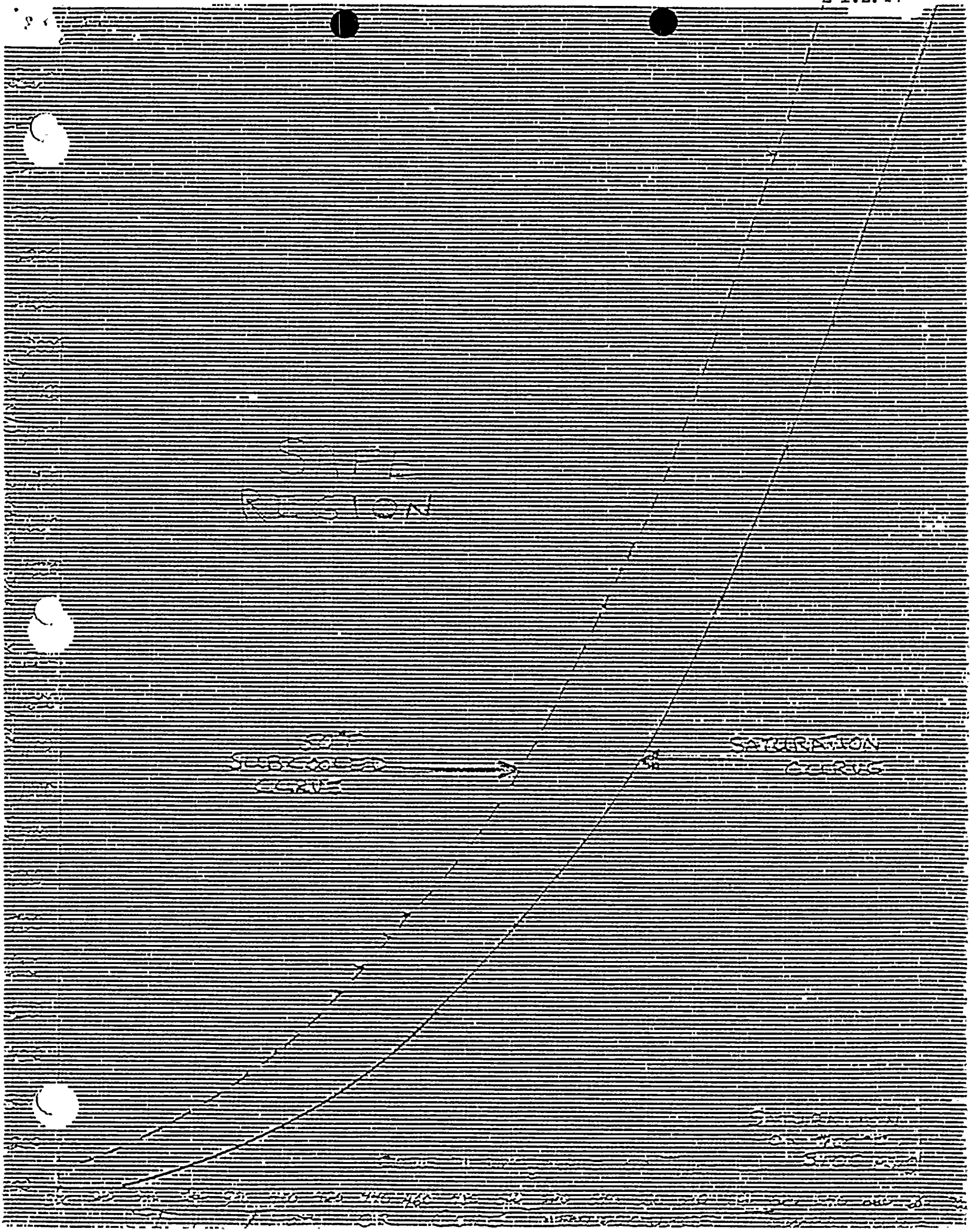

REGION
SATURATION
CURVE

Table 1

Correction to indicated Steam Generator Water level for Reference Leg Heatup effects due to post-accident containment temperature (before reactor trip)

Maximum Containment temperature reached before reactor trip, °F	Correction to S/G Level % of Span
90°	0%
150°	2%
200°	5%
250°	8%
300°	12%
350°	16%
400°	21%

Basis:

Level Calibration Pressure $\leq$ 1000 Psia
Reference Leg calibration temperature $\geq$ 90°F
Height of Reference Leg $\leq$ 1.1 x Level Span

Table 2

Corrections to allowable indicated Steam Generator water level for Reference Leg Heatup and Pressure changes following a high-energy line break, to assure that true level is between the level taps

Containment temperature °F	Correction to Minimum allowed Indicated Level % of Span	Correction to Maximum allowed Indicated Level % of Span
90°	+ 1	-4
150°	+ 3	-4
200°	+ 6	-4
250°	+ 9	-4
300°	+13	-4
350°	+17	-4
400°	+22	-4

Basis:

Level calibration Pressure $\leq$ 1000 Psia
Reference Leg Calibration Temperature $\geq$ 90°F
Height of Reference Leg $\leq$ 1.1 x Level Span
Pressure $\geq$ 50 Psia
Pressure $\leq$ 200 Psi + Calibration Pressure

Boiling in the Reference Leg is not assumed.

Table 3

Correction to indicated Pressurizer water level for Reference Leg Heatup effects due to post-accident containment temperature

Maximum Containment temperature reached °F	Correction to Pressurizer Level % of Span
90°	0%
150°	3%
200°	7%
250°	12%
300°	17%
350°	23%
400°	30%

Basis:

Level Calibration Pressure = 2250 Psia
Reference Leg Calibration Temperature $\geq$ 90°F
Height of Reference Leg $\leq$ 1.1 x Level Span

Table 4

Corrections to allowable indicated Pressurizer water level for Reference Leg Heatup and Pressure changes following a high-energy line break, to assure that true level is between the level taps

Containment temperature °F	Correction to Minimum allowed Indicated Level % of Span	Correction to Maximum allowed Indicated Level % of Span
90°	+ 6	-9
150°	+ 9	-9
200°	+13	-9
250°	+18	-9
300°	+23	-9
350°	+29	-9
400°	+36	-9

Basis:

Level Calibration Pressure = 2250 Psia
Reference Leg Calibration Temperature $\geq$ 90°F
Height of Reference Leg $\leq$ 1.1 x Level Span
Pressure $\geq$ 100 Psia
Pressure $\leq$ 350 Psi + Calibration Pressure

Boiling in reference Leg is not assumed.

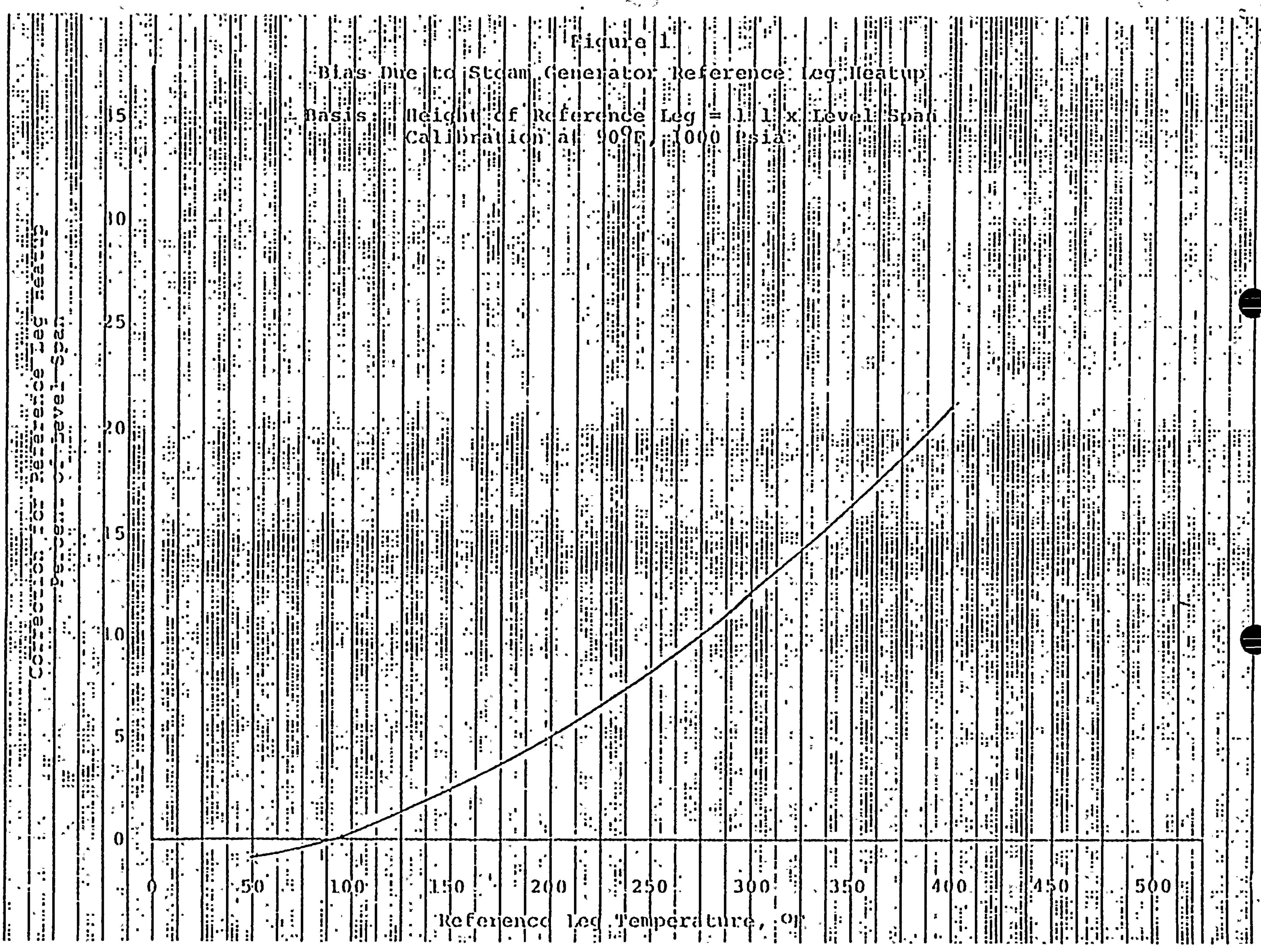


Figure 1

Bias Due to Steam Generator Reference Leg Heatup

Basis: Height of Reference Leg = 1.1 x Level Span
Calibration at 90ᵒF, 1000 Psia

Figure 2

Bias Due to Pressurizer Reference Leg Heatup

Basis: Height of Reference Leg = 1.1 x Level Span
Calibration at 90°F, 2250 Psia

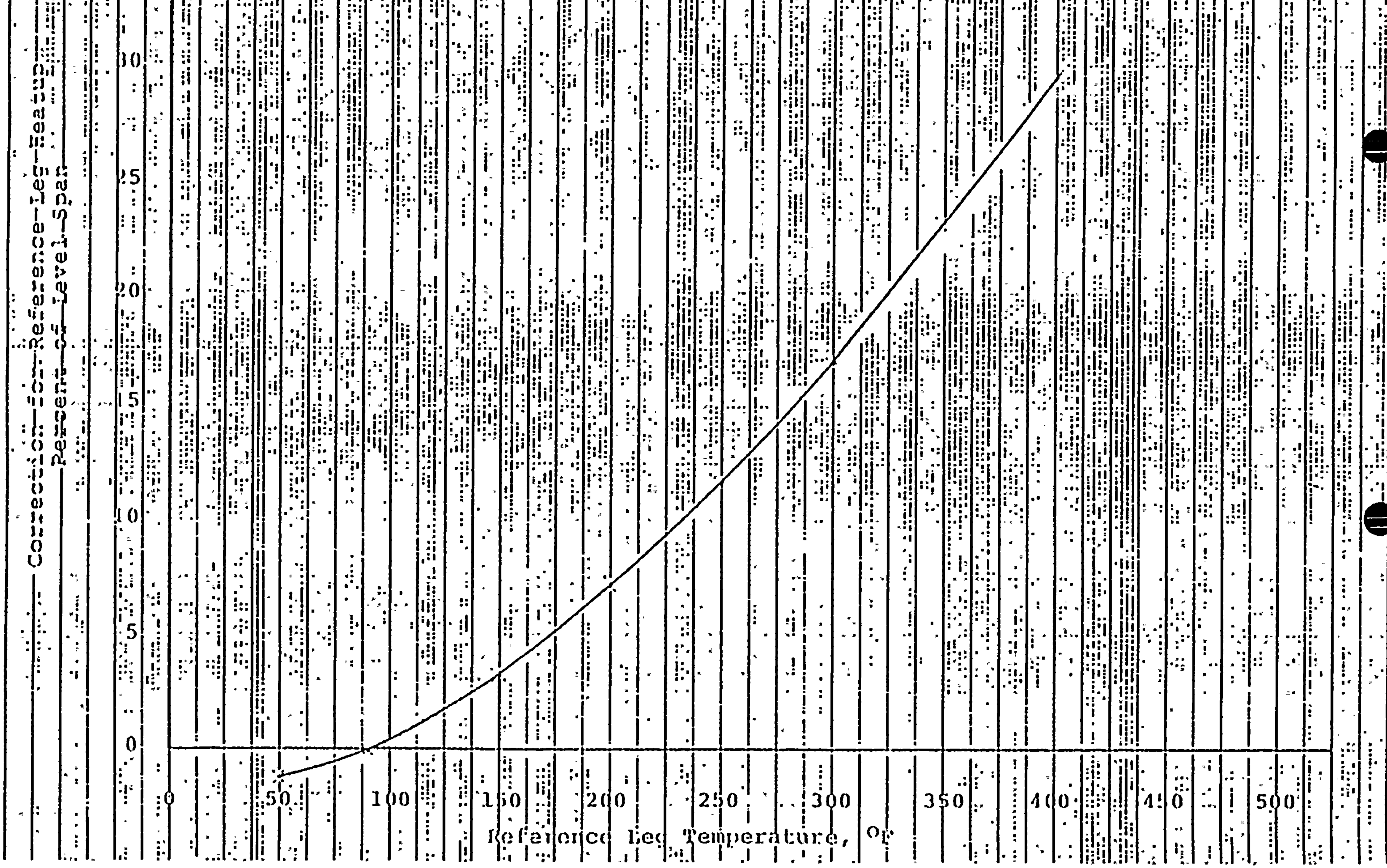


Figure 3

Bias Due to Steam Generator Pressure Change

Basis: Height of Reference Leg = 1.1 x Level Span

Calibration at 90°F, 1000 Psia

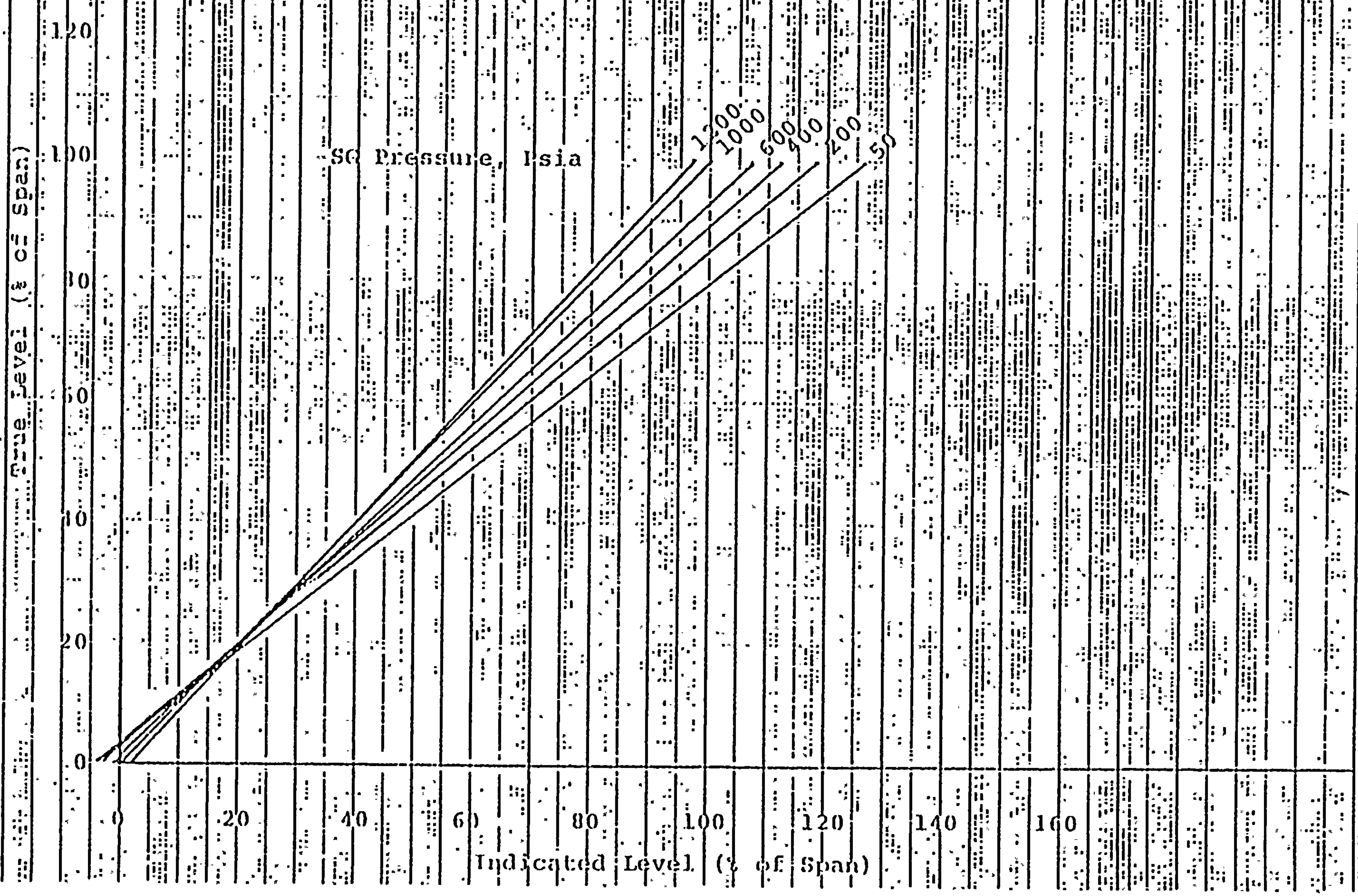
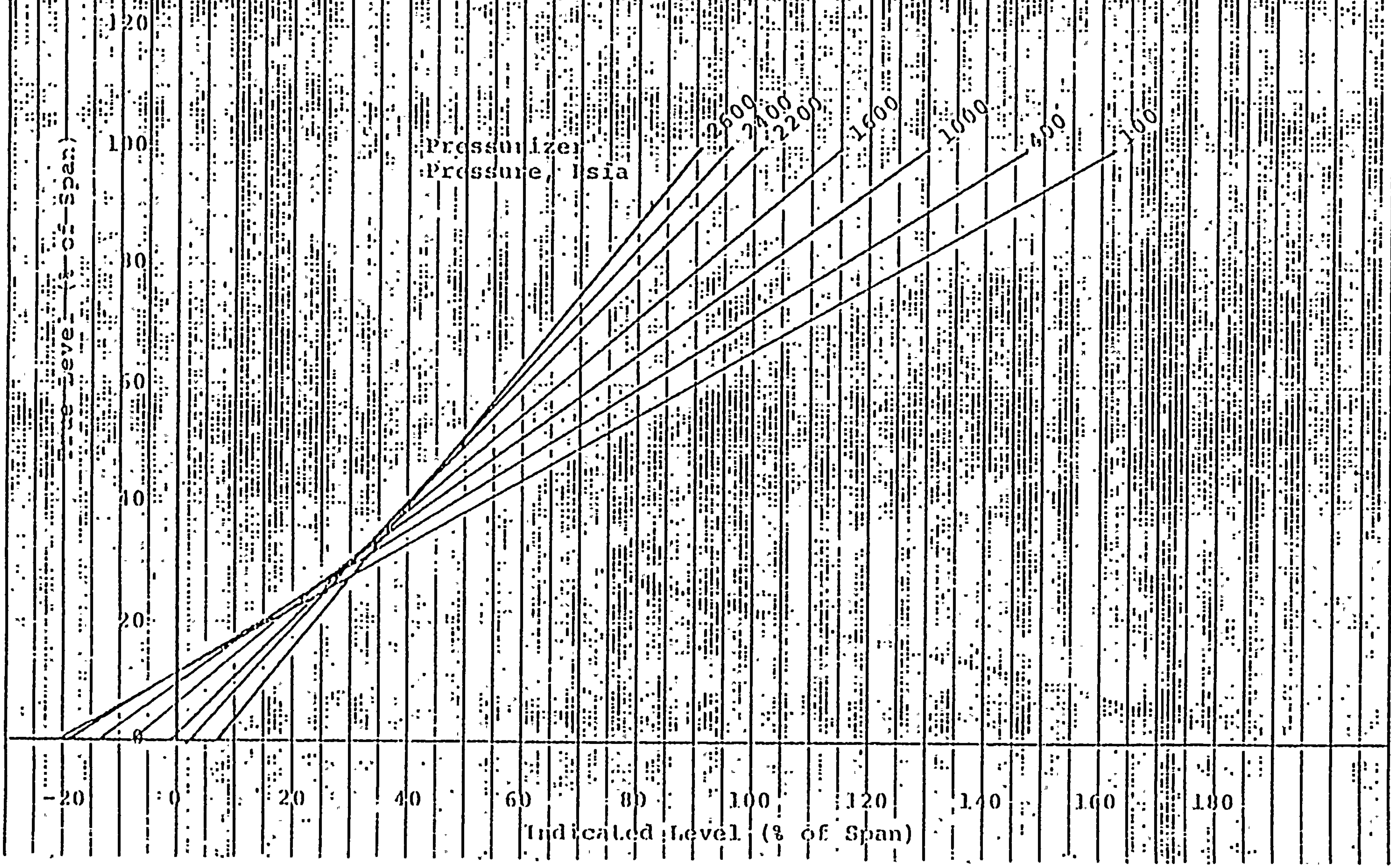


Figure 4

Bias Due to Pressurizer Pressure Change

Basis: Height of Reference Leg = 1.1 x Level Span
Calibration at 90°F, 2250 Psia



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