CURRENT

EMERGENCY PLAN

IMPLEMENTING PROCEDURES

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PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

EMERGENCY OPERATING PROCEDURE

TITLE: REACTOR TRIP WITH SAFETY INJECTION

NUMBER EP OP-0
REVISION 4
DATE 7/5/83
PAGE 1 OF 20

APPROVED: R. C. Thornberry 7-14-83
PLANT MANAGER DATE

SCOPE

This procedure covers the initial operating steps to be taken in the event of a reactor trip with safety injection signal. The safety injection signal may occur at some time after the reactor trip has taken place. If this is the case, the operator will cease using OP-5 (Reactor Trip Without Safety Injection) procedure and will use this procedure to control and analyze the plant condition.

SYMPTOMS[1]

The following symptoms are typical of those which may arise in a plant which is undergoing a loss of reactor coolant, loss of secondary coolant or steam generator tube rupture (one or more symptoms in each category may appear in any order)[2]:

LOSS OF REACTOR COOLANT

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Hi Pressurizer Water Level

Letdown Isolation/Pressurizer Heater Cutout

Increased Charging Flow

Hi Containment Pressure

Hi Containment Temperature

Hi Containment Humidity

Hi Containment Radiation

Hi Containment Recirc. Sump Water Level

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[1]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.

[2]The pressurizer water level indication should always be used in conjunc tion with other specified reactor coolant system indications to evaluate system response and to initiate manual operator actions.

LOSS OF SECONDARY COOLANT

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Letdown Isolation/Pressurizer Heater Cutout

Lo-Lo Reactor Coolant Tavg

Hi Containment Pressure

Hi Containment Temperature

Hi Containment Recirc. Sump Level

Steam Flow/Feedwater Flow Mismatch

Lo Steam Line Pressure (one or all Steam Lines)

Lo Steam Generator Water Level

Hi Steam Flow (one or all Steam Lines)

Lo Feedwater Pump Discharge Pressure

STEAM GENERATOR TUBE RUPTURE

Hi Air Ejector Radiation

Lo Pressurizer Pressure

Lo Pressurizer Water Level

Increasing Charging Flow

Letdown Isolation/Pressurizer Heater Cutout

Steam Flow/Feed Flow Mismatch

Hi Steam Generator Blowdown Radiation

Increasing Stem Generator Water Level

AUTOMATIC ACTIONS

1. Reactor trip and turbine trip.
2. Safety injection initiated.

OBJECTIVES

1. To verify the reactor trip and safety injection.

NOTE: If the plant is in a condition which warrants a reactor trip and safety injection and an automatic reactor trip and safety injection has not yet occurred, it is the reactor operators responsibility to manually initiate the reactor trip and safety injection.

2. To verify all SI equipment is operating and performing the intended function.

3. To monitor plant parameters and diagnose the initiating SI signal.

4. To mitigate the consequences of a valid SI signal by providing direction once the initiating signal is identified.

IMMEDIATE OPERATOR ACTIONS

ACTION	COMMENTS
1. Verify the following automatic actions. If required, use manual control to satisfy the action.	
a. Reactor trip (all rods on bottom, DRPI - Nuclear Instruments Decreasing.)	
b. Turbine trip (all four SV closed on EH panel.)	
c. Vital 4160 busses F, G and H transferred to startup power (breaker positions on VB-4.)	
d. Vital 4160 busses F, G and H voltage normal (120 volts indicated on 480 volt vital busses F, G and H, VB-4.)	
e. Diesel generators running and voltage normal (diesel RPM and generator voltmeter on VB-4.)	
f. Auxiliary building ventilation system in building and safeguards mode (mode light on ventilation section of VB-4).	
g. Control room ventilation system in mode 4 (mode light on VB-4).	
h. Both motor driven auxiliary feedwater pumps running and all 4 auxiliary feedwater LCV open. (Motor breaker position lights and LCV position indicators on VB-3).	

ACTION	COMMENTS
i. Check the safeguards postage stamp monitor lights on VB-1.	
IF 2 steam loops have Hi steam flow in alarm with any 2 loop Lo pressure in alarm OR 2 steam loops have Hi steam flow in alarm with any 2 loop Lo-Lo Tavg in alarm THEN: Verify all 4 main steam isolation valves, bypass valves and all 4 steam generator blowdown stop valves IC closed (valve position indication lights on VB-3).	
j. ALL ECCS pumps have started and automatic valve operations have occurred (all SI/FW ISOL/STM GEN LEVEL postage stamp monitor lights on VB-1 not in alarm).	j. Verify minimum of one ECCS train operating (SI, charging and RHR pump).
k. Containment Phase A and containment ventilation isolation (all containment Phase A postage stamp monitor lights on VB-1 not in alarm).	

SUBSEQUENT OPERATOR ACTIONS (PART A)

1. Verify the following pump flows.

   If the flows are not occurring, attempt to operate equipment manually or locally to establish the flows.

ACTION	COMMENTS
a. Minimum of one safety injection pump running with flow indicated when W.R. RCS pressure is less than the SI pump shutoff head (1465 psig). (VB-1)	a. NOTE: If W.R. RCS Pressure is greater than the shut-off head of the SI pump, continue on with this procedure to monitor W.R. RCS pressure and verify SI pump flow if pressure drops below the shutoff head of the SI pump.
b. Minimum of one charging pump running with flow via BIT indicated on FI 917. (VB-2)	
c. Verify both motor driven AFP running and flow indicated, to all 4 steam generators (VB-3),	
OR Start the steam driven AFP by opening FCV 95 and establish flow to all 4 steam generators (VB-3).	
Maintain maximum AFW flow until the steam generator water levels are in the narrow range. When the SG water levels approach 33% NR, verify automatic steam generator level control.	c. Automatic Steam Generator level control only applies to motor driven AFP's.
d. Verify RCS heat removal by	d. Atmospheric steam dump will be blocked by an existing "Turbine Tripped" condition. If condenser steam dump has been blocked due to a control malfunction or loss of the "Condenser Available" condition, decay heat removal will be effected by automatic actuation of the steam generator 10% atmospheric steam dump valves, or if
1) Observing automatic dump to condenser or atmospheric steam dump via the 10% steam dump valves (VB-3).	
AND 2) RCS Tavg decreasing to no-load temperature 547°F (VB-2)	

ACTION	COMMENTS
	these prove ineffective, the steam generator code safety valves. In this event, steam pressure will be maintained at the set pressure of the controlling valve(s) and reactor coolant average temperature will stabilize at approximately the saturation temperature for the steam pressure being maintained.
2. Monitor containment pressure (VB-1), if containment pressure reaches or exceeds 22 psig, verify the following actions. If required, use manual control to satisfy the action.	
a. Main Steam Isolation Valves and Bypass Valves closed. Phase B isolation postage stamp monitor lights not in alarm (VB-1).	
b. Steam Generator Blowdown Valves IC closed. Phase B isolation postage stamp monitor lights not in alarm (VB-1).	
c. Containment spray initiated (phase B isolation postage stamp monitor lights not in alarm VB-1).	
d. Phase B isolation (phase B isolation postage stamp monitor lights not in alarm VB-1).	
e. Manually trip all 4 RCP's.	e. CCW to the lube oil coolers will be lost on the phase B isolation.
3. Monitor the core exit thermocouple temperatures for indications of inadequate core cooling. If indications of inadequate core cooling exist, perform Appendix B of this procedure.	

SUBSEQUENT OPERATOR ACTIONS (PART B)

ACCIDENT DIAGNOSTICS

1. Evaluate RCS pressure:

   a. If W.R. RCS pressure falls below or is below 1950 psig, close or verify closed the following valves.

      Pressurizer Spray Valve PCV 455A
      Pressurizer Spray Valve PCV 455B
      Auxiliary Spray Valves 8145 and 8148
      Pressurizer Power Relief Valve PCV 474
      Pressurizer Power Relief Valve PCV 456
      Pressurizer Power Relief Valve PCV 455C

   a. Verify closed by observing position indication lights and discharge pipe temperature indicators.

   b. If W.R. RCS pressure remains above 1950 psig and is stable or increasing, go to Step 1 of Part C Subsequent Operator Actions.

2. If W.R.RCS pressure continues to decay below 1220 psig or is below 1220 psig and stable.

   2. NOTE: The conditions for stopping RCP must be continuosly monitored throughout the transient.

   a. Again verify a minimum of one charging pump delivering flow and one SI pump delivering flow to the RCS

   a. SI flow rate will increase with decreasing RCS pressure.

   b. Then, STOP all four reactor coolant pumps. Maintain seal water flow to the RCP seals.

   c. Close the centrifugal charging pump recirculation valves, 8105 and 8106.

   c. NOTE: When the W.R. RCS pressure is restored above 2000 psig, reopen valves 8105 and 8106 to prevent pump damage.

   d. If component cooling water to the RCP's is isolated due to a containment phase B isolation, stop all RCP's within 5 minutes and maintain seal flow as above.

ACTION	COMMENTS
3. If condenser air ejector radiation monitor is reading abnormally high radiation AND containment pressure, containment area radiation monitor, and containment recirc. sump level exhibit NORMAL readings, discontinue this procedure and begin procedure OP-3A, Steam Generator Tube Rupture.	
4. If steam generator pressure is ABNORMALLY LOW in one steam generator as compared to the other steam generators, discontinue this procedure and begin procedure OP-2, Loss of Secondary Coolant.	4. This is indicative of a secondary break upstream of MSIV.
5. If containment pressure, containment area radiation monitor, or containment recirc. sump level exhibit ABNORMALLY HIGH or INCREASING levels, discontinue this procedure and begin procedure OP-1, Loss of Reactor Coolant.	5. NOTE: For very small coolant breaks inside the containment, the containment pressure and containment recirc. sump level may increase very slowly and possibly not recognizable by the operator immediately. Therefore, the operator should monitor these parameters throughout the transient.
6. If containment pressure, containment area radiation monitor and containment recirc. sump level remains stable in the pre-event range, discontinue this procedure and begin procedure OP-2, Loss of Secondary Coolant.	6. This is indicative of a secondary break downstream of MSIV.

SUBSEQUENT OPERATOR ACTIONS (PART C)

ACTION	COMMENTS
1. Assume the event is NON SPURIOUS safety injection until all of the following items are verified NORMAL. a. Containment pressure. b. Containment temperature c. Containment recirc. sump level. d. Containment area radiation monitor. e. Condenser air ejector radiation. f. Auxiliary Bldg. control board area radiation. g. Reciprocal charging pump room area radiation. h. Plant ventilation particulate monitor. i. Plant ventilation radio gas monitor. If the above items a. through i. cannot be verified NORMAL, return to step 1 of Accident Diagnostics. If the above symptoms a. through i. are normal, and when j. W.R. RCS pressure is greater 2000 psig.	1. This step is entered from Accident Diagnostics step 1 b.
NOTE On spurious SI recovery, if RCS pressure decreased below the shutoff head of the SI pumps (1520 PSIG) during the transient, perform leak test (STP V-5) within 24 hours following the ECCS actuation on those valves listed in Table 3.4-1 of Tech Spec 4.4.6.2.2 which actuated or if there was flow through the valve. AND k. Pressurizer water level is greater than 22%. AND 1. RCS indicated subcooling is greater than 35°F.	1. If the RCS subcooling meter is inoperable or is suspected to be incorrect, use wide range Thot in conjunction with the attached RCS saturation curve (graph) to determine RCS subcooling.

ACTION	COMMENTS
AND m. Auxiliary feedwater flow to each steam generator is greater than 205 gpm or One steam generator wide range water level instrument indicates a level greater than 75%.	
THEN	
2. Reset safety injection.	2. CAUTION: 1) Automatic reinitiation of safety injection will not occur after this step since the reactor trip breakers are open. If the operator has indication that an SI is required after this step, he must initiate it manually. CAUTION: 2) If loss of off-site power occurs after resetting safety injection, it will be necessary to load the safeguards equipment onto the vital busses manually. If safety injection is reinitiated manually after the loss of off-site power the vital busses will automatically sequentially load the safeguard equipment. If manual loading or automatic loading is performed, verify the equipment given in Appendix A is loaded onto the vital busses.
a. Reset containment isolation phase A, train A and train B.	
b. Stop one charging pump at a time and evaluate RCS pressure. Maintain sufficient charging flow to supply adequate seal injection flow and to prevent RCS pressure from decaying. If RCS pressure drops below 1850 psig,	

ACTION	COMMENTS
reinitiate SI and return to Step 1 of the diagnostics.	
c. Stop both RHR and SI pumps.	
d. Verify AC turbine bearing oil pump and Hi pressure seal oil backup pump running after oil pressure decays to 11 psig and turbine bearing lift pump starts at 600 RPM turbine speed.	
e. Establish normal charging.	
1) Open instrument air valves FCV-584 and 682.	
2) Check open or open normal charging valve 8146.	
3) Check close or close charging to auxiliary spray valves 8145 and 8148 and alternate charging valve 8147.	
4) Open charging line isolation valves MO 8107 and 8108.	
5) Adjust HCV-142 and FCV-128 or reciprocal charging pump speed to achieve RCP seal flow and charging flow as required to maintain pressurizer level greater than 22%.	
6) Open RCP seal return valves MO 8100 and 8112. Check RCP seal return flow normal.	
7) Close the BIT inlet and outlet valves 8803A and B, 8801A and B.	

ACTION	COMMENTS
3. Verify the following:	
a. With normal RCS charging, the pressurizer water level remains above 10%.	
b. W.R. RCS pressure remains above 1850 psig.	
c. RCS indicated subcooling greater than 35°F.	c. CAUTION: Stopping and starting of the ECCS pumps can cause pump motor overheating or reduced motor life.
If item a., b., or c. above cannot be verified MANUALLY, REINITIATE SAFETY INJECTION and return to diagnostic Step 1, subsequent action Part "B", of this procedure. If the ECCS pumps are restarted, add 15°F to item c. above.	
4. Verify auxiliary feedwater flow and steam generator water levels approaching NO LOAD level (33% narrow range).	
5. Establish normal letdown.	
a. Check open or open letdown valves LCV-459 and 460.	
b. Open letdown isolation valve 8152.	
c. Open one 75 gpm letdown orifice valve.	
d. Verify PCV-135 opening by observing letdown flow.	
6. Establish VCT makeup and transfer charging pumps suction to VCT.	
a. Adjust VCT makeup blend to the existing boron concentration.	
b. Open VCT outlet valves LCV-112B and C.	
c. Close RWST to charging pump suction valves 8805A and B.	
d. Verify divert valve LCV-112A in AUTO.	
e. Verify charging flow normal.	

ACTION	COMMENT
7. If RCP's are not running, establish conditions for starting RCP's and start at least one RCP.	7. Start RCP 1 or 2 if possible to provide Pressurizer Spray capability.
8. With pressurizer level controlled in manual, verify pressurizer pressure control in AUTO and pressurizer sprays and heaters controlling pressure.	
9. Stop all 3 diesel generators, place diesel generator control switches in AUTO.	
10. Insure the main and feedpump turbines on turning gear once 0 RPM speed is reached.	
11. IF after securing safety injection and transferring the plant to normal pressurizer pressure and level control, the reactor coolant pressure does not drop below the low pressurizer pressure setpoint for safety injection actuation AND the pressurizer water level remains above 10%, AND the reactor coolant indicated subcooling is greater than 35°F, then consider the event a spurious safety injection. Continue to monitor these parameters closely; if any parameter fails to remain above the limit, manually reinitiate Safety Injection and return to Step 1 of the Diagnostic section.	11. CAUTION: Do not reset the reactor trip breakers until authorized by the Plant Superintendent.
SPURIOUS SI SIGNAL RECOVERY	
1. Proceed to a normal Hot Standby condition as follows:	
a. If steam line isolation has occurred:	
1) Close or check closed all 35 and 40% steam dump valves.	
2) Prepare or verify main condenser available for service.	
3) Equalize or attempt to equalize and open all 4 MSIV's. Monitor steam generator pressure closely during this operation. Immediately close all MSIV's if steam pressure rapidly drops during this operation.	3) A steam line break downstream of MSIV's will prevent equalizing.
4) Establish steam dump to condenser using steam pressure mode set at 1005 psig.	

ACTION	COMMENTS
5) If steam dump to the condenser is established, verify all atmospheric steam dump valves closed.	
b. Open the main generator motor operated disconnect switch and reenergize the unit auxiliary transformers by back-feeding from the 500 KV yard. Transfer all station auxiliary busses (12 and 4 KV busses) to the unit auxiliary transformers.	
c. Return the auxiliary building ventilation system to normal by resetting the "S" signal on both POV cabinets and selecting building only mode on VB-3.	
d. Reset both Units 1 and 2 control room ventilation systems on Unit 2 radiation control board and verify both Units 1 and 2 ventilation systems return to the normal mode of operation.	
e. When directed by the SFM, shutdown the following:	
1) One auxiliary saltwater pump.	
2) Steam driven auxiliary feedwater pump after steam generator levels are greater than 33% and motor driven pumps are controlling level.	
3) Close CFCU maxi flow valves then shutdown 1 CCW pump.	
4) Remove 2 CFCU's from service and place the running CFCU's on fast speed.	
f. Verify BA transfer pump running and open the BIT recirc. valves to begin increasing BIT concentration. Call Chemical and Radiation Department to begin sampling the BIT and BAT.	
g. Reset containment ventilation isolation trains A and train B.	

ACTION

COMMENTS

1) Open containment rad. Gas monitor valves FCV-681, 678 and 679.

2) Verify normal readings on containment air particulate and radio gas monitors on RMS board.

h. Reset radwaste isolation valves reset switches.

i. Open fire water valve FCV-633 and primary water to containment valve 8029.

j. Open valve 8045 N_2 to PRT.

k. If the incore chiller has been in service prior to the SI, open incore chiller valves FCV 655, 657, 654 and 656.

l. If the gross failed fuel detector has been in service prior to the SI, open Hot Leg sample valves 9356A and B.

1) Verify flow returns on the GFFD flowmeter.

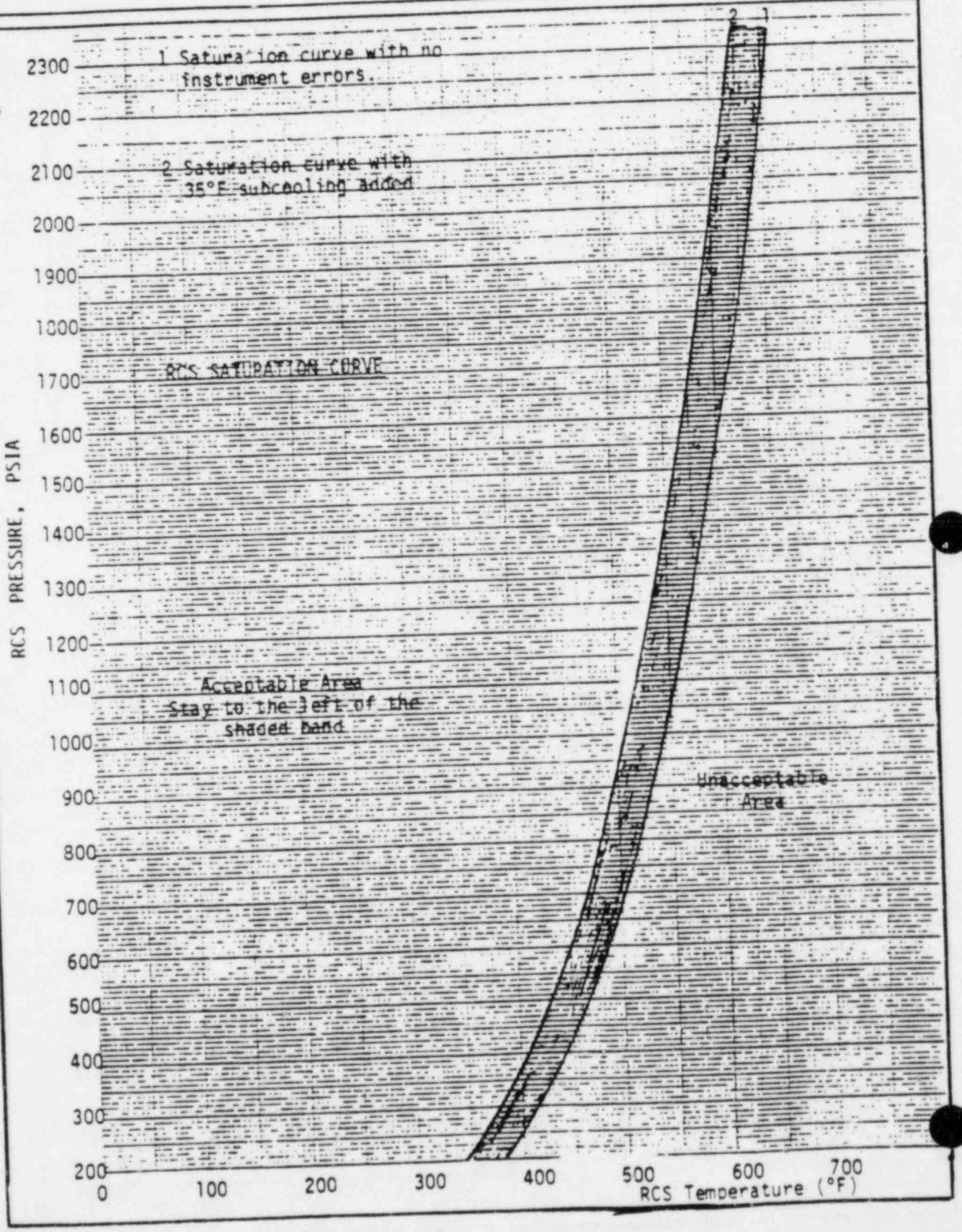
2) Verify the GFFD countrate returns on scale and stabilizes at a value below the post SI countrate on the recorder.

m. Open the pressurizer steam space sample valves 9354A and B

n. Open pressurizer relief tank gas analyzer valve 8034A.

2. Maintain Hot Standby conditions until authorized to proceed with a normal startup or inform the plant superintendent that the unit is proceeding to Cold Shutdown.

TITLE: REACTOR TRIP WITH SAFETY INJECTION



APPENDIX A

BLACKOUT WITH SAFETY INJECTION EMERGENCY LOADING OF VITAL BUSSES

1. If the vital busses lose voltage prior to resetting the safety injection signal, the vital busses will automatically load the vital equipment given below. Verify the equipment has been loaded by observing breaker lights on the control board.

2. If the vital busses lose voltage after the safety injection signal has been reset, load or verify loaded the equipment given below onto the vital busses manually. Allow approximately 4 seconds between loading of each piece of equipment onto a given vital bus. Load or verify that the CFCU are running in Low Speed.

VITAL BUS F	VITAL BUS G	VITAL BUS H
D/G 1-3	D/G 1-2	D/G 1-1
MCC 1-F	MCC 1-G	MCC 1-H
CC Pp 1-1	CC Pp 1-2	SI Pp 1-2
SI Pp 1-1		
CFCU 1-2	RHR Pp 1-1	RHR Pp 1-2
CFCU 1-1	CFCU 1-3	CFCU 1-4
CCW Pp 1-1	CFCU 1-5	CCW Pp 1-3
ASW Pp 1-1	CCW Pp 1-2	AFW Pp 1-2
AFW Pp 1-1	ASW Pp 1-2	

3. Load the containment spray Pumps only if they were running prior to the blackout.

VITAL BUS G	VITAL BUS H
Cont Spray Pp 1-1	Cont Spray Pp 1-2

APPENDIX B

DETERMINATION OF ADEQUATE CORE COOLING

This appendix provides the guidance to determine adequate core cooling if inadequate core cooling is suspected. Further, the instructions for regaining adequate core cooling is presented.

ACTION	COMMENTS
1. Monitor the core exit thermocouple temperatures. a. If the P-250 is available go to step 2. b. If the P-250 is <u>not</u> available go to step 3.	
2. If 5 or more P-250 thermocouple readings exceed 1200°F, notify the Shift Foreman that inadequate core cooling exists and go to step 5. If there are <u>not</u> 5 or more that exceed 1200°F, discontinue this appendix but continue to monitor the thermocouple readings.	
3. At the thermocouple incore board in the control room, Monitor 10 core-centered thermocouples. If any 3 of the 10 thermocouples exceed 700°F (pegged hi) proceed to step 4. If there are <u>not</u> 3 thermocouples that exceed 700°F, discontinue this appendix but continue to monitor the thermocouple readings.	
4. If SI flow to the RCS and AFW flow to the steam generators cannot be verified, notify the Shift Foreman that inadequate core cooling may exist and go to step 5. If <u>both</u> SI flow to the RCS and AFW flow to the steam generators <u>can</u> be verified, discontinue this Appendix but continue to monitor the thermocouple readings.	
5. The Shift Foreman will verify if inadequate core cooling exists using the appropriate steps above. If inadequate core cooling exists the Shift Foreman will direct operations as follows:	

APPENDIX B (Cont.)

ACTION	COMMENTS
a. Declare a General Emergency Implement the instructions given in Emergency Procedure G-1 regarding on and off-site protective actions.	
b. Attempt to establish SI flow to the RCS and AFW flow to the steam Generators.	
c. Continue monitoring core outlet temperature to determine the effectiveness of the remaining actions.	
d. DEPRESSURIZE THE RCS by method 1 or 2 below.	
1) Dump steam to the condenser or atmosphere if the steam generator levels are in the narrow range and AFW flow is evident.	1) THIS IS THE PREFERRED METHOD.
2) Verify the SIS or charging pumps are running and available to deliver water to the RCS. THEN Open the pressurizer PORV's.	2) Opening the PORV's will provide a drop in RCS pressure sufficient to allow the SI flow required to cool the core. This method is to be used only if 1) (above) is ineffective.
e. If no means of depressurization are available, or if the depressurization did not result in decreasing core exit thermocouple temperatures, THEN START one RCP if possible. If the RCP fails after starting, replace the lost RCP with any remaining RCP.	e. Attempt to establish CCW and seal water flow to the pump; however, if CCW and/or seal water flow cannot be established, proceed to start a RCP. The pump must be started to move coolant thru the core.

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   a. Designate this event a Nofification of Unusual Event if ECCS flow is indicated. Notify plant staff and response organizations required for this classification by implementing Emergency Procedure G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-Site Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation".

   b. Reclassify this event according to the Appendix Z instructions in OP-3A "Steam Generator Tube Rupture" or OP-1 "Loss of Coolant Accident", if the accident diagnostics require implementation of either these procedures.

   c. In the event inadequate core cooling is verified per Appendix B reclassify this event as a General Emergency. Notify plant staff and response organizations required by EP G-2 and G-3 in accordance with EP G-1.

TITLE: EMERGENCY OPERATING PROCEDURE
LOSS OF COOLANT ACCIDENT

APPROVED: R. C. Thornberry 7-14-83
PLANT MANAGER DATE

SCOPE

This procedure covers the operating steps to be taken in the event of a Loss of Coolant Accident. It is assumed that reactor trip and safety injection actuations have occured. The operator should have already performed the immediate operator actions and diagnostics of Emergency Operation Procedure No. OP-0.

SYMPTOMS

(See OP-0 Symptoms/Diagnostics)

AUTOMATIC ACTIONS

(See OP-0)

OBJECTIVES

1. Verify and establish short term core cooling to prevent or minimize damage to the fuel cladding and release of radioactivity.
2. Maintain long term shutdown and cooling of reactor by recirculation of spilled reactor coolant, injected water and containment spray drainage.
3. In the case of the small break LOCA, to reduce plant conditions to the cold shutdown condition for repairs.

IMMEDIATE OPERATION ACTIONS

1. Perform the immediate operator actions in the reactor trip with Safety Injection Emergency Procedrue OP-0.

SUBSEQUENT OPERATOR ACTIONS

ACTION	COMMENTS
1. Initiate the site Emergency alarm	
2. Monitor the RWST level	
a. If the level decreases slowly, proceed to step 3.	a. A small break LOCA is indicated.

ACTION	COMMENTS
b. If the level decreases rapidly such that the low level alarm is eminent, verify ECCS flow from at least one charging and one SI pump, and after W.R. RCS pressure decreases to <1220 psig, stop all 4 reactor coolant pumps and close the Centrifugal charging pump recirc. valves (8105 & 8106). Proceed to Appendix A, LOCA Injection/ Recirculation changeover procedure.	b. A large break LOCA is indicated. The RCP seal water flow should be maintained when the pumps are tripped. The recirc. valves (8105 & 8106) shall be reopened if pressure is restored to >2000 psig to protect the pumps from damage.
3. Monitor the RWST level closely throughout this procedure. If RWST level is decreasing, such that the low level RHR pump trip setpoint 33% appears imminent, go directly to Appendix A, LOCA Injection/ Recirculation Changeover Procedure, attached. When Appendix A is completed, return to this procedure and continue.	3. In the worst case, with RCS near 0 psig and minimum Tech. Spec. level in RWST with all ECCS equipment discharging including containment spray, the Operator has 14 minutes from time of break to RWST lo level.
4. Verify containment sump level increasing. If no increase is evident as the RWST level decreases, return to OP-0 diagnostics, step 3, 4, 5 and 6, to reevaluate the accident.	4. CAUTION: In the case of the samll break, the sump may rise slowly as the RWST level decreases slowly. Monitor the containment sump along with the RWST. If the containment sump fails to increase with decreasing RWST, the accident may have been misdiagnosed.
5. Verify steam generator levels being maintained and flow approximately equal to all steam generators. If any steam generator level increases in an unexpected manner, go to OP3A (Steam Generator Tube Rupture).	5. Steam generator tube ruptures may be indicated.
6. Monitor the condensate storage tank and upon reaching approximately 10% level, perform a. or b. below	6. If the lo lo level alarm occurs on the CST, the operator has approximately 25 minutes to perform items a. or b.
a. Verify a level in the raw water storage reservoir; then open FCV 436 and 437 (reservoir supply to AFW pumps). Allow the AFW pumps to run during the transfer.	

ACTION	COMMENTS
Monitor the AFW flow closely. If flow is lost, trip all 3 AFW pumps until the transfer is complete, then restart the pumps.	
b. If the raw water storage reservoir is not available, go to Appendix C (AFW Pump Suction Supply from Fire Water Tank Procedure). Allow the AFW pumps to run during the transfer. Monitor the AFW flow closely. If flow is lost, trip all three AFW pumps until the transfer is complete, then restart the pumps.	
7. Monitor the core exit thermocouple temperature for indications of inadequate core cooling. If indications of inadequate core cooling exit, perform Appendix F of this procedure.	
8. Verify the following:	
a. PORV PCV 474 closed PORV PCV 456 closed PORV PCV 455C closed	a. Verify by position indication and discharge pipe temperature indicators.
b. PORV Backup Valve 8000A open PORV Backup Valve 8000B open PORV Backup Valve 8000C open	b. Verify, by position indication lights, valves open and power available.
c. If any PORV opens during this procedure, verify closure. If the valve fails to close, close the backup valve.	
d. Monitor W.R. RCS pressure. If RCS pressure remains <2000 psig and stable or decreasing, go to step 15.	

ACTION	COMMENTS
9. If W.R. RCS pressure begins to increase after step 8. above, maintain full SI flow until the SI Termination Criteria below is met. Continue to monitor throughout this procedure for the below SI Termination Criteria. a. W.R. RCS pressure >2000 psig and increasing b. AND, PZR level >50% c. AND, RCS indicated subcooling >35°F d. AND, All 4 steam generator NR water levels are greater than 33% OR Flow to all lo level steam generator is greater than 205 gpm per lo level steam generator.	9. If the centrifugal pump recirc. valves (8105 & 8106) were closed due to low RCS pressure (1220 psig), reopen the valves when the RCS pressure increases above 2000 psig. NOTE: Pressure rising indicates the problem could have been a stuck open PORV. It may take a minute or two after step 8 for the pressure change. c. If at any time the subcooling Margin Monitor becomes inoperable or is suspect, use the saturation curve to determine subcooling.
10. If the SI termination criteria in step 9 CANNOT be met, go to step 15.	
11. If the above SI termination criteria IS met, RESET SAFETY INJECTION and proceed as below:	11. CAUTION 1: Automatic reinitiation of safety injection will not occur after this step since the reactor trip breakers are open. If the operator has indication that an SI is required after this step, he must initiate it manually. CAUTION 2: If loss of offsite power occurs after resetting safety injection, it will be necessary to load the safeguards equipment onto the vital buses manually. If safety injection is reinitiated manually after the loss of offsite power, the vital buses will automatically sequentially load the safeguard equipment.

ACTION	COMMENTS
	If off-site power is lost after the SI signal is reset, go to Appendix G (Blackout with SI Emergency Loading of Vital Buses).
a. Reset containment isolation phase A.	
b. Stop both RHR and SI pumps.	
c. Stop one charging pump at a time and evaluate RCS pressure. Maintain sufficient charging flow to maintain RCS pressure and seal water injection flow. If W.R. RCS pressure drops below 2000 psig or PZR level drops below 50% or RCS subcooling drops below 35°F, reinstate sufficient charging flow to maintain RCS pressure. If W.R. RCS pressure drops below 1850 psig return to step 1 of the Accident Diagnostics in OP-0. If charging pumps are restarted after this step, add 15°F of subcooling to the SI termination criteria every time the pumps are restarted.	
d. Verify AC turbine bearing oil backup pump and hi pressure seal oil pump running after oil pressure decays to 11 psig and turbine bearing lift pump starts at 600 RPM turbine speed.	d. Verify the unit goes on turning gear at 0 RPM.
e. Establish charging flow to maintain RCS pressure. 1) Open instrument air valves FCV-584 and 682. 2) Check open or open normal charging valve 8146. 3) Close or check closed charging to auxiliary spray valves 8145 and 8148 and alt. charging valve 8147. 4) Open charging line isolation valves 8107 and 8108.	e. Charging at a rate greater than normal might be required in order to maintain PZR pressure and level.

ACTION	COMMENTS
5) Adjust HCV-142 and FCV-128 or reciprocal charging pump speed to achieve RCP seal flow and charging flow as required to maintain pressurizer level greater than 22%.	5) Automatic PZR level control may not be possible at this time due to the TAVG signal inaccuracies (if RCP's are tripped), or TAVG being out of the normal control band.
6) Open RCP seal return valves, MO 8100 and 8112. Check seal return flow normal.	
7) Close the BIT inlet and outlet valves 8803A and B and 8801A and B.	
f. Continue to monitor the Primary System. If W.R. RCS Press drops below 1850 psig or PZR water level drops below 22% or RCS indicated subcooling drops below 35°F, reinitiate SI manually and return to OP-0 diagnostics unless this has already been performed. If SI is reinitiated add 15°F to the SI TERMINATION criteria prior to the second termination of the pumps.	
g. Establish normal letdown	
1) Verify containment area radiation monitor reading approximately post-accident level.	1) Containment area hi radiation may mean fuel damage. If cont. hi radiation exists, do not establish letdown outside containment. Establish letdown to the PRT if letdown is required.
2) Open letdown valves LCV-459 and 460.	
3) Open letdown isolation valve 8152.	
4) Open one 75 gpm letdown orifice valve.	

ACTION	COMMENTS
5) Verify PCV-135 opening by observing letdown flow.	5) Monitor PZR level and W.R. RCS Press to ensure they remain >22% and 1850 psig during this step.
h. Establish VCT makeup and transfer charging pumps suction to VCT.	
1) Adjust VCT makeup blend to the value indicated on the boron measurement system.	1) This assures the primary system will not be diluted during the recovery actions.
2) Open VCT outlet valves LCV-112B and C after VCT level normal.	
3) Close RWST to charging pump suction valves 8805A and B.	
4) Verify divert valve LCV-112A in AUTO.	
i. Verify at least one RCP running or verify a bubble in the PZR and establish conditions for starting at least one RCP. If conditions for starting a RCP exists, start at least one RCP. Attempt to start RCP 1 or 2 so that pressurizer spray will be available.	i. The criteria given in OP-0 for stopping the RCP's on low pressure still applies: Check SI pump flow and stop RCP's at W.R. RCS pressure 1220 psig. Also, if pressure drops below 1220 psig close the centrifugal charging pump recirc. valve (8105 & 8106). The recirc. valve shall be reopened if pressure is restored above 2000 psig.
j. Stop all 3 diesel generators if off-site power is available and place diesel generator control switches in AUTO.	
k. With pressurizer level greater than 22%, verify pressurizer heaters controlling pressure.	
l. Continue to monitor the condensate storage tank level and transfer the AFW pumps to an alternate source if low level is approached.	

ACTION	COMMENTS
12. Verify using the RCS subcooling monitor that 50°F subcooling is present.	
13. If 50°F subcooling is present and can be maintained, proceed witha normal cooldown using Operating Procedure L-5, if required, to perform repairs. If repairs are not required, maintain hot standby conditions until authorized to proceed by the Plant Superintendent.	13. The criteria tripping reactor coolant pumps on low pressure will not apply if a cooldown using Operating Procedure L-5 is performed.
If 50°F subcooling <u>is not</u> indicated, attempt to establish 50°F subcooling by steam dump from the steam generators to the condenser or atmosphere.	
a. If steam dump is necessary, reduce the steam generator pressure to maintain a RCS cooldown rate of less than 50°F/HR, consistent with the CVCS makeup capability.	a. If steam dump at the reduced pressure setting is used to maintain subcooling, proceed to cooldown the plant using Operating Procedure L-5 (Plant Cooldown from Minimum Load to Cold Shutdown).
b. If 50°F subcooling can be achieved with steam dump, proceed with the cooldown using L-5. If 50°F subcooling cannot be maintained go to step 15.	
14. If 50°F RCS indicated subcooling cannot be established, REINITIATE SAFETY INJECTION and return to OP-0 Diagnostics, step 1.	
15. If closing the PORV's in step 8 failed to recover the RCS pressure, maintain MAX SI flow and proceed to step 16.	15. If this is the case, then we probably have an unisolatable break in the primary system.
If SI termination criteria in step 9 could not be met, maintain MAX SI flow and proceed to step 16.	
If 50°F subcooling cannot be maintained in step 13 above, REINITIATE SI and proceed to step 16.	

ACTION	COMMENTS
16. If any SI equipment has failed, attempt to operate the equipment locally or from the control room. Effect repairs if necessary.	
17. If wide range RCS pressure is above 165 psig, stable or increasing, reset safety injection and stop both RHR pumps.	17. Restart the RHR pumps if RCS pressure decays to 165 psig after this step.
18. If the RCP's are operating, stop all 4 RCP's after:	18. If CCW is lost to the RCP's, stop all pumps within 5 minutes and maintain seal water flow. Monitor the conditions for stopping RCP's throughout this procedure. Conditions for stopping RCP's should continually be monitored during this procedure.
a. Verifying at least one charging and SI pump are delivering flow and b. W.R. RCS pressure decreases to less than 1220 psig.	
19. If W.R. RCS pressure decreases below the steam generator's pressure, verify RWST level decreasing rapidly. Maintain maximum SI flow until the RWST Lo Level RHR Pump Trip occurs (trip the RHR pumps at 33% if the automatic pump trip fails to occur), then perform Appendix A.	19. A large break LOCA is indicated.
20. If W.R. RCS pressure is decreasing or stable and is above 1065 psig, continue with the steps below.	20. A small break LOCA is indicated. The instructions given in step 20 will aid in the cooldown and depressurization.
a. Reduce steam generator pressure to 865 psig using steam dump by methods b or c below.	a. Reducing steam pressure will lower the RCS pressure and temperature.

ACTION	COMMENTS
b. If the condenser is available, open the main steam isolation valves and dump steam to the condenser using the steam header pressure mode.	b. Continue to monitor RWST level. As RCS pressure decreases SI flow will increase and RWST level decrease will accelerate. If pressurizer level has been lost, monitor PZR level indication for its return.
c. If the condenser is not available, use the 10% atmospheric dumps.	
d. Maintain a RCS cooldown no greater than 50°F/HR.	
21. Monitor RWST level closely. If the RWST Lo Level Alarm is imminent, perform step 24.e. If the alarm is not imminent, continue with step 22.	21. The cooldown should increase SI flow and decrease RWST level.
22. If containment Hi-Hi pressure has initiated containment spray:	
a. Verify the additive tank level is decreasing and that the entire tank is discharged.	
23. Periodically check the auxiliary building radiation monitors for ECCS leakage if Appendix A has been performed. If leakage is found, attempt to isolate the leakage; however, do not interrupt ECCS flow at any time.	
24. If Appendix A, LOCA Injection/Recirculation Changeover Procedure, has <u>not</u> yet been performed, continue to monitor the RWST level and <u>prepare</u> for Appendix A in the following manner.	
a. At the 480 volt vital load centers F and H, close the <u>breakers</u> for the following valves: 8980 RHR pump supply from RWST 52-1F-31. 8976 SI pump supply from RWST 52-1H-20.	a. This will allow operation of valves during Appendix A. <u>DO NOT</u> make any valve operation at this time.

ACTION	COMMENTS
b. Reset the SI, Phase B isolation and containment spray isolation signals.	b. Reset only. Do not start or stop any SI equipment.
c. Close (CUT IN) the series contactors for the following valves using the toggle switches in the control room. (VB-2) 8809A and B, RHR pumps, Injection to cold legs. 8976A and B, S.I., Pump Recirc. 8982A and B, RHR pumps suction from containment sump.	c. This will allow operation of valves during Appendix A. DO NOT make any valve operations at this time.
d. If the RCS pressure is greater than 1500 psig (shutoff head of the SI pumps), shutdown these pumps prior to transferring to cold leg recirculation.	d. During cold leg recirculation, no recirc. path is available to these pumps.
e. Maintain maximum SI flow until the RWST low level RHR pump trip occurs. (Trip the RHR pumps at 33% RWST level if the automatic trip fails, then perform Appendix A.)	
DO NOT PROCEED BEYOND THIS STEP UNTIL APPENDIX A HAS BEEN PERFORMED.	
25. If containment spray has been initiated, prepare to provide RHR spray as follows in steps 26 through 31.	25. Containment spray should continue for 2 hours using RHR for iodine removal. If an RHR Train has failed, terminate containment spray. DO NOT use the operating RHR Train for containment spray.
26. Check that the entire content of the spray additive tank has been injected.	
27. Stop both containment spray pumps on receiving the RWST level lo lo alarm. Verify tank empty on RWST indicators.	
28. Close the No. 1 RHR to Cold Leg Injection Valve (8809 A).	

ACTION	COMMENTS
29. Open the RHR Pump 1-1 to Spray Ring Valve (9003 A).	
30. Close the Containment Spray Pump Discharge Valves (9001A and B).	
31. Containment spray may be terminated after the 2 hour period when the containment pressure has been reduced to approximately 0 psig.	
32. To terminate spray, proceed as follows:	
a. Close the RHR Pump 1-1 to Spray Ring Valve (9003 A).	
b. Open the No. 1 RHR to Cold Leg Injection Valve (8809 A).	
c. Regulate No. 1 RHR pump flow using its hand control valve (HCV-638) to maintain pump motor current less than 57.5 amps. (VB-1)	
33. The systems are now lined up for the cold leg recirculation phase. Continue to operate in this manner for 19-1/2 hours.	
During this period, make the following motor operated valves available by closing their 480V breakers at the vital load centers.	33. DO NOT make any valve changes after making the valves available.
8802A SI pump No. 1 discharge to hot legs 52-1F-48.	
8835 SI pump common discharge to cold legs 52-1G-24.	
8703 RHR pumps common discharge to hot legs 52-1G-56.	
8802B SI pump No. 2 discharge to hot legs 52-1H-26.	

ACTION	COMMENTS
34. During the cold leg recirculation phase, the Shift Foreman will form the plant operators into critical plant systems and equipment assesment teams. The systems or equipment to receive the greatest attention will be determined by the Shift Foreman and will be based on knowledge of past system/ equipment reliability and service. This assesment function may be performed inside or outside the control room as conditions warrant. The critical parameters to be assessed will be determined by the Shift Foreman. The Shift Foreman will consider the following list of critical systems which may require assesment. a. ECCS systems b. AFW systems c. Safeguards Vent. systems d. Off site power availability e. Diesel Generators f. Instrument air systems g. Liquid and Gas Radwaste systems h. Containment Fan Coolers i. Component Cooling Water system j. Auxiliary Saltwater system k. Condenser and Circ. Water System l. Steam dump system m. Makeup water system	
35. Continue to operate the ECCS systems in the Cold Leg Recirculation MODE for 19-1/2 hours, then perform Appendix B, Cold Leg Recirculation/ Hot Leg Recirculation Changeover Procedure. Continue to operate in the Hot Leg Recirculation Mode until authorized by the Plant Superintendent to terminate hot leg recirculation.	

APPENDIX A

LOCA INJECTION/RECIRCULATION CHANGEOVER PROCEDURE

SUBSEQUENT OPERATOR ACTIONS

ACTION	COMMENTS
1. All steps listed below must be carried out expeditiously, in a precise orderly sequence. Do not interrupt the operation until all actions are completed. When both ECCS trains are initially available and a valve fails to respond or to complete its demanded operations, postpone any corrective action until the subsequent operational steps are performed.	1. CAUTION: If a loss of off-site power has occurred in coincidence with the LOCA and all 3 diesel generators are running and supplying the vital busses, continue with these instructions as written. If a diesel generator has failed, go to Appendix E (Loss of Off-Site Power During LOCA with Loss of Diesel Generator) for additional guidance before proceeding
2. Monitor RWST level closely. If the RHR pumps do not trip at 33%, trip them manually.	
3. If during this operation the RWST approaches L-Lo level, stop all pumps taking suction from the RWST. Restart pumps after the RHR system is aligned to provide suction.	
4. At the vital 480 volt load centers F and H, close the breakers for the following valves <u>if not already performed</u>. 8980 RHR pumps supply from RWST 52-1F-31. 8976 SI pump supply from RWST 52-1H-20	4. This step may be delayed until time permits.
5. Reset SI, Phase B isolation and containment spray signals <u>if not already reset</u>.	

APPENDIX A (cont.)

ACTION	COMMENTS
6. If off-site power is available, shutdown all 3 diesel generators and leave them in Auto if this has not been performed.	
7. Close (cut in) the series contactors for the following valves from the toggle switches in the control room if not already CUT IN. 8809 A & B RHR pumps injection to cold legs. 8974 A & B SI pumps recirculation. 8982 A & B RHR pumps suction from sump.	
8. With the SI, charging and possibly the spray pumps still taking suction from the RWST and the RHR pumps tripped at 33% in the RWST, proceed to transfer RHR suction to the containment sump as follows in steps 9 thru 29. Monitor RWST level, trip all pumps taking suction from the RWST upon reaching Lo-Lo Level in the tank. Restart pumps after RHR suction supplied.	
9. Check that the containment recirculation sump level indicators read at least 40% to provide adequate NPSH to the RHR pumps.	
10. Close the two RHR heat exchanger outlet crosstie valves (8716A & B).	
11. Close the No. 2 RHR pump normal suction valve (8700B).	

APPENDIX A (cont.)

ACTION	COMMENTS
12. Open the No. 2 RHR pump suction valve from the containment recirculation sump (8982B).	
13. Open the component cooling water outlet valve from No. 2 RHR heat exchanger (FCV-364.)	
14. Restart No. 2 RHR pump and check flow to the reactor vessel (VB-1).	
15. Close the safety injection pump recirculation valves (8974A & B).	
16. Open the safety injection pump suction from RHR pump no. 2 (8804B). Check for increased safety injection pump flow and pressure.	
17. Close the safety injection pumps normal suction valve (8976) from the RWST.	17. This step may be delayed if breakers in step 4. have not been racked in.
18. Open the alternate suction valves for the centrifugal charging pumps (8807A & B). Check for increasing charging pump flow and pressure.	
19. Close the no. 1 RHR pump normal suction valve (8700A).	
20. Open the no. 1 RHR pump suction valve from the containment recirculation sump (8982A).	
21. Check the level in the recirculation sump again for adequate NPSH.	
22. Open the component cooling water outlet valve from no. 1 RHR heat exchanger (FCV-365).	

APPENDIX A (cont.)

ACTION	COMMENTS
23. Restart the no. 1 RHR pump and check for flow to the reactor vessel.	
24. Open the centrifugal charging pumps alternate suction valve from RHR pump no. 1 (8804A). Check for increased charging pump flow and pressure.	
25. Close the charging pumps normal suction valves from the RWST (8805A & B).	
26. Close the RHR pumps normal suction supply valve from the RWST (8980).	26. This step may be delayed if breakers in step 4. have not been racked in.
27. When the lo lo level point is reached in the RWST, trip both containment spray pumps.	27. Trip any other engineered safeguard pumps that are still taking suction from the RWST. This will only be necessary if the preceeding steps have not been completed prior to reaching the lo lo level set point.
28. If step 4, 17 and 26 were delayed, perform these steps at this time.	
29. If either RHR pump failed, either containment sump to RHR suction valve failed to open (valves 8982A or B) or either RHR Train to centrifugal charging pumps or SI pumps suction valves 8804A or B failed to open, go to Appendix D (RHR Train Failure).	
30. If W.R. RCS pressure is less than 1065 psig, return to step 25 of the LOCA procedure. If W.R. RCS pressure is greater than 1065 psig, return to LOCA procedure step that was left to perform this appendix.	30. Large Break LOCA Small Break LOCA

APPENDIX B

COLD LEG RECIRCULATION/HOT LEG RECIRCULATION CHANGE OVER PROCEDURE

ACTION	COMMENTS
Hot Leg Recirculation Phase	
1. Approximately 19-1/2 hours after the injection phase, the recirculation flow path is changed from the cold legs to the hot legs.	
2. It is important during this phase to insure that two separate and redundant trains of both RHR and safety injection pumps are established.	
3. Close the no. 1 RHR pump cold leg injection valve (8809A).	
4. Close the RHR pump no. 1 valve to the containment spray header (9003A) if it is open.	
5. Check open the RHR pump no. 1 valve to the safety injection pumps and centrifugal charging pumps (8804A).	
6. Shut down both centrifugal charging pumps and close both BIT inlet valves (8803A and B).	
7. Shutdown no. 1 safety injection pump.	
8. Close no. 1 safety injection pump discharge crosstie valve (8821A).	
9. Open the no. 1 safety injection pump hot leg injection valve (8802A).	
10. Start no. 1 safety injection pump and check for rated flow of approximately 650 gpm.	
11. Close the no. 1 safety injection pump normal suction valve (8923A).	

APPENDIX B (cont.)

ACTION	COMMENTS
12. Close the no. 2 RHR pump cold leg injection valve (8809B).	
13. Check closed the no. 2 RHR pump valve to the containment spray header (9003B).	
14. Check open the no. 2 RHR pump to the safety injection pumps alternate suction valve (8804B).	
15. Shutdown no. 2 safety injection pump.	
16. Close the no. 2 safety injection pump discharge crosstie valve (8821B).	
17. Close the safety injection pumps common discharge valve (8835) to the cold legs.	
18. Open the no. 2 safety injection pump hot leg injection valve (8802B).	
19. Start the no. 2 safety injection pump and check for rated flow of approximately 650 gpm.	
20. Close the no. 2 safety injection pump normal suction valve (8923B).	
21. The systems are now set up in two completely separate and redundant trains with each RHR pump supplying a separate SI pump. No containment spray or direct RHR recirculation are utilized.	
22. If desired, direct RHR recirculation to the hot legs may be used simultaneously as follows:	
a. Open the No. 1 RHR train discharge crosstie valve (8716A).	

APPENDIX B (cont.)

ACTION	COMMENTS
b. Open the common RHR hot leg injection valve (8703). c. Adjust the RHR train No. 1 flow (HCV-638) to insure adequate suction to the SI pump and to maintain RHR pump motor current less than 57.5 amps.	
23. If containment spray is desired for any reason (such as loss of fan cooler unit) it may be accomplished as follows: a. Open the No. 2 RHR Train valve to the containment spray header (9003B). b. No flow control is available in this operation, so SI pump suction pressure and RHR pump motor current must be closely watched.	
24. Divide the auxiliary saltwater system into two separate trains: a. Open idle CCW heat exchanger outlet valve (FCV-430 or FCV-431). b. Open saltwater inlet valve on idle heat exchanger FCV-602 or FCV-603). c. Open stop valves of idle heat exchanger in the water box vent lines to air removal tank (el. 119'). d. Verify CCW heat exchanger saltwater outlet valve (SW-65 or SW-66) throttled at 56° to maintain water box volume. e. Verify that operating standby ASW pump discharge valve is open (SW-54 or SW-55). f. Close motor operated pump discharge crosstie valves (FCV-495 and FCV-496). g. Verify approximately equal motor current on each ASW pump motor and equal flow through each heat exchange.	24. If Appendix E was used to correct a failed diesel generator problem, do not separate the two trains.
25. Line up the component cooling water system for long term recirculation: a. Verify that the idle CCW heat exchanger outlet valve (FCV-430 or FCV-431) is open. b. Open or verify open FCV-355 Header "C" supply. c. Close pump suction header crosstie valve (CCW-4) between headers "B" and "C". d. Close CCW Pump 1 discharge valve (CCW-18) to header "A". e. Close CCW Pump 2 discharge valve (CCW-16) to header "B". f. Close CCW Pump 3 discharge valve (CCW-17) to header "B". g. Isolate CCW header "C" from header "B" by closing valve CCW-24.	25. Same note as 24 above.

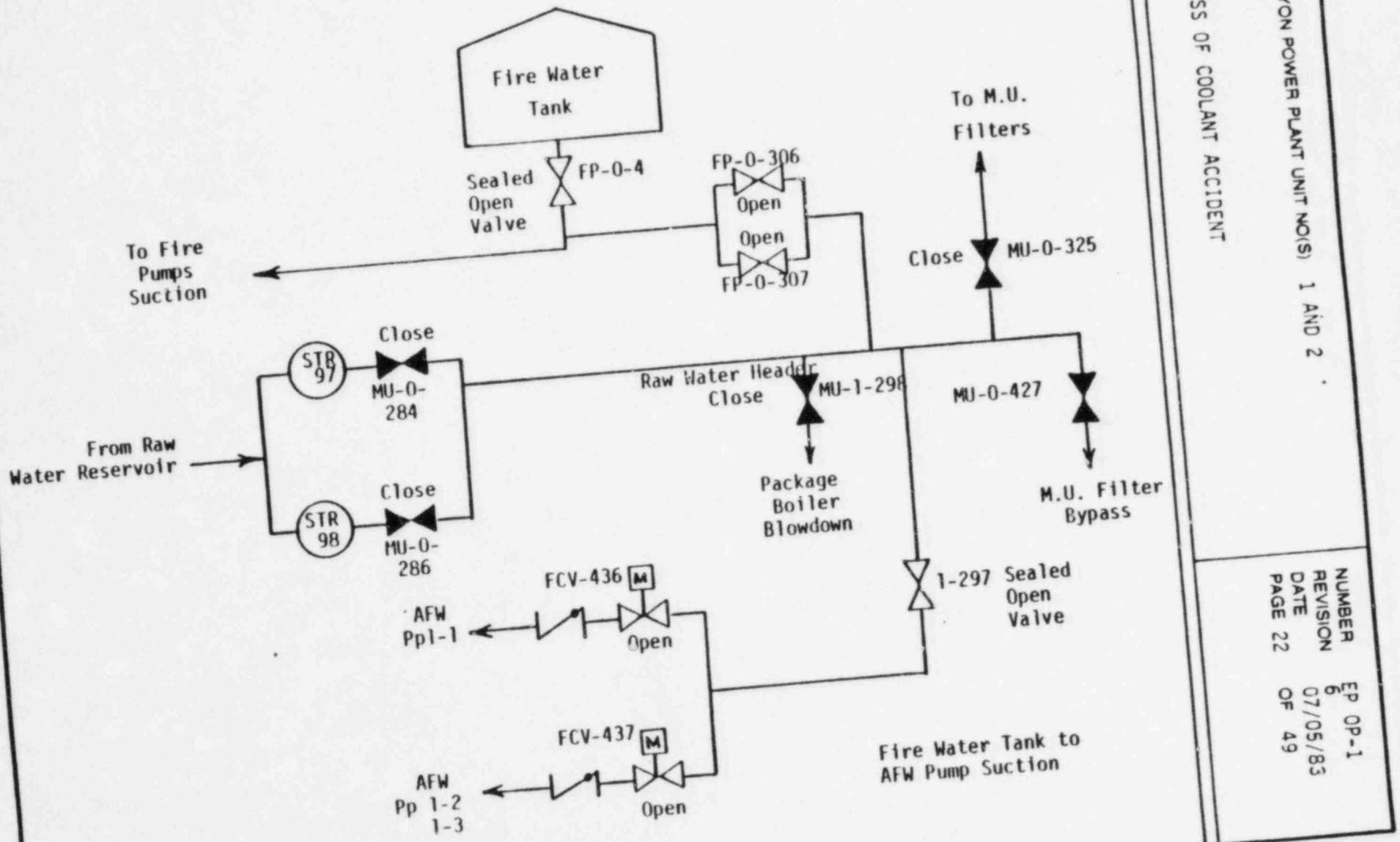
APPENDIX C

AUXILIARY FEED PUMP SUCTION SUPPLY FROM FIRE WATER TANK

The Operator has 20 minutes to perform this operation after the Lo Lo level alarm on the condensate storage tank and before the AFW pumps lose suction. This provides sufficient time; however, the operator must not delay and must carry out the valve line up in order as written.

If the AFW pumps are being supplied from the raw water reservoir and a seismic event occurs with resultant loss of AFW suction and auxiliary feedwater flow to the steam generators, the steam generators will boil dry in about 30 minutes. Under these conditions, it is especially important to expedite this procedure and reestablish AFW flow to the steam generators prior to the reactor losing its heat sink.

ACTION	COMMENTS
Using the attached drawing, proceed to supply the AFW pumps suction from the fire water tank.	
1. Close or verify closed MU-0-284 and MU-0-286.	1. Closing these valves prevents losing fire water out a possible break in the reservoir supply line.
2. Close or check closed MU-1-298.	
3. Close or check closed MU-0-325.	
4. Close or check closed MU-0-427.	
5. Open FP-0-306 and FP-0-307.	
6. Notify the control room that the suction for the AFW pumps is now available from the fire water tank.	
7. From the control room open FCV 436 and 437.	
8. Proceed to the auxiliary feedwater pumps and vent the pump casings if required to remove air.	


Fire Water Tank
Sealed Open Valve
FP-0-4
FP-0-306
Open
Open
FP-0-307
To Fire Pumps Suction
To M.U. Filters
Close
MU-0-325
Close
STR 97
MU-0-284
From Raw Water Reservoir
Raw Water Header
Close
MU-1-298
MU-0-427
Package Boiler Blowdown
M.U. Filter Bypass
Close
STR 98
MU-0-286
FCV-436
M
AFW Ppl-1
Open
1-297 Sealed Open Valve
FCV-437
M
AFW Pp 1-2 1-3
Open
Fire Water Tank to AFW Pump Suction

APPENDIX D

RHR TRAIN/COMPONENT FAILURE

A. FAILURE IN RHR TRAIN NO. 2

ACTION	COMMENTS
1. If RHR pump No. 2 failed, containment sump to RHR valve 8982B or RHR pump No. 2 to SI suction valve 8804B failed to open proceed with steps a. to d. to provide charging and SI pump suction from RHR pump No. 1.	1. Monitor RWST level, when the level reaches the lo lo alarm setpoint, trip all safeguards pumps taking suction from the tank.
a. Verify RHR pump No. 1 crosstie valves to SI pump suction 8807A or B open.	
b. Close or verify closed Train No. 2 to SI pump suction valve 8804B.	
c. Throttle HCV 638 to ensure adequate suction for the SI and centrifugal charging pumps (approximately 20 psig above containment pressure) while maintaining RHR pump motor current less than 57.5 amps.	
d. Return to the LOCA procedure step that was left to perform Appendix A.	

APPENDIX D

B. FAILURE IN RHR TRAIN NO. 1

ACTION	COMMENTS
1. If RHR pump No. 1 failed, containment sumpe to RHR valve 8982A or RHR pump No. 1 to charging pumps suction valve 8804A failed to open, proceed with steps a. to d. to provide charging and SI pump suction from RHR pump No. 2.	1. Monitor RWST level, when the level reaches the lo lo alarm set-point, trip all safe-guards pumps taking suction from the tank.
a. Verify RHR pump No. 2 crosstie valves to SI pump suction 8807A or B open.	
b. Close or verify closed Train No. 1 to SI pump suction valve 8804A.	
c. Throttle HCV 637 to ensure ade-quate suction for the SI and centrifugal charging pumps (approximately 20 psig above containment pressure) while maintaining RHR pump motor current less than 57.5 amps.	
d. Return the the LOCA procedure step that was left to perform Appendix A.	

APPENDIX E

LOSS OF OFF-SITE POWER DURING LOCA WITH LOSS OF DIESEL GENERATOR

ACTION COMMENTS

A. If a diesel generator fails during the LOCA procedure, continue with the LOCA procedure as written until Appendix A (LOCA Injection/Recirculation Change Over Procedure) is to be performed. Then follow the guidance given below for the alignment for cold leg and hot leg recirculation.

B. Diesel Generator Failure

Diesel Generator 1-1 Failure

1. If diesel generator 1-1 has failed, the following steps should be used to align the system for cold leg recirculation

   a. Verify the following pumps are running.

      ASW Pumps 1 and 2
      AFW Pump 3
      Charging Pumps 1 and 2
      CCW Pumps 1 and 2
      SI Pump 1
      C.S. Pump 1
      RHR Pump 1

   b. With diesel generator 1-1 failed, do the following steps in the order given below in Appendix A (LOCA Injection/Recirculation Change Over Procedure).

      Steps 2,3,4,5,7,8,9,10,15,18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, then do step 17.

APPENDIX E (Cont.)

ACTION	COMMENTS
c. Throttle HCV-638 to provide adequate suction for the SI and charging pumps (approximately 20 psig above containment pressure while maintaining RHR pump motor current less than 57.5 amps).	
d. Verify the cold leg recirculation flow path as follows: RHR pump 1 from containment sump to cold legs 1 and 2, SI pump 1 from RHR pump 1 to all cold legs, charging pumps 1 and 2 from RHR pump 1 to all cold legs via the BIT. Containment spray pump 1 from RWST to spray headers.	
2. Proceed as follows after 19-1/2 hours for hot leg recirculation.	
a. Perform the following steps in the order given below in Appendix B (Cold Leg Recirculation/Hot Leg Recirculation Change Over Procedure). Steps: 1,3,4,5,6,7,8,9,10,11.	
b. Close HCV-638 RHR discharge valve.	
c. Open 8716A RHR pump crosstie valve.	
d. Open 8703 RHR to hot legs 1 and 2.	
e. Throttle open HCV 638 to hold an RHR pressure greater than 29 psig above containment pressure or less than 57.5 amps on RHR pumps.	

APPENDIX E (Cont.)

ACTION	COMMENTS
f. Verify hot leg recirculation flow path as follows: RHR pump 1 from containment sump to SI pump 1 suction via valves 8804A, 8807A and B and to hot legs 1 and 2 via valve 8703. SI pump 1 from RHR pump 1 to RCS hot legs 1 and 2	

Diesel Generator 1-2 Failure

1. If diesel generator 1-2 has failed the following steps should be used to align the system for cold leg recirculation.

   a. Verify the following pumps are running.

      ASW Pumps 1
      AFW Pumps 2 and 3
      Charging Pump 1
      CCW Pumps 1 and 3
      SI Pumps 1 and 2
      C.S. Pump 2
      RHR Pump 2

   b. With diesel generator 1-2 failed, do the following steps in the order given below in Appendix A (LOCA Injection/ Recirculation Change Over Procedure).

      Steps: 2,3,4,5,7,8,9,10,11,12 13,14,15,16,17,18,25,26,27,28.

APPENDIX E (Cont.)

ACTION	COMMENTS
c. Throttle HCV-637 to provide adequate suction for the SI and charging pumps (approximately 20 psig above containment pressure while maintaining RHR pump motor current less than 57.5 amps).	
d. Verify the cold leg recirculation flow path as follows: Containment spray pump 2 from RWST to spray headers. RHR pump 2 from containment sump to cold legs 3 and 4, SI pumps 1 and 2 from RHR pump 2 to all cold legs, charging pump 1 from RHR pump 2 to all cold legs via the BIT.	
2. Proceed as follows after 19-1/2 hours for hot leg recirculation.	
a. Perform the following steps in the order given below in Appendix B (Cold Leg Recirculation/Hot Leg Recirculation Change Over Procedure). Steps: 1,6,7,8,9,10,12,13,14, 15,16,18,19.	
b. Close 8807A and B (RHR Pump No. 2 to charging pumps).	
c. Close HCV-637 RHR discharge valve.	
d. Open 8716B RHR crosstie valve.	
e. Open 8703 RHR to hot legs 1 and 2.	

APPENDIX E (Cont.)

ACTION	COMMENTS
f. Throttle open HCV-637 to hold an RHR pressure greater than 20 psig above containment pressure or less than 57.5 amps on the RHR pumps.	
g. Verify the hot leg recirculation flow path as follows: RHR pump 2 from containment sump to SI pumps 1 and 2 suction, via valve 8804B and to hot legs 1 and 2 via 8703. SI pumps 1 and 2 from RHR pump 2 to all RCS hot legs.	

Diesel Generator 1-3 Failure

1. If diesel generator 1-3 has failed, the following steps should be used to align the system for cold leg recirculation.

   a. Verify the following pumps are running

      ASW Pump 2
      AFW Pump 2
      Charging Pump 2
      CCW Pumps 2 and 3
      SI Pump 2
      C.S. Pumps 1 and 2
      RHR Pumps 1 and 2

   b. With the diesel generator 1-3 failed, do the following steps in order given below in Appendix A (LOCA Injection/Recirculation Change Over Procedure).

      Steps: 2,3,4,5,7,8,9,10,11,12,13 14,15,16,17,18.19,20,21,22,23,24, 27,28.

APPENDIX E (Cont.)

ACTION	COMMENTS
c. Throttle HCV-638 and 637 to provide adequate suction for the SI and charging pump (approximately 20 psig above containment pressure while maintaining RHR pump motor current less than 57.5 amps).	
d. Verify cold leg recirculation flow path as follows: Containment spray pumps 1 and 2 from RWST to spray headers. RHR pump No. 2 from containment sump to cold legs 3 and 4 and to SI pump No. 2. SI pump No. 2 from RHR No. 2 to all cold legs. RHR pump No. 1 from containment sump to cold leg 1 and 2 and to No. 2 centrifugal charging pump. Centrifugal charging pump No. 2 from RHR Pump No. 2 to all cold legs via the BIT.	
2. Proceed as follows after 19-1/2 hours for hot leg recirculation.	
a. Perform the following steps in the order given in Appendix B (Cold Leg Recirculation/Hot Leg Recirculation Change Over Procedure). Steps: 1,2,3,4,6,12,13,14,15,16, 17,18,19,20, then perform step 22.	

APPENDIX E (Cont.)

ACTION	COMMENTS
b. Close 8804A RHR supply to charging pumps.	b. All BIT inlet and outlet valves will not close with a failure of 1-3 diesel generator. This step prevents flow to the cold legs via the charging pumps and BIT.
c. Verify hot leg recirculation flow path as follows. RHR pump 1 from containment sump to hot legs 1 and 2 via HCV-638. RHR pump No. 2 from containment sump to SI pump No. 2 via 8804B. SI pump 2 from RHR pump 2 to RCS hot legs 3 and 4.	

APPENDIX F

DETERMINATION OF ADEQUATE CORE COOLING

This appendix provides the guidance to determine adequate core cooling if inadequate core cooling is suspected. Further, the instructions for regaining adequate core cooling is presented.

ACTION	COMMENTS
1. Monitor the core exit thermocouple temperatures. a. If the P-250 is available go to step 2. b. If the P-250 is not available go to step 3.	
2. If 5 or more P-250 thermocouple readings exceed 1200°F, notify the Shift Foreman that inadequate core cooling exists and go to step 5. If there are not 5 or more that exceed 1200°F, discontinue this appendix but continue to monitor the thermocouple readings.	
3. At the thermocouple incore board in the control room, Monitor 10 core-centered thermocouples. If any 3 of the 10 thermocouples exceed 700°F (Pegged hi) proceed to step 4. If there are not 3 thermocouples that exceed 700°F, discontinue this appendix but continue to monitor the thermocouple readings.	
4. If SI flow to the RCS and AFW flow to the steam generators cannot be verified, notify the Shift Foreman that inadequate core cooling may exist and go to step 5. If both SI slow to the RCS and AFW flow to the steam generators can be verified, discontinue this Appendix but continue to monitor the thermocouple readings.	
5. The Shift Foreman will verify if inadequate core cooling exists using the appropriate steps above. If inadequate core cooling exists the Shift Foreman will direct operations as follows:	

APPENDIX F (Cont.)

ACTION	COMMENT
a. Declare a General Emergency Implement the instructions given in Emergency Procedure G-1 regarding on and off-site protective actions.	
b. Attempt to establish SI flow to the RCS and AFW flow to the steam generators.	
c. Continue monitoring core outlet temperature to determine the effectiveness of the remaining actions.	
d. DEPRESSURIZE THE RCS by method 1 or 2 below.	
1) Dump steam to the condenser or atmosphere if the steam generator levels are in the narrow range and AFW flow is evident.	1) THIS IS THE PREFERRED METHOD.
2) Verify the SIS or charging pumps are running and available to deliver water to the RCS THEN Open the pressurizer PORV's.	2) Opening the PORV's will provide a drop in RCS pressure sufficient to allow the SI flow required to cool the core. This method is to be used if 1) (above) is ineffective.
e. If no means of depressurization are available, or if the depressurization did not result in decreasing core exit thermocouple temperatures, THEN START A RCP if possible. If the RCP fails after starting, replace the lost RCP with any remaining RCP.	e. Attempt to establish CCW and seal water flow to the pump; however, if CCW and/or seal water flow cannot be established, proceed to start a RCP. The pump must be started to move coolant thru the core.

APPENDIX G

BLACKOUT WITH SAFETY INJECTION EMERGENCY LOADING OF VITAL BUSSES

1. If the vital busses lose voltage prior to resetting the safety injection signal, the vital busses will automatically load the vital equipment given below. Verify the equipment has been loaded by observing breaker lights on the control board.

2. If the vital busses lose voltage after the safety injection signal has been reset, load or verify loaded the equipment given below onto the vital busses manually. Allow approximately 4 seconds between loading of each piece of equipment onto a given vital bus. Load or verify that the CFCU are running in low speed.

VITAL BUS F	VITAL BUS G	VITAL BUS H
D/G 1-3	D/G 1-2	D/G 1-1
MCC 1-F	MCC 1-G	MCC 1-H
CC Pp 1-1	CC Pp 1-2	SI Pp 1-2
SI Pp 1-1		
CFCU 1-2	RHR Pp 1-1	RHR Pp 1-2
CFCU 1-1	CFCU 1-3	CFCU 1-4
CCW Pp 1-1	CFCU 1-5	CCW Pp 1-3
ASW Pp 1-1	CCW Pp 1-2	AFW Pp 1-2
AFW Pp 1-1	ASW Pp 1-2	

3. Load the containment spray Pumps only if they were running prior to the blackout.

VITAL BUS G	VITAL BUS H
Cont Spray Pp 1-1	Cont Spray Pp 1-2

APPENDIX H

VERIFICATION OF ESF FUNCTIONING AND EFFECTIVENESS DURING LOCA

The primary function of the Shift Technical Adviser during any emergency is to evaluate plant conditions and advise the Shift Foreman on recovery procedures or actions to be taken to mitigate the consequences of the emergency. This appendix provides a method of evaluating the effectiveness of the ESF system during any LOCA and provides guidance on reclassifying the accident from a Site Emergency to a General Emergency should conditions warrant. The on shift Shift Technical Adviser (or his designated alternate if additional manpower is available) will make this evaluation as the event progresses and will make the necessary recommendations to the Shift Foreman based on his findings.

For all accidents except the LOCA[1], the maximum amount of activity which could be released is low enough so that persons located beyond the site boundary are not in immediate jeopardy even under the worst circumstances. In the case of the LOCA, however, it is theoretically possible that a large fraction of the core inventory of the volatile fission products (noble gases and iodines) could be released if one assumes multiple failures of the various engineered safety features. In such a case, doses within the LPZ could be very high, particularly to the thyroid gland. Loss of life is possible. As a result, it is imperative that downwind areas of the LPZ be evacuated as soon as possible in a LOCA situation where the functioning and/or effectiveness of the engineered safety feature systems is in doubt. In the case of the LOCA with inadequate core cooling, the major release would not be expected for at least two hours due to the time required to melt a large fraction of the core and the expected time before any containment failure would be likely. Th[illegible], early recognition of the signs of ESF malfunction and prompt action in this event can prevent most, if not all, of the exposure of persons within the LPZ.

In the event of a LOCA, the Evaluations Coordinator should pay particular attention for signs that the ESF systems have malfunctioned, and if their effectiveness is in doubt, go ahead and classify the accident as a General Emergency and have the Emergency Coordinator notify those agencies given in General Appendix 2 of the emergency procedures and the NRC Operation Center immediately.

This Appendix and worksheets provide a checklist of three major categories of items to look for, and provides criterion to indicate that the various ESF have or have not functioned. In several cases there is more than one indicator to verify the functioning of a particular

[1]Which includes loss of the primary system heat sink and resultant expulsion of coolant from the primary system to the extent that safety injection is required.

APPENDIX H (Cont'd)

safety feature. For example, SI pump flow is measured directly by a flow indicator, but can also be inferred from pump operation and valve position indicators. If the various indications do not agree, a judgement must be made on the basis of what is considered to be the best evidence. Normally, however, the conservative course of action should be followed.

1. Worksheet for Verification of ESF Functioning and Effectiveness During a LOCA.

This worksheet is to be used first to check that the minimum components in each of the ECCS and containment cooling systems have operated correctly. Although this does not guarantee that they will be effective, it provides reasonable assurance. Conversely, their failure vastly increases the chance of fuel melting or overheating and overpressurization of the containment (thereby jeopardizing its ability to retain fission products). Therefore, classify the accident as a General Emergency unless the minimum required components in each of the categories have functioned or are immediately initiated manually.

The worksheet applies only to the injection phase. Although it is also necessary to maintain core cooling during the recirculation phase, the speed with which it must be restored is less cricical. However, if the ability to cool the core is lost, and is not likely to be restored rapidly, a General Emergency is justified.

Included on the worksheet is the verification of containment isolation valve closure. Post-accident dose calculations are based upon the assumption that containment leakage rate is 0.1%/day. If the leakage rate exceeds this, the off-site does will increase proportionately. Although it is not possible to rapidly measure the leak rate, if all major penetrations that lead directly to the atmosphere are closed by at least one valve, the leak rate is probably reasonably low.

If at least one valve in each of the paths on the worksheet (Page 39), Item 7, is not closed either automatically or by operator action within about 15 minutes, consider the accident a General Emergency.

2. Worksheet for Verification of Containment Pressure Less than Design Pressure

This worksheet is used to determine if the internal containment pressure significantly exceeds the design pressure of the structure. Doubts are cast about the ability of the containment to retain

APPENDIX H (Cont'd)

the fission products (at least a maximum leakage rate of 0.1%/day) if design pressure is exceeded. It also indicates that the ESF are not functioning properly, since the pressure should never get that high if a minimum safeguards train works correctly.

The containment is designed for 47 psig coincident with the forces caused by a double design earthquake (0.4g). With no earthquake (or following completion of an earthquake), the containment can withstand 1.5 times the previous pressure, or 70 psig. Figure 1 on the worksheet shows the maximum allowable containment pressure as a function of the earthquake strength. If the curve is exceeded, the accident must be considered a General Emergency.

3. Worksheet for Verification of Containment Radiation Level Within Expectations

This worksheet is used to determine the extent of core damage. Two high range gamma instruments (RE-30 and RE-31) have been installed to measure the internal containment radiation level following a LOCA. Figure 1 on the worksheet shows the calculated response of these instruments as a function of time after a LOCA assuming various degrees of core damage. Any LOCA would be expected to release the activity contained in the coolant and so a reading of this magnitude should not be cause for concern. Similarly, in a major LOCA some cladding failure may occur due to the combined effects of DNB, depressurization, and metal-water reaction. Cladding failure will release some of the activity contained in the gap between the pellet and the cladding. However, the amount of cladding failure should be small. Thus, if the activity in the containment reaches the line labeled "100% gap release," it is indicative of gross core damage and/or the onset of fuel melting. In either case, the ECCS has failed to function as expected and the accident should be considered as a General Emergency. That is, if the containment radioactivity reaches or exceeds the value on Figure 1 for 100% gap release, consider the accident as a General Emergency.

If there is any question about the validity of the readings, or if the above instruments have failed, readings can be taken at the containment exterior with protable radiation protection equipment. Specifically, Figure 2 on the worksheet shows similar data for a CP type instrument located at the exterior surface of the steel liner (but inside the movable concrete shield) at the equipment hatch. Figure 3 on the worksheet shows the does rate outside the containment concrete wall. The readings at the equipment hatch can be made with an extension probe on a Victoreen

APPENDIX H (Cont'd)

Rad Gun. The HPI-1010 would be an appropriate instrument to use for measurements external to the concrete containment wall.

NOTE: Normal background is about 0.015 mR/hr on the HPI-1010.

WORKSHEET 1, APPENDIX H
WORKSHEET FOR VERIFICATION OF ESF FUNCTIONING
AND EFFECTIVENESS DURING A LOCA

PERFORMED BY _____ DATE _____ TIME _____

1. BASIC ACCIDENT INFORMATION

UNIT _____ DESCRIPTION _____

DATE/TIME OF OCCURENCE _____ / _____

2. CENTRIFUGAL CHARGING PUMPS

a. Pump suction valve open ☐ 8805A ☐ 8805B
b. BIT inlet valve open ☐ 8803A ☐ 8803B
c. BIT outlet valve open ☐ 8801A ☐ 8801B
d. Charging pump ON ☐ No. 1 ☐ No. 2
e. Flow through FI-917 _____ gpm
f. At least one train must be verified in service by verifying an operable flow path and the pump ON, or by verifying flow through FI-917. ☐ YES ☐ NO

BY _____ TIME _____

3. SAFETY INJECTION PUMPS

a. Pump supply valve from RWST open ☐ 8976
b. Pump suction valve open ☐ 8923A ☐ 8923B
c. Pump discharge crosstie valve open ☐ 8821A ☐ 8821B
d. Pump cold leg discharge open ☐ 8835
e. SIS pump ON ☐ No. 1 ☐ No. 2
f. RCS pressure 1500 psig ☐ YES ☐ NO psig ____ _____
g. Flow established FI-918 _____ gpm FI-922 _____ gpm
h. If RCS 1500 psig, at least one train must be verified in service by verifying an operable flow path and the pump ON, or by verifying flow established through the FI. ☐ N/A ☐ YES ☐ NO

BY _____ TIME _____

4. ACCUMULATORS

a. Accumulators discharge (LI's show low level) No. 1 ☐ LI950 or 951; No. 2 ☐ LI952 or 953; No. 3 ☐ LI954 or 955; No. 4 ☐ LI 956 or 957
b. RCS pressure <600 psig? ☐ YES ☐ NO psig _____
c. At least one LI per accumulator indicates discharge, if RCS <600 psig. ☐ N/A ☐ YES ☐ NO ☐

BY _____ TIME _____

WORKSHEET 1, APPENDIX H

5. RESIDUAL HEAT REMOVAL PUMPS

a. Pump supply valve from RWST open ☐ 8980

b. Pump suction valve open ☐ 8700A ☐ 8700B

c. HX outlet flow control valve open ☐ HDV-638 ☐ HCV-637

d. Cold leg injection valve open ☐ 8809A ☐ 8809B

e. RHR pump ON ☐ No. 1 ☐ No. 2

f. RCS pressure <170 psig ☐ YES ☐ NO psig _____

g. Flow established ☐ FI-970 _____gpm ☐ FI-971 ____gpm

h. If RCS <170 psig, at least one train must be verified in service by verifying an operable flow path and the pump ON, or by verifying flow through the FI. ☐ N/A ☐ YES ☐ NO

BY _____ TIME _____

6. CONTAINMENT SPRAY AND COOLING

a. Spray additive tank valve open ☐ 8992

b. Spray additive tank valve open ☐ 8994A ☐ 8994B

c. Spray pump discharge valve open ☐ 9001A ☐ 9001B

d. Spray pump ON ☐ No. 1 ☐ No. 2

e. Fan coolers ON: No. 1 ☐; No. 2 ☐ ; No. 3 ☐ ; No. 4 ☐ ; No. 5 ☐

f. Containment Hi-Hi pressure signal received ☐ YES ☐ NO

g. At least two spray pumps have functioned OR one spray pump and three fan coolers functioned if a containment Hi-Hi pressure signal received. ☐ N/A ☐ YES ☐ NO

BY _____ TIME _____

7. CONTAINMENT ISOLATION VALVE CLOSURE

	INSIDE CONT.	OUTSIDE CONTAINMENT
a. Pressure/Vacuum relief closed	☐ FCV-662	☐ FCV-663 and 664
b. Purge supply closed	☐ FCV-660	☐ FCV-661
c. Purge exhaust closed	☐ RCV-11	☐ RCV-12

d. At least one valve in each of the above flow paths must be closed within 15 minutes ☐ N/A ☐ YES ☐ NO

BY _____ TIME _____

8. If item 2.f, 3.h, 4.c, 5.h, 6.g, OR 7.d, is NO, consider the accident as a General Emergency

BY _____ TIME _____

WORKSHEET 2, APPENDIX H
WORKSHEET FOR VERIFICATION OF CONTAINMENT PRESSURE LESS THAN DESIGN PRESSURE

PERFORMED BY _____ DATE _____ TIME _____

1. BASIC ACCIDENT INFORMATION

   UNIT _____ DESCRIPTION _____

   DATE/TIME OF OCCURRENCE _____ / _____

2. EARTHQUAKE FORCE MONITOR (EFM-1)

EFM-1 Indicator	Peak Reading		Peak Earthquake Acceleration	
a. Longitudinal	_____	x 0.01 =	_____	g
b. Vertical	_____	x 0.01 =	_____	g
c. Transverse	_____	x 0.01 =	_____	g

BY _____ TIME _____

3. CONTAINMENT PRESSURE

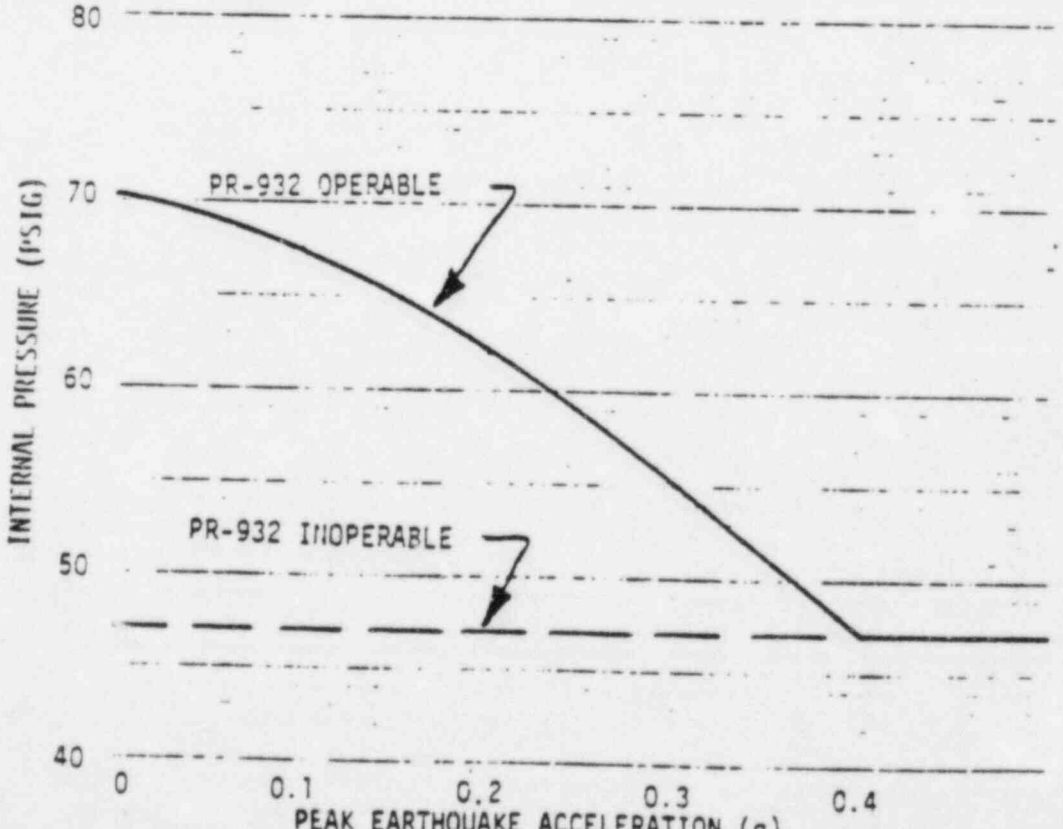


Figure 1
Internal Pressure Capability of the Containment Versus Earthquake Acceleration

WORKSHEET 2, APPENDIX H

a. Using the largest acceleration in g's from the EFM-1 (item 2 above) and Figure 1 determine:

1) Maximum allowable pressure with PR-932 operable _____ psig

2) Maximum allowable pressure without PR-932 operable _____ psig

b. Using containment pressure indicator PR-932 or any 2 of 4 of the following indicators PI-934, 935, 936, 937, record containment pressure every two or three minutes for the first 15 minutes of the accident.

INSTRUMENT ID	TIME	PRESSURE (PSIG)

BY _____ TIME _____

4. DESIGN LIMITATION (complete 3.a OR 3.b)

a. If PR-932 was used in item 3.b to determine containment pressure, are any pressure readings greater than the maximum allowable pressure with PR-932 operable (item 3.a.1):

YES ☐ NO ☐

OR

b. If any 2 of 4 of the following indicators, PI-934, 935, 936, or 937, were used to determine containment pressure, are any pressure readings greater than the maximum allowable pressure without PR-932 operable (item 3.a.2):

YES ☐ NO ☐

5. If item 3.a OR 3.b is YES, consider the accident as a General Emergency.

BY _____ TIME _____

WORKSHEET 3, APPENDIX H
WORKSHEET FOR VERIFICATION OF CONTAINMENT RADIATION LEVELS

PERFORMED BY _____ DATE _____ TIME _____

1. BASIC ACCIDENT INFORMATION

   UNIT _____ DESCRIPTION _____

   DATE/TIME OF OCCURRENCE _____/_____

2. Using the lowest reading on one of the following, RE-30, RE-31, (in the Control Room), the Victoreen Rad Gun (between the equipment hatch steel door and movable concrete shield), or a HPI-1010 (at the containment concrete wall), determine the radiation level following an accident approximately every 15 minutes for 2 hours.

INSTRUMENT ID	TIME	DOSE RATE(R/HR)	BY

WORKSHEET 3, APPENDIX H

3. Determination of Expected Radiation Level

a. Using Figure 1, (page 44) the time after the accident and readings from RE-30 and RE-31 (item 2), are radiation levels equal to or higher than expected for 100% gap release.

☐ N/A ☐ YES ☐ NO

b. Using Figure 2, (page 45) the time after the accident and readings from the Victoreen Rad Gun (item 2), are radiation levels equal to or higher than expected for 100% gap release.

☐ N/A ☐ YES ☐ NO

c. Using Figure 3, (page 46) the time after the accident and readings from the HPI-1010 (item 2), are radiation levels equal to or higher than expected for 100% gap release.

☐ N/A ☐ YES ☐ NO

4. If item 3.a., 3.b., OR 3.c. is YES, consider the accident as a General Emergency.

BY _____ TIME _____

WORKSHEET 3, APPENDIX H

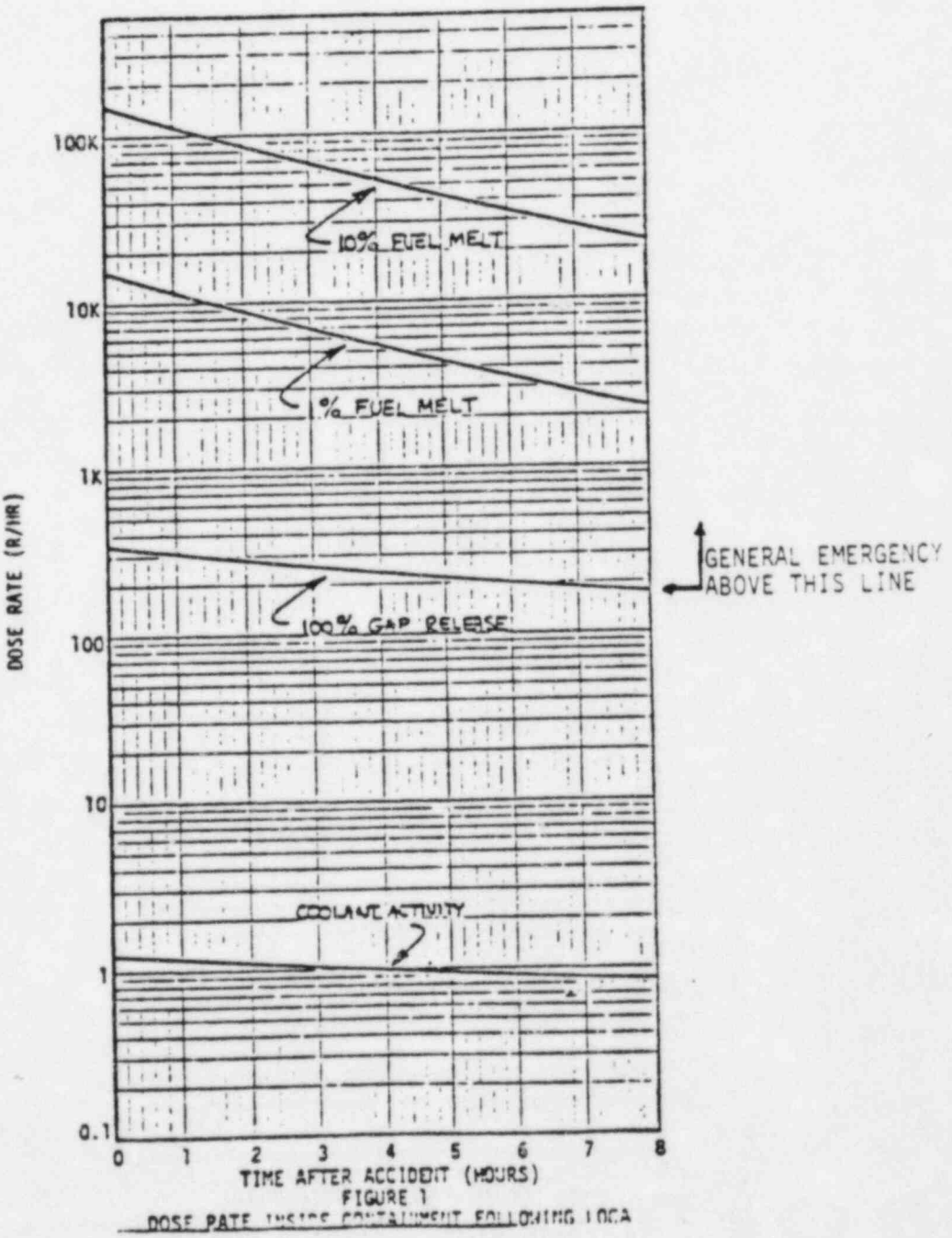


FIGURE 1
DOSE RATE INSIDE CONTAINMENT FOLLOWING LOCA

WORKSHEET 3, APPENDIX H

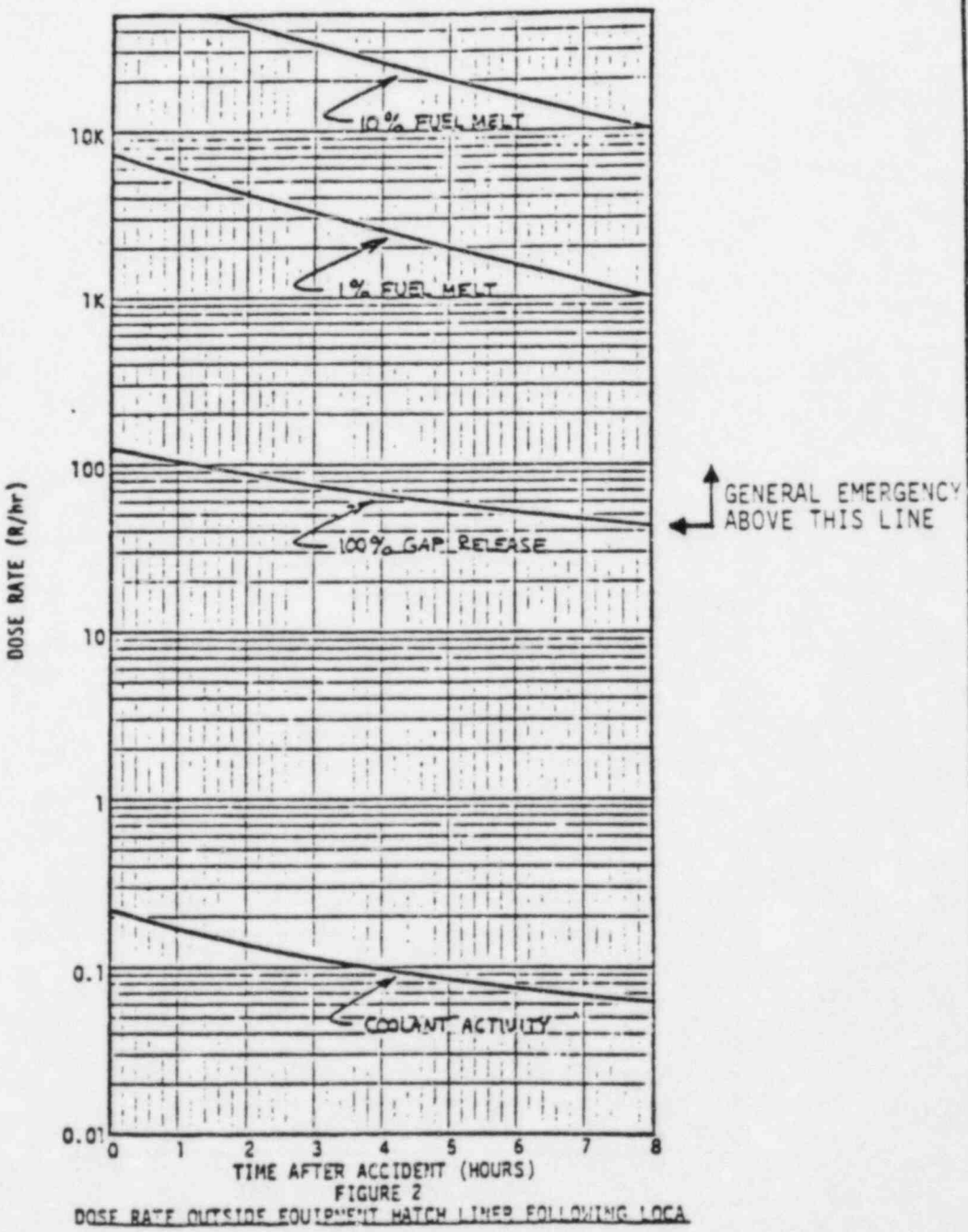


FIGURE 2

DOSE RATE OUTSIDE EQUIPMENT HATCH LINER FOLLOWING LOCA

WORKSHEET 3, APPENDIX H

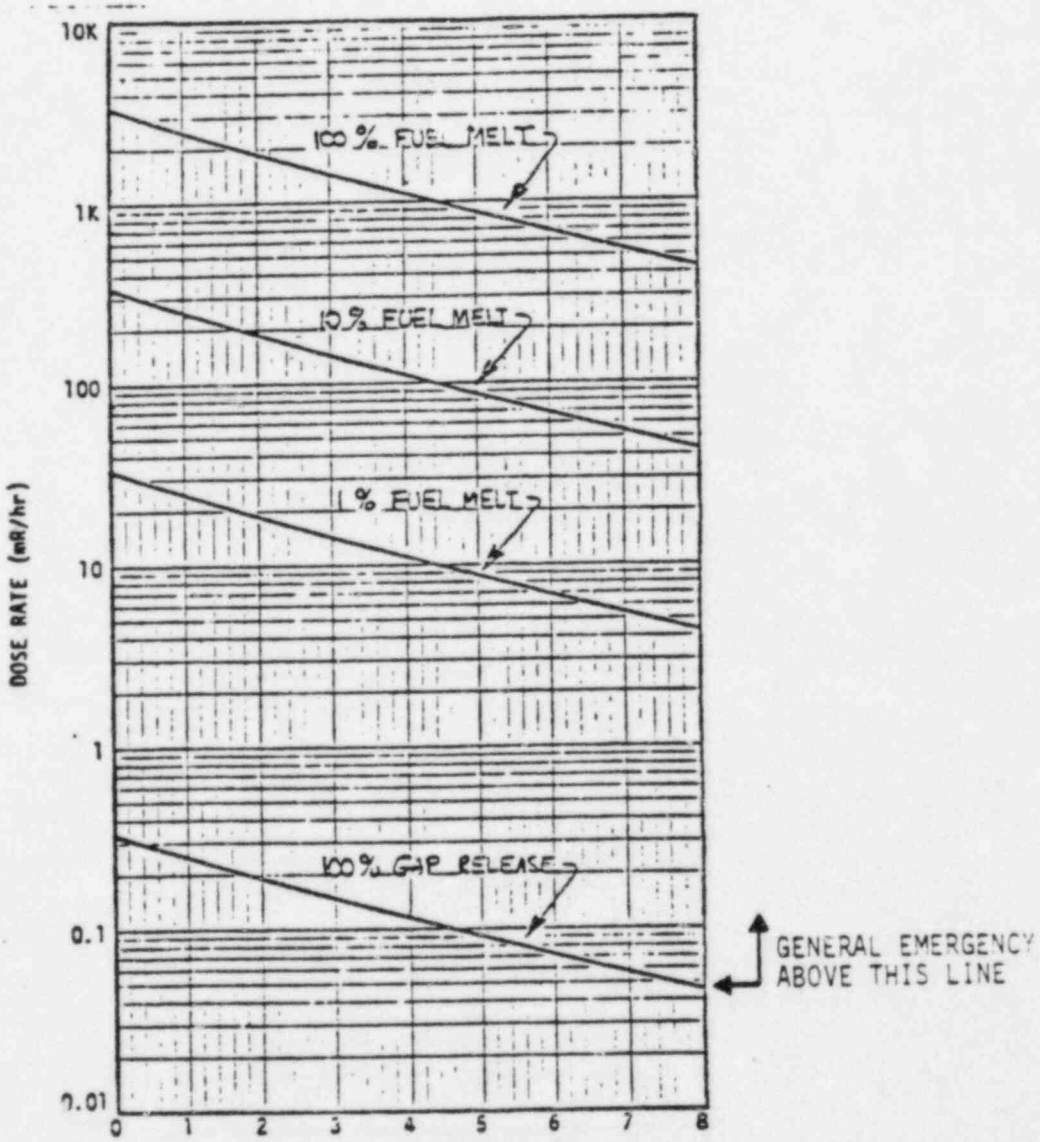
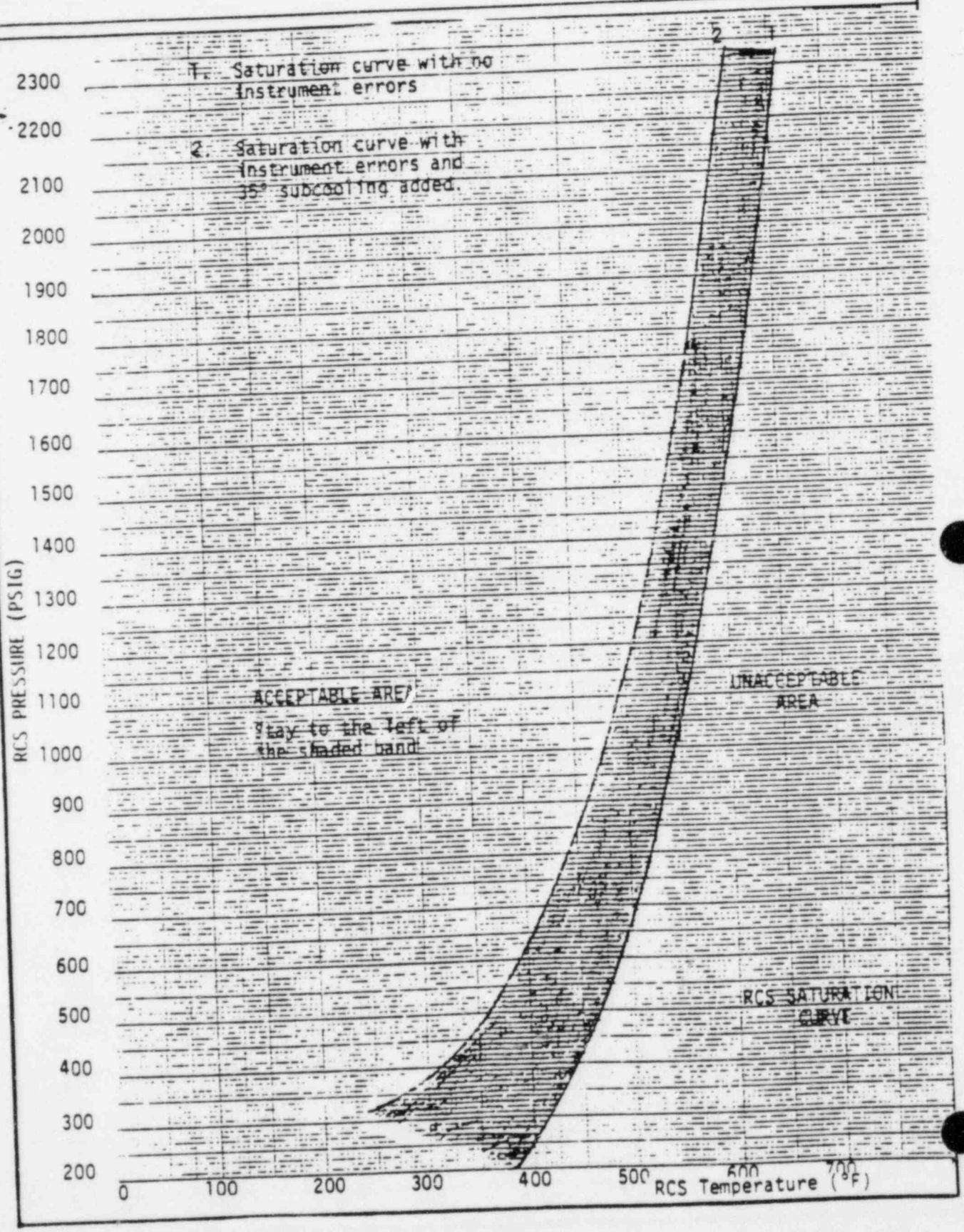


FIGURE 3
DOSE RATE OUTSIDE OF CONTAINMENT SHIELD WALL FOLLOWING LOCA


1. Saturation curve with no instrument errors
2. Saturation curve with instrument errors and 35° subcooling added.
ACCEPTABLE AREA
Stay to the left of the shaded band
UNACCEPTABLE AREA
RCS SATURATION CURVE
RCS PRESSURE (PSIG)
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
0
100
200
300
400
500
600
700
RCS Temperature (°F)

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been activated and upon direction from the Shift Foreman, proceed as follows:

   a. Designate this event a Site Area Emergency. Notify plant staff and organizations required for this classification by Emergency Procedures G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-Site Organization" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

   b. In the event inadequate core cooling is verified per Appendix F or the verification of ESF Functioning and Effectiveness during LOCA, Appendix H, indicates ESF failure, reclassify this event as a General Emergency. Notify plant staff and response organizations in accordance with EP G-2 and EP G-3 and implement the instructions in EP G-1 regarding on and off-site protective actions.

PG&E
Nuclear Plant Operations
68-10709 (4/82)

DIABLO CANYON POWER PLANT
PROCEDURE ON-THE-SPOT CHANGE

Procedure No. EP OP-4B Rev. 0 Unit No. 1 ☐ 2 ☐ 1&2 ☒

Title LOSS OF ALL AC POWER

Type of Change: ☒ PERMANENT (green) ☐ TEMPORARY (yellow); Expiration Date _____

Requesting Department OPERATIONS Originator N. LIEW

ORIGINATOR

Proposed Change: (Does this alter the intent of original procedure? ☐ Yes ☒ No)
(Does it constitute an unreviewed safety/environmental question? ☐ YES ☒ NO)

delete Step 12.b, 12.c and 12.d on page 10 of 61.

Reason for Change: The above steps are replaced by step 12.b, 12.c and 12.d on page 11 of 61. Duplicity caused by word processing error.

Authorizations _____ (Plant Management Staff) _____ (Plant Management Staff w/SRO License) 2/14/83 Date*

Immediate distribution to the Control Room and affected work areas required? ☒ YES ☐ NO
Distributed To: ☒ Control Room ☐ Others QC

Initial Distribution By: N. LIEW

DOCUMENT CONTROL

Date Received by Document Control _____

PSRC Review and Plant Manager's approval no later than _____ Date above *plus 14 days

PSRC POST CHANGE REVIEW

Review Date _____

PSRC recommends approval ☐ Yes ☐ No _____ Plant Manager's Approval ☐ N/A

Meeting Number ☐☐-☐☐☐

REQUESTING DEPARTMENT

Follow-up To Rejected On-the-Spot Change ☐ Additional Information ☐

Action Taken/Remarks:

DISTRIBUTION: ☒ Same as Original Procedure Distribution ☐ Others _____ Please see additional sheets ☐

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

EMERGENCY OPERATING PROCEDURE

TITLE: EMERGENCY BORATION

NUMBER EP OP-6
REVISION 6
DATE 7/5/83
PAGE 1 OF 5

APPROVED: R. C. Thornberry 7-14-83
PLANT MANAGER DATE

SCOPE

This procedure covers the situations which require emergency boration and the methods for accomplishing this operation. Three methods of emergency boration are discussed in this procedure. The preferred method is borating at 10gpm using the VCT make-up system. The next method is borating through the emergency boration valve (CVCS-8104). The next alternate method is boration using the RWST.

SYMPTOMS

Any one of the following conditions requires emergency boration.

1. Control rods inserted below the low-low insertion limit. (alarm PK03-14)
2. Failure of any control rod to fully insert following a reactor trip as indicated by rod position indication and rod bottom lights.
3. Uncontrolled reactor coolant system cooldown following a reactor trip with no ESF action as indicated by:
   a. Lo-Lo T_{avg} alarm (window PK02-04).
   b. Continuous or unexpected decrease of T_{avg} below no load value (547°F).
   c. Abnormal decreasing pressurizer level and/or pressure.
4. Uncontrolled or unexplained reactivity increase as indicated by:
   a. Unexplained control rod insertion.
   b. Increasing T_{avg} or nuclear power with no increased load demand.
   c. Unexpected increasing count rate when shutdown.
5. When boration is required and normal boration through the VCT make-up system is not possible.
6. Shutdown margin less than acceptable minimum limits as per Technical Specification 3.1.1.1, 3.1.1.2 and 3.9.1.

AUTOMATIC ACTIONS

1. None

IMMEDIATE OPERATOR ACTIONS

ACTIONS	COMMENTS
1. If the VCT makeup system is operable, borate at 10gpm by using the BORATE or MANUAL MODE.	
2. If the VCT makeup system is inoperable or is not sufficient, use the emergency boration valve as follows:	
a. Verify boric acid pump in low speed or transfer the running boric acid pump to low speed	
b. Open the emergency boration motor operated valve (CVCS-8104).	
c. Increase charging flow:	c. Monitor PZR level and open additional letdown orifice valve if necessary. If PZR is solid, verify PCV-135 is functioning properly.
1) If the PD pump is inservice, go to manual and increase charging flow to maximum.	
2) If a centrifugal pump is in service, go to manual and increase charging flow to maximum. If necessary, close one recirc. valve (8105 or 8106).	2) CAUTION: Re-open the recirc valve if an SI occurs or if the pump is in danger of dead-heading.
d. Verify sufficient charging and emergency borate flows into RCS.	d. High VCT pressure will inhibit boric acid flow. It may be necessary to vent VCT. The minimum BORIC ACID flow (12%) is 10gpm.

SUBSEQUENT OPERATOR ACTION

1. If the above methods did not function:	
a. Swap charging pump suction from the VCT to the RWST.	
b. Shift to centrifugal pump operations, if not already in use. Insure charging flow is >100gpm.	b. This will insure that sufficient boron is injected to satisfy Tech. Specs. 3.1.1.1, 3.1.1.2 and 3.9.1.

SUBSEQUENT OPERATOR ACTIONS (Continued)

ACTIONS	COMMENTS
2. Borate as needed to place the reactor in a safe condition	
a. If boration was required due to a stuck rod borate 100ppm for each stuck rod.	a. 300 gallons of 12%B.A.≈100ppm
b. If the boration was required due to violation of Rod Insertion Limits (RIL), borate until rods are above RIL.	b. If rods are in manual, pull rods to match TAVG with TREF as boration occurs.
c. If criticality was reached inadvertently below the RIL, borate 100ppm.	
d. If the boration was due to Tech. Specs. 3.1.1.1, 3.1.1.2 or 3.9.1, borate until within limits.	
e. If boration was due to an uncontrolled or unexplained reactivity increase or uncontrolled cooldown following a reactor trip, borate as necessary to regain control	
3. When sufficient boron has been added proceed as follows:	
a. If the VCT makeup system method was used for this procedure	
1) Stop the boration	
2) Set up the VCT makeup system for AUTOMATIC makeup.	2) Use the boron meter to determine the necessary blend.
b. If the emergency boration valve (CVCS-8104) method was used:	
1) Close the emergency boration valve (CVCS-8104).	
2) Return the boric acid pump to auto.	

3) Return the charging control to automatic and open recirc. valves if closed.

4) Close the additional letdown orifice stop valve if it was opened.

5) Use the boron meter and adjust the automatic makeup system to the new concentration.

c. Have the Rad and Chem department take a boron sample.

1) Take sample from:

a. Hot legs of reactor coolant loops.

b. Pressurizer liquid volume.

2) Adjust VCT makeup blend as needed.

3) Use pressurizer sprays to equalize boron concentrations if necessary.

4. Monitor the level in the boric acid tank(s) to determine if replenishment of the tank(s) is necessary to meet plant Technical Specification limiting conditions for operation.

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been activated and upon direction from the Shift Foreman, proceed as follows:

   a. Notify the Plant Superintendent, Supervisor of Operations and Plant Manager or their designated alternates.

   b. If the emergency boration resulted from the plant not being in a controlled or expected condition while operating or shutdown (such as symptoms 1, 2, 3, 4 or 6), designate this event as a Significant Event. Notify the NRC Bethesda Operations Center within one hour as described in Operating Procedure O-4 "Operating Order (One Hour Reporting Requirements to NRC)."

2. If, in the opinion of the Shift Foreman, the plant condition requiring emergency boration warrants increased awareness on the part of the plant emergency organization or state and county response organizations, designate this event a Notification of Unusual Event and notify plant staff and response organizations required by Emergency Procedure G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-Site Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

PG&E **Pacific Gas and Electric Company**

NUMBER EP OP-8
REVISION 6
DATE 7/5/83
PAGE 1 OF 23

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2
EMERGENCY OPERATING PROCEDURE
TITLE: CONTROL ROOM INACCESSIBILITY

APPROVED: R. C. Thornberry 7-14-83
PLANT MANAGER DATE

SCOPE

These instructions are provided to cover those conditions prevailing when operation from the main Control Room is no longer possible due to fire, smoke, heat, chlorine, high radioactivity or other occurrences which make the Control Room uninhabitable.

SYMPTOMS

The following alarms may come in:

1. Control Room Ventilation alarm (PK5-06) due to hi radiation or hi chlorine.
2. Fire/Smoke detector alarm (PK 10-10).
3. High radiation alarms.

OBJECTIVES

1. Establish stable hot standby conditions from the hot shutdown panel.
2. To provide instructions to allow the plant to be taken to cold shutdown condition from hot standby from outside the Control Room if conditions require this.

AUTOMATIC ACTIONS

1. Possible transfer to Control Room ventilation to Mode 3 (high Chlorine) or Mode 4 (Pressurization).
2. Possible start of the diesel generators (if offsite power is lost).

IMMEDIATE OPERATOR ACTIONS

1. Trip the reactor and main unit turbine.
2. Verify reactor tripped (all rods on bottom DRPI - reactor power decreasing, Nuclear Instruments).
3. Verify turbine tripped (all four SV closed on EH panel).
4. Proceed to the hot shutdown panel.

SUBSEQUENT OPERATOR ACTIONS

	ACTIONS	COMMENTS
	The below listed equipment should have its control switch placed in the following position prior to transferring to local control to insure a bumpless transfer.	Transfer of equipment to local control may remove it from various auto control schemes (i.e., press., level, etc.) Auto starts due to bus transfer or SI will still occur. Transferring BA pps & Pzr groups to local control removes them from their auto control schemes. (It may be advisable to leave them in REMOTE at this time).
	a. PZR HTR GRPS 12 and 14 to the neutral position.	
	b. The appropriate orifice isolation valve (8149 A, B,C) to the open position, and orifices not in service in the closed position.	
	c. BA XFR PPS 11 and 12 to low speed.	
1.	TO MAINTAIN THE PLANT IN HOT STANDBY	
	A. With off-site power available	
	1. The following equipment can be transferred to local control immediately:	
	*a. BA XFER pump 11	
	*b. Containment fan coolers 11, 13 and 14.	It is advisable to leave the following equipment in AUTO (Remote) if they are controlling properly in the AUTO position, unless manual control is desired.
	*c. 8149A&C (letdown orifice valves).	HCV 142 FCV 128 PCV 19,20,21 and 22 (10% steam dumps) LCV 110,111,115 and 113 (AFW level control valves)

*These items must have their control transfer relays hand reset when transferring control back to Control Room (in addition to being in remote position on transfer switch).

ACTIONS

COMMENTS

d. HCV 142
e. FCV 128
f. 10% steam dump valves
g. LCV 110,111,115 and 113
h. CCW pump 11 and 13
i. ASW pump 11
j. Cent. Chg. pump 11
*k. Pzr. Heater group 14
l. AFW pump 13
*m. LCV 108
*n. LCV 109

2. The following equipment must have their control transfer cutout switch cut in prior to transferring to local control:

a. Located inside the 480V Bus F AUX relay panel:

*1. Containment fan cooler 12

*2. 8149B (letdown orifice valve)

b. Located inside the 480V Bus G AUX relay panel:

*1. FCV 95 (AFW pump 11)

*2. MOV 8104 (Emerg. Borate Valve)

*3. LCV 106

*4. LCV 107

*5. BA XFER pump 12

*6. CONTAINMENT fan cooler 15

*These items must have their control transfer relays hand reset when transferring control back to Control Room (in addition to being in remote position on transfer switch).

ACTIONS	COMMENTS
c. Located at 4 KV Bus G	
1. CCW pump 12	
2. ASW pump 12	
3. Cent. Chg. pump 12	
d. Located at 4 KV Bus H	
AFW pump 12	
e. LOCATED INSIDE 480V Bus 13D cutout switch panel	
*PZR heater group 12	
3. Trip the main feedwater pump turbines and ensure that they go on turning gear once zero speed is reached.	
4. Ensure that the bearing oil pump, HP seal oil backup pump and the bearing lift oil pumps are running; and that the main unit turbine goes on turning gear once zero speed is reached.	
5. Maintain the reactor at hot standby condition by:	
a. Controlling steam generators at 33% with the auxiliary feedwater controls.	a. See attached graph for determining actual VS. indic. level (approx. 63% indic. on wide range equals 33% actual on narrow range at 1005#).

*These items must have their control transfer relays hand reset when transferring control back to Control Room (in addition to being in remote position on transfer switch).

ACTIONS	COMMENTS
b. Controlling pressurizer level at 22% by use of the charging pumps and letdown valves. Do not allow level to go below 20% to ensure against letdown isolation. If letdown isolation does occur, restore letdown per Appendix A.	
c. Control pressurizer pressure at 2235 psi by use of the backup heaters as needed.	
d. Verify steam generator pressure is being maintained at approximately 1005 psi by use of the condenser steam dump. This will be an automatic function unless vacuum is lost on the condenser. Manual operation of the 10% steam dumps will then be required.	
e. Calculate the SDM for hot Xe free conditions.	
f. Stop any dilution in progress.	f. This may require local valve manipulations.
6. Establish or verify communications between the hot shutdown panel and:	6. Establish as personnel availability allows.
a. Outside telephone exchange (send an operator to the plant office).	
b. Dedicated shutdown panel	
c. 480V vital switchgear area	
d. 4 KV vital switchgear area	

ACTIONS	COMMENTS
7. Maintain shutdown margin using method a. or b. below.	
a. By opening the emergency borate valve 8104 from the hot shutdown panel.	a. Observe boric acid flow on FI at hot shutdown panel.
b. Boration may be accomplished by opening manual valve 8471 so that boric acid flows through normally open FCV-110A, but bypasses the blender, and running the boric acid pump in fast speed.	b. Indication of boric acid flow using this method will be at local FI (PM 96 on 100' El. Aux. Bldg.)
8. Place diesel generator control selector switch on excitation cubicle to LOCAL position. Verify the AUTO/TEST selector switch on local panel in the AUTO position.	8. Done locally in each D.G. room.
9. Place SU FDR breaker transfer switches to LOCAL position on cubicles.	
B. With loss of off-site power:	
1. The same as A. above except that diesels start automatically and assume the vital bus loads.	
a. Verify that the diesels have started and have assumed their normal loads. Verify 4 KV Bus F, G and H volts at the hot shutdown panel.	a. Shutdown unnecessary equip. not needed for current plant status.
b. Verify that equipment with controls located at hot shutdown panel have re-started after transfer of power to diesels. Restart locally if necessary.	

ACTIONS	COMMENTS
c. Transfer PZR heater groups 12 & 13 to emergency supply. 480V vital power breakers 52-1G-72, 52-1H-74.	c. Htr Grps 12&13 on back-up supply can ONLY be controlled (from outside the control room) by locally closing or opening their breakers for pressure control.
C. Maintain hot standby until Control Room access is restored and control has been returned to the Control Room.	C. If Control Room access is not restored rapidly, a decision must be reached on how long to remain in hot standby and when to start cooling down to cold shutdown. The basis for this decision is the amount of water inventory in the condensate storage tank. Refer to condensate curves in this procedure for guidance in making this decision.
D. Notify plant management.	
E. Declare this event an alert. Carry out the instructions given in General Appendix 2 to the Emergency Procedures (Notification of Offsite Agencies in the Event of an Emergency).	

TO TAKE THE PLANT FROM HOT STANDBY TO COLD SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

ACTIONS	COMMENTS
1. Calculate the SDM for cold Xe free conditions and borate as necessary. Energize pressurizer heaters during boration to equalize the boron concentrations in the PZR with the RCS. Alternatively, see Appendix B for spray actuation.	1. Containment entry will be required to accomplish various evolutions in this procedure, therefore, preparations should be made as soon as practicable to allow for this. Also, I&C Dept. personnel assistance will be required to execute certain steps.

ACTIONS	COMMENTS
2. Sample the RCS and PZR to ensure boron concentrations are equalized and adequate for cold shutdown.	
3. Maintain RCS temperature and press. within the operating band of the attached curves during cooldown.	3. Do not exceed 100°F/HR cooldown rate. A 50°F/HR cooldown rate is recommended.
4. Maintain cold Xe free boron conc. by closely monitoring RCS boron conc.	4. Remote readout of the boron analyzer is available at the secondary sample panel (85' El.).
5. De-energize all PZR heaters. Open and rack out breakers for Prop. heaters (52-13D-5) and group 13 heaters (52-13E-2). Place heater groups 12 and 14 in the OFF position.	5. If heater groups 12 and 13 are on backup supply, open their bkrs.
6. Commence RCS cooldown using 10% atmospheric steam relief valves and reducing pressure using pressurizer spray per Appendix B attached. (If it is desired to secure normal charging to RCS valve 8146, a pneumatic jumper will have to be installed around SV 200 in PM 90 in Containment.)	6. As an alternate means of cooldown (if condenser available) use handjack on 40% steam dump valve. Ensure letdown remains in service while utilizing auxiliary spray (560°F Δ T limit). NOTE: During cooldown, actual PZR level can be determined by using the attached curve and indicated level at the dedicated shutdown panel (LI-406).
7. When RCS temperature has been reduced below 543°F (as indicated at the dedicated shutdown panel) open the following instrument AC breakers to inhibit HI steam line flow and Low Pzr pressure SI.	7. Automatic and manual SI is not available with these breakers open. If plant conditions warrant initiation of auto SI, close both instrument AC breakers.

ACTIONS	COMMENTS
a. PY 1115 Train A Output Cab.	
b. PY 1418 Train B Output Cab.	
8. Shutdown two RCP's to decrease the heat input to the system. Leave RCP #2 running, as it is connected to the PZR surge line.	8. Local indication of RCP vibration and RCP seal injection flows should be observed periodically during cooldown.
9. Do not allow the temperature difference between loops to exceed 25°F. The temperature of RCS loop 1 is directly indicated at the dedicated shutdown panel. Temperature for loops 2, 3 and 4 can be determined as a function of steam gen. pressure using the saturation curve on the attached graphs.	
10. When RCS pressure decreases below 1000 psig, close the accumulator outlet valves (one at a time) by performing the following at each breaker:	10. MOV 8808A 52-1F-46 MOV 8808B 52-1G-07 MOV 8808C 52-1H-14 MOV 8808D 52-1G-05
a. Lay down close contactor seal in wire on terminal #4 (inside bkr cubicle).	
b. Close breaker.	
c. Depress close contactor.	
d. When close contactor drops out, immediately re-open breaker. (If open contactor picks up before breaker is opened, close valve fully using local handwheel.	d. Closure of these valves can be verified locally.
e. Re-lift and tape seal in wire on terminal #4.	

ACTIONS	COMMENTS
11. When RCS pressure drops below 1500# or RCP #1 seal leak-off flow decreases below 1 GPM (can be observed locally) open #1 seal bypass valve 8142 by placing pneumatic jumper around SV 205 at PM 90. (El. 91' East side of containment.)	
12. Continue to cool RCS until the temperature is less than 350°F and pressure is below 390#. Maintain pressure by reducing spray flow and energizing PZR heater.	12. Open additional orifices as necessary to maintain normal letdown flow.
13. Place RHR system in service on recirc. to collect a RHR system water sample for boron determination by manually closing MOV 8809A&B (RHR to C.L. 1,2,3 & 4) and starting RHR pumps from their switchgear cubicles. Observe that recirc. flow has been established (Observe FI's located locally outside the RHR pump rooms).	13. Cut in control transfer relays cutout switches on the RHR pumps prior to starting locally. Observe pump amps locally. Do not allow the RHR to run longer than 30 min. on recirc.
14. Collect RHR sample and analyze for boron conc. Ensure boron conc. equal to or greater than the RCS boron conc.	
15. Shutdown both RHR pumps.	
16. Close 8980 using handwheel.	16. RWST to RHR suction.
17. Close the breakers for 8701 (52-1G-25) & 8702 (52-1H-19).	17. RHR suction from RCS H.L.4
18. Open 8702 and 8701 by momentarily pushing the open contactor for the valve. The valve should be full open in about 100 seconds. When the valve is full open as indicated by the open contactor dropping out OPEN the valve breaker to prevent the valve from reclosing automatically.	18. Observe local pump suction pressure indication (which should increase to RCS pressure).

19. Open the CCW outlet FCV 364 and FCV 365 (RHR HX's) by shutting off the air supply to the valves. (Valves fail open on loss of air.)	19. Observe CCW flow thru HX's local FI's (100' El Aux. Bldg.)
20. Start #1 RHR pump on recirc.	20. Monitor recirc. flow locally.
21. Slowly open 8809A until an increase in flow is observed This is to allow the RHR system to heat up.	21. Observe local temperature indicator on RCS outlet of RHR HX. (located in RHR HX room)
22. Start #2 RHR pump as per steps 20 and 21 above. (except using 8809B in step 21).	
23. Slowly open 8809A & B to commence further cooldown of RCS.	
24. Install signal simulator units to PM 135 and FM 133 (located in PM 87 on 85' el. of Aux. Bldg.)	24. This allows for operation of HCV 133 and PCV 135. Contact I&C personnel for installation.
25. Install pressure gauge upstream of PCV 135 to monitor letdown press.	
26. Open RHR Hx crosstie valves 8734A & B and establish RHR to letdown by fully opening HCV 133.	
27. Regulate letdown flow by controlling PCV 135.	27. Letdown orifice valves should remain open.
28. When condenser vacuum can no longer be maintained, proceed as follows:	28. Condenser vacuum can be observed at the main unit turbine pedestal on PI 256, or on local indicator in PM 177 on 104' El. (near PY 17).
a. Terminate condenser steam dump (if in use).	

ACTIONS	COMMENTS
b. Break condenser vacuum.	
c. Shutdown the air ejectors and secure shaft seal system on the main feed pumps and main unit turbine.	
29. Open & rack out SI pump breakers (52-HH-15 and 52-HF-15) and manually shut valve 8835. (SI to C.L. 1,2,3 and 4.)	
30. Reduce letdown flow less than charging flow to begin increasing PZR level to approx. 90%.	
31. When RCS temp. is reduced below 200°F, fill the steam generators all the way and place in wet layup.	
32. Ensure shutdown margin remains greater than 1.0% Δ K/K.	
33. Fill the PZR all the way.	33. While filling and cooling down the PZR with auxiliary spray, per Appendix B, ensure the PZR cooldown rate does not exceed 200°F/HR.
34. Shutdown remaining RCP's when the RCS temp. is below 160°F.	
35. Continue to cooldown the PZR until the PZR temp. is below 150°F.	
36. Reduce the system pressure to approx. 50 psi by reducing charging flow and increasing RHR letdown flow.	
37. Shutdown the charging pump.	

38. Stop any spray flow in progress and close the RHR letdown valve HCV 133.

39. Leave the RHR system in service recirculating from hot leg 4 to the cold legs.

40. After approximately 72 hours of cooling, one RHR train and related auxiliary systems may be shut down. The remaining RHR train must remain in service.

APPENDIX A

LETDOWN ISOLATION

Should letdown isolation occur due to low PZR level, proceed as follows:

1. Place control switch(s) for LTDN orifice valve(s) in CLOSED position.
2. Re-establish PZR level via charging flow control.
3. At nuclear auxiliary relay rack "B", depress and hold in energized position relays 33aoX / LCV 459 and 33aoX / LCV 460 for approx. 10 seconds.

   NOTE: Relays 33aoX / LCV 459 and 33aoX / LCV 460 are located in the top right hand corner of RNARB (cable spreading rm. 128' el.) and are appropriately labeled..
4. Open letdown orifice isolation valve(s) as required from the hot shutdown panel.
5. Check letdown flow re-established.

APPENDIX B

PRESSURIZER SPRAY ACTUATION

When pressurizer spray actuation is required in the performance of this procedure use method A or B below:

A. With RCP 1-1 or 1-2 operating.

1. This method uses a normal pressurizer spray valve and requires a RCP associated with its respective spray valve to be in operation.

a. To use PCV 455A (Loop 1):

(1) Contact the I&C Dept. and have them disconnect the output of PC 455G in Hagan Rack 19 at TB H leads #9 and #10, and install a 4-20 ma current source (Transmation model 1040 or equivalent) to the disconnected leads. This will allow for modulation of PCV 455A.

(2) Establish phone communications between the Hot Shutdown Panel and Hagan rack area.

(3) Increasing current to the valve will cause increased opening of the valve.

(4) When the valve is closed and operation of the valve is not required, turn off transmation unit.

b. To use PCV 455B (Loop 2)

(1) Contact the I&C Dept. and have them disconnect the output of PC 455F in Hagan Rack 19 at TB H leads #5 and #6, and install a 4-20 ma current source (Transmation model 1040 or equiv.) to the disconnected leads. This will allow for modulation of PCV 455 B.

(2) Establish phone communications between the Hot Shutdown Panel and Hagan rack area.

(3) Increasing current to the valve will cause increased opening of the valve.

(4) When the valve is closed and operation of the valve is not required, turn off transmation unit.

APPENDIX B CONT'D

B. With no RCP's in operation

1. This method requires access into containment on the 91 ft. elev. Proceed as follows:

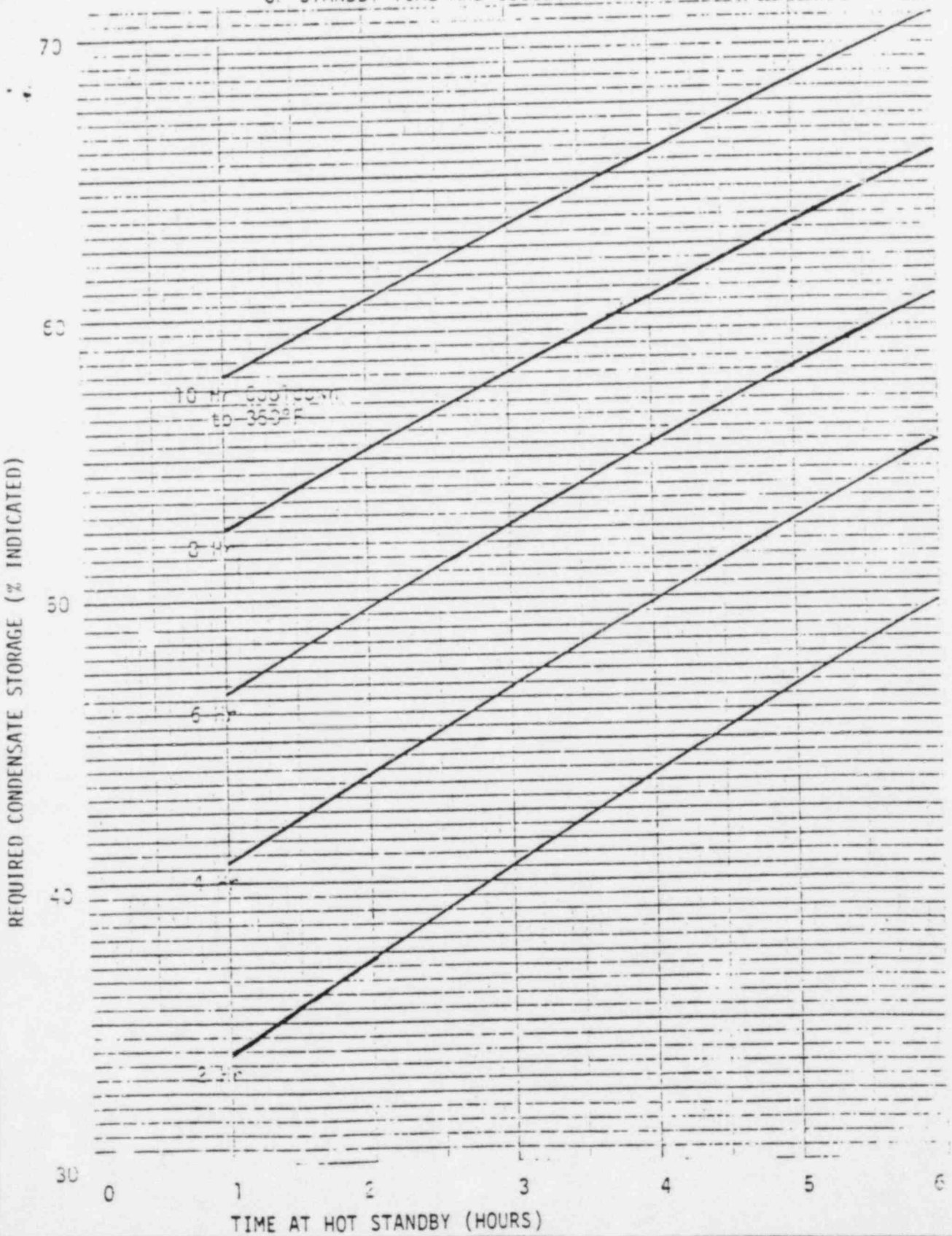
   a. Contact the I&C Dept. and have them install a pneumatic jumper around SV 66 in Mech. panel 90 (located 91 ft. elev. next to the aux. spray valve) for aux. spray valve 8145. (Valve is air to open, fail closed).

   b. Establish phone communications between Mech. panel 90 and the Hot Shutdown Panel.

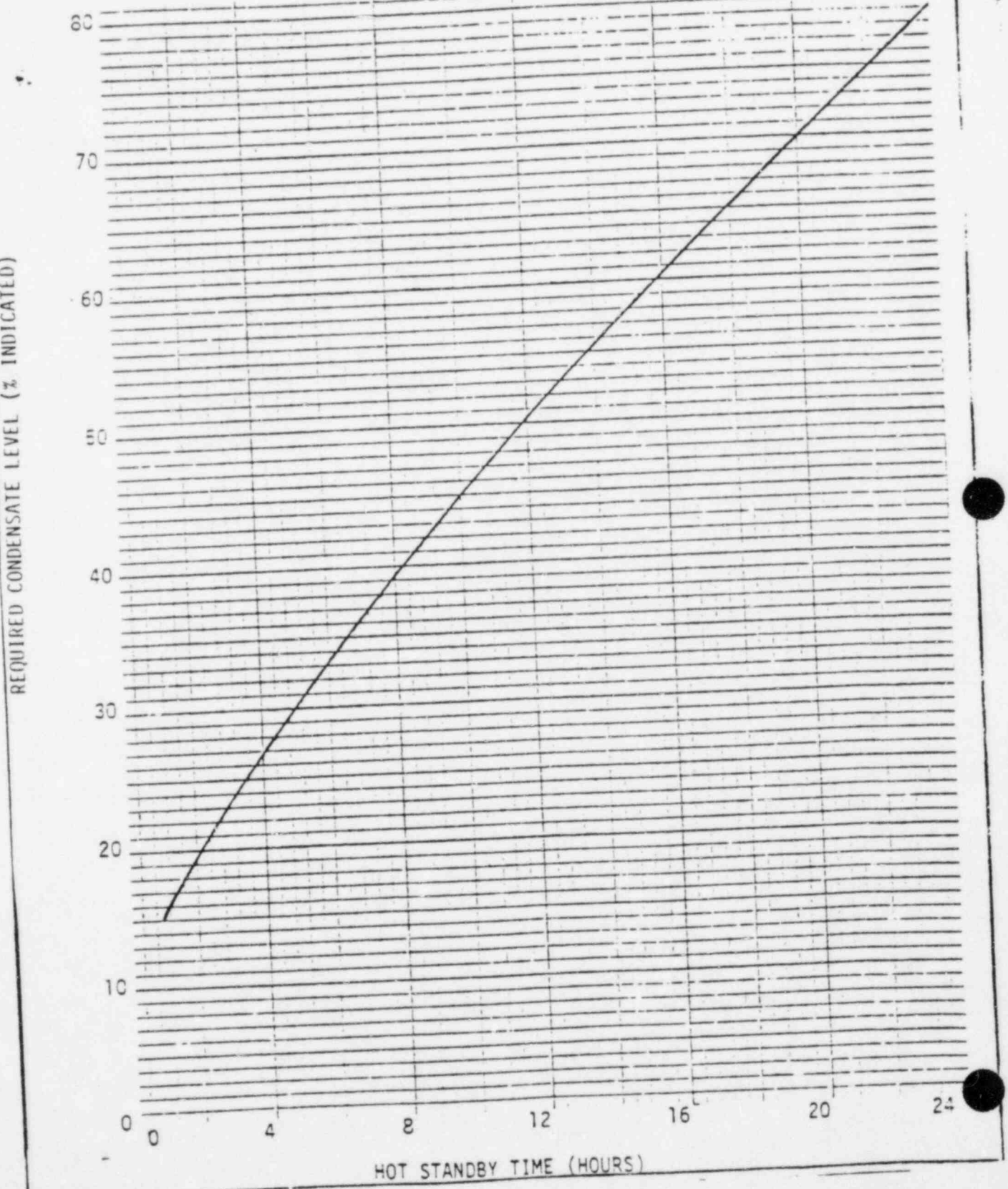
   c. Cut in air to open valve 8145 and cut out air to close the valve as required.

   d. Observe valve locally to ensure valve is responding correctly.

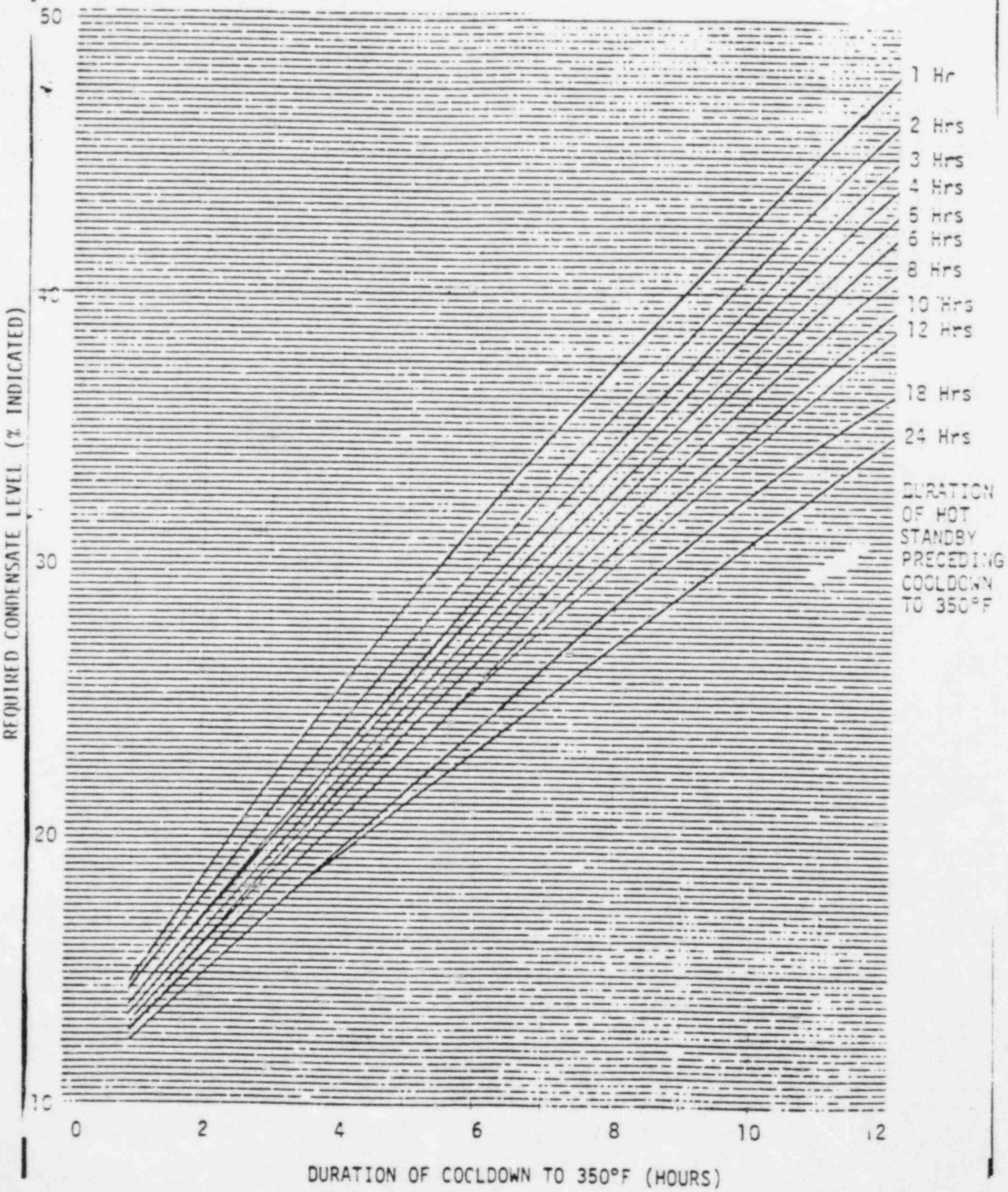
REQUIRED CONDENSATE STORAGE CAPACITY AS A FUNCTION OF STANDBY TIME AND COOLDOWN TIME (RATED Mwt=3423)

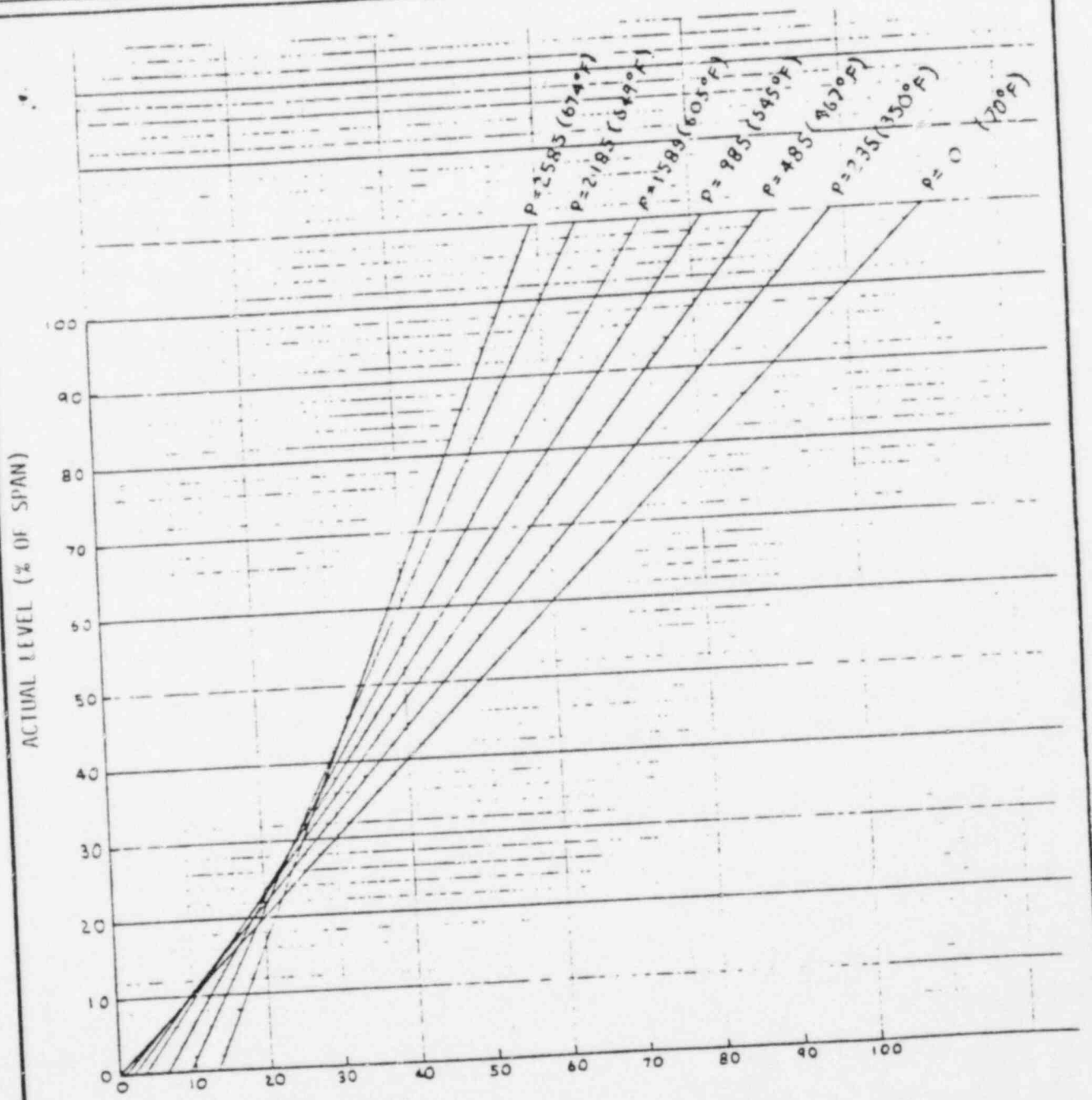


REQUIRED CONDENSATE LEVEL TO MAINTAIN
A GIVEN HOT STANDBY TIME (RATED MW$_t$ = 3423)

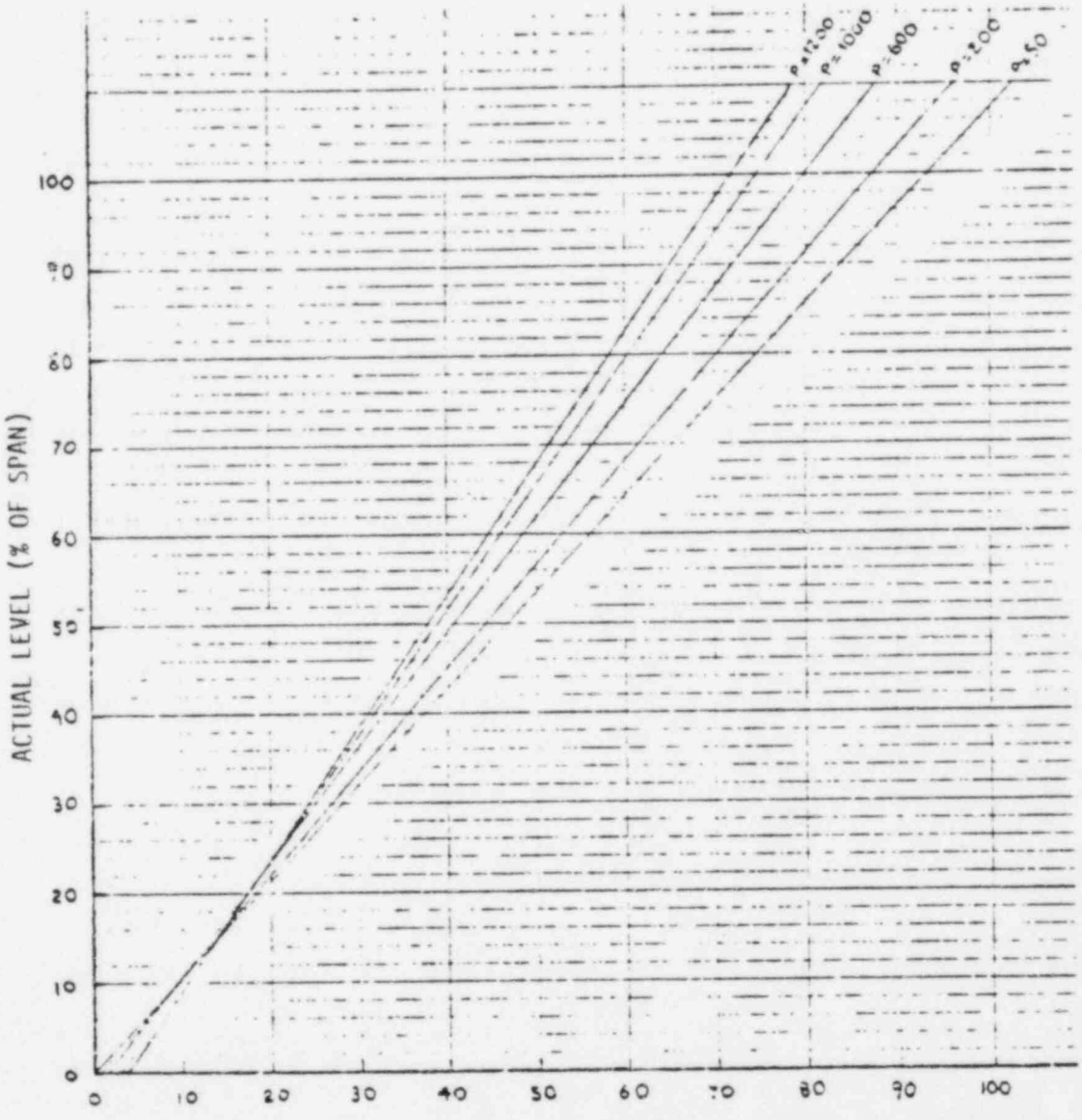


REQUIRED LEVEL OF CONDENSATE TO COOLDOWN TO 350°F.



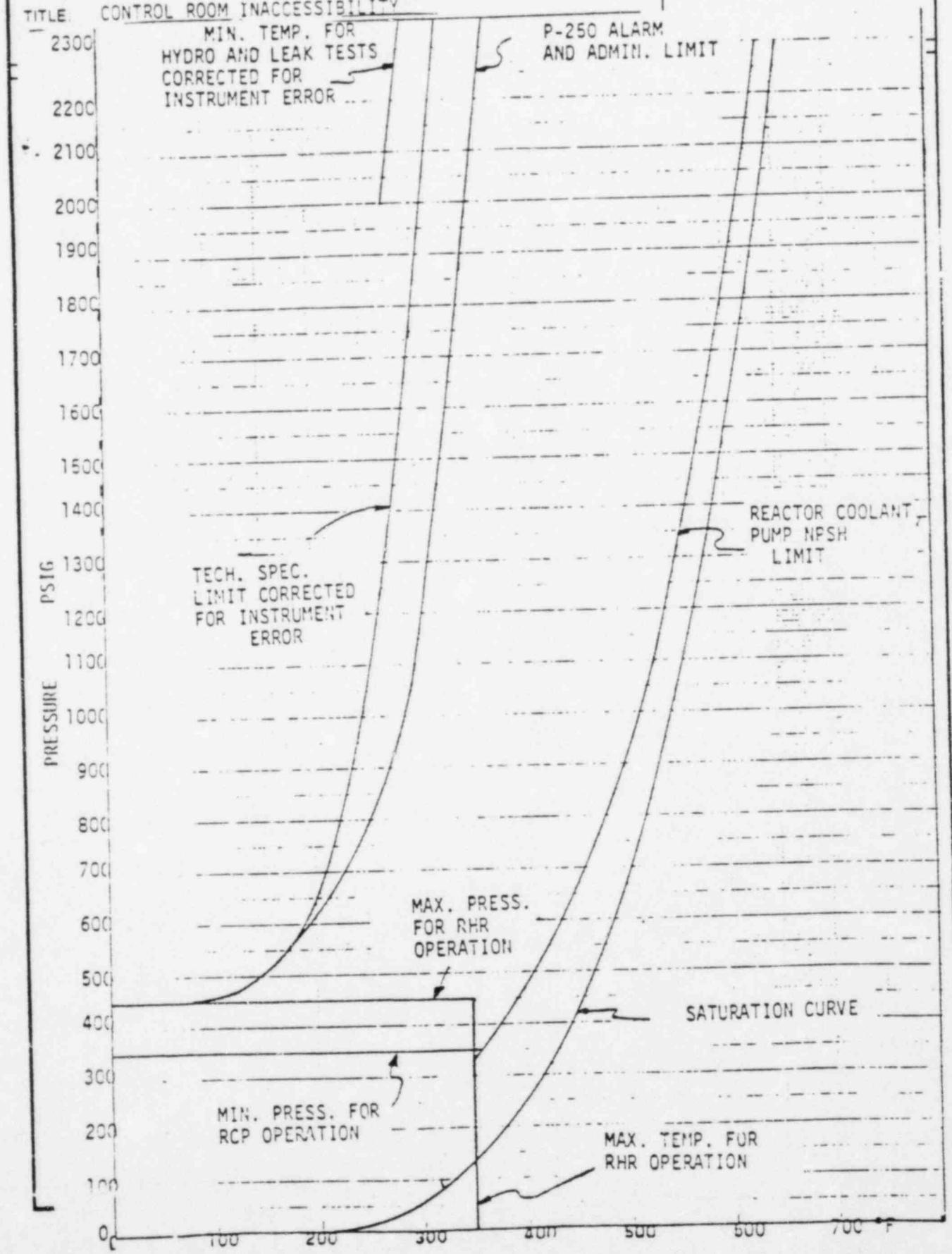


LI-406
PRESSURIZER LEVEL CORRECTION CURVES FOR PRESSURIZER PRESSURES (PSIG)
(CONTAINMENT TEMPERATURE=100°F EXCEPT AT : 0 PSIG; 70°F)



STEAM GENERATOR LEVEL (WIDE RANGE) CORRECTION CURVES
FOR STEAM GENERATOR PRESSURE (PSIG)
(CONTAINMENT TEMPERATURE-100°F)

TITLE CONTROL ROOM INACCESSIBILITY



APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been activated and upon direction from the Shift Foreman, proceed as follows:

   a. Designate this event an Alert. Notify plant staff and response organizations required for this classification by implementing Emergency Procedure G-2 "Establishment of the On-Site Emergency Organization" and G-3 Emergency Procedure "Notification of Off-Site Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

   b. If, after evacuation of the Control Room, control of shutdown systems cannot be established within 15 minutes, redesignate this event as a Site Area Emergency. Notify plant staff and response organizations required by EP G-2 and EP G-3 in accordance with EP G-1.

PG&E **Pacific Gas and Electric Company**

NUMBER EP OP-23
REVISION 3
DATE 07/05/83
PAGE 1 OF 15

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NO(S) 1 and 2
EMERGENCY OPERATING PROCEDURE
TITLE: NATURAL CIRCULATION OF REACTOR COOLANT

APPROVED: R. C. Thornberry PLANT MANAGER 7-14-83 DATE

SCOPE

If forced reactor coolant flow is terminated, (all 4 RCP's tripped) Natural Circulation of the coolant will occur when a temperature gradient exists between the core and the steam generators. EP OP-23 provides guidance for the operator when Natural Circulation is required. Special consideration is given to prevent too rapid a cooldown which could cause upper head void formation.

EP OP-23 assumes that off-site power is available but that all reactor coolant pumps (RCP) are available to cool the core (e.g., loss of CCW to RCP's or RCP's failure).

SYMPTOMS

1. RTD bypass line low flow alarms.
2. Reactor coolant low flow protection bistable monitor lights on.
3. Reactor coolant flow indication decreases to near zero in all loops.
4. RCP breaker lights and motor ammeters indicate breakers tripped.
5. Possible RCP bus undervoltage or underfrequency.

AUTOMATIC ACTIONS

1. Reactor trip if above P-7.
2. Turbine trip above P-7.

OBJECTIVES

1. Remove decay heat from the Reactor Coolant System (RCS) and maintain subcooling by controlling RCS pressure and temperature.
2. Maintain the Reactor subcritical.

ATTACHMENT

1. Natural Circulation of Reactor Coolant

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
IMMEDIATE ACTIONS	
CAUTION: If SI actuation occurs at any time, immediately go to E-0, Reactor Trip with Safety Injection.	
1. Verify Reactor Trip:	1. Manually trip reactor.
a. All control rods fully inserted.	a. If any control rod NOT fully inserted, THEN emergency borate 100 ppm for each rod not fully inserted.
b. Neutron flux - DECREASING	
2. Verify Turbine Trip:	2. Manually trip turbine
a. All turbine stop valves - CLOSED	
3. To limit an increasing RCS pressure transient, manually OPEN the normal pressurizer spray valves PCV-445A & B during the RCP coastdown.	
SUBSEQUENT ACTIONS	
CAUTION: Since RCP's are tripped RTD bypass temperature and associated interlocks will be inaccurate. Use wide range loop RTD's and core thermocouples to determine RCS temperature.	
1. Check RCS Average Temperature	
a. Wide Range Temperature - Decreasing towards 547°F	a. Dump steam:
	1) Manually open condenser steam dump valve OR manually open steam generator 10% dumps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
b. Wide Range Temperature - LESS THAN 554°F	
1) Verify feedwater flow control valves - CLOSED	1) Manually close valve.
c. Temperature - STABILIZES AT 547°F	c. STOP dumping steam. IF cooldown continues, THEN close the main steam isolation valves.
2. Verify AFW flow on FI 157, 158, 159 & 160 (VB3)	
a. Both motor driven AFW pumps running	a. START non-operating motor driven AFW pump.
b. Turbine driven pump steam supply valve FCV-95 OPEN IF 2 steam generator narrow range levels < 15%.	b. Manually OPEN valve.
c. AFW level control valves OPEN and restoring steam generator level to narrow range indication.	c. Manually OPEN AFW level control valves to recover steam generator level.
3. Check RCS Pressure:	
a. Pressure - GREATER THAN 1850 PSIG.	a. IF pressure less than 1850 psig, THEN verify SI actuation and go to E-0, REACTOR TRIP WITH SAFETY INJECTION.
b. Pressure - STABLE OR INCREASING.	b. IF pressure decreasing, THEN:
	1) Verify pressurizer PORV's closed; if not, manually close.
	2) Verify pressurizer heaters on; if not manually turn on

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
c. After the RCP coastdown, if pressurizer spray is required to control RCS pressure: 1) OPEN pressurizer auxiliary spray valves CVCS-8145 and/or 8148.	

NOTE: Table 5.7-1 of Section 5 of the Technical Specifications limits the number of unheated auxiliary spray cycles if the spray water temperature and pressurizer water temperature differential is >320°F.

2) Position the normal pressurizer spray valves PCV-455 A & B, in MANUAL for desired RCS pressure control.	

NOTE: Positioning PCV-455 A & B allows for some pressurizer spray bypass flow thus giving more FINE RCS pressure control.

4. Check Pressurizer Level:	
a. Level - GREATER THAN 17%	a. Verify letdown isolation, if not, manually isolate letdown.
b. Level - TRENDING TO 22%	b. Manually control charging to restore pressurizer level.
c. Verify seal water flow to the reactor coolant pumps.	c. Manually control charging to restore adequate seal water flow to RCP's.

CAUTION: Do not throttle AFW flow until water level is above top of U-Tubes. (69% WR)

5. Check Steam Generator Levels:	
a. Level - IN NARROW RANGE.	a. Continue filling steam generators until level is in narrow range.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
b. Throttle AFW flow to maintain range level at 33%.	
1) Shutdown the turbine driven Aux. Feedwater Pump at 33% Narrow Range Steam Generator Level.	
CAUTION: Since RCP'S are tripped, RTD bypass temperatures and associated interlocks will be inaccurate, use wide range loop RTD'S and core thermocouples to determine RCS temperature.	
6. Verify Natural Circulation From Trending Values:	
a. Verify RCS subcooling by observing greater than 50°F subcooling margin monitor (VB2).	a. If 50°F subcooling can NOT be verified:
	1) Verify using core average thermocouple reading (pt. U0001) on the P-250 computer.
	2) If the P-250 is not available, use 10 core centered thermocouples to determine core outlet temperature.
	3) Lower steam pressure setpoint on the Steam dump valves to provide a core outlet temperature of < 600°F.
b. Steam pressure - STABLE.	
c. RCS hot leg temperature - STABLE OR SLOWLY DECREASING.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
d. Core exit TC's - STABLE OR SLOWLY DECREASING	
e. RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE.	
7. Transfer condenser steam dump to pressure control mode.	7. IF condenser NOT available., THEN use steam generator 10% dumps.
8. If P-12 is activated take the following steps:	
a. Place both steam dump interlock switches to the Bypass Interlock position (spring return).	
b. Block both trains of steam line safety injection circuit.	
9. Monitor the NIS channels to verify continued subcritical status of the core.	
a. When neutron flux has decreased below P-6, 10^{-11} amps in the intermediate range, verify source range detectors re-energized.	a. Manually re-energize source range detectors.
b. Transfer a nuclear recorder to the source range scale.	
10. Maintain Stable Plant Conditions	
a. Pressurizer pressure - AT 2235 PSIG.	
b. Pressurizer level - AT 22%	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT RESPONSE	
c. Steam Generator narrow range levels - AT 33%.	
11. Investigate the cause of the loss of forced reactor coolant flow.	
a. If RCP can be returned to service refer to OP A-6 Reactor Coolant Pump Procedure.	a. If RCP flow cannot be restored rapidly, refer to Vol. 9 of Plant Manual to determine the length of time the plant can maintain "HOT STAND-BY" based on Condensate Storage Tank water inventory, if using atmospheric steam dumps for steam generator pressure control.
b. If RCP's are returned to service refer to EP OP-5 Reactor Trip Without Safety Injection.	

NOTE: If the decision to initiate cooldown is made, it will be necessary to borate the reactor coolant. This process should be started as soon as possible to take advantage of the higher natural circulation flow rates immediately following a trip.

12. Borate the reactor coolant system to the cold xenon free condition via the BIT (the preferred path).

a. OPEN MOV 8803 A and B.

b. OPEN MOV 8801 A and B.

c. Verify flow on FI-917 (VB2).

NOTE 1: It should take approximately 15 minutes to inject the BIT based on 120 gpm centrifugal charging pump flow and maintaining adequate seal injection to the RCP's.

NOTE 2: It may be necessary to inject the BIT as many as three times to achieve a cold xenon free concentration.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
d. Keep pressurizer heaters energized during boration.	
e. Maintain pressure using auxiliary spray.	
13. Verify Cold Shutdown boron concentration by sampling:	
a. RCS hot leg.	
b. Pressurizer liquid	b. Pressurizer liquid may not be the same concentration as the active portion of the RCS.
c. Letdown line	
14. Line up the CVCS makeup control system for the new boron concentration and place the system in AUTO.	
15. Commence degassing the RCS consecutively with cooldown to a hydrogen concentration of less than 5cc/Kg. Refer to OP B1A:III.	
16. Verify that all Control Rod Drive Mechanism cooling fans are in operation.	16. Start all fans if possible.
17. Start RCS cooldown.	
a. Maintain cooldown rate LESS THAN 25°F/hr.	
b. Slowly increase rate of steam dump to start the cooldown.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
1) Transfer steam dump control to MANUAL.	
2) OPEN dump valves as necessary to obtain desired cooldown rate.	2) Dump steam using the 10% in manual control dumps.
CAUTION: If the steam generator 10% dumps are used for cooldown, maintain steam generator pressures balanced to avoid an SI on steam generator differential pressure.	
c. Verify Auxiliary Feedwater System is automatically maintaining Steam Generator Narrow Range level at 33%.	c. Manually throttle auxiliary feedwater flow, as necessary.
d. Monitor the Condensate Storage Tank.	
1) If CST level is low, and condensate pumps are available restore CST level by pumping down the condenser hotwell.	
2) At LO-LO Level Alarm in the CST refer to Appendix A of EP OP-3A to shift CST suction to an alternate source.	
18. Check RCS Hot Leg Temperature:	
a. RCS hot leg temperature - LESS THAN 550°F.	a. DO NOT proceed until RCS hot leg temperature is less than 550°F.
19. Commence depressurizing the RCS to approximately 1865 psig:	
a. If letdown is in service, depressurize RCS using pressurizer auxiliary spray.	a. IF letdown NOT in service THEN use pressurizer PORV's.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
20. When the reactor coolant system pressure decreases below the P-11 setpoint (1915 psig) block both trains of the pressurizer low pressure safety injection signal.	
CAUTION: SI actuation circuits will automatically unblock if RCS pressure increase above 1915 PSIG	
21. Maintain the following RCS conditions:	
a. RCS pressure - about 1865 psig.	
b. Pressurizer level - about 22%.	
c. RCS cooldown rate - Less than 25°F/hr.	
22. Verify RCS cooldown:	
a. Core exit thermocouples - Trending down.	
b. Wide Range hot leg RTD temperature- Trending down.	
c. RCS subcooling on subcooling monitor (VB2) - increasing (minimum of 50°F).	
NOTE: Thermocouple toggle switch on VB2 adjacent to subcooling monitor gives capability to monitor core subcooling margin or reactor vessel head region subcooling margin.	
23. Depressurize RCS as follows:	
a. If all CRDM fans are running maintain 50°F subcooling.	a. If all CRDM cooling fans are NOT available for operation: 1) Maintain 200°F subcooling until RCS pressure is 1200 psig.

ACTION/EXPECTED RESPONSES	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
	2) Maintain RCS pressure at 1865 psig until RCS temperature is cooled down to 420°F.
b. If letdown in service, depressurize using auxiliary spray.	b. If letdown NOT in service, THEN use pressurizer PORVs.
24. Continue RCS cooldown AND depressurization:	
a. Maintain cooldown rate - LESS THAN 25°F/hr.	
b. Maintain subcooling requirements of step 23.a.	b. If the required subcooling cannot be maintained, STOP the depressurization and reestablish the required subcooling.
c. Maintain the reactor coolant system pressure-temperature relationship within the boundaries of the Plant Cooldown Curve, Vol. 9 of the Plant Manual. NOTE: Plant Cooldown Curve attached is for information only.	
25. Verify NO voiding in Reactor Vessel Head Area.	25. If voiding is suspected due to large variations in pressurizer level or RVLIS Plenum Range<100%, THEN repressurize the RCS to collapse the void in the head area. Also refer to EP OP-44, Gaseous Voids In The RCS.
a. Pressurizer level RESPONSE NORMAL.	

ACTION/EXPECTED RESPONSES	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
b. Reactor Vessel Level Instrument Plenum Range(PAM PNL) indicating 100%.	
26. If all CRDM fans are NOT in operation:	
a. Maintain RCS at 1200 psig while continuing to cooldown to 350°F.	
b. Maintain 1200 psig for approximately 8 hours to allow the upper head to cool off to a temperature less than saturation for 400 psig (445°F) before continuing with the depressurization.	
27. Check if SI system should be disabled:	
a. RCS pressure - Less than 1000 psig but greater than 700 psig.	a. DO NOT disable any SI system equipment if greater than 1000 psig.
b. Average RCS temperature - LESS 350°F but RCS cold leg temperature greater than 323°F.	b. DO NOT disable any SI system equipment if Average RCS temperature is greater than 350°F.
c. Isolate SI accumulators.	
1) Close the isolation valves.	
2) Rack out each isolation valve breaker.	
d. Disable the safety injection pumps by opening the DC control power to the pump breaker.	
e. Disable the non-operating centrifugal charging pump by opening the DC control power to the pump breaker	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

SUBSEQUENT ACTIONS (CON'T)

28. Open additional letdown orifices if necessary to maintain normal letdown flow.

29. Maintain adequate RCP Seal Injection Flow.

    a. Adjust HCV-142, as necessary.

30. When system pressure has been reduced to approximately 400 psig, hold it constant at this value by reducing auxiliary spray flow and energizing the PZR heaters as necessary.

31. When RCS hot leg temperature has been reduced to less than 350°F and pressure is between 380-420 psig, place the RHR system in service recirculating from hot leg 4 to the cold legs, in accordance with OP B-2:II RHR Normal Operation.

32. Prior to RCS cold leg temperature being reduced to 323°F insure the pressurizer PORVs are providing low pressure protection by verifying the Low Pressure Setpoint protection c/o switch is CUT IN (VB2).

    a. If the positive displacement reciprocating charging pump is operating:

        1) Verify MOV's 8701 and 8702 are open.

        2) Rack out their motor breakers.

33. Continue RCS cooldown to below 200°F with RHR System.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
SUBSEQUENT ACTIONS (CON'T)	
CAUTION: Depressurizing the RCS before the entire RCS is below 200°F may result in void formation in the system.	
34. Continue Cooldown of Inactive Portion of RCS:	
a. Upper head region - ALL CRDM FANS RUNNING.	a. IF fans NOT running, THEN DO NOT depressurize RCS until upper head cools to less than 200°F (approximately 27 hours after RHR system is placed in service).
b. Steam Generator U-Tubes - CONTINUE DUMPING STEAM from all steam generators until it is VERIFIED that they have stopped steaming.	b. DO NOT depressurize RCS until steam generators have stopped steaming.
35. GO TO Operating Procedure L-5, "Plant Cooldown From Minimum Load to Cold Shutdown", Step 21 for continued cooldown of the RCS to a cold shutdown condition using RHR forced cool down.	

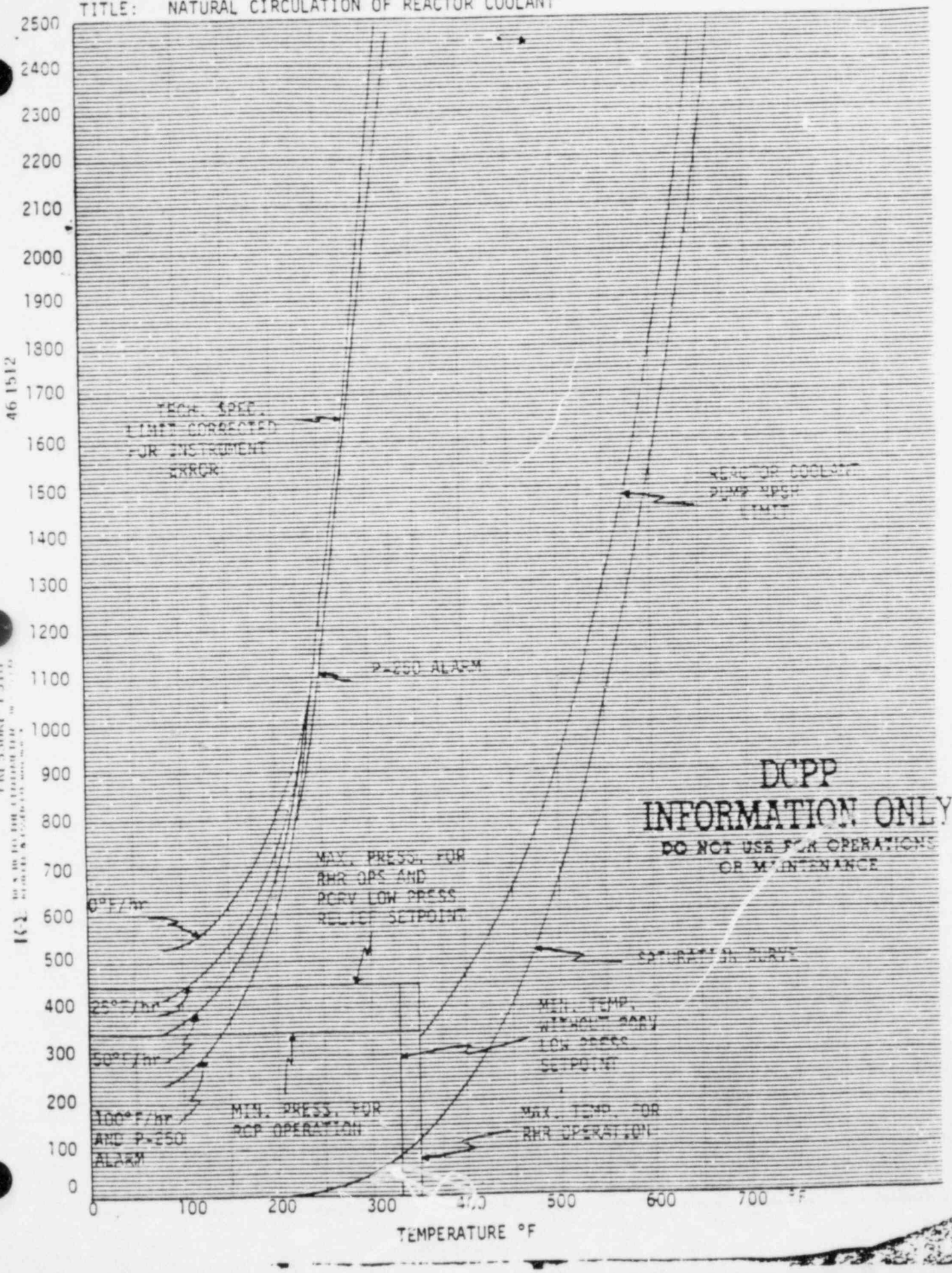
APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been activated and upon direction from the Shift Foreman proceed as follows:

   a. Designate this event a Notification of Unusual Event. Notify plant staff and response organizations required for this classification by implementing Emergency Procedures G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-Site Emergency Organization" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

TITLE: NATURAL CIRCULATION OF REACTOR COOLANT



PG&E Pacific Gas and Electric Company

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP R-1
REVISION 10
DATE 7/5/83
PAGE 1 OF 15

TITLE: EMERGENCY PROCEDURE
PERSONNEL INJURY OR ILLNESS (RADIOLOGICALLY RELATED) AND/OR OVEREXPOSURE

APPROVED: R. C. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure describes the actions which are to be taken in the event of:

1. Personnel injury or illness (minor or serious) where the victim is radiologically contaminated.

2. Overexposure (or suspected overexposure) from an external source.

3. Overexposure (or suspected overexposure) from an internal source.

4. A combination of the above.

Injuries or illnesses which do not involve radioactive contamination or overexposure are handled in accordance with Emergency Procedures M-1 or M-2. This procedure and changes thereto requires PSRC review.

DISCUSSION

Any radiologically related injury or illness or potential radiation overexposure is a serious matter requiring prompt attention to the care of the patient and prompt appropriate corrective action to preclude re-occurrence. In addition, followup investigation to quantify the extent of exposure to radiation requires care in the gathering and retention of samples, radiation readings and other evidence which may contribute to the understanding of the incident and assist both in care of the injured and in preventing re-occurrence.

IMMEDIATE ACTIONS

1. The employee(s) who are at the scene shall:

   a. Render all necessary first aid.

   b. Notify the control room (Shift Foreman) as soon as practical, and provide a phone number for the patients location.

2. Shift Foreman (Interim Site Emergency Coordinator)

a. Evaluate plant status that may have produced the personnel injury, illness and/or overexposure. Sound the site emergency signal to clear the affected area, if the situation warrants it.

b. Dispatch additional first aid personnel such as the project construction EMT [redacted] to the scene of the injury or illness if required.

c. Notify Chemistry and Radiation Protection personnel (ext. [redacted]).

d. Call an ambulance if the injury warrants it. Refer to Appendix 1 "Measures to be taken if Medical Care Is Required" for instructions.

SUBSEQUENT ACTIONS

The Shift Foreman shall direct all subsequent actions until relieved by the long-term Site Emergency Coordinator if the situation warrants it.

1. Actions Common to All Occurrences

a. Transport the patient to the first aid room, provided that this can be done without aggravating the injury.

b. Take actions as specified in the following sections as appropriate for the particular occurrence.

Section 2: Minor injury when contamination is present.

Section 3: Serious injury when contamination is present.

Section 4: Overexposure from external source

Section 5: Overexposure from internal source.

c. Perform the notifications required by Appendix Z "Emergency Procedure Notification Instructions."

NOTE: Form 69-9221 "Emergency Notification Record" is provided to record notifications not documented elsewhere.

d. Collect personnel dosimetry assigned to the individual and have it evaluated.

e. Begin gathering information to assist the long-term Site Emergency Radiological Advisor in his evaluation. Guidance on things which should be investigated is given in Appendix 2 "Factors to Consider in Making a Preliminary Evaluation."

f. Close out the event with the following written reports:

1) Report to NRC (required within 24 hours for an Unusual Event, or within 30 days for a report under 10CFR20.403).

2) Form 62-4587 "Report of Industrial Injury to Employee."

3) Form 62-4586 "Employers' Report of Occupational Injury or Illness."

4) Nuclear Plant Problem Report. (See Nuclear Plant Administrative Procedure C-12.)

NOTE: Reports to NRC and the Nuclear Plant Problem Report are not required for minor injuries or illness for which onsite first aid and decontamination is adequate.

2. Minor Injury or Illness When Contamination is Present

The following steps apply to injuries where prompt medical attention is not required (i.e., first aid at the plant is adequate).

a. Make the following surveys and record the results on the "Skin and Clothing Decontamination" Form (Form 69-9392).

1) The wound prior to decontamination.

2) The object causing the injury (if possible) and any clothing penetrating or touching the injury. These items should be retained, if possible, until the long-term Site Emergency Radiological Advisor has completed his evaluation so that detailed radionuclide analysis can be performed, if required.

3) The wound during each decontamination and after final decontamination.

NOTE: These personnel surveys are in addition to other radiological surveys (e.g., work area, equipment) which may be required by radiation protection management.

b. Decontaminate the wound using the standard procedures discussed in Radiation Control Procedure G-4. In cases of severe contamination, where there is a realistic possibility that significant internal retention of radionuclides may have occurred, it is desirable to retain wash solutions (or samples thereof), swabs, and other such material which may be useful to the Site Emergency Radiological Advisor.

NOTE: Refer to Emergency Procedure RB-5 "Personnel Decontamination" in the event normal decontamination facilities are overloaded or unavailable.

c. Complete any additional first aid measures.

d. Complete accident report Form 62-4587, "Report of Industrial Injury to Employee" and forward to plant clerk for processing.

NOTE: This documentation requirement assumes no medical attention (beyond first aid) is required and that no lost time occurs. If lost time beyond the day of injury is likely, or if medical treatment (including doctor referral) is required, complete Form 62-4586, "Employers' Report of Occupational Injury of Illness" and forward to plant clerk.

3. Serious Injury or Illness When Contamination is Present

The following steps apply to injuries or illnesses where prompt medical attention is required (i.e., the patient must be taken to a hospital) and the patient is contaminated. In this type of circumstance, the need for treatment of the injury and comfort of the patient will take precedence over the need for decontamination.

a. Call San Luis Ambulance and French Hospital and have the patient transported to French Hospital. The detailed steps to be taken if this is required are given in Appendix 1 of this procedure. The Control Room should keep personnel attending the patient informed of the status of the ambulance.

b. During the interval until the ambulance arrives keep the patient as comfortable as possible. Survey and decontaminate the patient to the extent that time and conditions permit. Do not decontaminate the patient if it will aggravate his injury. Record survey results on the "Skin and Clothing Decontamination" Form (Form 69-9392.)

1) Survey any wounds and/or the victim's skin (if possible).

2) Survey the object causing the injury (if possible) and any clothing penetrating or touching the injury. These items should be retained, if possible, until the long-term Site Emergency radiological Advisor has completed his evaluation so that detailed radionuclide analyses can be performed, if required.

3) Decontaminate the patient using the standard procedures discussed in Radiation Control Procedure G-4. In cases of severe contamination, where there is a realistic possibility that significant internal retention of radionuclides may have occurred, it is desirable to retain wash solutions (or samples thereof), swabs, and other such material which may be useful to the Site Emergency Radiological Advisor.

NOTE: Refer to Emergency Procedure RB-5 "Personnel Decontamination" in the event normal decontamination facilities are overloaded or unavailable.

c. Have the hospital kit and a handheld radio available for transport to the hospital with the monitor accompanying the patient, or the team dispatched to the hospital.

4. Overexposure From External Source

The following steps apply to cases where the patient has (or is suspected to have) received a dose from an external source to the whole body, or any portion thereof, in excess of an applicable limit contained in Radiation Control Standard No. 1, and where the individual does not require prompt medical attention for any other reason. Personnel suspected of overexposure shall not re-enter radiation controlled areas unless authorized by the Site Emergency Coordinator.

a. Provide any first aid or medical attention which the patient may required.

b. Notify San Luis Ambulance and French Hospital and transport the patient to French Hospital in accordance with Appendix 1 for observation or treatment in any of the following circumstances:

1) The patient is known or suspected to have received at least any of the following:

   a) 25 rem to the whole body, active blood forming organs, lens of eyes, gonads, head or trunk.

   b) 150 rem to the skin.

   c) 375 rem to the extremities.

2) The patient shows signs of radiation sickness, such as nausea, vomiting, extreme sweating, weakness, diarrhea, extreme anxiety, incoherence, sensitivity of the nerves (tingling or itching sensation).

3) The patient shows evidence of radiation dermatitis (skin damage). Except for extremely high skin dose (greater than 5,000 rem), in which case pain occurs promptly and is intense, the symptoms at the time of exposure are a sensation of warmth and itching. Redness, blistering and other effects may not appear for several days.

c. If the patient requires transportation to the hospital, during the interval until the ambulance arrives keep the patient comfortable. Survey the individual and perform any decontamination which circumstances require and/or permit. Do not aggravate any injury or unduly alarm the patient in performing these operations. Record survey results on the "Skin and Clothing Decontamination" Form (Form 69-9392) and/or "Radiation Dose Rate Survey Record" (Form 69-9316). In cases of severe contamination, handle as in Step 3.c to the extent practical.

d. To the extent practical, save all vomit, urine, feces or other samples which may assist the long-term Site Emergency Radiological Advisor in evaluating the accident. This is particularly important if internal deposition of radioactive materials is suspected.

e. Collect the patient's personnel dosimetry and any materials which may have been activated (if a neutron exposure is suspected) such as belt buckles, watches, jewelry, prior to sending him to the hospital or releasing him. This will be processed for evaluation.

f. Subsequent actions will be based upon the results of the evaluation of the external exposure.

5. Overexposure From Internal Sources

The following steps apply to cases where the patient has (or is suspected to have) ingested a significant quantity of radioactive material. If the ingestion was by breathing, this procedure applies any time that the concentration to which the person has been exposed is greater than or equal to (MPC) x PF, where (MPC) refers to the normal (40 hr.) maximum permissible concentration, and PF refers to the protection factor the patient obtained when a quantitatively fit tested to the respirator that was worn for the job.

a. Take any medical action which may be required as a result of injury or external dose received (Steps 3 and 4 above). The treatment of these effects should take precedence over the evaluation of internal exposure.

b. Remove and retain for subsequent radiological analysis the patient's clothing and respirator.

c. Survey the patient thoroughly and record the results on the "Skin and Clothing Decontamination" Form (Form 69-9392).

d. Decontaminate individual to as low as practical without causing further injury. If practical, save samples of the decontamination solutions, swabs, and other materials which may be of use in subsequent radiological evaluations.

e. Count the patient on the whole body counter. The results of this analysis will, in large measure, determine the necessity for further medical attention or surveillance.

f. Collect and save any urine, feces, or vomit which is passed from the patient. The long-term Site Emergency Radiological Advisor may request that special urine samples be collected for bioassay.

g. Subsequent actions will be based upon the results of the evaluation of the internal exposure.

h. If the patient is sent to the hospital, make arrangements to have all urine, feces or vomit samples retained for radiological analysis.

REFERENCES

1. Radiation Control Standard No. 1, "Personnel Exposure."
2. Radiation Control Standard No. 2, "Internal Exposure Controls."
3. Radiation Control Standard No. 5, "Medical."
4. Radiation Control Standard No. 8, "Reporting Requirements."
5. Radiation Control Procedure No. G-3, "Personnel Internal Exposure Control."
6. Radiation Control Procedure No. G-4, "Personnel Contamination Control."
7. Radiation Control Procedure No. G-7, "Radiation Surveys."
8. Emergency Procedure G-1, "Accident Classification and Emergency Plan Activation."
9. Emergency Procedure G-2, "Establishment of the Onsite Emergency Organization."
10. Emergency Procedure G-3, "Notification of Offsite Organizations."
11. Emergency Procedure R-4, "High Radiation (In Plant).
12. Emergency Procedure RB-5, "Personnel Decontamination."
13. Emergency Procedure OR-1, "Offsite Support and Assistance"

ATTACHMENTS

1. Form 69-9221, "Emergency Notification Record."
2. Form 69-9316, "Radiation Dose Rate Survey Record."
3. Form 69-9392, "Skin and Clothing Decontamination."
4. Form 62-4587, "Report of Industrial Injury to Employee."

5. Form 62-4586, "Employers' Report of Occupational Injury or Illness."

6. Form 62-6015, "Medical Referral."

7. Light Duty Program Letter.

8. Safety, Health and Claims Personnel to Be Contacted for Reporting of Injuries at Diablo Canyon (1/83).

APPENDIX 1

MEASURES TO BE TAKEN IF MEDICAL CARE IS REQUIRED

The following are the procedural steps to be taken in the event a contaminated patient must be transported to the hospital for medical treatment:

1. Call San Luis Ambulance (Phone 543-2626, Emergency No. 543-7911) and provide the following information:

   a. Name of caller.

   b. Company affiliation.

   c. Phone number of caller. (Where he can be reached.)

   d. Name of injured or ill person.

   e. Where the patient is located.

   f. Where the patient is to be transported (French Hospital).

   g. Nature of injury or illness.

   h. Patient is contaminated.

   i. Any other medical information which might be pertinent to transporting the patient.

   Record this information on Form 69-9221, "Emergency Notification Record," or other suitable log.

2. Contact the Security Shift Supervisor [redacted] and have him call the security force at the Port San Luis entrance [redacted] and alert them that the ambulance is entering. It is also advisable to have an escort accompany the ambulance from the Security Building to the first aid room to minimize the delay in reaching the destination.

3. The victim shall be transported to French Hospital. Call ahead to the hospital (Phone 543-5353) and provide the following information:

   a. Name of caller.

APPENDIX 1 (Cont'd)

MEASURES TO BE TAKEN IF MEDICAL CARE IS REQUIRED

b. Company affiliation.

c. Phone number of caller. (Where he can be reached.)

d. Name of injured or ill person.

e. Age of injured or ill person (approximate if not known).

f. Extent of injury, illness or symptoms.

g. Medical history (if known).

h. Radiological conditions.

Record this information on Form 69-9221, "Emergency Notification Record", or other suitable log.

4. Prior to arrival of the ambulance, the patient should be decontaminated to the extent practical without aggravation of injury.

5. If the patient cannot be completely decontaminated prior to arrival of the ambulance, wrap him in a blanket prior to placing him in the ambulance in order to minimize the spread of contamination. Alternatively, he may be placed in the plant's Nuclear Accident Emergency Carrier.

6. An individual qualified in radiation monitoring shall accompany the victim to the hospital. This individual should take a hospital kit and a handheld radio with him.

NOTE: Two hospital kits and radios are stored in Access Control. Additional equipment and radios are also available at the PG&E San Luis Obispo Service Center.

7. Two additional individuals qualified in radiation monitoring should be dispatched to French Hospital to assist hospital personnel.

NOTE: Refer to EP OR-1 "Offsite Support and Assistance" for air ambulance and medivac support.

APPENDIX 2

FACTORS TO CONSIDER IN MAKING A PRELIMINARY INVESTIGATION

It is important to conduct the preliminary investigation in a systematic manner to assure that potentially valuable evidence is not overlooked, lost or destroyed. The following is a reference listing of items which should be checked (if they are applicable). Also, two other factors are important in conducting an investigation of this type, namely: a) information which is gathered should be written down in a comprehensive, neat manner, and b) all samples, clothing, or other articles which are collected should be put in sample bottles or plastic bags, and labelled with the patient's name, date, collection time, sample identification, and other pertinent data.

1. Factors Common to All Accidents

   a. Date, time of occurrence.

   b. Basic reconstruction of events.

   c. Probable source(s) of radioactivity involved.

   d. Names and addresses of all witnesses.

2. Considerations in Evaluating External Exposure

   a. Exactly where was the patient located at the time of exposure?

   b. How was patient physically oriented with respect to source (will help to evaluate nonuniform exposure)?

   c. On what part(s) of body were dosimeters being worn?

   d. Were self-reading dosimeter readings recorded and all nonself-reading types collected?

   e. Are there any "natural" dosimeters available? (Belt buckles, wrist watches, gold tooth fillings, and other such items are useful in determining neutron dose.)

   f. Exactly what was the time interval over which exposure occurred?

g. Are there any applicable dose rate measurements, and if so, exactly where and when were they made?

1) Ion chamber measurements

2) Area monitors

3) Other

h. What was the status of the plant at time of exposure?

3. Considerations in Evaluating Internal Exposure

a. Where was the patient located at time of exposure?

b. Exactly what was the time interval over which exposure occurred?

c. Can sample(s) of liquids which were internally deposited be obtained?

d. Can samples of airborne activity which were breathed be obtained before the area is purged?

e. Are there any applicable monitor readings?

1) Process monitors

2) Continuous Air Monitors

3) Area Monitors

4) Other

f. Can samples of patient's clothing, decontamination solutions, secretions, respirator filters, be saved?

g. Can the region in the vicinity of the occurrence be smear-tested, or can decontamination solutions be retained?

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been activated and upon direction from the Shift Foreman, proceed as follows:

   a. In case of a minor injury with contamination present or an overexposure case from any source which does not meet the criteria for an Unusual Event, notify the Plant Manager, Plant Superintendent and Supervisor of Chemistry and Radiation Protection or their designated alternates.

   b. Designate this event a significant event in a case of overexposure from an external source where the exposure (for the quarter) exceeds the following:

      5 Rem Whole Body
      30 Rem Skin of Whole Body
      75 Rem Extremities

      Notify the NRC Bethesda Operations Center using the red phone in the Control Room as a minimum within one hour. Gather sufficient information from all sources prior to calling so that the phone call is meaningful. Refer to Operating Procedure O-4 "Operating Order (One Hour Reporting Requirements to NRC)" for a suggested format for reporting. Notify the NRC that your call is pursuant to 10CFR50.72 (Notification of Significant Events).

      Notify the Director, NRC Region 5, by telephone and telegraph, mailgram or facsimile within 24 hours of the event. Indicate the notification is pursuant to 10CFR20.403 (Notification of Incidents).

   c. Designate this a Notification of Unusual Event in any case of an injury or overexposure requiring transportation of the patient to an offsite hospital or if extensive onsite decontamination is required (soap and water washings do not remove contamination or offsite decontamination assistance is required). Notify plant staff and response organizations required for this classification by implementing Emergency Procedures G-2 "Establishment of the Onsite Emergency Organization" and G-3 "Notification of Offsite Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

d. In addition to the notifications performed under "c." above, for a Notification of Unusual Event, if the case involves an overexposure from an external source which exceeds:

25 Rem Whole Body
150 Rem Skin
375 Rem Extremities

Immediately notify the Director, NRC Region 5 by telephone and telegraph, mailgram and facsimile. Indicate the notification is pursuant to 10 CFR20.403 (Notification of Incidents).

2. In addition to notification performed above, also notify the following in any case where NRC notification is required.

a. Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate in the Department of Nuclear Plant Operations:

Mr. W. H. Fujimoto

PGandE:
Plant Ext.:
Home:

b. Compensation Claims Representative in the Department of Safety, Health and Claims, per the attached list of personnel.

NOTE: 1) The System Dispatcher will handle the notification of General Office Personnel if they cannot be promptly reached.

2) Nuclear Mutual Limited (NML) holds the Company liability and property damage insurance for Company personnel and property. They should be notified under the same circumstances as the NRC. Notification is made by the Company's Insurance Department. The Department of Nuclear Plant Operations should be requested to interface between the plant and the Insurance Department when required. American Nuclear Insurers/Mutual Atomic Energy Liability Underwriters (ANI/MAELU) holds third party insurance coverage and would be similarly notified in accidents involving a third party.

69-[illegible]21 3/82 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

69-9316 7/80 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

RADIATION DOSE RATE SURVEY RECORD

DATE _____ TIME _____ SWP/RWP NO _____ SURVEY NO. _____

AREA OR EQUIPMENT _____

TYPE OF SURVEY _____ SHEET ___ OF ___

ITEM NO.	DESCRIPTION	BETA		GAMMA		NEUTRON	
		m rad/hr	distance	mR/hr	distance	mrem/hr	distance

SURVEYED BY _____

SURVEY TYPE	INSTRUMENT	TYPE DETECTOR	SERIAL NO.	DATE CALIB. DUE
BETA				
GAMMA				
NEUTRON				

COMMENTS _____

RECOMMENDATIONS _____

SURVEY REVIEWED _____ DATE _____
SUPERVISOR

69-9392 7/81 (100)

DIABLO CANYON POWER PLANT

SKIN AND CLOTHING DECONTAMINATION

NAME				DATE	TIME OF OCCURRENCE	AM / PM
UNIT	ELEV.	BLDG.	ROOM	AIR SAMPLE LOG NUMBER	SURVEY LOG NUMBER	

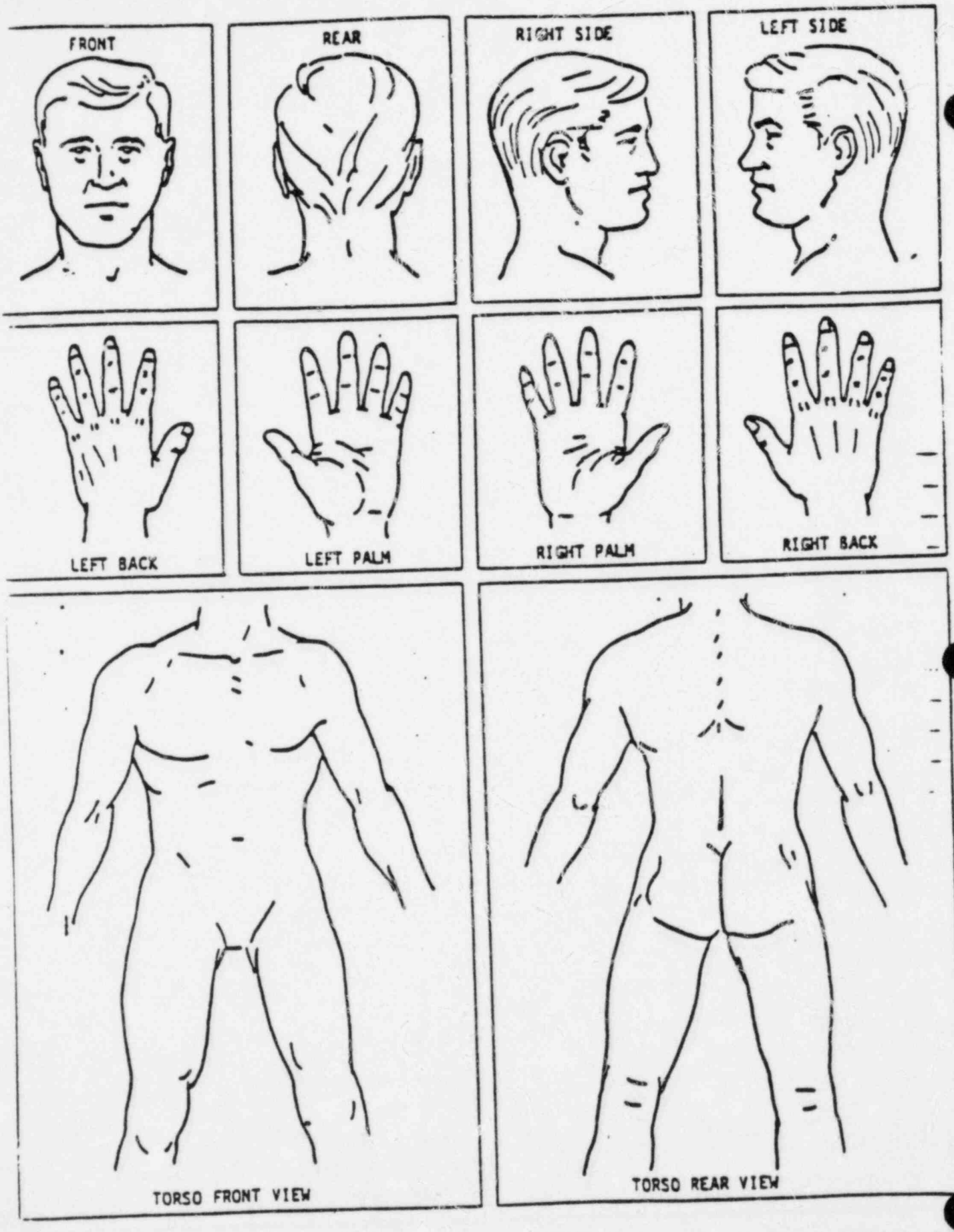
ITEM NO.	LOCATION OF CONTAMINATION	TIME OF SURVEY	INITIAL SURVEY RESULTS	SURVEY INSTRUMENT

DECONTAMINATION INFORMATION

ITEM NO.	DECONTAMINATION AGENT USED	TIME	SURVEY		SKIN CONDITION AFTER TREATMENT
			INSTRUMENT	RESULTS	

REMARKS

SIGNATURE: _____



☐ SKIN ☐ PROTECTIVE CLOTHING ☐ PERSONAL CLOTHING

62–4587 Rev. 1/79

PACIFIC GAS AND ELECTRIC COMPANY

Report of Industrial Injury to Employee

1. Name _____ 6. Division _____

2. Address _____ ZIP _____

3. Telephone No. _____ 7. Department _____

4. Social Security No. _____ 8. Date of Accident _____

5. Occupation _____ 9. Time of Accident _____

10. Location of Accident _____ 11. Nature of Injury _____

12. What were you doing and how did accident occur? _____

_____

_____

13. Describe First Aid rendered: _____

14. Witnesses to accident:

1. _____

2. _____

3. _____ 15. _____
Signature of Employee

16. Date injury reported: _____

17. Date 30 days elapses: _____ 18. _____
* See Over Signature of Supervisor

INSTRUCTIONS: This report (Items 1 thru 15) should be *written* and *signed* by the *employee personally* and countersigned by the supervisor. It is for all Industrial Injuries and is in duplicate. The original is to be retained for Company records; the copy is to be detached after completion and given to the employee. Before signing in Item 18, the *supervisor* should fill in the date of the report (Item 16) and compute and notate the date *30 days* from the date the injury was reported (Item 17).

If the employee later requires treatment by a doctor or becomes disabled, Form 62–4586 must be prepared and forwarded to the Safety, Health and Claims Department *IMMEDIATELY* accompanied by the original of this report.

If the employee is unable to fill out or sign this report, it should be prepared, signed by the supervisor and the employee should be given a copy within 5 days as required by law.

If the injured employee cannot write English, the report may be made according to a verbal statement. If necessary, the employee may sign by a mark and a witness to the report should sign below the employee's mark.

If you wish to exercise your rights under Item III of the information section, please separate this page and present it to your selected physician.

§ 9785. Duties of the Employee-Selected Physician. The physician or facility chosen by the employee who undertakes to provide treatment pursuant to Labor Code Section 4600 shall:

(a) Within 3 working days after undertaking to provide such treatment notify the employer of the name and address of such treating physician or facility, and

(b) Within 5 working days following initial examination shall submit a written report to the employer to include:

(1) The name and address of injured employee;

(2) The employee's medical history as obtained by the physician;

(3) Findings on examination;

(4) The subjective complaints reported by the employee;

(5) The planned course, scope and duration of treatment;

(6) If appropriate, the estimated return-to-work date;

(7) An opinion as to whether residual permanent disability is to be anticipated and, if possible, an estimate of its extent;

(8) An opinion as to whether the employee will eventually be able to engage in the occupation being performed at the time of injury.

(c) At reasonable intervals during active treatment submit progress reports to the employer and, particularly, report promptly to the employer when:

(1) The employee's condition permits return to work;

(2) The employee's condition require him or her to leave work;

(3) Hospitalization or surgery is indicated or recommended;

(4) The employee's condition becomes permanent and stationary;

(5) The employee's condition undergoes a previously unexpected significant change; this report shall contain a statement of the proposed course of treatment required, if any, by that change;

(6) The employee is referred to another physician for consultation;

(7) The employee reasonably requests additional appropriate information.

43-1566 Rev 7/75

PACIFIC GAS and ELECTRIC COMPANY
Employer's Report of Occupational Injury or Illness
CONFIDENTIAL – *For Use by Company Attorneys*

DIVISION
GENERAL OFFICE OR
GENERAL CONSTRUCTION

DEPARTMENT	DISTRICT, TOWN OR LOCAL OFFICE	R.E. NUMBER
LOCATION OR ITEM NUMBER	ACCOUNT NUMBER	JOB NUMBER

ACCIDENT REPORT NUMBER
ALPHA YEAR NUMBER

California law requires an employer to report within five days every industrial injury or occupational disease which (a) results in lost time beyond the day of injury or (b) requires medical treatment other than first aid. These must be reported to the Safety, Health and Claims Department, General Office within three days so that the Company can comply with the law. In addition, cases which result in death or require hospitalization of more than 24 hrs. for other than observation, (b) result in loss of any member of the body, or (c) produce any of seven degree of permanent disfigurement require an immediate telephone report to the Department. Also the appropriate governmental agencies can be notified as required by law.

EMPLOYER

1. Firm Name: PACIFIC GAS AND ELECTRIC COMPANY
2. Mailing Address: 77 BEALE STREET, SAN FRANCISCO, CA 94106 Phone 781-4211, Ext. 3171
3. Address and Phone Number of Reporting O.S.H.A. Establishment
4. Nature of Business: PUBLIC UTILITY – Gas & Electric
5. Unemployment Insurance Account Number: 002-2199

EMPLOYEE

6. Name
7. Social Security Number
8. Home Address
8a. Home Phone Number
9. Sex: ☐ MALE ☐ FEMALE
10. Occupation / Job Title
11. Age
12. Department
13. Wages: $ ☐ PER WEEK ☐ PER MONTH
13a. Length of Service with P.G. & E. Co. _____ YEARS
13b. How long has employee been employed in this occupation? A ☐ Less than Six Months B ☐ From Six Months to Two Years C ☐ Over Two Years
13c. Years of Experience

INJURY OR ILLNESS

14. Where did accident occur? Number and Street / City or Town / County
15. On Employer's Premises? ☐ YES ☐ NO
16. What was employee doing when injured? (Be specific)
17. How did accident or illness occur? (Use separate sheet if necessary)
18. Name object or substance that directly injured employee
19. Nature of injury or illness and part of body affected
20. Name and address of physician
21. Name and address of hospital, if hospitalized
22. Date of injury or illness: Mo., Day, Yr.
23. Time of Day: HOURS
24. Was employee unable to work on any day after incident? ☐ YES – Date last worked: ☐ NO
25. Has employee returned to work? ☐ YES – Date returned: ☐ NO Still off work.
If answer to #24 is "Yes", has subscription benefit form been signed? ☐ YES
26. Did employee die? ☐ YES – Date: ☐ NO
Under which operation does employee work?
Date accident first reported
Date of this report
Report completed by (print or type name and title)

Filing of this report is not an admission of liability. "... No report of injury required to be filed by an employer or insurer by this chapter shall be admissible as evidence in any adversary proceeding before the Workmen's Compensation Appeals Board."

Labor Code, Section 6412

FIRM: PACIFIC GAS & ELECTRIC COMPANY

OFFICIAL POSITION: Mgr., Safety, Health & Claims Dept.

TELEPHONE: 781-4211 EXTENSION: 3171

Dept.	PLEASE DO NOT USE THIS COLUMN
9	
Town 10	Case No.
	Employer No.
Social Security Number 11-19	
Age 24-25	Agency
Date 26-41	Sex
Time 42-45	Age
Occupation 46-48	Occupation
Service 49	Weekly Wage
Co. Service 50-51	Injury
52-54	Accident Type
55-57	Agency
58-60	Agency Part
61-63	Supplemental Agency
64-66	Nature of Injury
67	Part of Body
Nat. Inj. 68-69	Injury Date
Pt. Body 70-71	Extent of Injury
Type Inj. 72	Assistance Claimed
73	Report Law
74	Cases by
N.I. 75-76	
Case Code J 80	

Report # _____ Date _____, 19___

Dr. _____

Kindly give to bearer,

Mr./Ms. _____

medical attention, and forward a complete detailed report immediately to Manager, Safety, Health and Claims Dept.,245 Market Street, San Francisco,94106. Your bills should be itemized and all bills and reports rendered in triplicate.

PACIFIC GAS AND ELECTRIC COMPANY

By _____ RC# _____

Mgr. – Foreman – Supt.

62-4018 (REV. 5/80)

PLEASE COMPLETE AND RETURN TO EMPLOYEE

(EMPLOYEE MUST HAVE COMPLETED CARD TO RETURN TO WORK)

Pacific Gas and Electric Co.: Date _____, 19___

Mr./Ms. _____

Occupation _____ Report # _____

Employed By _____ RC# _____ Division.

Injured at _____ a.m. p.m. on _____, 19___

☐ Return to full work immediately _____

☐ Modified work until _____

☐ Unable to work until _____

☐ Restrictions or limitations _____

☐ Return Appt. Date: _____ Time: _____

☐ Discharged from treatment _____

Signed _____ MD.

PACIFIC GAS AND ELECTRIC COMPANY

PG&E —

DIABLO CANYON POWER PLANT
P.O. Box 56 · Avila Beach, California 93424 · (805) 595-7311

R. C. THORNBERRY
PLANT MANAGER

Dear Dr.

Thank you for being one of our panel physicians that treat our employees. Our primary goal is to provide employees who sustain industrial injuries requiring medical attention with prompt, first-class treatment. Your assistance in this endeavor is appreciated.

There is an area of concern to us. While the number of employees that require treatment by a physician has remained stable or in some cases declined, the number of disabling injuries requiring time away from work, i.e., lost time injuries, has dramatically increased.

We believe that some of this time away from work might possibly be avoided if the availability of light (modified) duty or desk-type work were more widely known. Some physicians have stated that in some cases the patient will respond more rapidly to treatment if kept busy in a light-duty capacity. Productive, light-duty assignments are almost always available for employees released for work within the medical restrictions established by the physician.

It our policy to have an injured employee accompanied by a supervisor or other representative on the first doctor's visit. Should there be any question about the availability or type of light duty that can be provided, he or she will be able to answer for us.

Our employees' welfare is our main concern. Should you have any questions about our program, I will be glad to call on you at your convenience.

Sincerely,

R. C. THORNBERRY

RCT:kgs

3/83
RW9

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

Safety, Health and Claims Personnel to be Contacted for Reporting of Injuries at Diablo Canyon[1]

EMPLOYEE INJURIES

In all cases of serious employee injuries (for example, injuries involving hospitalization, electric contact, hernia, amputation, fractures, or injuries expected to result in lost time from work beyond the day of injury) or death, which occur while on the job, report should be made as follows:

During Working Hours:

T. B. Honey — PGandE local

(If Mr. Honey is not available, the person answering the telephone will take the message and notify Mr. Honey or any other parties necessary in the Safety, Health and Claims Department).

Any Other Time:

Report to one of the persons on the following list, trying each in order until one is contacted:

1.	T. B. Honey	Pinole
2.	A. Thomas	San Francisco
3.	C. B. Powell	San Francisco
4.	P. S. Benitez	San Rafael
5.	T. G. Scott	Oakland
6.	L. Lasagna	Albany
7.	C. W. Allen	San Francisco
8.	B. L. Wade	Larkspur
9.	J. A. Glimme	Danville
10.	J. C. Vocke	Lafayette
11.	W. A. Hutchison	San Carlos
12.	M. C. Dolan	Oakland
13.	M. W. Johnson	Walnut Creek
14.	R. W. Hall	Richomod
15.	I. M. Crawford	Hercules
16.	R. G. Schumaker	El Granada
17.	R. D. Fagg	San Rafael
18.	P. C. Boettcher	Moraga
19.	H. W. Reynolds	Sunnyvale
20.	B. P. Sadler	Belmont

[1] This listing extracted from Safety, Health, and Claims memo regarding Personnel to be Contacted for Reporting of Accidents, dated 01/13/83.

Non-Employee Injuries

C. O. Schreil, San Luis Obispo (office) (office) (home)

If he cannot be reached, contact one of the following in order of preference:

During working hours:

1. John C. Echols
2. Doug G. Keeler
3. George G. Perry (collection only)

After working hours on Monday through 8:00 a.m. on Friday, except holidays:

1. John C. Echols	Pleasant Hill
2. Doug G. Keeler	Concord
3. John C. Vocke	Layfayette
4. Amos L. Bechtold	Cupertino
5. William H. Bingaman	Novato
6. E. Anthony Giudici	San Carlos
7. J. Alex McCorquodale	San Ramon
8. Bruce P. Sadler	Belmont
9. George G. Perry (collection only)	Hayward
10. Stanley W. Johnston	Fairfield

After 5:00 p.m. on Fridays to 8:00 a.m. on Mondays and holidays:

Contact the Investigator delegated to stay on call for all emergencies. He may be reached through the System Dispatcher. If he is not available, the Dispatcher will follow the procedures for "After Working Hours."

TITLE: EMERGENCY PROCEDURE
RELEASE OF AIRBORNE RADIOACTIVE MATERIALS

APPROVED: R Patterson 7/15/83
PLANT MANAGER DATE

SCOPE

This procedure describes the steps to be taken to evaluate and recover from the consequences of an airborne release that results in an Unusual Event, Alert, Site Area, or General Emergency. It does not describe the operation of the plant equipment necessary to terminate or minimize the release. This latter subject is covered in the appropriate OP series Emergency Procedure for the particular release mechanism. This procedure and all changes thereto requires PSRC review.

SYMPTOMS

1. The following symptoms indicate that an airborne release may be occurring in the Controlled Area:

   a. There is actual or suspected leakage of water, steam, or noncondensible gases from any vessel or piping system containing primary coolant, liquid radwaste, or gaseous radwaste.

   b. Damage occurs to a submerged, irradiated fuel assembly with the resultant release of significant quantities of noncondensible gases.

   c. Alarms occur on CAMs.

   d. A fire occurs in radioactive materials.

   e. G-M type survey instruments in the area begin to show an increasing background count rate.

      NOTE: The external dose rate produced by airborne levels near MPC is very low and may not be noticed on a Rad Owl. However, it produces a noticeable increase on a G-M survey instrument.

   f. A major radioactive material spill occurs.

2. There are numerous indications available in the control room to identify and diagnose a possible airborne release.

   These vary depending upon the mechanism of the release, and are covered in detail in the OP series Emergency Procedures and EP G-1, "Accident Classification and Emergency Plan Activation." However, the most likely symptom(s) will involve alarms on at least one of the area and/or process radiation monitors.

IMMEDIATE ACTIONS

1. Personnel in the Area

   a. Unless qualified and equipped with appropriate monitoring and/or respiratory equipment, evacuate the area and proceed to access control.

   b. Notify the control room.

2. The Shift Foreman (interim Site Emergency Coordinator) shall:

   a. Clear the affected area.

      This can be done most efficiently by sounding the emergency signal. The emergency signal shall be sounded for the following circumstances:

      1) Airborne contamination is widespread. Refer to EP R-4, "High External Radiation (In-Plant)."

      2) Major damage occurs to plant equipment. Refer to appropriate OP procedure or EP G-1, "Accident Classification and Emergency Plan Activation."

      3) Site evacuation is necessary. Refer to EP G-5, "Evacuation of Nonessential Site Personnel."

      4) Mobilization of personnel is necessary. Refer to EP G-2, "Establishment of the Onsite Emergency Organization" and EP G-4, "Personnel Assembly and Accountability."

      5) The Shift Foreman deems it necessary.

   b. Establish an appropriate interim onsite emergency organization in accordance with EP G-1, "Accident Classification and Emergency Plan Activation."

1) Assign the Emergency Liaison Coordinator and the Liaison Assistant to begin notification of offsite agencies and plant staff.

2) Assign operators to isolate the release using appropriate OP series emergency procedures.

3) Have the Emergency Evaluations and Recovery Coordinator (normally the Shift Engineer) begin preliminary evaluation and classification of the actual or potential severity of the release. Instructions for performing this evaluation are contained in the Subsequent Actions section of this procedure.

c. Treat any injured personnel in accordance with EP R-1, "Personnel Injury (Radiologically Related) and/or Overexposure."

SUBSEQUENT ACTIONS

1. Subsequent Actions Common to All Events

a. Establish an appropriate long-term onsite emergency organization in accordance with EP G-2, "Establishment of Onsite Emergency Organization." As a minimum, notify the following personnel:

1) Plant Manager (Long-Term Emergency Coordinator)

2) Plant Superintendent

3) Supervisor of Chemistry and Radiation Protection

b. Alert offsite groups in accordance with EP G-3, "Notification of Offsite Organizations."

1) Prompt notification of County and other offsite authorities should occur within about 15 minutes for the Unusual Event class and sooner (consistent with the need for other emergency actions) for other classes. Use Form 69-9221, Emergency Notification Record.

NOTE: As a minimum, notify the NRC Operations Center within one hour via the "hot line." This notification is required pursuant to 10CFR50.72 as an event requiring initiation of the licensee's emergency plan or any section of that plan.

2) Periodic updates on the status of the emergency shall be provided to the County and other offsite authorities, at least every 15 minutes. Use Form 69-10262, Emergency Status Form, giving as much information as is known at the time.

2. Classify the Emergency

a. General

1) To a large extent, subsequent actions are based upon the potential severity of the occurrence, as identified by the emergency classification. Therefore, the Emergency Evaluations and Recovery Coordinator (EERC) shall inform the Site Emergency Coordinator at the earliest possible time whether the emergency is classified as an Unusual Event, Alert, Site Area or General Emergency using EP G-1, "Accident Classification and Emergency Plan Activation."

NOTE: If core damage is a possibility, the Shift Engineer should be directing his attention towards its assessment and the task of classifying the accident should be assigned to someone else, such as a Senior Control Operator.

2) The EERC shall keep the Site Emergency Coordinator apprised of any escalation or reduction of the emergency classification.

b. How to Make Initial Classification of the Emergency

There are four general methods for initially classifying an emergency:

1) accident scenario,

2) estimate release rate,

3) use accident summary sheets, or

4) perform offsite monitoring.

Each is discussed below.

1) Classify Emergency Based Upon Emergency Scenario

The preferred method for initially classifying the emergency is to diagnose the most likely cause (LOCA, steam line break, gas decay tank rupture, etc.) and base the classification on this information.

a) Go to the appropriate OP series procedure and use the guidance contained therein to classify the accident.

b) If the emergency does not fit any OP series procedure, or if the guidance in the OP series procedure is unclear, go to EP G-1.

EP G-1 gives examples of typical emergency scenarios which fall into each accident classification. Classify the emergency at a level consistent with the scenario which most closely approximates the actual situation.

c) If multiple emergency situations are occurring simultaneously, such that the probability of a release of radioactive materials is increased over what it would be for a single occurrence, classify the emergency one level higher than it would otherwise have been based on the most severe single occurrence.

2) Classify Emergency Based On Release Rate

a) General

The second best way to classify the emergency is to estimate the magnitude of the release rate. However, using release rate information to classify the emergency is subject to the following limitation:

(1) If the classification based upon the emergency scenario is more severe than would be warranted by release data, use the conservative (emergency scenario) classification. The reason for this is that EP G-1 specifies a classification for many events based upon the potential for a release, and this conservative classification must be used even if the actual release does not materialize.

(2) If the release data indicates a classification more severe than the classification based upon the scenario, use the conservative classification based on release data, if the release data is considered to be reliable.

(3) Both whole body and thyroid exposure must be considered when making a classification based upon release data. Classify the emergency based upon the most conservative of these two values.

b) Dose and Release Rate Criteria for Classifying Emergency

The criteria for classifying an emergency based on dose and release data are summarized in Appendix 1.

c) Instructions

Regardless of the particular instruments used, the basic technique is as follows:

(1) Determine the classification criteria using Appendix 1. Use real meteorological data if possible, or default values as necessary.

(2) Estimate the noble gas and iodine release rates in curies/second. There are numerous possible techniques for doing this. Appendix 2 gives detailed instructions for the following common methods.

(a) Use of plant vent noble gas monitors RE-14 or RE-29.

(b) Use of plant vent iodine monitor RE-24.

(c) Use of containment air sample results if leak is via containment purge or other path out of containment.

(d) Use of RCS coolant sample results during S/G tube rupture.

(3) Compare the estimated release rate data with the criteria values.

3) Classify Emergency Using Accident Summary Sheets

Appendix 6 contains summary sheets for each accident analyzed in the FSAR. They can be used to estimate the severity of an accident.

4) Classify Emergency Based On Field Monitoring Data

a) General

As discussed in Appendix 1, the accident classification definitions are based upon dose rates at the site boundary. In theory, therefore, field data taken at the site boundary should provide a direct method of classifying the accident. In practice, this is only the third best technique because there is the possibility that you will miss the plume, and also because it takes considerable time to deploy monitoring teams.

b) Instructions

Appendix 6 summarizes the basic formulas related to environmental monitoring that are useful in classifying accidents and in projecting doses.

NOTE: At this point, the emergency is classified. Go to Steps 3, 4, 5, or 6 for Unusual Event, Alert, Site Area Emergency, or General Emergency, respectively.

3. Subsequent Actions for an Unusual Event

a. Evaluate the internal exposure received by affected personnel using the instructions given in Emergency Procedure R-1, "Personnel Injury (Radiologically Related) and/or Overexposure."

b. Make the best possible quantification of the extent of any offsite release using the results of air samples, effluent monitors, environmental monitoring, or other techniques.

c. Conduct appropriate cleanup and re-entry operations.

NOTE: General guidelines for cleanup and re-entry are contained in Attachment 1.

d. Close-out the event with a verbal summary to offsite agencies and complete the following written reports:

1) Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

2) Written summary to NRC within 24 hours.

4. Subsequent Actions for an Alert

a. Activate the Technical Support Center, the Emergency Operations Facility, and the Operational support Center in accordance with EP's, EF-1, EF-3 and EF-2, respectively.

b. If the release has the potential for necessitating onsite protective measures (i.e., if it is more than about 10 times the threshold levels for an Alert), make a check of downwind onsite assembly areas to determine if any protective measures are needed for onsite personnel.

c. If the results of the initial assessment indicate that site personnel are receiving significant exposures, and that evacuation can measurably reduce it, the Site Emergency Coordinator shall order their evacuation either offsite (preferred) or to an upwind site location (if the duration of the release is expected to be very short).

d. Provide periodic meteorological assessments to offsite authorities and, if any releases are occurring, dose projections for actual releases.

1) Activation of EARS is the preferred method for transmitting dose projections offsite.

2) If EARS is not available in either the automatic (EARAUT) or manual (EARMAN) mode, perform appropriate hand calculations using Appendices 2 - 6, and Attachment 1 of this procedure.

e. Perform Comprehensive Follow-up Surveys Onsite

1) Personnel Assembly Areas

Although a preliminary assessment should have been made at personnel assembly areas, if the release was substantially in excess of limits, it is wise to check or recheck these locations as time and conditions permit, with the following objectives:

a) To verify that long-term evacuation is not required if personnel were not previously evacuated based upon the initial assessment.

b) To obtain iodine and particulate samples if these were not obtained earlier (assuming that significant quantities of iodine and particulate matter were released, and that the cloud has not long since passed).

c) To run smear surveys to see whether decontamination is required. If significant activity is found, the smear pads should be counted on the MCA to assist in determining the isotopes to which persons might have been exposed. (If significant personnel exposure is suspected, the persons should also be whole body counted in accordance with Emergency Procedure R-1.)

2) Remainder of Site

Downwind areas which may have been contaminated should be checked for contamination to provide data for determining the necessity and extent of cleanup operations. Smear samples should be retained for subsequent isotopic analysis if required.

f. Perform Offsite Monitoring as Warranted

If the estimate of curie release and/or onsite monitoring indicates that offsite effects are negligible (as they would be for most Alert conditions), offsite monitoring may not be necessary. However, if there is a realistic possibility that offsite locations may have become contaminated, local government agencies should be alerted and an offsite monitoring program should be instituted for the following purposes:

1) Determine the need for long-term decontamination or impoundment of foodstuffs, even if offsite personnel evacuation is not required.

NOTE: These decisions are the responsibility of local government agencies. However, current governmental recommendations are summarized in EP RB-10.

2) Allay any public concern.

3) Obtain background data for reports to regulatory agencies.

g. Conduct appropriate post-accident cleanup and re-entry operations.

h. Close-out the event with a verbal summary to offsite agencies and complete the following written reports:

1) Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

2) Written summary to NRC within 8 hours.

5. Subsequent Actions for a Site Area Emergency

a. Activate the Technical Support Center, the offsite Emergency Operations Facility and the onsite Operational Support Center in accordance with EP's, EF-1, EF-3, and EF-2, respectively.

b. Consider evacuation of nonessential site personnel.

If it is likely that a release is occurring, or will occur which exceeds the threshold for a Site Area Emergency (i.e., 17mR WB or 85 mrem thyroid at site boundary), evacuation of site personnel either offsite (preferred) or to an upwind site location (if the duration of the release is expected to be very short).

c. Provide periodic meteorological assessments to offsite authorities and, if any releases are occurring, dose projections for actual releases.

1) Activation of EARS is the preferred method for transmitting dose projections offsite.

2) If EARS is not available in either the automatic (EARAUT) or manual (EARMAN) mode, perform appropriate hand calculations using Appendices 2 - 6, and Attachment 1 of this procedure.

d. Perform Offsite Monitoring

A Site Area Emergency release is of sufficient magnitude such that some offsite protective measures, such as evacuation of persons in portions of the LPZ, or long-term impoundment of foodstuffs, may be required near the site boundary. Therefore, an offsite monitoring program should be established for the following purposes:

1) Initially, the program should be directed toward identifying those areas where personnel evacuation may be necessary to prevent persons from exceeding the recommended evacuation criteria doses of 500 mrem whole body and/or 5 rem thyroid.

2) Once any immediate evacuation is accomplished, the program should be set up to determine the need for long-term decontamination or impoundment of foodstuffs, which may be desirable even in areas where prompt personnel evacuation was not required.

NOTE: These decisions are the responsibility of local government agencies. However, current government recommendations are summarized in EP RB-10.

3) The program should provide background data for any necessary reports to regulatory agencies.

4) The program should provide the data to answer questions of public concern.

e. Take Protective Measures for Members of the Public (if required)

Table 1 summarizes recommended protective actions for exposure to a passing plume. The area where action is taken must include the entire area in which the dose criteria have been exceeded. A somewhat larger area than this should be considered.

If evacuation is required, determine which area is to be evacuated. On a map, draw an arrow pointing in the downwind direction. Mark a 22.5° sector on both sides of this downwind sector. Evacuate everyone within this 67.5° sector out to the limit of the LPZ.

NOTE: The decision to evacuate and which area is to be evacuated are the responsibility of local government agencies.

f. Conduct appropriate post-accident cleanup and re-entry operations.

g. Close-out the event with a verbal summary to offsite agencies and complete the following written reports:

1) Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

2) Written summary to NRC within 8 hours.

6. Subsequent Actions for a General Emergency

a. Activate the Technical support Center, the Emergency Operations Facility and the onsite Operational Support Center in accordance with EP's, EF-1, EF-3, and EF-2, respectively.

b. Evacuate Site Personnel

1) As soon as the accident has been classified as a General Emergency, evacuate all nonessential site personnel in accordance with instructions given in EP G-5.

2) Evacuate site personnel engaged in recovery actions if it appears that they will exceed the emergency dose criteria given in EP RB-2.

c. Evacuate Members of the Public from the Downwind LPZ

As soon as the accident has been classified as a General Emergency, notify the Sheriff and recommended immediate evacuation of the LPZ in the downwind direction with the remainder of the ingestion pathway LPZ being placed on

standby alert.[1] If it is anticipated that conditions will escalate to a General Emergency, it is not necessary to delay evacuation of the LPZ until confirmed offsite monitoring results are obtained.

If evacuation is required, determine the area which should be evacuated first. On a map, draw an arrow pointing in the downwind direction. Mark a 22.5° sector on either side of this downwind sector. Evacuate everyone within this 67.5° sector out to the limit of the LPZ.

d. Provide periodic meteorological assessments to offiste authorities and, if any releases are occurring, dose projections for actual releases.

1) Activation of EARS is the preferred method for transmitting dose projections offsite.

2) If EARS is not available in either the automatic (EARAUT) or manual (EARMAN) mode, perform appropriate hand calculations using appendices 2 - 6, and Attachment 1 of this procedure.

e. Perform Offsite Monitoring

1) General

A General Emergency release is of sufficient magnitude such that some offsite protective measures beyond the LPZ, such as evacuation or long-term impoundment of foodstuffs, may be required. Therefore, an offsite monitoring program should be established for the following purposes:

a) Initially, the program should be directed toward identifying those areas located beyond the LPZ where personnel evacuation may be necessary to

[1]This can be done by sounding the Early Warning System.

prevent persons from exceeding the recommended evacuation criteria doses of 500 mrem whole body and/or 5 rem thyroid.

b) Once any immediate evacuation is accomplished, the program shall be set up to determine the need for long-term decontamination or impoundment of foodstuffs, which might be desirable even in areas where prompt personnel evacuation was not required.

NOTE: These decisions are the responsibility of local government agencies. However, current government recommendations are summarized in EP RB-10.

c) The program should provide background data for any necessary reports to regulatory agencies.

d) The program should provide the data to answer questions of public concern.

f. Take Protective Measures

Table 1 summarizes recommended protective actions for exposure to a passing plume. The area where action is taken must include the entire area in which the dose criteria are exceeded. A somewhat larger area than this should be considered.

NOTE: Evacuate at least a 67.5° sector (22.5° on both sides of the downwind sector).

g. Conduct appropriate post-accident cleanup and reentry operations.

h. Close-out the event with verbal summary to offsite agencies and complete the following written reports:

1) Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

2) Written summary to NRC within 8 hours.

APPENDICES

1. Summary of Criteria for Classifying Emergency Based Upon Dose and Release Data
2. Instructions for Estimating Noble Gas Release Rate Using Plant Vent Monitors RE-14 or RE-29
3. Instructions for Estimating Iodine Release Rate Using Plant Vent Monitor RE-24
4. Use of Containment Air Sample Data to Estimate Release Rate
5. Accident Summary Sheets
6. Summary of Field Monitoring Formulae that are Useful in Classifying Accidents

ATTACHMENTS

1. Form 69-11105, "Worksheet for Use of Main Steam Line Monitors, or RCS Coolant Sample Results During S/G Tube Rupture Accidents"
2. Form 69-10262, "Emergency Status Form"
3. For 69-9221, "Emergency Notification Record"

TABLE 1

RECOMMENDED PROTECTIVE ACTIONS TO REDUCE WHOLE BODY AND THYROID DOSE FROM EXPOSURE TO A GASEOUS PLUME

Projected Dose (rem) to the Population	Recommended Actions[a]	Comments
Whole Body - Less than 0.5[b] Thyroid - less than 5	No planned protective actions[c]. Offsite authorities may issue an advisory to seek shelter and await further instruction. Monitor environmental radiation levels.	Previously recommended protective actions may be reconsidered or terminated.
Whole Body - 0.5 to 5 Thyroid - 5 to 25	Seek shelter as a minimum. Consider evacuation/unless constraints make it impractical. Monitor environmental radiation levels. Control access to affected areas.	If constraints exist to prevent full-scale evacuation, special consideration should be given for evacuation of children and pregnant women.
Whole Body - 5 and above Thyroid - 25 and above	Conduct mandatory evacuation. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels. Control access to affected areas.	Sheltering is an alternative if evacuation can not be promptly accomplished.

(a) These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration (e.g., weather, plume arrival time).

(b) The value of 0.5 rem whole body is based upon guidance from the State of California (see reference 3).

(c) At the time of the incident, officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable (ALARA).

APPENDIX 1

SUMMARY OF CRITERIA FOR CLASSIFYING EMERGENCY BASED UPON DOSE AND RELEASE DATA

NOTE 1: For each classification, the actual definition is given from EP G-1. If the necessary information is available, this is the best criteria to use. In addition, however, a set of Derived Criteria are also provided. These are calculated criteria, which are slightly less accurate because of the necessity to make calculational assumptions, but which may be more useful depending on what information is readily available.

NOTE 2: In general, derived criteria are expressed in terms of the site boundary atmosphere dilution factor, $(X/\dot{Q})_{800}$. This can be obtained from the meteorological computer. However, if this information is not readily available, default values of the criteria are given using the FSAR design basis $(X/Q)_{800} = 5.3 \times 10^{-4}$ sec/m^3.

NOTE 3: The definitions of terms used in the equations are:

$\dot{Q}_{NG}$ = noble gas release rate (Ci/sec)

$\dot{Q}_I$ = iodine release rate (Ci/sec)

Q_{NG} = total curies of noble gas released (Ci)

Q_I = total curies of iodine released (Ci)

X_I = iodine concentration (μCi/CC or Ci/m^3)

$(X/\dot{Q})_{800}$ = centerline atmospheric dilution factor @ 800 m (sec/m^3)

A. UNUSUAL EVENT

1. Definition

Radiological effluent technical specification limits exceeded.

APPENDIX 1 (Continued)

The technical specification limits correspond to site boundary 800 m or 0.5 miles dose rates of:

a. Whole body $\geq$ 0.057 mR/hr.

b. Thyroid $\geq$ 0.170 mrem/hr.

2. Derived Criteria

a. Noble Gas Release Rate

$$\dot{Q}_{NG} \geq \frac{6.3 \times 10^{-7}}{(\dot{X}/\dot{Q})_{800}}$$

Default Value: $\dot{Q}_{NG} \geq 0.0012$ Ci/sec

b. Iodine Release Rate

$$\dot{Q}_{I} \geq \frac{9.2 \times 10^{-11}}{(\dot{X}/\dot{Q})_{800}}$$ (Assumed to be I-131)

Default Value: $\dot{Q}_{I} \geq 1.7 \times 10^{-7}$ Ci/sec

c. Centerline Iodine Concentration @ 800 m

$X_{I} > 9.2 \times 10^{-11}$ (Assumed to be I-131)

B. ALERT

1. Definition

Radiological effluents greater than 10 times technical specification limits exceeded.

This corresponds to the following dose rates at the site boundary (800 m or 0.5 miles):

a. Whole body $\geq$ 0.57 mR/hr.

b. Thyroid $\geq$ 1.70 mrem/hr.

APPENDIX 1 (Continued)

2. Derived Criteria

a. Noble Gas Release Rate

$$\dot{Q}_{NG} \geq \frac{6.3 \times 10^{-6}}{(\dot{X}/Q)_{800}}$$

Default Value: $\dot{Q}_{NG} \geq 0.012$ Ci/sec

b. Iodine Release Rate

$$\dot{Q}_I \geq \frac{9.2 \times 10^{-10}}{(\dot{X}/Q)_{800}}$$ (Assumed to be I-131)

Default Value: $\dot{Q}_I \geq 1.7 \times 10^{-6}$ Ci/sec

c. Centerline Iodine Concentration at 800 m

$X_I \geq 9.2 \times 10^{-10}$ (Assumed to be I-131)

C. SITE AREA EMERGENCY

1. Definition

Radiological effluents correspond to greater than 50 mR/hr for 1/2 hour or greater than 500 mR/hr for 2 minutes to the whole body (or five times these levels to the thyroid) at the site boundary (800 m).

This can also be interpreted to mean an accident which produces a total dose at the site boundary of $\geq$ 17 mR (whole body) or $\geq$ 85 mrem (thyroid).

2. Derived Criteria

a. Peak Noble Gas Release Rate ($\geq$ 2 minutes duration)

$$\dot{Q}NG \geq \frac{5.6 \times 10\text{-}_3}{(\dot{X}/\dot{Q})_{800}}$$

Default Value: $\dot{Q}_{NG} \geq 10.5$ Ci/sec

APPENDIX 1 (Continued)

b. Average Noble Gas Release Rate ($\geq$ 30 minutes duration)

$$\dot{Q}_{NG} \geq \frac{5.6\times10^{-4}}{(\dot{X}/Q)_{800}}$$

Default Value: $\dot{Q}_{NG} \geq 1.0$ Ci/sec

c. Total Noble Gas Release

$$Q_{NG} \geq \frac{0.68}{(\dot{X}/Q)_{800}}$$

Default Value: $Q_{NG} \geq 1280$ Curies

d. Peak Iodine Release Rate ($\geq$ 2 minutes duration)

$$\dot{Q}_{I} \geq \frac{1.35\times10^{-6}}{(\dot{X}/Q)_{800}}$$ (Assumed to be I-131)

Default Value: $\dot{Q}_{I} \geq 2.5\times10^{-3}$ Ci/sec

e. Average Iodine Release Rate ($\geq$ 30 minutes duration)

$$\dot{Q}_{I} \geq \frac{1.35\times10^{-7}}{(\dot{X}/Q)_{800}}$$ (Assumed to be I-131)

Default Value: $\dot{Q}_{I} \geq 2.5\times10^{-4}$ Ci/sec

f. Total Iodine Release

$$Q_{I} \geq \frac{1.65\times10^{-4}}{(\dot{X}/Q)_{800}}$$

Default Value: $Q_{I} \geq 0.3$ Curies

D. GENERAL EMERGENCY

1. Definition

Radiological effluents correspond to 1 R/hr whole body or 5 rem/hr thyroid at the site boundary.

APPENDIX 1 (Continued)

2. Derived Criteria

a. Noble Gas Release Rate

$$\dot{Q}_{NG} \geq \frac{0.011}{(X/Q)_{800}}$$

Default Value: $\dot{Q}_{NG} \geq 21$ Ci/sec

b. Iodine Release Rate

$$\dot{Q}_{I} \geq \frac{2.7 \times 10^{-6}}{(X/Q)_{800}}$$ (Assumed to be I-131)

Default Value: $\dot{Q}_{I} \geq 0.005$ Ci/sec

APPENDIX 2

INSTRUCTIONS FOR ESTIMATING NOBLE GAS RELEASE RATE USING PLANT VENT MONITORS RE-14 or RE-29

APPLICABILITY

First choice if noble gas release is going out of plant vent.

INSTRUCTIONS

1. Determine Plant Vent Flow Rate (in cfm) on Affected Unit

   a. Check FR-12 on Unit 2 RMS board in control room. If operable, read flow rate directly off of chart.

   F_{vent} = [cfm]

   b. If FR-12 is inoperable, determine the flow rate using the number of ventilation fans in operation and the following fan capacities:

   ____ FHB exhaust fans @ 35750 cfm/fan = _____ cfm
   ____ Aux Bldg exhaust fans @ 73500 dfm/fan = _____ cfm
   ____ Cont purge exhaust fans @ 55000 cfm/fan = _____ cfm
   ____ Cont H_2 purge fan @ 300 cfm/fan = _____ cfm

   Sum F_{vent} = [cfm]

2. Read RE-14 (in control room) if it is on scale. Otherwise, read RE-29 in the package boiler room. Convert the readings to plant vent concentration using Figure 1 (for RE-14) or Figure 2 (for RE-29). Summarize the data in spaces provided.

   NOTE: On Figure 1, assume effective age<1000 hours for all accidents except a fuel handling accident where the fuel has been out of the core for at least a month.

RE-14			RE-24		
Time	cpm	µCi/cc	Time	mR/hr.	µCi/cc

APPENDIX 2 (Continued)

3. Calculate Noble Gas Release Rate

Regardless of the instrument used, the formula for calculating the noble gas release rate is:

$$\dot{Q}_{NG}(Ci/sec) = (\mu Ci/cc\ Vent \times F_{vent}\ (cfm) \times 4.72 \times 10^{-4}$$

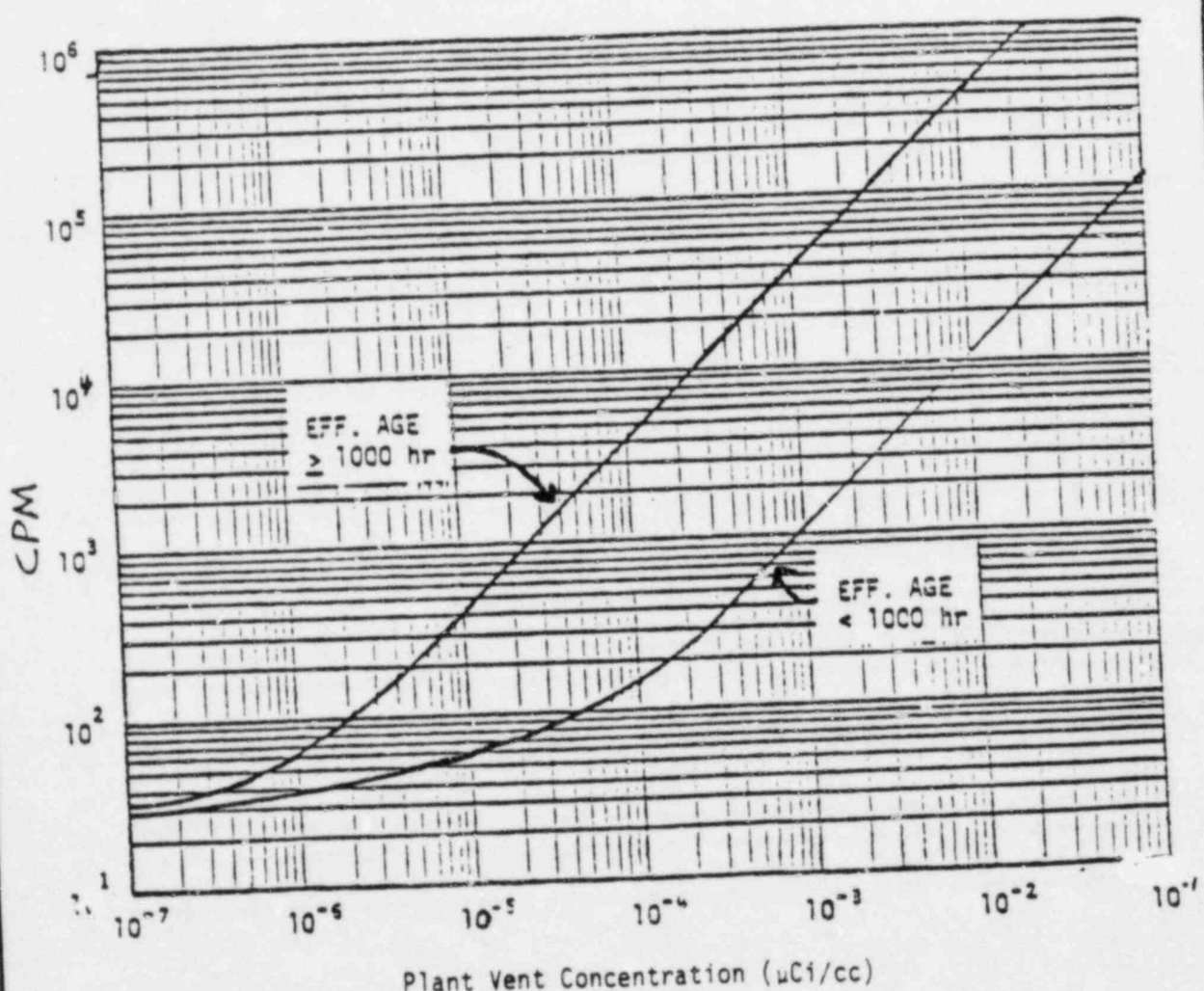
INSTR.	TIME	(μCi/cc)	x	(F_{vent})	x	(4.72×10^{-4})	=	$\dot{Q}_{NG}$ (Ci/sec)
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____
RE-___	____	_____	x	_____	x	(4.72×10^{-4})	=	_____

DATE_____ BY_____

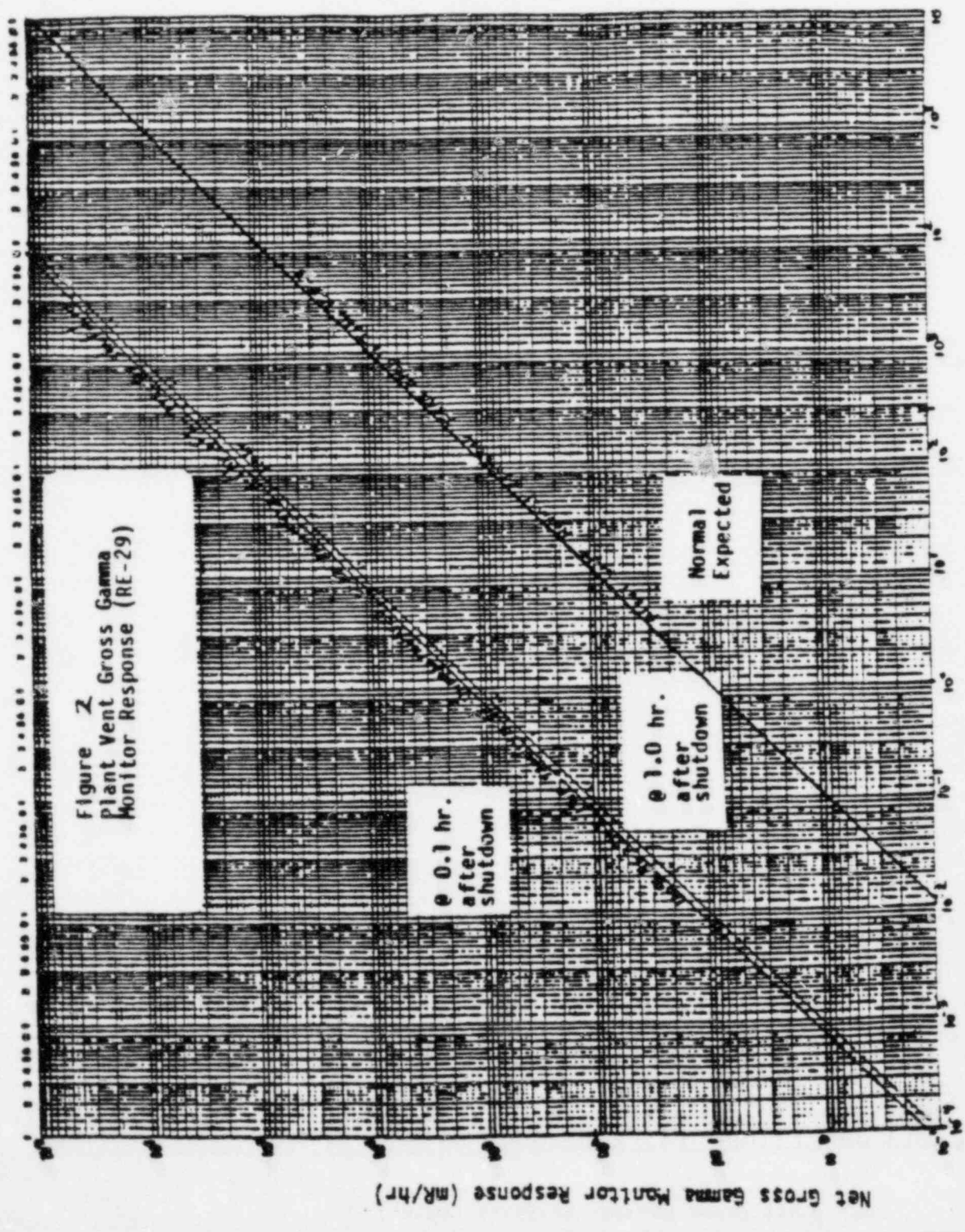
APPENDIX 2 (Continued)

FIGURE 1

RESPONSE OF PLANT VENT RADIOGAS MONITOR (RE-14)



APPENDIX 2 (Continued)



APPENDIX 3

INSTRUCTIONS FOR ESTIMATING IODINE RELEASE RATE USING PLANT VENT MONITOR RE-24

APPLICABILITY

RE-24 first choice for estimating iodine release rate for minor accidents, where release path is the plant vent. RE-24 will go off scale for any release classed as Site Area Emergency or above, and dose rates may make instrument inaccessible. Under such circumstances, it is best to estimate the release rate by some other method, although a technique is given for estimating high release rates using this instrument.

INSTRUCTIONS

1. Determine Ratio of Plant Vent Flow Rate to Sampler Flow Rate

   a. Sampler Flow Rate

      Read at instrument. Otherwise assume the normal setting of 1 cfm.

      F_{samp} = [cfm]

   b. Plant Vent Flow Rate

      1. Check FR-12 on Unit 2 RMS board in control room. If operable, read flow rate directly off of chart.

         F_{vent} = [cfm]

      2. If FR-21 is inoperable, determine the flow rate using the number of ventilation fans in operation and the following fan capacities:

         _____ FHB exhaust fans @ 35750 cfm/fan = _____ cfm
         _____ Aux Bldg exhaust fans @ 73500 dfm/fan = _____ cfm
         _____ Cont purge exhaust fans @ 55000 cfm/fan = _____ cfm
         _____ Cont H_2 purge fan @ 300 dfm/fan = _____ cfm

         Sum F_{vent} = [cfm]

APPENDIX 3 (Continued)

c. Calculate Flow Rate Ratio

FRR = F_{vent} + F_{samp} = _____ + _____ = [ ]

2. Obtain Reading On Instrument and Calculate Release Rate

a. Turn the toggle switch on the front of the instrument to the uCi/sec($\times 10^{-11}$) position.

b. Turn the SCALE FACTOR switch to the "1000" position. This switch is located inside the door on the lower front part of the instrument. Record the scale factor in the blank in paragraph 2.d. below.

c. To allow for instrument response time wait at least one (1) minute and then read the chart. Enter this reading in the blank in paragraph 2.d. below. The chart reading is a number between 1 and 1000. If the instrument does not read on scale, I-131 is not a significant contribution to the accident.

d. Calculate the release rate using the formula

$\dot{Q}_I$ (Ci/sec)=(Chart Reading)x(scale Factor)x(FRR)x 10^{-17}.

TIME	(Reading)x(Factor)	x (FRR)	x (10^{-17})	= $\dot{Q}_I$ (Ci/sec)
___	_____	_____	___	$\frac{10^{-17}}{10^{\ }}$ = _____
___	_____	_____	___	$\frac{}{10^{\ }}$ = _____
___	_____	_____	___	$\frac{}{10}$ = _____
___	_____	_____	___	$\frac{}{10}$ = _____
___	_____	_____	___	$\frac{}{10}$ = _____
___	_____	_____	___	$\frac{}{10}$ = _____
___	_____	_____	___	$\frac{}{10^{\ }}$ = _____
___	_____	_____	___	= _____

3. Calculating Release Rate If Cartridge is analyzed in the Lab

Sometimes it is desirable to take the cartridge to the counting room. If so, have the technician report the total uCi of I or I-131 contained on the cartridge.

APPENDIX 3 (Continued)

a) Activity on Cartridge (A_{cart}) = _____ µCi (circle I or I-131)

b) Estimate the time over which the release has persisted (in seconds).

$$\Delta t_{RELEASE} = _____ (SEC)$$

c) Calculate the average release rate using the equation:

$$\dot{Q}_I \text{ (Ci/sec)} = \frac{[A_{cart} \text{ (µCi)}] \times (FRR) \times 10^{-6}}{[\Delta t_{RELEASE} \text{ (Sec)}]}$$

$$= \frac{(\quad) \times (\quad) \times 10^{-6}}{(\quad)} = \boxed{\qquad\qquad \text{Ci/sec}}$$

4. Calculating Release Rate If RE-24 is Inaccessible

NOTE: This method is very approximate and is an interim technique only.

a. Take a Radowl or other gamma dose rate measuring instrument and approach RE-24 as close as possible, being careful not to exceed personnel exposure limits.

b. Get as close to RE-24 as you can and take a Radowl reading (in R/hr) and also estimate the distance (in meters) you are from RE-24.

Dose Rate (DR) = _____ R/hr
Distance to RE-24 (d) = _____ m

c. Estimate the time over which the release has persisted (in seconds). $\Delta t_{RELEASE}$ = sec

APPENDIX 3 (Continued)

d. Calculate the release rate from the equation.

$$\dot{Q}_I \text{ (Ci/sec)} = \frac{60 \times (DR) \times (d)^2 \times (FRR)}{(\Delta t_{RELEASE})}$$

$$= \frac{60 \times (\quad) \times (\quad)^2 \times (\quad)}{(\quad)}$$

$$= \boxed{\qquad\qquad \text{Ci/sec}}$$

5. Calculating Release Rate If RE-24 is Accessible, But Dose Rates Are Too High To Permit Cartridge To Be Collected

a. Proceed as in paragraph 4 above, with the following exceptions:

1) Open Cartridge holder door and take dose reading on exposed cartridge. Again, estimate distance in meters.

DR = _____ R/hr
d = _____ m

b. Calculate the release rate from the equation:

$$\dot{Q}_I \text{ (Ci/sec)} = \frac{1.3 \times (DR) \times (d)^2 \times (FRR)}{(\Delta t_{RELEASE})}$$

$$= \frac{1.3 \times (\quad) \times (\quad)^2 \times (\quad)}{(\quad)}$$

$$= \boxed{\qquad\qquad \text{Ci/sec}}$$

NOTE: The reason the equations are different is because there is less shielding when the cartridge is exposed.

APPENDIX 4

USE OF CONTAINMENT AIR SAMPLE DATA TO ESTIMATE RELEASE RATE

APPLICABILITY

Many postulated accidents first result in a release to containment. From there the activity may go to the environment via the containment purge (if it is not isolated), or via some unspecified leak path. If a containment air sample is obtained and the leakage flow rate is know, or can be estimated, the release rate is easily determined.

INSTRUCTIONS

1. Obtain air sample and analyze for noble gas and/or iodine. The results will be given as concentration, C (in μCi/cc), in the containment atmosphere.

TIME AT WHICH SAMPLE WAS TAKEN	$C_{NOBLE\ GAS}$ (μCi/cc)	C_{IODINE} (μCi/cc)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. Estimate flow rate from containment, R_{cont} (in cfm).

   NOTE: If there is no obvious leak path, assume containment leaks at design value of 0.1%/day, which translates to F_{cont} = 1.8 cfm.

   F_{cont} = [_____ cfm]

3. Calculate Release Rate

   The expression is as follows:

   $$\dot{Q}\ (Ci/sec) = C\ (\mu Ci/cc) \times F_{cont}\ (cfm) \times (4.72 \times 10^{-4})$$

APPENDIX 4 (Continued)

TIME	(C_{IODINE})	x	(F_{CONT})	x	(4.72×10^{-4})	=	Q_{IODINE} (Ci/sec)
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		

TIME	$(C_{NOB\ GAS})$	x	(F_{CONT})	x	(4.72×10^{-4})	=	$Q_{NOB\ GAS}$ (Ci/sec)
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		
					4.72×10^{-4}		

APPENDIX 5

ACCIDENT SUMMARY SHEETS

This attachment contains summary sheets for the various postulated accidents which have been analyzed in the FSAR. THese sheets contain both the "design basis" and "expected" case variables which were assumed in the FSAR analyses. The sheets can be used to compare actual measurements with assumed numbers from the FSAR, in order to help evaluate how things are going in relation to predictions, or they can be used as a source of data to supply unavailable numbers in calculations which are performed at the time of the accident.

Two sets of data are included. The "design basis" case is expected to be highly conservative, where every variable is at a worst-case condition. The "expected" case is the best estimated prediction of what might actually occur. When FSAR values are used to make calculations or predictions at the time of the accident, the "design basis" values can be used to provide a quick upper limit result, but as soon as data becomes available which tends to confirm one case or the other, the one which best agrees with the data should be used.

The accident classifications identified in this attachment are based on the activity releases. Other emergency procedures may have different classifications which are based on the initiating event.

The summary sheets provided are:

A. 1A MAJOR LOCA
B. 1B MAJOR STEAM LINE BREAK
C. 1C MAJOR FEEDWATER LINE BREAK
D. 1D BLACKOUT (OR PLANT COOLDOWN WITH ATMOSPHERIC DUMP)
E. 1E SMALL LOCA
F. 1F TUBE RUPTURE
G. 1G LOCKED ROTOR
H. 1H FUEL HANDLING ACCIDENT IN FUEL HANDLING BUILDING
I. 1I FUEL HANDLING ACCIDENT IN CONTAINMENT
J. 1J ROD EJECTION ACCIDENT
K. 1K GAS DECAY TANK RUPTURE
L. 1L LIQUID HOLDUP TANK RUPTURE
M. 1M VCT RUPTURE

SUMMARY SHEET 1A
MAJOR LOCA

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1.	Total Release to Containment Free Volume, Ci			
	a. Xe-133	2.03×10^{8}	1.36×10^{6}	
	b. Other Noble Gases	5.73×10^{8}	4.27×10^{5}	
	c. I-131	2.21×10^{7}	1.82×10^{5}	
	d. Other Iodine	1.90×10^{8}	2.73×10^{5}	
	e. Effective Age of Mixture (hr)	0	20	
	f. Release Assumption	100% of core N.G., 25% of core iodines	100% of gap N.G., 25% of gap iodines	
2.	Containment Spray Effectiveness			
	a. Removal half-life (hrs)	0.022	0.0075	
	b. Number of operable spray pumps	1	2	
3.	Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day	

SUMMARY SHEET 1A (Continued

4.	Total Release to Environs, First 2 Hours, Ci		
	a. Xe-133	16,840	56
	b. Other Noble Gases	25,930	21
	c. I-131	191	0.05
	d. Other Iodine	1,325	0.08
	e. Effective Age of Mixture	1	40
	f. Release Mechanism	Containment Leakage	Containment Leakage
5.	$(\chi/\dot{Q})$ CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b, 10000m (6 mi. LPZ)	2.20×20^{-5}	2.20×10^{-6}
6.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (mR)	5,600	0.365
	b. Total 10000m dose for 30 days (mR)	567	0.06
7.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (mR)	95,900	1.25
8.	Accident Classification	General Emergency	Alert
9.	Miscellaneous		
	a. Containment-free volume cc	7.36×10^{10}	
	b. RCS Coolant Mass (gm)	2.4×10^{8}	

SUMMARY SHEET 1A (Continued

9. Miscellaneous

a. Containment-free volume cc 7.36×10^{10}

b. RCS Coolant Mass (gm) 2.4×10^{8}

SUMMARY SHEET 1B
MAJOR STEAM LINE BREAK

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions and Assumptions			
a. Primary Coolant Activity (μCi/gm)			
1) Xe-133	270	67.2	
2) I-131	2.6	0.65	
3) Other Iodine	7.9	2.0	
b. Secondary Water Activity (μCi/gm)			
1) I-131	0.015	0.44×10^{-4}	
2) Other Iodines	0.037	0.90×10^{-4}	
c. Assumed Fuel Defects (%)	1	0.2	
d. Primary to Secondary Leakage (gpm)	1	0.014	
e. Steam Release, 1st Two Hours (lbs)			
1) Failed Generator	97,000		
2) Other generator (atmospheric dump)	520,000		
f. Total Steam Release During 8-Hour Cooldown (lbs)	1,600,000		
g. Liquid Release Fraction for Iodine			
1) Failed Generator	0.1		
2) Other generators	0.01		

SUMMARY SHEET 1B (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
2.	Activity Release to Environs, First 2 Hours (Ci)			
	a. Xe-133	56.8	0.172	
	b. Other Noble Gases	5.2	0.016	
	c. I-131	0.157	0.00045	
	d. Other Iodines	0.047	0.0013	
	e. Effective Age of Mixture (hrs)	65	65	
3.	$(\dot{x}/Q)$ CL (sec/m^3)			
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
4.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	1.8	0.0006	
	b. Total 10000m dose for 30 days (mR)	0.03	0.0010	
5.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	65	0.012	
	b. Total 10000m dose for 30 days (mR)	66	0.012	
6.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1B (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
7. Miscellaneous			
a. Fluid Mass/Stm Gen (lbs)			
1) Water	95,100		
2) Steam	6,620		
b. Safety Valve and Steam Dump Valve Capacities (lb/hr/valve)			
1) S.G. safety valve	800,000		
2) 10% atmospheric dump	380,000		
3) 35% atmospheric dump	597,000		

SUMMARY SHEET 1C
MAJOR FEEDWATER LINE BREAK

The release from this accident comes from release of steam by safety valves and/or atomospheric steam dump of steam generator water during cooldown if the condenser is not available. The steam generator water is contaminated if there is tube leakage. The feedwater itself which is released has very little activity in it and is ignored. This accident is basically the same as a steam-line break and summary sheet 9B can be used. Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steam-line break case.

SUMMARY SHEET 1D
BLACKOUT (PLANT COOLDOWN WITH ATMOSPHERIC DUMP)

The release from this accident comes from release of steam by safety valves and/or atmospheric steam dump of steam generator water is contaminated if there is tube leakage. This accident is basically the same as a steam-line break and summary sheet 9B can be used. Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steam-line break case.

SUMMARY SHEET 1E
SMALL LOCA (RELEASE OF COOLANT TO CONTAINMENT)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1.	Initial Coolant Activity (μCi/gm)			
	a. Xe-133	270	45.7	
	b. Other Noble Gases	30	5.6	
	c. I-131	2.62	0.45	
	d. Other Iodine	7.88	1.35	
	e. Effective Age of Mixture (hr)	60	60	
	f. Fuel Defects (%)	1	0.2	
2.	Initial Release to Containment (Ci)			
	a. Xe-133	65,430	16,280	
	b. Other Noble Gases	7,950	1,980	
	c. I-131	63	16	
	d. Other Iodine	193	48	
	e. Assumption	100% of Coolant N.G. activity +10% of coolant iodines	100% of Coolant N.G. Activity +10% of coolant iodines	
3.	Containment Spray Effectiveness			
	a. Removal Half-life (hrs)	0.022	0.0075	

SUMMARY SHEET 1E (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
	b. Number of operable spray pumps	1	2	
	c. Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day	
4.	Containment Leak Rate (%/day)	0.1	0.05	
5.	$(\chi/\dot{Q})$ CL (sec/m^3)			
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
6.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	0.18	0.004	
	b. Total 10000m dose for 30 days (mR)	0.05	0.001	
7.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	0.2	0.0009	
	b. Total 10000m dose for 30 days (mR)	0.03	0.0001	
8.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1E (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
9.	Miscellaneous			
	a. Containment-Free Volume (cc)	7.36×10^{10}		
	b. RCS Coolant Mass (gm)	2.4×10^{8}		
	c. Liquid Release Fraction for Iodine	0.1		

SUMMARY SHEET 1F
TUBE RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions and Assumptions			
a. Primary Coolant Activity (μCi/gm)			
1) Xe-133	270	67.2	
2) I-131	2.6	0.65	
3) Other Iodine	7.9	2.0	
b. Secondary Water Activity (μCi/gm)			
1) I-131	0.015	0.44×10^{-4}	
2) Other Iodines	0.037	0.90×10^{-4}	
c. Assumed Fuel Defects (%)	1	0.2	
d. Primary to Secondary Leakage (gpm)	1	0.014	
e. Steam Release, 1st Two Hours (lbs)			
1) Failed generator	31,000		
2) Other generators (atmospheric dump)	380,000		
f. Total Steam Release During 8 hour Cooldown (lbs)	1,600,000		
g. Liquid Release Fraction for Iodine			
1) Failed generator	0.01		
2) Other generators	0.01		

SUMMARY SHEET 1F (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
2.	Total Release to Environs First 2 hours (Ci)			
	a. Xe-133	10,980	2,383	
	b. Other Noble Gases	1,067	234	
	c. I-131	0.75	0.14	
	d. Other Iodines	3.1	0.62	
	e. Effective Age of Mixture (hrs)	65	65	
3.	$(\chi/\dot{Q})$ CL (sec/m^3)			
	a. 800 m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
4.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	360	7.7	
	b. Total 10000m dose for 30 days (mR)	15	0.3	
5.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	340	4.3	
	b. Total 10000m dose for 30 days (mR)	15	0.2	
6.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1F (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
7. Miscellaneous			
a. Fluid Mass/Stem Gen. (lbs)			
1) Water	95,000		
2) Steam	6,620		
b. Safety Valve and Steam Dump Valve Capacities (lbs/hr/valve)			
1) S.G. safety valve	800,000		
2) 10% atmospheric dump	380,000		
3) 35% atmospheric dump	597,000		

SUMMARY SHEET 1G
LOCKED ROTOR ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	97	0.73	
b. Other Noble Gases	19.6	0.21	
c. I-131	0.24	0.003	
d. Other Iodines	0.36	0.003	
e. Effective Age of Mixture	50	50	
f. Assumptions			
1) Coolant Activity	1% fuel defects +3% of gap activity	0.2% fuel defects +3% of gap activity	
2) Primary to Secondary Leakage (gpm)	1	0.014	
3) Secondary Steam Release, 1st Two Hours (lbs)	617,000	617,000	
4) Total Steam Release During 8 Hour Cooldown (lbs)	1,600,000	1,600,000	
2. $(\chi/\dot{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1G (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
3. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	4.4	0.004	
b. Total 10000m dose for 30 days (mR)	0.5	0.0004	
4. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	82	0.06	
b. Total 10000m dose for 30 days (mR)	27	0.02	
5. Accident Classification	Alert	Alert	
6. Miscellaneous			
a. Fluid Mass/Stm Gen. (lbs)			
1) Water		95,100	
2) Steam		6,620	
b. Safety Valve and Steam Dump Valve Capacity (lbs/hr/valve)			
1) S.G. safety valve		800,000	
2) 10% atmospheric dump		380,000	
3) 35% atmospheric dump		597,000	
c. Liquid Release Fraction for Iodines	0.01		

SUMMARY SHEET 1H
FUEL HANDLING ACCIDENT IN FUEL HANDLING BLDG

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions			
a. Radial Peaking Factor of Damaged Assembly	1.65	1.26	
b. Elapsed Time Since Reactor Shutdown (hrs)	100	100	
c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity	
d. Bundle Submergence (ft)	26	26	
e. Pool Decontamination Factor for Iodine	100	760	
f. Total Assembly Gap Activity at Time of Accident			
1) Xe-133	100,000	8,137	
2) Other Noble Gases	4,500	1,500	
3) I-131	52,670	5,282	
4) Other Iodines	7,000	220	
5) Effective Age of Mixture (hr)	600	600	
2. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
3. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	100,400	523	
b. Other Noble Gases	4,100	101	

SUMMARY SHEET 1H (Continued)
FUEL HANDLING ACCIDENT IN FUEL HANDLING BLDG

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
c. I-131	80	0.005	
d. Other Iodines	10	0.0002	
e. Effective Age of Mixture (hrs)	600	600	
4. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	2,450	1.5	
b. Total 10000m dose for 30 days (mR)	102	0.06	
5. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	22,200	0.08	
b. Total 10000m dose for 30 days (mR)	923	0.003	
6. Accident Classification	Site Emergency	Alert	
7. Miscellaneous			
a. Fuel Handling Building Volume (ft^3)	435,000		
b. Fuel Handling Building Exhaust Rate (cfm)	35,700	35,700	
c. Filter Cleanup Factor	0.10	0.01	

SUMMARY SHEET 1I
FUEL HANDLING ACCIDENT IN CONTAINMENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions			
a. Radial Peaking Factor of Damaged Assembly	1.65	1.26	
b. Elapsed Time Since Reactor Shutdown (hrs)	100	100	
c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity	
d. Bundle Submergence (ft)	26	26	
e. Pool Decontamination Factor for Iodine	100	760	
f. Total Assembly Gap Activity at Time of Accident (Ci)			
1) Xe133	100,000	8,137	
2) Other Noble Gases	4,500	1,500	
3) I-131	52,670	5,282	
4) Other Iodines	7,000	220	
5) Effective Age of Mixture (hrs)	600	600	
2. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
3. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	12,460	38	

SUMMARY SHEET 1I (Continued)
FUEL HANDLING ACCIDENT IN CONTAINMENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
b. Other Noble Gases	557	7	
c. I-131	65	0.033	
d. Other Iodines	8.7	0.0013	
e. Effective Age of Mixture (hrs)	600	600	
4. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.31	0.0001	
b. Total 10000m dose for 30 days (mR)	0.013	4×10^{-6}	
5. Thyroid Dose Results			
a. Total 800 m dose for 1st two hours (mR)	18.4	6×10^{-4}	
b. Total 10000m dose for 30 days (mR)	0.76	3×10^{-5}	
6. Accident Classification	Site Emergency	Alert	
7. Miscellaneous Activity Release Mechanism	Activity released from cavity to containment atmosphere is confined directly above the cavity water level. It is picked up by the fan coolers and sent out through the containment purge.		

SUMMARY SHEET 1J
ROD EJECTION ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Containment Free Volume (Ci)			
a. Xe-133	2.01×10^5	1.52×10^5	
b. Other Noble Gases	6.82×10^4	6.22×10^4	
c. I-131	7.32×10^3	7.28×10^3	
d. Other Iodine	1.11×10^4	1.09×10^4	
e. Effective Age of Mixture (hrs)	40	40	
f. Release Assumption	Coolant activity (1% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)	Coolant activity (0.2% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)	
2. Containment Spray Effectiveness			
a. Removal half-life (hrs)	0.022	0.0075	
b. Number of operable spray pumps	1	2	
3. Containment Leak Rate (%/day)	0.1	0.05	
4. (χ/Q) CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1J (Continued)
ROD EJECTION ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
5. Total Release to Environs, 1st 2 Hours (Ci)			
a. Xe-133	11.2	5.6	
b. Other Noble Gases	4.1	2.0	
c. I-131	0.0098	0.002	
d. Other Iodine	0.015	0.002	
e. Effective Age of Mixture (hrs)	40	40	
f. Release Mechanism	Containment Leakage	Containment Leakage	
6. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.73	0.04	
b. Total 1000m dose for 30 days (mR)	0.13	0.006	
7. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	3.3	0.04	
b. Total 10000m dose for 30 days (mR)	0.14	0.002	
8. Accident Classification	Alert	Alert	
9. Miscellaneous			
a. Containment free volume (cc)	7.36×10^{10}		
b. RCS Coolant Mass (gm)	2.4×10^{8}		

SUMMARY SHEET 1K
GAS DECAY TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	65,400	16,300	
b. Other Noble Gases	7,300	2,140	
2. (x/Q) CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
3. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	2,010	44	
b. Total 10000m dose for 30 days (mR)	84	2	
4. Accident Classification	Site Emergency	Alert	
5. Miscellaneous			
a. Tank Volume (cc)	2.18×10^{-7}		
b. Tank Press	100 psi		
c. Volume Released (cc)	1.48×10^{8}cc		

SUMMARY SHEET 1L
LIQUID HOLDUP TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Activity in Holdup Tank (Ci)			
a. Xe-133	51,000	10,200	
b. Other Noble Gases	4,710	930	
c. I-131	492	98.3	
d. Other Iodines	1,086	217	
e. Effective Age of Mixture (hrs)	60	60	
2. Cleanup Parameters			
a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}	
b. Charcoal Filter Cleanup Factor	0.1	0.01	
c. Release Duration (hrs)	2	2	
3. Activity Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	51,000	10,200	
b. Other Noble Gases	4,710	930	
c. I-131	0.00492	0.0098	
d. Other Iodines	0.01086	0.00217	
4. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1L (Continued)
LIQUID HOLDUP TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
5. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	1,440	37	
b. Total 10000m dose for 30 days (mR)	60	1.6	
6. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	1.93	0.003	
b. Total 10000m dose for 30 days (mR)	0.08	0.0001	
7. Accident Classification	Site Emergency	Alert	
8. Miscellaneous			
a. Tank Volume (cc)		3.03×10^8	

SUMMARY SHEET 1M
VOLUME CONTROL TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Activity in VCT (Ci)			
a. Xe-133	3,330	828	
b. Other Noble Gases	198	42	
c. I-131	12.1	3.0	
d. Other Iodines	35	8.7	
e. Effective Age of Mixture (hrs)	60	60	
2. Cleanup Parameters			
a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}	
b. Charcoal Filter Cleanup Factor	0.1	0.01	
c. Release Duration (hrs)	2	2	
3. Activity Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	3,330	828	
b. Other Noble Gases	198	42	
c. I-131	0.00012	0.000003	
d. Other Iodines	0.00035	0.00009	
4. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1M (Continued)
VOLUME CONTROL TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
4. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (5 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
5. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	465	9.3	
b. Total 10000m dose for 30 days (mR)	19	0.4	
6. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.03	0.00004	
b. Total 10000m dose for 30 days (mR)	0.001	0.000001	
7. Accident Classification	Site Emergency	Alert	
8. Miscellaneous			
a. Tank Volume (cc)	1.1×10^7		

APPENDIX 6

SUMMARY OF FIELD MONITORING FORMULAE THAT ARE USEFUL IN CLASSIFYING ACCIDENTS

1. Relationship Between Whole Body Dose Rate and Noble Gas Release Rate

   If a whole body dose rate measurement is taken in the environment, it can be related to the release rate using the equation:

   $$DR_{WB,L} = 9 \times 10^{5} \times \bar{E}_{\gamma} \times \dot{Q}_{NG} \times (X/\dot{Q})_{L}$$

   Where: $DR_{WB,L}$ = Whole body dose rate at location L (mR/hr.)

   $\bar{E}_{\gamma}$ = average gamma energy (mev) (default value - 0.1 mev)

   $\dot{Q}_{NG}$ = noble gas release rate (Ci/sec)

   $(X/\dot{Q})_{L}$ = dilution factor at downwind location L

   NOTE: This equation can also be used to calculate downwind dose rate if the release rate is known.

2. Relationship Between Thyroid Dose Rate and Iodine Concentration

   Assuming all iodine is I-131:

   $$DR_{THY,L} = 1.85 \times 10^{6} \quad [X_{131}]_{L}$$

   Where: $DR_{THY,L}$ = Thyroid dose rate at location L (Rem/hr).

   $[X_{131}]_{L}$ = I-131 Concentration at Location L (μCi/cc or Ci/m^3)

3. Relationship Between Thyroid Dose Rate and Iodine Release Rate

   Assuming all iodine is I-131:

   $$DR_{THY,L} = (1.85 \times 10^{6}) (\dot{Q}_{I}) (X/\dot{Q})_{L}$$

APPENDIX 6 (Continued)

Where: $DR_{THY,L}$ = Thyroid dose rate at location L (Rem/hr).

$\dot{Q}_I$ = iodine release rate (Ci/sec)

$(X/\dot{Q})_L$ = dilution factor at location L (sec/m^3)

4. Extrapolation of Dose Rates, Doses or Concentrations to Other Locations

If a dose or dose rate value is available at one location in the environment, it may be extrapolated to another location if the respective $(X/\dot{Q})$ values are known.

$$(DR)_A = \frac{(X/\dot{Q})_A \, (DR)_B}{(X/\dot{Q})_B}$$

or

$$(D)_A = \frac{(X/\dot{Q})_A \, (D)B}{(X/\dot{Q})_B}$$

or

$$X_A = \frac{(X/\dot{Q})_A \, X_B}{(X/\dot{Q})_B}$$

Where:

DR = dose rate (μR/hr, mR/hr, R/hr)

D = dose (μR, mR, R)

X = concentration (μCi/cc or Ci/m^3)

A,B = locations A and B

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

PERFORMED BY_____ DATE_____ TIME_____

APPLICABILITY

One of the most difficult accidents to estimate the release rate for is a S/G Tube Rupture. This is due to uncertainties in primary to secondary leak rate and in steam release rate to the atmosphere. The release pathway for a secondary system release will largely depend on identifying the affected Steam Generator and whether or not it's associated Main Steam Isolation Valve (MSIV) has been closed. When the MSIV is open and the condenser is used as the principal heat sink, the condenser air ejectors release via the Plant Vent, which is a monitored release point. If the Condenser is unavailable or if the MSIV is closed, steam flow from the affected Steam Generator should be assumed to be released via atmospheric steam dumps. The instantaneous release rate ($\dot{Q}$) may be calculated below using the radioactivity concentration of the primary or secondary system.

INSTRUCTIONS

1. Determine the effluent stream concentration, C(μCi/cc) by one of the two following methods:

   1.A. Main Steam Line Monitors (RE-71, 72, 73 & 74). This is the preferred method, but it is possible that radioactivity levels in secondary system steam (or water if the steam-line is flooded) may be too low for Monitors RE-71 - 74 to come on-scale. Otherwise, enter appropriate data below and perform the indicated calculations:

TIME_____ BY_____	Main Steam Line Monitor Channel* RE-71	RE-72	RE-73	RE-74	
(1) Reading (CPM)					
(2) Total Conc (C_{Total}) From Figure A**					

*NOTE: Re-71 corresponds to Steam Generator (S/G) number 1, RE-72 to S/G-2, RE-73 to S/G-3, and RE-74 to S/G-4.

**Use emergency (Initial Release Curve) values.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

To calculate the fraction of total steam line activity attributable to Noble Gases, Iodines, and Particulates, some assumptions and calculations have to be performed. If the FSAR design basis steam generator tube rupture is assumed, then the fraction of the total activity in the steam line can be broken down as follows:

$C_{NOB\ GAS} = C_{TOTAL} \times 0.9990(F^1_{NG})$

$C_{IODINE} = C_{TOTAL} \times 0.000195(F^1_{I})$ - DEFAULT VALUES

$C_{PART} = C_{TOTAL} \times 0.000005(F^1_{PART})$

However, these fractions should be adjusted based on reactor coolant sample analyses, and partitioning factors. To accomplish this, first determine the relative concentrations of noble gases, iodines, and particulates in the reactor coolant as described below:

Calculate Fractional Reactor Coolant Activity

$F_{NG} = \frac{\text{(Total Noble Gas Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{I} = \frac{\text{(Total Iodine Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{PART} = \frac{\text{(Total Particulate Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

Calculate Fractional Steam-Line Activity

$$F^1_{NG} = \frac{(F_{NG})(PF_{NG})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{I} = \frac{(F_I)(PF_I)}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{PART} = \frac{(F_{PART})(PF_{PART})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

VALUES OF STEAM GENERATOR PF (PARTIONING FACTOR)

Steam Generator Water Level

Radionuclide Group	Empty	Normal	Flooded
Noble Gases (PF_{NG})	1.0	1.0	1.0
Iodines (PF_I)	0.1	0.01	1.0
Particulates (PF_{PART})	0.01	0.01	1.0

Calculate Steam-Line Concentration

$C_{NOB\ GAS} = C_{TOTAL} \times F^1_{NG} =$ _____ $\frac{\mu Ci}{cc}$

$C_{IODINE} = C_{TOTAL} \times F^1_{I} =$ _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES} = C_{TOTAL} \times F^1_{PART} =$ _____ $\frac{\mu Ci}{cc}$

Proceed to Section 2.

1.B. Steam line activity can be estimated using an analysis of reactor coolant activity. This method is not as preferable as using RE-71, 72, 73, or 74, but it can provide a conservative methodology for calculating steam line concentration.

Calculate Fractional Reactor Coolant Activity

$F_{NG} = \frac{\text{(Total Noble Gas Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_I = \frac{\text{(Total Iodine Activity of Reactor Coolant}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{PART} = \frac{\text{(Total Particulate Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Calculate Fractional Steam-Line Activity

$$F^1_{NG} = \frac{(F_{NG})(PF_{NG})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_I = \frac{(F_I)(PF_I)}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{PART} = \frac{(F_{PART})(PF_{PART})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

PF Values are the same as provided in section 1A.

Calculate Steam-Line Concentration (Use if Steam Generator is not flooded)

$C_{NOB\ GAS}$ = (Total reactor coolant activity) x F^1_{NG} x 0.056* = _____ $\frac{\mu Ci}{cc}$

$C_{IODINES}$ = (Total reactor coolant activity) x F^1_I x 0.056* = _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES}$ = (Total reactor coolant activity) x F^1_{PART} x 0.056* = _____ $\frac{\mu Ci}{cc}$

Calculate Steam-Line Concentration (Use if Steam-Generator is flooded)

$C_{NOB\ GAS}$ = (Total reactor coolant activity) x F^1_{NG} = _____ $\frac{\mu Ci}{cc}$

$C_{IODINES}$ = (Total reactor coolant activity) x F^1_I = _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES}$ = (Total reactor coolant activity) x F^1_{PART} = _____ $\frac{\mu Ci}{cc}$

2. Once the radioactive steam or water concentration is determined in the steam-line using either section 1A or 1B, the release rate from the affected steam generator can be calculated in three different ways. They are described in this section. If the steam generator is flooded (solid) proceed directly to section 2C.

*Factor to account for density differences between steam and water, at approximately 558°F and 1115 (psia). This corresponds to the highest lift setpoint for the safety valves. This value will overestimate the concentration of radioactive material in steam for any lower pressure and temperature.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

2A. Steam Flow Rate Monitors

Each steam line at DCPP has a flow rate monitor which is capable of providing steam flow in pounds per hr (lbs/hr) and which will read on-scale if any steam line relief valves are open. Determine this release from the operators for the appropriate channel (512, 522, 532, 542).

FR = _____ (lbs/hr)

Release Rates for noble gases, iodines, and particulates can then be calculated as:

$$\dot{Q}_{NG} = FR \ \frac{lbs}{hr} \times C_{NOB\ GAS} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6}* = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{IODINE} = FR \ \frac{lbs}{hr} \times C_{IODINE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{PARTICULATES} = FR \ \frac{lbs}{hr} \times C_{PARTICULATE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

*Factor to convert lbs/hr to cc/sec and μCi/cc to Ci/sec based on specific volume of steam.

2B. Operation of Relief and/or Safety Valves

Each steam line has six relief valves. Determine which valves are open and total the relief capacity of the open valves.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Valve	Relief Capacity (If Open) in (lbs/hr)
10% Steam Dump	4.0×10^5
#1 Safety	8.5×10^5
#2 Safety	8.5×10^5
#3 Safety	8.5×10^5
#4 Safety	8.5×10^5
#5 Safety	8.5×10^5

Total relief from open valves = FR = _____ (lbs/hr)

$$\dot{Q}_{NG} = FR \ \frac{lbs}{hr} \times C_{NOB\ GAS} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6}* = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{IODINE} = FR \ \frac{lbs}{hr} \times C_{IODINE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{PARTICULATES} = FR \ \frac{lbs}{hr} \times C_{PARTICULATE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

*Factor to convert lbs/hr to cc/sec and μCi/sa. Based on the specific volume of steam.

2C. Primary to Secondary Leak Rate

Atmospheric release of steam can be estimated if the primary to secondary leak rate is known. If direct determination of this value is not possible, the default value for a steam generator tube rupture is 600 gpm.

FR = _____ (gpm)

Calculate Equivalent Steam Flow (Use if Steam Generator is not flooded)

$FR^1 = FR \times 1.13 \times 10^3* = _____ \frac{cc}{sec}$

*Factor to convert gpm (water) to cc/sec (steam)

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Calculate Equivalent Water Flow (Use if Steam Generator is flooded)

$FR^1 = FR \times 63.08^{**} = \underline{\qquad} \left(\frac{cc}{sec}\right)$

$\dot{Q}_{NG} = FR^1 \left(\frac{cc}{sec}\right) \times C_{NOB\ GAS} \left(\frac{\mu Ci}{cc}\right) \times 10^{-6} = \underline{\qquad} \left(\frac{Ci}{sec}\right)$

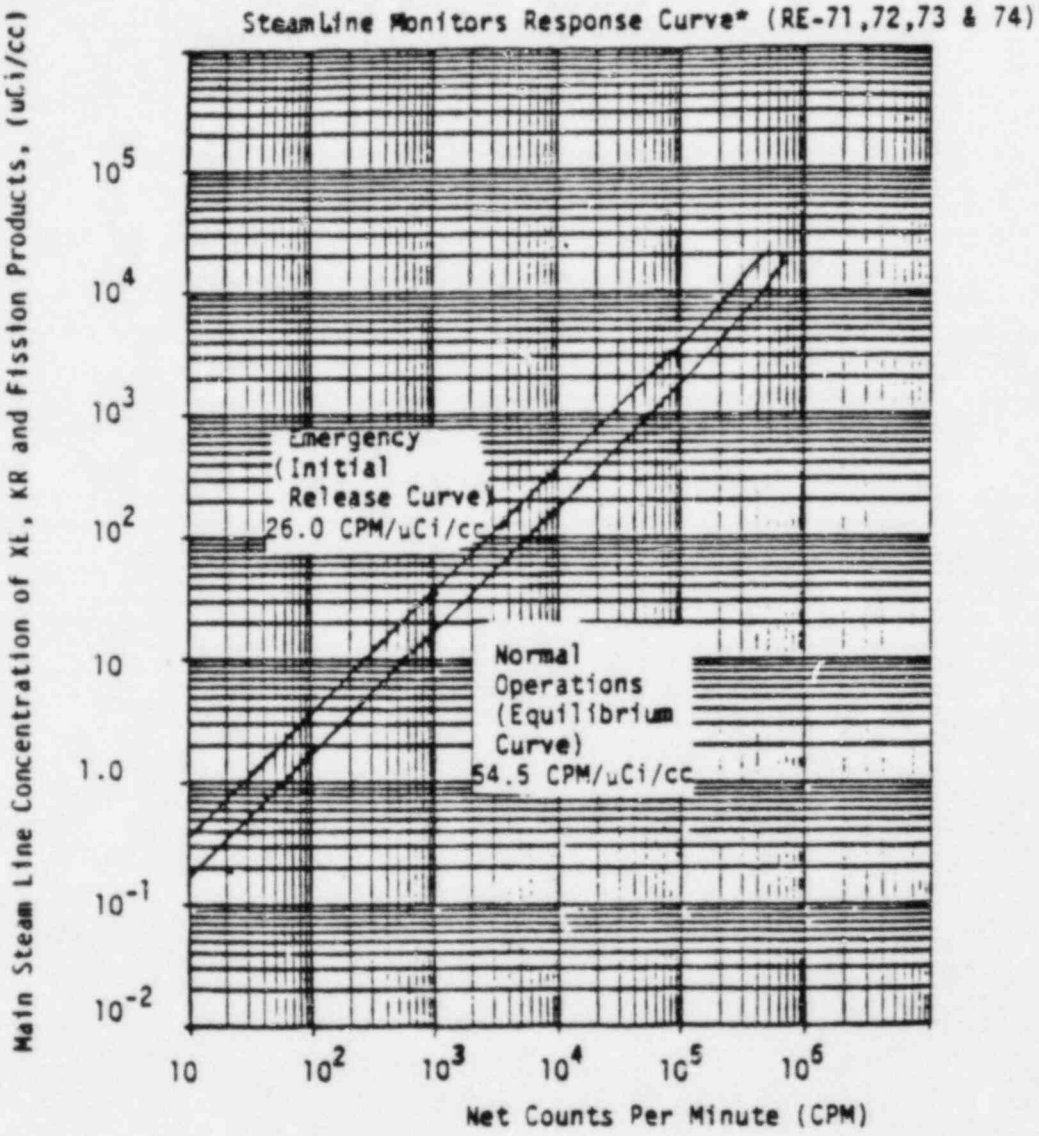
$\dot{Q}_{IODINE} = FR^1 \left(\frac{cc}{sec}\right) \times C_{IODINE} \left(\frac{\mu Ci}{cc}\right) \times 1 \times 10^{-6} = \underline{\qquad} \left(\frac{Ci}{sec}\right)$

$\dot{Q}_{PARTICULATE} = FR^1 \left(\frac{cc}{sec}\right) \times C_{PARTICULATE} \left(\frac{\mu Ci}{cc}\right) 1 \times 10^{-6} = \underline{\qquad} \left(\frac{Ci}{sec}\right)$

**Factor to convert gpm (water) to cc/sec (water)

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1
FIGURE A



*Isotopic Composition Based On Average Values from FSAR Tables 11.1-11, 12 and 17 for Normal Operations and for Emergency Conditions the Carryover Factors Applied to Normal Iodine Values are 0.13% Volatile Plus 0.25% Mechanical and only 0.25% Mechanical for Particulates.

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

PART A: RADIOLOGICAL EMERGENCY STATUS FORM

Provide as much information as is available and appropriate at the time of the status report.

Date: ___/___/___ Time: _____ AM/PM (Form Completed) Status Report # _____ (Number Sequentially)

Person Authorizing Report: _____ (DCPP only) Site Emergency Coordinator

Person Transmitting Report: _____ Location _____ (DCPP only)

TSC DIST: (9 copies)

1. Site Emergency Coordinator
2. Emergency Evaluation & Recovery Coord.
3. Emergency Liason Coordinator (2)
4. Emergency Maintenance Coord.
5. Emergency Operations Coordinator
6. Emergency Radiological Advisor
7. NRC Office
8. TSC File
9. TSC Status Board

EOF DIST: (10 copies)

1. Recovery Manager
2. UDAC
3. Advisor To The County
4. Radiological Emerg., R.M.
5. Operations and Analytical, R.M.
6. Engineering and Logistics, R.M.
7. Public Information, R.M.
8. Coporate Law Dept. Coord.
9. EOF Status File
10. EOF Emerg. Status Board

---

1. Emergency Classification: ___Unusual Event ___Alert ___Site Area Emergency ___General Emergency

2. Update on Incident: Date ___/___/___ Time Incident Began: ___AM ___PM

   a. Site Emergency Signal Sounded YES [ ] NO [ ]

   b. What Happened:

   _____

   _____

   _____

3. Radiological Release Information: (attach isotopic breakdown if available)

   a. Time Data Collected: _____ AM/PM Unit Involved ___1 ___2

   b. Release: ___Occurring ___Anticipated--When: _____ AM/PM

   c. Location of Release: ___Plant Vent ___Steam ___Surface ___Liquid Dch.___

   d. Estimated Duration of Release: ___Hours

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

e. Release Monitored: by monitors # _____

f. Iodine: Est. Total Quantity_____Ci Release Rate_____Ci/sec,

g. Particulates: Est. Total Quantity_____Ci Release Rate_____Ci/sec,

h. Noble Gases: Est. Total Quantity_____Ci Release Rate_____Ci/sec,

i. Estimate of Surface Contamination: ____dpm/100cm^2 Where: _____
(attach form 69-10296 for out of plant contamination readings)

j. Unusual Radiation Levels in Plant: Where: _____ mR/hr: ____

k. Radiation Level at site boundary (downwind) _____ mR/hr: _____
(sector)

l. Meteorological Date (Use 10m elevation on primary met tower or designate other)
Source_____

m. Wind Velocity: _____ m/secx2.2= _____ mph Direction (from): _____ deg.

n. Weather Conditions: ___Rain ___Clear ___Fog ___Cloudy

o. Stability:
___Class Sigma A (deg): _____ Delta T: _____degrees C/
(10m to 76m or _____)
X/Q 800m=_____E_____Mixing Depth_____m.

p. Projection Time_____:

CENTERLINE (EARS SECTOR ( ) DOSE PROJECTIONS (Circle Which)	PLUME ARRIVAL TIME	DOSE RATE mR /hr W.B.	DOSE RATE mR /hr THY	INTEGRATED DOSE mR W.B.	INTEGRATED DOSE mR THY	AFFECTED SECTOR
Site Boundary (800m)						
2 Miles (2-5)						
6 Miles (5-10)						
10 Miles (10-20)						
EARS PLUME CENTER DOSE	_____ radius					

4. Recommended Emergency Actions/Protective Measures for SLO County or California Department Radiation Health (Provide only new recommendations):
_____
_____

5. Emergency Response Actions Underway by PGandE: _____
_____

6. Prognosis for Escalation or Termination of Accident: _____
_____

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

PART B: MISCELLANEOUS EMERGENCY INFORMATION FORM

Provide as much information as is available and appropriate at the time of the status report.

Date: ___/___/___ Time: _____ AM/PM (Report Completed) Status # _____ (Number sequentially)

Person Authorizing Report: _____ (DCPP only) Site Emergency Coordinator

Person Preparing Report: _____ Location _____ (DCPP only)

Time Data Collected _____ AM/PM

1. Personnel Injuries: How Many? _____

   a. Type: _____ Contamination: ___Yes ___No

   b. Injured Person Location: ___Plant ___Ambulance ___Hospital _____ (which)
      ___Other _____ (where)

   c. Ambulance requested ___Yes ___No, Location _____.

2. Fires:

   a. Location: _____ Time Reported: _____ AM/PM

   b. Type: ___ Electrical ___ Fuel _____ (what kind)

   c. Contamination Present: ___Yes ___No

   d. Fire Assistance Requested: ___Yes ___No

   e. Fire Assistance Onsite: ___Yes ___No

3. Security/Safeguards:

   a. Bomb Threat: Search Conducted: ___Yes ___No

      Search Results: _____

      Site Evacuated: ___Yes ___No

   b. Intrusion: Insider: _____ Outsider _____

      Point of Intrusion: _____ Extent of Intrusion: _____

      Apparent Purpose: _____

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

Part B: Miscellaneous Emergency Information Form

c. Strike/Demonstrations: Size of Group: _____

Purpose: _____

d. Sabotage: Radiological: ___Yes ___No Arson: ___Yes ___No

Equipment/Property: _____

e. Extortion: Source (phone, letter, etc.): _____

Location of Letter: _____

Demands: _____

f. General: Firearms Involved: ___Yes ___No Violence: ___Yes ___No

Control of Facility Compromised or Threatened: ___Yes ___No

Stolen/Missing Material: _____

Agencies Notified (FBI, State Police, County Sheriff, etc.): _____

_____
(Circle agencies onsite)

4. Press Information:

Location of Press Release: ___San Francisco/___San Luis Obispo

Other: _____
(where)

Time of Press Release: _____AM/PM

News Media Interest: ___Yes ___No Local/National: _____

Data Received By: _____
Date: ___/___/___ Time: _____AM/PM

RETAIN THIS FORM FOR EVENT EVALUATION

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PG&E Pacific Gas and Electric Company

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE: EMERGENCY PROCEDURE
RADIOLOGICAL FIRE

NUMBER	EP R-6
REVISION	6
DATE	7/5/83
PAGE	1 OF 10

APPROVED: R. C. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure discusses the actions which are taken in the event of a fire which involves radioactive materials or radiation. This procedure and changes thereto requires PSRC review.

GENERAL

A radiological fire is one which involves either radiation or radioactive materials. Examples of this type of fire are fires in the solid radwaste storage facility, the drumming station, contaminated ventilation filters, and electrical or lube oil fires in radiation areas. The primary hazard (after plant safety and personnel injury) is the spread of contamination. All reasonable attempts to prevent the spread of smoke-borne contamination should be made.

SYMPTOMS

1. A fire is discovered in the auxiliary building, fuel handling building, containment or solid radwaste storage facility.

2. The fire detection system annunciator indicates a fire in any area where radioactive materials or radiation areas are present.

AUTOMATIC ACTION

The fire water sprinkler systems may activate.

IMMEDIATE ACTION

1. Activate the fire signal by dialing [illegible] "XX" is a code which gives the location of fire (see Table 1). The fire signal is a 30-second blast on the fire sirens. The signal will be followed by the location code of the fire on the code call system repeated 8 times. The first five persons to dial 76 will be connected into a conference call. The priority for the conference call is:

   a. Shift Foreman (Interim Site Emergency Coordinator).

   b. Senior Control Operator (Fire Brigade Leader).

c. Assistant Fire Brigade Leaders (two).

d. Plant Superintendent/Manager

e. Fire Marshal

2. The Shift Foreman and Senior Control Operator will dial 76 and be given full details regarding the fire. These should include exact locations, severity, potential danger to the safety of the plant and any special radiological hazards present. The Shift Foreman shall coordinate the emergency action.

3. Members of the on-shift fire brigade should report to the control room to pick up their equipment and receive instructions from the Shift Foreman. The Shift Foreman is responsible for establishing an appropriate on-shift emergency organization and assuring that Technical Specifications for control room staffing are not violated.

4. If the fire occurs during normal working hours, members of the maintenance fire brigades should go to the cold machine shop. The Assistant Fire Brigade Leaders should enter the conference call to receive their instructions.

5. If appropriate, change the control room ventilation system to the isolation mode (Mode 3) to prevent the entry of smoke and airborne activity.

6. Clear the area affected by the fire. This may be done by sounding the Site Emergency Signal, or other appropriate means.

7. Fire fighters should wear supplied air breathing apparatus unless air samples have been taken and indicate that there is no airborne activity hazard. Supplied air breathing apparatus should also be used when smoke inhalation is a hazard. When self-contained breathing apparatus (SCBA) is used, a crew should be dispatched to an air bottling refilling station and prepare to refill the backpack bottles as required. The stations are located at the northwest end of the Unit 2 component cooling water heat exchangers on the +85-foot elevation and on the +140-foot elevation behind the Control Room.

SUBSEQUENT ACTIONS

The Shift Foreman, acting as Interim Site Emergency Coordinator, shall direct all subsequent actions from the Control Room until relieved by the long-term Site Emergency Coordinator if the emergency warrants it. Such actions should include the following:

1. If a fire cannot be physically contained and controlled promptly with available resources, assistance from the California Department of Forestry should be requested. Their assistance should also be requested at any other time the Fire Brigade Leader feels that they may be needed. Refer to Appendix 1 for telephone numbers.

   NOTE: 1) If outside assistance has been requested, notify the Security Department [(3330 or 3363)] and have them notify the Avila Gate. One or more plant operating personnel shall be dispatched to the Security Building to escort and provide radiological monitoring to CDF personnel.

   2) Maintain a record of notifications made to offsite personnel, Form 69-922, "Emergency Notification Record" may be used to provide this record.

2. If CDF is called to respond, insure that the person calling CDF gives a name and number to call the plant back. Provide CDF with details concerning location and the type of fire. Also give CDF an update of the fire conditions even before they arrive as they may decide to send more support.

3. If CDF responds, their first responding Chief Officer will identify himself. He may initially decide to go to the scene of the fire. He will eventually decide to contact the PGandE Site Emergency Coordinator. Therefore, escort and access should be provided to him to reach either the control room or TSC, depending on where the Site Emergency Coordinator is located.

4. During the course of the fire, the Control Operator and those at the scene should pay particular attention for signs that the operability of the various engineered safeguards equipment is reduced below minimum Technical Specification limits, or if such damage is imminent, shut down the unit immediately.

   NOTE: Operating Procedure K-2C provides the operator with listing of safeguards equipment which may be affected by fires in various locations. This procedure should be consulted to assist in determining the operating strategy during the fire.

5. Establish an initial emergency classification based on the criteria in Appendix Z and perform the actions required by the classification.

6. If the Control Room must be evacuated, follow the instructions given in Emergency Procedure OP-8.

7. If a sprinkler system was activated, the thermal element must be replaced before the system can be reset.

8. Investigate to see whether any radioactive material release limits were violated.

9. Close out with verbal summary to offsite organizations and complete the following written reports:

   a. Plant Problem Report (See Nuclear Plant Administrative Procedure C-12)

   b. Written summary to NRC within 24 hours for an Unusual Event or 8 hours for a higher classification.

10. If a fire has been put out before CDF arrives, they may still request to send one engine company to visit the site for their close out.

REFERENCES

1. Emergency Procedure M-6, "Non-Radiological Fire."
2. Emergency Procedure G-1, "Accident Classification and Emergency Plan Activation."
3. Emergency Procedure G-2, "Establishment of the Onsite Emergency Organization.
4. Emergency Procedure G-3, "Notification of Offsite Organizations."
5. Diablo Canyon Power Plant - Fire Protection Plan.
6. General Operating Order 1.300 and 1.301.
7. PGandE Fire Prevention Manual.
8. Accident Prevention Rule 23.

ATTACHMENTS

1. Form 69-9221, "Emergency Notification Record," 7/80.

TABLE 1

FIRE CODE CALL LOCATIONS

CODE	LOCATIONS
	Control Building
	No. 1 Containment
	No. 1 Turbine Building
	No. 1 Auxiliary Building
	No. 1 Fuel Handling Building
	Package Boiler Area
	Hot machine shop area
	No. 2 Containment
	No. 2 Turbine Building
	No. 2 Auxiliary Building
	No. 2 Fuel Handling Building
	Security Diesel Area
	Grass Fire
	Outside Transformer Fire
	Intake Structure
	500 kV Switchyard
	230 kV Switchyard
	Radwaste Storage
	All Clear
	Fire Drill

TABLE 1 (Cont'd)

FIRE CODE CALL LOCATIONS

CODE	LOCATIONS
	Test Fire Code
	Administration Building
	Security Building
	Training Building
	Assembly Building
	Technical Support Center

APPENDIX 1

FIRE ASSISTANCE COMMUNICATION

1. California Department of Forestry — 543-4242 (Emergency Only)
   543-4244 (Business)

OR

San Luis Obispo County Sheriff
(Request they dispatch the
California Department of Forestry)

1. Automatic Tie Line
   (Control Room and TSC)
2. Radio (Control Room,
   TSC or Security)

OR

3. 543-7911 (Emergency Only)
   543-2850 (Business)

2. Fire Marshal
   Randy Kohout

Plant Extension:
Home Phone:

OR

HP Freq. Pager Call No.
(Group Call 411)

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceeds as follows:

   a. Designate this event a Notification of Unusual Event if a verified fire is not under control within 10 minutes of initiating fire fighting efforts or if California Division of Forestry Assistance is requested, or for any fire in radioactive material causing an uncontrolled increase in airborne activity. Notify plant staff and response organizations required for this classification by implementing Emergency Procedures G-2 "Establishment of the Onsite Emergency Organization" and G-3 "Notification of Offsite Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

   b. Designate this event an ALERT if a verified fire is not under control within 10 minutes of initiating fire fighting efforts and the fire is located in one of the following areas containing safety systems:

      1) Containment
      2) Control Room
      3) Cable Spreading Room
      4) Diesel Generator Room
      5) Auxiliary Building
      6) Intake Structure Pump Room

      Notify Plant Staff and response organizations required by EP G-2 and EP G-3 in accordance with EP G-1.

   c. Designate this event a Site Area Emergency if a verified fire is not under control within 10 minutes of initiating fire fighting efforts in an area containing safety systems, and causes a confirmed loss of a safety system function that causes entry into a technical specification action statement. Notify plant staff and response organizations required by EP G-2 and EP G-3 in accordance with EP G-1.

   d. Designate this event a General Emergency if the fire causes massive damage to plant systems which, in the opinion of the Site Emergency Coordinator, is likely to lead to a core melt situation. Notify plant staff and response organizations required by EP G-2 and EP G-3 and implement the instructions in EP G-1 regarding on and offsite protective actions.

2. In addition to personnel required to be notified by EP G-2 also notify the following:

   a. Fire Marshal (See Appendix 1)

   b. System Dispatcher (if load may be affected)

   NOTE: In off-normal working hours, consideration should also be given to calling in additional members of the Plant Fire Brigade. This should not take precedence over calling CDF.

69-9221 7/80 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PG&E **Pacific Gas and Electric Company**

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

NUMBER EP R-7
REVISION 3
DATE 7/5/83
PAGE 1 OF 10

TITLE: EMERGENCY PROCEDURE
OFFSITE TRANSPORTATION ACCIDENTS

APPROVED: R. C. Thornberry 7-15-83
PLANT MANAGER DATE

SCOPE

This procedure discusses the response of the plant personnel to transportation accidents which occur offsite involving shipments of radioactive material. Accidents which occur onsite are handled using Emergency Procedures R-2, R-3, R-4, or R-5 as appropriate. This procedure and changes thereto requires PSRC review.

DISCUSSION

Once a shipment of radioactive materials has left the site, or prior to its arrival on the site, the responsibility for it rests with the carrier. In the event of a transportation accident, the responsibility for recovery rests with the carrier and local and state officials, rather than with the Company. However, if an accident occurs in the vicinity of the plant, local officials may request the assistance of plant personnel for radiological monitoring because of their knowledge and experience and because of the monitoring and other equipment at their disposal. Plant personnel should be prepared to assist to the maximum extent practical, while at the same time recognizing that they are acting in a strictly advisory capacity.

SYMPTOMS

The Shift Foreman is notified that an accident involving radioactive material has occurred.

IMMEDIATE OPERATOR ACTIONS

1. In the initial contact, the individual receiving the message should try to gather the following information:

   a. Location of accident.

b. Type of material involved:

1) New fuel

2) Spent fuel

3) Solid radwaste

4) Liquid radwaste

5) Pharmaceuticals

6) Sources

7) Special Nuclear Material

c. Type of container(s) involved.

d. Apparent extent of damage.

e. Is there fire or submergence of the containers?

f. Are there personnel injuries?

g. The results of any measurements which have been made.

h. Who is on the scene and who is in charge?

i. What recovery actions are planned or being taken?

j. The identity of the carrier.

k. Origination point and destination of the shipment.

l. The name and phone number of the caller.

2. Notify the Shift Foreman.

3. The Shift Foreman should insure that a record is kept of the initial contact as well as all subsequent contacts with offsite persons. Form 69-9221, "Emergency Notification Record," is provided to assist in this.

SUBSEQUENT ACTIONS

1. Perform the notifications required by Appendix Z.

2. Send a two man survey team to the scene. The team should carry the following minimum equipment:

   a. Dose rate instrument (HPI-1010, Radowl or equivalent).

   b. G-M survey instrument.

   c. Alpha survey instrument (only if the accident involves new fuel assemblies or an alpha emitting source).

   d. Air sampler with appropriate filters and cartridges.

   e. Radiation barrier rope.

   f. Warning signs: "Caution - Surface Contamination Area" and "Caution - Radioactive Materials."

   g. Smear pads and/or 2" duplex papers

   h. Plastic bag for retention of smear samples.

   i. Pocket dosimeters and (if time permits) the team members' personnel dosimeters (film badge or TLD).

   j. Survey forms (Forms 69-9315 and 69-9316 preferred, but Form 69-9259 is also okay).

   NOTE 1: It is highly desirable to take a radio if time permits. All but the radio, film badge and alpha survey meter are located in the various emergency kits. Preferably, an entire kit should be taken to the scene. Radios are available in the Security Building, Emergency Operations Facility and Mobile Radiological Van.

   NOTE 2: If criticality is a possibility (i.e., if fuel is submerged in water) a neutron dose rate meter (such as the PNR-4or5) could be taken if readily available. This instrument is not necessary, however, since gamma radiation always accompanies a criticality.

3. Close out with a verbal summary to offsite authorities in step 1 above. If classified as an Unusual Event, follow with a written summary to NRC within 24 hours.

INSTRUCTIONS FOR MONITORING TEAM

1. Make gamma dose rate measurements since this is the most likely hazard. If any significant gamma dose rate is measured, erect a barrier so that all locations where the dose rate is greater than or equal to 5 mR/hr are located within it. Hang Radiation Area signs as appropriate.

   NOTE: Members of the general public, not participating in the recovery effort, should be kept at a distance beyond the 0.6 mr/hr isodose line by an appropriate barrier.

2. Make a direct alpha and/or beta-gamma survey, as appropriate, of the ground and the surfaces for the container if contamination is a possibility. If contamination is found, above the specified limits, erect a barrier around all areas where the contlevel is the most restrictive of the following:

   a. 100 dpm/100 cm^2 if Pu-239 may be present.

   b. 1000 dpm/100 cm^2 if Pu-239 is not present but uranium, I-131 or Sr-90 may be present.

   c. 5,000 dpm/100 cm^2 if none of the above are likely to be present in significant quantities.

   The survey is made by holding the probe within 1/2 inch of the surface without actual contact. The net count rate is converted to dpm/100 cm^2 by the following formula:

$$[\text{dpm}/100\ cm^2] = \frac{(CR_{net})}{\text{epsilon}_1}$$

where:

CR_{net} = net cpm on instrument

= $(cpm)_{gross,\ shield\ off} - (cpm)_{background}$

$epsilon_1$ = probe efficiency factor from Table 1

NOTE 1: The alpha probe is sensitive to sunlight. Therefore, shield the probe to the extent practical.

NOTE 2: It is not necessary to erect barriers for both contamination and dose rate. Just erect the one which keeps persons farthest from the source and place both types of signs on it.

3. If significant contamination is found in Step 2 above, smear samples can be taken to determine whether smearable contamination is present. If alpha contamination is likely, use 2" filters for taking the smears. Retain all smear samples for subsequent laboratory analysis.

Count the samples and determine the [dpm/100 cm^2] in accordance with the following formula:

$$[dpm/100\ cm^2] = \frac{(0.11)(CR_{net})}{(epsilon_2)\ (A)}$$

where:

(CR_{net}) = net cpm as above

$epsilon_2$ = probe efficiency factor from Table 1

A = area smeared (ft^2)

4. If criticality or fuel melting is a possibility, erect barriers at least 100 yards from the scene.

   NOTE: A criticality is accompanied by a blue flash which is visible even when a person is not looking at the source.

5. Obtain liquid samples if it appears liquid contamination is a problem. These should be labeled and returned to the lab.

6. Report in to the Site Emergency Coordinator at least once per hour and determine the meteorological conditions.

7. Maintain exposure as low as reasonably achievable. Do not exceed any normal exposure limit without authorization of the Site Emergency Coordinator. Try to prevent any unbadged person from receiving more than 250 mrem.

8. Advise state and/or local officials of methods which could be used to contain the spread of contamination or minimize the radiation field. These may include the use of wood or metal sheets, plastic or cloth tarpaulins, firefighting foam or dirt berms and rocks.

9. Advise and assist in the treatment of any injured and/or contaminated personnel using the techniques specified in the Radiation Control Standards and Emergency Procedures.

ATTACHMENTS

1. Form 69-9221, "Emergency Notification Record"

2. Form 69-9315, "Contamination Survey Record"

3. Form 69-9316, "Radiation Dose Rate Survey Record"

4. Form 69-9259, "Emergency Environmental Monitoring Field Data Sheet"

SUPPORTING PROCEDURES

EP G-2 Establishment of the Onsite Emergency Organization
EP G-3 Notification of Offsite Emergency Organizations
EP R-1 Personnel Injury (Radiologically Related) and/or Overexposure.
EP RB-4 Access to and Establishment of Controlled Areas Under Emergency Conditions.
RCP G-6 Release of Materials from Controlled Areas.
EP RB-6 Area and Equipment Decontamination.

TABLE 1

PROBE EFFICIENCIES FOR SURVEY INSTRUMENTS

PROBE	EPSILON[1] (direct survey) (cpm/dpm/100 cm^2)	EPSILON[2] (smear) (cpm/dpm)
HP-240	0.011	0.018
HP-260	0.040	0.20
HP-210	0.040	0.18
HP-230A	0.0029	0.016
Alpha	0.056	0.095

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   a. Notify the following plant staff personnel, or their designated alternates:

      Plant Manager
      Plant Superintendent
      Supervisor of Chemistry and Radiation Protection
      Power Plant Engineer
      Supervisor of Operations
      Technical Assistant to the Plant Manager

   b. Report the situation to the County Sheriff's Office and California Office of Emergency Services. They may already be aware of the situation, so this may be a courtesy call.

   c. If the shipment originated or had a distinction at the plant, designate this event a Notification of Unusual Event. Notify plant staff and response agencies required by Emergency Procedures G-2 "Establishment of the Onsite Emergency Organization" and G-3 "Notification of Offsite Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

2. In addition to any notifications performed under 1 above, also notify the following company personnel:

   a. Supervising Nuclear Generation Engineer (Personnel and Environmental Safety):

      Mr. W.H. Fujimoto
      PGandE office
      Office
      Home

      NOTE: If the above cannot be promptly reached request the system dispatcher to contact alternate personnel.

b. Los Padres District Manager:

Mr. D.L. Kennady
Office
Office
Home

NOTE: If the above cannot be promptly reached request Morro Bay Switching Center to contact alternate personnel.

69-9221 7/80 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

69-9315 7/80 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT
CONTAMINATION SURVEY RECORD

DATE _____ TIME _____ SWP/RWP NO. _____ SURVEY NO. _____

AREA OR EQUIPMENT _____

DIRECT SURVEY RESULTS

ITEM DESCRIPTION	TYPE		INST. AND S/N	DETECTOR USED	GROSS CPM	BKG CPM	NET CPM	EFFI-CIENCY	$\frac{dpm}{dm^2}$
	α	βγ							

REMOVABLE CONTAMINATION SURVEY RESULTS

INSTRUMENT USED

ITEM DESCRIPTION	TYPE		AREA, dm^2	COUNT TIME	TOTAL COUNTS	GROSS cpm	BKG cpm	NET cpm	EFFI-CIENCY	$\frac{dpm}{dm^2}$
	α	βγ								

COMMENTS _____

SURVEYED BY _____ COUNTED BY _____ DATE/TIME _____

REVIEWED BY _____ DATE _____
SUPERVISOR

69-9316 7/80 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

RADIATION DOSE RATE SURVEY RECORD

DATE _____ TIME _____ SWP/RWP NO _____ SURVEY NO. _____

AREA OR EQUIPMENT _____

TYPE OF SURVEY _____ SHEET ___ OF ___

ITEM NO.	DESCRIPTION	BETA		GAMMA		NEUTRON	
		m rad/hr	distance	mR/hr	distance	mrem/hr	distance

SURVEYED BY _____

SURVEY TYPE	INSTRUMENT	TYPE DETECTOR	SERIAL NO.	DATE CALIB. DUE
BETA				
GAMMA				
NEUTRON				

COMMENTS _____

RECOMMENDATIONS _____

SURVEY REVIEWED _____ DATE _____
SUPERVISOR

PACIFIC GAS AND ELECTRIC COMPANY
NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

EMERGENCY ENVIRONMENTAL MONITORING FIELD DATA SHEET

Team _____ Leader _____ Member _____

Monitoring Location _____

1. THREE FOOT BETA-GAMMA RADIATION FIELD READINGS

a. Count Rate

Calibration Due Date _____

Time	Type of Probe	CPM[Shield off(UP)] Gross	BKG*	Net	CPM[Shield on(down)] Gross	BKG*	Net

b. Dose Rate

Calibration Due Date _____

Time	Instrument	mR/hr(Window Open) Gross	BKG*	Net	mR/hr(Window Closed) Gross	BKG*	Net

c. Integral Dose

Instrument	① Time Started	② Time Complete	③ Duration(HR) ②-①	④ Total Dose(mR)	⑤ Dose Rate(mR/hr) ④÷③

2. AIR SAMPLE DATA

Calibration Due _____

Sampler	Time Started	Time Completed	Duration (Minutes)	Flow Rate (CFM)	Sample Volume (FT^3)

3. PARTICULATE DETERMINATION

Type of Probe	Gross	CPM(Shield off) BKG*	① Net	② E_s	③ E_f	④ Volume(FT^3)	$\frac{① \times 1.59 \times 10^{-11}}{② \times ③ \times ④}$ (uCi/ml)

4. IODINE DETERMINATION

Type of Probe	Gross	CPM(Shield Off) BKG*	① Net	② E_2	③ E_c	④ Volume(FT^3)	$\frac{① \times 1.59 \times 10^{-11}}{② \times ③ \times ④}$ (uCi/ml)

*NUMERICAL VALUE FOUND IN EMERGENCY PROCEDURE RB-7 OR RB-8

5. ENVIRONMENTAL MONITOR READINGS

a. PIC Reading — Calibration Due _____

Time	Dose Rate (mR/hr)

b. T*SC-4 Reading Calibration Due _____

① Scaler Count	② Count Time (Sec)	① ÷ ② (mR/hr)

6. GROUND SURVEYS

Time _____

Description	Probe	CPM (Shield off) Gross	BKG*	Net ①	② ε_1	① x ② (μCi/ml)

7. VEGETATION SAMPLES

NOTE: USE HP-240 OR EQUIVALENT PROBE

Time _____

Description	CPM (Shield off) Gross	BKG*	Net ①	① x 2.5×10^{-6} (μCi/ml)

8. SMEAR SAMPLES

Time _____

Description	Probe	Gross	BKG*	Net ①	② ε_3	3 Area Smeared (Ft^3)	$\frac{0.11 \times ①}{② \times ③}$ ($\mu Ci/dm^2$)

9. LIQUID SAMPLES

Time _____

Description	Volume of Sample Counted	Gross CPM	Immersion Data BKG*	Net CPM

10. REMARKS

TITLE: EMERGENCY PROCEDURE
EMPLOYEE INJURY OR ILLNESS (NONRADIOLOGICAL)

APPROVED: R. C. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure describes the actions which are to be taken in the event of an illness or injury to an employee which does not involve radioactive contamination or overexposure. Injuries in which radiological considerations are involved are discussed separately in the R series of Emergency Procedures. This procedure and changes thereto requires PSRC review.

APPLICABILITY

This procedure is to be followed for incidents involving Nuclear Plant Operations personnel, or other company employees at the plant site at the request of the Nuclear Plant Operations Department. In the event of an incident involving any other company employee (such as a General Construction Employee), perform only the asterisked (*) steps in this procedure.

IMMEDIATE ACTIONS

The employee(s) who are at the scene shall:

*1. Render all necessary first aid.
*2. Notify the control room (Shift Foreman) as soon as practical.

SUBSEQUENT ACTIONS

The Shift Foreman shall direct all subsequent actions until relieved by the long term Site Emergency Coordinator if the emergency warrants it. Such actions should include the following:

*1. Sound emergency signal, code override, or other general warning signal to clear the area if the situation warrants it.

*2. Dispatch additional first aid personnel such as the project construction EMT (Extension 4) to the scene of the injury or illness if required. Personnel who have not been instructed to provide assistance at the scene should remain on their jobs and stay clear of the affected area.

*3. Transport the injured person to a Company panel physician or hospital if the situation warrants it (refer to the attached list). If possible, the employee is to be accompanied by a supervisor. The practices which are to be followed if this step is necessary are given in the following section of this procedure.

4. Secure the names and addresses of all witnesses (both Company and non-Company).

*5. Perform the notifications required by Appendix Z.

6. Complete the appropriate accident report(s) and forward to the office supervisor for processing.

   a. Form 62-4587, "Report of Industrial Injury to Employee" in cases where no medical treatment was required other than minor first aid at the plant.

   b. Form 62-4586, "Employer's Report of Occupational Injury of Illness" in all cases requiring medical treatment (including doctor referral) other than first aid or results in lost time beyond the day of injury.

   c. Form 62-5542, "Report of Automobile Accident" if appropriate.

TRANSPORTATION OF INJURED PERSONNEL

1. The preferred mode of transportation for injured persons is by Company panel ambulance service. Company or private vehicles should only be used in cases where the delay associated with securing an ambulance might result in significant deterioration of the injured person's condition, or when the injury is of a minor nature where use of an ambulance is not warranted.

2. When requesting ambulance service (refer to the attached list), provide the following information to the ambulance service.

   a. Name of caller

   b. Company affiliation

   c. Phone number of caller (where he can be reached)

   d. Name of injured or ill person

e. Where the patient is located

f. Where the patient is to be transported

g. Nature of injury or illness

h. Any other medical information which might be pertinent to transporting the injured person

Record this information on Form 69-9221, "Emergency Notification Record", or other log.

*3. If ambulance or medical personnel are to enter the site, contact the Security Department and have them notify the security force at the Port San Luis entrance. It is necessary to have an escort accompany the ambulance personnel from the Security Building to the patient.

4. If possible, have a supervisor accompany the injured person to the hospital (or doctor's office). If this is not practical, call a supervisor and have him meet the patient at the hospital (or doctor's office). The supervisor should inform the doctor about the Company's light duty program.

5. If possible, call ahead to the hospital (or doctor) and provide the following information:

a. Name of caller

b. Company affiliation

c. Phone number of caller (where he can be reached)

d. Name of injured or ill person

e. Age of injured or ill person (approximate if not known)

f. Extent of injury, illness or symptoms

g. Medical history (if known)

h. Radiological conditions.[1]

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[1] If the injury or illness is involved with radiation, see "R" Emergency Procedures. However, the hospital should also be informed when radiation is not involved, because in the absence of such knowledge, they will assume that radiation is involved.

Record this information on Form 18-9221, "Emergency Notification Record", or other log.

6. A medical referral, Form 62-6015, shall be completed and sent to the hospital (or doctor) with the injured person along with a copy of the Light Duty Program Letter (copy attached). These forms should be taken by the accompanying supervisor, the patient, or the ambulance driver, as appropriate. Do not delay transport of seriously ill or injured persons while obtaining these forms.

REFERENCES

1. Rule 16, PGandE Accident Prevention Rules.
2. PGandE Standard Practice 250.
3. NRC Information Notice 80-06, "Notification of Significant Events."

ATTACHMENTS

1. Form 62-4587, "Report of Industrial Injury to Employee"
2. Form 62-4586, "Employer's Report of Occupational Injury or Illness"
3. Form 62-6015, "Medical Referral"
4. Form 62-4542, "Report of Automobile Accident"
5. Form 69-9221, "Emergency Notification Record"
6. Light Duty Program Letter
7. Company Panel of Physicians, Ambulance, and Hospitals serving the immediate area around Diablo Canyon.
8. Panel of Physicians, Ambulances and Hospitals, Coast Valley Division, SP 251.1-1.
9. Safety, Health and Claims Personnel to be contacted for Reporting of Injuries at Diablo Canyon.
10. Appendix Z, Emergency Procedure Notification Instructions

62-4587 Rev. 1/79

PACIFIC GAS AND ELECTRIC COMPANY

Report of Industrial Injury to Employee

1. Name _____ 6. Division _____

2. Address _____ ZIP _____

3. Telephone No. _____ 7. Department _____

4. Social Security No. _____ 8. Date of Accident _____

5. Occupation _____ 9. Time of Accident _____

10. Location of Accident _____ 11. Nature of Injury _____

12. What were you doing and how did accident occur? _____

_____

_____

13. Describe First Aid rendered: _____

14. Witnesses to accident:

1. _____

2. _____

3. _____ 15. _____
Signature of Employee

16. Date injury reported: _____

17. Date 30 days elapses: _____ 18. _____
* See Over Signature of Supervisor

INSTRUCTIONS: This report (Items 1 thru 15) should be *written* and *signed* by the *employee personally* and countersigned by the supervisor. It is for all Industrial Injuries and is in duplicate. The original is to be retained for Company records; the copy is to be detached after completion and given to the employee. Before signing in Item 18, the *supervisor* should fill in the date of the report (Item 16) and compute and notate the date *30 days* from the date the injury was reported (Item 17).

If the employee later requires treatment by a doctor or becomes disabled, Form 62-4586 must be prepared and forwarded to the Safety, Health and Claims Department *IMMEDIATELY* accompanied by the original of this report.

If the employee is unable to fill out or sign this report, it should be prepared, signed by the supervisor and the employee should be given a copy within 5 days as required by law.

If the injured employee cannot write English, the report may be made according to a verbal statement. If necessary, the employee may sign by a mark and a witness to the report should sign below the employee's mark.

INFORMATION FOR THE INJURED EMPLOYEE

This notice complies with the
California Labor Code

I. **General Information:** The Company has an extensive safety program to help its employees avoid injury. In the event of a work-related injury requiring medical care, special provision has been made for the best medical services available. The Company is very much concerned with its injured employees, and is proud to extend the medical program developed over years of experience for your benefit. Every reasonable effort will be devoted in minimizing the extent and duration of your industrial injury.

The Company is entirely self-insured for industrial injuries to its employees which arise out of and occur in the course of employment. All compensation benefits, including medical treatment, rehabilitation programs, and disability payments are administered by the Company. If questions arise, please contact your supervisor.

II. **Medical Benefits:** Through continuing efforts, the Company has utilized the talents of highly qualified physicians and specialists throughout PG&E system. A panel of doctors familiar with the various Company programs and benefits, including the light duty work program, has been established to provide a greater service to the injured employee.

You are entitled to receive medical, surgical, and hospital services and supplies reasonably required to cure or relieve you from the effects of your injury, including nursing care and such things as crutches and artificial limbs. Reasonable transportation expense incidental to treatment will also be provided.

III. **Selection of Treating Physician:** Treatment of industrial-injured employees is provided by the employer at the employer's expense with the employee having the opportunity to change physicians if desired. California law permits employees who sustained an industrial injury to be treated by a physician or at a facility of their choice within a reasonable geographic area *commencing 30 days after the date injury is reported*, or immediately by your personal physician, provided you notified the Company prior to your injury.

If you wish to continue your present treatment, you may do so. It is recommended that you continue with the physician that has been provided, but if you wish to change doctors, notify your supervisor. The Company's experience in this area is available to assist you in selecting the proper medical care. If you elect to change to another treating physician or facility after 30 days, you must notify your supervisor of the name and address of the physician or facility you have selected to continue treatment. You should show this document to the physician or facility so they will be notified of the immediate duty to report to the Company as required by Section 4603.2 of the Labor Code. If the facility or physician requests, you are required to sign a medical information release to permit reports of treatment to be rendered to the Company.

IV. **Amount of Indemnity Payable:** If your weekly wage exceeds $231.00, you are entitled to the maximum Temporary Disability indemnity of $154.00 per week, commencing on the 4th full day after injury. If the work-related injury results in hospitalization or more than 21 days of disability, payments will commence the 1st full day of disability. If your disability results in lost time for over two years or you lose time after two years, you will be paid temporary disability at the rate currently in effect. This applies only to injuries on or after 1-1-75. Permanent disability is paid at the rate of $70.00 per week.

V. **Rehabilitation:** Effective January 1, 1975, the employer must provide a rehabilitation program for any employee where the treating physician advises the Company that the employee will be unable to return to his usual and customary occupation at the time of injury, on a permanent basis.

This program provides services such as vocational evaluation, counseling, retraining, including on-the-job training and placement necessary to restore the injured employee to suitable employment, which is not confined to reemployment with PG&E. The Company works in conjunction with the California Rehabilitation Bureau.

VI. **Death Benefits:** If your injury results in death and you have a totally dependent spouse, the sum of $50,000.00 is the maximum benefit, except in cases involving a spouse and one or more dependent minor children, the maximum is $55,000.00. There is also a maximum burial allowance of $1,500.00. In cases of partial dependency, the death benefit will be a sum equal to four times the amount annually devoted to the support of the dependents not to exceed $50,000.00.

VII. **Further Information:** If you wish further information on your particular case, in addition to what your supervisor has provided, contact the Workers' Compensation Claims Section (415) 781-4211 Extension 3171.

Information and Assistance Officers located in the offices of the Division of Industrial Accidents, Workers' Compensation Appeals Board are a further source of information and services. The Workers' Compensation Appeals Board is the final arbiter of claims to workers' compensation.

If you wish to exercise your rights under Item III of the information section, please separate this page and present it to your selected physician.

§ 9785. Duties of the Employee-Selected Physician. The physician or facility chosen by the employee who undertakes to provide treatment pursuant to Labor Code Section 4600 shall:

(a) Within 3 working days after undertaking to provide such treatment notify the employer of the name and address of such treating physician or facility, and

(b) Within 5 working days following initial examination shall submit a written report to the employer to include:

(1) The name and address of injured employee;

(2) The employee's medical history as obtained by the physician;

(3) Findings on examination;

(4) The subjective complaints reported by the employee;

(5) The planned course, scope and duration of treatment;

(6) If appropriate, the estimated return-to-work date;

(7) An opinion as to whether residual permanent disability is to be anticipated and, if possible, an estimate of its extent;

(8) An opinion as to whether the employee will eventually be able to engage in the occupation being performed at the time of injury.

(c) At reasonable intervals during active treatment submit progress reports to the employer and, periodically, report promptly to the employer when:

(1) The employee's condition permits return to work;

(2) The employee's condition require him or her to leave work;

(3) Hospitalization or surgery is indicated or recommended;

(4) The employee's condition becomes permanent and stationary;

(5) The employee's condition undergoes a previously unexpected significant change; this report shall contain a statement of the proposed course of treatment required, if any, by that change;

(6) The employee is referred to another physician for consultation;

(7) The employee reasonably requests additional appropriate information.

PACIFIC GAS and ELECTRIC COMPANY

Employer's Report of Occupational Injury or Illness

CONFIDENTIAL – *For Use by Company Attorneys*

DIVISION
GENERAL OFFICE OR
GENERAL CONSTRUCTION

DEPARTMENT | DISTRICT, BRANCH OR LOCAL OFFICE | A.C. NUMBER

LOCATION OR ITEM NUMBER | ACCOUNT NUMBER | JOB NUMBER

ACCIDENT REPORT NUMBER
ANNUAL YEAR | NUMBER | U.S.A. STATE CODE

EMPLOYER

1. Name: PACIFIC GAS AND ELECTRIC COMPANY
2. Mailing Address: 77 BEALE STREET, SAN FRANCISCO, CA 94106 Phone 781-4211 Ext. 3171
3. Address and Phone Number of Reporting C.S.H.A. Representative
4. Nature of Business: PUBLIC UTILITY – Gas & Electric
5. Compensation Insurance Account Number: 002-2799

EMPLOYEE

6. Name
7. Social Security Number
8. Home Address
8a. Home Phone Number
9. Sex: ☐ MALE ☐ FEMALE
10. Occupation / Job Title
11. Age
12. Department
13. Wages: $ ☐ PER WEEK ☐ PER MONTH
13a. Length of Service with P.G. & E. Co. _____ YEARS
13b. How long has employee been employed in his present occupation? A ☐ Less than Six Months B ☐ Six Months to Two Years C ☐ Over Two Years
13c. Years of Experience
14. Where did accident occur? Number and Street / City or Town / County
15. On Employer's Premises? ☐ YES ☐ NO
16. What was employee doing when injured? Be specific.
17. How did accident or illness occur? Use separate sheet if necessary.
18. Name object or substance that directly injured employee.
19. Nature of injury or illness and part of body affected.
20. Name and address of physician
21. Name and address of hospital, if hospitalized
22. Date of injury or illness
23. Time of Day: HOURS
24. Was employee working at usual job before injury? ☐ YES – Date last worked: _____ ☐ NO
If answer to #24 is "No," has employee been given another job? ☐ YES
25. Has employee returned to work? ☐ YES – Date returned: _____ ☐ NO
26. Did employee die? ☐ YES – Date: _____ ☐ NO
Date employee last worked: _____ Date of this report: _____
If injury contributed by action of third party state name and address:

Dept.	PLEASE DO NOT USE THIS COLUMN
9	
Division 01	
Social Security Number 10-18	
Age 19-20	
Sex 21	
Wage 22-28	
Occupation 29-41	
Service 42-48	
Co. Service 49-51	
52-54	
55-57	
58-60	
61-63	
64-66	
66-67	
Nat. Inj. 68-69	
Pt. Body 70-71	
Type Inj. 72	
73	
74	
Y.L. 75-76	
Cas Code J 80	

Filing of this report is not an admission of liability. "... No report of injury required to be filed by an employer or insurer by this division shall be admissible as evidence in any adversary proceeding before the Workmen's Compensation Appeals Board."

Labor Code, Section 6412

FIRM: PACIFIC GAS & ELECTRIC COMPANY

OFFICIAL POSITION: Mgr., Safety, Hearth & Claims Dept.

TELEPHONE: 781-4211 EXTENSION: 3171

Report # _____ Date _____, 19___

Dr. _____

Kindly give to bearer.

Mr./Ms. _____

medical attention, and forward a complete detailed report immediately to Manager, Safety, Health and Claims Dept., 245 Market Street, San Francisco, 94106. Your bills should be itemized and all bills and reports rendered in triplicate.

PACIFIC GAS AND ELECTRIC COMPANY

By _____ WC # _____

Mgr. – Foreman – Supt.

62-5015 (REV 5/80)

PLEASE COMPLETE AND RETURN TO EMPLOYEE

(EMPLOYEE MUST HAVE COMPLETED CARD TO RETURN TO WORK)

Pacific Gas and Electric Co.: Date _____, 19___

Mr./Ms. _____

Occupation _____ Report # _____

Employed By _____ WC # _____ Division.

Injured at _____ a.m. p.m. on _____, 19___

☐ Return to full work immediately _____

☐ Modified work until _____

☐ Unable to work until _____

☐ Restrictions or limitations _____

☐ Return Appt. Date: _____ Time: _____

☐ Discharged from treatment _____

Signed _____ M.D.

Confidential

For Use by Company Attorneys Only
REPORT OF AUTOMOBILE ACCIDENT

FORWARD REPORT TO

(1) OTHER DRIVER

Name

Address (Street, City, State)

Phone No. ☐ Male ☐ Female

Date of Birth Operator's Lic. No. State

Insurance Company

(2) OTHER VEHICLE OR PROPERTY OWNER

Name

Address Phone No.

Vehicle: Make Type Year Lic. No. Color

ACCIDENT REPORT NUMBER

Alpha	Year	Seq. Number	Div. Use

(3) PASSENGERS IN OTHER VEHICLES, WITNESSES, OR INJURED PERSONS

	NAME	ADDRESS	PHONE No.	PASSENGER	WITNESS	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐
5.				☐	☐	☐
6.						

(4) PASSENGERS IN COMPANY VEHICLE

	NAME	ADDRESS	PHONE No.	EMPLOYEE YES	EMPLOYEE NO	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐

(5) DATE, TIME AND LOCATION OF ACCIDENT

On (Date) at (Time) Hours, On (Street or rural highway)

at/near (Intersecting street, house number or highway location) In (City or County, State)

(6) DESCRIPTION OF ACCIDENT

Complete details of how accident occurred

Other vehicle was ☐ stopped ☐ moving (Direction) on (Street) at (Speed)

Company vehicle was ☐ stopped ☐ moving (Direction) on (Street) at (Speed)

(If necessary, use additional sheet to complete story)

Describe weather, road and light conditions

Number of seat belts in Company vehicle Number of seat belts in use at time of accident

Indicate which investigating agency will prepare a report: ☐ CHP ☐ Sheriff ☐ City Police ☐ None ☐ Other

(7) VEHICLE & PROPERTY DAMAGE

DESCRIBE DAMAGE TO: Other Vehicle(s) or Property

Cost if known $ or estimate: ☐ Under $50 ☐ Over $50 ☐ Over $100

DESCRIBE DAMAGE TO: ☐ Company Vehicle ☐ Lease/Rental Vehicle ☐ Personal Vehicle

Cost if known $ or estimate: ☐ Under $100 ☐ Over $100 ☐ Over $500

Were photos taken of accident scene and damage? ☐ Yes ☐ No

(8) COMPANY DRIVER & VEHICLE INFORMATION

Company Driver Home Address Company Phone No.

Age Occupation Reporting to Local Office at

Cal. Driver's Lic. No. Class Expiration Date

Division or G.O. Dept. District Department

Vehicle No. Lic. No. Lic. No Type Year Odometer Reading

Driver's Signature

Date of this report 19 Countersigned (Mgr., Supt., Gen. Foreman, etc.) Company Phone No.

LOCATION OR ITEM No.	ACCOUNT No.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M., W.O., D.& C.)	JOB No. ISSUED TO COVER REPAIRS (W.O., M.D.& C.)	R.C. No.

INSTRUCTIONS

All accidents arising out of the operation of Company-owned, leased or rented vehicles, as well as employee-owned, leased or rented vehicles used on Company business, must be reported to the Supervisor in charge immediately. All injuries to persons or serious damage to property of others involving above vehicles must be reported to the Safety, Health and Claims Department Field Investigator or, if he is unavailable, the General Office Safety, Health and Claims Department. Such notification shall be by the fastest means of communication and this report prepared the same day. Answer each question fully. When blank spaces are not sufficient for full statements, answer each on separate sheets and attach hereto.

PREPARE A SKETCH OF ACCIDENT BELOW: Sketch should show:

1) POSITION OF VEHICLES, BUILDINGS, STRUCTURES, ETC.

2) STREET NAMES, DIRECTIONS OF TRAVEL, STOP OR WARNING SIGNS, ETC.

3) LANE WIDTHS, SKID MARKS, POINT OF IMPACT, INCLUDING MEASUREMENTS AS APPROPRIATE!

69-9221 3/82 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PACIFIC GAS AND ELECTRIC COMPANY

PG&E —

DIABLO CANYON POWER PLANT
P.O. Box 56 · Avila Beach, California 93424 · (805) 595-7311

R. C. THORNBERRY
[illegible]
PLANT MANAGER

Dear Dr.

Thank you for being one of our panel physicians that treat our employees. Our primary goal is to provide employees who sustain industrial injuries requiring medical attention with prompt, first-class treatment. Your assistance in this endeavor is appreciated.

There is an area of concern to us. While the number of employees that require treatment by a physician has remained stable or in some cases declined, the number of disabling injuries requiring time away from work, i.e., lost time injuries, has dramatically increased.

We believe that some of this time away from work might possibly be avoided if the availability of light (modified) duty or desk-type work were more widely known. Some physicians have stated that in some cases the patient will respond more rapidly to treatment if kept busy in a light-duty capacity. Productive, light-duty assignments are almost always available for employees released for work within the medical restrictions established by the physician.

It our policy to have an injured employee accompanied by a supervisor or other representative on the first doctor's visit. Should there be any question about the availability or type of light duty that can be provided, he or she will be able to answer for us.

Our employees' welfare is our main concern. Should you have any questions about our program, I will be glad to call on you at your convenience.

Sincerely,

R. C. THORNBERRY

RCT:kgc

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

Company Panel of Physicians, Ambulances, and Hospitals[1]
Serving the Immediate Area Around Diablo Canyon

Ambulance[2] Name	Address	Phone	Remarks
San Luis Ambulance Service	358 Santa Rosa San Luis Obispo		Radiation Exposure Patients
CENTRAL DISPATCH			
Five Cities Ambulance Service	135 South Halcyon Rd. Arroyo Grande		
CENTRAL DISPATCH			
South Bay Fire/Ambulance	2315 Bayview Heights Los Osos		
CENTRAL DISPATCH			
Bay Ambulance	510 Bonita Morro Bay		
Hospitals			
French Hospital	1911 Johnson Avenue San Luis Obispo		Radiation Exposure Patients-Extern Defib. Equip.
Sierra Vista Hospital (10 minutes to clear for helicopter)	1010 Murray Avenue San Luis Obispo		External Defibrillation Equipped
Arroyo Grande Community Hospital and Medical Center	345 South Halcyon Rd Arroyo Grande		External Defibrillation Equipment

Physicans

San Luis Medical Clinic	1235 Osos Street San Luis Obispo	
Richard E. Fleming	1235 Osos Street San Luis Obispo	Industrial Injury Treatment
T. A. Beresky	100 Casa Street San Luis Obispo	Eye

Physicians' Exchange

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1. This list extracted from Standard Practice No. 251.1-1, Panel of Physicians, Ambulances, and Hospitals, Coast Valleys Division, dated 6/16/82.

2. See also EP OR-1 "Offsite Support and Assistance" for Air Ambulance and Medical Support.

PACIFIC GAS AND ELECTRIC COMPANY
SAFETY, HEALTH, AND CLAIMS DEPARTMENT

PANEL OF PHYSICIANS, AMBULANCES, AND HOSPITALS

COAST VALLEYS DIVISION

Issued: 6/16/82

TOWN	ADDRESS	TELEPHONE	SERVICE
ARROYO GRANDE			
Physicians's Exchange	135 South Halcyon Road		Ambul.
Five Cities Ambulance Service			Ambul.
CENTRAL DISPATCH			Hosp. DEF
A.G. Community Hospital and Medical Center	345 South Halcyon Road		
ATASCADERO			
Doctors	See PASO ROBLES		
North County Medical Services (Emergency Medical Technician)	3886 El Camino Real		Ambul.
CENTRAL DISPATCH			Ambul.
Twin Cities Community Hospital	1500 Las Tablas, Templeton		Hosp DEF
BAYWOOD PARK - LOS OSOS			
South Bay Fire/Ambulance	2315 Bayview Heights		Ambul
CENTRAL DISPATCH			Ambul

I - Industrial Injury Treatment
E - Preemployment Physical Examinations
EYE - Eye Injuries
PM - Paramedic Services
"DEF" - Hospital Equipped with External Defibrillators
* - Willing to Fly
** - Helicopter Landing Facility Available
RAD - Radiation Exposure Incidents

PACIFIC GAS AND ELECTRIC COMPANY
SAFETY, HEALTH, AND CLAIMS DEPARTMENT

PANEL OF PHYSICIANS, AMBULANCES, AND HOSPITALS

COAST VALLEYS DIVISION

Issued: 6/16/82

TOWN	ADDRESS	TELEPHONE	SERVICE
ARROYO GRANDE			
Physicians's Exchange			
Five Cities Ambulance Service	135 South Halcyon Road		Ambul.
CENTRAL DISPATCH			Ambul.
A.G. Community Hospital and Medical Center	345 South Halcyon Road		Hosp. DEF
ATASCADERO			
Doctors	See PASO ROBLES		
North County Medical Services (Emergency Medical Technician)	3886 El Camino Real		Ambul.
CENTRAL DISPATCH			Ambul.
Twin Cities Community Hospital	1500 Las Tablas, Templeton		Hosp DEF
BAYWOOD PARK - LOS OSOS			
South Bay Fire/Ambulance CENTRAL DISPATCH	2315 Bayview Heights		mbul mbul

I - Industrial Injury Treatment
E - Preemployment Physical Examinations
EYE - Eye Injuries
PM - Paramedic Services
"DEF" - Hospital Equipped with External Defibrillators
* - Willing to Fly
** - Helicopter Landing Facility Available
RAD - Radiation Exposure Incidents

SP 251.1
Panel of Physicians, Ambulances and Hospitals
Coast Valleys Division

TOWN		ADDRESS	TELEPHONE	SERVICE
CAMBRIA				
	Cambria Ambulance Service	1460 Main Street		Ambul
CENTRAL DISPATCH				Ambul
CARMEL	(Area Code 408)			
	Red Cross Ambulance	Carmel Fire House, 6th & Delores Streets		Hosp DEF
	Community Hospital of the Monterey Peninsula	Carmel & Pacific Grove Highway		
CARMEL VALLEY	(Area Code 408)			
	C. Winter Van Horn	Village Medical Center		I-E
	Paulino E. Tocchet	10 Del Fino Place		I-E
CASTROVILLE	(Area Code 408)			
	Donald M. Crosiar	10349 Merrit Street		I
	Joseph L. Kirch	11272 Merrit Street		I-E
	Bert Clair Eliason	10349 Merrit Street		I-E
HOLLISTER	(Area Code 408)			
	N.L. Currie	390 Seventh Street		I-E
	Martin M. Bress	931 Sunset Drive		I-E
	Stephens & Poletti Ambulance	328 Fourth Street		Ambul
	Hazel Hawkins Hospital	911 Sunset Drive		Hosp DEF
KING CITY	(Area Code 408)			
	Duane F. Hyde	210 Canal Street		I-E
	South County Ambulance	124 North Second Street		1) Ambul
	George L. Mee Memorial Hospital	300 Canal Street		Hosp DEF

SP 251.1
Panel of Physicians, Ambulances and Hospitals
Coast Valleys Division

TOWN	ADDRESS	TELEPHONE	SERVICE
LOMPOC (Area Code 805)			
Community Ambulance Service	410 East Locust		Ambul
Lompoc Hospital District	508 East Hickory Avenue		Hosp DEF
LOS OSOS (Area Code 805)			
South Bay Fire Department/Ambulance	Bayview Heights		Ambul
CENTRAL DISPATCH			
MONTEREY (Area Code 408)			
W.A. Carnazzo	464 Pacific Street		I-E
Nello P. Torri	1010 Cass Street		I-E
Howard Press	172 El Dorado		I-E
John J. D'Attilio	880 Cass Street		Eye
George S. Campion	1010 Cass Street		Eye
Physician's Exchange			Ambul
Peninsula Medics	561 Redwood Avenue Sand City		Hosp DEF
Eskaton Health Care Center (24-hour Emergency Service)	576 Hartnell Street		Hosp DEF
Peninsula Community	Carmel & Pacific Grove Highway, Carmel		
MORRO BAY (Area Code 805)			
Bay Ambulance	510 Bonita		Ambul

Non-Employee Injuries

C. O. Schreil, San Luis Obispo [redacted] office)
(office)
(home)

If he cannot be reached, contact one of the following in order of preference:

During working hours:

1. John C. Echols
2. Doug G. Keeler
3. George G. Perry (collection only)

[redacted]

After working hours on Monday through 8:00 a.m. on Friday, except holidays:

1.	John C. Echols	Pleasant Hill
2.	Douglas G. Keeler	Concord
3.	John C. Vocke	Layfayette
4.	Donald A. Rushton	San Mateo
5.	William H. Bingaman	Novato
6.	E. Anthony Giudici	San Carlos
7.	J. Alec McCorquodale	San Ramon
8.	Stanley W. Johnson	Fairfield
9.	George G. Perry (collection only)	Hayward
10.	Bruce P. Sadler	Belmont

[redacted]

After 5:00 p.m. on Fridays to 8:00 a.m. on Mondays and holidays:

Contact the Investigator delegated to stay on call for all emergencies. He may be reached through the System Dispatcher. If he is not available, the Dispatcher will follow the procedures for "After Working Hours."

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

Safety, Health and Claims Personnel to be Contacted for Reporting of Injuries at Diablo Canyon[1]

EMPLOYEE INJURIES

In all cases of serious employee injuries (for example, injuries involving hospitalization, electric contact, hernia, amputation, fractures, or injuries expected to result in lost time from work beyond the day of injury) or death, which occur while on the job, report should be made as follows:

During Working Hours:

T. B. Honey [redacted]

(If Mr. Honey is not available, the person answering the telephone will take the message and notify Mr. Honey or any other parties necessary in the Safety, Health and Claims Department).

Any Other Time:

Report to one of the persons on the following list, trying each in order until one is contacted:

1.	T. B. Honey	Pinole
2.	A. Thomas	San Francisco
3.	C. B. Powell	San Francisco
4.	P. S. Benitez	San Rafael
5.	T. G. Scott	Oakland
6.	L. Lasagna	Albany
7.	C. W. Allen	San Francisco
8.	B. L. Wade	Larkspur
9.	J. A. Glimme	Danville
10.	J. C. Vocke	Lafayette
11.	W. A. Hutchison	San Carlos
12.	M. C. Dolan	Oakland
13.	M. W. Johnson	Walnut Creek
14.	R. W. Hall	Richomod
15.	I. M. Crawford	Hercules
16.	R. G. Schumaker	El Granada
17.	R. D. Fagg	San Rafael
18.	P. C. Boettcher	Moraga
19.	H. W. Reynolds	Sunnyvale
20.	B. P. Sadler	Belmont

[redacted]

[1] This listing extracted from Safety, Health, and Claims memo regarding Personnel to be Contacted for Reporting of Accidents, dated 01/13/83.

TOWN	ADDRESS	TELEPHONE	SERVICE
SOLVANG			
F.A. Pedersen	2030 Viborg Road		I-E
W.B. Van Valin	2030 Viborg Road		I-E
Physicians' Exchange	Santa Maria		
Coast Ambulance Service	361 Alisal Road		Ambul
Santa Ynez Valley Hospital	700 Alamo Pintado Rd.		Hosp DEF
TEMPLETON			
Peter S. Davis	1400 Las Tablas, Suite 2		I-E
Willard Osibin	1400 Las Tablas		I-E
*R.A. Greenman	1400 Las Tablas		E
CENTRAL DISPATCH			Ambul
Twin Cities Hospital	1500 Las Tablas		Hosp DEF
WATSONVILLE			
*E.H. Eiskamp	850 Freedom Boulevard		I-E
P.K. Gilman	850 Freedom Boulevard		I-E
David E. Bushman	30 Brennan Street		I-E
Douglas A. Liddicoat	274 Green Valley Road		Eye
W. Webb Wilson	272 Green Valley Road		Eye
Physicians' Exchange			
A-1 Watsonville Ambulance	1046A Freedom Boulevard		Ambul
**Watsonville Community Hospital	Green Valley Road at Holohan Road		Hosp DEF

TOWN	ADDRESS	TELEPHONE	SERVICE
SANTA BARBARA			
St. Francis Hospital	601 East Micheltorena	[redacted]	Hosp DEF
SANTA MARIA			
Jules Bertero	201 West Cook Street		I-E
*Harry K. Lienke	217 East Fesler		I-E
*Donald E. Reiner	1414-D South Miller St.		I
D.D. Shepard	1414 South Miller St.		Eye
Industrial Medical Group of Santa Maria Valley			
Dr. Betty Suits Tibbs	3130 Skyway Drive, Suite 702		I-E
Dr. William J. Tibbs	3130 Skyway Drive, Suite 702		I-E
Physicians' Exchange			
911 Ambulance Service			PM
Santa Maria Ambulance Service	602 East Cook Street		Ambul
Police Department (For Emergency Only)	Santa Maria		Ambul
Marian Hospital	1400 East Church St.		Hosp DEF
Valley Community Hospital	505 East Plaza		Hosp
SOLEDAD			
Soledad Ambulance Service (County Emergency Services)	Soledad		Ambul

TOWN	ADDRESS	TELEPHONE	SERVICE
PASO ROBLES (Area Code 805)			
*Stanley J. Kirk Physicians' Exchange	1305 Vine Street		I-E
Professional Ambulance Service	1035 Vine Street		Ambul
CENTRAL DISPATCH			Ambul
Twin Cities Hospital	1500 Las Tablas Road Templeton		Hosp DEF
SALINAS (Area Code 408)			
W.H. Lawler, Jr.	110 John Street		I-E
Howard C. Miles	535 East Romie Lane		I-E
Stanley G. Parker	535 East Romie Lane		I-E
George J. Hinn	505 East Romie Lane		I
Glenn H. Smith	230 San Jose Street		Eye
E.O. Dong	535 East Romie Lane		Eye
Physicians' Exchange			
A-1 Ambulance Service	241 East Market Street		Hosp DEF
Salinas Valley Memorial Hospital	450 East Romie Lane		Hosp DEF
SAN LUIS OBISPO (Area Code 805)			
*Richard E. Fleming	1235 Osos Street		I-E
T.A. Beresky	100 Casa Street		Eye
SLO Medical Clinic	1235 Osos Street		
Physicians' Exchange			
San Luis Ambulance Service	385 Santa Rosa		Ambul RAD
CENTRAL DISPATCH			Ambul
French Hospital	1911 Johnson Avenue		Hosp DEF RAD
**Sierra Vista Hospital (20 MInutes to clear for chopper)	1010 Murray Avenue		Hosp DEF

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNITS NOS. 1 and 2

TITLE: EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

APPENDIX Z

1. When this emergency procedure has been implemented for injuries or illnesses occurring within the site boundary, and upon direction from the Shift Foreman, proceed as follows:

   *a. Notify the Plant Manager, Plant Superintendent, Supervisor of Chemistry and Radiation Protection or their designated alternates.

   b. Notify the Compensation Claims Representative, Department of Safety Health and Claims, per the attached list of personnel.

   *c. Designate this event a significant event if, in the opinion of the Shift Foreman, the injury will require treatment or observation which will last longer than 48 hours, or in any case of a fatality. Notify the NRC Bethesda Operation's Center within one hour, as a minimum, using the red phone in the Control Room. Gather sufficient information from all sources so that the phone call is meaningful. Refer to Operating Procedure O-4 "Operating Order (One hour report requirements to NRC)" for a suggested format for reporting. Notify the NRC that your call is pursuant to 10 CFR Part 50.72 (Notification of Significant Events).

   *d. In addition to the notification performed above, also notify the following if NRC is notified, Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate in the Department of Nuclear Plant Operation:

   Mr. W. H. Fujimoto
   PGandE
   Plant Extension
   Home
   [redacted]

   NOTE: If the above General Office personnel cannot be promptly reached, request the Systems Dispatcher to contact alternate personnel.

2. When this emergency procedure has been implemented for injuries occurring outside the site boundary such as along the plant access road, and upon direction from the Shift Foreman, proceed as follows:

   *a. Notify the Plant Manager or his designated alternate.

   b. Notify the Compensation Claims Representative, Department of Safety Health and Claims, per the attached list of personnel.

PG&E **Pacific Gas and Electric Company**

NUMBER EP M-2
REVISION 9
DATE 7/5/83
PAGE 1 OF 3

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE: EMERGENCY PROCEDURE
NONEMPLOYEE INJURY OR ILLNESS (THIRD PARTY)

APPROVED: R. A. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure describes the actions which are to be taken in the event of an injury or illness involving a nonemployee which is incurred in connection with Company operations either on or in the vicinity of the plant site. This procedure and changes thereto requires PSRC review.

APPLICABILITY

This procedure is to be followed for incidents involving non-employees who are on or near the site at the request of the Nuclear Plant Operations Department (such as a Xerox serviceman). In the event of an incident involving other non-employees at or near the site (such as a construction worker), perform only the asterisked (*) steps in this procedure.

IMMEDIATE ACTIONS

The employee(s) who are at the scene shall:

*1. Render all necessary first aid.

*2. Notify the control room (Shift Foreman) as soon as practical.

SUBSEQUENT ACTIONS

The Shift Foreman shall direct all subsequent actions until relieved by the Long Term Site Emergency Coordinator (if the situation warrants it). Such actions should include the following:

*1. Sound emergency signal, code override, or other general warning signal to clear the area if the situation warrants it.

*2. Dispatch additional first aid personnel such as the project construction EMT [redacted] to the scene of the injury or illness if required. Personnel who have not been instructed to provide assistance at the scene should remain on their jobs and stay clear of the affected area.

*3. Call an ambulance or physician if the situation warrants it. The practices which are to be followed if this step is necessary are given in the following section of this procedure.

4. Secure the names and addresses of all witnesses (both Company and noncompany).

*5. Perform the notifications required by Appendix Z.

6. An accident report should be completed as soon as practical either on Form 62-6226 "Report of Miscellaneous Accident," or Form 62-4542, "Report of Automobile Accident," as is appropriate. The accident report should be forwarded to the plant clerk for processing.

POLICIES TO BE FOLLOWED WHEN REQUESTING OUTSIDE ASSISTANCE

If a third party requires medical care, the following policies should be followed by Company personnel who secure assistance.

1. If the injured or ill individual is in a condition where he can speak for himself, call the physician which he requests. If an ambulance is required, call the ambulance which he requests.

2. If the injured or ill individual cannot speak for himself, but friends, relatives, or his employer are present, leave the matter of his care to them.

3. If an injured or ill individual cannot speak for himself, and friends, relatives, or employer, or public officials are not present or will not take change, call a local ambulance service and have the injured or ill person sent to the San Luis Obispo General Hospital for treatment.

4. Whenever a physician or an ambulance is called, it should be clearly stated by the employee making the call that this is not Company responsibility and is made not on behalf of the Company but of the injured or ill person or for his benefit, or until family, friends, employer, or public officials can take charge.

5. An injured or ill third party should only be transported in a Company vehicle in the event of an extreme emergency when the delay associated with securing an ambulance might result in a significant deterioration of the injured person's condition.

POLICIES TO BE FOLLOWED IN THE EVENT OF RADIOACTIVE CONTAMINATION

If the injured or ill individual is significantly contaminated with radioactive material or overexposed, the matter will be treated in the same manner as would a similar incident involving a Company employee (see Emergency Procedure R-1 "Personnel Injury (Radiologically related) and/or Overexposure).

REFERENCES

1. PGandE Standard Practice 250.
2. PGandE Claims Department Circular Letter No. 19, 10/1/49.
3. NRC Information Notice 80-06, "Notification of Significant Events."

ATTACHMENTS

1. Form 62-6226, "Report of Miscellaneous Accident."
2. Form 62-4542, "Report of Automobile Accident."
3. Appendix Z, Emergency Procedure Notification Instructions

62-6226 (REV 6/80)

FORWARD REPORT TO:

PG&E

REPORT OF MISCELLANEOUS ACCIDENT

CONFIDENTIAL

FOR USE BY COMPANY ATTORNEYS ONLY

ACCIDENT REPORT NUMBER

DEPARTMENT (CHECK)	GAS	ELECTRIC	STEAM	WATER	OTHER	ALPHA	YEAR	SEQ. NUMBER	DIV. USE
	1.	2.	3.	4.	5.				

CHECK #2 ELECTRIC — FOR ALL POWER PLANTS AND WATER COLLECTING
CHECK #3 STEAM HEAT — FOR COMMERCIAL STEAM HEAT ONLY

1. LOCATION OF ACCIDENT: STREET, HIGHWAY, MILEPOST, OR OTHER SPECIFIC LOCATION, CITY, NEAREST TOWN, POWER HOUSE, ETC. AND COUNTY

2. DATE OF ACCIDENT: (MONTH—DAY—YEAR) **3.** TIME HOURS **4.** DATE COMPANY WAS NOTIFIED: (MONTH—DAY—YEAR)

5. INCIDENT BEING REPORTED: ☐ CAR-POLE ☐ TRIP-FALL ☐ FIRE ☐ ELECTRIC CONTACT
☐ EXPLOSION ☐ MOTOR BURNOUT ☐ STORM ☐ DIG-IN ☐ OTHER

REPORT: If necessary, use reverse side of this form for explanatory sketch or additional information.

WERE PHOTOS TAKEN OF THE ACCIDENT? ☐ YES ☐ NO WAS ANY PHYSICAL EVIDENCE SECURED IN CONNECTION WITH THIS INCIDENT? ☐ YES ☐ NO

6. NAME AND ADDRESS OF
1. INJURED PERSON 2. PERSON DAMAGING COMPANY PROPERTY OR 3. OWNER OF DAMAGED PROPERTY OTHER THAN PG&E PROPERTY.....
(INDICATE NUMBER IN SQUARE)

☐ NAME ADDRESS CITY, STATE PHONE NUMBER
☐ NAME ADDRESS CITY, STATE PHONE NUMBER
☐ NAME ADDRESS CITY, STATE PHONE NUMBER

7. WITNESSES. IMPORTANT — Secure names, addresses and phone numbers of all witnesses—if no eye witness, give names of those who can give information. Show "none" if there were no witnesses.

PG&E EMPLOYEE'S NAME, DEPT., PHONE NUMBER:	NON-EMPLOYEE'S NAME, ADDRESS, PHONE NUMBER:

8. ESTIMATED TOTAL DOLLAR DAMAGE TO PG&E COMPANY PROPERTY $_____

9. WAS THERE ANY DAMAGE TO PROPERTY OF OTHERS? ☐ YES ☐ NO ☐ UNKNOWN IF YES, ESTIMATE TOTAL DOLLAR DAMAGE $_____

10. NAME OF FIRE SUPPRESSION UNIT: ☐ USFS ☐ COUNTY ☐ FIRE DISTRICT ☐ CDF ☐ MUNICIPAL ☐ UNKNOWN ☐ NONE

11. IS COLLECTION ACTION BY THE COMPANY RECOMMENDED? ☐ YES ☐ NO

DIVISION, G.O., OR GENERAL CONSTRUCTION	DEPARTMENT	REPORT PREPARED BY: (PRINT NAME)	REPORT REVIEWED BY: (MANAGER, SUPT., FOREMAN, ETC.)
			SIGNED:
DISTRICT & TOWN		DATE:	PRINT NAME:
		PHONE NO.	PHONE NO.

LOCATION OR ITEM NO.	ACCOUNT NO.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M., W.O., M., D. & C.)	JOB NO. ISSUED TO COVER REPAIRS (W.O., M., D. & C.)	R.C. NO.

Confidential

For Use by Company Attorneys Only
REPORT OF AUTOMOBILE ACCIDENT

FORWARD REPORT TO:

(1) OTHER DRIVER

Name _____

Address _____ (Street, City, State)

Phone No. _____ ☐ Male ☐ Female

Date of Birth _____ Operator's Lic. No. _____ State _____

Insurance Company _____

ACCIDENT REPORT NUMBER

Alpha	Year	Seq. Number	Div. Use

(2) OTHER VEHICLE OR PROPERTY OWNER

Name _____

Address _____ Phone No. _____

Vehicle: Make _____ Type _____ Year _____ Lic. No. _____ Color _____

(3) PASSENGERS IN OTHER VEHICLES, WITNESSES, OR INJURED PERSONS

	NAME	ADDRESS	PHONE No.	PASSENGER	WITNESS	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	
4.				☐	☐	
5.				☐	☐	☐
6.						

(4) PASSENGERS IN COMPANY VEHICLE

	NAME	ADDRESS	PHONE No.	EMPLOYEE YES	EMPLOYEE NO	INJURED OR FATAL
1.				☐	☐	☐
2.				☐	☐	☐
3.				☐	☐	☐
4.				☐	☐	☐

(5) DATE, TIME AND LOCATION OF ACCIDENT

On _____ (Date) at _____ (Time) Hours, On _____ (Street or rural highway)

at/near _____ (Intersecting street, house number or highway location) In _____ (City or County, State)

(6) DESCRIPTION OF ACCIDENT

Complete details of how accident occurred

Other vehicle was ☐ stopped ☐ moving _____ (Direction) on _____ (Street) at _____ (Speed) MPH

Company vehicle was ☐ stopped ☐ moving _____ (Direction) on _____ (Street) at _____ (Speed) MPH

(If necessary, use additional sheet to complete story)

Describe weather, road and light conditions _____

Number of seat belts in Company vehicle _____ Number of seat belts in use at time of accident _____

Indicate which investigating agency will prepare a report: ☐ CHP ☐ Sheriff ☐ City Police ☐ None ☐ Other _____

(7) VEHICLE & PROPERTY DAMAGE

DESCRIBE DAMAGE TO:
Other Vehicle(s) or Property _____

Cost if known $ _____ or estimate: ☐ Under $500 ☐ Over $500 ☐ Over $1000

DESCRIBE DAMAGE TO: ☐ Company Vehicle ☐ Lease/Rental Vehicle ☐ Personal Vehicle

Cost if known $ _____ or estimate: ☐ Under $100 ☐ Over $100 ☐ Over $500

Were photos taken of accident scene and damage? ☐ Yes ☐ No

(8) COMPANY DRIVER & VEHICLE INFORMATION

Company Driver _____ Home Address _____ Company Phone No. _____

Age _____ Occupation _____ Reporting to Local Office at _____

Cal. Driver's Lic. No. _____ Class _____ Expiration Date _____

Division or G.O. Dept. _____ District _____ Department _____

Vehicle No. _____ Lic. No. _____ Lic. No. _____ Type _____ Year _____ Odometer Reading _____

Driver's Signature _____

Date of this report _____ 19____ Countersigned _____ (Mgr., Supt., Gen. Foreman, etc.) Company Phone No. _____

LOCATION OR ITEM No.	ACCOUNT No.	JOB IN PROGRESS AT TIME OF ACCIDENT (G.M. W.O. D.&C.)	JOB No. ISSUED TO COVER REPAIRS (W.O. M.D.&C.)	R.C. No.

INSTRUCTIONS .

All accidents arising out of the operation of Company-owned, leased or rented vehicles, as well as employee-owned, leased or rented vehicles used on Company business, must be reported to the Supervisor in charge immediately. All injuries to persons or serious damage to property of others involving above vehicles must be reported to the Safety, Health and Claims Department Field Investigator or, if he is unavailable, the General Office Safety, Health and Claims Department. Such notification shall be by the fastest means of communication and this report prepared the same day. Answer each question fully. When blank spaces are not sufficient for full statements, answer each on separate sheets and attach hereto.

PREPARE A SKETCH OF ACCIDENT BELOW: Sketch should show:

1) POSITION OF VEHICLES, BUILDINGS, STRUCTURES, ETC.

2) STREET NAMES, DIRECTIONS OF TRAVEL, STOP OR WARNING SIGNS, ETC.

3) LANE WIDTHS, SKID MARKS, POINT OF IMPACT, INCLUDING MEASUREMENTS AS APPROPRIATE!

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 and 2

TITLE: EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

APPENDIX Z

I. When this emergency procedure has been implemented for injuries or illnesses occurring within the site boundary, and upon direction from the Shift Foreman, proceed as follows:

*a. Notify the Plant Manager, Plant Superintendant, Supervisor of Chemistry and Radiation Protection or their designated alternates.

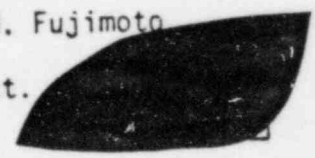
b. Contact the Division Field Claims Investigator:

Mr. C. O. Schreil
at
Office
Home


If the Field Claims Investigator cannot be promptly reached (at office, home, or on mobile division radio), the General Office Department of Safety, Health, and Claims shall be immediately notified in his place. A list of appropriate personnel is attached to Emergency Procedure M-1 or notification of appropriate personnel will be handled by the System Dispatcher if requested.

*c. Designate this event a <u>significant event</u> if, in the opinion of the shift forman, the injury will require treatment or observation which will last longer than 48 hours, or in any case of a fatality. Notify the NRC Bethesda Operation's center within one hour, as a minimum, using the red phone in the Control Room. Gather sufficient information from all sources so that the phone call is meaningful. Refer to Operating Procedure O-4 "Operating Order (One Hour Reporting Requirements to NRC)" for a suggested format for reporting. Notify the NRC that your call is pursuant to 10 CFR Part 50.72 (Notification of Significant Events).

*d. In addition to the notifications performed above, also notify the following, if NRC is notified, Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate in the Department of Nuclear Plant Operation:

Mr. W. H. Fujimoto
PGandE
Plant Ext.
Home


<u>NOTE</u>: If the above General Office personnel cannot be promptly reached, request the Systems Dispatcher to contact alternate personnel.

APPENDIX 2 (Continued)

2. When this emergency procedure has been implemented for injuries occurring outside the site boundary such as along the plant access road, and upon direction of the Shift Foreman, proceed as follows:

*a. Notify the Plant Manager or his designated alternate.

b. Contact the Division Field Claims Investigator as in 1.b above.

TITLE: EMERGENCY PROCEDURE
EARTHQUAKE

APPROVED: R. E. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure and changes thereto requires PSRC review.

GENERAL

Earthquakes affect the plant by producing ground motion which causes plant buildings and equipment to be stressed by induced vibration. This vibration is defined by a spectrum consisting of acceleration, frequency and duration. The values of these parameters used in the design of the Diablo Canyon Plant are given in Section 3.7 of the FSAR. Instrumentation at the site measures and records acceleration frequency and duration, but only the maximum acceleration along three perpendicular axes is indicated. The seismic instrumentation which meets the requirements of Technical Specification Table 3.3-7 is described in Appendix 1. Only accelerations of greater than 0.01 g's on the containment base slab are recorded on the triaxial time-history accelographs.

For purposes of this procedure, earthquakes are classified by the maximum acceleration indicated by the triaxial accelerometer located on the containment base slab.

Maximum Acceleration (g's)	DCPP Earthquake Classification	NUREG-0654 Classification Criteria	NUREG-0654 Action Level
Unmeasured to 0.01	Micro	Not detected in plant.	None
0.01 to 0.1	Moderate	Detected or felt in plant	Unusual event
0.1 to 0.2	Strong	Detected	Unusual event
0.2 to 0.6	Large	Greater than OBE levels	Alert
Greater than 0.6	Major	Greater than SSE levels	Site emergency

Unmeasured to moderate earthquakes are expected at Diablo Canyon during the life of the plant. A strong, large or major earthquake is not expected. This is based on geological explorations and on the recorded seismic history of the site.

This procedure is to be followed in the event that an earthquake occurs which triggers the recording instruments or is felt in plant. In the event that damage occurs, follow the appropriate Emergency Operating Procedure to mitigate the consequences of the damage first, then follow this procedure for investigation of the plant for further damage and reporting. The operator response is graduated, based on the local acceleration indicated by the Earthquake Force Monitor (EFM) up to 0.5g or on the SMP-1 playback if greater than 0.5g.

A verified earthquake undetected by the basic or supplemental monitoring systems but felt "in-plant" should be handled as a moderate earthquake.

NOTE: "In-plant" is inside the double fence (Plant Protected Area).

MICRO EARTHQUAKE (Unmeasured to 0.01g)

Symptoms

1. The supplemental system (SS), Terra Technology DCS-302, is triggered but the basic system (BS) Kinemetrics SMA-3, is not triggered. This means alarm input no. 1186 is in alarm and alarm input no. 1112 is not in alarm on PK 13-24 ("Seismic Instr. System").

Automatic Actions

None expected.

Immediate Operator Actions

None.

Subsequent Actions

NOTE: Triggering of the Terra Tech Supplemental System alone (that is, the kinemetrics System does not trigger) does not necessarily put the plant in an emergency condition. If ground motion is felt in the plant, discontinue this section and proceed to the "MODERATE EARTHQUAKE" section.

1. Subsequent Operator Action

   a) Determine if the supplemental system trigger was real or false. False triggers are known to be caused by Circulating Water Pump or Auxiliary Saltwater Pump transients or accidental impact of a vehicle or other object near the trigger package or electronic noise.

   b) Notify a Power Production Engineer (Nuclear) by the next working day of the event.

2. Subsequent Power Production Engineer Action

   a) Have the I & C Dept. record strip charts of the three free field tapes and transmit them to the PPE (Nuclear).

   b) Compare the three free field recordings with each other and with known plant conditions at the time of the event. Determine if a real earthquake has been recorded. A real earthquake will be evident when all accelerometer channels show similar readings.

   c) If the triggering event was false, reset the event counter and determine if a least half of the tape cassette's recording time is still available. If so, leave the tapes in place. If not, replace tapes with a fresh set.

   d) If the triggering event was a real earthquake, then:

      1) Perform a post-event calibration of the SS Tapes (I & C Dept.)

      2) Remove the complete tape set and replace with fresh tapes (I & C Dept.).

      3) Forward a copy of the three free field tapes to the Civil Engineering Dept. and await their disposition. The "used" tapes are held on file until the Civil Engineering Dept. decides they may be erased and reused or sent to Terra Tech. Corp. for analysis.

MODERATE EARTHQUAKE (0.01g to 0.1g)

Symptoms

1. The maximum acceleration on the containment base slab is indicated to be between 0.01 and 0.1g by the EFM.

2. The "Seismic Instr System" annunciator is activated (PK 15-24).

3. Ground motion is felt "in-plant" (inside the double fence).

Automatic Actions

None expected.

Immediate Operator Actions

1. Notify the Shift Foreman (Interim Site Emergency Coordinator).

2. Make a general survey of the control room instrumentation, with particular attention to annunciator and computer alarms, to verify that no apparent damage has occurred.

3. Notify the RPM on shift to make preparations for entering Containment to conduct a quick inspection for fires.

Subsequent Actions

1. General

   a. Establish the onsite emergency organization for an Unusual Event as specified in EP G-2 "Establishment of the Onsite Emergency Organization."

   b. Notify offsite organizations as specified in EP G-3 "Notification of Offsite Organizations."

   c. Instruct one Power Production Engineer (Nuclear) to come onsite and retrieve seismic data.

2. Subsequent Operator Action

   a. If a unit trip has occurred, maintain the unit in HOT STANDBY (Mode 3) until the Plant Manager authorizes a return to power.

   b. Within two hours following an earthquake exceeding 0.02g, inspect all zones listed in Technical Specification Table 3.3-11 for fires. If the Kinemetrics SMA-3(BS) was not triggered assume the earthquake to be less than 0.02g.

   c. Complete the "Post-Earthquake Level Indicator Check List," (Form 18-9249) and give it to the Shift Foreman.

   d. The Unit(s) will be placed in HOT STANDBY if investigation reveals physical damage which could impair the operation of any Seismic Class I equipment.

   e. Call the U.C. Berkeley seismograph station (415) 642-2160 and obtain the epicenter location and magnitude of the earthquake. This recording is updated each weekday at 11:00 a.m. and on Friday afternoons. It also has special updates following most earthquakes that are felt in California.

3. Subsequent Power Production Engineer Action

   a. Initiate retrieval of seismic data from the Kinemetrics SMA-3 basic seismic monitoring system (BS). (See STP I-37C)

      1) Perform a post-event calibration of the BS tapes.

      2) Replace the tape cassettes in the SMA-3 and perform a pre-event calibration.

      3) Reset the EFM.

      4) Play back the tapes removed from the SMA-3 on the SMP-1.

         (a) Determine if the earthquake exceeds 0.02g. If so, immediately notify the Shift Foreman and commence an engineering evaluation of the fire detection instrumentation in accordance with Technical Specification 3.3.3.8, ACTION b. This evaluation may include the performance of applicable system functional tests, but must be completed within 72 hours following the earthquake.

(b) Send a copy of the record play back to the Chief Civil Engineer.

(c) Retain the cassette tapes for further analysis.

b. Initiate retrieval of additional seismic data from the supplemental seismic monitoring system.

1) Perform a post-event calibration of the SS tapes.

2) Do not play back any channels unless requested by the Chief Civil Engineer.

3) Forward the tapes by registered mail to Terra Technology Corp. for normal processing including the time and date of earthquake (with copy of transmittal letter to the Chief Civil Engineer).

4) Install a new set of tapes in the SS recorder and perform a pre-event calibration.

c. Notify Kinemetrics that an onsite recalibration of SMA-3 ad SMP-1 equipment is required. This must be performed within five days following the initial event.

d. Gather local data in accordance with Appendix 1.

4. Close out with verbal summary to offsite authorities followed by a written summary to NRC within 24 hours.

STRONG EARTHQUAKE (0.1 to 0.2g)

Symptoms

1. The maximum acceleration on the containment base slab is indicated to be between 0.1g and 0.2g by the EFM.

2. The "Seismic Instr System" main annunciator is activated (PK 15-24).

3. The ground motion is strongly noticeable to operations personnel on shift.

Automatic Actions

The Unit may trip due to induced vibration or spurious relay actuation.

Immediate Operator Actions

1. Notify the Shift Foreman (Interim Site Emergency Coordinator).

2. Make a general survey of the instrumentation in the control room with particular attention to the main annunciator and computer alarms, to verify that no readily apparent damage has occurred.

3. Notify the RPM on shift to make preparations for entering Containment to conduct a quick inspection for fires.

Subsequent Actions

1. General

   a. Establish the onsite emergency organization for an Unusual Event as specified in EP G-2 "Establishment of the Onsite Emergency Organization."

   b. Notify offsite organizations as specified in EP G-3 "Notification of Onsite Organizations."

   c. Instruct at least two Power Production Engineers (Nuclear) to come to the plant to assist in the post earthquake evaluation.

2. Subsequent Operator Action

   a. If a Unit has tripped, maintain the Unit in the HOT STANDBY condition until the Plant Manager authorizes a return to power.

   b. Follow-up Investigation

      The follow-up investigation involves the performance of various tests and inspections of the plant. As each check is completed, the appropriate check or data sheets should be forwarded to the Shift Foreman for his review. Since some of the surveillance tests will take a considerable period to complete, the Shift Foreman has been provided with a summary sheet (Form 18-9248) to help keep track of the progress of the investigation.

      1) Complete the "Post-Earthquake Level Indicator Check List" (Form 18-9249). Return it to the Shift Foreman.

2) Within two hours following the earthquake, inspect all zones listed in Technical Specification Table 3.3-11 for fires.

3) Complete the following "Post-Earthquake Level Indicator Check Lists," checking all indicated areas for structural and equipment damage. When inspecting the various areas, pay particular attention to chipped paint at pipe restraints and hanger clamps indicating pipe movement; spauled grouting at equipment support anchors attached to walls or floors; concrete cracks, especially near equipment support anchors; damaged pipe snubbers as evidenced by leakage from hydraulic reservoirs and/or broken or bent hardware.

   a) Containment (outside missile shield)

   b) Containment (inside missile shield, if unit is shutdown)

   c) Auxiliary building (main area)

   d) Auxiliary building (penetration areas)

   e) Fuel handling building (main area)

   f) Fuel handling building (vent. equipment areas)

   g) Turbine building

   h) Outside areas

   i) Intake structure

   The areas referred to on the check lists are shown on the plant drawings included as Attachment 1 to this procedure. Return the completed checklists to the Shift Foreman.

4) Complete the Post-Earthquake Surveillance Test Checklist. Forward all completed data sheets the Shift Foreman.

5) The Unit(s) will be placed in HOT STANDBY if investigation reveals physical damage which could impair the operation of any Seismic Class I equipment.

6) Call the U.C. Berkeley seismograph station (415) 642-2160 and obtain the epicenter location and magnitude of the earthquake. This recording is updated each weekday at 11:00 a.m. and on Friday afternoons. It also has special updates following most earthquakes that are felt in California.

3. Subsequent Power Production Engineer Action

a. Initiate retrieval of seismic data from the Kinemetrics SMA-3 basic seismic monitoring system (BS). (See STP I-37C)

1) Perform a post-event calibration of the BS tapes.

2) Replace the tape cassettes in the SMA-3 and perform a pre-event calibration.

3) Reset the EFM.

4) Play back the tapes removed from the SMA-3 on the SMP-1.

a) Send a copy of the record play back to the Chief Civil Engineer.

b) Return the cassette tapes for further analysis.

b. Initiate retrieval of additional seismic data from the supplemental seismic monitoring system.

1) Perform a post-event calibration of the SS tapes.

2) Play back all channels (retain on site).

3) Forward the tapes by special courier to Terra Technology Corp. for normal processing including the time and date of earthquake.

4) Install a new set of tapes in the SS recorder and perform a pre-event calibration.

c. Notify Kinemetrics that an onsite recalibration of SMA-3 and SMP-1 equipment is required. This must be performed within five days following the initial event.

d. Gather local data in accordance with Appendix 1.

e. Commence an engineering evaluation of the fire detection instrumentation in accordance with Technical Specification 3.3.3.8, ACTION b. This evaluation may include the performance of applicable system functional tests, but must be completed within 72 hours following the earthquake.

4. Close out with verbal summary to offsite authorities followed by a written summary to NRC within 24 hours.

LARGE EARTHQUAKE (between 0.2g and 0.6g)

Symptoms

1. The "Seismic Instr System" main annunciator is activated (PK 15-24).

2. The maximum acceleration indicated by the earthquake force monitor or the SMP-1 tape playback strip chart is greater than 0.2g's but less than 0.6 g's.

3. Seismic reactor trip (PK 04-15).

Automatic Actions

1. The Unit may trip due to induced vibration.

2. Seismic Reactor trip at greater than or equal to 0.35g.

Immediate Operator Actions

1. Notify the Shift Foreman (Interim Site Emergency Coordinator).

2. Make a general survey of the instrumentation in the control room, with particular attention to the main annunciator and computer alarms.

3. Begin appropriate action to place the unit(s) into HOT STANDBY on a controlled basis.

4. Notify the RPM on shift to make preparations for entering Containment to conduct a quick inspection for fires.

Subsequent Actions

1. General

   a. Sound the Emergency Signal.

   b. Declare an ALERT.

   c. Establish the onsite emergency organization as specified in EP G-2 "Establishment of the Onsite Emergency Organization."

   d. Notify offsite personnel and agencies as specified in EP G-3 "Notification of Offsite Organizations."

2. 10CFR100 requires the unit be placed in a shutdown condition following earthquakes in excess of the OBE. Plant shutdown to COLD SHUTDOWN should commence at the direction of the Site Emergency Coordinator.

3. Subsequent Operator Action.

   a. Perform the same procedure as for a STRONG earthquake (0.1 to 0.2g).

4. Subsequent Power Production Engineer Actions

   a. Perform the same procedure as for a STRONG earthquake (0.1 to 0.2g).

5. Close out with verbal summary to offsite authorities followed by a written summary to NRC within 24 hours.

MAJOR EARTHQUAKE (GREATER THAN 0.6g's)

Symptoms

1. The "Seismic Instr System" main annunciator as activated (PK 15024).

2. The maximum acceleration indicated by the earthquake force monitor is pegged at 50%g.

3. The maximum acceleration on the SMP-1 playback strip chart is greater than 0.6g's.

4. Seismic reactor trip (PK 04-15).

Automatic Actions

Seismic reactor trip.

Immediate Operator Actions

1. Check reactor tripped and unit in HOT STANDBY. If not, trip reactor manually.

2. Notify the Shift Foreman (Interim Site Emergency Coordinator).

3. Make a general survey of the instrumentation in the control room, with particular attention to the main annunciator and computer alarms.

4. Notify the RPM on shift to make preparations for entering Containment to conduct a quick inspection for fires.

Subsequent Actions

1. General

   a. Sound site emergency signal.

   b. Declare a SITE EMERGENCY.

   c. Establish the onsite emergency organization as specified in EP G-2 "Establishment of the Onsite Emergency Organization."

   d. Notify offsite personnel and agencies in EP G-3 "Notification of Offsite Organizations."

2. 10CFR100 requires the unit be placed in a shutdown condition following earthquakes in excess of the OBE. Plant shutdown to COLD SHUTDOWN should commence at the direction of the Site Emergency Coordinator.

3. Subsequent Operator Actions

   a. Perform the same procedure as for a STRONG earthquake (0.1 to 0.2).

4. Subsequent Power Production Engineer Actions

   a. Perform the same procedure as for a STRONG earthquake (0.1 to 0.2g).

5. Close out with verbal summary to offsite authorities followed by a written summary to NRC within 24 hours.

REFERENCES

1. 10 CFR 100, Appendix A, Section VI (a) (3).

2. AEC Regulatory Guide 1.12, "Instrumentation for Earthquakes."

3. ANSI Standard N18.5, "Earthquake Instrumentation Criteria for Nuclear Power Plant."

4. Diablo Canyon FSAR, Section 3.7.

5. PGandE Drawing No. 443296, "Seismic Instrumentation."

6. PGandE Drawing No. 452417, "Diagram of Connections, Seismic Instrumentation System."

7. "Seismic Instrumentation System," Record Print No. DC683697.

8. NUREG-0610, "Draft Emergency Action Level Guidelines for Nuclear Power Plants," September 1979.

APPENDICES

1. Post-Earthquake Inspection Area Identification

2. Seismic Instrumentation Description and Post Earthquake Checklist

ATTACHMENTS

1. Form 18-9221, "Emergency Notification Record."

2. Form 18-9248, "Post-Earthquake Evaluation Summary."

3. Form 18-9249, "Post-Earthquake Level Indicator Check Lists" (3 pages).

4. Form 18-9250, "Post-Earthquake Area Inspection Check Lists" (10 pages).

5. Form 18-9251, "Post-Earthquake Surveillance Check List."

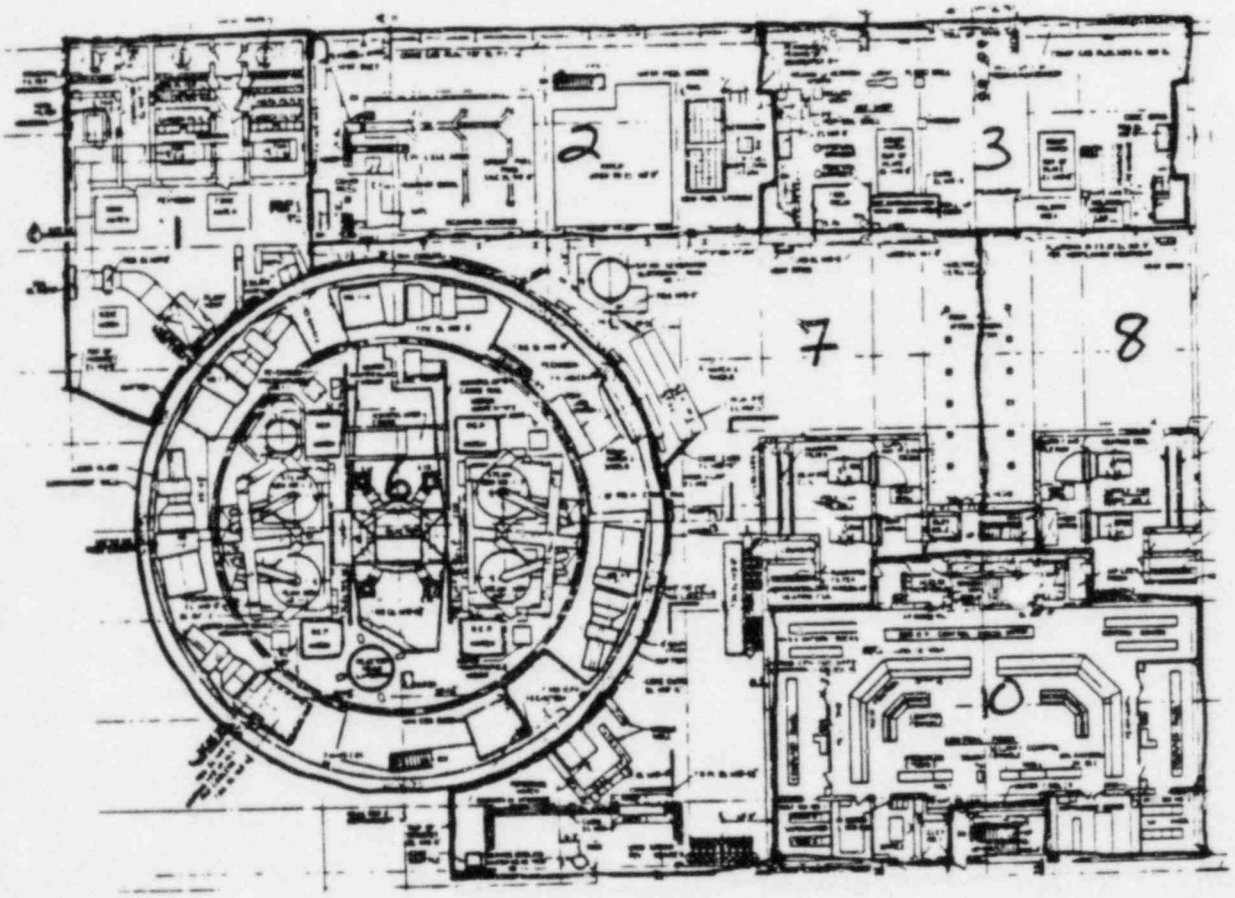
6. Form 18-9252, "Post-Earthquake Electrical Power Check List."

7. Form 18-10291, "Data Sheets for Peak Shock Recorders S/N 701, 710, 728."

8. Form 69-9283, "Data Sheet for Engdahl Peak Acceleration Recorder."

APPENDIX 1

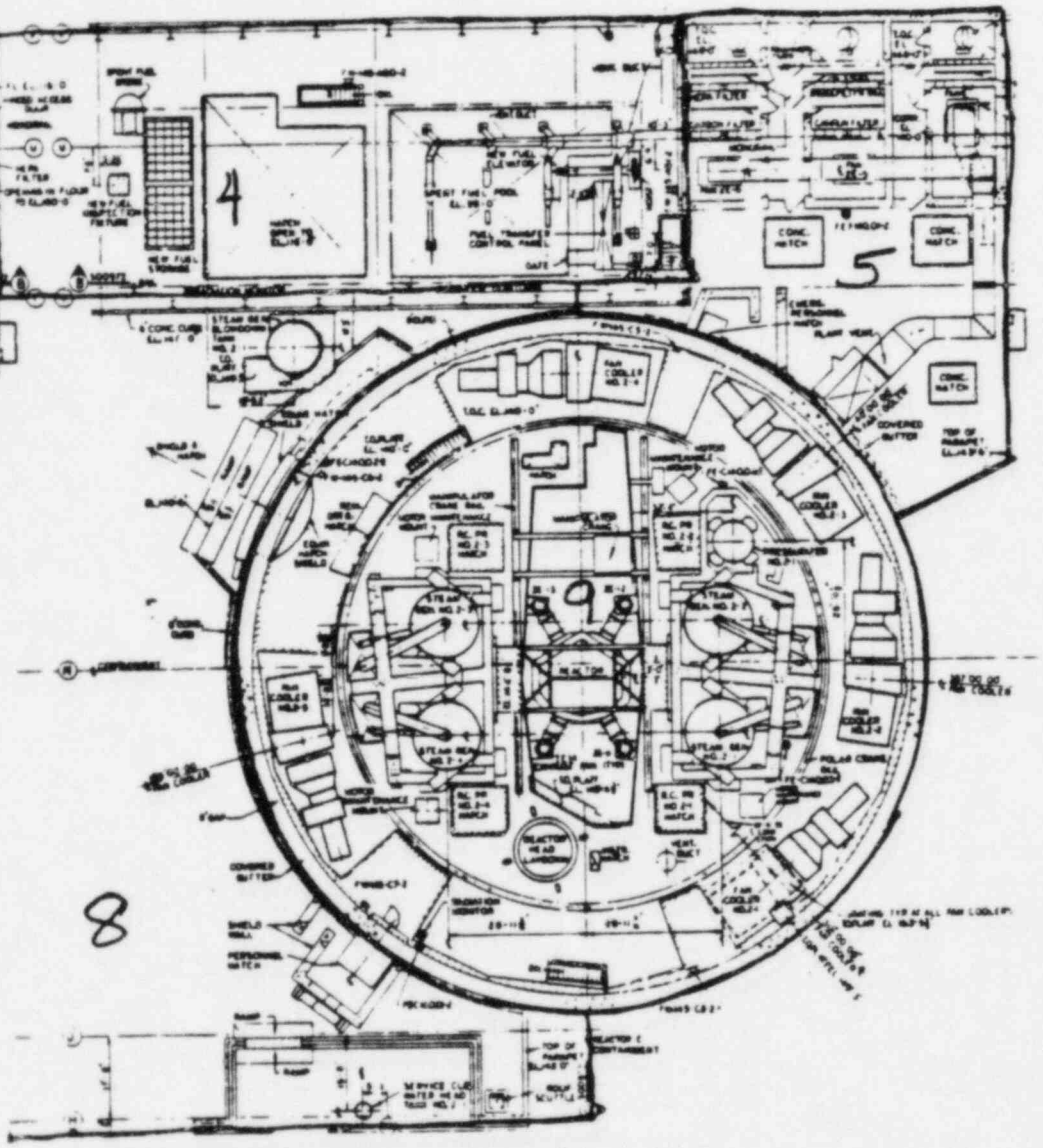
POST-EARTHQUAKE INSPECTION AREA IDENTIFICATION



10A - ROOF AREA AND EQUIPMENT ABOVE CONTROL ROOM (ELEV. 167')

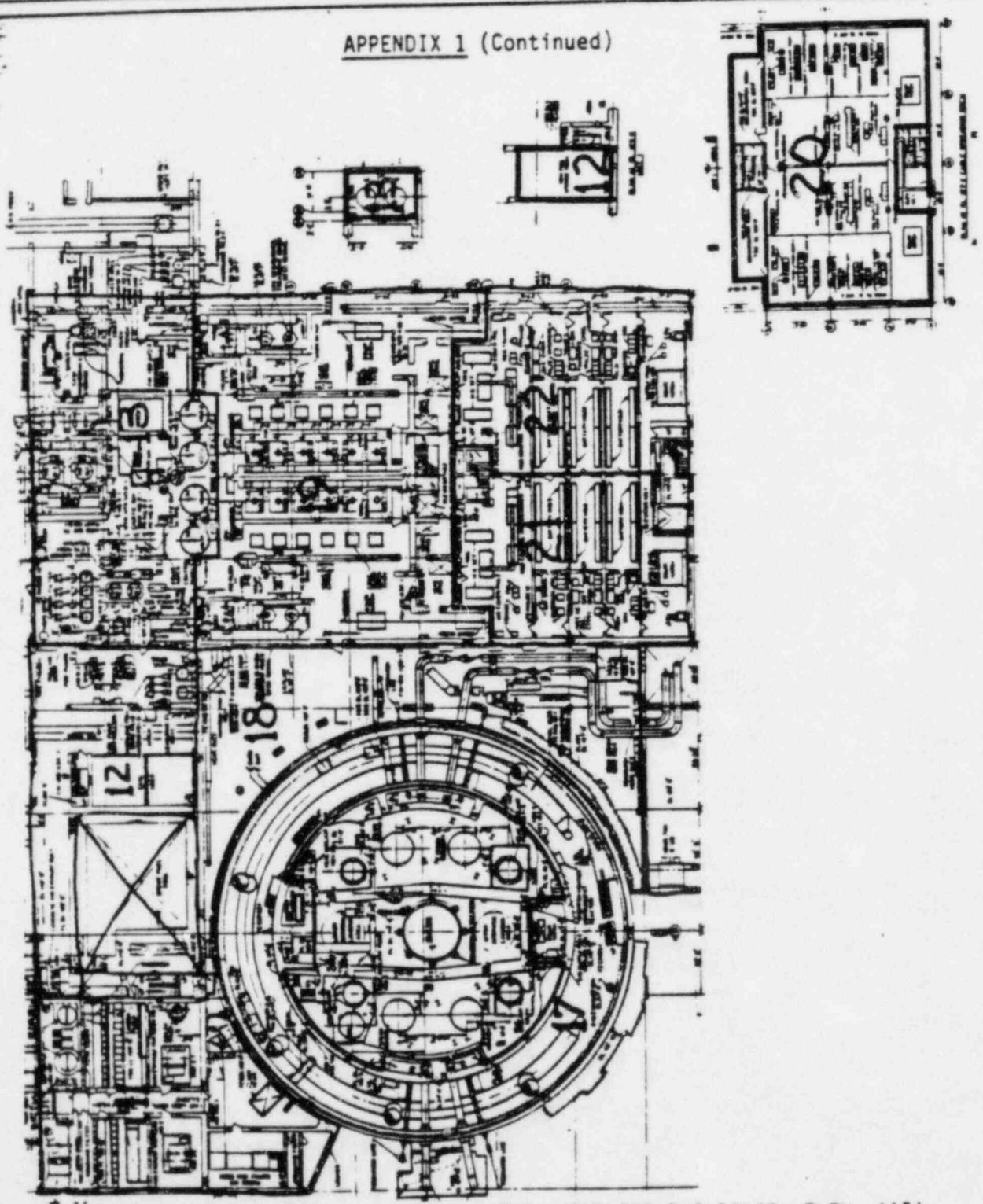
UNIT 1 - CONTAINMENT, AUXILIARY & FUEL HANDLING BUILDINGS, ELEV. 140'

APPENDIX 1 (Continued)



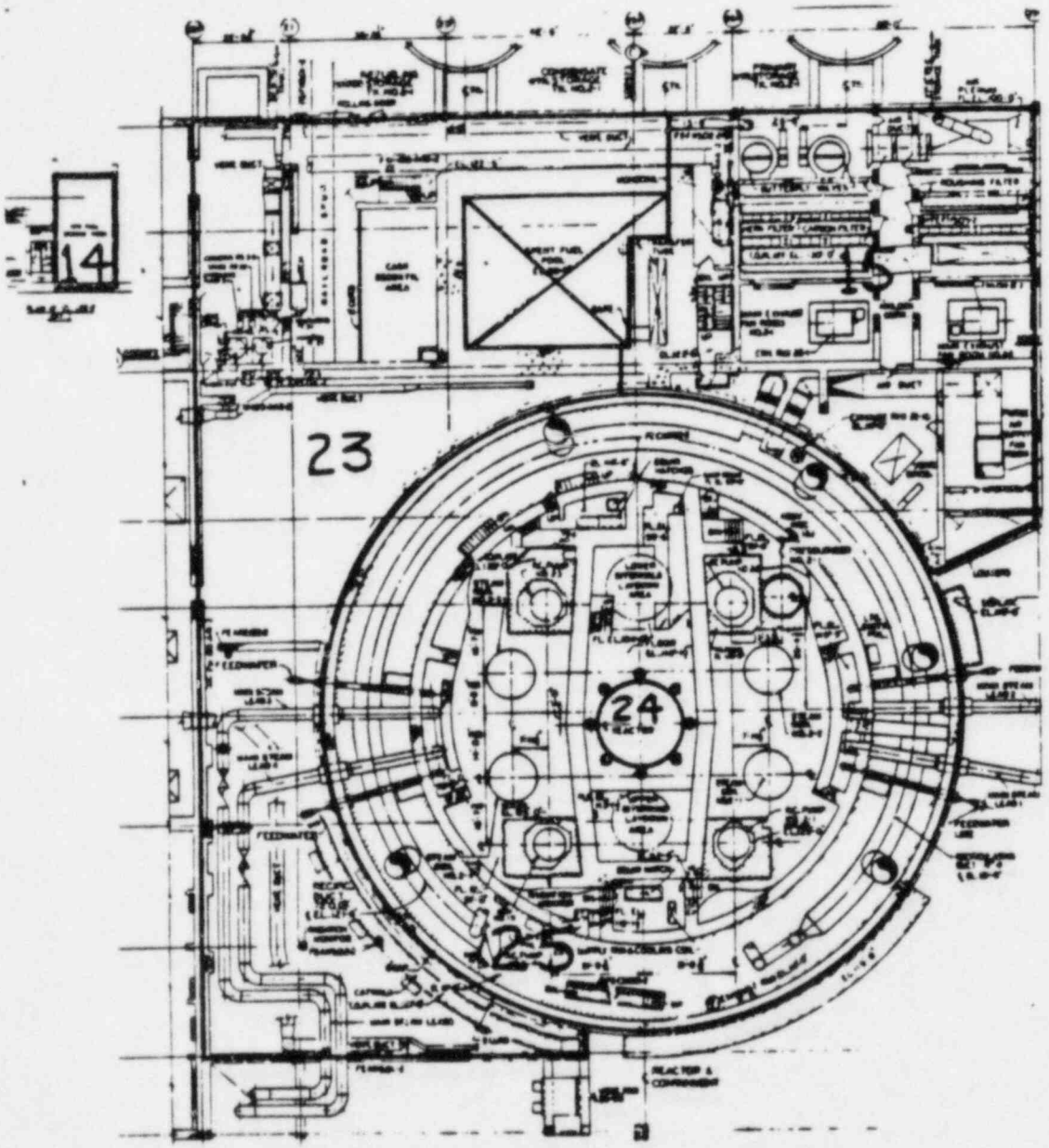
UNIT 2 - CONTAINMENT & FUEL HANDLING BUILDINGS, ELEV. 140'

APPENDIX 1 (Continued)



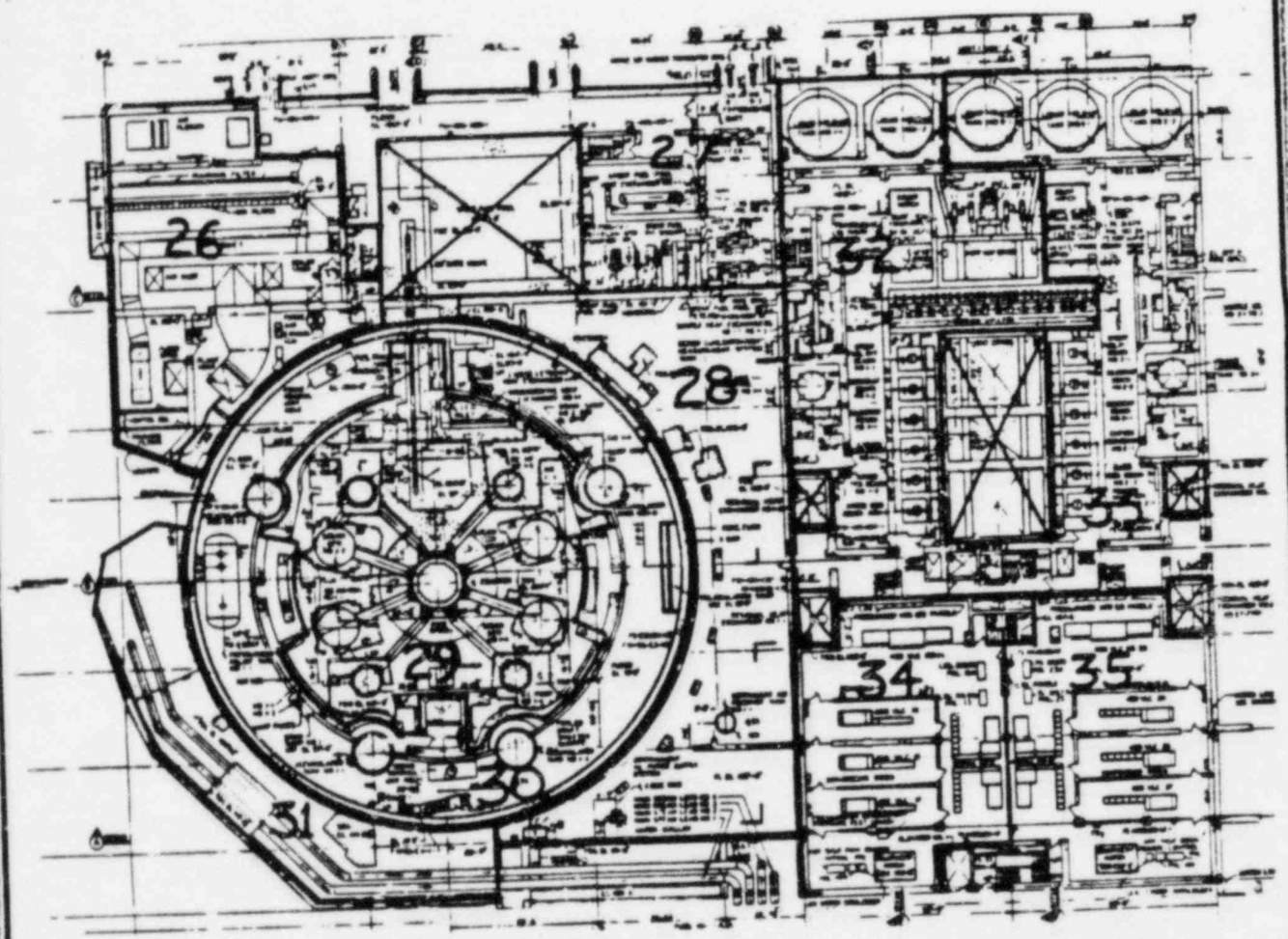
UNIT 1 - CONTAINMENT, AUXILIARY & FUEL HANDLING BUILDINGS, ELEV. 115'

APPENDIX 1 (Continued)



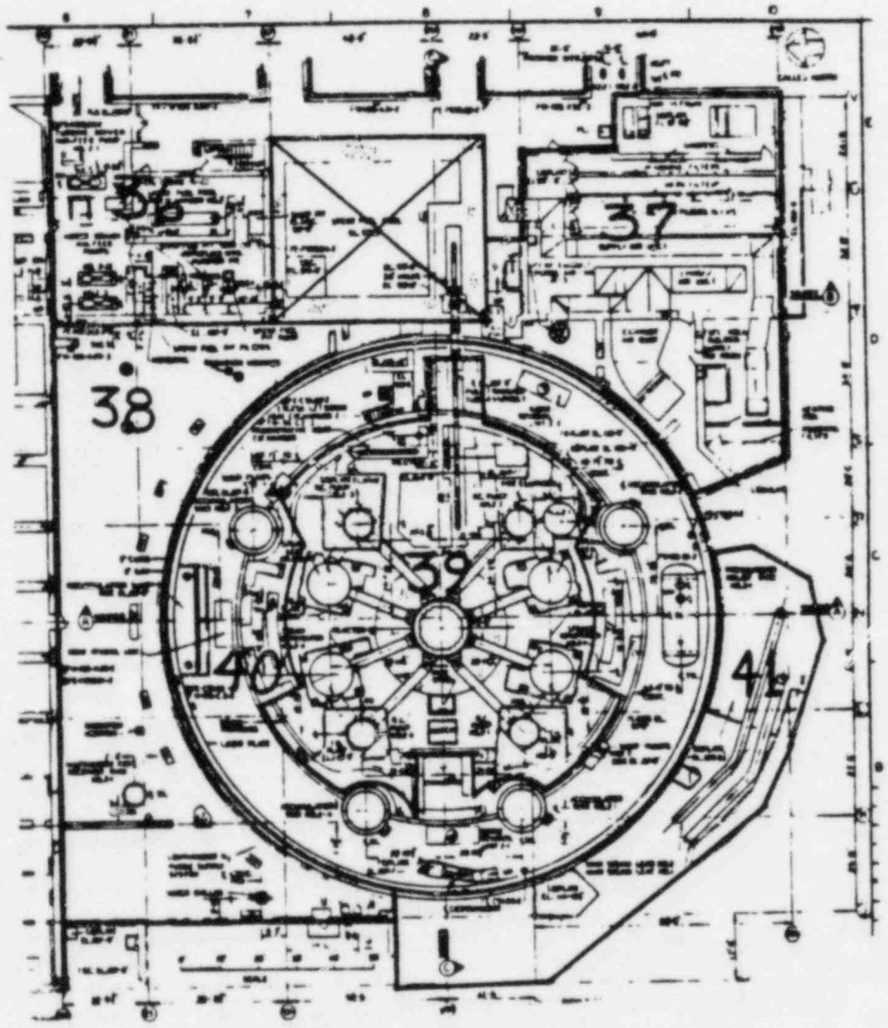
UNIT 2 - CONTAINMENT, & FUEL HANDLING BUILDINGS, ELEV. 115'

APPENDIX 1 (Continued)



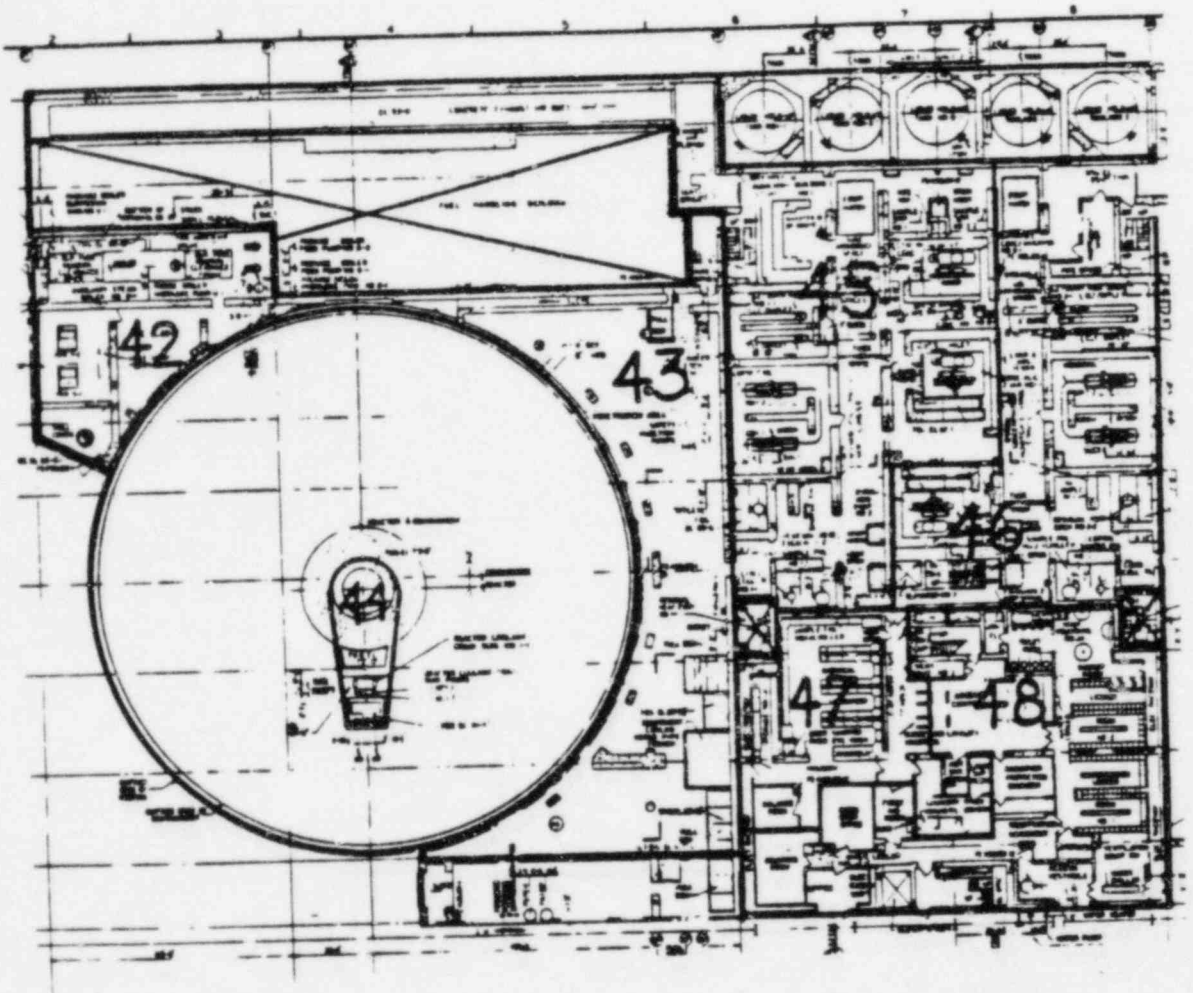
UNIT 1 - CONTAINMENT, AUXILIARY & FUEL HANDLING BUILDINGS,
ELEV. 91' & 100'

APPENDIX 1 (Continued)



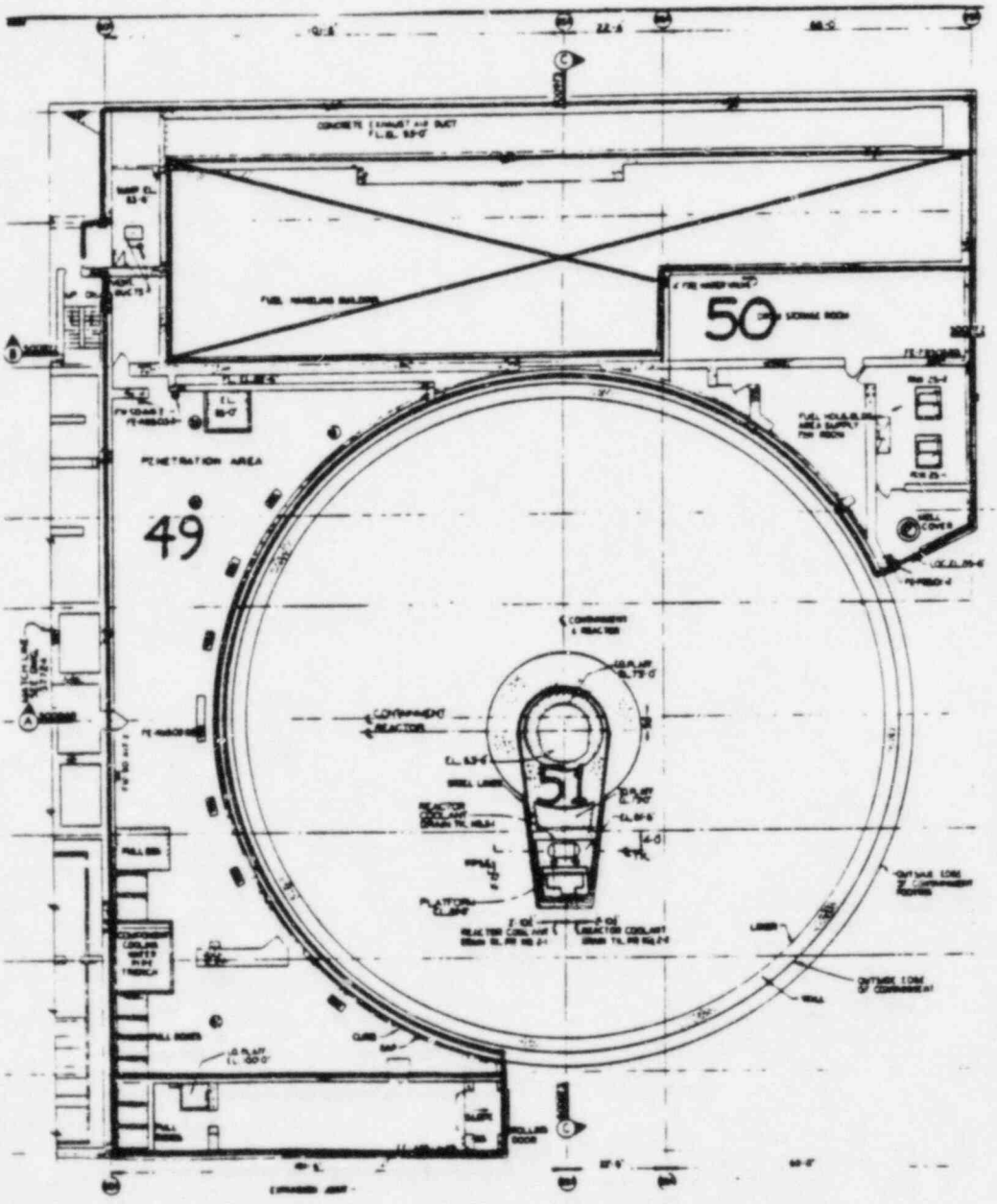
UNIT 1 - CONTAINMENT, & FUEL HANDLING BUILDINGS, ELEV. 85', 91', & 100'

APPENDIX 1 (Continued)



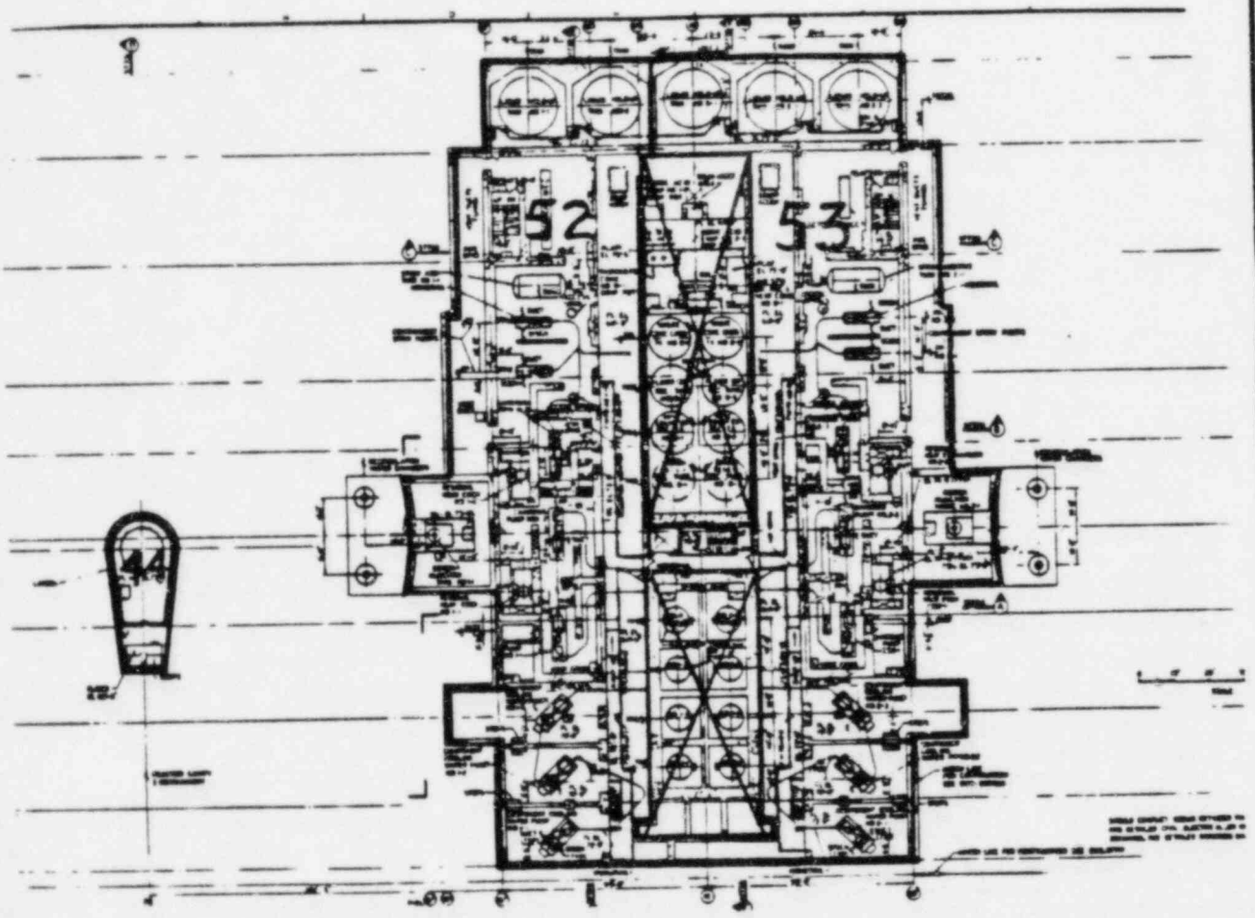
UNIT 1 - CONTAINMENT & AUXILIARY BUILDINGS, ELEV. 85'

APPENDIX 1 (Continued)



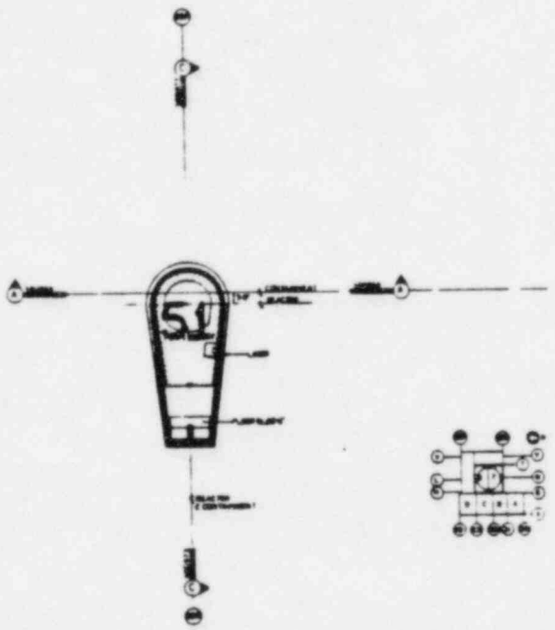
UNIT 2 - CONTAINMENT & FUEL HANDLING BUILDINGS, ELEV. 85'

APPENDIX 1 (Continued)



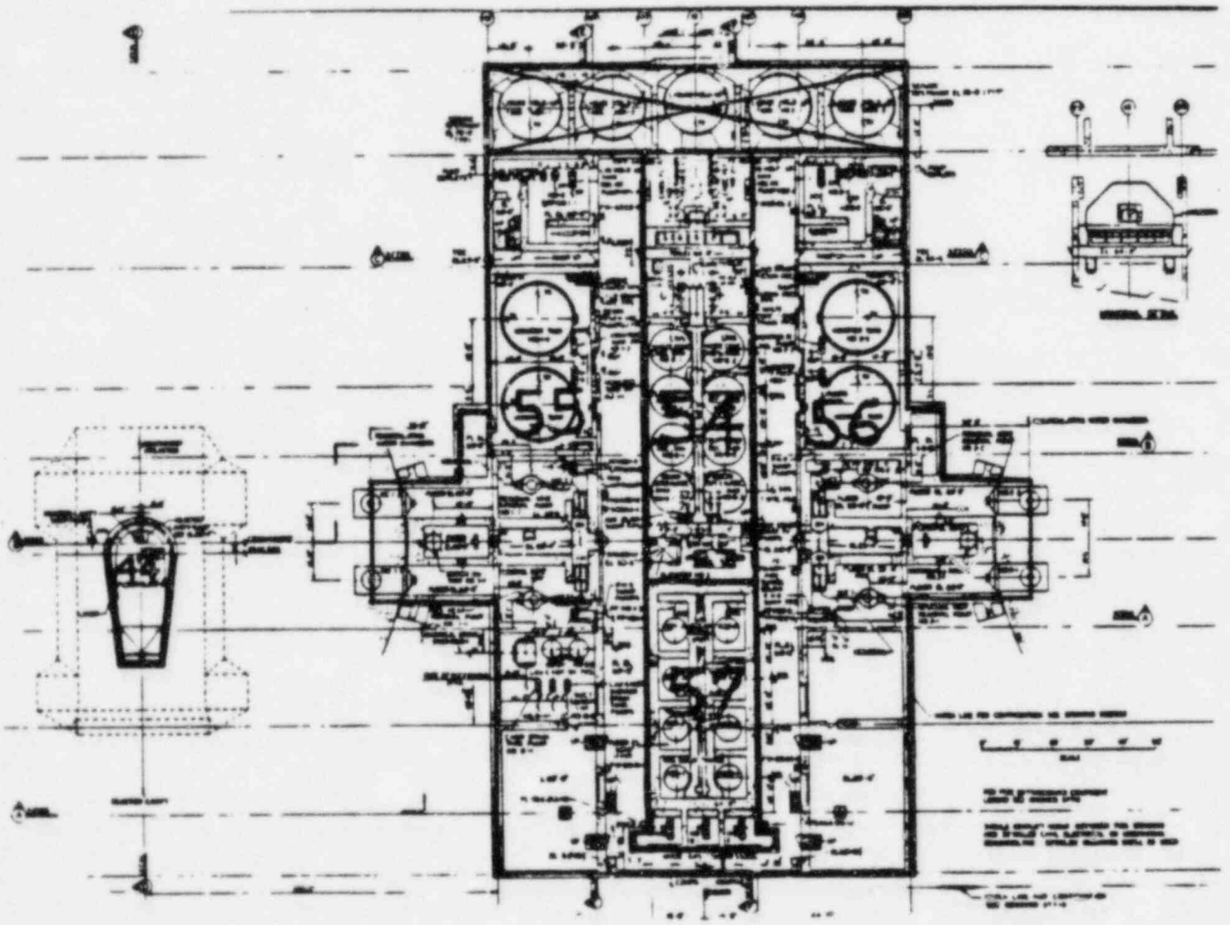
UNIT 2 - CONTAINMENT & AUXILIARY BUILDINGS, ELEV. 73'

APPENDIX 1 (Continued)



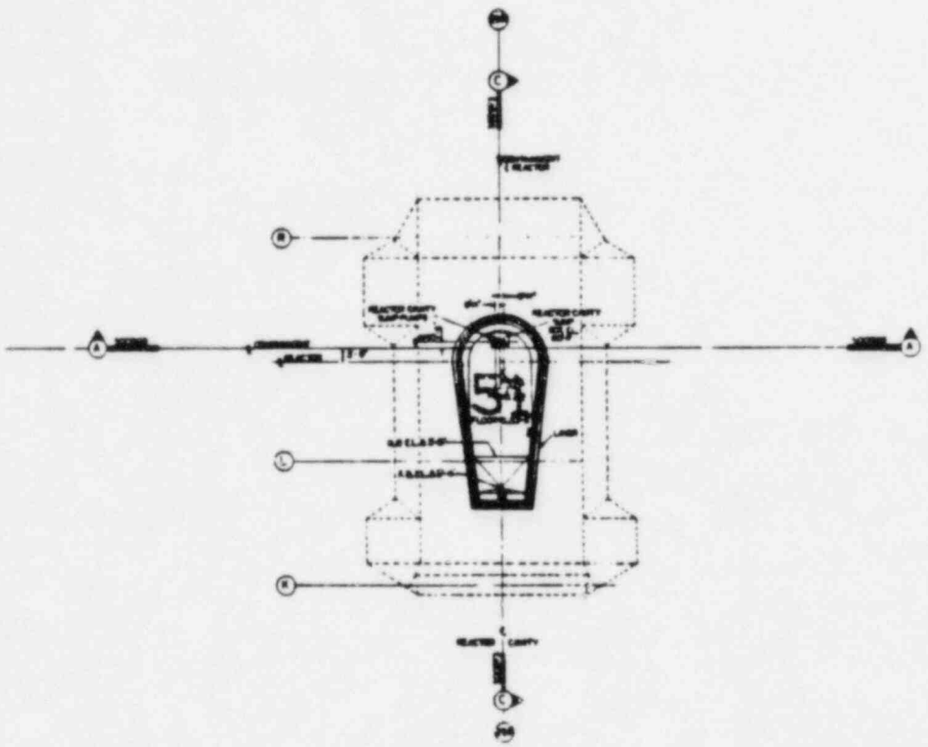
UNIT 2 - CONTAINMENT, ELEV. 61', 73'

APPENDIX 1 (Continued)



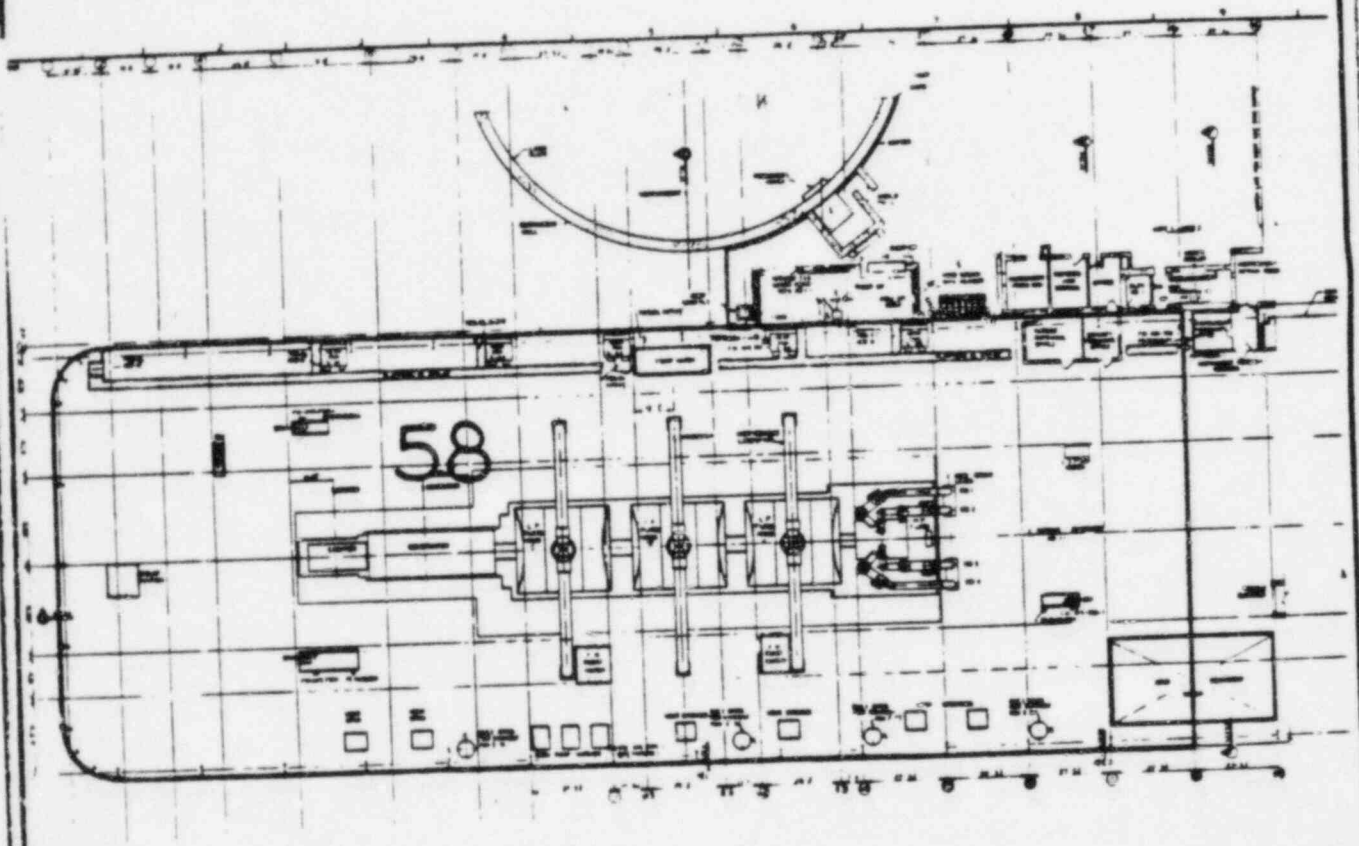
UNIT 1 - CONTAINMENT & AUXILIARY BUILDINGS, ELEV. 60' & 64'

APPENDIX 1 (Continued)



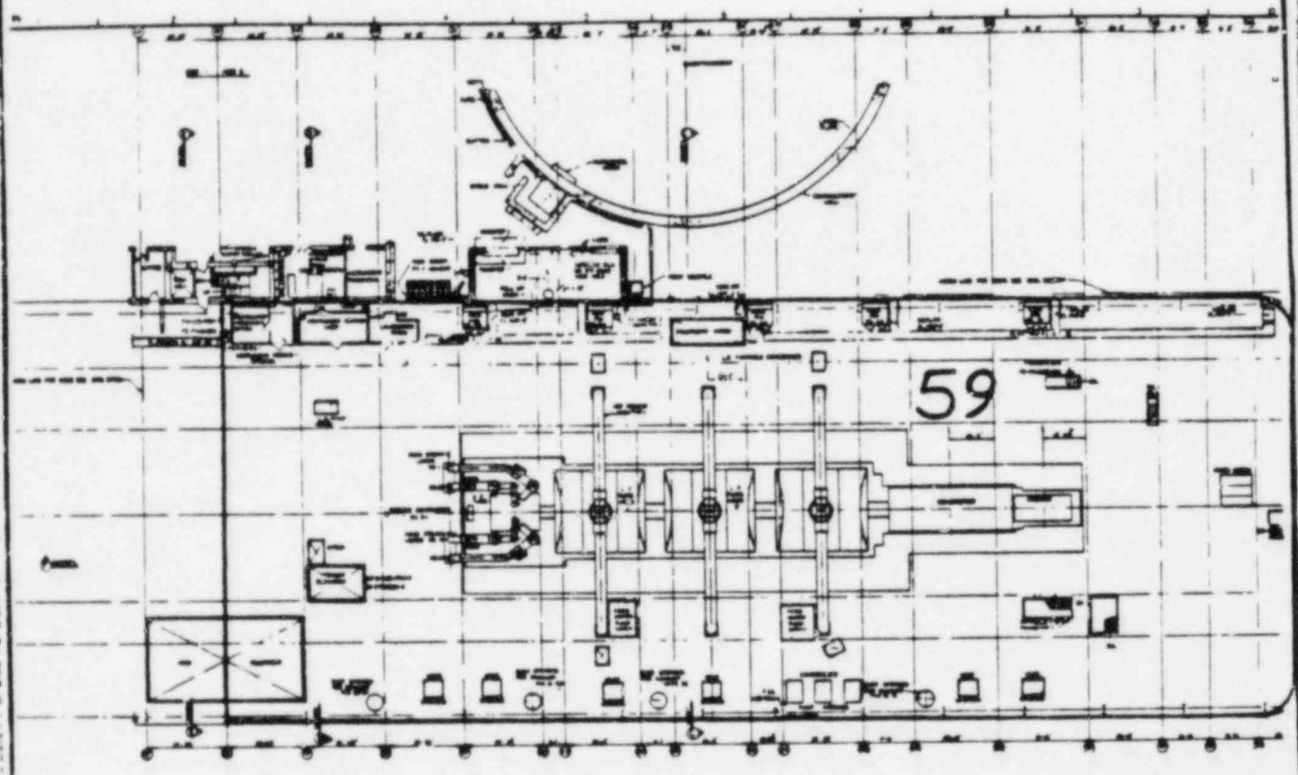
UNIT 2 - CONTAINMENT & AUXILIARY BUILDING, ELEV. 60' & 64'

APPENDIX 1 (Continued)



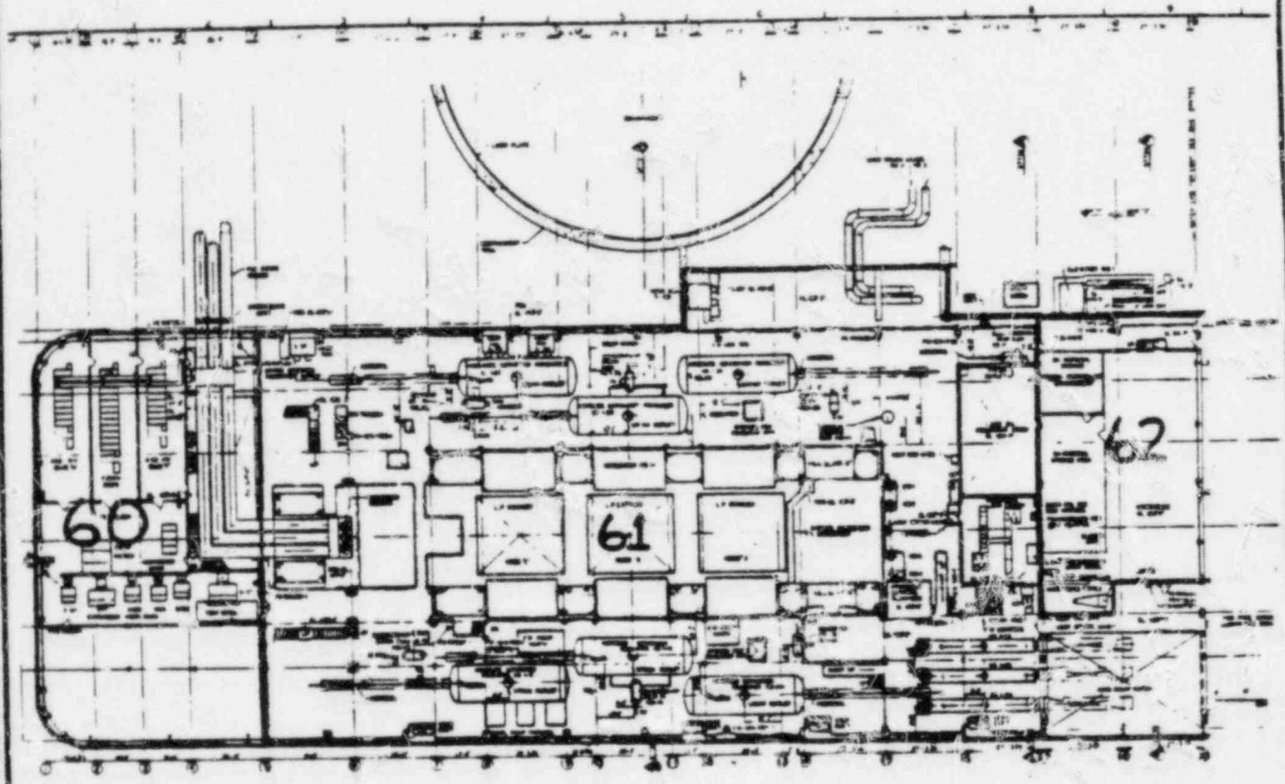
UNIT 1 - TURBINE BUILDING, ELEV. 140'

APPENDIX 1 (Continued)



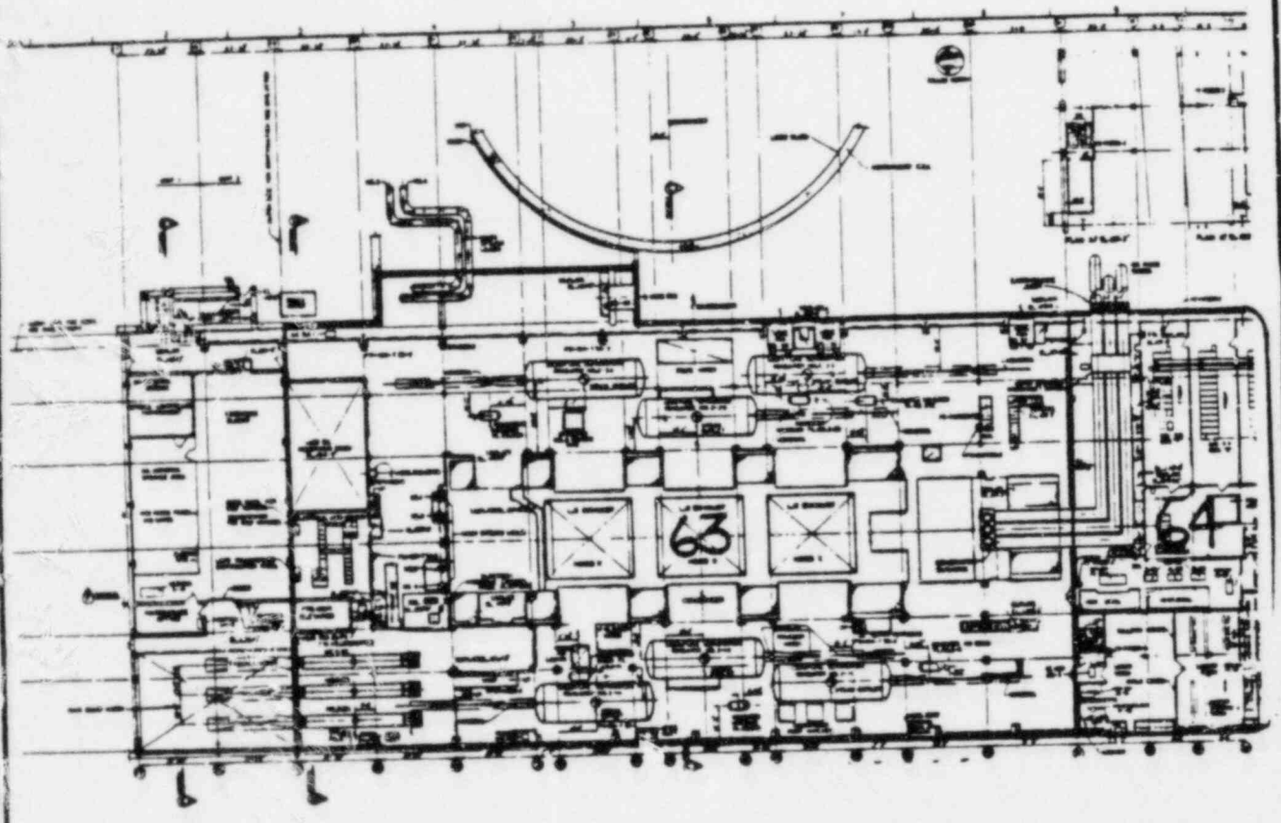
UNIT 2 - TURBINE BUILDING, ELEV. 140'

APPENDIX 1 (Continued)



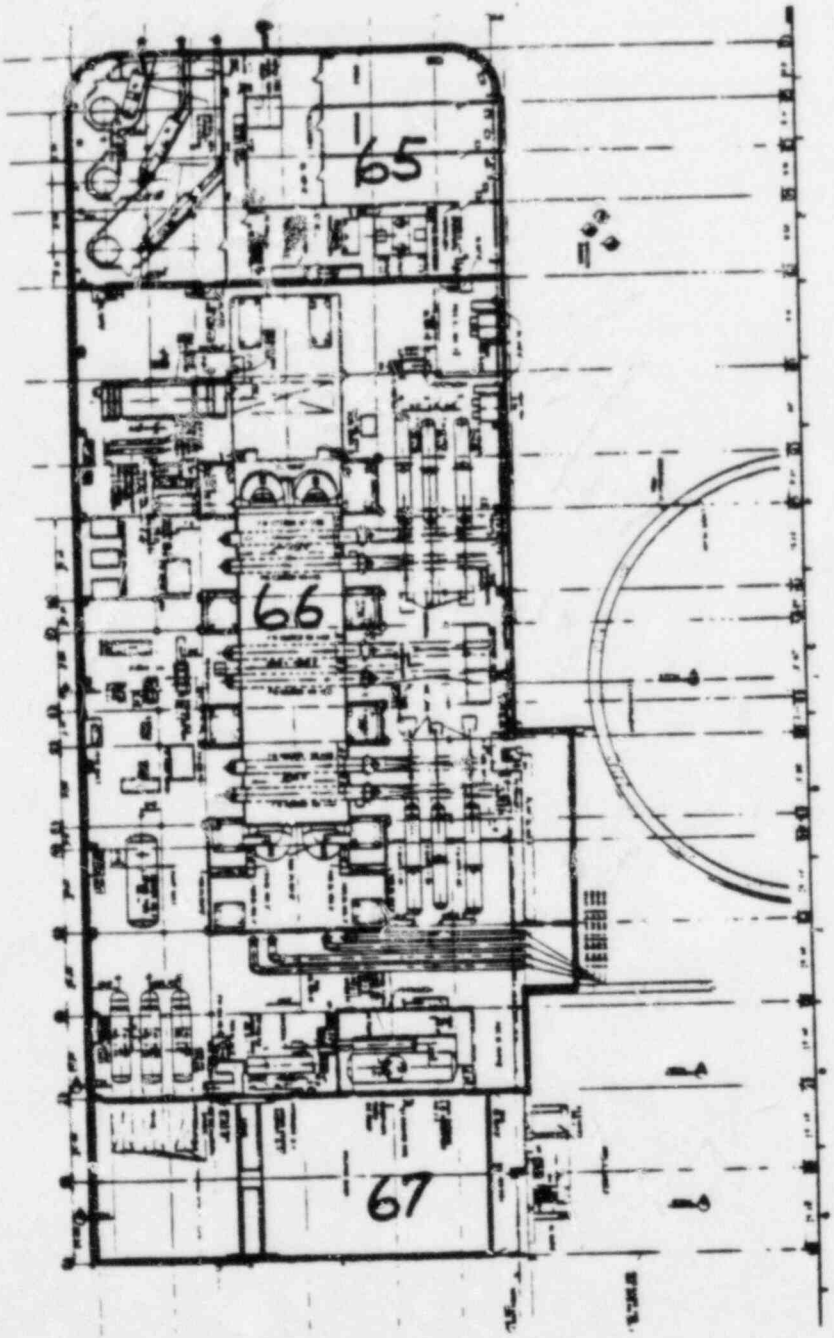
UNIT 1 - TURBINE BUILDING, ELEV. 119'

APPENDIX 1 (Continued)



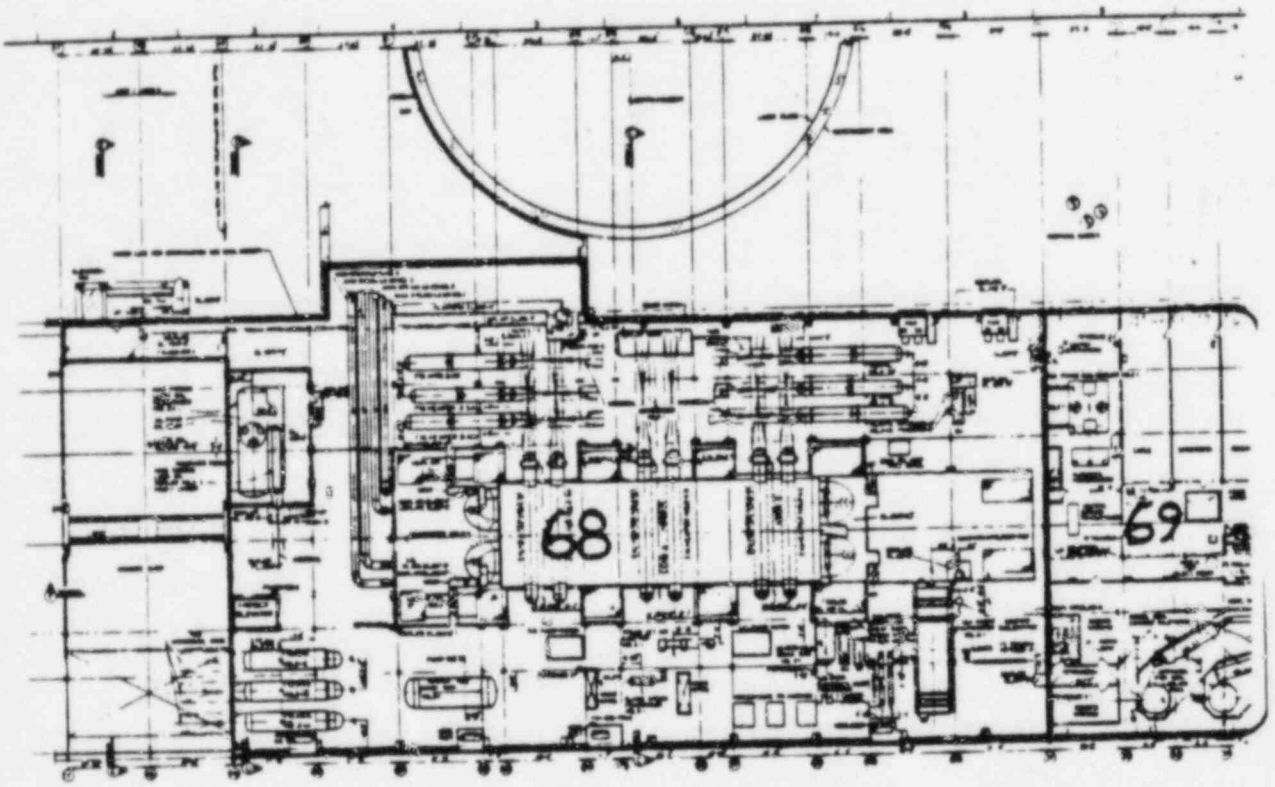
UNIT 2 - TURBINE BUILDING, ELEV. 119'

APPENDIX 1 (Continued)



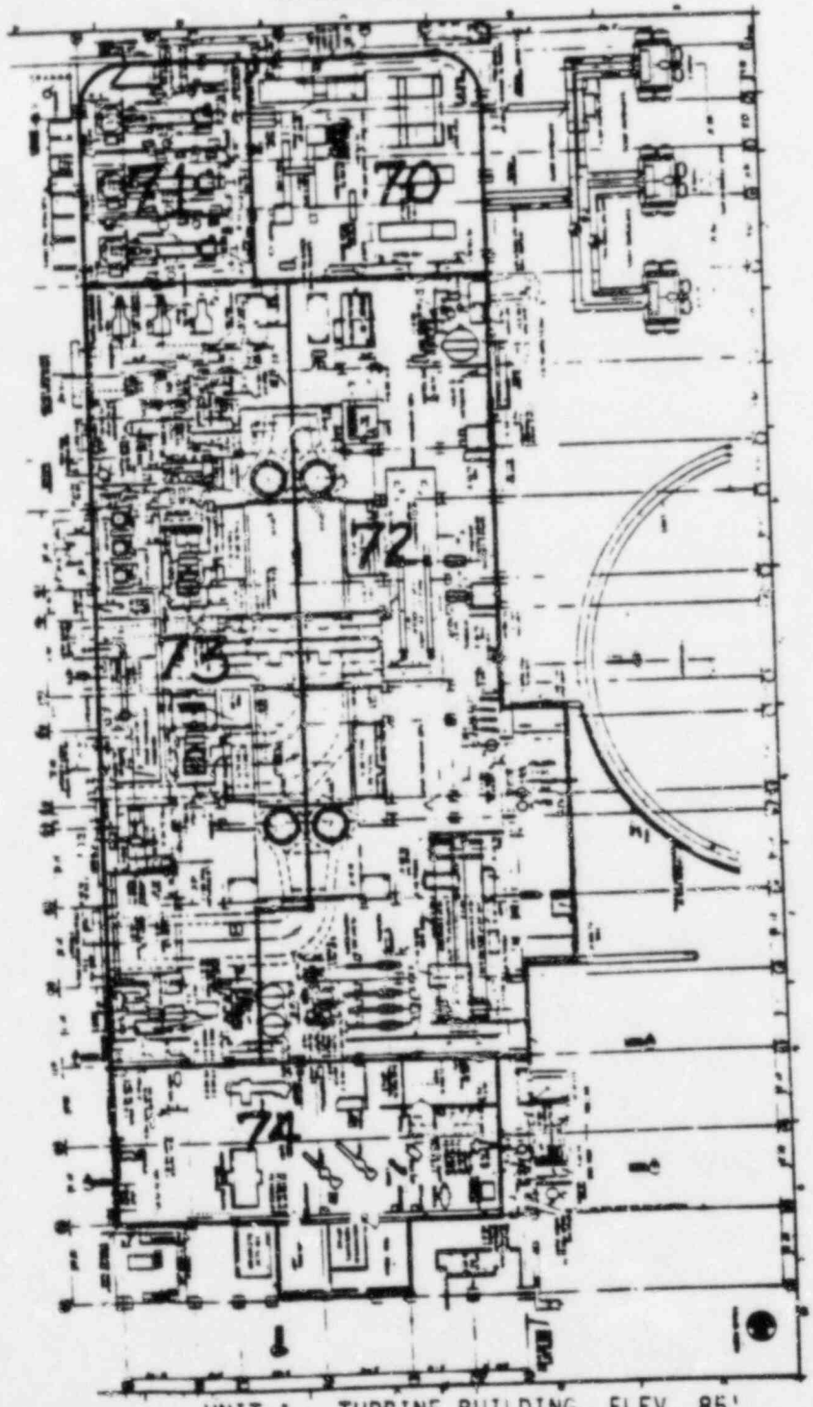
UNIT 1 - TURBINE BUILDING, ELEV. 104'

APPENDIX 1 (Continued)



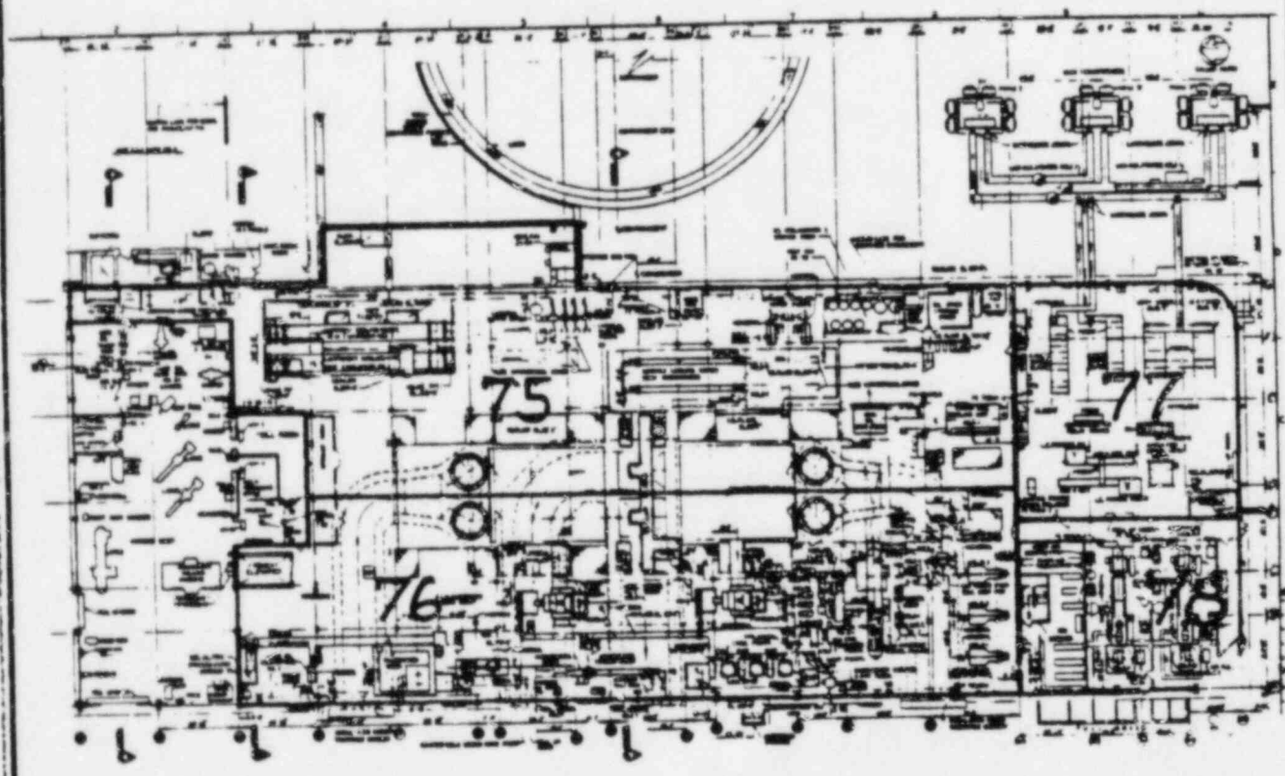
UNIT 2 - TURBINE BUILDING, ELEV. 104'

APPENDIX 1 (Continued)



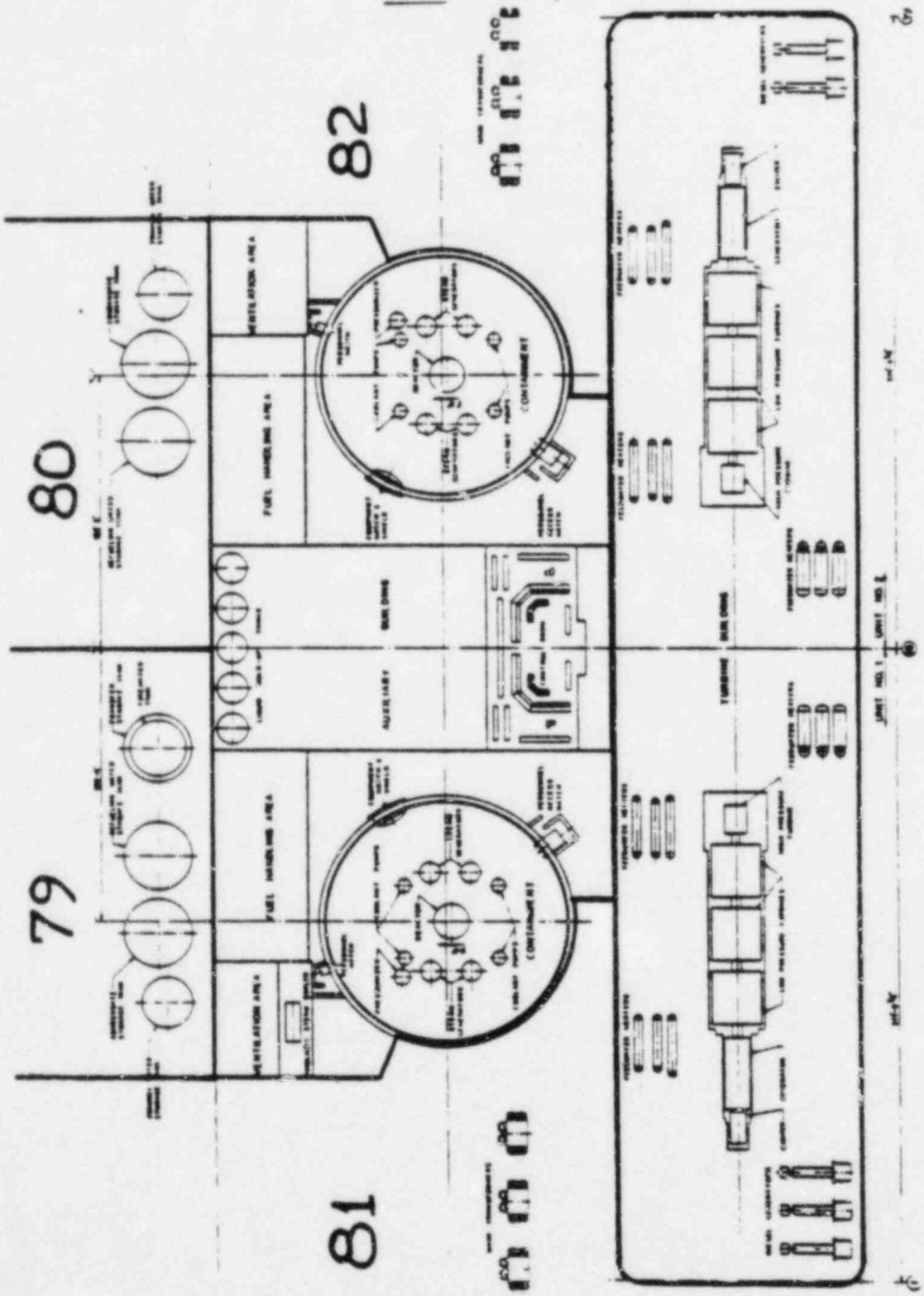
UNIT 1 - TURBINE BUILDING, ELEV. 85'

APPENDIX 1 (Continued)



UNIT 2 - TURBINE BUILDING, ELEV. 85'

APPENDIX 1 (Continued)



UNITS 1 & 2 - LAYOUT

APPENDIX 2

SEISMIC INSTRUMENTATION DESCRIPTION AND POST EARTHQUAKE CHECKLIST

1. GENERAL

There are three types of seismic sensors: 1) Engdahl peak shock recorders, 2) Engdahl peak acceleration recorders, and 3) Kinemetrics triaxial accelerometers. The different sensors are provided at plant locations as shown on PGandE drawing 443296, 443043, and 443044.

INSTRUMENTS AND SENSOR LOCATIONS	MEAS. RANGE	NO. OF INSTR.	DWG. DESIG.
1. Triaxial Response-Spectrum Recorders (Engdahl)			
a. Containment Base Slab, El. 89, 180°	1.6-90g 2-25.4 Hz	1	
2. Triaxial Peak Accelographs (Engdahl)			
a. Containment Base Slab, El. 89, 180°	±2g	1	3b
b. Top Unit 1 Containment, El. 303.5, 225°	±5g	1	3a
c. Intake near ASW Pump 1-1 Bay, El. 2	±2g	1	3f
d. Turbine Building, El. 85, Machine Shop	±2g	1	3e
e. Auxiliary Building, El. 140, Hot Shop	±2g	1	3k
f. Auxiliary Building, El. 140, near Control Room Door	±2g	1	3m
3. Triaxial Time-History Accelographs (Kinemetrics)			
a. Unit 1 Containment Base Slab, El. 89, 180°	±1g	1	1b
b. Top Unit 1 Containment, El. 303.5, 225°	±2g	1	1a
c. Auxiliary Building, El. 64	±1g	1	1p

DISCUSSION

1. Triaxial Response - Spectrum Recorders (Engdahl)

   Each of these units contains twelve spring steel reeds of different lengths and weights. A diamond tipped stylus is attached to the free end of each reed. A flat plate is mounted adjacent to each stylus such that in the event of an earthquake, the vibrating stylus inscribes a permanent record of its deflection on the plate. Since each reed has a different resonant frequency, this arrangement provides the earthquake acceleration (as measured by reed displacement) at twelve different frequencies.

   There are actually three individual shock recorder units on the containment base slab with one unit oriented along the three perpendicular (x, y, z) axes.

2. Triaxial Peak Accelerographs or Peak Acceleration Recorder (Engdahl PAR's)

   The accelerograph records by scribing a line on the surface of a record plate. Three record plates are included in each unit, oriented along the three perpendicular axes. The lines are inscribed by a contact diamond stylus, one for each axis. The peak acceleration is measured as the maximum deflection from the zero baseline.

3. Triaxial Time - History Accelerographs (Kinemetrics)

   Each triaxial accelerometer unit contains three accelerometers oriented along the three perpendicular axes. Each accelerometer is a damped spring-mass device which is fed to a mechanical-electrical transducer. The signals from the accelerometers are fed to one or both of two units (see Figure 1). The first is a SMA-3 magnetic tape cassette recording system. This system has a starter unit which automatically starts the cassettes at a preset level (0.01 g) and shuts it off when the acceleration drops below this level (the unit is then ready for a succeeding earthquake). The tapes can be played back on a SMP-1 playback which is rack mounted with the SMA-3 unit. This provides a strip chart record of the acceleration.

The base slab accelerometer output also goes to an earthquake force monitor unit (EFM-1), which simply contains three indicators (one each axis) which read out in percent of g. The indicator pointer is held at its maximum reading until reset, so peak acceleration can be determined.

POST - EARTHQUAKE CHECK

NOTE: Spare cassettes and plates are stored in the chart room adjacent to the control room.

1. Replace the cassettes in the SMA-3 recording system following the retrieval instructions on page 9 of Record No. 683697-15. Insure that a post-earthquake calibration is put on tape before removal. Play back the cassettes and record the peak acceleration. Since the SMA-3 is a higher class instrument than EFM-1, base subsequent action on the peak "base-slab" acceleration recorded by the SMA-3 if this reading is greater than the EFM-1. Keep the strip charts with the other records of the quake. Send the cassettes to the Supervising Nuclear Generation Engineer (Nuclear Operations) in the G.O. Department of Nuclear Plant Operation with instructions to pass on to the Chief Civil Engineer.

   If the acceleration on the EFM has greater 0.5 g's, determine the actual peak acceleration from unit containment base slab as follows:

   a. Play back the tapes on the position #1 of the play back recorder.

   b. Find the highest peak (either positive or negative) for the highest acceleration.

   c. Convert to g's. The scaling on this range is ±1.0g. (For range 2 ±0.5 g's; for range 4 ±0.25 g's; for range 10 ± 0.1 g's)

2. If the maximum acceleration indicated by the earthquake force monitor is greater than 0.1g, replace the recording plates in the Engdahl peak shock recorder and peak acceleration recorders (PAR's).

3. Measure to the nearest hundredth of an inch the length of the scribe marks (maximum distance of the scratched record from the zero line) on each plate from the peak shock recorder using the

magnifying scale provided. Record the length of the scribe on the appropriate attached data sheet noting the recorder serial number and the reed number. Convert the scribe length in inches to the equivalent static acceleration by multiplying by the acceleration sensitivity. Record this value on the data sheet. Forward one copy of the data sheet, as well as the plates, to the Department of Nuclear Plant Operations for transmittal to the Chief Civil Engineer. Retain the original copy for the plant records.

4. When removing or installing PAR record plates, use the following procedure:

   a. Remove the record access plugs from the PAR housing.

   b. Remove or install the PAR record plates.

CAUTION: It is important not to move the scribe arms of the PAR in the measurement axis direction while removing or installing PAR record plates. This will avoid false indications on the record plates.

---

   c. Record the serial numbers of all PAR record plates and corresponding PAR location following removal on the data sheet.

   d. Record the time and date of removal on the PAR record plates and data sheet.

5. Measure, to the nearest thousandth of an inch, the length of the scribe mark (maximum distance of the scratched record from the zero line) on each record plate from the PAR's using the magnifying scale provided. Record the length of the scribe on the appropriate attached data sheet noting the PAR number and the record plate serial numbers. Convert the scribe length, in inches, to the equivalent static acceleration by multiplying by the acceleration sensitivity of the PAR. Record this value on the data sheet. Forward one copy of the data sheet, as well as the PAR record plates, to the Department of Nuclear Plant Operation, Supervising Nuclear Generation Engineer, for transmittal to the Chief Civil Engineer. Retain the original copy for the plant records.

The nominal acceleration sensitivities for Engdahl PAR's model number PAR400-1 (2g) and PAR400-2 (5g) are 10 g/inch and 25 g/inch, respectively.*

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* Based on a nominal full scale deflection of 0.200 inches.

18-9221 7 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

POST-EARTHQUAKE EVALUATION SUMMARY

1. DATE/TIME OF QUAKE _____/_____

2. POWER LEVELS: UNIT 1 _____ MWE, UNIT 2 _____ MWE

3. PEAK ACCELERATION (FROM EFM-1)

   NORTH-SOUTH _____G: EAST-WEST _____G; VERTICAL _____G

4. CHECK LISTS

	TIME / INITIALS
a. Seismic Instrument Procedure	_____/_____
b. Level Indicator Check List	_____/_____
c. Surveillance Test Check List	_____/_____
d. Electrical Power Check List	_____/_____
e. Area Inspection Check List	_____/_____

REMARKS: _____

_____

_____

_____

5. Epicenter: _____ Magnitude _____

   Obtain day after the earthquake from U.C. Berkeley Seismographic Station - (415) 642-2160.

Reviewed by:

Power Production Engineer _____

Date/Time _____/_____

18-9249 10/77 (50)

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

POST-EARTHQUAKE LEVEL INDICATOR CHECK LIST

UNIT ____ DATE _____

INSTRUCTIONS: Check the indicators twice, at about 15 minutes to 1 hour apart. Inform the Shift Foreman of any reading outside of its normal range, or which changes by more than expected in the interval.

	LEVEL / TIME	
	Reading 1	Reading 2
UNIT 1		
Vertical Board 1		
LI-139 CCW Surge Tank	____/____	____/____
LI-140 CCW Surge Tank	____/____	____/____
LI-930 Spray Additive Tank	____/____	____/____
LI-931 Spray Additive Tank	____/____	____/____
LI-940 Containment Receiver Sump	____/____	____/____
LI-941 Containment Receiver Sump	____/____	____/____
Vertical Board 2		
LI-920 Refueling Water S.T.	____/____	____/____
LI-921 Refueling Water S.T.	____/____	____/____
LI-921 Refueling Water S.T.	____/____	____/____
LI-112 Volume Control Tank	____/____	____/____
LI-149 Primary Water Storage Tank	____/____	____/____
Vertical Board 3		
LI-148 Condensate Storage Tank	____/____	____/____
LI-147 Transfer Tank	____/____	____/____
LI-144 Raw Water Res. 01A	____/____	____/____
LI-145 Raw Water Res. 01B	____/____	____/____
LI-148 Fire Water S.T.	____/____	____/____
COMMON		
Aux. Bldg. Control Panel		
LI-180 Monitor Tank 1-1	____/____	____/____
LI-181 Monitor Tank 1-2	____/____	____/____
LI-188 RCDT 1-1	____/____	____/____
LI-60 Containment Sump 1-1	____/____	____/____
LI-61 Containment Sump 1-2	____/____	____/____
LI-62 Reactor Cavity Sump 1-1	____/____	____/____
LI-229 Waste Conc. Holding Tank	____/____	____/____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

POST-EARTHQUAKE LEVEL INDICATOR CHECK LIST

	LEVEL / TIME	
	Reading 1	Reading 2
Aux. Bldg. Control Panel (Cont.)		
LI-170 Liquid Holdup Tank 1-1	/	/
LI-168 Liquid Holdup Tank 1-2	/	/
LI-167 Liquid Holdup Tank 0-1	/	/
LI-168 Liquid Holdup Tank 2-1	/	/
LI-170 Liquid Holdup Tank 2-2	/	/
LI-165 Conc. Holding Tank	/	/
LI-158 Equip. Drain Rec. 0-1	/	/
LI-160 Equip. Drain Rec. 0-2	/	/
LI-162 Floor Drain Rec. 0-1	/	/
LI-164 Floor Drain Rec. 0-2	/	/
LI-180 Monitor Tank 2-1	/	/
LI-181 Monitor Tank 2-2	/	/
LI-188 RCDT 2-1	/	/
LI-60 Containment Sump 2-1	/	/
LI-61 Containment Sump 2-2	/	/
LI-62 Reactor Cavity Sump 2-1	/	/
UNIT 2		
Vertical Board 1		
LI-139 CCW Surge Tank	/	/
LI-140 CCW Surge Tank	/	/
LI-930 Spray Additive Tank	/	/
LI-931 Spray Additive Tank	/	/
LI-940 Containment Receiver Sump	/	/
LI-941 Containment Receiver Sump	/	/
	/	
Vertical Board 2		
LI-920 Refueling Water Storage Tank	/	/
LI-921 Refueling Water Storage Tank	/	/
LI-922 Refueling Water Storage Tank	/	/
LI-112 Volume Control Tank	/	/
LI-149 Primary Water Storage Tank	/	/

18-9249 10/77 (50)

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

POST-EARTHQUAKE LEVEL INDICATOR CHECK LIST

	LEVEL / TIME	
	Reading 1	Reading 2
Vertical Board 3		
LI-148 Condensate Storage Tank	____/____	____/____
LI-147 Transfer Tank	____/____	____/____
LI-144 Raw Water Res. 01A	____/____	____/____
LI-145 Raw Water Res. 01B	____/____	____/____
LI-148 Fire Water Tank	____/____	____/____

Data Taken By: _____

REMARKS: _____

_____

_____

Reviewed By:

Shift Foreman: _____ Date/Time ____/____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

CONTAINMENT (OUTSIDE MISSILE SHIELD)

UNIT 1	CHECKED BY	TIME/DATE
AREA - 6* (ELEV. 140' & ABOVE) INCLUDING DOME & LINEAR, SPRAY HDRS. & PIPING, ETC.		/
AREA - 17 (ELEV. 117')		/
AREA - 30 (ELEV. 91')		/

UNIT 2	CHECKED BY	TIME/DATE
AREA - 9 (ELEV. 140' & ABOVE) INCLUDING DOME & LINER, SPRAY HDRS. & PIPING, ETC.		/
AREA - 25 (ELEV. 117')		/
AREA - 40 (ELEV. 91')		/

REMARKS: _____

REVIEWED BY:

SHIFT FOREMAN _____

TIME/DATE _____/_____

* Area designations refer to Attachment 1 to Emergency Procedure M-4.

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST
CONTAINMENT (INSIDE MISSILE SHIELD)

NOTE: To be completed only if Unit is shut down.

UNIT 1	CHECKED BY	TIME/DATE
AREA - 16* (ELEV. 117')		/
AREA - 29 (ELEV. 91')		/
AREA - 44 (BELOW ELEV. 91')		/

UNIT 2	CHECKED BY	TIME/DATE
AREA - 24 (ELEV. 117')		/
AREA - 29 (ELEV. 91')		/
AREA - 51 (BELOW ELEV. 91'		/

REMARKS: _____

REVIEWED BY:

SHIFT FOREMAN _____

TIME DATE _____/_____

* Area designations refer to Attachment 1 to Emergency Procedure M-4.

18-9250 10/77 (50)

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

AUXILIARY BUILDING (MAIN AREA)

UNITS 1 & 2	CHECKED BY	TIME/DATE
AREA - 10* (ELEV. 140')		/
AREA - 10A (ROOF AREA & EQUIP. ABOVE ELEV. 140')		/
AREA - 13 (ELEV. 115' & 126')		/
AREA - 19 (ELEV. 115')		/
AREA - 20 (ELEV. 127')		/
AREA - 21 (ELEV. 115')		/
AREA - 22 (ELEV. 115')		/
AREA - 32 (ELEV. 100')		/
AREA - 33 (ELEV. 100')		/
AREA - 34 (ELEV. 100')		/
AREA - 35 (ELEV. 100')		/
AREA - 45 (ELEV. 85')		/
AREA - 46 (ELEV. 85')		/
AREA - 47 (ELEV. 85')		/
AREA - 48 (ELEV. 85')		/
AREA - 52 (ELEV. 73')		/
AREA - 53 (ELEV. 73')		/
AREA - 54 (ELEV. 60' & 64')		/
AREA - 55 (ELEV. 60' & 64')		/
AREA - 56 (ELEV. 60' & 64')		/
AREA - 57 (ELEV. 64')		/

REMARKS: _____

_____

_____

_____

REVIEWED BY:

SHIFT FOREMAN _____

TIME/DATE _____/_____

* Area designation refers to Attachment 1 of Emergency Procedure M-4.

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

AUXILIARY BUILDING (PENETRATION AREAS)

UNIT 1	CHECKED BY	TIME/DATE
AREA - 7 (ELEV. 140')		/
AREA - 18 (ELEV. 115')		/
AREA - 28 (ELEV. 100')		/
AREA - 43 (ELEV. 85')		/

UNIT 2	CHECKED BY	TIME/DATE
AREA - 8 (ELEV. 140')		/
AREA - 23 (ELEV. 115')		/
AREA - 38 (ELEV. 100')		/
AREA - 49 (ELEV. 85')		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST
FUEL HANDLING BUILDING (MAIN AREA)

UNIT 1	CHECKED BY	TIME/DATE
AREA - 2 (ELEV. 140')		/
AREA - 3 (ELEV. 140') HOT SHOP AREA		/
AREA - 12 (ELEV. 115' & 126')		/
AREA - 27 (ELEV. 100')		/

UNIT 2	CHECKED BY	TIME/DATE
AREA - 4 (ELEV. 140')		/
AREA - 14 (ELEV. 115' & 126')		/
AREA - 36 (ELEV. 100')		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST
FUEL HANDLING BUILDING (VENT. EQUIPMENT AREAS)

UNIT 1	CHECKED BY	TIME/DATE
AREA - 1 (ELEV. 140')		/
AREA - 11 (ELEV. 115')		/
AREA - 26 (ELEV. 100')		/
AREA - 42 (ELEV. 85')		/

UNIT 2	CHECKED BY	TIME/DATE
AREA - 5 (ELEV. 140')		/
AREA - 15 (ELEV. 115')		/
AREA - 37 (ELEV. 100')		/
AREA - 50 (ELEV. 85')		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

UNIT 1 TURBINE BUILDING

UNIT 1	CHECKED BY	TIME/DATE
AREA - 58 (ELEV. 140')		/
AREA - 60 (ELEV. 107' & 119')		/
AREA - 61 (ELEV. 119' & 125')		/
AREA - 62 (ELEV. 119' & 123')		/
AREA - 65 (ELEV. 107')		/
AREA - 66 (ELEV. 104' & 108')		/
AREA - 67 (MACH. SHOP OVERHEAD)		/
AREA - 31 (ELEV. 109') MN. STM. LINE PLTFM.		/
AREA - 70 (ELEV. 85' & BELOW)		/
AREA - 71 (ELEV. 85')		/
AREA - 72 (ELEV. 85' & BELOW)		/
AREA - 73 (ELEV. 85' & BELOW)		/
AREA - 74 (ELEV. 85')		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

UNIT 2 TURBINE BUILDING

UNIT 2	CHECKED BY	TIME/DATE
AREA - 59 (ELEV. 140')		/
AREA - 63 (ELEV. 119' & 125')		/
AREA - 64 (ELEV. 107' & 119')		/
AREA - 68 (ELEV. 104' & 108')		/
AREA - 41 (ELEV. 109') MN. STM. LINE PLTFM.		/
AREA - 69 (ELEV. 107')		/
AREA - 75 (ELEV. 85' & BELOW)		/
AREA - 76 (ELEV. 85' & BELOW)		/
AREA - 77 (ELEV. 85' & BELOW)		/
AREA - 78 (ELEV. 85')		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

OUTSIDE AREAS

	CHECKED BY	TIME/DATE
AREA - 79 (UNIT 1 F.H. BLDG. EXTERIOR, STOR. TKS, STOR. AREAS, ETC.)		/
AREA - 80 (UNIT 2 F.H. BLDG. EXTERIOR, STOR. TKS, STOR. AREAS, ETC.)		/
AREA - 81 (UNIT 1 BLDG. EXTERIORS, MN, AUX, & STUP. XFMR. BKS. & STRUCTURES, ETC.)		/
AREA - 82 (UNIT 2 BLDG. EXTERIORS, MN, & AUX. XFMR. BKS. & STRUCTURES, ETC.)		/
AREA - 83 (UNITS 1 & 2 DISCH. STRUCTURE)		/
AREA - 84 (230 KV SWYD. & LINES)		/
AREA - 85 (RAW WTR. STOR. PONDS)		/
AREA - 86 (500 KV SWYD. & LINES)		/

REMARKS: _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT

POST-EARTHQUAKE AREA INSPECTION CHECK LIST

INTAKE STRUCTURE

	CHECKED BY	TIME/DATE
AREA - 87 (ELEV. 17.5')		/
AREA - 88 (ELEV. -2')		/
AREA - 89 (AUX. SALT WATER PUMP COMPARTMENTS & VENT. SHAFTS)		/
AREA - 90 (PIPE & DISCHARGE VALVE GALLERIES)		/

REMARKS:

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

POST-EARTHQUAKE SURVEILLANCE TEST CHECK LIST

UNIT _____ DATE _____

INSTRUCTIONS: Check the data sheet with the time test is completed and the initials of the person performing the test.

	TIME / INITIALS
A. Instrument Surveillance Tests	
1. I-1, Channel Check (shift and daily portions only)	_____ / _____
a. Shift Data Sheet	_____ / _____
b. Daily Data Sheet	_____ / _____
2. I-29, Emergency Signals and Communications System Functional Test	_____ / _____
B. Reactor and Auxiliaries	
1. R-1A, Exercising Full Length Control Rods	_____ / _____
2. R-10, Reactor Coolant System Leakage Evaluation.	_____ / _____
C. Miscellaneous and Integrated Tests	
1. M-16B Operation of Slave Relays K604A and K604B (Safety Injection.	_____ / _____
2. M-16C Operation of Slave Relay K608A (Safety Injection).	_____ / _____
3. M-16D Operation of Slave Relay K608B (Safety Injection).	_____ / _____
4. M-16E Operation of Slave Relay K633A and K609A (Safety Injection and Auxiliary FW Pump Start).	_____ / _____
5. M-16F Operation of Slave Relay K633B and K609B (Safety Injection and Auxiliary FW Pump Start).	_____ / _____
6. M-16I Operation of Slave Relays K606A and K606B (Phase A Containment Isolation).	_____ / _____

REMARKS: _____

_____

_____

Reviewed by:

Power Production Engineer _____

Date/Time _____ / _____

COAST VALLEYS DIVISION
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

ELECTRICAL POWER CHECK LIST

DATE: _____

INSTRUCTIONS: Insure that the lines indicated are functioning properly. Insure that the batteries are undamaged and that the chargers continue to supply the load. Start all diesels and bring them to rated voltage.

	TIME / INITIALS
A. 500 KV System	
1. Midway #2 line	/
2. Midway #3 line	/
3. Gates line	/
4. Tie line to Unit 1	/
5. Tie line to Unit 2	/
6. 500 KV Switchyard	/
B. 230 KV System	
1. Morro Bay-Diablo line	/
2. Morro Bay-Mesa line	/
3. Tie line to startup bank 1-1	/
4. Tie line to startup bank 2-1	/
5. 230 KV Switchyard	/
C. Station Batteries & Chargers	
1. Battery 1-1	/
2. Battery 1-2	/
3. Battery 1-3	/
4. Battery 2-1	/
5. Battery 2-2	/
6. Battery 2-3	/
D. Diesel Generators	
1. Generator 1-1	/
2. Generator 1-2	/
3. Generator 1-3	/
4. Generator 2-1	/
5. Generator 2-2	/

REMARKS: _____

_____

_____

Reviewed By:

Shift Foreman _____ Date/Time _____/_____

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

CALIBRATION AND TEST DATA SHEET

PEAK SHOCK RECORDER™

PSR1200 - H

RECORDER S/N 701 CALIBRATION DATE March 23, 1981 INITIALS _____

RECORD PLATES S/N _____ SURFACE _____

REED NUMBER	FREQUENCY (Hertz)	ACCELERATION SENSITIVITY (g/inch)	DISPLACEMENT (inches)	EQUIVALENT STATIC ACCELERATION (g)
1	1.94	0.353		
2	2.57	0.552		
3	3.12	0.853		
4	3.83	1.20		
5	5.43	2.23		
6	6.45	3.41		
7	8.06	5.08		
8	10.3	7.82		
9	12.6	12.9		
10	16.2	19.5		
11	20.1	29.65		
12	25.7	49.3		

Damping: 2% viscous damping (Q of 25)

TESTER _____ TEST DATE _____

TEST LOCATION _____ PREPARED BY _____

TEST NUMBER _____ DATE _____

* Values based on Kinemetrics Calibration Test Report and Certification for DCPP Seismic Instrumentation.

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

CALIBRATION AND TEST DATA SHEET

PEAK SHOCK RECORDER™

PSR1200 - H

RECORDER S/N 710 CALIBRATION DATE March 23, 1981 INITIALS _____

RECORD PLATES S/N _____ SURFACE _____

REED NUMBER	FREQUENCY (Hertz)	ACCELERATION SENSITIVITY (g/inch)	DISPLACEMENT (inches)	EQUIVALENT STATIC ACCELERATION (g)
1	1.90	0.339		
2	2.48	0.545		
3	3.21	0.822		
4	3.80	1.20		
5	5.37	2.22		
6	6.52	3.20		
7	7.97	5.03		
8	10.0	7.36		
9	12.8	12.1		
10	16.1	20.3		
11	20.2	30.6		
12	25.6	45.8		

Damping: 2% viscous damping (Q of 25)

TESTER _____ TEST DATE _____

TEST LOCATION _____ PREPARED BY _____

TEST NUMBER _____ DATE _____

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

CALIBRATION AND TEST DATA SHEET

PEAK SHOCK RECORDER™

PSR1200 - V

RECORDER S/N 728 CALIBRATION DATE March 23, 1981 INITIALS _____

RECORD PLATES S/N _____ SURFACE _____

REED NUMBER	FREQUENCY (Hertz)	ACCELERATION SENSITIVITY (g/inch)	DISPLACEMENT (inches)	EQUIVALENT STATIC ACCELERATION (g)
1	1.89	.299		
2	2.45	.485		
3	3.20	.823		
4	3.87	1.11		
5	5.21	2.08		
6	6.38	3.05		
7	8.20	5.00		
8	10.2	7.64		
9	12.6	12.1		
10	15.9	18.1		
11	20.2	29.1		
12	25.3	44.1		

Damping: 2% viscous damping (Q of 25)

TESTER _____ TEST DATE _____

TEST LOCATION _____ PREPARED BY _____

TEST NUMBER _____ DATE _____

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: CALIBRATION AND TEST DATA SHEET -PEAK ACCELERATION RECORDER - EP M-4

DATE _____ TIME _____ PAR 400- 1 RECORDER S/N 669

RECORD PLATE S/N 517 CAL. DATE 9/29/81

LOCATION; CONTAINMENT BASE SLAB UNIT 1, EL. 89', 180°

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	g/mm	Inches	mm	(g)	
L	16.3	0.640				
T	16.1	0.635				
V	15.4	0.606				

DATE _____ TIME _____ PAR 400- 2 RECORDER S/N 654

RECORD PLATE S/N 516 CAL. DATE 10/2/81

LOCATION: TOP OF UNIT 1 CONTAINMENT, EL.303.5', 225°

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	g/mm	Inches	mm	(g)	
L	32.5	1.28				
T	30.1	1.18				
V	32.3	1.27				

DATE _____ TIME _____ PAR 400- 1 RECORDER S/N 673

RECORD PLATE S/N 521 CAL. DATE 10/1/81

LOCATION: INTAKE NEAR ASW PUMP 1-2 BAY, EL. 2'

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	g/mm	Inches	mm	(g)	
L	13.1	0.515				
T	15.4	0.606				
V	13.8	0.543				

TITLE: CALIBRATION AND TEST DATA SHEET - PEAK ACCELERATION RECORDER -EP M-4

DATE _____ TIME _____ PAR 400- 1 RECORDER S/N 672

RECORD PLATE S/N 520 CAL DATE 9/29/81

LOCATION: TURBINE BUILDING, MACHINE SHOP EL.85'

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	g/mm	Inches	mm	(g)	
L	16.2	0.635				
T	15.6	0.615				
V	14.2	0.558				

DATE _____ TIME _____ PAR 400- 1 RECORDER S/N 682

RECORD PLATE S/N 526 CAL DATE 9/29/81

LOCATION: AUXILIARY BUILDING, HOT SHOP EL.140'

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	9/mm	Inches	mm	(g)	
L	15.3	0.601				
T	15.4	0.608				
V	12.7	0.500				

DATE _____ TIME _____ PAR 400- 1 RECORDER S/N 683

RECORD PLATE S/N 527 CAL DATE 9/29/81

LOCATION: AUXILIARY BUILDING NEAR CONTROL ROOM DOOR EL. 140'

SENSOR	ACCELERATION SENSITIVITY		DISPLACEMENT		ACCELERATION	PERFORMED BY
	g/in	9/mm	Inches	mm	(g)	
L	16.2	0.635				
T	16.0	0.630				
V	14.3	0.562				

PG&E Pacific Gas and Electric Company

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE: EMERGENCY PROCEDURE
NONRADIOLOGICAL FIRE

NUMBER	EP M-6
REVISION	8
DATE	7/5/83
PAGE	1 OF 10

APPROVED: R. C. Thornberry — PLANT MANAGER — 7-15-83 DATE

SCOPE

This procedure discusses the actions which are taken in the event of a fire which does not involve radioactive materials. This procedure and changes thereto requires PSRC review.

GENERAL

Fires at Diablo Canyon can be classified as either radiological or nonradiological. Nonradiological fires do not involve either radiation or radioactive material. Examples of such fires are fires in the turbine building or outside grass fires. Radiological fires are handled in accordance with Emergency Procedure R-6, "Radiological Fires".

SYMPTOMS

1. A fire is discovered outside the plant or inside the plant in an area where no radioactive materials are located.

2. The fire detection system may indicate the presence of a fire within the plant.

AUTOMATIC ACTIONS

The Sprinkler, Deluge, Halon, Cardox, or Intake CO_2 fire systems may activate.

IMMEDIATE ACTION

1. Activate the fire signal by dialing [redacted] is a code which gives the location of the fire (see Table 1). The fire signal is a 30 second blast on the fire sirens. The signal will be followed by the location code of the fire on the code call system repeated 8 times. The first five persons to dial 76 will be connected into a conference call. The priority of the conference call is:

   a. Shift Foreman (Interim Site Emergency Coordinator).
   b. Senior Control Operator (Fire Brigade Leader).

c. Assistant Fire Brigade Leaders (Two).
d. Plant Superintendent/Manager.
e. Fire Marshal

2. The Shift Foreman and Senior Control Operator will dial 76 and be given the details regarding the fire, including the exact location and potential damage to the plant.

3. Members of the on-shift fire brigade should report to the control room to pick up their equipment and receive instructions from the Shift Foreman. The Shift Foreman is responsible for establishing an appropriate on-shift emergency organization and assuring that Technical Specifications for control room staffing are not violated.

4. If the fire occurs during normal working hours, members of the Maintenance Fire Brigade should go to the cold machine shop. The Assistant Fire Brigade Leaders should enter the conference call to receive their instructions.

5. If appropriate, isolate (Mode 3) the control room ventilation system to prevent the entry of smoke. If the fire is within the control room, change the ventilation system to Mode 2 for 100% outside air makeup.

6. If the fire is in an area protected by either the cardox, halon or deluge systems, manually initiate these systems from the panel in the control room or locally.

7. Clear the area affected by the fire. This may be done by sounding the site emergency signal, or other appropriate means.

SUBSEQUENT ACTIONS

The Shift Foreman, acting as Interim Site Emergency Coordinator, shall direct all subsequent actions from the control room until relieved by the long term Site Emergency Coordinator if the emergency warrants it. Such actions should include the following:

1. If the fire is a grass fire, notify the California Department of Forestry and give details regarding the fire.

2. If the fire cannot be physically contained and controlled promptly with available resources, or if the Fire Brigade Leader recommends, assistance from the California Department of Forestry should also be requested. Refer to Appendix 1 for telephone numbers.

NOTE: 1) If outside assistance has been requested, notify the Security Department [redacted] have them notify the Avila Gate. One or more plant operating personnel shall be dispatched to the Security Building to escort CDF crews to the scene of the fire. Security Officers may be requested to escort off-site fire fighters to the appropriate plant access door.

2) Maintain a record of notification made to offsite personnel. Form 69-9221 "Emergency Notification Record" may be used to provide this record.

3. If CDF is called to respond, insure that the person calling CDF gives a name and number to call back the plant. Provide CDF with details concerning location and type of fire. Also give CDF an update of fire conditions even before they arrive as they may decide to send more support.

4. If CDF responds, their first responding chief officer will identify himself. He may initially decide to go to the scene of the fire. He will eventually desire to contact the PGandE Site Emergency Coordinator. Therefore escort and access should be provided to him to reach either the Control Room or TSC depending on where the Site Emergency Coordinator is located.

5. If the fire is a grass fire that is near the plant, a person such as the Assistant Fire Brigade Leader from the Maintenance Brigade should be dispatched to the scene. This person can then interface with CDF and assist in providing equipment and manpower.

6. During the course of the fire, the Control Operator and those at the scene should pay particular attention for signs that the operability of the various engineered safeguards equipment is being affected. If the operability of any safeguards equipment is reduced below minimum Technical Specifications limits, or if such damage is imminent, shut down the Unit immediately.

NOTE: Operating Procedure K-2C provides the operator with listing of safeguards equipment which may be affected by fires in various locations. This procedure should be consulted to assist in determining the operating strategy during the fire.

7. Establish an initial emergency classification based on the criteria in Appendix Z and perform the actions required by the classification.

8. If the control room must be evacuated, follow the instructions given in Emergency Procedure OP-8.

9. If the deluge or cardox system has been activated, the system must be reset after the fire is extinguished. The reset buttons for the cardox system are located in the terminal boxes on the south side of the cardox assembly on the 104 foot elevation of the turbine building. The reset buttons for the deluge system are located locally. If the system was activated by a thermal element, the thermal element must be replaced before the system can be reset.

10. Supplied air breathing apparatus should be worn if smoke inhalation is a hazard. If self-contained breathing apparatus (SCBA) is being used, a crew should be dispatched to an air bottle refilling station and prepare to refill the backpack bottles as required. The stations are located at the northwest end of the Unit No. 2 component cooling water heat exchangers on the +85 foot elevation and on the +140 foot elevation behind the control room.

11. Close out with verbal summary to offsite organizations and complete the following written reports:

    a. Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

    b. Written summary to NRC within 24 hours for an Unusual Event or 8 hours for a higher classification.

12. If the fire is put out before CDF arrives, they may still request to send one engine company to the site for their close out.

SPECIAL CONSIDERATIONS REGARDING BRUSH FIRES

1. Because of the danger of rapid spreading, the Department of Forestry should always be called in case of a brush fire.

2. A fire trailer containing 300 gallons of water is located south of the Administration Building near the circulating water discharge gate structure for fighting grass fires. Portable fire fighting packs are located on the trailer.

3. When fighting a brush fire there are several basic precautions which should be taken by plant personnel engaged in fire fighting:

   a. Always remain upwind on the fire.
   b. Remain downhill of the fire, if possible.
   c. Watch for fires circling behind the fire fighters.

REFERENCES

1. Diablo Canyon Power Plant - Fire Protection Plan
2. Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."
3. Emergency Procedure G-2 "Establishment of the Onsite Emergency Organization."
4. Emergency Procedure G-3 "Notification of Offsite Emergency Organizations."
5. General Operating Orders - 1.300 and 1.301
6. PGandE Fire Prevention Manual
7. Accident Prevention Rule No. 23
8. Emergency Procedure R-6, "Radiological Fire."

ATTACHMENTS

1. Form 69-9221, "Emergency Notification Record."

TABLE 1

FIRE CODE CALL LOCATIONS

CODE	LOCATIONS
	Control Building
	No. 1 Containment
	No. 1 Turbine Building
	No. 1 Auxiliary Bldg.
	No. 1 Fuel Handling Building
	Package Boiler Area
	Hot machine shop area
	No. 2 Containment
	No. 2 Turbine Building
	No. 2 Auxiliary Bldg.
	No. 2 Fuel Handling Building
	Security Diesel Area
	Grass fire
	Outside Transformer Fire
	Intake structure
	500 kV switchyard
	230 kV switchyard
	Radwaste Storage
	All clear
	Fire Drill
	Test fire code
	Administration Building
	Security Building
	Training Building
	Assembly Building
	Technical Support Center

APPENDIX 1

FIRE ASSISTANCE COMMUNICATION

1. California Department of Forestry — 543-4242 (Emergency Only)
   543-4244 (business)

OR

San Luis Obispo County Sheriff
(Request they dispatch the
California Dept. of Forestry)

1. Automatic Tie Line
   (Control Room & TSC)
   or
2. Radio (Control Room,
   TSC or Security)
   or
3. 543-7911 (Emergency Only)
   543-2850 (business)

2. Fire Marshal
   Randy Kohout

Plant Extension
Home Phone
or
HP Freq Pager Call
(Group Call

APPENDIX Z

EMERGENCY PROCEDURE NOTIFICATION INSTRUCTIONS

1. When this emergency procedure has been implemented, and upon direction from the Shift Foreman, proceed as follows:

   a. Designate this event a Notification of Unusual Event for fires within the site boundary if a verified fire is not under control within 10 minutes of initiating fire fighting efforts or if the California Department of Forestry Assistance is requested. Notify plant staff and response organizations required for this classification by implementing Emergency Procedures G-2 "Establishment of the On-Site Emergency Organization" and G-3 "Notification of Off-site Organizations" in accordance with Emergency Procedure G-1 "Accident Classification and Emergency Plan Activation."

   b. Designate this event an ALERT if a verified fire is not under control within 10 minutes of initiating fire fighting efforts and the fire is located in one of the following areas containing safety systems:

      1) Containment
      2) Control Room
      3) Cable Spreading Room
      4) Diesel Generator Room
      5) Auxiliary Building
      6) Intake Structure Pump Room

      Notify Plant Staff and response organizations required by EP G-2 and EP G-3 in accordance with EP G-1.

   c. Designate this event a Site Area Emergency if a verified fire is not under control within 10 minutes of initiating fire fighting efforts in an area containing safety systems, and causes a confirmed loss of a safety system function that causes entry into a technical specification action statement. Notify plant staff and response organizations required by EP G-2 and EP G-3 in accordance with EP G-1.

   d. Designate this event a General Emergency if the fire causes massive damage to plant systems which, in the opinion of the Site Emergency Coordinator, is likely to lead to a core melt situation. Notify plant staff and response organizations required by EP G-2 and EP G-3 and implement the instructions in EP G-1 regarding on and offsite protective actions.

APPENDIX Z (continued)

2. In addition to personnel required to be notified by EP G-2 also notify the following:

   a. Fire Marshal (See Appendix 1)

   b. System Dispatcher (if load may be affected).

   NOTE: In off-normal working hours, consideration should also be given to calling in additional members of the Plant Fire Brigade. This should not take precedence over calling CDF.

69-92[illegible]3/82 (100)

DEPARTMENT OF NUC[illegible]R PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET ____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PG&E Pacific Gas and Electric Company

NUMBER EP M-7
REVISION 5
DATE 7/5/83
PAGE 1 OF 5

DEPARTMENT OF NUCLEAR PLANT OPERATIONS

DIABLO CANYON POWER PLANT UNIT NO(S) 1 AND 2

TITLE EMERGENCY PROCEDURE
OIL SPILL ISOLATION AND CLEANUP

APPROVED: R. C. Thornberry PLANT MANAGER 7-15-83 DATE

SCOPE

This procedure outlines the steps required to isolate and clean up small oil spills that could occur during tank truck loading and unloading or during other plant operations. It is absolutely necessary that no oil reaches Diablo Creek or the ocean from spills that might occur. This procedure and changes thereto requires PSRC review.

IMMEDIATE OPERATOR ACTION

1. Perform any operation which can be done rapidly to stop the spill.
2. Notify the Shift Foreman.

SUBSEQUENT ACTION

1. Notify the following Company personnel.
   a. For all occurrences:
      1) Plant Manager.
      2) Plant Superintendent.
      3) Supervisor of Operations.
      4) Supervisor of Chemistry and Radiation Protection.
   b. If any oil reaches the creek or the ocean:
      1) Manager of Nuclear Plant Operations or his alternate.
      2) Supervising Nuclear Generation Engineer (Personnel and Environmental Safety) or his alternate.
      3) District Manager, Los Padres District.
      4) Onsite DER Marine Biologist.

5) PGandE Law Department.

[Mr. David J. Williamson
Company Phone:
Home Phone:]

6) PGandE Public Information Office, San Luis Obispo

[Ms. Suzanne G. Brown
Company Phone:
Home Phone:]

2. Notify the following non-Company agencies if any oil reaches the Creek or ocean.

a. Federal National Response Center.

U.S. Coast Guard
Washington, D.C.
Tel. (800) 424-8802 (toll free)

or

Coast Guard
San Francisco (Captain of the Port)
Tel. (415) 556-3740

or

Coast Guard
Monterey (Captain of the Port)
Tel. (408) 375-2278

b. California State Office of Emergency Services
Sacramento (ring down line)

or

Tel. (800) 852-7550 (toll free)

or

Tel. (916) 427-4341

c. Environmental Protection Agency
Tel. (415) 974-8131

d. California State Land Commission
Tel. (213) 590-5201

e. State - Executive Officer

California Regional Water Quality Control Board
Central Coast Region
1122 Laurel Lane
San Luis Obispo, CA 94301
Tel. (805) 549-3147
(Request California Office of Emergency Services to notify in off-hours)

NOTE: A record of all such notifications should be kept on Form 69-9221, "Emergency Notification Record" or similar log.

3. Emergency Actions for Spills During Loading and Unloading of Tank Trucks.

NOTE: Operating Procedure K-8 requires that operating personnel be present during loading and unloading of tank trucks. This individual will be responsible for taking necessary action should an oil spill occur during these operations.

a. Types of spills that could be expected:

1) Transfer hose connection at truck or tank breaks loose and oil spills onto pavement.

2) Transfer hose from tank truck breaks or cracks and oil spills onto pavement.

3) Overfilling of the diesel fuel oil tanks or the auxiliary boiler fuel oil tank.

4) Oil drain from the transfer hose after being disconnected.

5) A leak at the lube oil receiving connection occurs.

b. Methods for oil spill containment and cleanup:

1) Sand bags and absorbents are stored near the diesel fuel oil storage tanks and the auxiliary boiler fuel oil storage tank for the purpose of diking and absorbing spilled oil.

2) Sand bags should be used to dike any significant oil spill which could flow to Diablo Creek or the ocean. Once the flow of oil has been stopped, absorbents should be used to clean up the oil.

3) The absorbent should be used by itself only if the leak is of a small nature and a shallow film has been formed on the pavement. The absorbent can contain small spills by absorption.

c. Action to be taken if truck is loading oil:

1) Shut off any transfer pump involved.

2) Isolate all connections to the transfer hose.

d. Action to be taken if truck is unloading oil:

1) Close truck tanker drain valve.

2) If a leak occurs at the lube oil receiving connection, the transfer pumps must also be shut down and the connection isolated from the lube oil storage tank.

4. Emergency Actions for Spill at Circulating Water Pump from Bearing Oil Pot

a. Turn off sump pump at intake structure sump.

b. Before turning on sump pumps mentioned in "a" above, clean oil from sump area.

5. Emergency Actions for Major Oil Spill in an Area Which Leads to the Turbine Building Sump

a. Periodically check the sump to verify that it is not overflowing to the discharge side.

b. Take samples periodically from the effluent of the oil water separator. If significant quantities of oil seem to be coming from the oil water separator, then redirect flow to the oil water separator holding tank.

6. Followup Reports

a. Prepare a Nuclear Plant Problem Report (see Nuclear Plant Administrative Procedure C-12).

b. Written notification to the Executive Officer of the RWQCB is required within 5 days of awareness of the non-compliance.

The written report will include the information required by the RWQCB Water Discharge Requirements. A copy of the report should be provided to the NRC, Region V to meet NRC reporting requirements.

c. Any letters or reports issued outside the company should be reviewed by Mr. David Williamson of the PG&E Law Department.

REFERENCES

1. California Regional Water Quality Control Board - Central Coast Region, Order No. 82-24, NPDES No. CA0003751, Waste Discharge Requirements for PGandE Diablo Canyon Nuclear Power Plant Units 1 and 2, San Luis Obispo County.

2. Diablo Canyon EPA Oil Spill Prevention Control and Countermeasure Plan, Rev. 2, 3/25/80.

ATTACHMENT

1. Form 69-9221, "Emergency Notification Record"

69-92[illegible] 3/82 (100)

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT

EMERGENCY NOTIFICATION RECORD

EMERGENCY IDENTIFICATION _____ DATE _____ SHEET _____

PERSON CALLED	AFFILIATION	TIME	REACHED	BY	MESSAGE GIVEN	RESPONSE

PG&E
Nuclear Plant Operations
69-10709 (4/82)

DIABLO CANYON POWER PLANT
PROCEDURE ON-THE-SPOT CHANGE

Procedure No. EP G-2 Rev. 3 Unit No. 1 ☐ 2 ☐ 1 & 2 ☒

Title ESTABLISHMENT OF ON-SITE EMERGENCY ORGANIZATION

Type of Change: ☒ PERMANENT (green) ☐ TEMPORARY (yellow); Expiration Date _____

Requesting Department TECHNICAL ASSISTANCE Originator SHAWN P. DAUGHERTY

ORIGINATOR

Proposed Change: (Does this alter the intent of original procedure? ☐ Yes ☒ No)
(Does it constitute an unreviewed safety/environmental question? ☐ YES ☒ NO)

UPDATE OF EMERGENCY CALL OUT LIST
per ATTACHED FORM# 69-10297 dated 7-6-83

RESCIND OTSC DATED 1-21-83

Reason for Change:

Many personnel who are required to be notified in the event of an emergency have changed positions and/or phone numbers. The updated call out list, 69-10297 dated 7-6-83, reflects those changes

Authorizations: _____ (Plant Management Staff) _____ (Plant Management Staff w/SRO License) 7/15/83 Date

Immediate distribution to the Control Room and affected work areas required? ☐ YES ☒ NO
Distributed To: ☐ Control Room ☐ Others _____
Initial Distribution By:

DOCUMENT CONTROL

Date Received by Document Control 7/15/83

PSRC Review and Plant Manager's approval no later than 7/29/83 Date above *plus 14 days

PSRC POST CHANGE REVIEW

Review Date _____

PSRC recommends approval ☐ Yes ☐ No

Meeting Number ☐☐ - ☐☐☐

_____ Plant Manager's Approval ☐ N/A

NO DEPARTMENT

Follow-up To Rejected On-the-Spot Change ☐ Additional Information ☐

Action Taken/Remarks:

DISTRIBUTION: ☐ Same as Original Procedure Distribution ☐ Others _____ Please see additional sheets ☐

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Evaluation & Recovery Coordinator (Assigned to TSC)	____	____	1. J. M. Gisclon Power Plant Engineer	[redacted]		____ ____	____	____ ____
	____	____	*2. L. F. Womack Sr. Power Production Eng.			____ ____	____	____ ____
	____	____	*3. V. R. Foster Sr. Power Production Eng.			____ ____	____	____ ____
	____	____	*4. E. G. Davis Sr. Power Production Eng.			____ ____	____	____ ____
	____	____	*5. R. M. Luckett Regulatory Compliance Eng.			____ ____	____	____ ____

DC0075 3 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Operations Coordinator (Assigned to Control Room)	____	____	1. R. Patterson Plant Superintendent	[redacted]		____ ____	____	____ ____
	____	____	*2. J. A. Sexton Supervisor of Operations			____ ____	____	____ ____
	____	____	*3. S. R. Fridley General Operating Foreman			____ ____	____	____ ____
	____	____	*4. W. G. Crockett Sr. Power Prod. Eng. (Operations)			____ ____	____	____ ____
	____	____	*5. R. L. Fisher Sr. Power Prod. Eng.			____ ____	____	____ ____

DC0075 2 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
Site Emergency Coordinator (Assigned to (TSC)	____	____	*1. R.C. Thornberry Plant Manager			____	____	____	____	____
	____	____	*2. R. Patterson Plant Superintendent			____	____	____	____	____
	____	____	*3. J. M. Gisclon Plant Engineer			____	____	____	____	____
	____	____	*4. W. B. Kaefer Tech. Asst. to the Plant Mgr.			____	____	____	____	____
	____	____	5.			____	____	____	____	____

Classification: [ ] Unusual Event [ ] Alert [ ] Site Area Emergency [ ] General Emergency

Event Description _____

_____

_____

DC0075 1 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Radiological Advisor (Assigned to TSC)	____	____	*1. J. V. Boots Sup. of Chem & Rad Prot.	[redacted]		____ ____	____	____ ____
	____	____	*2. W. A. O'Hara Sr. Chem & Rad Prot. Eng			____ ____	____	____ ____
	____	____	*3. H. W. C. Fong Chem & Rad Prot. Eng.			____ ____	____	____ ____
	____	____	4.			____ ____	____	____ ____
	____	____	5.			____ ____	____	____ ____

DC0075 4 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Liaison Coordinator (Assigned to TSC)	____	____	*1. T. J. Martin Training Supervisor	[redacted]		____ ____	____	____ ____
	____	____	*2. J. E. Molden Trng. Coord.			____ ____	____	____ ____
	____	____	*3. W. F. Steinke Trng. Coord.			____ ____	____	____ ____
	____	____	*4. J. R. Tinlin Training Coordinator			____ ____	____	____ ____
	____	____	5.			____ ____	____	____ ____

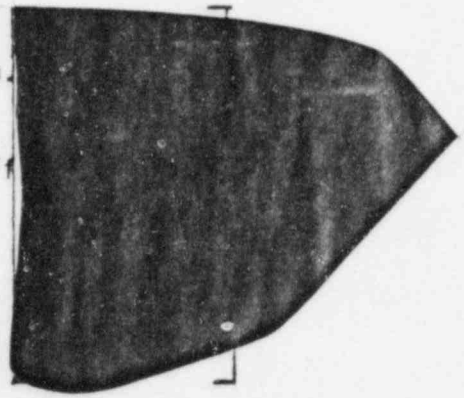
1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

ll Out Instructions:

Contact one person for each position.
Contact first listed available person (preferred position holder); if unavailable, contact the next available person
Persons with a * are designated for on-call rotation.
Describe emergency classification and position person is called for. Describe event if requested.

OTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

MERG. RGANIZ. OSITION	NOT AVAIL ABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
dvisor to the ounty Emerg. rganization Assigned o EOF)	____	____	1. W. B. Kaefer Tech. Asst. to Plant Man.			___ ___	___	___ ___
	____	____	*2. W. J. Keyworth Sr. Pow. Prod. Eng.(Staff			___ ___	___	___ ___
	____	____	*3. T. E. Brake Pow. Prod. Eng. (Staff)			___ ___	___	___ ___
	____	____	*4. W. J. Kelly Pow. Prod. Eng. (Staff)			___ ___	___	___ ___
	____	____	5.			___ ___	___	___ ___



C0075 6 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Operations Advisor (Assigned to TSC)	_____	(No On-Call Person for this position)	1. J. A. Sexton Sup. of Operations	[redacted]		___ ___	___	___ ___
	_____		2. S. R. Fridley General Operating Forema			___ ___	___	___ ___
	_____		3. T. J. Martin Training Supervisor			___ ___	___	___ ___
	_____		4. W. G. Crockett Sr. Power Prod. Eng. (Operations)			___ ___	___	___ ___
	_____		5.			___ ___	___	___ ___

DC0075 7 1. Insert date person is not available.

Call Out Instructions:

1. Contact one person for each position.
2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher; optional for unusual event.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES NO	TIME	WILL BE IN YES NO
Emergency Maintenance Coordinator (Assigned to TSC)	____	____	*1. D. B. Miklush Supervisor of Maintenanc	[redacted]		___ ___	___	___ ___
	____	____	*2. R. Nanninga Sr Pow Prod Eng (Maint)			___ ___	___	___ ___
	____	____	*3. W. R. Ryan Gen. Maint. Foreman			___ ___	___	___ ___
	____	____	4. D. L. Bauer Sr. Pow. Prod. Eng.			___ ___	___	___ ___
	____	____	5. G. M. Zocher Electrical Foreman			___ ___	___	___ ___
	____	____	6. D. A. Green Mechanical Foreman			___ ___	___	___ ___

OTE: 1) Stop call out at this point for the Unusual Event Classification, continue for high classification. Determine if the Site Emergency Coordinator requires additional personnel.

perations upport Center upervisor	Request the Emergency Maintenance Coordinator to assign a maintenance foreman as OSC support center supervisor.	___ ___	___	___ ___

C0075 8 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

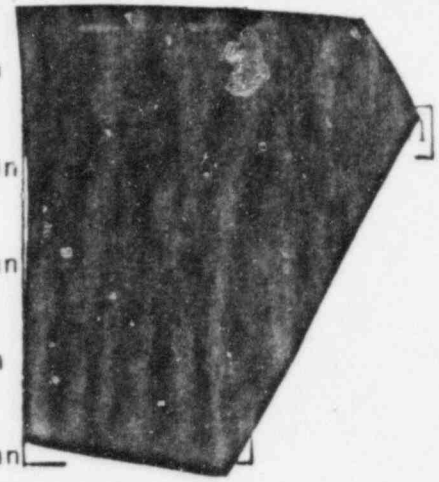
NOT FOR PUBLIC DISCLOSURE

Call Out Instructions:

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2. Contact first listed available person (preferred position holder); if unavailable, contact the next available person
3. Persons with a * are designated for on-call rotation.
4. Describe emergency classification and position person is called for. Describe event if requested.

NOTE: Personnel to report to assigned location for Alert Classification or higher.

EMERG. ORGANIZ. POSITION	NOT AVAILABLE[1]	ON-CALL POS. HOLDER[2]	NAME/NON-EMERGENCY TITLE	HOME PHONE/ PLANT PHONE	H/P FREQ. PAGER CALL # GROUP CALL #	CONTACTED YES	CONTACTED NO	TIME	WILL BE IN YES	WILL BE IN NO
Site Chemistry & Radiation Protection Coordinator (Assigned to Access Control)	____	____	1. H. A. Ferguson Rad. Prot. Mon. Foreman			____	____	____	____	____
	____	____	*2. D. R. Clifton Chem & Rad Prot. Foreman			____	____	____	____	____
	____	____	*3. R. S. Snyder Chem & Rad Prot. Foreman			____	____	____	____	____
	____	____	*4. P. W. Baxter Rad. Prot. Mon. Foreman			____	____	____	____	____
	____	____	*5. L. Vulchev Chem & Rad Prot. Foreman			____	____	____	____	____
	____	____	*6.			____	____	____	____	____



DC0075 9 1. Insert date person is not available.
2. Insert date person assumes "on-call" responsibility. (Person on call will possess the pager for this position)

NOT FOR PUBLIC DISCLOSURE

If the Pressurized Ion Chambers (PICs) are located in an affected sector, they shall be read. PIC locations are described in Table 6.

Collection of any other types of samples (i.e., ground deposition measurements, vegetation, soil, water or milk samples) will be at the direction of the Emergency Evaluations and Recovery Coordinator or the Radiological Monitoring Director.

1. External Dose Rate and/or Count Rate Measurements

   a. Equipment Required

      1) Any of the following instruments can be used for external dose rate measurements:

         a) Rad Owl.

         b) Victoreen Radgun.

         c) HPI-1010

         d) RO-2

      For measuring an external count rate, use an Eberline E-140/N survey meter equipped with either an HP-240 standard GM probe, HP-260 pancake GM probe, or an HP-210 shielded GM probe.

   b. Procedure

      1) Dose or Count Rate Measurements

         a) Make a dose rate and/or count rate measurement with the detector held about three feet off the ground (i.e., approximately at waist level). Scan in a 360° direction. If the detector is so equipped, take the data both window (or shield) on and off.

            NOTE: When using the HP-210 probe, take both shield up (GM window down) and shield down (GM window up) readings. These readings may be required later to account for sky shine. Be sure to note the correct reading under the correct headings on the Data Sheet - cpm [shield off (up)] or cpm [shield on (down)].

b) Identify the type of instrument (or probe) used, time survey was started, and calibration due date of the instrument on Section 1 of the Field Data Sheet.

c) Using the highest value obtained during the scan, calculate the net dose or count rate values by subtracting the appropriate background values given in Table 7.

d) Report both the open window (or shield) on and off values and the type of instrument used, to the Emergency Evaluations and Recovery Coordinator (EERC), or Radiological Monitoring Director (RMD).

2) Integral Dose

The Rad Owl and the HPI-1010 have the capability for dose integration if desired. If an integrated measurement is made, the data can be entered in Section 1.c. of the Field Data Sheet. Integral measurements with the Rad Owl should be made with the window open. Report the integral dose and the time period over which it was collected to the EERC or RMD, as appropriate.

2. Collection of Air Samples

a. Equipment Required

1) One of the following air samplers, equipped with sample head for two-inch filters:

a) RADECO Model HD-28B (120V AC-powered).

b) RADECO Model H-809B (12V DC-powered, with battery).

c) RADECO Model H-809C (12V DC-powered, without battery).

2) Two-inch diameter absolute particulate filter paper.

3) Coin envelope for retention of filter.

4) HI-Q 2-½"-diameter characoal cartridge or AgZ cartridge.

5) Plastic sandwich bag for retention of cartridge.

6) Gummed or other label for labeling cartridge container.

7) Wristwatch or stopwatch.

b. Procedure

1) Assemble the filter and halogen cartridge in the sampling head as shown in Figure 5. Draw an arrow on the cartridge to indicate the direction of flow.

2) Place the filter head on the sampler.

3) For an HD-28B, proceed as follows:

a) Plug in the sampler, turn on the power, and simultaneously start a stopwatch (or reset the timer on the sampler itself, if a sampling time of several hours is contemplated).

b) Quickly adjust the flow rate to the desired value (typically 2 cfm).

4) For an H-809C, proceed as follows:

a) Attach the sampler to the car battery by attaching the red cable to the positive battery terminal and the black cable to a chassis ground.

NOTE: Close the hood and place the air sampler on top of it to avoid engine fan turbulence.

b) Turn the vehicle engine on. Start the sampler. Note the airflow. Do not attempt to adjust the airflow by turning the setscrew on the top of the flowmeter.

5) For an H-809B, proceed as follows:

a) If an automobile is available, put the toggle switch on the black battery pack in EXT. Connect the red cable to the positive terminal of the

battery and the black cable to a chassis ground.

NOTE: Close the hood and place the air sampler on top of it to avoid engine fan turbulence.

b) If an automobile is not available, put the toggle switch on the black battery pack in INT.

NOTE: The unit will not run using 120V AC, so do not sample while charging.

c) Dial in the appropriate sampling time, using the appropriate combination of toggle switches.

d) Turn on vehicle engine. Start the sampler. Note the airflow. Do not attempt to adjust the airflow by turning the setscrew on the top of the flowmeter.

NOTE: The maximum flow rate is ~1 cfm when the unit is using its own battery.

6) Periodically check the flow indicators to verify that the flow rate is being maintained. If the flow rate changes significantly during sample collection, note the value at the end of the sample period and determine the average value of the flow rate. This average value should be used to determine the size of the sample collected.

7) Allow the sampler to run until at least 10 ft^3 (but preferably 30-50 ft^3) is collected. The greater the volume sampled, the better.

8) Stop the vehicle engine. Stop the sampler and remove the filter head.

9) Make the halogen and particulate measurements discussed in steps 3 and 4 below, if desired.

10) Label the envelope and then place the particulate filter in the coin envelope.

11) Place the iodine cartridge in a sandwich bag and label the bag.

12) Enter the collection data in Section 2 of the Field Data Sheet.

3. Determination of Gross Iodine (Field Technique)

a. Equipment Required

1) Eberline E-140/N survey meter equipped with either an HP-240/270 standard GM probe, an HP-260 pancake GM probe, or an HP-210 shielded pancake GM probe. The HP-210 probe is preferred.

2) Cylinder of dry air equipped with regulator.

3) Plastic bag.

4) Forceps or tweezers

b. Procedure

1) Depending on the air samples used, remove the cartridge from the air sampler head (HD-28) or remove sampler head from sampler (H-809).

2) Insert the cartridge (or sample head) into the adapter sample head shown on Figure 6.

3) Open the main valve on the air cylinder and note the cylinder pressure gauge. It should normally read about 1800 psi. Replace the cylinder if it reads <300 psi. Close the main valve. Open the flow control valve and adjust the regulator so that the delivery pressure gauge reads 5 psi. Close the flow control valve.

4) Attach the air cylinder/regulator to the adapter and sample as shown in Figure 6. Open the main valve and flow control valve to allow air to blow through the cartridge in the reverse direction. Let the purge continue until the cylinder pressure gauge drops 200 psi. The technique removes noble gases from the halogen cartridge.

5) Record the standard background count rate for the GM probe used for counting the cartridge using Table 7 onto Section 4 of the Field Data Sheet.

6) Remove the cartridge and place the probe within one-half inch of the upstream side of the cartridge. See Figure 7. Measure and then record the count rate. When using the HP-240/270 probe, the window must open. The detector is face down when the HP-210 or HP-260 is used.

7) Record the count rate in Section 4 of the Field Data Sheet. Note time sample was started and calibration due date of the instrument.

8) Bag and label the cartridge. Survey the exterior of the bag. Decontaminate or put it into another bag if contamination levels above uncondition release limits are found.

9) Calculate gross iodine concentration from the following expression:

$$\mu Ci/ml = \frac{(1.59 \times 10^{-11})\ (CR_{net})}{(\varepsilon_2)\ (\varepsilon_c)\ (V)}$$

where:

CR_{net} = net cpm on cartridge

ε_2 = probe efficiency from Table 8

E_c = cartridge collection efficiency, assumed to be 0.80

V = volume of airborne sample (ft^3)

10) Report gross iodine concentration, probe used, and volume of sample to the Emergency Evaluations and Recovery Coordinator or the Radiological Monitoring Director.

4. Determination of Gross Particulate (Field Technique)

a. Equipment Required

1) Eberline E-140/N survey meter equipped with either an HP-240/270 standard GM probe, an HP-260 pancake GM probe, or an HP-210 shielded pancake GM probe.

2) Coin envelope.

3) Forceps or tweezers.

b. Procedure

1) Remove the filter from the air sampler head.

2) Record the standard background taken from Table 7 for the probe being used in the appropriate location in Section 3 of the Field Data Sheet. When using the HP-210 or HP-260 probe, the reading is taken with the detector faced down. The window must be open when using the HP-240/270 probe.

3) Place the probe (window open using the HP-240/270 probe, face down using HP-210 probe) within one-half inch to the upstream side of the filter in an analagous manner to the counting of halogen cartridges shown in Figure 7. Filters should be handled with forceps (or tweezers) and the probe should not touch the filter, in order to avoid contamination of the probe.

4) Record the count rate in Section 3 of the Field Data Sheet. Note time sample was started and calibration due date of the instrument.

5) Label the envelope and place the filter in the coin envelope, using the forceps (or tweezers). Place the probe within one-half inch over the envelope. If the count rate now decreases, then radon products should be suspected. Note this on the Field Data Sheet.

6) Determine the net count rate and calculate the gross particulate activity from the expression:

$$\mu Ci/ml = \frac{(1.59 \times 10^{-11})\ (CR_{net})}{(\varepsilon_3)\ (E_f)\ (V)}$$

where:

CR_{net} = net cpm on filter

ε_3 = probe efficiency from Table 9

E_f = cartridge collection efficiency, assumed to be 0.90

V = volume of airborne sample (ft^3)

7) Report the activity, type of probe used, and volume of sample, to the Emergency Evaluations and Recovery Coordinator or Radiological Monitoring Director.

5. Soil and Vegetation Sampling

a. Equipment Required

1) Trowel.

2) Grass cutters or knife.

3) 18" x 24" plastic bags.

4) Masking tape.

5) Labels.

6) Eberline E-140/N survey meter with HP-240/270 standard GM probe.

7) Protective clothing as determined by surveys.

b. Procedure

1) Vegetation Sampling and Counting

a) Cut the vegetation from the approximately 1 m^2 of ground; the aim being to collect approximately one pound. Cut the vegetation at a height of 1-2 cm from base of vegetation to approximate what a grazing animal would consume. Do not contaminate the sample with dirt.

b) Place the vegetation in the plastic bag, top end first. Slowly compress the air out of the bag and

seal it with tape. One pound of material will normally fill the bag about half full.

CAUTION: DO NOT PLACE BODY OVER BAG OPENING WHILE COMPRESSING IT'S CONTENTS.

c) Label the bag with the following information

1) Location of sample

2) Date and time of sample. The time is expressed using the military (24 hour period) standard.

3) Name of person who took sample

d) Using Table 7, pick the standard background for the HP-240/270 probe and record it on Section 7 of the Field Data Sheet.

e) Flatten the bag and lay the probe (window open) on the center of the bag.

f) Fold the bag over the probe and note the reading. Record the reading on the field data sheet along with time of survey and instrument calibration due data.

g) The activity level in μCi/gm can be obtained from the following expression:

$$\mu Ci/gm = 2.5 \times 10^{-6} \times CR_{net}$$

where:

CR_{net} = net cpm on a standard GM tube (HP-240/270)

h) Survey the exterior of the bag. If contamination levels above unconditional release limits are found, decontaminate or place it into another bag. Note the contamination levels on the label.

i) Report the type of vegetation samples and the activity level to the Emergency Evaluations and

Recovery Coordinator or the Radiological Monitoring Director.

2) Soil Sampling

a) Sample the soil from about a m^2 area. Remove only the top surface (to a depth of = ¼" or less) using the trowel. Stay upwind and wear appropriate protective clothing when scraping. See GENERAL INSTRUCTIONS.

b) Place the sample in a bag, seal, and label.

c) No field counting of soil samples is required. The samples are taken for follow-up analysis only. Scan the bag to determine if there is a high count rate (>1,000 cpm). Survey the exterior of the bag. If contamination is found above unconditional release limits, decontaminate or place another bag over it. Record any high count rates on Section 10 of the Field Data Sheet.

6. Liquid Sampling and Counting

a. Equipment Required

1) Sample bottle (1 liter)

2) Labels.

3) Eberline E-140/N survey meter equipped with HP-240/270 standard GM probe.

4) Sheet plastic or plastic bag.

5) Protective clothing as determined by surveys

b. Procedure

1) Wrap the GM probe and cord (window open) in thin plastic to protect it against liquid damage and contamination.

2) Immerse the probe in as large a body of liquid as is available (reservoir, cattle trough, 10-gallon milk can, etc.) to obtain the gross open window reading.

Enter the reading in Section 9 of the Field Data Sheet along with the time of survey and calibration due date of the instrument.

3) Use 60 cpm as a background count rate to determine the net count rate.

4) Report the type of sample, volume of sample counted, and net count rate to the Emergency Evaluations and Recovery Coordinator or Radiological Monitoring Director.

5) Collect and label a 1-liter sample and retain for later analysis. If readings ≥200 cpm were obtained during probe immersion, place the 1-liter sample in a plastic bag and then tape the opening. Survey the exterior of the bag. If contamination levels above unconditional release limits are found, decontaminate or place another bag over it.

6) Survey the probe after it has been removed from it's plastic bag. Decontaminate if practical. Otherwise treat it as radioactive material.

7. Ground Surveys

a. Equipment Required

Eberline E-140/N survey meter equipped with either an HP-240/270 standard GM probe and HP-260 pancake GM probe, or an HP-210 shielded pancake GM probe. The HP-210 is the preferred detector because its shield reduces the influence of sky shine.

Protective clothing as required by surveys. See GENERAL INSTRUCTIONS.

b. Procedure

1) Hold the GM probe, window open using HP-240/270 probe (shield up when using HP-210 probe) not more than two inches above the ground, and measure the count rate. The following precautions should be taken when making this measurement.

a) Make the measurement over short grass on undisturbed land (common grazing, permanent pasture).

b) Make the measurement at least 20 yards from any building, road, railway, bridge, or heaps of material such as gravel, rubble, or road-cut. These all contain varying amounts of natural uranium and thorium.

c) Haystacks or silos should be avoided because they may contain in an concentrated form the total deposition on grass which originally covered a large area. Trees and hedges also act as collectors of fallout which is washed out to a variable extent by rain. In an emergency, they may trap large amounts of airborne particulate and give a falsely high reading.

d) Care must be taken to avoid any contamination of the instrument. If necessary, wrap the instrument (including probe) in a plastic bag prior to starting survey.

2) Identify the type of probe used and enter the data in Section 6 of the Field Data Sheet. Include the time the survey was started and the calibration due date of the instrument.

3) Calculate the net count rate value by subtracting the background value given in Table 7.

NOTE 1: It is not possible to correct the background values for sky shine if an HP-240/270 or HP-260 is being used. Significant sky shine will invalidate ground surveys taken with these probes.

NOTE 2: If an HP-210 is being used, the effect of sky shine can be estimated. To do this, take a second measurement with the GM window facing the sky (shield down reading). Then add 1/10 of this figure to the normal background from Table 7 and use this sum as the

corrected background. That is:

$(Bckg)_{Corrected} = (Bckg)_{Table\ 7} + 0.10(CPM)_{Sky}$

where:

$(Bckg)_{Corrected}$ = background corrected for sky shine (cpm)

$(CPM)_{sky}$ = gross cpm with detector window facing upward

4) Calculate the ground deposition from the following equation:

Ground Deposition ($\mu Ci/m^2$) = $\varepsilon_1 \times CR_{NET}$

where:

ε_1 = probe efficiency factor given in Table 10

CR_{net} = net count rate (in cpm) from ground survey

5) Report location of measurement, ground deposition, and the type of instrument used to the Emergency Evaluations and Recovery Coordinator or Radiological Monitoring Director.

8. Determination of Smearable Contamination

a. Equipment Required

1) Two-inch diameter filters with holders.

2) Eberline E-140/N survey meter equipped with an HP-240/270 Standard Probe, an HP-260 pancake probe, or an HP-210 shielded pancake GM probe.

b. Procedure

1) Select a representative smooth surface to smear-test. Examples are tops of cars, store windows or sills, and walls of buildings.

2) Wipe the area using a uniform, moderate fingertip pressure. Estimate the total area smeared, in square feet or fraction thereof.

3) Take a background count rate measurement and then a count of the filter. Enter the data in Section 8 of the Field Data Sheet along with the time of the survey and the calibration due date of the instrument.

4) Put the filter into a labeled holder and save it for later analysis in the counting room.

5) Calculate the smearable contamination as follows:

$$dpm/dm^2 = \frac{(0.11)\ (CR_{net})}{(\varepsilon_3)A}$$

where:

CR_{net} = net cpm on filter

ε_3 = probe efficiency factor from Table 9

A = area smeared, in square feet

6) Report the type of surface smeared, instrument used, and the smearable contamination level to the Emergency Evaluations and Recovery Coordinator or Radiological Monitoring Director.

9. How to Read the TASC-4

NOTE: For purposes of emergency monitoring standardize the scaler-timer by using a ten-second count.

a. On the NT-29 timer, set ten-seconds.

1) The top thumbwheel is set at 1; the middle and lower onces are set at 0 (i.e., a reading of 1.00).

2) The MIN-SEC toggle switch is set in SEC.

3) The RANGE MULTIPLIER is set at X10.

b. On the NS-12 scaler, set the TEST/SCALER toggle switch to SCALER.

c. Press the STOP pushbutton, then press the RESET pushbutton (the RESET pushbutton should never be depressed while counts

are being applied to the register; first stop the count by pressing the STOP pushbutton).

d. Set the PRESET rotary switch to the OFF position.

e. Press the START button to start a count.

f. The scaler will begin to accumulate counts and will continue doing so until the preset time period has elapsed. At this point, counting will automatically stop.

g. The dose rate is determined from the following expression:

$$DR\ (\mu R/hr) = \frac{(\text{total counts})}{(\text{counting time in seconds})}$$

For a ten-second count, this becomes:

$$DR\ (\mu R/hr) = \frac{(\text{total counts})}{10}$$

h. Report dose rate to the Emergency Evaluations and Recovery Coordinator or Radiological Monitoring Director.

10. "How to read the Pressurized Ion Chamber (PIC)"

a. Equipment

1) High Security Pin Tumbler key (in Emergency Kit)

2) Screwdriver with 0.25-inch blade or equivalent

b. Using the screwdriver and key (as applicable), open the door and read the liquid crystal digital display.

NOTE: The selector switch must be in the "READ" position. Also some PIC's have a window to view the display so the unit need not be opened.

c. Look at the strip chart. One trace on it (usually a straight line) matches one of the markings immediately below the chart. This indicates the range. The second trace will normally fluctuate. This trace indicates the actual dose rate. It should correspond with that shown on the digital display. Using a felt-tip type pen or a pencil, indicate

and write the date, time and initials of person checking the reading on the chart. If the two readings do not agree, use the higher reading.

d. Close the cover. Record data on Field Data Sheet. Report the reading.

11. Recordkeeping

All records generated by the utilization of this procedure for an exercise or emergency shall be forwarded the next working day to the Senior Emergency Planner for review and retention.

a. Records generated from exercises will be categorized as non permanent and retained for a minimum of five years.

b. Records generated from actual emergency events will be categorized as lifetime and placed into lifetime storage in accordance with procedure "Requirements for Retention and Extended Storage of Operation Phase Activity Records, (AP-E-1-S1)."

FIGURES

1. Onsite assembly and Monitoring Locations.

2. Emergency Offsite Monitoring Locations.

3. Locations of DER Onsite Environmental Sampling and Monitoring Locations.

4. Locations of DER Offsite Environmental Sampling and Monitoring Locations.

5. Exploded View of Halogen Cartridge and Particulate Filter in Sampling Head.

6. Method for Blowing Noble Gases from Halogen Cartridge.

7. Position of GM Tube and Cartridge for Gross Iodine Determination.

TABLES

1. Description of Emergency Onsite Monitoring Locations.

2. Description of Emergency Offsite Monitoring Locations.

3. DER Environmental Sampling Locations.

4. Environmental Radiation Monitoring Network Station of the NRC.

5. Locations of Selected Dairies.

6. PIC Locations.

7. Background Data for β/γ Dose and/or Count Rate Measurements.

8. GM Probe Efficiency Factors for Iodine Determinations.

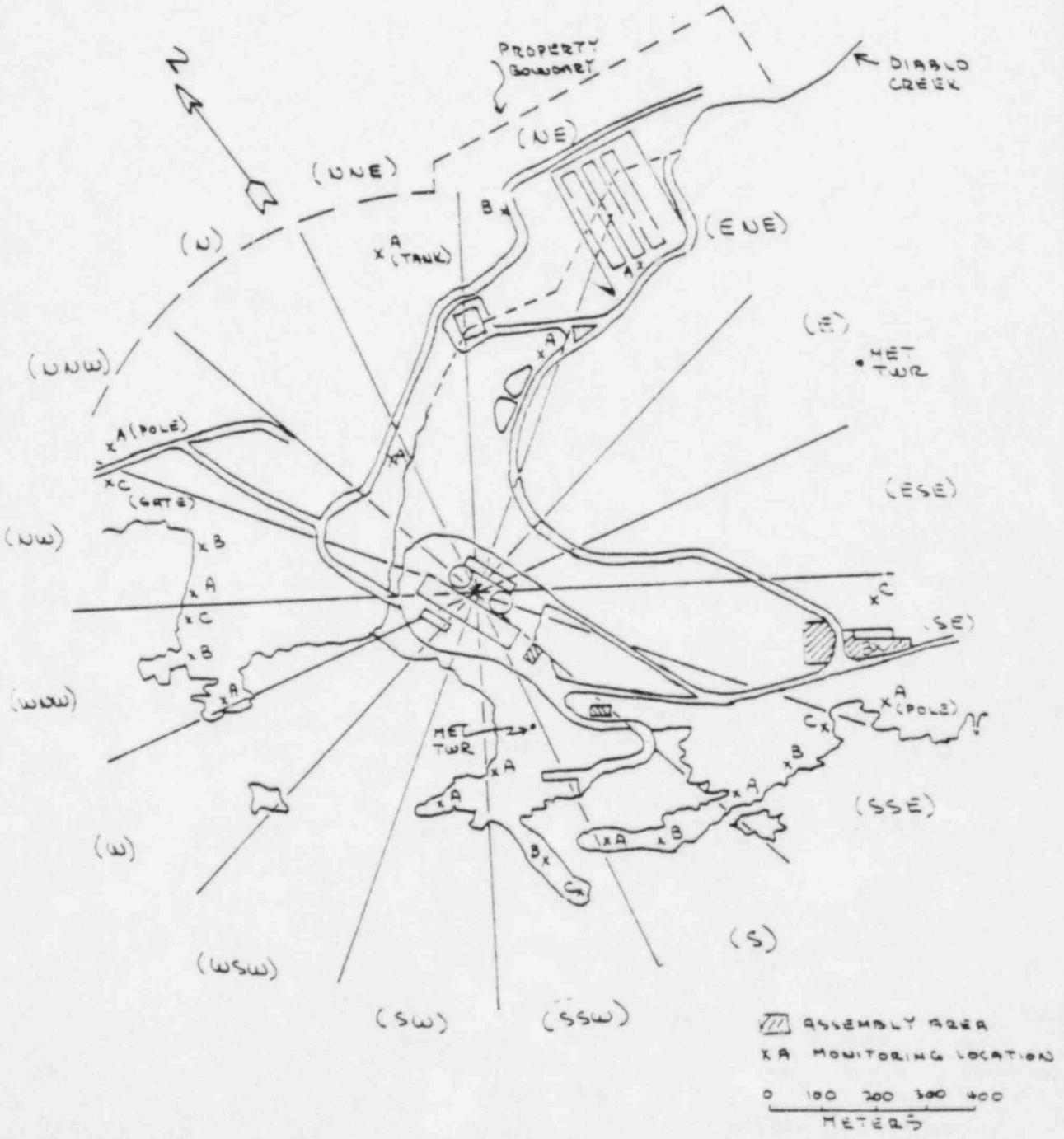
9. GM Probe Efficiency Factors for Particulate Determinations.

10. GM Probe Efficiency Factors for Ground Surveys.

ATTACHMENTS

1. Form 69-9259, "Emergency Environmental Monitoring Field Data Sheet".

FIGURE 1
ONSITE ASSEMBLY AND MONITORING LOCATIONS



TITLE: EMERGENCY OFFSITE RADIOLOGICAL ENVIRONMENTAL MONITORING

FIGURE 2
EMERGENCY OFFSITE MONITORING LOCATIONS

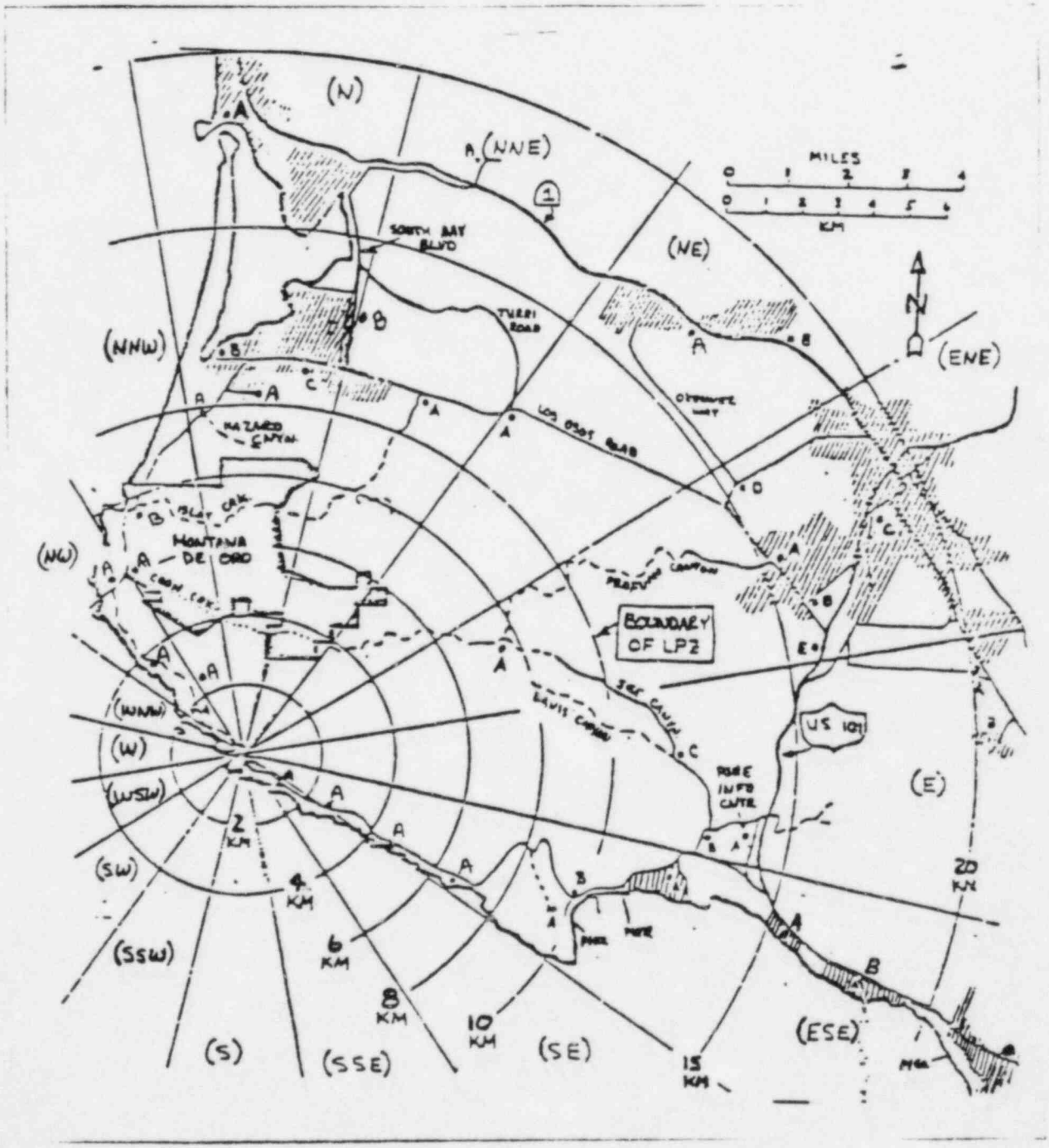
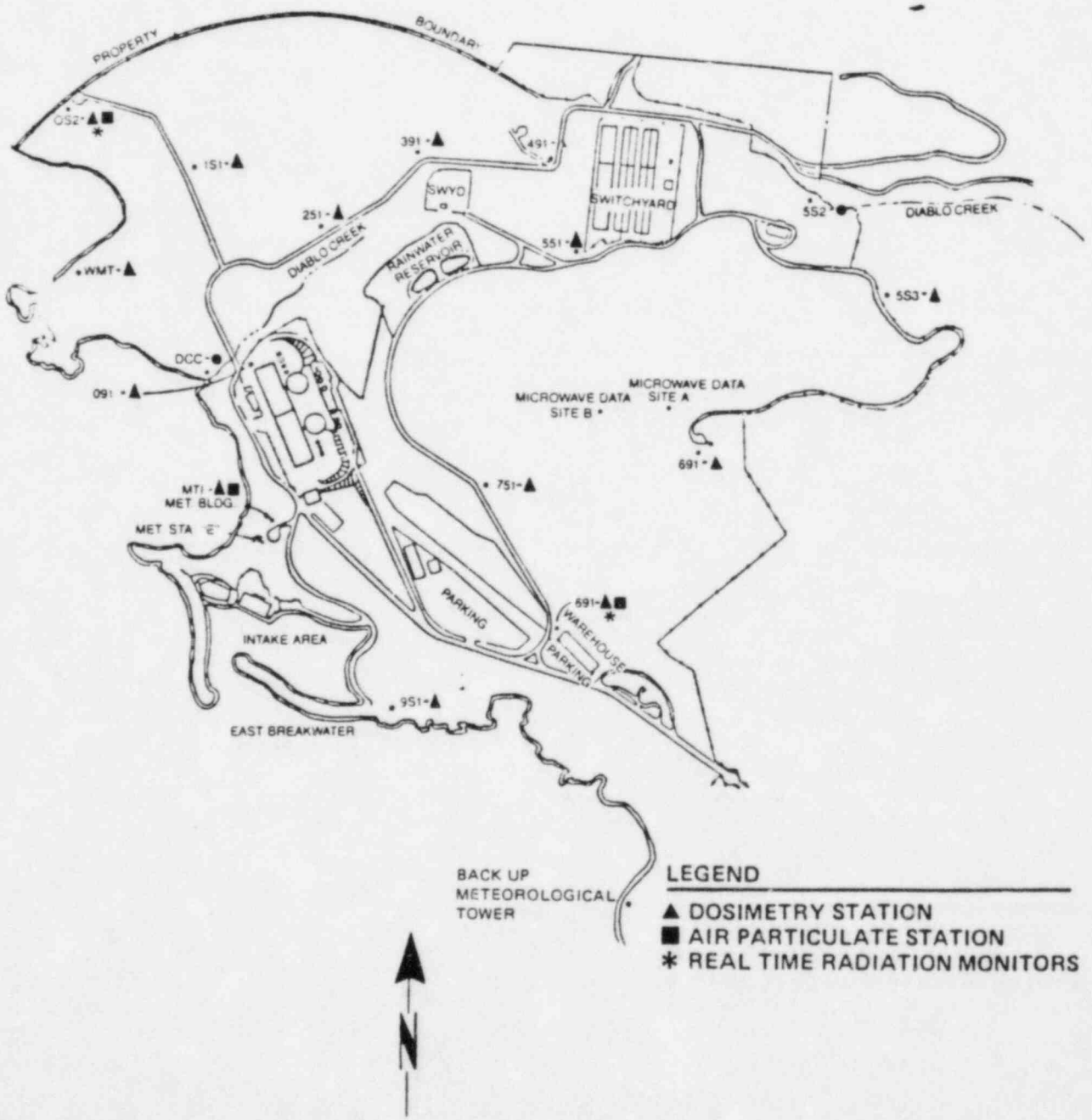


FIGURE 3
LOCATIONS OF DEPARTMENT OF ENGINEERING RESEARCH'S
ONSITE ENVIRONMENTAL SAMPLING AND MONITORING STATIONS



TITLE: EMERGENCY OFFSITE RADIOLOGICAL ENVIRONMENTAL MONITORING

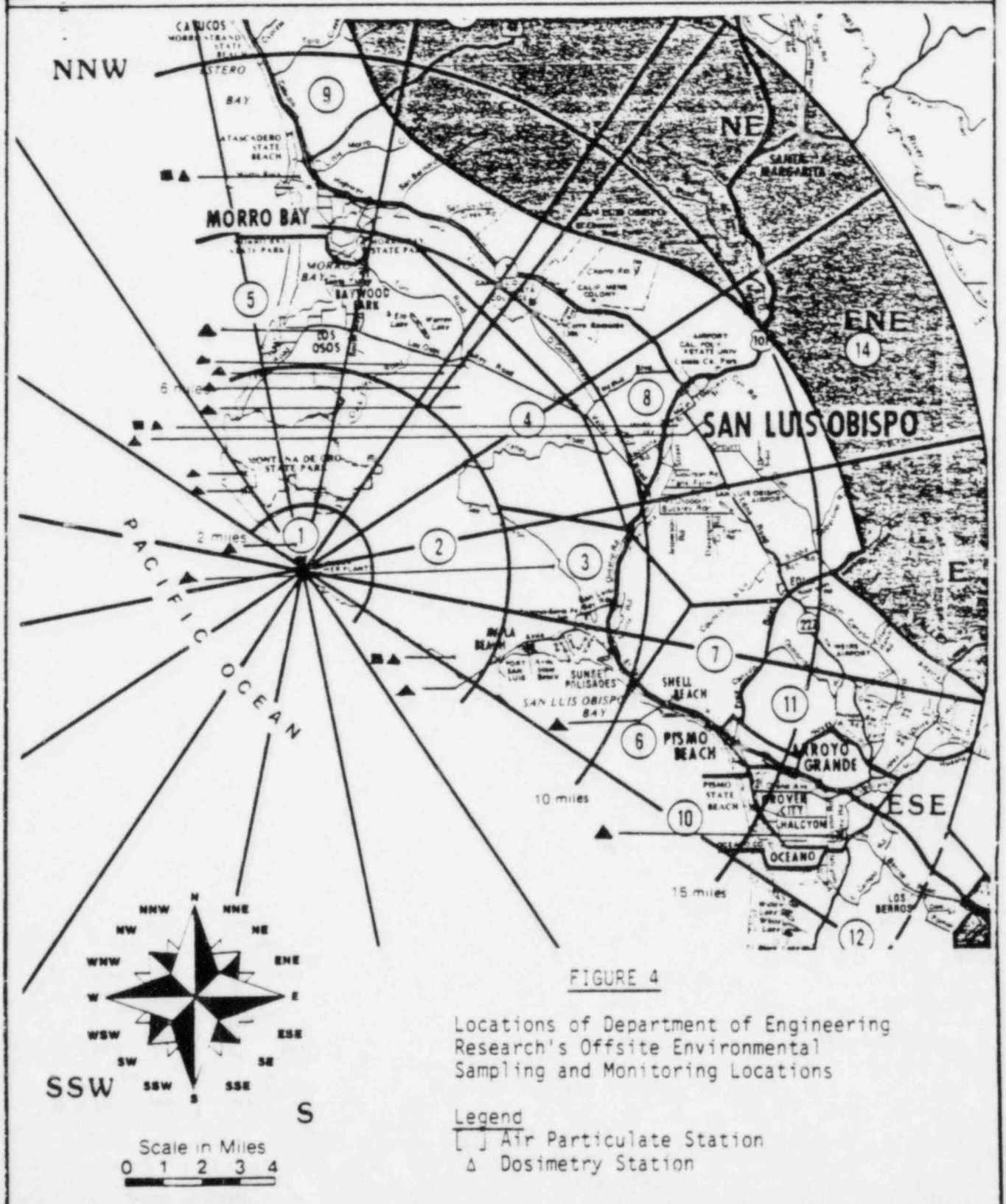


FIGURE 4

Locations of Department of Engineering Research's Offsite Environmental Sampling and Monitoring Locations

Legend
[ ] Air Particulate Station
Δ Dosimetry Station

FIGURE 5
EXPLODED VIEW OF HALOGEN CARTRIDGE AND PARTICULATE FILTER IN SAMPLING HEAD

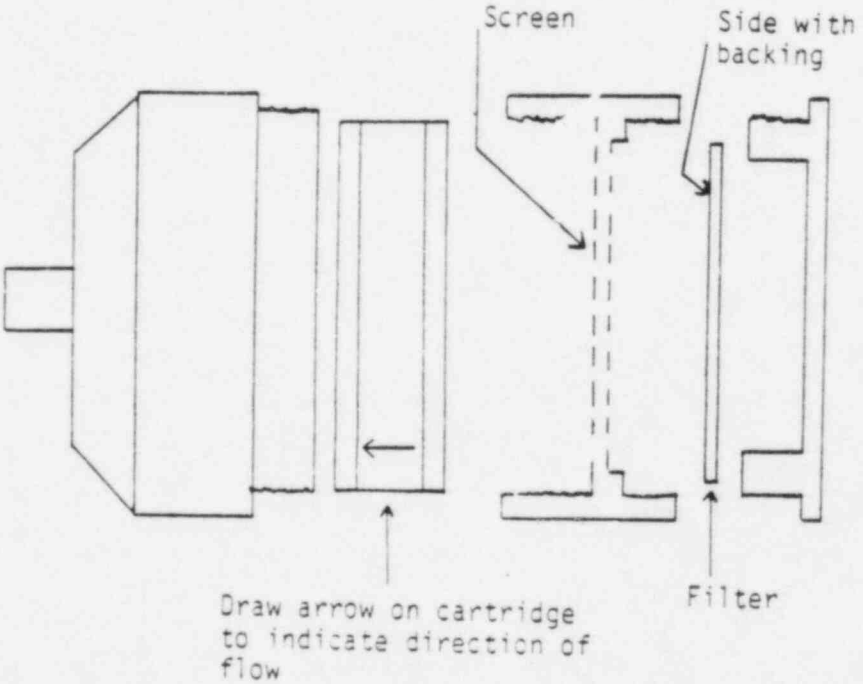


FIGURE 6
METHOD FOR BLOWING NOBLE GASES FROM HALOGEN CARTRIDGE

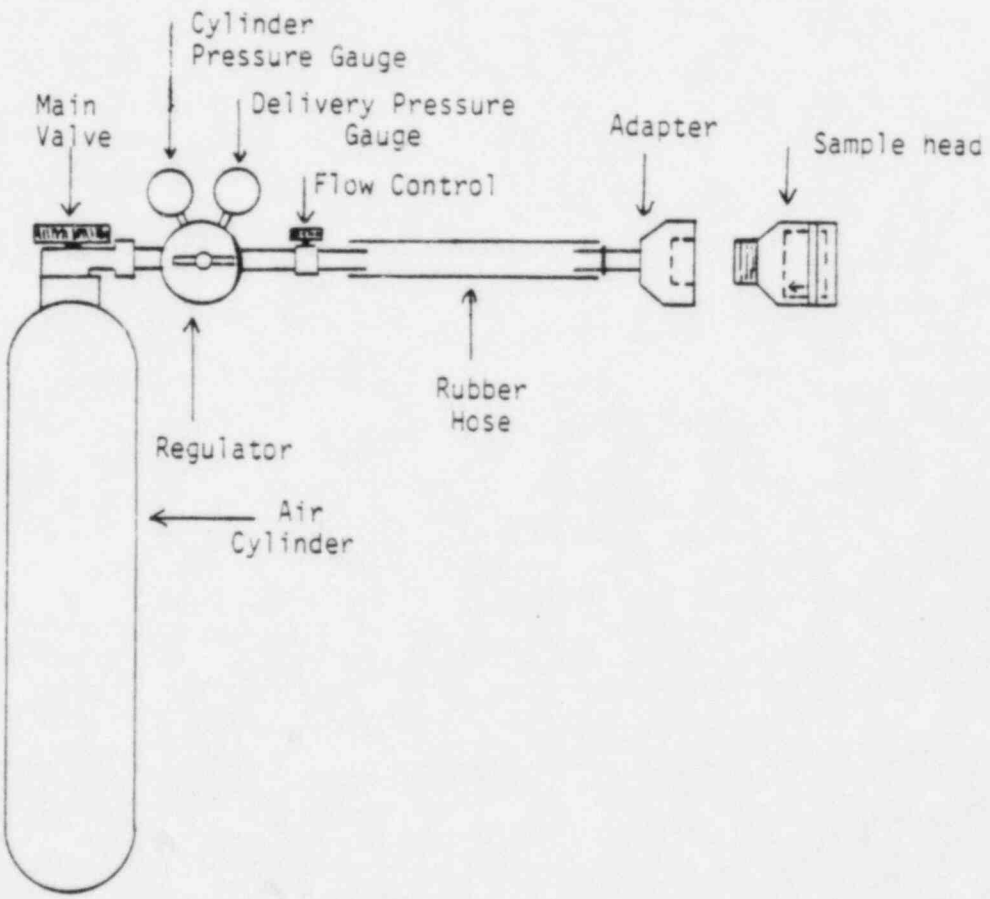


FIGURE 7
POSITION OF GM TUBE AND CARTRIDGE FOR GROSS IODINE DETERMINATION

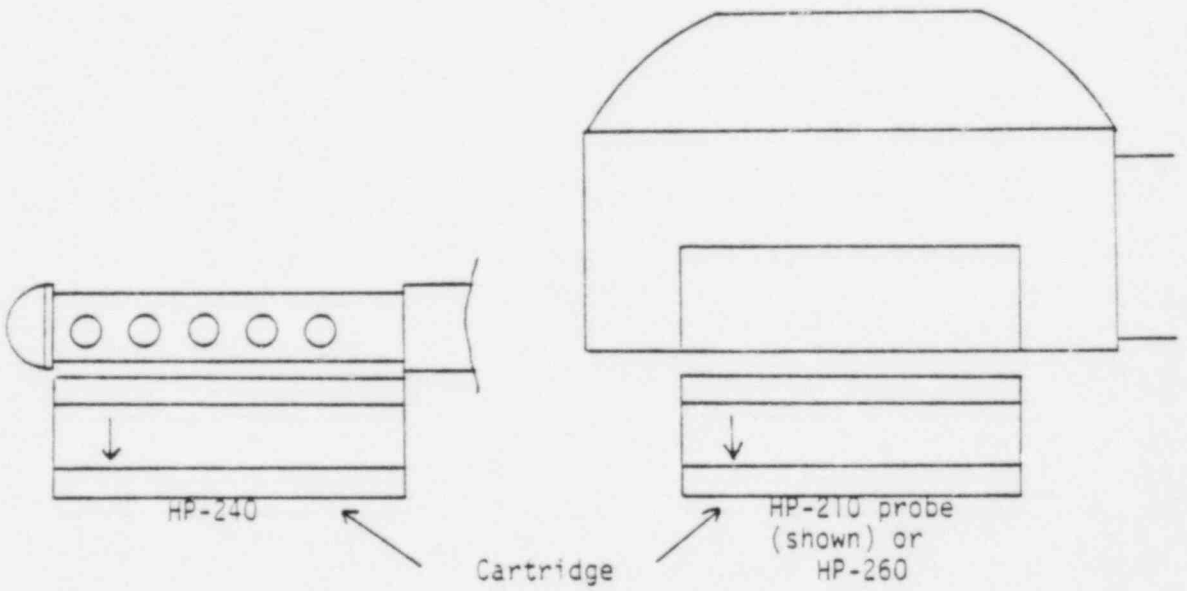


TABLE 1

DESCRIPTION OF EMERGENCY ONSITE MONITORING LOCATIONS

Coordinate	Straight Line Distance From Plant (Meters)	Description	AC Power Available
N,A	300	South side of road	No
N,NE,A	700	In front of wooden water tank	No
NE,A	420	Adjacent to east reservoir	Yes
NE,B	800	North side next to road, adjacent to gulley	No
ENE,A	700	South side of switch-yard at fence	No
SE,C	700	Air sampler-behind north side of GC warehouse	Yes
SE,B	800	Front of GC warehouse	Yes
SE,A	800	40 feet off the main road on the west side of road	No
SSE, A	700	Adjacent to guard shack on bluff	Yes
SSE,B	700	Adjacent to culvert on west side of dirt road	No
SSE,C	700	West of sandblasting area	No
S,A	---	On breakwater	No

TABLE 1 (Continued)

Coordinate	Straight Line Distance From Plant (Meters)	Description	AC Power Available
S,B	---	On breakwater	No
SSW,A	400	West of met tower - requires - 53 - key for gate - not accessible by vehicle	No
SSW,B	---	On breakwater	No
SSW,C	---	On breakwater	No
SW,A	500	West of met tower- requires - 53 - key for gate - not accessible by vehicle	Yes
WNW,A	500	Near gulley on south side - requires - 53 - key for gate	No
WNW,B	600	40 feet in front gate - requires - 53 - key	No
WNW,C	600	North side of road in clearing-may have plant growth	No
NW,A	600	North side of road in clearing-may have plant growth	No
NW,B	600	Northwest side of dirt road	No
NW,C	800	At gate on road leading to north road	No
NNW,A	800	30 feet north of steps leading to pond	No

TABLE 2

DESCRIPTION OF EMERGENCY OFF-SITE MONITORING LOCATIONS

Coordinate	Straight Line Distance From Plant (KM)	Description[8]	AC Power Available
N,10,A	9.8	West of Montana de Oro State Park sign (0.6 miles SW of Rodman Drive on Pecho Road. Good radio at path off road south of State Park sign. Sign on path reads "No Vehicles".	No
N,15,A	10.0	End of Alamo Drive in Cabrillo Estates. (Turn off Pecho Road at Rodman and go to the top of the hill. Turn right onto Alamo and follow it to the end). Good radio. Phone available.	Yes[1]
N,15,B	11.6	Sunset Terrace Golf Course at Clubhouse. Good radio at west end of Howard Drive or on road running north of the golf course.	Yes[2]
N,15,C	11.3	Baywood Park Fire Station (Turn south off of Los Osos Road onto Bayview Heights Drive. Has a TASC-4. DER's monitoring Station 10 is located at Sunnyside School next door). Good radio. Phone available.	Yes
N,20,A	18.0	Morro Bay Power Plant. DER's monitoring Station 9 is located here. Good radio. Phone available.	Yes

TABLE 2 (Continued)

Coordinate	Straight Line Distance From Plant (KM)	Description	AC Power Available
NNE,15,A	11.3	Intersection of Los Osos Valley Road and Clark Valley Road (under PG&E transmission lines). Good radio.	No
NNE,15,B	12.9	Los Osos Jr. High School on South Bay Boulevard in the playing field. Good radio.	No
NNE,20,A	17.6	0.2 miles north along San Bernardo Creek Road is on the northeast side of Highway 1. Good radio.	No
NE,15,A	10.6	Intersection of Los Osos Valley Road and Turri Road. DER's monitoring Station 11 is located nearby. Good radio at intersection.	No
NE,20,A	17.4	Sheriff's headquarters. (EOF) Turn south on Highway 1 at sign indicating Sheriff's Operational Center. Good Radio. Phone available.	Yes
NE,20,B	19.2	PG&E substation near Men's Colony, adjacent to northeast side of Highway 1. Good Radio. Phone available.	Yes

TABLE 2 (Continued)

Coordinate	Straight Line Distance From Plant (KM)	Description	AC Power Available
ENE,8,A	9.0	See Canyon Road, 4.2 miles up from San Luis Bay Drive intersection. Good radio. Telephone available. Rattlesnake hazard.	Yes[1]
ENE,20,A	14.8	Laguna Jr. High School at intersection of Los Osos Road and Perfumo Canyon Road. Good radio.	Yes[3]
ENE.20,B	16.0	Fire station at inter- of Los Osos Valley and Madonna Roads. Good radio.	Yes
ENE,20,C	18.6	PG&E Information Zone 1 substation at corner of walker and Pacific Streets. DER's Station 12 is also located here. Good radio.	Yes
ENE,20,D	15.6	Corner of Foothill Boulevard and O'Conner Way. Good radio.	Yes[1]
ENE,20,E	15.8	Yancy's Restaurant (formerly Hob Nob) parking lot. Good radio.	Yes[2]
E,15,A	14.5	PG&E Information Center. Good radio.	Yes
E,15,B	13.4	Bellevue-Sante Fe School. Fair Radio.	Yes[4]

TABLE 2 (Continued)

Coordinate	Straight Line Distance From Plant (KM)	Description	AC Power Available
E,15,C	11.3	See Canyon Road, 1.7 miles up from San Luis Bay Drive intersection. Survey at intersection of See Canyon Road and Davis Canyon Road. Good radio.	Yes[1]
E,25,A	20.2	SLO County Airport. The field on the right of the road to the parking lot. Good radio.	Yes
E,25,B	21.5	SLO Country Club. East side of parking lot in the fairway. Good radio.	Yes[2]
ESE,4,A	2.6	Turnout on access road, 1.6 miles from Security Building. Marked with red/white fence post. Radio near plant or near location ESE,10,A	No
ESE,6,A	4.5	Turnout on access road 2.8 miles from Security Building. Marked with red/white fence post. Radio near plant or near location ESE,10,A.	No

TABLE 2 (Continued)

Coordinate	Straight Line Distance From Plant (KM)	Description	AC Power Available
ESE,8,A	6.9	Gate next to shack at road to ruins, 4.3 miles from Security Building along access road. Marked with red/white fence post. DER station 16 is near here. Radio near plant or near location ESE,10,A	No
ESE,10,A	9.6	Top of San Luis Hill[5]. Gate at 6.2 miles from the Security Building. Fair radio.	No
ESE,10,B	10.0	Port San Luis Gate. TASC-4 and DER's Station 27 are located here. Radio on road to Pirates Cove.	Yes
ESE,15,A	11.6	Parking lot behind Avila Beach Post Office. Radio on road to Pirates Cove.	Yes
ESE,20,A	15.3	Pismo Beach Fire Dept. on Shell Beach Road. Good radio.	Yes
ESE,20,B	19.2	0.5 miles northwest of the Shorecliff Inn on Shell Beach Road. Good radio.	Yes[1]
SE,2,A	1.3	Turnout on access road, 0.8 miles from Security Building near meteorological Tower A. Marked with red/white fence post. DER Station 7 is near here. Good radio.	No

TABLE 2 (Continued)

Coordinate	Straight Line Distance From Plant (KM)	Description	AC Power Available
NW,2,A	1.6	0.6 miles north from Field's property gate (1 mile north from plant, just ENE of Lion Rock).	No
NW,4,A	3.5	Fields' road near large watering pond.	No
NW,8,A	6.1	Near residence by park gate.	Yes[1]
NNW,4,A	2.7	Near wood paneled house.	Yes[1]
NNW,8,A	5.8	Parking lot near end of road at southern park boundary (near gate to Fields' property). Good radio.	No[6]
NNW,8,B	7.6	Ranger station overlooking Spooner's Cove. Good radio on road south of Ranger Station at "Locked Gate Ahead" sign (near parking overlook of Spooner's Cove).	Yes[7]

NOTES:

[1]Power is available at nearby residences.

[2]During working hours. Also power is available at nearby residences.

[3]During school hours. Also at nearby residences.

[4]During school hours.

TABLE 2 (Notes Continued)

[5]A dirt road leads to the top of the hill. The intersection of this road with access road is marked with a red/white fence post. A 90909 key is required on the gate. A four-wheel drive vehicle is preferred. Alternatively; take readings on the access road at the marked fence post.

[6]Power is available at nearby residence on Fields' property (NW,8,A) and monitoring can be performed at this latter location.

[7]During daylight hours.

[8]Radio comments refer to the best result using unaided handi-talkies using repeaters (H.P. Frequency).

TABLE 3

DER ENVIRONMENTAL SAMPLING LOCATIONS

Code	Description	Radial Direction 0°	Radial Distance (Miles)
0B1	Point Buchon (Station 18).....	325	3.6
0S1	Exclusion Fence-Northwest Corner (Station 3).....	320	0.1
0S2	North Gate (Station 31).....	320	0.5
1A1	Crowbar Canyon (Station 13).....	327	1.6
1C1	Montana de Oro Campground (Station 38).....	336	4.7
1S1	Wastewater Pond (Station 32).....	330	0.4
2D1	Sunnyside School (Station 10).....	10	6.9
2F1	Morro Bay (Station 26).....	0	10.9
2F2	Morro Bay Power Plant (Station 9).....	358	11.2
2S1	Back Road-300 m North of Plant (Station 33).....	0	0.2
3D1	Clark Valley (Station 40).....	24	6.2
3S1	Road NW of 230 kv Switchyard (Station 34).....	23	0.4
4C1	Clark Valley - Gravel Pit.....	45	5.8
4D1	Los Osos School (Station 11).....	36	7.6
4S1	Back Road Between Switchyards (Station 35).....	43	0.5
5C1	Junction Perfumo/See Canyon Roads (Station 39)...	64	4.7
5F1	SLO Zone 1 Substation (Station 12).....	68	11.2
5F2	Cal Poly Farm (Station 25).....	60	12.6
5F3	SLO County Health Department (Station 29).....	70	12.7
5S1	400 kv Switchyard (Station 4).....	58	0.4
5S2	Diablo Creek Weir (Station 20).....	65	0.6
5S3	Microwave Tower Road (Station 8).....	70	0.7
6D1	Junction See/Davis Canyon Roads (Station 41).....	89	7.5
6S1	Microwave Tower (Station 5).....	94	0.5
7C1	Pecho Creek Ruins (Station 16).....	118	4.1
7D1	Avila Gate (Station 27).....	120	6.6
7D2	Avila Beach (Station 14).....	110	7.6
7F1	Shell Beach (Station 17).....	110	10.8
7F2	Pismo Beach (Station 22).....	115	12.6
7G1	Arroyo Grande (Station 23).....	115	16.8
7G2	Oceano Substation (Station 15).....	118	17.3
7G3	Woodland Dairy (Station 30).....	122	17.9
7S1	Overlook Road (Station 36).....	112	0.3
7S2	Diablo Peak (Station 28).....	103	1.1
8S1	Target Range (Station 6).....	125	0.5

TABLE 3 (Continued)

Code	Description	Radial Direction 0°	Radial Distance (Miles)
8S2	Southwest Site Boundary (Station 7).....	128	1.1
9S1	South Cove (Station 37).....	167	0.4
DCC	Diablo Creek at Diablo Cove (Station 21).....	270	0.1
DCM	Diablo Cove (Station 19).....	270	0.2
ICO	Iodine Cartridge Composite.....	0	0.0
LO	Lompoc (at City Hall).....	154	44.6
MT1	Meteorological Tower (Station 1).....	185	0.2
SM	Santa Maria (at Health Dept.).....	127	29.7
SV	Solvang (at Sheriff's Substation).....	144	56.7
WN1	Northwest Guard Shack (Station 2).....	290	0.2

TABLE 4

ENVIRONMENTAL RADIATION MONITORING NETWORK STATION OF THE NUCLEAR REGULATORY COMMISSION

NRC STATION NO.	SECTOR	AZIMUTH	ZENTH	DESCRIPTION
1	SE	125°	1.0 mi.	Site entrance road
2	ESE	119°	4.2 mi.	Site entrance road
3	ESE	107°	6.9 mi.	San Miguel Street, Avila Beach
4	ESE	109°	10.6 mi.	Corner of Naomi Avenue and Seacliff Drive, Sunset Palisades area
5	ESE	113°	14.1 mi.	Corner of Atlantic City Avenue and Front Street, Grover City
6	ENE	68°	9.6 mi.	Perfumo Canyon Road, Laguna Lake Park Area
7	N	359°	11.1 mi.	PG&E Morro Bay Power Plant
8	N	359°	6.6 mi.	Pecho Valley Road, Cuesta by the Sea Area
9	NNW	339°	4.7 mi.	Montana De Oro State Park
10	NNW	328°	3.5 mi.	Private Property Road at end of Pecho Valley Road
11	NNW	332°	1.3 mi.	Private Property Road North of Diablo Canyon Plant
12	NE	37°	21.4 mi.	San Diego Road, Atascadero
13	NE	37°	21.4 mi.	San Diego Road, Atascadero
14	NE	37°	21.4 mi.	San Diego Road, Atascadero

TABLE 5

LOCATIONS OF SELECTED DAIRIES

DAIRY HERD	LOCATION RELATIVE TO DCPP
L.F. Domenghini (500 cows)	NNE, 12.5 miles
Roemer and Jones (200 cows)	NNE, 11 miles
Dutch Maid Farm (100 cows)	NE, 8 miles
Don Warden (200 cows)	NE, 8 miles
Jim Spreafico (150 cows)	E, 9.5 miles
SLO Cal Poly Farm	ENE, 10 miles
Albertoni Farm	SE, 23.5 miles (Guadalupe)

TABLE 6

PIC LOCATIONS

LOCATION	DESCRIPTION
Site 1	DCPP North Gate Guard Post
Site 2	SSW Corner of Target Range
Site 3	715 Harbor Street, Morro Bay. Small fenced yard on NE corner of Harbor Street and Piney Street intersection.
Site 4	Montano de Oro State Park. At the Park Ranger's residence, adjacent to the emergency siren.
Site 5	Los Osos Fire Department
Site 6	SLO County Sheriff's Office. South of EOF trailer behind retaining wall
Site 7	SLO Police Department. Intersection of Santa Rosa Street and Walnut Street. Behind fence SW of Walnut Street driveway.
Site 8	SLO Service Center
Site 9	PGandE Energy Information Center
Site 10	DCPP Front Gate
Site 11	Pismo Beach. From Bellow Street go N.E., turn between Veterans's Memorial and St. Paul's Church and proceed up dirt road. PIC is on top of hill north of pump house and west of water storage tank.

TABLE 6 (Continued)

LOCATION	DESCRIPTION
Site 12	SLO County Building. Grover City. Exit Hwy. 101 at 4th street. Take 4th to Longbranch and proceed NE on Longbranch. County Social Services Building is on corner of 16th and Longbranch.

TABLE 7

BACKGROUND DATA FOR β/γ DOSE AND/OR COUNT RATE MEASUREMENTS (3' ABOVE GROUND

INSTRUMENT	BACKGROUND DOSE RATE (mR/hr) WINDOW CLOSED	WINDOW OPEN
Rad Owl	0	0
Victoreen Radgun	0.02	0.02
HPI-1010	0.015	NA
RO-2	0	0

GM PROBE	BACKGROUND COUNT RATE (cpm) SHIELD ON	SHIELD OFF
HP-240/270	60	60
HP-260	NA	50
HP-210	NA	50

TABLE 8

GM PROBE EFFICIENCY FACTORS, ε_2 FOR IODINE DETERMINATIONS

GM PROBE	ε_2 (counts/dis)
HP-240/270	0.013
HP-260	0.09
HP-210	0.09

TABLE 9

GM PROBE EFFICIENCY FACTORS, ε_3, FOR PARTICULATE DETERMINATIONS

GM PROBE	ε_3 (counts/dis)
HP-240/270	0.018
HP-260	0.20
HP-210	0.18

TABLE 10

GM PROBE EFFICIENCY FACTORS, ε_1, FOR GROUND SURVEYS

GM PROBE	ε_1 ($\mu Ci/m^2/cpm$)
HP-240/270	0.0042
HP-260	0.0012
HP-210	0.0011

PACIFIC GAS AND ELECTRIC COMPANY
NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

EMERGENCY ENVIRONMENTAL MONITORING FIELD DATA SHEET

Team _____ Leader _____ Member _____

Monitoring Location _____

1. THREE FOOT BETA-GAMMA RADIATION FIELD READINGS

a. Count Rate

Calibration Due Date _____

Time	Type of Probe	CPM[Shield off(UP)] Gross	BKG*	Net	CPM[Shield on(down)] Gross	BKG*	Net

b. Dose Rate

Calibration Due Date _____

Time	Instrument	mR/hr(Window Open) Gross	BKG*	Net	mR/hr(Window Closed) Gross	BKG*	Net

c. Integral Dose

Instrument	① Time Started	② Time Complete	③ Duration(HR) ② - ①	④ Total Dose(mR)	⑤ Dose Rate (mR/hr) ④ ÷ ③

2. AIR SAMPLE DATA

Calibration Due _____

Sampler	Time Started	Time Completed	Duration (Minutes)	Flow Rate (CFM)	Sample Flow (FT³)

3. PARTICULATE DETERMINATION

Type of Probe	Gross	CPM(Shield off) BKG*	① Net	② ϵ_2	③ E_c	④ Volume(FT³)	① × 2.22 × 10⁶ / (② × ③ × ④)

4. IODINE DETERMINATION

Type of Probe	Gross	CPM(Shield Off) BKG*	① Net	② ϵ_2	③ E_c	④ Volume(FT³)	① × 2.22 × 10⁶ / (② × ③ × ④)

*NUMERICAL VALUE FOUND IN EMERGENCY PROCEDURE RB-7 OR RB-8

5. ENVIRONMENTAL MONITOR READINGS

a. PIC Reading — Calibration Due _____

Time	Dose Rate (mR/hr)

b. TASC-4 Reading — Calibration Due _____

① Scaler Count	② Count Time (Sec)	① ÷ ② (mR/hr)

6. GROUND SURVEYS

Time _____

Description	Probe	Gross CPM (Shield off)	BKG*	Net ①	② ε	① ÷ ② (DPM/100 cm²)

7. VEGETATION SAMPLES

NOTE: USE HP-240 OR EQUIVALENT PROBE

Time _____

Description	Gross CPM (Shield off)	BKG*	Net ①	① × 1 (DPM/100 cm²)

8. SMEAR SAMPLES

Time _____

Description	Probe	Gross	BKG*	Net ①	② ε	3 Area Smeared (Ft²)	Net × 2 / ε / 3 / 100 (DPM/100 cm²)

9. LIQUID SAMPLES

Time _____

Description	Volume of Sample Counted	Gross CPM	Immersion Data BKG*	Net CPM

10. REMARKS

TITLE EMERGENCY PROCEDURE
CALCULATION OF RELEASE RATE
AND INTEGRATED RELEASE

APPROVED R Patterson PLANT MANAGER 7/15/83 DATE

SCOPE

This procedure describes methods to determine airborne radioactivity release rates and total curie release under emergency conditions. The methods to determine airborne radioactivity release rate and total release are discussed as follows: 1) Determination of total release and release rate via the plant vent; 2) Determination of total release and release rate via the plant containment dome monitors; 3) Determination of total release and release rate via the secondary system (i.e., steam dump, blowdown tank) or an unmonitored pathway. This procedure and changes thereto requires PSRC review.

GENERAL

Figure 1 provides a flow chart to determine which of the above methods is appropriate for use under existing emergency conditions. Work sheets to perform necessary calculations are provided in this procedure. Release rate and total curie release values will be used to calculate projected doses offsite (EP RB-11).

PROCEDURE

Work Sheets 69-9260, 69-9284, 69-10555, and 69-11105 of this procedure are to assist in making the calculations. The instructions which follow are in the same sequence as they appear on the work sheets.

1. Determination of Noble Gas Release Rate Via the Plant Vent RE-14 or RE-29

   a. Determine the Plant Vent Flow Rate

      This section presents the method(s) to be utilized in determining the plant vent flow rate. The information obtained should be recorded on the work sheets as described below:

1) The plant vent flow rate can be read directly on FR-12 (located on the Unit 2 RMS board in the control room). Enter the flow rate (in cfm) at Step 2.B on the work sheet.

2) If FR-12 is inoperable, the flow rate may be estimated by multiplying the number of fans in operation on the affected unit by their respective flow rates (Step 2.A on work sheet) and summing.

3) Subsequent calculations require the flow rate to be expressed in cc/sec instead of cfm. This conversion is carried out in Step 2.C.

b. Determine the Plant Vent Noble Gas Release Rate

The release rate will probably exhibit considerable variation over the course of the release. However, at any moment in time, the release rate can be determined as follows:

1) Determine which noble gas plant vent monitor is on-scale. RE-14 (normal range) reads in cpm. RE-29 (high range) reads in mR/hr. Enter the reading on Work Sheet 69-9260, Step 3.

2) Using Figure 2 or 3, as appropriate, convert the monitor reading to plant vent concentration (μCi/cc). Enter the value on Work Sheet 69-9260, Step 3.

NOTE: On Figure 2, use the curve labeled "effective age < 1,000 hours" for all accidents except those involving spent fuel which has been stored for greater than 1,000 hours ($\sim$ 1-1/2 months).

3) Release rate may be obtained by using the following formula:

$$\dot{Q}\ (Ci/sec) = \text{Vent Flow Rate } (cc/sec) \times \text{Vent Concentration } (\mu Ci/cc) \times 10^{-6}\ (Ci/\mu Ci) \quad (1)$$

Enter result on Work Sheet 69-9260, Step 3.

2. Determination of Total Curie Release of Noble Gases Via the Plant Vent (RE-14 or 29).

Total curie release of noble gases is the product of release rate times the duration of release (ΔT).

a. From the strip chart of the monitor of interest, determine the duration of the release rate (ΔT) in seconds. Enter value on Work Sheet 69-9260, Step 4.A.

b. Multiply Δt time $\dot{Q}$ (Ci/sec) to obtain total release. Enter value on Work Sheet 69-9260, Step 4.

c. If the release rate has varied over time, sum the products of Δt times $\dot{Q}$ to obtain the total curie release up to that point in time. Enter value on Work Sheet 69-9260, Step 4.

3. Determination of the Total I-131 Release and Release Rate Via Plant Vent (RE-24).

Each Unit's plant vent is sampled by a normal range radioiodine monitor (RE-24). This instrument measures both the I-131 collection rate and the I-131 activity collected on the silver zeolite cartridge. Either of the above values can be displayed locally by operating a selector switch on the instrument. It is important to note that this instrument only measures the I-131 activity collected on the cartridge. To convert cartridge collection figures to total plant release, it is necessary to multiply by the ratio of the plant vent flow rate to the sample flow rate.

To use this instrument for assessing an accidental release, proceed as follows:

a. Estimating Curies Released and the Release Rate to the Present Moment

1) If the high alarm for RE-24 has activated, go to Step 3.C.

2) Read the sampler flow rate on the local indicator. This data is entered in Section 5.A of the Work Sheet

and is used to calculate the vent/sampler flow ratio. The plant vent flow rate (use the cfm value from Section 2.B of the Work sheet) is also entered and the ratio is determined.

3) Turn the toggle switch on the front of the instrument to the "μCi($\times 10^{-6}$)" position.

4) Turn the SCALE FACTOR switch to the "X1000" position. This switch is located inside the door on the lower part of the front of the instrument. Enter the scale factor in Section 5.B of the Work Sheet.

5) Wait at least one minute (to allow for the instrument response time) and then read the chart and enter this reading on the work sheet. The chart reading will be a number between 1 and 1,000. Do not apply any other correction factors to the chart reading, since these are all taken into account on the work sheet.

NOTE 1: If the instrument does not read upscale with a "X1000" scale factor, I-131 will not be a significant contribution to exposure projections from the accident, and calculations of I-131 dose rates are performed primarily for informational/documentational purposes. Do not make any more adjustments to the instrument until the engineering staff arrives.

NOTE 2: If the release produces an off-scale reading on the "X1000" scale, I-131 will have to be assessed using the high range iodine monitor; or alternatively, the cartridge will have to be analyzed in the counting room.

6) The activity release to the present time is the product of the chart reading, the scale factor, the flow rate ratio, and a conversion factor of 10^{-12}. The latter factor includes the 10^{-6} factor which is to be applied to the chart reading when the switch is in the "μCi($\times 10^{-6}$)" position, and a second factor of 10^{-6} to convert μCi into Ci.

7) The I-131 release rate (Ci/sec) is the product of the chart reading, the scale factor, the flow rate, and a conversion factor of 10^{-17}.

b. Projecting the Total I-131 Release

Once the activity released to the moment is known, there are three ways to project the total I-131 release.

1) Estimate the total release duration after assessing the situation.

2) Extrapolate the total release duration from the trace on the chart.

NOTE: This may not be possible if the scale factor was changed during the release.

3) Calculate the total release based on the "cleanup half-life."

a) Move the toggle switch to the "μCi/sec($x10^{-11}$)" position. Wait 1 minute and read the chart, then return the switch to the "μCi($x10^{-6}$)" position.

b) The additional curies that will be released are obtained by using the following equation:

$$Q_{ADD} = (1.44)\ \dot{Q}_{131} \times t_{1/2,CU} \qquad (2)$$

where:

Q_{ADD} - additional curies (Ci) that will be released

$\dot{Q}_{131}$ = I-131 release rate (Ci/sec)

$T_{1/2,CU}$ = cleanup half-life (seconds)

c) Determining the Cleanup Half-Life.

Given any two release rates during the cleanup period (decreasing release rate) and the time interval between them, the cleanup half-life is given by:

$$T_{1/2,CU} = \frac{(0.693)\ \Delta t_{2,1}}{\ln (\dot{Q}_{2,CU}/\dot{Q}_{1,CU})} \qquad (3)$$

where:

$T_{1/2,CU}$ = cleanup half-life (seconds)

$\Delta t_{2,1}$ = elapsed time between data points 1 and 2 (seconds)

$\dot{Q}_{1,CU}$; $\dot{Q}_{2,CU}$ = release rates at times 1 and 2 respectively (Ci/sec)

If for any reason the cleanup half-life cannot be determined, assume the following values.

Location of Release	Cleanup Half-Life in Seconds as a Function of Number of Exhaust Fans in Operation		
	1	2	6
Auxiliary Building	600	300	-
Fuel Handling Bldg.	560	280	-
Containment	1980	-	-
Turbine Building	7560	3780	1260

d) The total release is obtained by adding the curies already released to the projected curie release.

$$Q_{TOTAL} = Q_{TO\ MOMENT} + Q_{ADD}$$

c. Determination of Total I-131 Release if RE-24 High Alarm Activates

1) Send a qualified person equipped with a portable dose rate instrument to the RE-24 local readout and recorder.

2) Use portable dose rate instrument to determine general background levels of radiation in the vicinity of the monitor. Record readings and their locations on Work Sheet, Section 6.A.

3) Turn off sampler flow. Record total time flow is off, on Work Sheet, Section 6.B.

4) If radiation levels are high, do not open cartridge door. Record dose rate outside the shield at distance of measurement on Work Sheet 6.C.

   a) Estimate distance from center of cartridge to point where dose rate is measured. Record value (in meters) on Work Sheet 69-9260, Step 6.C.

   b) The equation for the shield closed method is based on a source term involving a mixture of radioiodines representing unfractionated core inventory following two years of full power operation.

$$Q = 60\ DR(d)^2 \qquad (4)$$

where,

Q = quantity of radioiodines collected on cartridge (Curies)

DR = measured dose rate at distance of interest minus general background dose rate (R/hr)

d = estimated distance from center of cartridge to point where dose rate is measured (meters)

5) If radiation levels permit, open the cartridge door to make dose rate measurement. Record value on Work Sheet, Section 6.D.

   a) Estimate distance from center of cartridge to point where dose rate is measured. Record value (in meters) on Work Sheet, Section 6.D.

b) The equation for the shield open method is:

$$Q - 1.3\ DR(d)^2 \qquad (6)$$

where,

Q = Quantity of radioiodines collected on cartridge (Curies)

DR = dose rate measured at distance of interest minus general background dose rate (R/hr)

d = estimated distance from center of cartridge to point where dose rate is measured (meters)

6) Replace cartridge and turn on sampler flow.

7) Transport cartridge to laboratory for radio-analysis.

d. Determination of I-131 Release Rate if RE-24 Alarm Activates.

1) Release rate of radioiodines in the plant vent effluent can be calculated from the following equation:

$$\dot{Q} = (Q/\Delta t)(F/Fs) \qquad (7)$$

where,

$\dot{Q}$ = radioiodine release rate in plant vent effluent (Ci/sec)

Q = Quantity of radioiodines collected on cartridge (Curies)

Δt = time over which release rate is averaged (seconds)

F = plant vent flow rate (CFM)

Fs = sampler flow rate (CFM). Normally equal to 1.0 CFM.

2) The time over which the release rate is averaged (Δt) should be taken as the time during which the cartridge was installed in the monitor and sampler flow turned on and RE-24 high alarm activated. Some judgment must be used to properly estimate this time period.

4 Determination of Release Rate and Total Curie Release from Containment Radiation Monitor Readings (RE-30 and 31).

Form 69-10555 has been provided to assist in making these calculations.

a. Determine Noble Gas Release Rate

1) Containment High Range Area Monitor Readings

a) Determine the time in hours which has elapsed since the accident onset. Record this on the work sheet, in Sections 1.A through 1.D, and 2.C through 2.D.

b) Record the readings from both high range monitors (RE-30 and RE-31) on the Work Sheet, Section 1.A.

(1) If both monitors are functioning correctly, and neither is suspected of being near a "hot spot", then add the readings together, and record the sum on Work Sheet 69-10555, Section 1.A. Divide the sum by 2.0 and record the sum on the Work Sheet, Section 1.A, as "Mean Exposure Rate."

(2) If one monitor is not working properly, or is suspected of being near a "hot spot", record the properly operating monitor's reading in the "Mean Exposure Rate" column of Section 1.A.

2) Using the elapsed times since the accident began recorded on the work sheet, determine the Design Base Accident (DBA) - Loss of Coolant Accident (LOCA) exposure rate (R/hr) from Figure 4. Record this value in the "Actual Exposure Rate" column of Section 1.B of the Work Sheet.

3) Determine the corresponding noble gas release rate (Ci/sec) for the LOCA model at time t(hr) from Figure 5. Record this value in the "DBA-LOCA Noble Gas Release Rate" column of Section 1.C of the Work Sheet.

4) Divide the actual containment mean exposure rate by the DBA-LOCA exposure rate. Multiply the result by the DBA-LOCA Noble Gas release rate. The resultant value is the estimated noble gas release rate. Enter this value in Section 1.D of the Work Sheet.

b. Determine the Total Curie Release of Noble Gases

c. Determine the I-131 Release rates

1) Containment High Range Area Monitor Readings

Use the values for "Actual Containment Mean Exposure Rate" method determined in Work Sheet 69-10555, Section 1.A.

2) Design Basis Accident Exposure Rates and Release Rates

a) Determine the "DBA-LOCA exposure rate" values from Figure 4 (or use the values determined above).

b) Determine the corresponding "DBA-LOCA I-131 Release Rate" (Ci/sec) from Figure 6 and enter on the Work Sheet, Section 2.C.

3) Calculation of Accident I-131 Release Rates

a) Enter the values of "Ration of Actual/DBA Exposure Rates" and "DBA-LOCA I-131 Release Rate" for time (t) in Section 2.D of the Work Sheet.

b) Multiply the "Ratio of Actual/DBA Exposure Rates" by the DBA-LOCA I-131 Release RAte. The result is the "Projected I-131 Release Rate for time = t." Enter this value in Section 2.D of the Work Sheet.

5. Estimation of the Curies Release Via Secondary System or Unmonitored Pathway

A work sheet for determining the radioactive releases that may be associated with a steam generator tube rupture is provided as For 69-11105, "Worksheet for Use of Main Steam Line Monitors, Or RCS Coolant Sample Results During S/G Tube Rupture Accident." The worksheet provides instructions for the use of monitors RE-71, RE-72, RE-73, and/or RE-74 to determine releases that occur via the steam-line safety valves. Alternative methods to the use of RE-71, 72, 73, and 74 are also provided. If the condenser is still in service during a steam generator tube rupture accident, then release rate may be determined using the plant vent monitors described in this procedure. In the event that all these methods of assessing radiological release rate fail, or if it is determined that an unmonitored release path from the plant exists, then follow the instructions provided in this section to estimate the release rate.

To assist in making these calculations, Form 69-9284, "Worksheet for Estimation of Curie Release" has been developed. The worksheet is laid out in the same sequence as the discussion that follows.

a. Determination of Available Activity from a Fuel Release

This section of the procedure should be used in the event of a fuel handling accident, LOCA, or other accident where the major portion of the release comes from fuel damage.

1) Base Data

a) For each assembly involved (or the whole core if it was involved) enter the last date at which power operation occurred.

b) The cooling time is the interval (days) between the time of last power operation and the time that the release occurred. Cooling time is utilized to correct the fission product inventory in the damaged core for decay. For a bundle which has been out of the core 3 months, t_{cool} = 90 days. For a LOCA during operation, t_{cool} = 0 days.

c) The number of damaged fuel rods (suffering either clad rupture or pellet melting) must be estimated. For reference purposes, each assembly consists of 264 fuel rods, and the core as a whole contains 50,952 fuel rods (193 assemblies).

d) Enter the average reactor (not bundle) power over the last 30 days of reactor operation. For example, if a bundle is damaged and, during its last 30 days of operation, the reactor operated at 100% power 75% of the time and 50% power 25% of the time, the average power (expressed as a fraction of rated power) is:

$$(1.00)(0.75) + (0.50)(.25) = 0.875$$

2) Available Activity from Gap Release

If there is no pellet melting, the activity which is released is assumed to be gap activity only.

a) Section A.2., column 1 Form 69-9284 gives the equilibrium gap activity for the peak flux region of the core from full power operation. Since the highest assembly may not be involved, use of this data will usually overestimate the gap activity.

b) The full power values (column 1) are multiplied by the fractional core power, determined previously, to estimate the fraction of equilibrium gap activities. Since Kr-85 has a very long half-life (10 years), it builds up slowly through the cycle and is relatively insensitive to short term fluctuations in the reactor power. Therefore, for conservatism, the full power end of the cycle value is used.

c) In order to evaluate the radioactive decay which occurs during the interval between reactor shutdown and the time the accident occurs, first calculate the number of half-lives which have passed by determining the ratio $t_{cool}/T_{1/2}$ (enter

result column 3). The isotope half-lives are: Xe-133 = 5.3 days, I-131 = 8 days (since Kr-85 has a 10 year half-life, this ratio is set equal to zero, and always is assumed to have a decay factor equal to 1.0). The decay factor is then obtained by use of Figure 7 (enter result column 4, Section A.2.).

d) It is assumed that 100% of the noble gases are released from the gap of any fuel rod which suffers cladding failure. Since much of the iodine plates out, it is assumed that only 25% is released. This assumption is accomplished by multiplying the total gap activity by a gap release fraction of 0.25 (enter result column 5, Section A.2.).

e) When the foregoing factors are multiplied together and multiplied by the estimated number of rods with ruptured cladding, the total number of curies released from the fuel rod gaps is obtained (enter result column 7, Section A.2.).

3) Activity from Fuel Rod Melting

Section A.3., column 1 of Form 69-9284 gives the equilibrium activity for the peak power rod at full power operation. Calculation of the available activity from fuel rod melting is the same as the calculation of gap release. The only difference is that the curies of activity available for release from the fuel far exceeds that available from the gap.

4) Total Available Activity from Fuel Damage

This calculation consists of summing the foregoing results from gap release and fuel rod melting.

b. Determination of Available Activity from a Gas Release

The second type of release mechanism results from situations where noncondensible gases constitute the principal material released. If a liquid is present in the container which

fails, conditions are assumed to be such that the liquid does not vaporize significantly (although it may give up dissolved gases due to depressurization). This type of release is characteristic of a volume control tank (VCT) rupture, or other waste tank failure.

1) Base Data

The parameters of interest here are:

a) The concentration of activity in the container evaluated at atmospheric pressure.

b) The absolute pressure of the tank in psia, required for later corrections for gas compressibility.

c) The volumes of liquid and gas in the container, where the volume of gas is evaluated at the initial tank pressure. The volumes are expressed in cc. Volume conversion factors are as follows:

1 gal = 3,785 cc

1 ft^3 = 23,317 cc

The accident summary sheets give tank volumes for tanks involved in the various analyzed accidents.

d) The decay time, the interval in days, from the time the tank contents were sampled and analyzed and the time the release occurred.

2) Calculation of Available Activity

a) The sample concentrations in μCi/cc at atmospheric pressure are entered in column 1 of Part B.2. of Form 69-9284.

b) Since it is standard practice to express gas sample results in μCi/cc at atmospheric pressure, the concentrations in column 1, Section B.2. must be converted to prevailing tank pressure. This is

accomplished by multiplying by the ratio, Pcon/14.7, where Pcon is the absolute container pressure in psia. No pressure corrections are required for the liquid sample concentrations.

d) The initial activity must be corrected for decay. First, the number of half-lives which have elapsed is calculated in Section B.2., column 5, and then the decay factor is obtained using Figure 7. The isotope half-lives are: Xe-133 = 5.3 days; I-131 = 8.05 days. The decay factor for Kr-85 is approximated as being equal to one (1.0) due to its long half life of 10 years.

If additional activity has been added since the last sample was taken, then decay corrections should be used with care. For example if activity has been added on an irregular basis, then an estimate of this activity addition, corrected by its decay factor, should be added to the activity obtained by the above procedure. However, if activity is continuously added, a container's activity should be assumed to be in equilibrium and equal to the activity present at the time of the last sampling, and no decay factor should be applied.

e) All of the noble gas is assumed to be released from the gas filled void. Also, any noble gases dissolved in the liquid are assumed to bubble out of the liquid and be released when the container fails. However, iodine which is dissolved in water tends to remain in the liquid phase. In a liquid which does not boil, only 1 part in 10,000 will degas from the liquid. Thus we have to multiply the quantity of iodine by a factor of 10^{-4} to calculate what is actually released.

f) The available activity in Ci, Section B.2., column 9, is obtained by multiplying the initial container activity (μCi) by the decay factor, the liquid release fraction, and a conversion factor to convert μCi to Ci.

c. Determination of Available Activity from a Steam Release

This third type of calculation is employed when the accident scenario is a steam release or a hot liquid which flashes to vapor as it is released. Examples of this type of release are: steam line break, small loss of coolant without fuel damage (if fuel is damaged, part A is used to estimate the release from the fuel), blowdown through relief valve, feedwater line break, letdown line failure, etc.

1) Base Data

the principal information which must be estimated is the mass of steam which is released. The total mass contained in various containers is given in the accident summaries of Attachment 2. However, the entire contents of a container may not be released, so the circumstances of the actual accident must be considered. One way to estimate the mass release is to utilize the blow down rate and duration, if known. Another way is to compare the "before release" and "after release" contents of the container.

If the container initially contains both liquid and steam, and the release is from a point above the water level, assume that the initial inventory of steam is exhausted before any liquid vaporizes. Then, the difference between the total mass release and the initial inventory of steam represents the mass of liquid which is vaporized. If the release comes from a point below the water level, assume all of the released mass is from vaporized liquid. If the container is completely filled with water, then all of the mass release is considered to be vaporized water. The reason for making these distinctions is that the retention of iodine is influenced by the way in which the release takes place, as will be seen later, in Section 5.C.2.c) of this procedure.

2) Calculation of Available Activity

a) The mass of steam and vaporized liquid which are released are entered in Section C.2., column 1.

The pounds of steam released refers only to the initial inventory of steam when a break occurs above the water level. Otherwise, the release is considered to be vaporized water (see previous discussion).

b) In Section C.2., column 2, enter the sample results. The sample will be either as μCi/gm or μCi/cc of condensed liquid. The two sets of units are equivalent since the latter case refers to cc of water at STP, which has a density of 1 gm/cc.

c) In column 4, enter the release fraction. Basically, 100% of the Xe and Kr contained in the blown down mass is assumed to be released, regardless of whether it is steam or water, so the release fraction is 1.0. In the case of iodine release from water, the solubility of iodine makes it tend to stay with the water. When the leak is from a point above the water level, the appropriate release fraction for iodine from water is 10^{-2}. When the leak is from a point below the water level and the water itself tries to escape, it carries more iodine with it and the appropriate factor is 10^{-1}.

d) The available activity is the product of the previous factors.

In hot water systems such as the primary and secondary systems, activity is continuously added to the system due to fuel leaks, tube leaks, etc. Thus, equilibrium activity concentrations are rapidly established in such a system, and it is not necessary, or appropriate, to take credit for a radioactive decay factor.

d. Determination of Initial Releasable Activity from Available Activity

In the previous three subsections, we determined the activity available for release from the failed container, i.e., the "available activity". All of this activity which

is available for release may, or may not, actually be released. In the case of noble gases, the only effective cleanup mechanism is radioactive decay. In the case of iodine release, however, there are several additional cleanup mechanisms.

These include filtration, water scrubbing, and containment sprays. Credit in a given situation should be taken for these cleanup methods as appropriate in calculations of noble gas and iodine releases. Some release cleanup mechanisms such as exhaust filtration and water scrubbing are independent of radioactive decay and are treated separately.

However, the building volume cleanup processes such as building ventilation exhaust and containment spray are time-dependent and must be treated simultaneously with radioactive decay.

1) Total Available Activity

Total available activity is the sum of the available activities from all applicable modes of release, (i.e., fuel pellet, cladding gap, or reactor coolant for a fuel melt accident). This activity is entered in column 2 of Part D of Form 69-9284.

2) Water Scrubbing Factor

If an iodine release occurs in water, such as from damage to a fuel assembly while submerged in the spent fuel pool, a large part of the iodine will be scrubbed out of the bubbles as they rise to the surface. If the release is above the water level, use 1.0. If the release is below the water level use 0.01 (the value used in the design basis analysis). The most realistic value is 0.0013 (factor of 760).

3) Filter Cleanup Factor

Theoretically, a charcoal filter has a removal efficiency of 99.97%, corresponding to a cleanup factor of 0.0003. However, some of the iodine is organic, which is not removed as efficiently, so 99.9% (filter

factor of 0.001) is assumed. The design base analyses in the FSAR assume only 90% efficiency (clean-up factor of 0.1). The appropriate filter exhaust cleanup factor for iodine should be entered in column 4, Section D.

NOTE: Be certain that a exhaust filter cleanup factor is only taken credit for if the plant ventilation is operating in the affected area during the release.

4) Initial Releasable Activity

The initial releasable activity is obtained by multiplying the total available activity, column 2 of part D of Form 69-9284, by the applicable factors in columns 3 and 4.

Although this product is called the initial releasable activity, it must be remembered that if the release occurs within the containment, and containment integrity is intact, then the actual release will be significantly lower than this amount due to containment sprays and radioactive decay during the release period. For releases that occur in other buildings, the actual release to the environs will still be somewhat lower than the "releasable activity" due to radioactive decay during the release period. Therefore, it is necessary to compute an effective cleanup half-life which accounts for these removal processes.

5) Effective Cleanup Half-Life

The effective cleanup half-lives are determined in Section E of Form 69-9284 for the case of releases treated by exhaust ventilation or containment spray. If these systems are not operating, credit cannot be taken. The radioactive decay removal rates are entered in column 2 for use here. The building free volume for the appropriate activity release building is obtained by referring to Note 8 of Form 69-9284 and entered in column 3. The ventilation exhaust flow for the affected building is obtained using Work Sheet 69-9260 and entered in column 4 of Form 69-9284. The exhaust vent removal rate of activity from the building is

computed by dividing column 4 by column 3. This value is entered in column 5. In order to obtain an exhaust vent removal rate with the unit of hr^{-1}, the value in column 5 must be multiplied by 3,600 sec/hr. This result is entered in column 6. The containment spray removal rate is next entered in column 7 for I-131. The appropriate values are zero if no pumps are functioning, 31.5 hr^{-1} if one pump is functioning, and 92.4 hr^{-1} if two spray pumps are operating as indicated by Note 7 on Form 69-9284. The total building removal rates are next entered in column 8 by summing columns 2, 6, and 7. Finally, the effective cleanup half-lives are determined by diving 0.693 by the total building removal rates in column 8. The effective cleanup half-lives obtained are entered in column 9.

6) Initial Release Rate

The initial release rate at the time (t_1) of the release is obtained by first transferring the initial releasable activity at time t_1 from column 5 of Section D to column 2 of Section G of Form 69-9284. If the released activity is being vented through the station's exhaust ventilation system, then the appropriate exhaust vent removal rates from column 5 of part E are entered in column 3 of Section G. If the activity was released to the reactor containment and the containment ventilation system is isolated, then zero must be entered in column 3 for each isotope. If the containment ventilation system is isolated, then zero must be entered in column 3 for each isotope. The containment design basis leakage rate has been entered in column 4 for such cases. The building vent initial release rates are calculated by multiplying the values in column 2 by the values in column 3. The resulting values are entered in column 5. If the activity was released to an isolated containment, then the initial release rates are obtained by multiplying column 2 by column 4. These release rates are then entered in column 6.

7) Subsequent Release Rates

In order to determine the release rate at some subsequent time (t_2) it is necessary to first determine

the releasable activity at the corresponding time. Two separate cases for computing the releasable activity at subsequent time t_2 are identified and described in the following description of release rate calculations.

a) Effective cleanup half-lives do not change between t_1 and t_2

If the release rate at some subsequent time t_2 is desired and the total building removal rate (see column 8 of part E) has been constant between t_1 and t_2, then the release rate at time t_2 can be computed in a straight forward manner by use of parts F and G of Form 69-9284.

Part F is used to compute the releasable activity at time t_2. To do this, the time t_1 is entered in column 2, the releasable activity (Ci) at time t_1 is entered in column 3, and the time t_2 is entered in column 4. The releasable activity at time t_1 may be the initial releasable activity from Section D, column 5 or the releasable activity computed for some previous time. Next, the elapsed time, t_E is obtained by subtracting t_1 from t_2. The effective cleanup half-life, $T_{i,CU}$ from column 9 of Section E is entered in Section F, column 6. The number of elapsed effective cleanup half-lives can now be computed by dividing the elapsed time, T_E by $T_{i,CU}$. These values are entered in column 7 for each isotope and used to determine the cleanup correction factors from Figure 7. These values are entered in column 8. Finally, the releasable activity at time, t_2 is obtained by multiplying the releasable activity at time t_1 by the cleanup correction factor.

The releasable activity is entered in column 2 of part G and the release rate is computed in the same manner as the initial release rate as described above.

b) Effective Clean Half-Lives Changes between t_1 and t_2

If the effective cleanup half-lives change between t_1 and t_2, say at time t_x, then the releasable activity must first be computed at time t_x by the procedure described in section 7.a) above. This releasable activity is then entered in column 3 in a second usage of part F of Form 69-9284. The effective cleanup half-lives for the period between t_x and t_2 are then computed as before using Section E of Form 69-9284. The releasable activity at time, t_2 is then computed as before using Section F of Form 69-9284. Finally, the release rate is computed using Section G of Form 69-9284 as described in Section 5.d.6). above.

8) Total Noble Gas Release Rates

a) Use Table 1 to determine "effective age." Enter value on Work Sheet 69-9284, Section H.2.

b) In column H.3 enter the calculated release rates from Section G of Work Sheet.

c) Sum the release rates and enter result in column H.4.

d) Use Figure 8 to determine the ratio of total noble gas activity to summed Xe-133 and Kr-85 activity. Enter value in column H.5.

e) Multiply the summed release rates (column H.4) times the ratio from column H.5 to determine the noble gas release rate (Ci/sec).

TABLES

1. Initial Effective Age for Various Postulated Accidents.

FIGURES

1. Flow Chart for Determining Release Rate and Total Release.

2. Response of Plant Vent Radiogas Monitors (RE-14).

3. Response of Plant Vent High Range Radioiodine Monitors (RE-29).

4. DBA-LOCA Containment Monitor Exposure Rate Vs. Time Since Accident Onset (RE-30 and 31).

5. DBA-LOCA Noble Gas Release Rate Vs. Time Since Accident Onset (RE-30 and 31).

6. DBA-LOCA I-131 Release Rate Vs. Time Since Accident Onset (RE-30 and 31).

7. Radioactivity Decay Factor Vs. Number of Elapsed Half-Lives.

8. Ratio of Total Noble Gas to Kr-85 and Xe-133 Vs. "Effective Age."

APPENDIX

1. FSAR "Accident Summary Sheets"

ATTACHMENTS

1. Form 69-11105, "Worksheet for Use of Main Steamline Monitors, or RCS Coolant Sample Results During S/G Tube Rupture Accidents".

2. Form 69-9260, "Work Sheet for Determination of Release Rate or Total Release from Plant Vent Monitors."

3. Form 69-10555, "Work Sheet for Release Rate Estimation from Containment High Range Area Monitors."

4. Form 69-9284, "Work Sheet for Estimation of Curie Release."

5. Form 69-10556, "Release Rate Summary."

TABLE 1

INITIAL EFFECTIVE AGE FOR VARIOUS POSTULATED ACCIDENTS

		Initial Effective Age (Hours)
1.	Blackout	65
2.	Small Loss of Coolant Accident (LOCA)	60
3.	Major LOCA (No core melt)	40
4.	Major Steamline Break	65
5.	Major Feedwater Line Break	65
6.	Steam Generator Tube Rupture	65
7.	Locked Reactor Coolant Pump (RCP Rotor)	50
8.	Fuel Handling Accident in Fuel Handling Building (FHB)	600
9.	Control Rod Ejection	40
10.	Gas Decay Tank Rupture	80
11.	Liquid Holdup Tank Rupture	60
12.	Volume Control Tank (VCT) Rupture	60
13.	Design Base LOCA with Core Melt	1
14.	Gap Activity Release (fresh fuel)	20

NOTE 1: The value tabulated is the initial age assumed for the start of accident; to this must be added any time which has passed since the start of the accident. In the case of the fuel handling accident in the Fuel Handling Building, the FSAR assumes 600 hour (25 day) cooling. If the time since the damaged fuel assembly has operated is longer than 25 days, use this actual cooling time as the effective age.

NOTE 2: An "effective age" of 0 hours corresponds to the mixture which is contained in the fuel pellets at the time of reactor shutdown.

TITLE: CALCULATION OF RELEASE RATE AND INTEGRATED RELEASE

FIGURE 1

FLOW CHART FOR DETERMINING RELEASE RATE AND TOTAL RELEASE

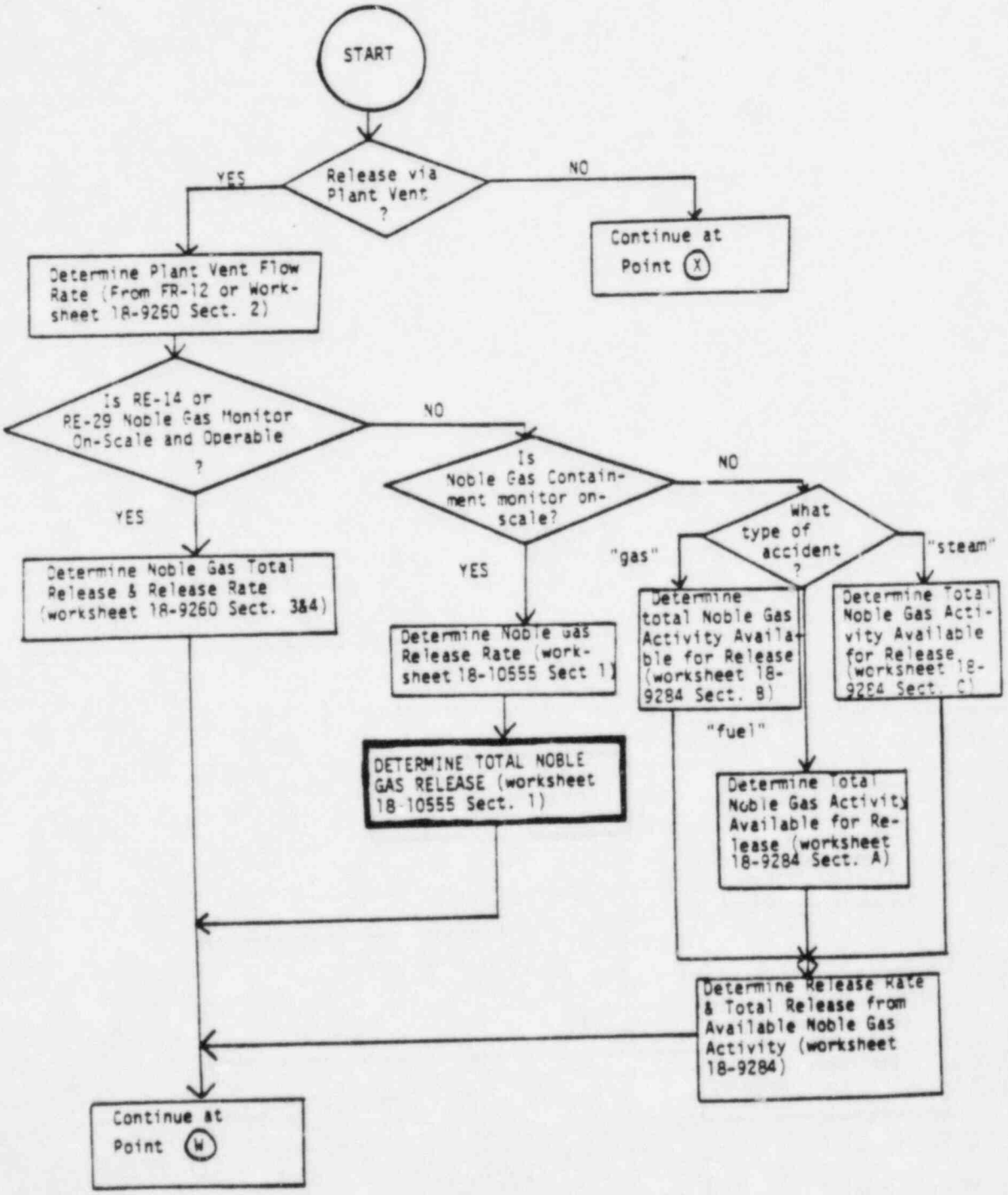


FIGURE 1 (continued)

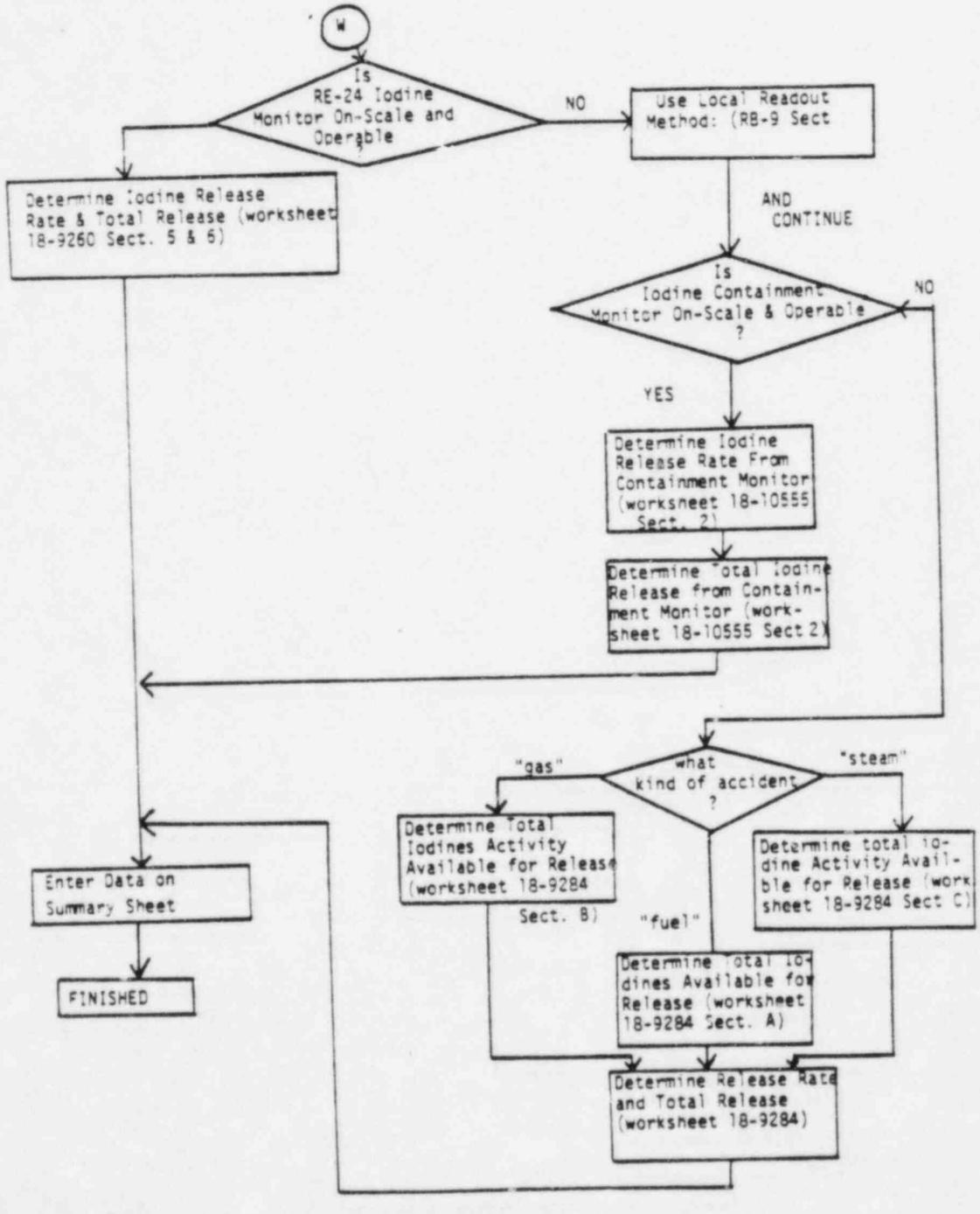


FIGURE 1 (continued)

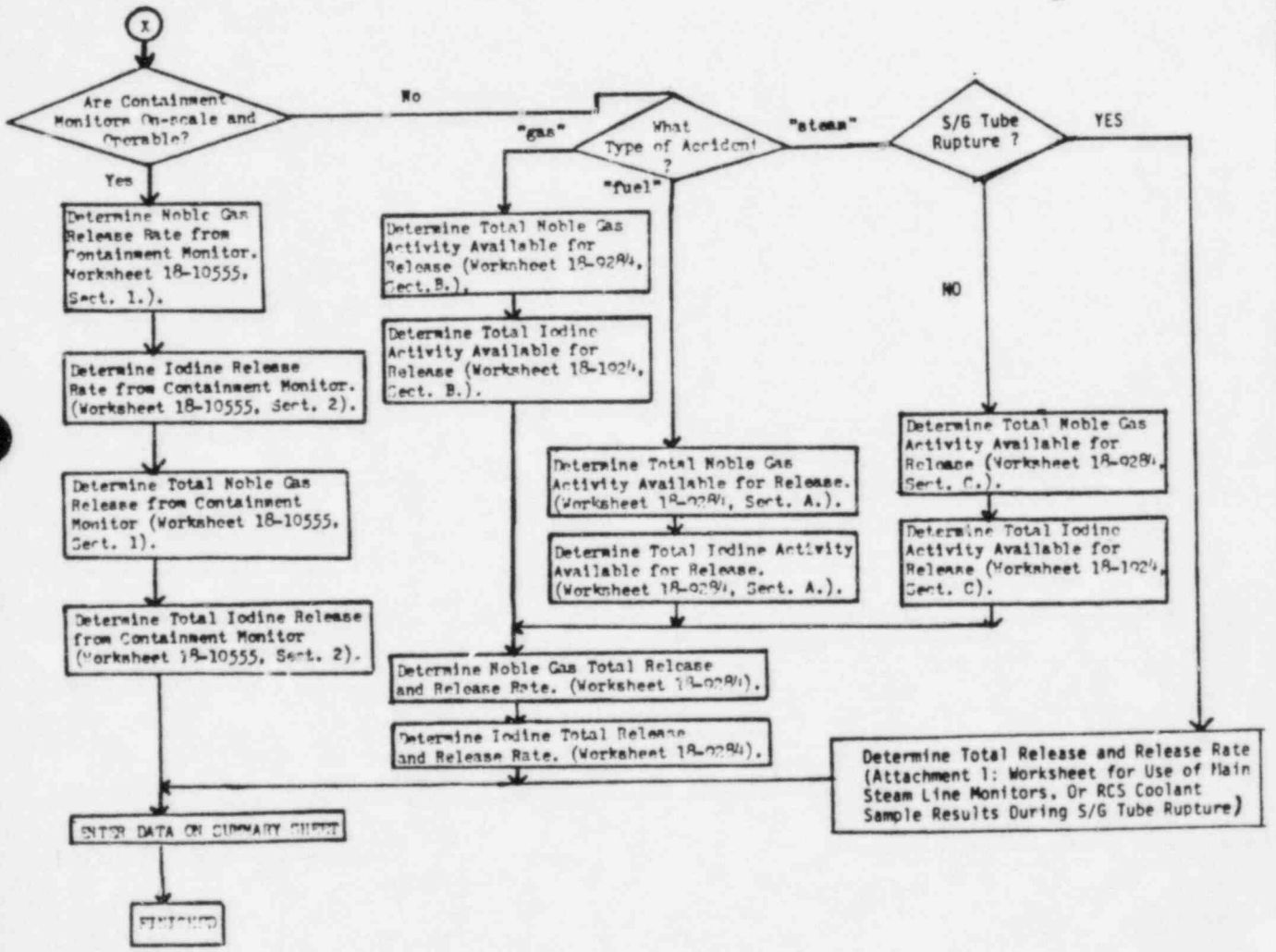
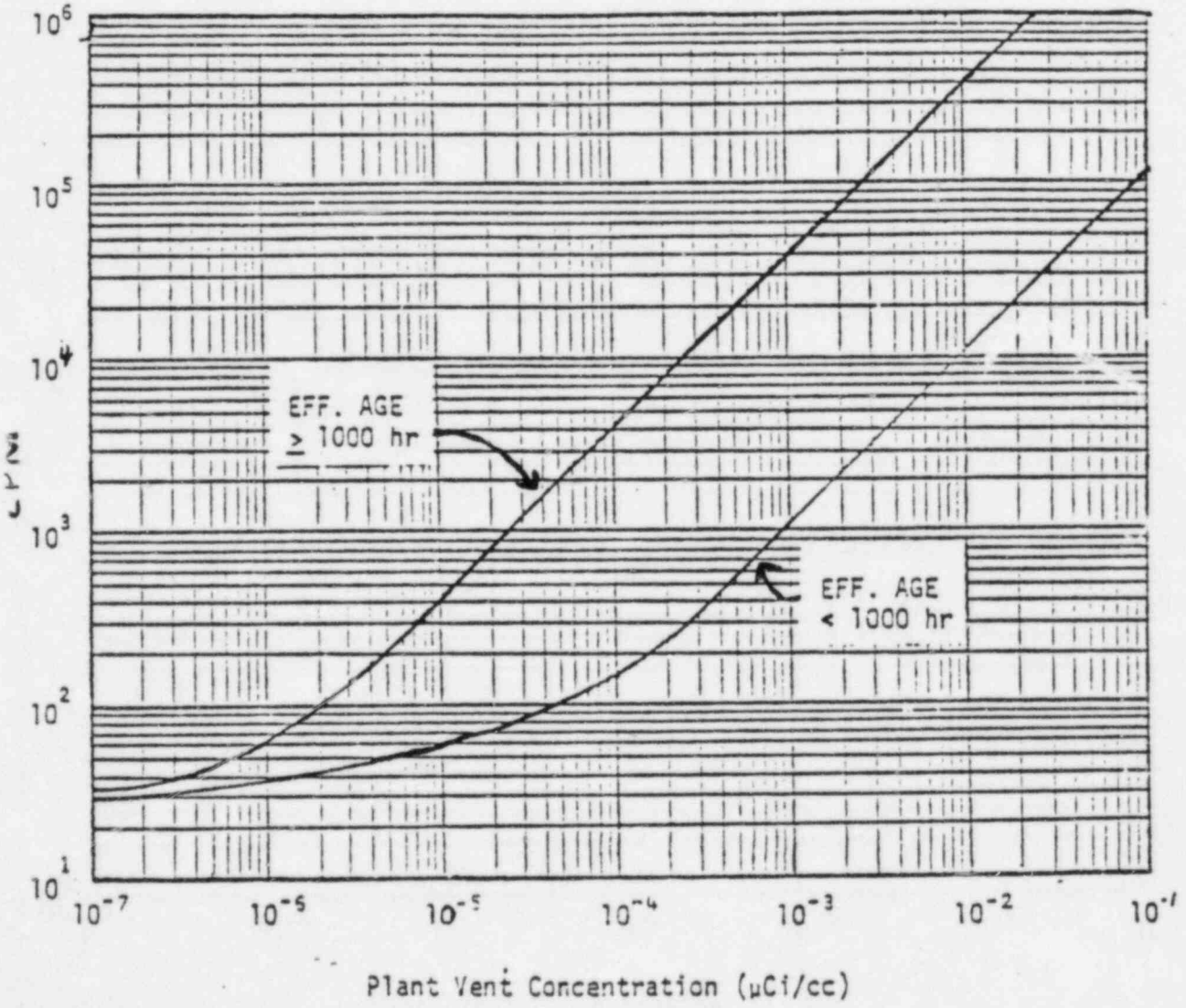


FIGURE 2

RESPONSE OF PLANT VENT RADIOGAS MONITOR

(RE-14)



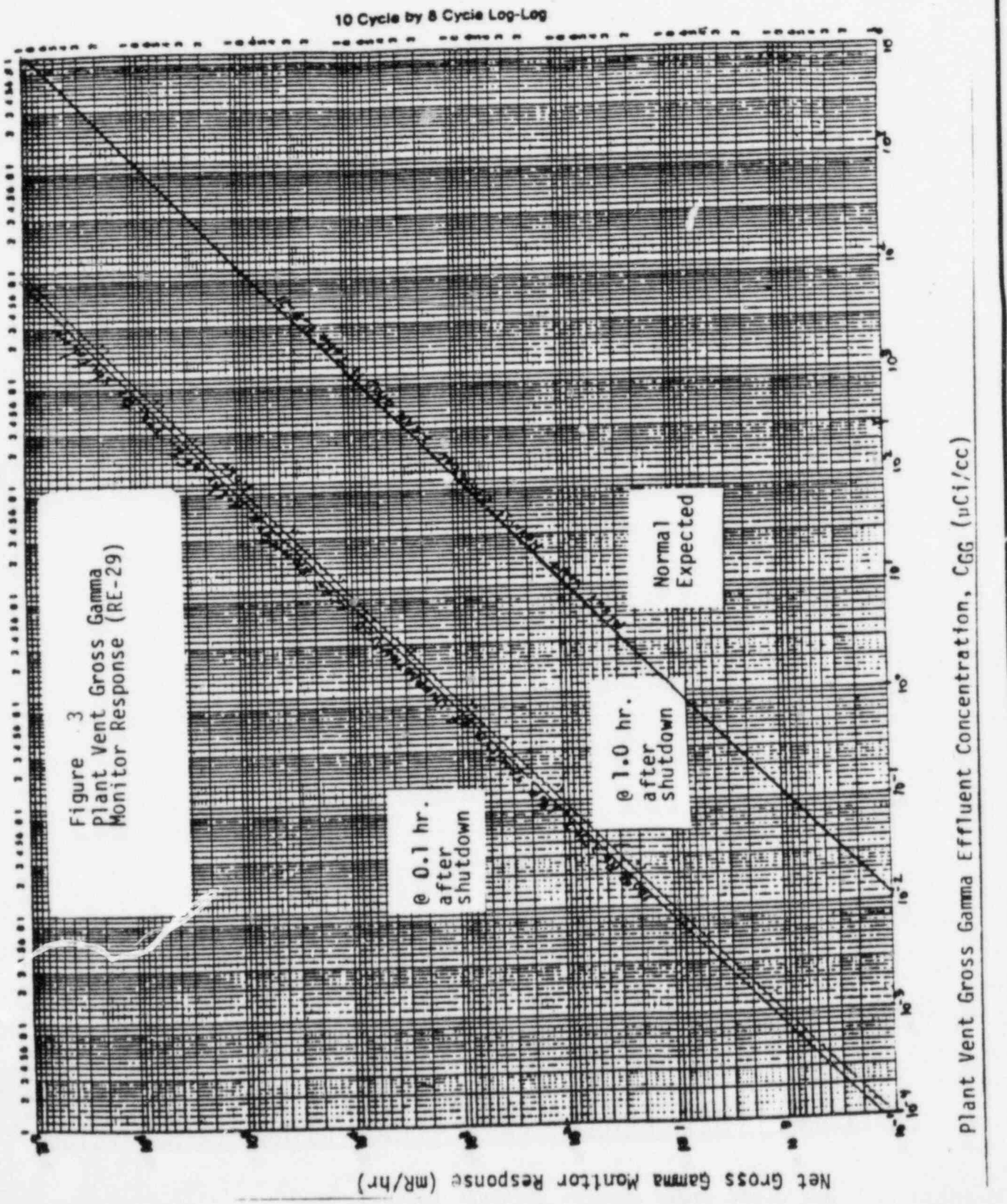

10 Cycle by 8 Cycle Log-Log
Figure 3
Plant Vent Gross Gamma
Monitor Response (RE-29)
@ 0.1 hr. after shutdown
@ 1.0 hr. after shutdown
Normal Expected
Net Gross Gamma Monitor Response (MR/hr)
Plant Vent Gross Gamma Effluent Concentration, C_{GG} (uCi/cc)

FIGURE 4
DBA-LOCA CONTAINMENT MONITOR EXPOSURE RATE
VS.
TIME SINCE ACCIDENT ONSET (RE-30 AND 31)

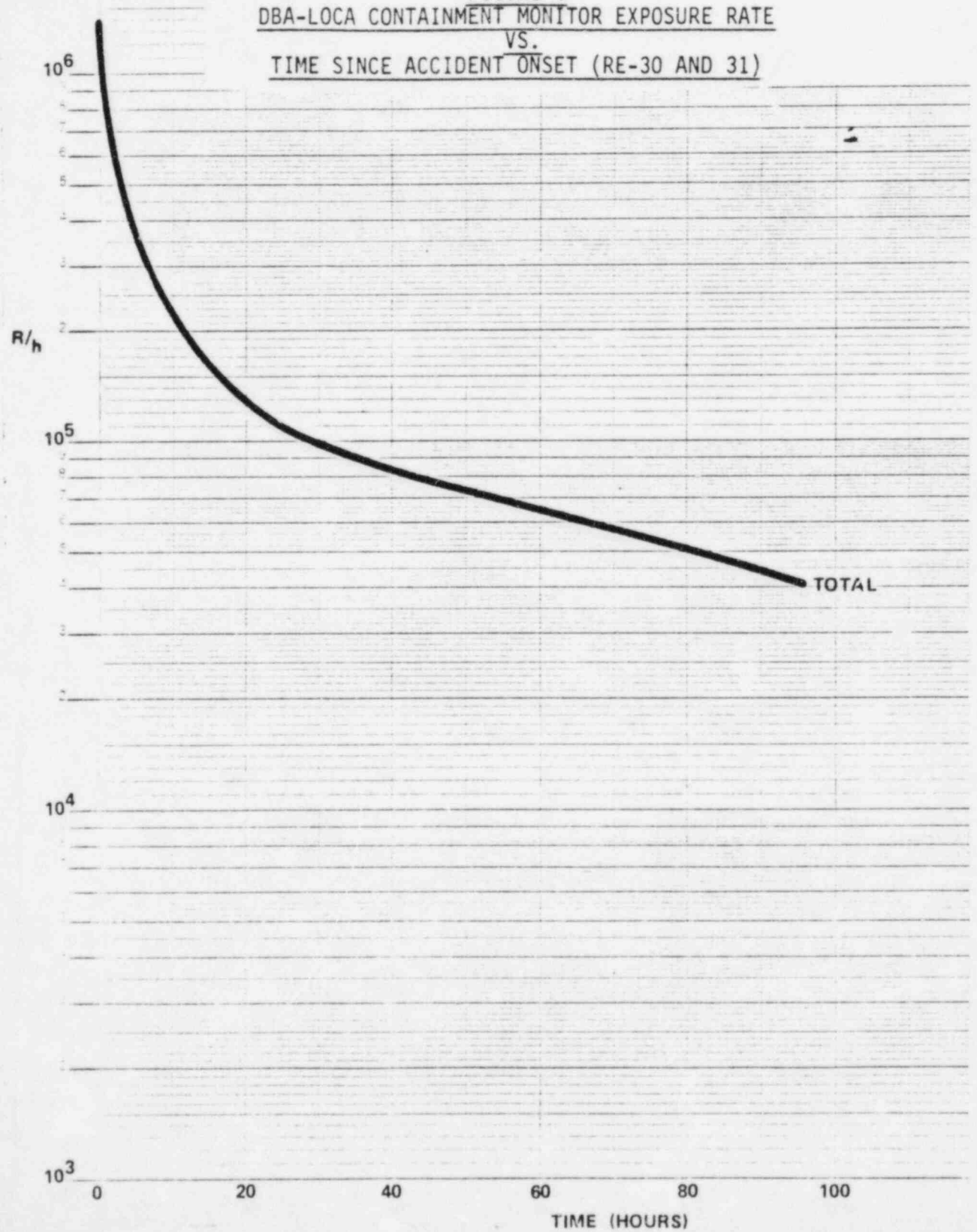


FIGURE 5

DBA-LOCA NOBLE GAS RELEASE RATE VS. TIME SINCE ACCIDENT ONSET
(RE-30 and 31)

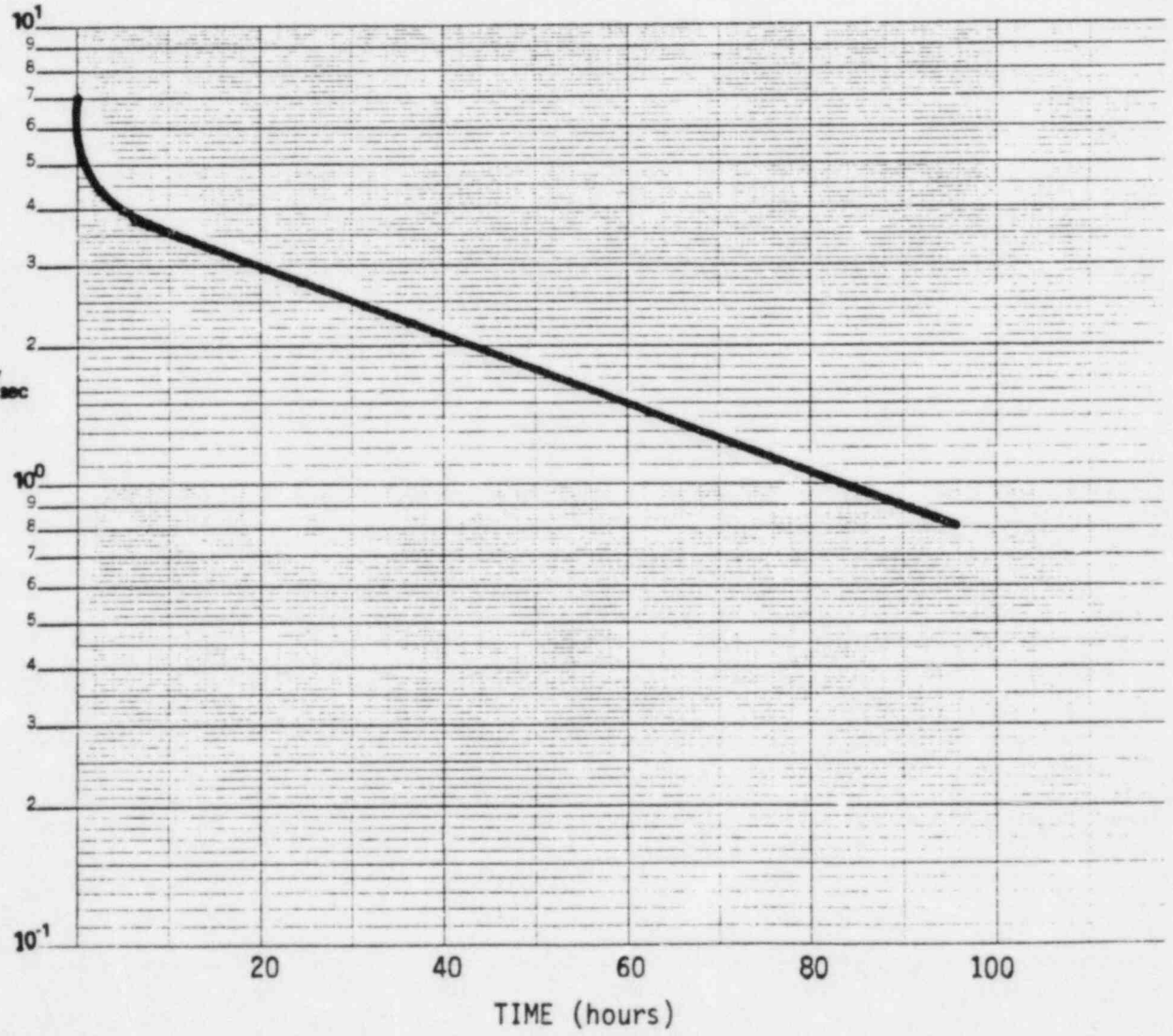


FIGURE 6

DBA-LOCA I-131 RELEASE RATE VS. TIME SINCE ACCIDENT ONSET
(RE-30 and 31)

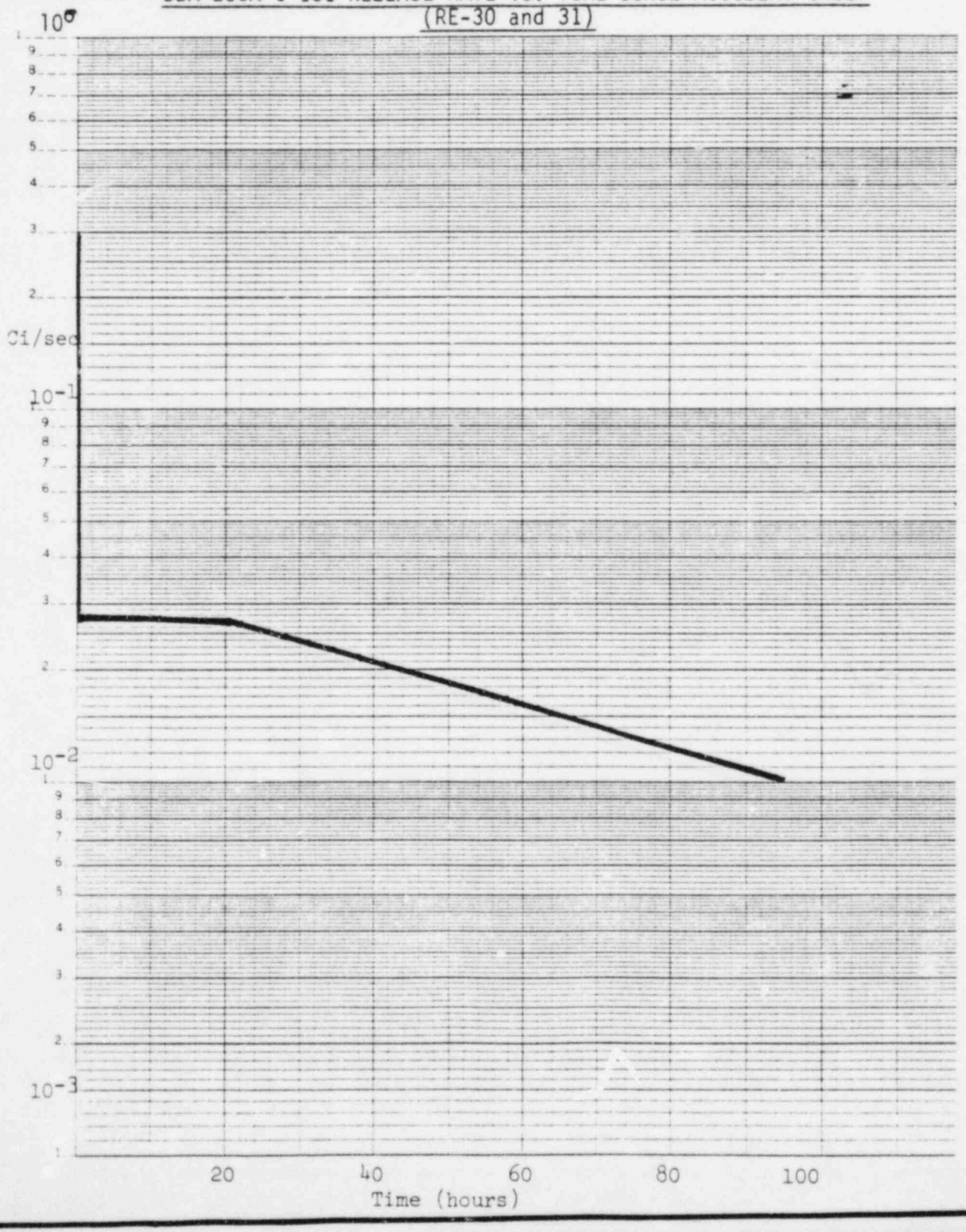


FIGURE 7

RADIOACTIVITY DECAY FACTOR VS. NUMBER OF ELAPSED HALF-LIVES

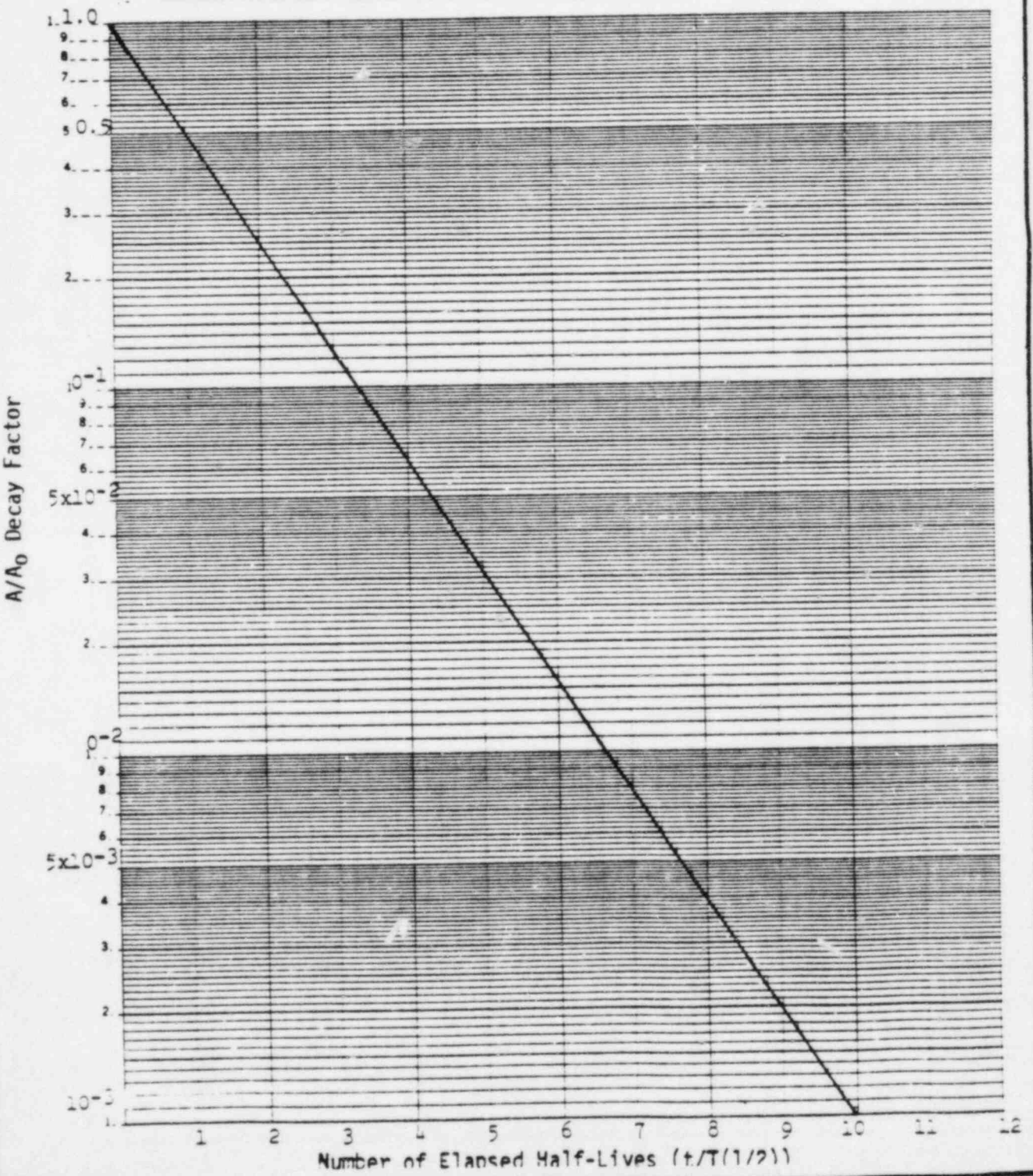


FIGURE 7 (continued)

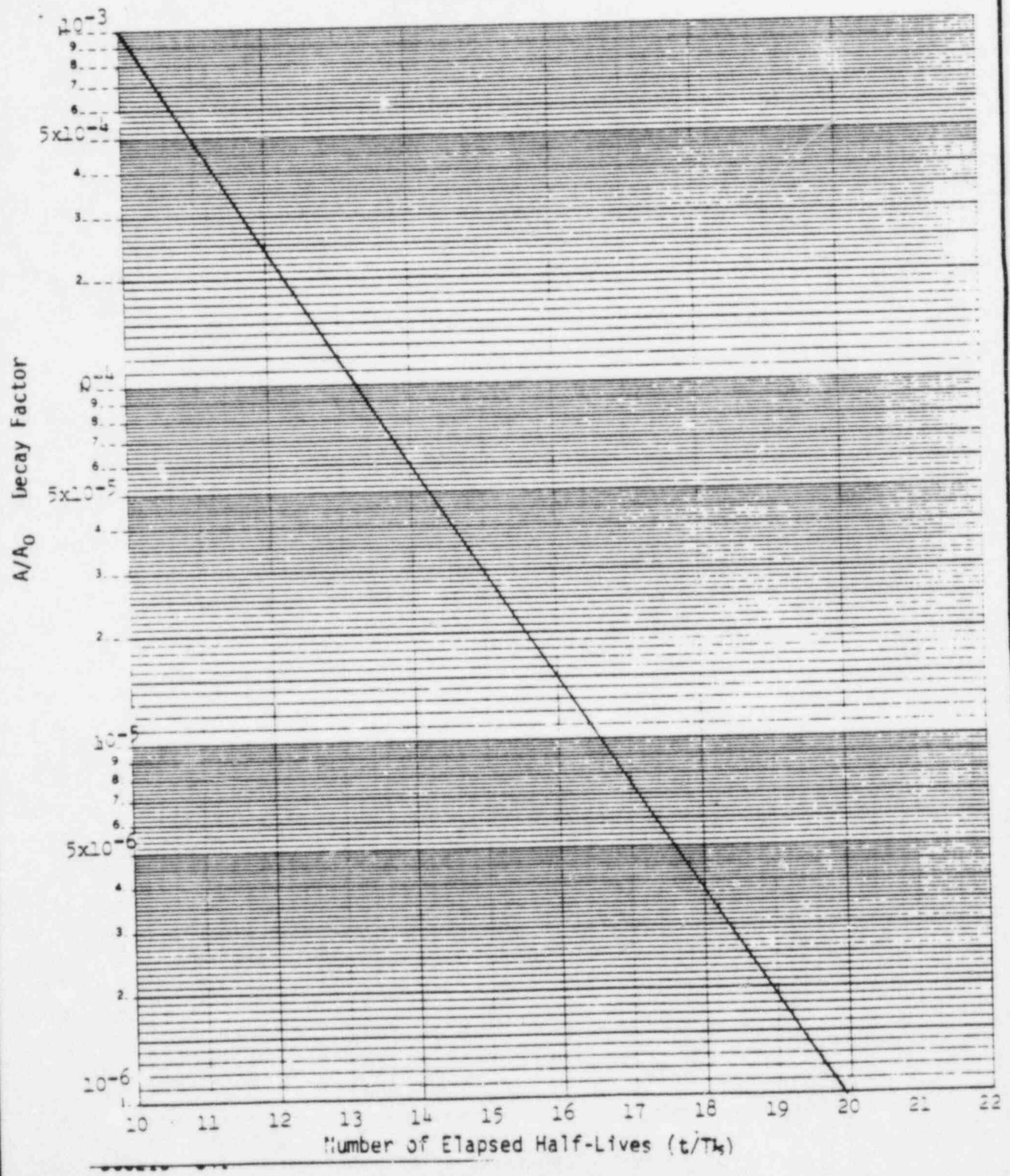
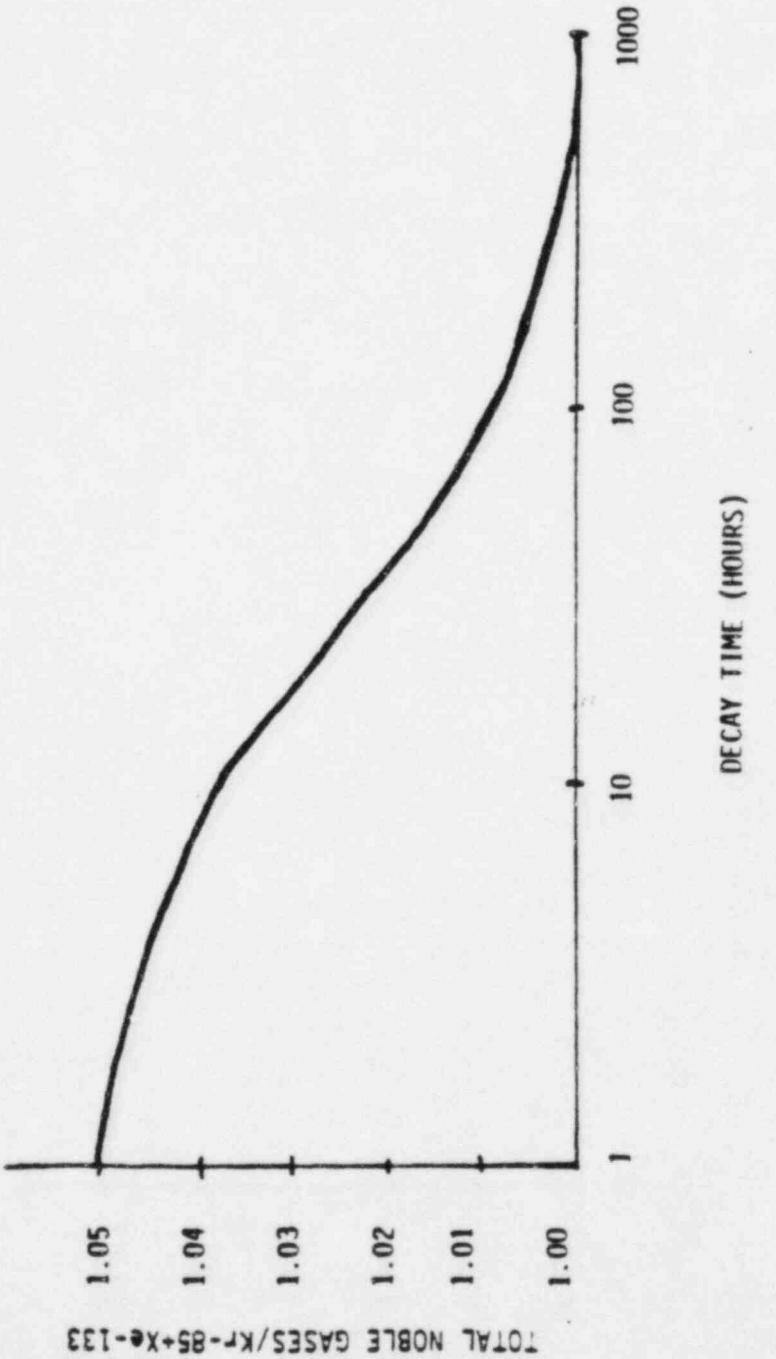


FIGURE 8

RATIO OF TOTAL NOBLE GAS TO KR-85 AND XE-133

VS. "EFFECTIVE AGE"



APPENDIX 1

ACCIDENT SUMMARY SHEETS

This attachment contains summary sheets for the various postulated accidents which have been analyzed in the FSAR. These sheets contain both the "design basis" and "expected" case variables which were assumed in the FSAR analyses. The sheets can be used to compare actual measurements with assumed numbers from the FSAR, in order to help evaluate how things are going in relation to predictions, or they can be used as a source of data to supply unavailable numbers in calculations which are performed at the time of the accident.

Two sets of data are included. The "design basis" case is expected to be highly conservative, where every variable is at a worst-case condition. The "expected" case is the best estimated prediction of what might actually occur. When FSAR values are used to make calculations or predictions at the time of the accident, the "design basis" values can be used to provide a quick upper limit result, but as soon as data becomes available which tends to confirm one case or the other, the one which best agrees with the data should be used.

The accident classifications identified in this attachment are based on the activity releases. Other emergency procedures may have different classifications which are based on the initiating event.

The summary sheets provided are:

A. 1A MAJOR LOCA
B. 1B MAJOR STEAM LINE BREAK
C. 1C MAJOR FEEDWATER LINE BREAK
D. 1D BLACKOUT (OR PLANT COOLDOWN WITH ATMOSPHERIC DUMP)
E. 1E SMALL LOCA
F. 1F TUBE RUPTURE
G. 1G LOCKED ROTOR
H. 1H FUEL HANDLING ACCIDENT INFUEL HANDLING BUILDING
I. 1I FUEL HANDLING ACCIDENT IN CONTAINMENT
J. 1J ROD EJECTION ACCIDENT
K. 1K GAS DECAY TANK RUPTURE
L. 1L LIQUID HOLDUP TANK RUPTURE
M. 1M VCT RUPTURE

TITLE: CALCULATION OF RELEASE RATE AND INTEGRATED RELEASE

SUMMARY SHEET 1A
MAJOR LOCA

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1.	Total Release to Containment Free Volume, Ci			
	a. Xe-133	2.03×10^{8}	1.36×10^{6}	
	b. Other Noble Gases	5.73×10^{8}	4.27×10^{5}	
	c. I-131	2.21×10^{7}	1.82×10^{5}	
	d. Other Iodine	1.90×10^{8}	2.73×10^{5}	
	e. Effective Age of Mixture (hr)	0	20	
	f. Release Assumption	100% of core N.G., 25% of core iodines	100% of gap N.G., 25% of gap iodines	
2.	Containment Spray Effectiveness			
	a. Removal half-life (hrs)	0.022	0.0075	
	b. Number of operable spray pumps	1	2	
3.	Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day	

SUMMARY SHEET 1A (Continued)

4.	Total Release to Environs, First 2 Hours, Ci		
	a. Xe-133	16,840	56
	b. Other Noble Gases	25,930	21
	c. I-131	191	0.05
	d. Other Iodine	1,325	0.08
	e. Effective Age of Mixture	1	40
	f. Release Mechanism	Containment Leakage	Containment Leakage
5.	(χ/Q) CL (sec/m^3)		
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}
	b. 100000m (6 mi. LPZ)	2.20×20^{-5}	2.20×10^{-6}
6.	Whole Body Dose Results		
	a. Total 800m dose for 1st two hours (mR)	5,600	0.365
	b. Total 10000m dose for 30 days (mR)	567	0.06
7.	Thyroid Dose Results		
	a. Total 800m dose for 1st two hours (mR)	95,900	1.25
8.	Accident Classification	General Emergency	Alert
9.	Miscellaneous		
	a. Containment-free volume cc	7.36×10^{10}	
	b. RCS Coolant Mass (gm)	2.4×10^{8}	

SUMMARY SHEET 1B
MAJOR STEAM LINE BREAK

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions and Assumptions			
a. Primary Coolant Activity (μCi/gm)			
1) Xe-133	270	67.2	
2) I-131	2.6	0.65	
3) Other Iodine	7.9	2.0	
b. Secondary Water Activity (μCi/gm)			
1) I-131	0.015	0.44×10^{-4}	
2) Other Iodines	0.037	0.90×10^{-4}	
c. Assumed Fuel Defects (%)	1	0.2	
d. Primary to Secondary Leakage (gpm)	1	0.014	
e. Steam Release, 1st Two Hours (lbs)			
1) Failed Generator	97,000		
2) Other generator (atmospheric dump)	520,000		
f. Total Steam Release During 8-Hour Cooldown (lbs)	1,600,000		
g. Liquid Release Fraction for Iodine			
1) Failed Generator	0.1		
2) Other generators	0.01		

SUMMARY SHEET 1B (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
2.	Activity Release to Environs, First 2 Hours (Ci)			
	a. Xe-133	56.8	0.172	
	b. Other Noble Gases	5.2	0.016	
	c. I-131	0.157	0.00045	
	d. Other Iodines	0.047	0.0013	
	e. Effective Age of Mixture (hrs)	65	65	
3.	$(\chi/\dot{Q})$ CL (sec/m^3)			
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
4.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	1.8	0.0006	
	b. Total 10000m dose for 30 days (mR)	0.03	0.0010	
5.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	65	0.012	
	b. Total 10000m dose for 30 days (mR)	66	0.012	
6.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1B (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
7. Miscellaneous			
a. Fluid Mass/Stm Gen (lbs)			
1) Water	95,100		
2) Steam	6,620		
b. Safety Valve and Steam Dump Valve Capacities (lb/hr/valve)			
1) S.G. safety valve	800,000		
2) 10% atmospheric dump	380,000		
3) 35% atmospheric dump	597,000		

SUMMARY SHEET 1C
MAJOR FEEDWATER LINE BREAK

The release from this accident comes from release of steam by safety valves and/or atmospheric steam dump of steam generator water during cooldown if the condenser is not available. The steam generator water is contaminated if there is tube leakage. The feedwater itself which is released has very little activity in it and is ignored. This accident is basically the same as a steam-line break and summary sheet 9B can be used. Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steam-line break case.

SUMMARY SHEET 1D
BLACKOUT (PLANT COOLDOWN WITH ATMOSPHERIC DUMP)

The release from this accident comes from release of steam by safety valves and/or atmospheric steam dump of steam generator water is contaminated if there is tube leakage. This accident is basically the same as a steam-line break and summary sheet 9B can be used. Note, however, that the steam release will be through relief valves and so the iodine liquid release fraction should be 0.01 for the entire release. This will reduce the thyroid dose somewhat from the steam-line break case.

SUMMARY SHEET 1E
SMALL LOCA (RELEASE OF COOLANT TO CONTAINMENT)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1.	Initial Coolant Activity (μCi/gm)			
	a. Xe-133	270	45.7	
	b. Other Noble Gases	30	5.6	
	c. I-131	2.62	0.45	
	d. Other Iodine	7.88	1.35	
	e. Effective Age of Mixture (hr)	60	60	
	f. Fuel Defects (%)	1	0.2	
2.	Initial Release to Containment (Ci)			
	a. Xe-133	65,430	16,280	
	b. Other Noble Gases	7,950	1,980	
	c. I-131	63	16	
	d. Other Iodine	193	48	
	e. Assumption	100% of Coolant N.G. activity +10% of coolant iodines	100% of Coolant N.G. Activity +10% of coolant iodines	
3.	Containment Spray Effectiveness			
	a. Removal Half-life (hrs)	0.022	0.0075	

SUMMARY SHEET 1E (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
	b. Number of operable spray pumps	1	2	
	c. Containment Leak Rate (%/day)	0.1 for 1st day, 0.05 after 1st day	0.05 for 1st day, 0.025 after 1st day	
4.	Containment Leak Rate (%/day)	0.1	0.05	
5.	$(\chi/\dot{Q})$ CL (sec/m^3)			
	a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
6.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	0.18	0.004	
	b. Total 10000m dose for 30 days (mR)	0.05	0.001	
7.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	0.2	0.0009	
	b. Total 10000m dose for 30 days (mR)	0.03	0.0001	
8.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1E (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
9.	Miscellaneous			
	a. Containment-Free Volume (cc)	7.36×10^{10}		
	b. RCS Coolant Mass (gm)	2.4×10^{8}		
	c. Liquid Release Fraction for Iodine	0.1		

SUMMARY SHEET 1F
TUBE RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions and Assumptions			
a. Primary Coolant Activity (μCi/gm)			
1) Xe-133	270	67.2	
2) I-131	2.6	0.65	
3) Other Iodine	7.9	2.0	
b. Secondary Water Activity (μCi/gm)			
1) I-131	0.015	0.44×10^{-4}	
2) Other Iodines	0.037	0.90×10^{-4}	
c. Assumed Fuel Defects (%)	1	0.2	
d. Primary to Secondary Leakage (gpm)	1	0.014	
e. Steam Release, 1st Two Hours (lbs)			
1) Failed generator	31,000		
2) Other generators (atmospheric dump)	380,000		
f. Total Steam Release During 8 hour Cooldown (lbs)	1,600,000		
g. Liquid Release Fraction for Iodine			
1) Failed generator	0.01		
2) Other generators	0.01		

SUMMARY SHEET 1F (Continued)

	PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
2.	Total Release to Environs First 2 hours (Ci)			
	a. Xe-133	10,980	2,383	
	b. Other Noble Gases	1,067	234	
	c. I-131	0.75	0.14	
	d. Other Iodines	3.1	0.62	
	e. Effective Age of Mixture (hrs)	65	65	
3.	$(\chi/\dot{Q})$ CL (sec/m^3)			
	a. 800 m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
	b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
4.	Whole Body Dose Results			
	a. Total 800m dose for 1st two hours (mR)	360	7.7	
	b. Total 10000m dose for 30 days (mR)	15	0.3	
5.	Thyroid Dose Results			
	a. Total 800m dose for 1st two hours (mR)	340	4.3	
	b. Total 10000m dose for 30 days (mR)	15	0.2	
6.	Accident Classification	Alert	Alert	

SUMMARY SHEET 1F (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
7. Miscellaneous			
a. Fluid Mass/Stem Gen. (lbs)			
1) Water	95,000		
2) Steam	6,620		
b. Safety Valve and Steam Dump Valve Capacities (lbs/hr/valve)			
1) S.G. safety valve	800,000		
2) 10% atmospheric dump	380,000		
3) 35% atmospheric dump	597,000		

SUMMARY SHEET 1G
LOCKED ROTOR ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	97	0.73	
b. Other Noble Gases	19.6	0.1	
c. I-131	0.24	0.003	
d. Other Iodines	0.36	0.003	
e. Effective Age of Mixture	50	50	
f. Assumptions			
1) Coolant Activity	1% fuel defects +3% of gap activity	0.2% fuel defects +3% of gap activity	
2) Primary to Secondary Leakage (gpm)	1	0.014	
3) Secondary Steam Release, 1st Two Hours (lbs)	617,000	617,000	
4) Total Steam Release During 8 Hour Cooldown (lbs)	1,600,000	1,600,000	
2. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1G (Continued)

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
3. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	4.4	0.004	
b. Total 10000m dose for 30 days (mR)	0.5	0.0004	
4. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	82	0.06	
b. Total 10000m dose for 30 days (mR)	27	0.02	
5. Accident Classification	Alert	Alert	
6. Miscellaneous			
a. Fluid Mass/Stm Gen. (lbs)			
1) Water		95,100	
2) Steam		6,620	
b. Safety Valve and Steam Dump Valve Capacity (lbs/hr/valve)			
1) S.G. safety valve		800,000	
2) 10% atmospheric dump		380,000	
3) 35% atmospheric dump		597,000	
c. Liquid Release Fraction for Iodines	0.01		

SUMMARY SHEET 1H
FUEL HANDLING ACCIDENT IN FUEL HANDLING BLDG

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions			
a. Radial Peaking Factor of Damaged Assembly	1.65	1.26	
b. Elapsed Time Since Reactor Shutdown (hrs)	100	100	
c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity	
d. Bundle Submergence (ft)	26	26	
e. Pool Decontamination Factor for Iodine	100	760	
f. Total Assembly Gap Activity at Time of Accident			
1) Xe-133	100,000	8,137	
2) Other Noble Gases	4,500	1,500	
3) I-131	52,670	5,282	
4) Other Iodines	7,000	220	
5) Effective Age of Mixture (hr)	600	600	
2. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-6}	
3. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	100,400	523	
b. Other Noble Gases	4,100	101	

SUMMARY SHEET 1H (Continued)
FUEL HANDLING ACCIDENT IN FUEL HANDLING BLDG

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
c. I-131	80	0.005	
d. Other Iodines	10	0.0002	
e. Effective Age of Mixture (hrs)	600	600	
4. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	2,450	1.5	
b. Total 10000m dose for 30 days (mR)	102	0.06	
5. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	22,200	0.08	
b. Total 10000m dose for 30 days (mR)	923	0.003	
6. Accident Classification	Site Emergency	Alert	
7. Miscellaneous			
a. Fuel Handling Building Volume (ft^3)	435,000		
b. Fuel Handling Building Exhaust Rate (cfm)	35,700	35,700	
c. Filter Cleanup Factor	0.10	0.01	

SUMMARY SHEET 1I
FUEL HANDLING ACCIDENT IN CONTAINMENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Initial Conditions			
a. Radial Peaking Factor of Damaged Assembly	1.65	1.26	
b. Elapsed Time Since Reactor Shutdown (hrs)	100	100	
c. Type of Release to Pool	100% of assembly gap activity	100% of assembly gap activity	
d. Bundle Submergence (ft)	26	26	
e. Pool Decontamination Factor for Iodine	100	760	
f. Total Assembly Gap Activity at Time of Accident (Ci)			
1) Xe133	100,000	8,137	
2) Other Noble Gases	4,500	1,500	
3) I-131	52,670	5,282	
4) Other Iodines	7,000	220	
5) Effective Age of Mixture (hrs)	600	600	
2. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
3. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	12,460	38	

SUMMARY SHEET 1I (Continued)
FUEL HANDLING ACCIDENT IN CONTAINMENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
b. Other Noble Gases	557	7	
c. I-131	65	0.033	
d. Other Iodines	8.7	0.0013	
e. Effective Age of Mixture (hrs)	600	600	
4. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.31	0.0001	
b. Total 10000m dose for 30 days (mR)	0.013	4×10^{-6}	
5. Thyroid Dose Results			
a. Total 800 m dose for 1st two hours (mR)	18.4	6×10^{-4}	
b. Total 10000m dose for 30 days (mR)	0.76	3×10^{-5}	
6. Accident Classification	Site Emergency	Alert	
7. Miscellaneous Activity Release Mechanism	Activity released from cavity to containment atmosphere is confined directly above the cavity water level. It is picked up by the fan coolers and sent out through the containment purge.		

SUMMARY SHEET 1J
ROD EJECTION ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Containment Free Volume (Ci)			
a. Xe-133	2.01×10^5	1.52×10^5	
b. Other Noble Gases	6.82×10^4	6.22×10^4	
c. I-131	7.32×10^3	7.28×10^3	
d. Other Iodine	1.11×10^4	1.09×10^4	
e. Effective Age of Mixture (hrs)	40	40	
f. Release Assumption	Coolant activity (1% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)	Coolant activity (0.2% defects) plus 10% of core gap activity times a liquid release fraction of either 0.1 (for I) or 1.0 (for N.G.)	
2. Containment Spray Effectiveness			
a. Removal half-life (hrs)	0.022	0.0075	
b. Number of operable spray pumps	1	2	
3. Containment Leak Rate (%/day)	0.1	0.05	
4. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1J (Continued)
ROD EJECTION ACCIDENT

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
5. Total Release to Environs, 1st 2 Hours (Ci)			
a. Xe-133	11.2	5.6	
b. Other Noble Gases	4.1	2.0	
c. I-131	0.0098	0.002	
d. Other Iodine	0.015	0.002	
e. Effective Age of Mixture (hrs)	40	40	
f. Release Mechanism	Containment Leakage	Containment Leakage	
6. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.73	0.04	
b. Total 1000m dose for 30 days (mR)	0.13	0.006	
7. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	3.3	0.04	
b. Total 10000m dose for 30 days (mR)	0.14	0.002	
8. Accident Classification	Alert	Alert	
9. Miscellaneous			
a. Containment free volume (cc)	7.36×10^{10}		
b. RCS Coolant Mass (gm)	2.4×10^{8}		

SUMMARY SHEET 1K
GAS DECAY TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Total Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	65,400	16,300	
b. Other Noble Gases	7,300	2,140	
2. (χ/Q) CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 10000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
3. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	2,010	44	
b. Total 10000m dose for 30 days (mR)	84	2	
4. Accident Classification	Site Emergency	Alert	
5. Miscellaneous			
a. Tank Volume (cc)	2.18×10^{7}		
b. Tank Press	100 psi		
c. Volume Released (cc)	1.48×10^{8}cc		

SUMMARY SHEET 1L
LIQUID HOLDUP TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Activity in Holdup Tank (Ci)			
a. Xe-133	51,000	10,200	
b. Other Noble Gases	4,710	930	
c. I-131	492	98.3	
d. Other Iodines	1,086	217	
e. Effective Age of Mixture (hrs)	60	60	
2. Cleanup Parameters			
a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}	
b. Charcoal Filter Cleanup Factor	0.1	0.01	
c. Release Duration (hrs)	2	2	
3. Activity Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	51,000	10,200	
b. Other Noble Gases	4,710	930	
c. I-131	0.00492	0.0098	
d. Other Iodines	0.01086	0.00217	
4. (χ/Q) CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	

SUMMARY SHEET 1L (Continued)
LIQUID HOLDUP TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
5. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	1,440	37	
b. Total 10000m dose for 30 days (mR)	60	1.6	
6. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	1.93	0.003	
b. Total 10000m dose for 30 days (mR)	0.08	0.0001	
7. Accident Classification	Site Emergency	Alert	
8. Miscellaneous			
a. Tank Volume (cc)		3.03×10^8	

SUMMARY SHEET 1M
VOLUME CONTROL TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
1. Activity in VCT (Ci)			
a. Xe-133	3,330	828	
b. Other Noble Gases	198	42	
c. I-131	12.1	3.0	
d. Other Iodines	35	8.7	
e. Effective Age of Mixture (hrs)	60	60	
2. Cleanup Parameters			
a. Liquid Release Fraction for Iodines from Tank to Auxiliary Building Atmosphere	10^{-4}	10^{-4}	
b. Charcoal Filter Cleanup Factor	0.1	0.01	
c. Release Duration (hrs)	2	2	
3. Activity Release to Environs, 1st Two Hours (Ci)			
a. Xe-133	3,330	828	
b. Other Noble Gases	198	42	
c. I-131	0.00012	0.000003	
d. Other Iodines	0.00035	0.00009	

SUMMARY SHEET 1M (Continued)
VOLUME CONTROL TANK RUPTURE

PARAMETER	FSAR DBA	FSAR EXPECTED	ACTUAL
4. $(\chi/\hat{Q})$ CL (sec/m^3)			
a. 800m (site boundary)	5.29×10^{-4}	5.29×10^{-5}	
b. 1000m (6 mi. LPZ)	2.20×10^{-5}	2.20×10^{-5}	
5. Whole Body Dose Results			
a. Total 800m dose for 1st two hours (mR)	465	9.3	
b. Total 10000m dose for 30 days (mR)	19	0.4	
6. Thyroid Dose Results			
a. Total 800m dose for 1st two hours (mR)	0.03	0.00004	
b. Total 10000m dose for 30 days (mR)	0.001	0.000001	
7. Accident Classification	Site Emergency	Alert	
8. Miscellaneous			
a. Tank Volume (cc)	1.1×10^7		

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

PERFORMED BY_____ DATE_____ TIME_____

APPLICABILITY

One of the most difficult accidents to estimate the release rate for is a S/G Tube Rupture. This is due to uncertainties in primary to secondary leak rate and in steam release rate to the atmosphere. The release pathway for a secondary system release will largely depend on identifying the affected Steam Generator and whether or not it's associated Main Steam Isolation Valve (MSIV) has been closed. When the MSIV is open and the condenser is used as the principal heat sink, the condenser air ejectors release via the Plant Vent, which is a monitored release point. If the Condenser is unavailable or if the MSIV is closed, steam flow from the affected Steam Generator should be assumed to be released via atmospheric steam dumps. The instantaneous release rate ($\dot{Q}$) may be calculated below using the radioactivity concentration of the primary or secondary system.

INSTRUCTIONS

1. Determine the effluent stream concentration, C(μCi/cc) by one of the two following methods:

   1.A. Main Steam Line Monitors (RE-71, 72, 73 & 74). This is the preferred method, but it is possible that radioactivity levels in secondary system steam (or water if the steam-line is flooded) may be too low for Monitors RE-71 - 74 to come on-scale. Otherwise, enter appropriate data below and perform the indicated calculations:

TIME_____ BY_____	Main Steam Line Monitor Channel* RE-71	RE-72	RE-73	RE-74	
(1) Reading (CPM)					
(2) Total Conc (C_{Total}) From Figure A**					

*NOTE: Re-71 corresponds to Steam Generator (S/G) number 1, RE-72 to S/G-2, RE-73 to S/G-3, and RE-74 to S/G-4.

**Use emergency (Initial Release Curve) values.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

To calculate the fraction of total steam line activity attributable to Noble Gases, Iodines, and Particulates, some assumptions and calculations have to be performed. If the FSAR design basis steam generator tube rupture is assumed, then the fraction of the total activity in the steam line can be broken down as follows:

$C_{NOB\ GAS} = C_{TOTAL} \times 0.9990(F^1_{NG})$

$C_{IODINE} = C_{TOTAL} \times 0.000195(F^1_{I})$ - DEFAULT VALUES

$C_{PART} = C_{TOTAL} \times 0.000005(F^1_{PART})$

However, these fractions should be adjusted based on reactor coolant sample analyses, and partitioning factors. To accomplish this, first determine the relative concentrations of noble gases, iodines, and particulates in the reactor coolant as described below:

Calculate Fractional Reactor Coolant Activity

$F_{NG} = \frac{\text{(Total Noble Gas Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{I} = \frac{\text{(Total Iodine Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{PART} = \frac{\text{(Total Particulate Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

Calculate Fractional Steam-Line Activity

$$F^1_{NG} = \frac{(F_{NG})(PF_{NG})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{I} = \frac{(F_I)(PF_I)}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{PART} = \frac{(F_{PART})(PF_{PART})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

VALUES OF STEAM GENERATOR PF (PARTIONING FACTOR)

Radionuclide Group	Steam Generator Water Level		
	Empty	Normal	Flooded
Noble Gases (PF_{NG})	1.0	1.0	1.0
Iodines (PF_{I})	0.1	0.01	1.0
Particulates (PF_{PART})	0.01	0.01	1.0

Calculate Steam-Line Concentration

$C_{NOB\ GAS} = C_{TOTAL} \times F^{1}_{NG} =$ _____ $\frac{\mu Ci}{cc}$

$C_{IODINE} = C_{TOTAL} \times F^{1}_{I} =$ _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES} = C_{TOTAL} \times F^{1}_{PART} =$ _____ $\frac{\mu Ci}{cc}$

Proceed to Section 2.

1.B. Steam line activity can be estimated using an analysis of reactor coolant activity. This method is not as preferable as using RE-71, 72, 73, or 74, but it can provide a conservative methodology for calculating steam line concentration.

Calculate Fractional Reactor Coolant Activity

$F_{NG} = \frac{\text{(Total Noble Gas Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{I} = \frac{\text{(Total Iodine Activity of Reactor Coolant}}{\text{(Total Reactor Coolant Activity)}} =$ _____

$F_{PART} = \frac{\text{(Total Particulate Activity of Reactor Coolant)}}{\text{(Total Reactor Coolant Activity)}} =$ _____

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Calculate Fractional Steam-Line Activity

$$F^1_{NG} = \frac{(F_{NG})(PF_{NG})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_I = \frac{(F_I)(PF_I)}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

$$F^1_{PART} = \frac{(F_{PART})(PF_{PART})}{[(F_{NG})(PF_{NG}) + (F_I)(PF_I) + (F_{PART})(PF_{PART})]}$$

PF Values are the same as provided in section 1A.

Calculate Steam-Line Concentration (Use if Steam Generator is not flooded)

$C_{NOB\ GAS}$ = (Total reactor coolant activity) x F^1_{NG} x 0.056* = _____ $\frac{\mu Ci}{cc}$

$C_{IODINES}$ = (Total reactor coolant activity) x F^1_I x 0.056* = _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES}$ = (Total reactor coolant activity) x F^1_{PART} x 0.056* = _____ $\frac{\mu Ci}{cc}$

Calculate Steam-Line Concentration (Use if Steam-Generator is flooded)

$C_{NOB\ GAS}$ = (Total reactor coolant activity) x F^1_{NG} = _____ $\frac{\mu Ci}{cc}$

$C_{IODINES}$ = (Total reactor coolant activity) x F^1_I = _____ $\frac{\mu Ci}{cc}$

$C_{PARTICULATES}$ = (Total reactor coolant activity) x F^1_{PART} = _____ $\frac{\mu Ci}{cc}$

2. Once the radioactive steam or water concentration is determined in the steam-line using either section 1A or 1B, the release rate from the affected steam generator can be calculated in three different ways. They are described in this section. If the steam generator is flooded (solid) proceed directly to section 2C.

*Factor to account for density differences between steam and water, at approximately 558°F and 1115 (psia). This corresponds to the highest lift setpoint for the safety valves. This value will overestimate the concentration of radioactive material in steam for any lower pressure and temperature.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

2A. Steam Flow Rate Monitors

Each steam line at DCPP has a flow rate monitor which is capable of providing steam flow in pounds per hr (lbs/hr) and which will read on-scale if any steam line relief valves are open. Determine this release from the operators for the appropriate channel (512, 522, 532, 542).

FR = _____ (lbs/hr)

Release Rates for noble gases, iodines, and particulates can then be calculated as:

$$\dot{Q}_{NG} = FR \ \frac{lbs}{hr} \times C_{NOB\ GAS} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6}* = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{IODINE} = FR \ \frac{lbs}{hr} \times C_{IODINE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{PARTICULATES} = FR \ \frac{lbs}{hr} \times C_{PARTICULATE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

*Factor to convert lbs/hr to cc/sec and μCi/cc to Ci/sec based on specific volume of steam.

2B. Operation of Relief and/or Safety Valves

Each steam line has six relief valves. Determine which valves are open and total the relief capacity of the open valves.

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Valve	Relief Capacity (If Open) in (lbs/hr)
10% Steam Dump	4.0×10^5
#1 Safety	8.5×10^5
#2 Safety	8.5×10^5
#3 Safety	8.5×10^5
#4 Safety	8.5×10^5
#5 Safety	8.5×10^5

Total relief from open valves = FR = _____ (lbs/hr)

$$\dot{Q}_{NG} = FR \ \frac{lbs}{hr} \times C_{NOB\ GAS} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6}* = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{IODINE} = FR \ \frac{lbs}{hr} \times C_{IODINE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

$$\dot{Q}_{PARTICULATES} = FR \ \frac{lbs}{hr} \times C_{PARTICULATE} \ \frac{\mu Ci}{cc} \times 3.1 \times 10^{-6} = _____ \frac{Ci}{sec}$$

*Factor to convert lbs/hr to cc/sec and μCi/sa. Based on the specific volume of steam.

2C. Primary to Secondary Leak Rate

Atmospheric release of steam can be estimated if the primary to secondary leak rate is known. If direct determination of this value is not possible, the default value for a steam generator tube rupture is 600 gpm.

FR = _____ (gpm)

Calculate Equivalent Steam Flow (Use if Steam Generator is not flooded)

$$FR^1 = FR \times 1.13 \times 10^3* = _____ \frac{cc}{sec}$$

*Factor to convert gpm (water) to cc/sec (steam)

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1

Calculate Equivalent Water Flow (Use if Steam Generator is flooded)

$FR^1 = FR \times 63.08^{**} = _____ \left(\frac{cc}{sec}\right)$

$\dot{Q}_{NG} = FR^1 \left(\frac{cc}{sec}\right) \times C_{NOB\ GAS} \left(\frac{\mu Ci}{cc}\right) \times 10^{-6} = _____ \left(\frac{Ci}{sec}\right)$

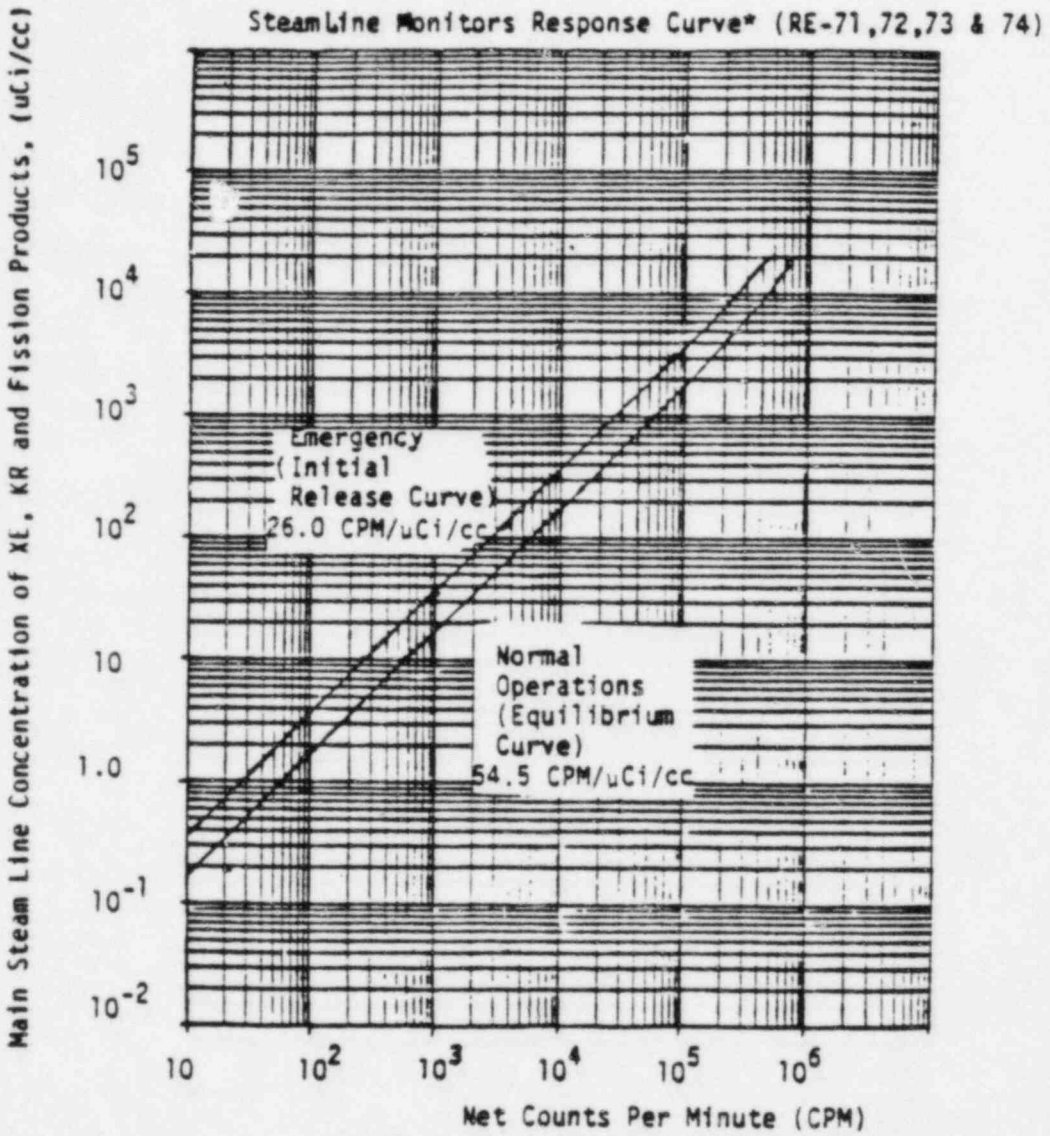
$\dot{Q}_{IODINE} = FR^1 \left(\frac{cc}{sec}\right) \times C_{IODINE} \left(\frac{\mu Ci}{cc}\right) \times 1 \times 10^{-6} = _____ \left(\frac{Ci}{sec}\right)$

$\dot{Q}_{PARTICULATE} = FR^1 \left(\frac{cc}{sec}\right) \times C_{PARTICULATE} \left(\frac{\mu Ci}{cc}\right) 1 \times 10^{-6} = _____ \left(\frac{Ci}{sec}\right)$

**Factor to convert gpm (water) to cc/sec (water)

TITLE: WORKSHEET FOR USE OF MAIN STEAM LINE MONITORS, OR RCS COOLANT SAMPLE RESULTS DURING S/G TUBE RUPTURE ACCIDENT

ATTACHMENT 1
FIGURE A



*Isotopic Composition Based On Average Values from FSAR Tables 11.1-11, 12 and 17 for Normal Operations and for Emergency Conditions the Carryover Factors Applied to Normal Iodine Values are 0.13% Volatile Plus 0.25% Mechanical and only 0.25% Mechanical for Particulates.

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: WORK SHEET FOR DETERMINATION OF RELEASE RATE OR TOTAL RELEASE FROM PLANT VENT MONITORS - EP RB-9

1. Basic Accident Information

Unit _____ Date/Time of Occurence _____ ____/_____

Description _____ Init. Eff. Age (hr)_____

2. Determine Plant Vent Flow Rate (Affected Unit Only)

a. Ventilation equipment in operation (affected unit only)

_____ FHB exhaust fans @ 35750 cfm/fan = _____ (cfm)

_____ Aux. Bldg. exhaust fans @ 73500 cfm/fan = _____ (cfm)

_____ Cont. purge exhaust fans @ 55000 cfm/fan = _____ (cfm)

_____ Cont. H_2 purge fan @ 300 cfm/fan = _____ (cfm)

b. Total plant vent flow rate (sum above or read directly from FR-12 in Control Room) = _____ (cfm)

c. Conversion to cc/sec

_____ (cfm) x 472 = _____ (cc/sec)

3. Determine Noble Gas Release Rate (RE-14 and RE-29)

RE	Reading	① Vent Concentration (uCi/cc)	② (Vent Flow) (cc/sec)	③ Conversion (Ci/uCi)	①②③ Q (ci/sec)
14	_____ cpm	_____	_____	10^{-6}	
29	_____ mR/hr	_____	_____	10^{-6}	

4. Estimating Total Curie Noble Gas Release

RE	① Q (Ci/sec)	② Δt (sec)	① x ② Q(Ci)
14	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
29	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Sum of Q (RE-14)

Sum of Q (RE-29)

TITLE: WORK SHEET FOR DETERMINATION OF RELEASE RATE OR TOTAL RELEASE FROM PLANT VENT MONITORS - EP RB-9

5. Determine I-131 Release From Plant Vent Iodine Monitor (RE-24)

a. Determine flow rate ratio

1) Sample flow rate _____(cfm) (from indicator on sampler)

2) Plant vent flow rate_____(cfm)

3) Ratio (plant vent ÷ sampler) = _____ ÷ _____ = [ ]

b. Determine curie release of I-131 to the moment

NOTE: Readings must be taken with front panel toggle switch in "μCi(x10^{-6})"

① Chart Reading	② Calibration Conversion	③ Scale Factor	④ Flow Rate Ratio	⑤ I-131 Release (Ci) ① x ② x ③ x ④
	10^{-12}			

c. Projecting total release of I-131

1) Release rate at the moment

① Chart Reading	② Calibration Conversion	③ Scale Factor	④ Flow Rate Ratio	⑤ I-131 Release Rate (Ci/sec) ① x ② x ③ x ④
	10^{-17}			

2) Projected additional release

$Q_{additional} = (1.44)(\dot{Q}_{131})(T_{1/2,cu}) = (1.44)(\quad)(\quad) =$ _____Ci

3) Total release

$Q_{total} = Q_{to\ moment} + Q_{additional} =$ _____ + _____ = [ ] Ci

6. Estimation of I-131 Release by High Alarm Method

a. Background Radiation Levels

Location	Readings (R/hr_{Bkgd})

b. Sample Flow Off

OFF t_1	ON t_2	Total Time Off $t_1 - t_2$ (min)

TITLE: WORK SHEET FOR DETERMINATION OF RELEASE RATE OR TOTAL RELEASE FROM PLANT VENT MONITORS - EP RB-9

c. Total I-131 Curies (Cartridge door closed)

① R/hr	② R/hr_{Bkgd}	③ ① - ② (R/hr_{Net})	④ Distance (Meters)	⑤ Conversion Factor	③ x ④ x ⑤ Q (Ci)
				60	

d. Total I-131 Curies (Cartridge door open)

① R/hr	② R/hr_{Bkgd}	③ ① - ② (R/hr_{Net})	④ Distance (Meters)	⑤ Conversion Factor	③ x ④ x ⑤ Q (Ci)
				60	

7. Estimation of I-131 Release Rate by High Alarm Method

① Q (Ci)	② Δt (sec)	③ Plant Vent Flow Rate(CFM)	④ Sampler Flowrate	$\frac{①}{②} \times \frac{③}{④}$ Q Ci/Sec

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE: WORK SHEET FOR RELEASE RATE ESTIMATION FROM CONTAINMENT HIGH RANGE AREA MONITORS - EP RB-9

PERFORMED BY _____ DATE _____ TIME _____

PROCEDURE

1. Noble Gas Release Rate

   A. Containment high range monitor readings at time = t (hr)

t (hr)	RE-30 Exposure Rate (R/hr)		RE-31 Exposure Rate (R/hr)		Sum of Exposure Rate (R/hr)		(1) Actual Mean Containment Exposure Rate* (R/hr)
_____	_____	+	_____	=	_____	x 0.5 =	_____
_____	_____	+	_____	=	_____	x 0.5 =	_____
_____	_____	+	_____	=	_____	x 0.5 =	_____
_____	_____	+	_____	=	_____	x 0.5 =	_____
_____	_____	+	_____	=	_____	x 0.5 =	_____
_____	_____	+	_____	=	_____	x 0.5 =	_____

*NOTE: If the reading from one of the two monitors is suspected to be artificially high as a result of proximity to a "hot spot," utilize the reading believed to be most representative of containment ambient radiation levels.

   B. Figure 4 exposure rates at time = t (hr)

t (hr)	(2) DBA-LOCA Containment Exposure Rate at time = t (R/hr)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

   C. Figure 5 DBA-LOCA Noble Gas Release Rates at time = t (hr)

t (hr)	(3) DBA-LOCA Noble Gas Release Rate at time = t (Ci/sec)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

TITLE: WORK SHEET FOR RELEASE RATE ESTIMATION FROM CONTAINMENT HIGH RANGE AREA MONITORS - EP RB-9

1. D. Calculation of Noble Gas Release Rate at time = t (hr):

t (hr)	① Actual Containment Mean Exposure Rate (R/hr)	② DBA-LOCA Exposure Rate at time = t (R/hr)	①/② Ratio of Actual/DBA Containment Exposure Rate at time = t		③ DBA-LOCA Noble Gas Release Rate at time = t (Ci/sec)		Noble Gas Projected Accident Release Rate at time = t (Ci/sec)
				x		=	
				x		=	
				x		=	
				x		=	
				x		=	
				x		=	

2. I-131 Release Rate

a. Use mean exposure rates ① from Noble Gas section, 1.A., if calculated. Otherwise, utilize section 1.A. to perform those steps.

b. Use Figure 4 exposure rates ② from Noble Gas section, 1.B., if calculated. Otherwise, perform that operation presently.

c. Figure 6 DBA-LOCA I-131 Release Rates at time = t (hr):

t (hr)	④ DBA-LOCA I-131 Release Rate (Ci/sec)

2. D. Calculation of projected I-131 release rates at time = t (hr) after accident:

t (hr)	①/② Ratio of Actual/DBA Exposure Rates at time = t		④ DBA-LOCA I-131 Release Rate time = t (Ci/sec)		Projected Accident Release Rate at item = t (Ci-sec.)
		x		=	
		x		=	
		x		=	
		x		=	
		x		=	

DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 & 2
EMERGENCY PROCEDURE RB-9
WORK SHEET FOR ESTIMATION OF CURIE RELEASE

CALCULATION BY _____ DATE _____ TIME _____

DESCRIBE ACCIDENT _____

DATE/TIME OF ACCIDENT _____ / _____

A. AVAILABLE ACTIVITY FROM FUEL ASSEMBLY (OR CORE)

1. BASE DATA

ASSM'BY	DATE OF LAST OPERATION	COOLING TIME, t_{cool} (DAYS)	AVG. CORE POWER, Pavg OVER LAST 30 DAYS OF OPER. (FRACTION OF RATED)	NUMBER RUPTURED RODS, N_{rup}	NUMBER OF MELTED RODS N_{melt}

2. AVAILABLE ACTIVITY FROM GAP RELEASE

ISOTOPE	ASSM'BY	① GAP ACT AT FULL POWER (Ci/ROD)	② P_{avg}	③ $(t_{cool}/T_{1/2})$	④ DECAY FACTOR[1] (FIG.7)[2]	⑤ GAP RELEASE FRACTION	⑥ N_{rup}	⑦ CURIES AVAILABLE ① x ② x ④ x ⑤ x ⑥
Xe-133		34				1.00		
		34				1.00		
		34				1.00		
KR-85		4	1.0	≈0	1.0	1.00		
		4	1.0	≈0	1.0	1.00		
		4	1.0	≈0	1.0	1.00		
I-131		18				0.25		
		18				0.25		
		18				0.25		

3. AVAILABLE ACTIVITY FROM FUEL ROD MELTING

ISOTOPE	ASSM'BY	① ROD ACT AT FULL POWER (Ci/ROD)	② P_{avg}	③ $(t_{cool}/T_{1/2})$	④ DECAY FACTOR[1] (FIG.7)[2]	⑤ MELT RELEASE FRACTION	⑥ N_{melt}	⑦ CURIES AVAILABLE ① x ② x ④ x ⑤ x ⑥
XE-133		5000				1.00		
		5000				1.00		
		5000				1.00		
KR-85		22	1.0	≈0	1.0	1.00		
		22	1.0	≈0	1.0	1.00		
		22	1.0	≈0	1.0	1.00		
I-131		2200				0.25		
		2200				0.25		
		2200				0.25		

4. TOTAL AVAILABLE ACTIVITY FROM FUEL DAMAGE

ISOTOPE	GAP RELEASE ASSEMBLY			MELT RELEASE ASSEMBLY			TOTAL AVAILABLE ACTIVITY (CURIES)
XE-133	___ +	___ +	___ +	___ +	___ +	___ =	___
KR-85	___ +	___ +	___ +	___ +	___ +	___ =	___
I-131	___ +	___ +	___ +	___ +	___ +	___ =	___

See notes at end of page 4

B. AVAILABLE ACTIVITY FROM A SAMPLED TANK CONTAINING GAS & LIQUID (WITH MINIMAL VAPORIZATION OF LIQUID)

1. BASE DATA

CONTAINER _____; LIQ.VOL., V_L _____(cc); GAS VOL., V_G _____(cc); ABS. PRESS, P_{con} _____(psia)

LIQ.SAMP. DATE/TIME _____/_____; GAS SAMP. DATE/TIME _____/_____; DATE/TIME OF RELEASE _____/_____

DECAY TIME, t_{dec}, LIQ/GAS _____/_____(days)

2. CALCULATION OF AVAILABLE ACTIVITY FROM SAMPLE RESULTS

		①	②	③	④	⑤	⑥	⑦	⑧	⑨
ISOTOPE	SAMPLE TYPE	CONC. (μCi/cc)	$\left(\frac{P_{con}}{1.47}\right)$	VOLUME, V_L or V_G (cc)	INITIAL CONTAINER ACTIVITY(μCi) ① x ② x ③	$\left(\frac{t_{dec}}{T_{1/2}}\right)^1$	DECAY FACTOR (FIG.7)[2,3]	CONVERSION (Ci/μCi)	LIQUID RELEASE FRACTION	AVAILABLE ACTIVITY (Ci) ④ x ⑥ x ⑦ x ⑧
XE-133	GAS							10^{-6}	1.0	
	LIQ		XXX					10^{-6}	1.0	
KR-85	GAS					≈0	1.00	10^{-6}	1.0	
	LIQ		XXX			≈0	1.00	10^{-6}	1.0	
I-131	GAS							10^{-6}	1.0	
	LIQ		XXX					10^{-6}	10^{-4}	

C. AVAILABLE ACTIVITY FROM A STEAM RELEASE

1. BASE DATA

CONTAINER _____; PRESSURE _____(psig); SAMPLE DATE/TIME, LIQ _____/_____, STM _____/_____

BLOWDOWN RATE _____(lb/hr); DURATION _____(hr); TOTAL MASS RELEASE _____(lb)

MASS OF STEAM INITIALLY IN CONTAINER _____(lb), POUNDS OF LIQUID VAPORIZED _____(lb)

2. CALCULATION OF AVAILABLE ACTIVITY FROM SAMPLE RESULTS

		①	②	③	④	⑤	⑥
ISOTOPE	SAMPLE TYPE	MASS RELEASE (POUNDS)	CONC (μCi/gm)	CONVERSION (gm/lb)	LIQUID RELEASE FRACTION	CONVERSION (Ci/μCi)	AVAILABLE ACTIVITY (Ci) ① x ② x ③ x ④ x ⑤
XE-133	STEAM			454	1.0	10^{-6}	
	LIQ			454	1.0	10^{-6}	
KR-85	STEAM			454	1.0	10^{-6}	
	LIQ			454	1.0	10^{-6}	
I-131	STEAM			454	1.0	10^{-6}	
	LIQ			454		10^{-6}	

See notes at end of page 4

D. DETERMINATION OF ACTUAL RELEASE FROM AVAILABLE ACTIVITY (Fuel Handling Accident)

① ISOTOPE	② TOTAL AVAILABLE ACTIVITY (Ci)	③ WATER SCRUBBING FACTOR[4,5]	④ FILTER CLEANUP FACTOR[6]	⑤ INITIAL RELEASABLE ACTIVITY AT TIME T_1 ②x③x④ (Ci)
XE-133		1.0	1.0	
KR-85		1.0	1.0	
I-131				

E. DETERMINATION OF EFFECTIVE CLEANUP HALF-LIFE AT TIME, t (Exhaust Ventilation or Containment Sprays Operating)

① ISOTOPE	② RADIOACTIVE[9] DECAY REMOVAL RATE (hrs^{-1})	③ BUILDING[8] FREE VOL. (cc)	④ BUILDING EXHAUST VENT FLOW RATE (cc/sec) WORK SHEET [18-9260]	⑤ BUILDING EXHAUST VENT REMOVAL RATE (sec^{-1}) ④/③	⑥ BUILDING EXHAUST VENT REMOVAL RATE (hr^{-1}) ⑤x 3600	⑦ CONTAINMENT[7] SPRAY REMOVAL RATE λ_s (hrs^{-1})	⑧ TOTAL BUILDING REMOVAL RATE (hrs^{-1}) ②x⑥x⑦	⑨ $T_{1/2}$ CU EFFECTIVE CLEANUP HALF-LIFE (HOURS) 0.693/⑧
XE-133	5.45×10^{-3}					0.0		
KR-85	7.38×10^{-6}					0.0		
I-131	3.59×10^{-3}							

F. RELEASABLE ACTIVITY AT A SUBSEQUENT TIME, t_2 FROM RELEASABLE ACTIVITY AT TIME, t_1

① ISOTOPE	② t_1 TIME	③ RELEASABLE ACTIVITY AT TIME, t_1 (Ci)	④ t_2 TIME	⑤ T_E ELAPSED TIME (HOURS) ④-②	⑥ $t_{1/2}$ CU EFFECTIVE CLEANUP HALF-LIFE BETWEEN t_1 and t_2 (HOURS) [Col. 9, E]	⑦ $T_E/T_{1/2}$ CU ELAPSED EFFECTIVE CLEANUP HALF LIVES ⑤/⑥	⑧ DECAY CORRECTION FACTOR [Fig. 7]	⑨ RELEASABLE ACTIVITY AT TIME, T_2 (Ci) ③x⑧
XE-133								
KR-85								
I-131								

G. BUILDING VENT OR CONTAINMENT LEAKAGE RELEASE RATE AT TIME t_1 or t_2 (Fuel Handling Accident)

① ISOTOPE	② RELEASABLE ACTIVITY AT TIME, T_1, or t_2 (Ci) ¶Col. 9. F)	③ EXHAUST[10] VENT REMOVAL RATE (sec^{-1}) (Col. 5, E)	④ CONTAINMENT[11] LEAKAGE RATE (Sec. $^{-1}$)	⑤ BUILDING VENT[10] ACTIVITY RELEASE RATE ②x③ (Ci/sec)	⑥ CONTAINMENT ACTIVITY LEAKAGE RELEASE RATE ②x④ (Ci/sec)
XE-133			1.2×10^{-8}		
KR-85			1.2×10^{-8}		
I-131			1.2×10^{-8}		

H. NOBLE GAS MIXTURE RELEASE RATES

① ISOTOPE	② EFFECTIVE AGE OF MIXTURE (hr)	③ CALCULATED ISOTOPIC RELEASE RATES (Ci/sec)	④ SUM OF XE-133 AND KR-85 RELEASE RATES (Ci/sec)	⑤ RATIO OF TOTAL NOBLE GAS ACTIVITY TO SUMMED XE-133 AND KR-85 ACTIVITY	④x⑤ ESTIMATED NOBLE GAS RELEASE RATE (Ci/sec)
XE-133					
KR-85					
XE-133					
KR-85					
XE-133					
KR-85					

I. NOTES

1. The decay time, t_{dec} or t_{cool} and the half-lives, $T_{1/2}$ are expressed in days.
2. Figure numbers refers to Figures in Emergency Procedure RB-9.
3. Do not consider decay if the container activity has been in equilibrium since the sample was taken.
4. Use 1.0 for I-131 if the leak is above the water level and 0.01 (design value) if the leak is below the water level.
5. The most realistic I-131 value (expected case) is 0.0013. A conservative design basis value is 0.01. In general use design values.
6. The most realistic I-131 value is 99.9% removal, corresponding to a cleanup factor of 0.001. A conservative value is 90% removal, or a factor of 0.01 (design value). In general, use design values.
7. If no spray pumps are functioning, use $\lambda_S = 0.0\ hr^{-1}$, if one spray pump is functioning, use $\lambda_S = 31.5\ hr^{-1}$, and if two spray pumps are operating, use $\lambda_S = 92.4\ hr^{-1}$.
8. Building free volumes - Auxilliary Building = 5.66×10^{10} cc, Fuel Handling Building = 3.71×10^{10} cc, Containment Building = 7.60×10^{10} cc, and Turbine Building = 3.02×10^{11} cc.
9. The radioactive decay removal rates are based on the half-lives of 127 hours for Xe-133, 10.72 yrs. for Kr-85, and 197 hours for I-131.
10. If the accident occurs in containment and containment purge is successfully isolated, it is not appropriate to take credit for exhaust ventilation cleanup.
11. The leakage rate for the containment is based on the design leak rate of 0.1% per day.

18 -10556 10/81 (100)

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF NUCLEAR PLANT OPERATIONS
DIABLO CANYON POWER PLANT UNIT NOS. 1 AND 2

TITLE - RELEASE RATE SUMMARY-EMERGENCY PROCEDURE RB-9

Calculation by _____ Date _____ Time _____

Describe Release Source _____

_____

_____

A. Initial Release Rates, Time _____ am/pm

1. Noble Gas _____ Ci/sec Effective Age _____ (hr)

2. Radioiodine _____ Ci/sec Effective Age _____ (hr)

B. Subsequent Release Rates

1. a. Noble Gas _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)

b. Noble Gas _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)

c. Noble Gas _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)

2. a. Radioiodine _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)

b. Radioiodine _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)

c. Radioiodine _____ Ci/sec

Time of Release _____ am/pm Effective Age _____ (hr)