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AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
KNIGHTON,G.W. Licensing Branch 3

SUBJECT: Forwards draft proposed FSAR changes,including revs to steam supply logic & recirculation flow path for auxiliary feedwater sys to correct nuclear cooling water sys flowrates.Changes will be incorporated in FSAR Amend 14.

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	NRR/DE/MTEB	17	1	1	NRR/DE/SAB	24	1	1
	NRR/DE/SGEB	25	1	1	NRR/DHFS/HFEB	40	1	1
	NRR/DHFS/LQB	32	1	1	NRR/DHFS/PSRB		1	1
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Arizona Public Service Company

ANPP-31405-EEVB/WFQ
December 10, 1984

Director of Nuclear Reactor Regulation
Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
PVNGS FSAR Update - BOP Systems
File: 84-056-026; G.1.01.10; 84-019-026

Reference: (1) Letter from E. E. Van Brunt, Jr., APS, to T. Bishop, NRC Region V, dated May 7, 1984 (ANPP-29445); Subject: Final Report DER 83-76 (Auxiliary Feedwater Pump Turbine Logic).
(2) Letter from E. E. Van Brunt, Jr., APS, to T. Bishop, NRC Region V, dated July 12, 1984 (ANPP-29951); Subject: Final Report DER 84-23 (Auxiliary Feedwater Pump "B" Discharge Valve to the Condensate Storage Tank).
(3) Letter from E. E. Van Brunt, Jr., APS, to G. W. Knighton, NRC, dated November 13, 1984 (ANPP-31101); Subject: Appendix R Spurious Actuation Analysis.

Dear Mr. Knighton:

Enclosed for your information are draft proposed FSAR changes. These changes 1) identify the presence of essential HVAC to cool the essential spray pond pumphouse, 2) revise the steam supply logic and recirculation flow path for the auxiliary feedwater system (Reference 1 and 2), 3) correct nuclear cooling water system flowrates, 4) clarifies the closure time of the main steam stop valves, 5) update the listing of safe shutdown equipment in accordance with the spurious actuation analysis submitted in Reference 3, 6) delete the letdown line low flow alarm, and make editorial corrections and clarifications. These changes are considered acceptable as 1) the essential HVAC meets design criteria as described in section 3.2, 2) the auxiliary feedwater system changes are consistent with CESSAR safety analyses, 3) the nuclear cooling water flowrates meet design requirements, 4) the revised closure time of the stop valves is consistent with the manufacturers criteria, 5) the listing of safe shutdown equipment supports the actions necessary to shutdown after a fire, and 6) the letdown low pressure alarm is sufficient to notify the operator to isolate the letdown lines.

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These changes are expected to be incorporated in FSAR Amendment 14 to the FSAR which is scheduled for submittal in February 1985. Please contact William Quinn of my staff if you have any questions.

Very truly yours,

E. E. Van Brunt Jr

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Production
ANPP Project Director

EEVB/WFQ/mb
Enclosure

[illegible]

ANPP-31405

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President, Nuclear Production of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt
Edwin E. Van Brunt, Jr.

Sworn to before me this 10 day of December, 1984.

Nora E. Mader
Notary Public

My Commission Expires:
My Commission Expires April 6, 1987

cc: A. C. Gehr (w/a)
R. P. Zimmerman (w/a)
E. A. Licitra (w/a)

12/10/84..8412120090

Table 7.3-7

AUXILIARY FEEDWATER ACTUATION SIGNAL

ACTUATED DEVICES LIST

Figure No.	Description	Function
10.4-11	Seismic Category I motor-driven auxiliary feedwater pump and pump room cooling unit (1)	Start
10.4-11	Non-Seismic Category I motor-driven auxiliary feedwater pump suction from condensate storage tank (2)	Close
10.4-11	Seismic Category I steam turbine driven auxiliary feedwater pump and pump room cooling unit (1)	Start (b)
10.4-11	Auxiliary feed regulating valves SG1 (4)	(a)
10.4-11	Auxiliary feed regulating valves SG2 (4)	(a)
9.5-9	Diesel generator system	Refer to section 7.4.1.1
9.2-4	Essential cooling water system	Refer to section 9.2.2
9.2-11	Essential chilled water system	Refer to section 9.2.9
10.4-8	Steam generator blowdown isolation valves (4)	Close

a. Cycles open and close to intact steam generator

b. Steam admission valve opens from intact steam generator

SGA-UV-134; Steam Supply Valve from S/G #1 opens on AFAS-1
SGA-UV-138; Steam Supply Valve from S/G #2 opens on AFAS-2

PVNGS AFS RELIABILITY ANALYSIS

design from the present Case 1 to design alternative Case 2. Specific recommendations are as follows:

- Provide the capability to manually supply Train 3 auxiliary feedwater pump from the Train A diesel generator (Case 2).
- Provide position indication in the control room on the pump test bypass valves.[a]
- Provide power to the suction valves for Train 3 auxiliary feedwater pump from the Train A diesel generator.
- Perform a total system test once every 18 months.
- Perform testing on different shifts.

4

(a) Full flow recirculation bypass valves have been deleted from the design and the path closed with a ~~flange~~ spectacle blind; valve position indication no longer required.

of the main steam isolation valves. The power and controls for the valves associated with this pump receive power from the Class 1E dc buses A and C.

The two safety-related auxiliary feedwater pumps are separated by a physical barrier. Piping and components are located, separated, or protected to preclude damage from missile and environmental effects.

3.2 System Operation

For emergency operation, normal flow is from the condensate storage tank to both the safety-related motor-driven AFS pump and to the steam turbine-driven AFS pump. An alternative supply of water is provided by local manual cross connections to the reactor makeup water tank.

A minimum flow recirculation system is provided on each pump discharge with recirculation to the condensate storage tank. Each of these pumps can supply either steam generator with feedwater. Condensate recirculation lines are provided downstream of the AFW pump to allow for full flow pump testing.[a]

Either auxiliary feedwater pump can supply the necessary feedwater for reactor decay heat removal and reactor cooldown to 350F.

For normal AFS operation the non-safety-related pump, located in the turbine building, is employed.

One manually operated auxiliary feedwater path to the steam generators is provided for the non-safety-related motor-driven auxiliary feedwater pump through the feedwater header.

At a reactor coolant temperature of 350F, the shutdown cooling system is placed in operation. The AFS duty cycle is then completed and it is returned to standby status.

(a) There is no requirement for full flow testing in a recirculation mode; a design change has flanged off the existing full flow recirculation lines.

conservative approach to the consideration of the human factor involved in activating train 3 in Case 2. Under these conditions it is not unreasonable to expect Cases 2 and 2A to be closer in terms of unavailability.

4.2.2 Discussion of Results

4.2.2.1 Dominant Failure Modes

The analysis indicated that the greatest unavailability was due to human error. The human error was inadvertently leaving the pump recirculation valve open after a test and inadvertently leaving the pump discharge locked-open manual valve closed after maintenance on the pump. These valves are not provided with position indicators in the control room. The locked-open pump discharge maintenance valve will not be tested or checked with pump operations after pump maintenance. The estimated human error failure probability for this was assessed at 2.7E-2 per demand.
4 By tech specs, the pump recirc valve will be opened for pump testing - once a month per train.[a] All pumps were assumed to be tested monthly. The data source indicates that the failure rate of valves with position indicators in the control room is assessed at about 1/2 order less than the valves without position indicators.

The AFS pump discharge valves, both the check and locked open manual valves, V015 & V016 and V024 & V025, do not indicate to be flow tested in any of the surveillance requirement. A pressure indicator is provided downstream of these valves, but this does not fully assure that these valves are or will fully open.

The two check valves, V079 and V080, which go to the feedwater headers to the steam generators, again do not indicate to be checked or tested in any of the surveillance requirements. The technical specification states that pump tests

(a) Monthly pump testing is satisfied using an orificed miniflow line without manipulation of any valves in the recirculation line.

shall be performed monthly and the crossover valves be tested at least once in 18 months, but no explicit total system testing is stated. These check and locked-open manual valves can only be tested during a total system test. Thus, it is recommended that total system test be required at least once every 18 months.

4.2.3 Conclusions

The conclusions of the study are as follows:

A. Provide the capability to supply train 3 auxiliary feedwater pump from the train A diesel generator (Case 2).

B. Provide position indication in the control room on the pump test by-pass valves[a].

C. Provide power to the suction valves for train 3 auxiliary feedwater pump from the train A diesel generator.

D. Perform a total system test once every 18 months. 4

E. Perform testing on different shifts.

(a) Full flow recirculation bypass valves have been deleted from the design and the path closed with a ~~flange~~ spectacle blind; valve position indication no longer required.

Table 9.2-28

ESSENTIAL CHILLED WATER SYSTEM

Component	Number of Units	Unit Capacity	Units Required for Operation	
Chillers	2	2.52×10^6 Btu/h, 210 tons	1	105 to 120F maximum cooling water
Chilled water pumps	2	20 hp, 400 gal/min	1	Centrifugal type
Expansion tanks	2	~~500~~ 80 gal	1	Closed to atmosphere
Chemical addition tanks	2	11 gal	1	Ball feeder

The essential chilled water system is automatically activated by the actuation signals shown on figure 9.2-10. Redundant chilled water units are connected to independent chilled water trains A and B which supply chilled water to the cooling coils of the essential trains A and B air conditioning units serving the control room, ESF switchgear, electrical penetration rooms, ESF equipment rooms and ECW pump rooms in the auxiliary building and the auxiliary feedwater pump rooms in the main steam support structure. Since each train is capable of removing the total emergency heat load (100% redundancy), one of the redundant chilled water systems with its corresponding essential air conditioning units can be manually deactivated once the other train has demonstrated its capability to supply the required essential chilled water. Table 9.2-29 lists Seismic Category I valves.

high pressure air leakage from the compressed air system. This is accomplished by separation of the compressed air system from the engineered safety features (ESF) systems, or by use of barriers between systems. Safety valves are provided in the system to prevent or mitigate a high-pressure rupture incident.

A normally open instrument air line and a normally closed service air line penetrate the containment (two separated penetrations), as shown in figure 9.3-1. The instrument air line penetrating the containment serves the normally operating valves of the pressurizer spray system and the normally operating valve of the nitrogen supply to the safety injection tanks (used to maintain pressure on top of the liquid in the tanks). The penetrating instrument line is provided with a check valve inside the containment and a solenoid-operated control valve on the outside of the containment. This ~~air~~ solenoid-operated valve closes automatically upon a containment isolation actuation signal (CIAS) or in case of an ~~air supply~~ electrical (Train A) failure. It can also be closed manually from the control room. Should the line rupture inside the containment, air flow is limited to a flow of 10 actual ft^3/min by a restriction orifice upstream of the ~~air~~ solenoid-operated control valve.

The service air line penetrating the containment is used for the refueling operations at the time of a programmed shutdown. This line is provided with a check valve inside the containment and a manual block valve at the point of service connection in the containment. The line is provided with a locked closed manual isolation valve outside the containment.

A compressed air system failure has no effect on the capability of air operated valves provided in ESF systems to perform a safe reactor shutdown. These valves are designed to fail safe in the absence of air; i.e. they position in a manner that does

Table 3.9-18

ESSENTIAL SPRAY POND PUMP - SUMMARY OF MAXIMUM STRESSES AND ALLOWABLES

Item	Max Stress[a] (psi)	Allowable Stress[a] (psi)
Suction bell	12,114	33,660
Suction nozzle	3,041	33,660
Discharge column	30,447	31,500
Discharge shell, lower section	4,479	31,500
Discharge shell, upper section	10,532	31,500
Tube	5,088	31,500
Discharge nozzle	8,515	31,500
Pump shaft	3,613	174,780
Bolts (axial)	8,642	14,220
(shear)	4,561	11,376
Shaft keys	17,461	52,434
Driver stand	2,615	31,500

a. The allowable stresses given above are obtained by multiplying the values given in ASME III Division 1, Appendix 1, by the specified factor of 1.8 for faulted condition.

tests that verify that the valve will open and close within the specified time limits when subjected to the ~~design pres-~~ MAXIMUM EXPECTED differential pressure ~~sure~~, and operability qualification of motor operators for the environmental conditions over the installed life (i.e., aging, radiation, accident, environment simulation, etc.) in

9.4.7.3 Safety Evaluation

Safety evaluations pertinent to the heating and ventilation system are numbered to correspond to the safety design bases and are as follows.

A. Safety Evaluation One

The diesel generator building is provided with a HVAC system designed to distribute air over the diesel generator, its components and the control equipment to maintain the maximum air temperature at or below the maximum design temperature specified in table 9.4-2. A normal unit heating system, designed to distribute tempered air in the diesel generator building, maintains the minimum temperature at or above the minimum design temperature and the maximum temperature at or below the maximum design temperature specified in table 9.4-2.

B. Safety Evaluation Two

No single failure of any component in the diesel generator building HVAC system can prevent the system from complying with safety design basis one. A single failure analysis is provided in table 9.4-7.

C. Safety Evaluation Three

The diesel generator HVAC system fans, and dampers are designed to Seismic Category I criteria.

9.4.7.4 Inspection and Testing Requirements

INSERT A

Preoperational testing is performed as described in section 14.2.

9.4.8 REFERENCES

CHANGE TO 9.4.9

1. "Particulate Characteristics of Dust Storms at the Palo Verde Nuclear Generating Station," Final Report, Arizona Public Service Company, 1978.

9.4.8 ESSENTIAL SPRAY POND PUMPHOUSE

The Essential Spray Pond (ESP) Pump House HVAC subsystem consists of two essential safety exhaust fans, one each for train A and train B. The function of this subsystem is to provide ventilation in the two ESP Pump Houses.

9.4.8.1 Design Bases

9.4.8.1.1 Safety Design Bases

Safety Design Bases applicable to the ESP Pump House HVAC subsystem are as follows:

A. Safety Design Basis One

The Essential Spray Pond Pump House HVAC subsystem is designed to assure ventilation of the ESP Pump Houses with outside air to maintain the temperatures within the limits required to ensure the operability of the equipment within the Pump Houses during emergency or post-accident operation of the ESPS.

B. Safety Design Basis Two

The exhaust fans are quality class Q, provided with missile protection and designed to function during and after an SSE.

9.4.8.1.2 Power Generation Design Bases

The ESP Pump House HVAC subsystem is designed to ventilate the Pump Houses with outside air to maintain the temperatures within the limits required to ensure operability of the equipment within the Pump Houses during normal plant shutdown ESPS operation.

9.4.8.1.3 Codes and Standards

The Essential Spray Pond Pump House HVAC subsystem is designed to conform to the applicable codes and standards listed in table 3.2-1.

9.4.8.2 System Description

The ESP Pump House HVAC subsystem ventilates each ESP Pump House using a single fan for each Pump House. The A and B train Pump Houses are each provided with corresponding train-related fans. The subsystem also includes necessary duct-WORK.

9.4.8.2.1 Component Description

The ESP Pump Houses each contain one essential quality class Q, missile protected exhaust fan and duct WORK as described in tables 9.4-3 and 3.2-1.

9.4.8.2.2 System Operation

The essential ventilation fans for the ESP Pump Houses operate whenever the ESP pumps are RUNNING. The exhaust fans induce a flow of outside air over the ESP pump motors and exhaust the heated air to the outside atmosphere. Conditions inside the pump house will approach outside air temperatures and normally be within the range identified in Table 9.4-2.

9.4.8.3 Safety Evaluation

Safety evaluations applicable the the ESP Pump House HVAC subsystem are numbered to correspond to the Safety Design Bases and are as follows:

A. Safety Evaluation One

The ESP Pump Houses are provided with a HVAC subsystem designed to circulate and exhaust outside air through each Pump House to maintain air temperatures within operability limits for the equipment within the Pump House.

B. Safety Evaluation Two

The ESP Pump House HVAC essential exhaust fans and structural supports are missile protected and designed to Seismic Category I Criteria. The exhaust fans are Quality Class Q.

9.4.8.4 Inspection and Testing Requirements

Preoperational testing is performed as described in Section 14.2.

Table 9.4-2

INSIDE DESIGN CONDITIONS

HVAC System	Space Temperatures Maximum (F)	Space Temperatures Minimum (F)
Control room	80[a]	70
Computer area	80[a]	70
ESF switchgear	77	60
ESF equipment rooms	77	60
Battery rooms	85	60
Cable spreading	122	40
Auxiliary building (excluding ESF equipment room and access control area)	104[d]	50
Access control area	80	70
ESF pump room	104/120[b]	50
Containment building	120/100[c]	50/70[c]
Fuel building	104	50
Radwaste building	104	50
Turbine building		
Below operating deck	122	50
Above operating deck	122	40
Diesel generator building		
Diesel generator room	140/120[e]	50
Diesel generator control room	122	50

Insert B

a. Relative humidity 40% to 60%
b. 104F for normal operation; 120F allowable for up to 4 hours followed by a decay to 104F over a 24-hour period
c. 50-120F for normal operation; 70F-100F for refueling; 20 to 90% relative humidity
d. During a normal plant shutdown, the shutdown heat exchanger rooms and adjacent valve galleries shall be maintained at a maximum temperature of 122F
e. 120F during normal operation and testing of the diesel generator; 140F during essential operation of the diesel generator.

6 6 6 6 6 6

INSERT B TO TABLE 9.4-2:

HVAC SYSTEM	MAX (F)	MIN (F)
ESSENTIAL SPRAY POND PUMP HOUSE	120	35

Table 9.4-3

HVAC SYSTEMS--SUMMARY OF DESIGN PARAMETERS AND DESIGN DETAILS (Sheet 6 of 6)

Area or Location	Operational Mode		Type Systems	Heat Load (Btu/h)	Flow Rate/Unit		No. Units & Capacity	Power Supply	Equipment Listing	Water Source	Water Makeup
	Normal	Essential			Air (ft^3/min)	Cooling Water (gal/min)					
Turbine building (continued)	X		Battery room exhaust	-	8,300	-	2/100	Normal 120V & 460V	Fan		
	X		Lube oil area normal exhaust	-	5,000	-	2/100	Normal 120V & 460V	Fan		
	X		Deminer-alizer	-	3,000	-	1/100	Normal 120V & 460V	Fan		
Diesel generator building											
Diesel genera-tor room		X	Vent fan	2.77×10^6/unit	127,300	-	2/100	Emergency trains A & B	Fans (1 per diesel generator)	-	-
	X		Heating	5.0 kW	750	-	2/50	Normal 120V & 460V	Unit heater	-	-
	X		Vent fan	18,866	4,000		1/100	Normal 120V & 460V			
	X		Spray system	-	-	-	1/100	-	Spray nozzles, piping a/o valves	Domestic water	30 gpm
Air compressor zone	X		Exhaust fan	39,000	4,200	-	2/100	Normal 460V	Exhaust fan		
Day tank room	X		Exhaust fan	-	400	-	4/100	Normal 460V	Exhaust fan	-	-
Diesel generator control room		X	Supply fan	127,000	11,700		2/100	Emergency trains A & B	Fan & high efficiency filter (one per diesel generator control room)	-	-
	X		Supply fan	17,240	1,900		2/100	Normal 460V	Fan & high efficiency filter (one per diesel generator control room)	-	-

INSERT C

AREA OR LOCATION	OP. MODE NORMAL	OP. MODE EPS.	TYPE SYSTEMS	HEAT LOAD (BTU/h)	FLOW AIR	FLOW WATER	NO. UNITS % CAPACITY	POWER SUPPLY	EQUIP. LISTING	WATER SOURCE	WATER BACKUP
ESP PUMP HOUSE		X	EXHAUST FAN	1.24×10^5 / UNIT	20,000	—	2/100	NORMAL 460 V	EXHAUST FAN	—	—

INSERT C TO TABLE 9.4-3

Table 3.2-1
QUALITY CLASSIFICATION OF STRUCTURES, SYSTEMS AND COMPONENTS (Sheet 23 of 39) 12

Principal Components	Location	Principal Construction Codes and Standards	Seismic Category	PVNGS Quality Assurance Class	Regulatory Guide 1.26 Quality Group Classification	ANSI N18.2 Safety Class
ESF switchgear room normal AHU						
Fan	CB	na	na	na	na	na
Filter	CB	na	na	na	na	na
Cooling coil	CB	B31.1	na	na	na	NNS
Heating coil	CB	na	na	na	na	na
Duct work	CB	SMACNA	na	na	na	na
Dampers	CB	SMACNA	na	na	na	na
Supports and hangers	CB	na	(h)	(h)	na	NNS
Battery room normal exhaust fans	CB	na	na	na	na	na
Smoke exhaust system						
Fan	CB	na	na	na	na	na
Dampers	CB	SMACNA	na	na	na	na
Ductwork	CB	SMACNA	na	na	na	na
INSERT D						
16. Fire protection system						
Water system components	All	NFPA/ANI(t)	na	(y)	na	NNS
Gas (CO_2 and Halon 1301) system components	AB,CB	NFPA/ANI	na	(y)	na	NNS
Support and hangers	All	na	(h)	(h)	na	NNS

PRINCIPAL COMPONENTS	LOCATION	CODES & STDS	SEISMIC CATEGORY	PVNGS QUALITY CLASS	REG GUIDE 1.26	ANSI N18.2
ESP PUMP HOUSE EXHAUST SYSTEM						
EXHAUST FAN ~~DUCT WORK~~	OU ~~ESP~~	IEEE-323/344/334	I	Q	na.	3
DUCTWORK	OU ~~ESP~~	SMACNA	I	Q	na	3-~~AQ~~

INSERT D TO TABLE 3.2-1

the refueling water tank,

generator fuel storage tanks, the condensate storage
tank, or cause loss of integrity to the spent fuel
2 pool. The missiles shall not cause loss of func-
tion to any system described in section 3.5.B as
required for safe shutdown.

3.5.1 MISSILE SELECTION AND DESCRIPTION

The sources of missiles which, if generated, could affect the safety of the plant are considered in this section. These are rotating component failure missiles, pressurized component failure missiles, and tornado generated missiles.

3.5.1.1 Internally Generated Missiles (Outside Containment)

There are two general sources of postulated missiles outside containment:

- Rotating component failures
- Pressurized component failure

A tabulation of safety-related structures, systems, and components outside the containment, their locations, seismic categories, quality group classifications, and the applicable FSAR sections, which include system piping and instrumentation drawings describing safety design features, is given in table 3.2-1. General arrangement and section detail drawings are located in section 1.2.

3.5.1.1.1 Rotating Component Failure Missiles

A tabulation of missiles generated by postulated failures of rotating components, their sources and characteristics, and provided missile protection is given in table 3.5-1.

Table 3.5-9
MISSILE BARRIERS FOR TORNADO AND ACCIDENT
MISSILES (Sheet 3 of 4)

Protected Systems and Components	Missile Barrier	Concrete Thickness (in.)			Design Concrete Strength (psi)
		Walls	Roof	Floor	
Diesel generator fuel storage tank	Underground (10 feet below grade with DG fuel oil storage tank valve box located above it)	NA	NA	NA	
Diesel fuel transfer pumps and pump motors	Underground in DG fuel oil storage tank valve box		$16^{(b)}$		5000
		16			4000
Main steam line isolation valves	Containment structure wall	44			6000
	Main steam support structure		20		5000
		39			4000
Condensate storage tank	Cylindrical walls	21	None	NA	~~4000~~ 5000
Condensate transfer pumps	Underground	NA	NA	NA	
Condensate piping	Underground	NA	NA	NA	
Essential spray pond pumps and pump motors	Pond discharge structure	24	24	24	4000
Refueling water tank	Cylindrical walls	21	None	NA	5000
Refueling water piping	Underground/barriers	NA	NA	NA	

Table 9.2-8

HEAT LOADS AND WATER REQUIREMENTS NUCLEAR COOLING WATER SYSTEM (Sheet 1 of 3)

Component	Related System	FSAR Section Reference	Heat Load (ea) (10^6 Btu/h)	Cooling Water Requirement (ea) (gal/min)
Boric acid concentrator package	Chemical and volume control system (CVCS)	9.3	11.00	700
Radwaste evaporator package	Radwaste	11.2	14.00	962
Waste gas compressor (2 ea) in series with	Radwaste	11.3	0.25	10
Waste gas compressor aftercooler (2 ea)	Radwaste	11.3	0.25	10
Reactor coolant sample cooler	Sampling	9.3.2	0.24	16
Safety injection system sample coolers (2 ea)	Sampling	9.3.2	0.13	7
Pressurizer vapor space sample cooler	Sampling	9.3.2	0.26	17 ~~26~~
Pressurizer surge sample cooler	Sampling	9.3.2	0.26	26 ~~17~~
Gas stripper	CVCS	9.3	7.6 (max)	700

actuator so that the stop valve is either fully open or fully closed. The function of the stop valves is to shut off the flow of steam to the turbine, when required. The stop valves WHEN STEAM PRESSURE IS PRESENT AND ARE CLOSED IN 0.5 SECONDS are closed within 0.2 seconds or less by actuation of the OR LESS WHEN NO STEAM PRESSURE IS PRESENT emergency trip system devices. These devices are independent of the electronic flow control unit (see section 10.2.2.3.1.5).

The turbine control valves are positioned by electrohydraulic servo-actuators in response to signals from their respective flow control unit. The flow control unit signal positions the control valves for long range speed control through the normal turbine operating range and for load control after the turbine-generator unit is synchronized.

The combined reheat valves located in the hot reheat lines are stop and intercept valves in one casing and control steam flow to the low-pressure turbines. During normal operation of the turbine, the stop and intercept valves are wide open. The intercept valve flow control unit positions the valve during startup and normal operations and closes the valve rapidly on loss of turbine load. The reheat stop valves close completely on turbine overspeed and trip.

10.2.2.3.1.4 <u>Power/Load Unbalance.</u> Associated with the load control unit is a rate sensitive power/load unbalance circuit whose purpose is to initiate control valve fast closing action under load rejection conditions that might lead to rapid rotor acceleration and consequent overspeed.

Valve action will occur when the power exceeds the load by at least 40% and generator current is lost in a time span of 35 ms or less. Cold reheat pressure is used as a measure of power, and generator current is used as a measure of load to provide discrimination between loss of load incidents and occurrences of electric system faults.

When the detection circuitry provides a signal indicating a power/load unbalance condition, all control valves are closed
4 in 0.2 seconds or less (WHEN STEAM PRESSURE IS PRESENT AND ARE CLOSED IN 0.3 SECONDS OR LESS WHEN NO STEAM PRESSURE IS PRESENT) by a fast acting solenoid for each control valve. Simultaneously, the load reference signal is grounded and the load reference motor begins to run back toward the no load flow point. Should the condition disappear quickly, the power/load unbalance circuit will reset automatically, and the load reference signal will be re-established near its value prior to the loss of load. Should the condition persist, and the load does not return within approximately 45 seconds, the load reference runback will be completed. The power/load unbalance circuit will clear automatically when the cold reheat pressure drops below 40%.

10.2.2.3.1.5 <u>Overspeed Protection.</u> Two means of overspeed trip protection are provided; a mechanical overspeed trip (OST) and a backup overspeed trip (BOST). The OST is a conventional eccentric ring that actuates a trip latch to operate a pilot valve that operates the mechanical trip valve. The mechanical trip valve releases the hydraulic fluid pressure in the steam valve actuator, allowing the springs to close the steam
4 valves. The OST trip is set at 110% of rated turbine speed. (Refer to Protection System Block Diagram, figure 10.2-4.)

The BOST is an electric trip normally set to operate at a slightly higher speed than the OST. Three independent BOSTs are provided by magnetic pickups from toothed wheels on the turbine shaft. The signals are amplified through electronic circuitry and are compared to trip speed reference voltage signals. Exceeding the trip speed will cause each BOST voltage to energize its master trip relay. The master trip relays, through a two-out-of-three logic, de-energize both pilot solenoids of the master (electric) trip solenoid valve. This releases the hydraulic fluid pressure in the steam valve actuators, causing the turbine main valves to close. The overspeed trip logic is shown in figure 10.2-3.

not negate the safety-related functional performance of the system. A list of these valves is given in table 9.3-2.

9.3.1.2.2 System Operation

Two compressors are normally in operation with the third on standby. Normally, one of the two compressors has adequate capacity for base load operation. The other compressor cycles on and off as required to meet increased plant demands as evidenced by a pressure drop in the compressed air system distribution piping. In order to equalize wear on all compressors, the compressors are interchanged for base load operation.

In the event that the two operating compressors fail to supply the full air demand, or an electrical trip of an operating compressor occurs, the resulting continuous low pressure in the supply line initiates an automatic start of the standby compressor. ~~Automatic starting of the standby compressor is also initiated, without loss of pressure, if an electrical trip of an operating compressor occurs.~~

Compressed air supplied by the compressors for instrument air use is filtered and dehumidified prior to its introduction into the instrument air distribution piping. This instrument air subsystem includes prefilters, filters, and regenerative duplex air driers and filters.

If plugging of a filter occurs, a high differential pressure alarm is provided to warn the operator who may then divert the air stream to the other filter through manually operated valves. Normally, filters are replaced on a regular basis to prevent plugging during operation.

The duplex driers are utilized in such a manner that one regenerates while the other is in service. The units interchange automatically on a time basis.

REVISE AS NECESSARY

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 1 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
AUXILIARY FEEDWATER SYSTEM			
Function: Maintain water inventory in the steam generators during hot standby and effect a reactor cooldown			
M-AFA-P01 and M-AFA-K01 and J-AFA-E01 and J-AFA-ST-52	Auxiliary feedwater pump, turbine and control panel	M-AFB-P01[s]	Auxiliary feedwater pump (motor driven)
J-AFA-HV-54	Auxiliary feedwater turbine trip and throttle valve	————	
J-AFA-FT-40A[q]	Auxiliary feedwater flow to steam generator No. 1	J-AFB-FT-41A[i][q]	Auxiliary feedwater flow to steam generator No. 1
J-AFA-HV-32	Auxiliary feedwater regulating valve to steam generator No. 1	J-AFB-HV-30[s]	Auxiliary feedwater regulating valve to steam generator No. 1
J-AFC-UV-36	Auxiliary feedwater isolation valve to steam generator No. 1	J-AFB-UV-34[s]	Auxiliary feedwater isolation valve to steam generator No. 1

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 2 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-AFA-FT-40B[q]	Auxiliary feedwater flow to steam generator No. 2	J-AFB-FT-41B[i][q]	Auxiliary feedwater flow to steam generator No. 2
J-AFC-HV-33	Auxiliary feedwater regulating valve to steam generator No. 2	J-AFB-HV-31[s]	Auxiliary feedwater regulating valve to steam generator No. 2
J-AFA-UV-37	Auxiliary feedwater isolation valve to steam generator No. 2	J-AFB-UV-35[s]	Auxiliary feedwater isolation valve to steam generator No. 2

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 3 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
CONDENSATE STORAGE AND TRANSFER SYSTEM			
Function: Provide condensate to the auxiliary feedwater pumps for steam generator makeup and provide makeup to the diesel generator cooling, essential cooling and essential chilled water systems.			
M-CTA-P01[x]	Condensate transfer pump No. 1	M-CTB-P01[i][x]	Condensate transfer pump No. 2
J-CTA-LT-35[n][p]	Condensate storage tank level	J-CTB-LT-36[n][p]	Condensate storage tank level

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 4 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
MAIN STEAM SYSTEM			
Function: Dissipate heat generated by NSSS through atmospheric dump valves, provide steam to the Train A auxiliary feedwater pump and provide effective control of reactor coolant temperature during cooldown.			
J-SGA-PT-1013A	Steam generator No. 1 pressure	J-SGB-PT-1013B[s]	Steam generator No. 1 pressure
J-SGA-LT-1113A	Steam generator No. 1 level (wide range)	J-SGB-LT-1113B[s]	Steam generator No. 1 level (wide range)
J-SGA-PT-1023A	Steam generator No. 2 pressure	J-SGB-PT-1023B[s]	Steam generator No. 2 pressure
J-SGA-LT-1123A	Steam generator No. 2 level (wide range)	J-SGB-LT-1123B[s]	Steam generator No. 2 level (wide range)
J-SGA-HV-179[k] and J-SGA-HY-179A and J-SGC-HY-179B and J-SGA-HY-179C and	Steam generator No. 2, line No. 2, atmospheric dump valve, solenoid valves and controller	J-SGB-HV-178[k][s] and J-SGB-HY-178A[s] and J-SGD-HY-178B[s] and J-SGB-HY-178C[s] and	Steam generator No. 1, line No. 2, atmospheric dump valve, solenoid valves and controller

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 5 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-SGA-HY-179R and J-SGC-HY-179S INSERT (A)		J-SGB-HY-178R[(s)] and J-SGD-HY-178S[(s)] INSERT (C)	
J-SGA-HV-184[(k)] and J-SGA-HY-184A and J-SGC-HY-184B and J-SGA-HY-184C and J-SGA-HY-184R and J-SGC-HY-184S INSERT (B)	Steam generator No. 1, line No. 1, atmospheric dump valve, solenoid valves and controller	J-SGB-HV-185[(k)(s)] and J-SGB-HY-185A[(s)] and J-SGD-HY-185B[(s)] and J-SGB-HY-185C[(s)] and J-SGB-HY-185R[(s)] and J-SGD-HY-185S[(s)] INSERT (D)	Steam generator No. 2, line No. 1, atmospheric dump valve, solenoid valves and controller
J-SGA-PV-313A[~~(m)~~ e] and J-SGA-PV-313B[~~(m)~~ e] and J-SGA-PT-313 and J-SGA-PSL-313	Nitrogen supply to atmospheric dump valves J-SGA-HV-184 and J-SGA-HV-179	J-SGB-PV-306A[(i)(m)] and J-SGB-PV-306B[(i)(m)] and J-SGB-PT-306[(i)(m)] and J-SGB-PSL-306[(i)(m)]	Nitrogen supply to atmospheric dump valves J-SGB-HV-185 and J-SGB-HV-178
J-SGA-UV-500P and J-SGA-UY-500P	Steam generator No. 1 blowdown isolation and solenoid valves	J-SGB-UV-500Q[(aa)] and J-SGB-UY-500Q	Steam generator No. 1 blowdown isolation and solenoid valves

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INSERTS TO PAGE 9B.1-19

INSERT (A):

and
J-SGA-HIC-179A
and
J-SGA-HIC-179B
and
J-SGA-ZE-179
and
J-SGA-ZT-179

INSERT (B)

and
J-SGA-HIC-184A
and
J-SGA-HIC-184B
and
J-SGA-ZE-184
and
J-SGA-ZT-184

INSERT (C)

and (s)
J-SGB-HIC-178A
and (s)
J-SGB-HIC-178B
and (s)
J-SGB-ZE-178
and (s)
J-SGB-ZT-178

INSERT (D)

and (s)
J-SGB-HIC-185A
and (s)
J-SGB-HIC-185B
and (s)
J-SGB-ZE-185
and (s)
J-SGB-ZT-185

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 6 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-SGA-UV-500S and J-SGA-UY-500S	Steam generator No. 2 blowdown isolation and solenoid valves	J-SGB-UV-500R[aa] and J-SGB-UY-500R	Steam generator No. 2 blowdown isolation and solenoid valves
J-SGA-UV-211	Steam generator No. 1 hot-leg blowdown sample isolation valve	J-SGB-UV-228[aa]	Steam generator No. 1 hot-leg blowdown sample isolation valve
J-SGA-UV-204	Steam generator No. 1 cold-leg blowdown sample isolation valve	J-SGB-UV-219[aa]	Steam generator No. 1 cold-leg blowdown sample isolation valve
J-SGA-UV-225	Steam generator No. 2 hot-leg blowdown sample isolation valve	J-SGB-UV-224[aa]	Steam generator No. 2 hot-leg blowdown sample isolation valve
J-SGA-UV-223	Steam generator No. 2 cold-leg blowdown sample isolation valve	J-SGB-UV-222[aa]	Steam generator No. 2 cold-leg blowdown sample isolation valve
J-SGA-UV-220	Steam generator No. 1 downcomer blowdown sample isolation valve	J-SGB-UV-221[aa]	Steam generator No. 1 downcomer blowdown sample isolation valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 7 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-SGA-UV-227	Steam generator No. 2 downcomer blowdown sample isolation valve	J-SGB-UV-226[(aa)]	Steam generator No. 2 downcomer blowdown sample isolation valve
J-SGA-UV-172[(c)] and J-SGA-UY-172A or J-SGA-UY-172B	Steam generator No. 1 downcomer feedwater isolation and solenoid valves	J-SGB-UV-130[(c)(aa)] and J-SGB-UY-130A or J-SGB-UY-130B	Steam generator No. 1 downcomer feedwater isolation and solenoid valves
J-SGA-UV-174[(c)]	Steam generator No. 1 economizer feedwater isolation valve	J-SGB-UV-132[(c)(aa)]	Steam generator No. 1 economizer feedwater isolation valve
J-SGA-UV-175[(c)] and J-SGA-UY-175A or J-SGA-UY-175B	Steam generator No. 2 downcomer feedwater isolation and solenoid valves	J-SGB-UV-135[(c)(aa)] and J-SGB-UY-135A or J-SGB-UY-135B	Steam generator No. 2 downcomer feedwater isolation and solenoid valves
J-SGA-UV-177[(c)]	Steam generator No. 2 economizer feedwater isolation valve	J-SGB-UV-137[(c)(aa)]	Steam generator No. 2 economizer feedwater isolation valve
J-SGE-UV-170[(d)]	Steam generator No. 1, line No. 1, main steam isolation valve	J-SGE-UV-170[(d)(aa)]	Steam generator No. 1, line No. 1, main steam isolation valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 8 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-SGE-UV-180[d]	Steam generator No. 1, line No. 2, main steam isolation valve	J-SGE-UV-180[d][aa]	Steam generator No. 1, line No. 2, main steam isolation valve
J-SGE-UV-171[d]	Steam generator No. 2, line No. 1, main steam isolation valve	J-SGE-UV-171[d][aa]	Steam generator No. 2, line No. 1, main steam isolation valve
J-SGE-UV-181[d]	Steam generator No. 2, line No. 2, main steam isolation valve	J-SGE-UV-181[d][aa]	Steam generator No. 2, line No. 2, main steam isolation valve
J-SGE-UV-183[d] and J-SGA-UY-183A	Steam generator No. 2 MSIV bypass and solenoid valves	J-SGE-UV-183[d][aa] and J-SGB-UY-183B	Steam generator No. 2 MSIV bypass and solenoid valves
J-SGE-UV-169[d] and J-SGA-UY-169A	Steam generator No. 1 MSIV bypass and solenoid valves	J-SGE-UV-169[d][aa] and J-SGB-UY-169B	Steam generator No. 1 MSIV bypass and solenoid valves
J-SGA-UV-134 and J-SGA-UV-134A	Steam supply valve to auxiliary feedwater (turbine-driven) pump or	___________	

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NO CHANGES TO THIS PAGE

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 9 of 37)
(footnotes at end of table)

Train "A"		Train "B"
J-SGA-UV-138 and J-SGA-UV-138A	Steam supply valve to auxiliary feedwater (turbine-driven) pump	

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 10 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
REACTOR COOLANT SYSTEM			
Function: Provide cooling during shutdown operations to preclude significant fuel damage[t][v]			
J-RCA-PT-102A	Pressurizer pressure	J-RCB-PT-102B[s]	Pressurizer pressure
J-RCA-LT-110X	Pressurizer level	J-RCB-LT-110Y[s]	Pressurizer level
J-RCA-TE-112HA and J-RCA-TT-112HA	Hot-leg loop 1 temperature for control room display	J-RCB-TE-112HB[i] and J-RCB-TT-112HB(i)	Hot-leg loop 1 temperature for control room display
J-RCA-TE-122HA and J-RCA-TT-122HA	Hot-leg loop 2 temperature for control room display	J-RCB-TE-122HB[i] and J-RCB-TT-122HB(i)	Hot-leg loop 2 temperature for control room display
J-RCA-TE-112CA and J-RCA-TT-112CA	Cold-leg loop 1A temperature for control room display	J-RCB-TE-112CB[i] and J-RCB-TT-112CB(i)	Cold-leg loop 1B temperature for control room display

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 11 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-RCA-TE-122CA and J-RCA-TT-122CA	Cold-leg loop 2A temperature for control room display	J-RCB-TE-122CB[i] and J-RCB-TT-122CB[i]	Cold-leg loop 2B temperature for control room display
______		J-RCB-TE-122H2[s] and J-RCB-TT-122H2[s]	Hot-leg loop 2 temperature for remote shutdown panel display
______		J-RCB-TE-122C2[s] and J-RCB-TT-122C2[s]	Cold-leg loop 2B temperature for remote shutdown panel display

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 12 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
SAFETY INJECTION AND SHUTDOWN COOLING SYSTEM			
Function: Provide the capability to remove decay heat.			
M-SIA-P01	LPSI pump No. 1	M-SIB-P01[s]	LPSI pump No. 2
J-SIA-FT-306	LPSI pump No. 1 flow	J-SIB-FT-307[i]	LPSI pump No. 2 flow
J-SIA-UV-651	Shutdown cooling suction isolation valve	J-SIB-UV-652[s] ~~(u)~~	Shutdown cooling suction isolation valve
J-SIA-HV-683	LPSI pump suction isolation valve (Refueling Water Tank)	J-SIB-HV-692[s]	LPSI pump suction isolation valve (Refueling Water Tank)
J-SIC-UV-653 (y) and E-PKC-N43 and E-PKC-B43 ~~(b)~~	Shutdown cooling containment isolation valve 480V inverter Local starter	J-SID-UV-654[s] (y) ~~(u)~~ and E-PKD-N44 (s) and E-PKD-B44 (s)	Shutdown cooling containment isolation valve 480V inverter Local starter
J-SIA-UV-655	Shutdown cooling containment isolation valve	J-SIB-UV-656[s] ~~(u)~~	Shutdown cooling containment isolation valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 15 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
CHEMICAL AND VOLUME CONTROL SYSTEM[r][w]			
Function: Maintain Reactor Coolant System (RCS) inventory and boron concentration and provide auxiliary spray to the pressurizer for RCS pressure control.			
M-CHA-P01 and J-CHA-PSL-216	Charging pump No. 1	M-CHB-P01[s] and J-CHB-PSL-217[s]	Charging pump No. 2
J-CHA-HV-205	Pressurizer auxiliary spray valve	J-CHB-HV-203[s]	Pressurizer auxiliary spray valve
J-CHA-UV-516[f] and J-CHA-UY-516	Letdown to regenerative heat-exchanger isolation ~~valve~~ and solenoid valves	J-CHB-UV-515[f][s] and J-CHB-UY-515[s]	Letdown to regenerative heat-exchanger isolation ~~valve~~ and solenoid valves
J-CHA-LT-~~200~~ 203A[o]	Refueling water tank level	J-CHB-LT-201[o]	Refueling water tank level

Non-Train Related

J-CHN-UV-501[g][s]	Volume control tank outlet valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 16 of 37)
(footnotes at end of table)

Train "A"	Train "B"
J-CHN-UV-527[g]~~[s]~~	Volume control tank bypass valve
J-CHE-HV-536[h][s]	Refueling water tank gravity feed valve
J-CHE-PDV-240[b]	Charging system pressure control valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 17 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
ESSENTIAL SPRAY POND SYSTEM			
Function: Remove heat from the Essential Cooling Water System and diesel generator cooling water heat exchangers and dissipate this heat into the atmosphere.			
M-SPA-P01	Essential spray pond pump	M-SPB-P01[s]	Essential spray pond pump
J-SPA-HV-49A	Essential spray pond spray header inlet valve	J-SPB-HV-50A[y]	Essential spray pond spray header inlet valve
J-SPA-HV-49B	Essential spray pond spray header bypass valve	J-SPB-HV-50B[y]	Essential spray pond spray header bypass valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 18 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
ESSENTIAL CHILLED WATER SYSTEM			
Function: Supply chilled water to HVAC Systems for the Control Building, Auxiliary Building and Main Steam Support Structure.			
M-ECA-E01	Essential chiller A	M-ECB-E01[s]	Essential chiller B
J-ECA-E01	Essential Chiller A auxiliary power panel	J-ECB-E02[i]	Essential chiller B auxiliary power panel
M-ECA-P01	Essential chilled water circulation pump	M-ECB-P01[s]	Essential chilled water circulation pump
J-ECA-FT-533 and J-ECA-FSL-533	Main chilled water supply flow	J-ECB-FT-534[s] and J-ECB-FSL-534[s]	Main chilled water supply flow
J-ECA-LV-15	Chilled water expansion tank level control valve	J-ECB-LV-16[i][j]	Chilled water expansion tank level control valve
J-ECA-LT-15 and J-ECA-LC-15 and J-ECA-LSLL-15	Chilled water expansion tank level control	J-ECB-LT-16[i][j] and J-ECB-LC-16[i] and J-ECB-LSLL-16[i]	Chilled water expansion tank level control
J-ECA-TV-29 and J-HJA-TE-123 and J-HJA-TIC-123	Control room essential air handling unit chilled water control valve	J-ECB-TV-30[i] and J-HJB-TE-124[i] and J-HJB-TIC-124[i]	Control room essential air handling unit chilled water control valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 19 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
ESSENTIAL COOLING WATER SYSTEM			
Function: Remove heat from all essential components required for emergency shutdown, and reject this heat to the essential spray ponds.			
M-EWA-P01	Essential Cooling Water System (ECWS) pump	M-EWB-P01[s]	Essential Cooling Water System (ECWS) pump
J-EWA-FT-151 and J-EWA-FSL-151	Cooling water flow to essential chiller	J-EWB-FT-152[s] and J-EWB-FSL-152[s]	Cooling water flow to essential chiller
J-EWA-LV-91	ECWS surge tank level control valve	J-EWB-LV-92[i][j]	ECWS surge tank level control valve
J-EWA-LT-91 and J-EWA-LC-91 and J-EWA-LSLL-91	ECWS surge tank level control	J-EWB-LT-92[i][j] and J-EWB-LC-92[i] and J-EWB-LSLL-92[i]	ECWS surge tank level control

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 20 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
HVAC - AUXILIARY BUILDING			
Function: Provide required environment in ESF equipment rooms in the Auxiliary Building and the Main Steam Support Structure.			
M-HAA-Z04	Auxiliary feedwater pump room A essential air cooling unit	M-HAB-Z04[s]	Auxiliary feedwater pump room B essential air cooling unit
M-HAA-Z02	LPSI pump room essential air cooling unit	M-HAB-Z02[s]	LPSI pump room essential air cooling unit
M-HAA-Z05	Essential cooling water system pump room essential air cooling unit	M-HAB-Z05[s]	Essential cooling water system pump room essential air cooling unit
M-HAA-Z06	Electrical penetration room essential air cooling unit	M-HAB-Z06[s]	Electrical penetration room essential air cooling unit

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[(a)] (Sheet 21 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
HVAC - CONTROL BUILDING			
Function: Provide required environment in ESF equipment and battery rooms and for operator comfort in the main control room and remote shutdown panel area.			
M-HJA-Z03	ESF switchgear room essential air handling unit	M-HJB-Z03[(s)]	ESF switchgear room essential air handling unit
M-HJA-J01A and J-HJA-PDSH-81	Control Building battery room "A" essential exhaust fan and differential pressure sensor	M-HJB-J01A[(s)] and J-HJB-PDSH-84[(s)]	Control Building battery room "D" essential exhaust fan and differential pressure sensor.
M-HJA-J01B and J-HJA-PDSH-83	Control Building battery room "C" essential exhaust fan and differential pressure sensor	M-HJB-J01B[(s)] and J-HJB-PDSH-82[(s)]	Control Building battery room "B" essential exhaust fan and differential pressure sensor
M-HJA-M25 and J-HJA-UY-61B	ESF switchgear room ventilation isolation damper and solenoid valve	M-HJB-M34[(z)] and J-HJB-UY-62B[(z)]	ESF switchgear room ventilation isolation damper and solenoid valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 22 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
M-HJA-M28 and J-HJA-UY-61A	ESF switchgear room ventilation isolation damper and solenoid valve	M-HJB-M38[z] and J-HJB-UY-62A[z]	ESF switchgear room ventilation isolation damper and solenoid valve
M-HJA-M36 and J-HJA-UY-58A	ESF switchgear room ventilation isolation damper and solenoid valve	M-HJB-M52[z] and J-HJB-UY-104A[z]	ESF switchgear room ventilation isolation damper and solenoid valve
M-HJA-M34 and J-HJA-UY-96	ESF switchgear room ventilation isolation damper and solenoid valve	M-HJB-M31[z] and J-HJB-UY-62D[z]	ESF switchgear room ventilation isolation damper and solenoid valve
M-HJA-M55 and J-HJA-UY-97A	ESF switchgear room ventilation isolation damper and solenoid valve	M-HJB-M28[z] and J-HJB-UY-104B[z]	ESF switchgear room ventilation isolation damper and solenoid valve
M-HJA-F04	Control room essential air handling unit	M-HJB-F04[i]	Control room essential air handling unit
M-HJA-M01 and J-HJA-UY-7A	Control room ventilation isolation damper and solenoid valve	M-HJB-M01[i](s) and J-HJB-UY-8A[i](s)	Control room ventilation isolation damper and solenoid valve

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet. 23 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
M-HJA-M52 and J-HJA-UY-7B	Control room normal air handling unit return isolation damper and solenoid valve	M-HJB-M55[i][s] and J-HJB-UY-8B[i][s]	Control room normal air handling unit return isolation damper and solenoid valve
M-HJA-M58 and J-HJA-UY-10A	Communications/ inverter room air supply isolation damper and solenoid valve	M-HJB-M10[i] and J-HJB-UY-11A[i]	Communications/ inverter room air supply isolation damper and solenoid valve
M-HJA-M59 and J-HJA-UY-10B	Communications/ inverter room air return isolation damper and solenoid valve	M-HJB-M13[i] and J-HJB-UY-11B[i]	Communications/ inverter room air return isolation damper and solenoid valve
M-HJA-M03	Fan HJB-F04 outside air supply isolation damper	M-HJB-M03[s]	Fan HJB-F04 outside air supply isolation damper
M-HJA-M02	Fan HJA-F04 outside air supply isolation damper	M-HJB-M02[s]	Fan HJA-F04 outside air supply isolation damper

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 24 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
HVAC - DIESEL BUILDING			
Function: Provide the required environment for equipment.			
M-HDA-A01	Diesel generator control room air handling unit	M-HDB-A01[s]	Diesel generator control room air handling unit
M-HDA-J01	Diesel generator room essential exhaust fan	M-HDB-J01[s]	Diesel generator room essential exhaust fan 13

NO CHANGES TO THIS PAGE

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 25 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
HVAC -- SPRAY POND PUMP HOUSE			
Function: Provide the required environment for equipment.			
M-HSA-J01	Essential spray pond pump house exhaust fan	M-HSB-J01[s]	Essential spray pond pump house exhaust fan

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 26 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
DIESEL GENERATING SYSTEM[1]			
Function: Provide onsite electrical power when offsite (normal) power is interrupted.			
M-DGA-H01	Diesel engine	M-DGB-H01[s]	Diesel engine
M-DFA-P01 ~~and~~ ~~J-DFA-PSL-35~~	Diesel fuel oil transfer pump	M-DFB-P01[s] ~~and~~ ~~J-DFB-PSL-36~~	Diesel fuel oil transfer pump
J-DGA-UV-1	Cooling water makeup valve	J-DGB-UV-2[i] j	Cooling water makeup valve
J-DGA-UV-3	Starting air solenoid	J-DGB-UV-4[s]	Starting air solenoid
J-DGA-UV-5	Starting air solenoid	J-DGB-UV-6[s]	Starting air solenoid
J-DGA-UV-7	Starting air solenoid	J-DGB-UV-8[s]	Starting air solenoid
J-DGA-UV-9	Fuel oil control	J-DGB-UV-10[s]	Fuel oil control
J-DGA-UV-11	Fuel oil control	J-DGB-UV-12[s]	Fuel oil control
J-DGA-UV-15	Starting air solenoid	J-DGB-UV-16[s]	Starting air solenoid
J-DGA-SSH-3	Overspeed trip	J-DGB-SSH-4[s]	Overspeed trip

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 27 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-DGA-SSH-5	Overspeed trip	J-DGB-SSH-6[s]	Overspeed trip
J-DGA-PSL-3	Low lube oil pressure trip	J-DGB-PSL-4[s]	Low lube oil pressure trip
J-DGA-PSL-5	Low lube oil pressure trip	J-DGB-PSL-6[s]	Low lube oil pressure trip
J-DGA-PSL-7	Low lube oil pressure trip	J-DGB-PSL-8[s]	Low lube oil pressure trip
J-DGA-PSL-9	Low lube oil pressure trip	J-DGB-PSL-10[s]	Low lube oil pressure trip
J-DGA-LSLL-11	Cooling water makeup control	J-DGB-LSLL-12[s]	Cooling water makeup control
J-DGA-LC-1	Cooling water makeup control	J-DGB-LC-2[s]	Cooling water makeup control
J-DGA-LC-7	Day tank level control	J-DGB-LC-8[s]	Day tank level control
E-PEA-G01	Diesel generator	E-PEB-G0~~1~~ 2[s]	Diesel generator

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 28 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
J-DGA-B02	Diesel generator control and excitation	J-DGB-B02[s]	Diesel generator control and excitation
J-DGA-B01	Diesel generator control	J-DGB-B01[s]	Diesel generator control
J-DGA-B03	Diesel generator high voltage cabinet	J-DGB-B03[s]	Diesel generator high voltage cabinet

13

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Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 32 of 37)
(footnotes at end of table)

Train "A"		Train "B"	
E-ZAA-C01	125V dc distribution auxiliary relay cabinet	E-ZAB-C01[s]	125V dc distribution auxiliary relay cabinet
E-ZAA-C03	125V dc distribution auxiliary relay cabinet	E-ZAB-C03[s]	125V dc distribution auxiliary relay cabinet
E-ZAA-C04	125V dc distribution auxiliary relay cabinet	E-ZAB-C04[s]	125V dc distribution auxiliary relay cabinet 13
E-ZAA-C05	125V dc distribution auxiliary relay cabinet	E-ZAB-C05[s]	125V dc distribution auxiliary relay cabinet
E-ZAA-C06	125V dc distribution auxiliary relay cabinet	E-ZAB-C06[s]	125V dc distribution auxiliary relay cabinet
E-ZJA-C01	125V dc distribution auxiliary relay cabinet	E-ZJB-C01[s]	125V dc distribution auxiliary relay cabinet
E-ZJA-C03	125V dc distribution auxiliary relay cabinet	E-ZJB-C03[s]	125V dc distribution auxiliary relay cabinet
J ~~E~~-SGA-C01	MSIV logic cabinet	J ~~E~~-SGB-C01(aa)	MSIV logic cabinet

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 35 of 37)
(footnotes at end of table)

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a. Only the Train "A" or Train "B" redundant identified equipment or specified alternate is required to be available to satisfy the safety function (i.e., no fire can disable both [redundant] trains). Train B equipment is used for the control room fire.

b. Circuit protection not required. Valve fails closed. Opening of circuit ~~Tripping of~~ power supply at auxiliary relay cabinet may be required to ensure the capability for pressurizer auxiliary spray.

c. For an MSSS fire, tripping of the non-essential auxiliary feedwater pump or the main feedwater pump may be required to prevent overfilling of the steam generator(s). 13

d. For an MSSS fire, manual tripping of the main turbine and isolation of the steam bypass control valves may be required.

e. Redundant vent valves are provided to allow depressurization of the Safety Injection Tanks (SIT's). In addition, each SIT is provided with an outlet isolation valve. For a containment fire, one of the SIT outlet isolation valves may have to be local manually closed to allow Reactor Coolant System depressurization to establish conditions for cold shutdown.

f. For a containment fire, J-CHB-HV-523 (located outside containment) may be used to isolate letdown.

g. Circuit protection not required. Local manual closing ~~alignment~~ may be necessary. Redundant means of isolation of the inadvertent boron dilution path is provided by local manual closing of CHV-771 (Reactor Makeup Water Tank outlet).

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[(a)] (Sheet 36 of 37)
(footnotes at end of table)

h. Circuit protection not required. Local manual opening ~~alignment~~ may be necessary. Redundant boration flow path provided by local manual alignment via CHV-327 and CHV-756 or CHV-755.

i. Not required for a control room fire.

j. Deleted ~~Local manual control using solenoid bypass valve required for shutdown from outside the control room. Local verification of expansion/surge tank level also required for shutdown from outside the control room.~~

INSERT (K)

k. ~~Local manual operation may be required after accumulator nitrogen volume is exhausted.~~

l. Local control from diesel generator control panel required for control room fire.

INSERT (M)

m. ~~Valves fail open. Tripping of power supply at auxiliary relay cabinets may be required for an MSSS or control room fire to align nitrogen to ADV's.~~

n. Circuit separation not required. Train B circuit isolation from the control room not required. Local indicator J-CHN-LI-22 (LT) provides backup level indication. 13

o. Refueling water tank level indication cannot be assured for a Fuel Building or control room fire. Backup tank level indication can be made available by attachment of a local indicator at one of the tank level transmitter connections.

Table 9B.1-4

LISTING OF ACTIVE SAFE SHUTDOWN EQUIPMENT[a] (Sheet 37 of 37)
(footnotes at end of table)

p. Reactor Makeup Water Tank (RMWT) provides additional steam generator makeup capacity. RMWT level indication can be made available by attachment of a local indicator at the tank level transmitter connections.

q. For the control room and MSSS fires ~~fire,~~ steam generator level indication is an alternate for this function.

r. Motor operated valve J-CHA-HV-524 is normally open. ~~and fails in the "as is" position.~~ Local manual opening may be required.

s. Circuits for the identified device are provided with disconnect capability or are otherwise independent of the control room. 13

t. For a control room fire, manual tripping of the reactor coolant pump (RCP) breakers (located outside the control room) may be required.

Deleted.

u. ~~For a control room fire, the operator may be required to defeat/override the SDC isolation valve interlocks to allow the SDC isolation valves to be opened after shutdown cooling initiation conditions have been met.~~

v. For a control room fire, Train B pressurizer backup heater operation will be available from outside the control room.

w. Circuit protection for valves J-CHB-UV-505 and J-CHA-UV-506 is not required since the valves fail to the "closed" position. Local manual alignment via handwheel is provided to realign, if desired.

INSERTS x, y, z, aa

INSERT (K) TO PAGE 9B.1-50

A symmetric cooldown is the preferred method for plant cooldown and requires operation of one ADV per steam generator. If one ADV per steam generator is not available by, at most, four hours following reactor trip, an assymetric cooldown should be performed.

INSERT (M) TO PAGE 9B.1-50

Backup nitrogen to the instrument air header will supply pneumatic energy for operation of the ADV's in the event of a control room fire. Operation of J-IAN-PV-52 and the liquid nitrogen vaporizer (M-GAN-E01A) is independent of the control room and of the offsite power supplies.

INSERTS TO PAGE 9B.1-51

X. For a control room or condensate storage tank, pump house fire, makeup water for the Essential Cooling Water, Essential Chilled Water, and Diesel Generator Systems is available from the Fire Protection System. For the control room fire, periodic local verification of expansion/surge tank level is necessary.

Y. To preclude control room fire spurious actuation preventing safe shutdown, valve is de-energized during normal plant operation.

Z. Dampers align to desired position upon loss of power. Opening circuit power supply at auxiliary relay cabinet may be required to align the Switchgear Room Essential Cooling System.

aa. For the control room fire, the main steam lines (including bypasses), the feedwater lines (economizer and downcomer), the steam generator blowdown lines, and the steam generator sample lines are isolated by opening circuit breakers in the Train A D.C. distribution panel. Disconnect switches for the Train B valves are not required.

barrier common to Fire Area II (Zone 19). The floor of Zone 20 is 3-hour rated and common to Fire Area III. The ceiling, which is also the roof of the Control Building, is non-rated.

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area I

13 The following listed equipment is all Train A related with the exception of a Train B outside air supply isolation damper and solenoid valve, and its associated Train B conduit, located in Zone 1. The isolation damper will fail to its desired position upon loss of air and/or electrical power. Although the Train A and Train B redundant dampers are located in the same fire zone, the damper failure mode will assure that the dampers will be property positioned. In the event of a fire in Fire Area I, Train B components identified in table 9B.1-4 would be used to safely shut down the plant.

- M-ECA-E01 — Train A essential chiller
- J-ECA-E01 — Train A essential chiller auxiliary power panel
- J-ECA-LT-15 — Train A chilled water expansion tank level control
- J-ECA-LV-15 — Train A chilled water expansion tank level control valve
- M-ECA-P01 — Train A essential chilled water circulation pump
- J-ECA-FT-533 — Train A main chilled water supply flow
- J-EWA-FT-151 — Train A cooling water flow to essential chiller
- M-HJA-Z03 — Train A ESF switchgear room essential air handling unit
- M-HJA-F04 — Train A control room essential air handling unit

• M-ECA-T01	Train A essential chilled water expansion tank
• M-HJA-M02	Train A fan HJA-F04 outside air supply isolation damper
• M-HJB-M02	Train B fan HJA-F04 outside air supply isolation damper
• J-ECA-TV-29	Train A control room essential air handling unit chilled water control valve
• M-HJA-M36 and J-HJA-UY-58A	Train A ESF switchgear room ventilation isolation damper and solenoid valve
• M-HJA-M34 and J-HJA-UY-96	Train A ESF switchgear room ventilation isolation damper and solenoid valve 13
• M-HJA-M55 and J-HJA-UY-97A	Train A ESF switchgear room ventilation isolation damper and solenoid valve
• E-PBA-S03	Train A 4.16 kV Class IE switchgear
• E-PHA-M31	Train A 480V Class IE motor control center
• E-PGA-L31	Train A 480V Class IE load center
• E-PGA-L33	Train A 480V Class IE load center
• E-PGA-L35	Train A 480V Class IE load center
• E-ZJA-C01	Train A 125V dc distribution auxiliary relay cabinet
• E-ZJA-C03	Train A 125V dc distribution auxiliary relay cabinet

- E-PKC-H13 Train A battery charger "C"
- E-PKC-M43 Train A 125V dc control center "C"
- E-PKC-N43 Train A 480V inverter
- E-PKC-B43 Train A 480V local starter for valve SIC-UV-653
- E-PKC-D23 Train A 125V dc distribution panel "C" (in E-PKC-M43)
- M-HJA-M25 and J-HJA-UY-61B Train A ESF switchgear room ventilation isolation damper and solenoid valve
- M-HJA-M28 and J-HJA-UY-61A Train A ESF switchgear room ventilation isolation damper and solenoid valve
- 13 E-PKA-D21 Train A 125V dc distribution panel "A" (in E-PKA-M41)
- E-PNA-N11 Train A 120V ac inverter "A"
- E-PNA-D25 Train A 120V ac vital instrument distribution panel "A"
- E-PKA-H11 Train A battery charger "A"
- E-PKA-M41 Train A 125V dc control center "A"
- M-HJA-J01B and J-HJA-PDSH-83 Train A Control Building battery room "C" essential exhaust fan and differential pressure sensor
- E-PKC-F13 Train A 125V dc battery "C"
- M-HJA-J01A and J-HJA-PDSH-81 Train A Control Building battery room "A" essential exhaust fan and differential pressure sensor
- E-PKA-F11 Train A 125V dc battery "A"
- Train A cable trays and conduit
- Train B conduit

- One Class A door in the 3-hour rated east wall to Zone 2
- One Class A sliding door in the 3-hour rated east wall to Zone 2
- One Class A door in the 3-hour rated north wall to Zone 3A

3. Sealed Penetrations

   Seals equal or exceed fire barrier ratings

4. Fire Dampers

   Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating (Refer to Appendix 9A response to Question 9A.112).

5. Protected Raceways

   None 13

6. Protected Structural Members

   Building structural columns and beams are protected by coatings with 3-hour fire ratings.

C. Safety Related Equipment and Components

- Train A cable trays and conduit[a]
- Train A essential chiller[a]
- Train A essential chiller auxiliary power panel[a]
- Train A Control Building ESF switchgear room essential air handling unit[a]
- Train A control room essential air handling unit[a]
- Train A main chilled water supply flow instrumentation[a]

---

a. Safe Shutdown Related

6. Protected Structural Members

Building structural columns and beams are protected by coatings with 3-hour ratings.

C. Safety Related Equipment and Components

- Train A Control Building battery room "C" essential exhaust fan ~~(a)~~ and differential pressure sensor[a]
- Train A 125V dc battery "C"[a]
- Train A conduit[a]

D. Non-Safety Related Equipment and Components

- Conduit
- Normal exhaust fan

E. Radioactive Material

None

F. Combustible Loading 13

1. Quantity/Type
   - 90 pounds of cable insulation (Hypalon)
   - 150 pounds of cable insulation (other)
   - 2,500 pounds of plastic battery cases
2. In-Situ Combustible Load 89,100 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 66.8 minutes

G. Fire Detection

Actuation of the ionization smoke detector system(s) and the thermal detector system(s) activates the automatic CO_2 gas system. Either detector system alone can provide early warning.

---

a. Safe Shutdown Related

6. Protected Structural Members

   Building structural columns and beams are protected by coatings with 3-hour ratings.

C. Safety Related Equipment and Components

   - Train A Control Building battery room "A" essential exhaust fan~~[a]~~ and differential pressure sensor [a]
   - Train A 125V dc battery "A"[a]
   - Train A conduit[a]

D. Non-Safety Related Equipment and Components

   - Conduit
   - Normal exhaust fan

E. Radioactive Material

   None

F. Combustible Loading

   1. Quantity/Type

      - 150 pounds of cable insulation (Hypalon)
      - 340 pounds of cable insulation (other)
      - 2,500 pounds of plastic battery cases

   2. In-Situ Combustible Load   102,000 Btu/ft^2

   3. Transient Combustible Load

   4. Equivalent Fire Severity   76.6 minutes

G. Fire Detection

   Actuation of the ionization smoke detector system(s) and the thermal detector system(s) activates the automatic CO_2 gas system. Either detector system alone can provide early warning.

---

a. Safe Shutdown Related

includes Zone 19 and is bounded to the north and west by 2-hour rated barriers common to Fire Area I, to the south by a 3-hour rated barrier common to Fire Area V and a non-rated exterior wall, and to the east by a 3-hour rated barrier common to the Corridor Building and a non-rated exterior wall. The floor to Zone 19 is a 3-hour rated barrier partially common to Fire Area III. The ceiling to Zones 18B and 19, which is also the roof of the Control Building, is non-rated.

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area II

The following listed equipment is all Train B related except: (1) some Train A conduit located in Zone 10B and, (2) some HVAC isolation dampers and solenoid valves and their associated Train B conduit, located in Zones 2, 12 and 13. The Train A conduit in Zone 10B which is safe shutdown related is protected with a 3-hour rated envelope. The HVAC isolation dampers fail to the desired position upon loss of air and electrical power. Although the Train A and B redundant dampers are located in the same fire zones, the damper failure mode will assure that the dampers will be properly positioned. In the event of a fire in Fire Area II, Train A components identified in table 9B.1-4 would be used to safely shutdown the plant. 13

- M-ECB-E01 — Train B essential chiller
- J-ECB-E02 — Train B essential chiller auxiliary power panel
- J-ECB-LT-16 — Train B chilled water expansion tank level control
- J-ECB-LV-16 — Train B chilled water expansion tank level control valve
- M-ECB-P01 — Train B essential chilled water circulation pump

• J-ECB-FT-534 and J-ECB-FSL-534	Train B main chilled water supply flow
• J-EWB-FT-152 and J-EWB-FSL-152	Train B cooling water flow to essential chiller
• M-HJB-Z03	Train B ESF switchgear room essential air handling unit
• M-HJB-F04	Train B control room essential air handling unit
• M-ECB-T01	Train B essential chilled water expansion tank
• M-HJA-M03	Train A fan HJB-F04 outside air supply isolation damper
• M-HJB-M03	Train B fan HJB-F04 outside air supply isolation damper
• J-ECB-TV-30	Train B control room essential air handling unit chilled water control valve
• M-HJA-M01 and J-HJA-UY-7A	Train A control room ventilation isolation damper and solenoid valve
• M-HJA-M52 and J-HJA-UY-7B	Train A control room normal air handling unit return isolation damper and solenoid valve
• M-HJB-M01 and J-HJB-UY-8A	Train B control room ventilation isolation damper and solenoid valve
• M-HJB-M55 and J-HJB-UY-8B	Train B control room normal air handling unit return isolation damper and solenoid valve

• M-HJB-M52 and J-HJB-UY-104A	Train B ESF switchgear room ventilation isolation damper and solenoid valve
• M-HJB-M31 and J-HJB-UY-62D	Train B ESF switchgear room ventilation isolation damper and solenoid valve
• M-HJB-M28 and J-HJB-UY-104B	Train B ESF switchgear room ventilation isolation damper and solenoid valve
• E-PBB-S04	Train B 4.16 kV ac Class IE switchgear
• E-PHB-M32	Train B 480V ac Class IE motor control center
• E-PGB-L32	Train B 480V ac Class IE load center 13
• E-PGB-L34	Train B 480V ac Class IE load center
• E-PGB-L36	Train B 480V ac Class IE load center
• E-ZJB-C01	Train B 125V dc distribution auxiliary relay cabinet
• E-ZJB-C03	Train B 125V dc distribution auxiliary relay cabinet
• E-PKD-H14	Train B battery charger "D"
• E-PKD-M44	Train B 125V dc control center "D"
• E-PKD-N44	Train B 480V inverter
• E-PKD-B44	Train B 480V local starter for valve J-SID-UV-654

• E-PKD-D24	Train B 125V dc distribution panel "D" (in E-PKD-M44)
• M-HJB-M34 and J-HJB-UY-62B	Train B ESF switchgear room ventilation isolation damper and solenoid valve
• M-HJB-M38 and J-HJB-UY-62A	Train B ESF switchgear room ventilation isolation damper and solenoid valve
• E-PKB-D22	Train B 125V dc distribution panel "B" (in E-PKB-M42)
• E-PNB-N12	Train B 120V ac inverter "B"
• E-PNB-D26	Train B 120V ac vital instrument distribution panel "B"
• E-PKB-H12	Train B battery charger "B"
• E-PKB-M42	Train B 125V dc control center "B"
• M-HJB-J01A and J-HJB-PDSH-84	Train B Control Building battery room "D" essential exhaust fan and differential pressure sensor
• E-PKD-F14	Train B 125V dc battery "D"
• M-HJB-J01B and J-HJB-PDSH-82	Train B Control Building battery room "B" essential exhaust fan and differential pressure sensor
• E-PKB-F12	Train B 125V dc battery "B"
• J-ZJB-E02	Train B remote shutdown isolation disconnect cabinet
• J-RCB-TT-122C2	Train B cold-leg loop 2B temperature for remote shutdown panel display
• J-RCB-TT-122H2	Train B hot-leg loop 2 temperature for remote shutdown panel display

- M-HJA-M59 and J-HJA-UY-10B — Train A communications/inverter room air return isolation damper and solenoid valve
- M-HJB-M13 and J-HJB-UY-11B — Train B communications/inverter room air return isolation damper and solenoid valve
- M-HJA-M58 and J-HJA-UY-10A — Train A communications/inverter room air supply isolation damper and solenoid valve
- M-HJB-M10 and J-HJB-UY-11A — Train B communications/inverter room air supply isolation damper and solenoid valve
- Train B cable trays and conduit
- Train A conduit (protected with a 3-hour rated envelope in Zone 10B). 13

C. Deviations from 10CFR50, Appendix R, Section III.G

1. A deviation is requested from section III.G.2 to the extent that it requires three-hour rated barriers to separate circuits of redundant trains.

<u>Discussion</u>:

The west and north walls of the southeast outside air and HVAC chases (adjacent to Fire Area II, Zones 2, 5B, 12, 13, 14, and 19) are common boundaries with Fire Area III, Zones 16 and 17, at elevation 140'0". The outside air and HVAC chases have walls of reinforced concrete construction rated for 2 or 3 hours. For a fire to propagate between redundant trains, the fire must burn through at least two 2-hour rated fire barriers. The outside air and HVAC chases are virtually devoid of combustibles. Fire dampers used in the two hour rated wall portions are identical in material and construction to three-hour labeled

FIRE ZONE 2

6. Protected Structural Members

   Building structural columns and beams are protected by coatings with 3-hour ratings.

C. Safety Related Equipment and Components

- Train B cable trays and conduit[a]
- Train B essential chiller[a]
- Train B essential chiller auxiliary power panel[a]
- Train B main chilled water supply flow instrumentation[a]
- Train B essential chilled water expansion tank[a]
- Train B cooling water flow to essential chiller instrumentation[a]
- Train A conduit[a]
- Train B chilled water expansion tank level control instrumentation[a]
- Train B fan HJB-F04 outside air supply isolation damper[a]
- Train A fan HJB-F04 outside air supply isolation damper[a]
- Train B control room essential air handling unit chilled water control valve[a]
- Train A control room ventilation isolation damper and solenoid valve[a]
- Train B control room ventilation isolation damper and solenoid valve[a]
- Train A control room normal air handling unit return isolation damper and solenoid valve[a]
- Train B control room normal air handling unit return isolation damper and solenoid valve[a]

a. Safe Shutdown Related

FIRE ZONE 8B

6. Protected Structural Members

   Building structural columns and beams are protected by coatings with 3-hour ratings.

C. Safety Related Equipment and Components

- Train B Control Building battery room "D" essential exhaust fan~~(a)~~ and differential pressure sensor(a)
- Train B 125V dc battery "D"(a)
- Train B conduit(a)

D. Non-Safety Related Equipment and Components

- Conduit
- Normal exhaust fan

E. Radioactive Material

None

F. Combustible Loading 13

1. Quantity/Type
   - 190 pounds of cable insulation (Hypalon)
   - 320 pounds of cable insulation (other)
   - 2,500 pounds of plastic battery cases
2. In-Situ Combustible Load 97,000 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 73 minutes

G. Fire Detection

Actuation of the ionization smoke detector system(s) and the thermal detector system(s) activates the automatic CO_2 gas system. Either detector system alone can provide early warning.

a. Safe Shutdown Related

6. Protected Structural Members

Building structural columns and beams are protected by coatings with 3-hour ratings.

C. Safety Related Equipment and Components

- Train B Control Building battery room "B" essential exhaust fan ~~[a]~~ and differential pressure sensor [a]
- Train B conduit[a]
- Train B 125V dc battery "B"[a]

D. Non-Safety Related Equipment and Components

- Conduit
- Normal exhaust fan

E. Radioactive Material

None

3 F. Combustible Loading

1. Quantity/Type
   - 200 pounds of cable insulation (Hypalon)
   - 390 pounds of cable insulation (other)
   - 2,500 pounds of plastic battery cases
2. In-Situ Combustible Load 105,000 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 79 minutes

G. Fire Detection

Actuation of the ionization smoke detectors system(s) and the thermal detector system(s) activates the

---

a. Safe Shutdown Related

•	E-PEA-G01	Train A diesel generator
•	J-DGA-B01	Train A diesel generator control
•	J-DGA-B02	Train A diesel generator control and excitation
•	J-DGA-LC-7	Train A day tank level control
•	M-DFA-T02	Train A fuel oil day tank
•	M-HDA-A01	Train A diesel generator control room essential air handling unit 13
•	M-HDA-J01	Train A diesel generator room essential exhaust fan
•	Train A cable trays and conduit	

C. Deviations from 10CFR50, Appendix R, Section III.G

See the section 9B.2 introduction for generic deviations.

• J-DGA-B03 Train A diesel generator high voltage cabinet.

FIRE ZONE 22A

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train A diesel generator controls and excitation[a]
- Train A generator - low voltage control panel
- Train A diesel generator high voltage ~~cubicle~~ cabinet[a]
- Train A cable trays and conduit[a]

D. Non-Safety Related Equipment and Components

- Neutral grounding transformer
- Cable trays and conduit

E. Radioactive Material

None 13

F. Combustible Loading

1. Quantity/Type

   - 200 pounds of cable insulation (Hypalon)
   - 1,000 pounds of cable insulation (other)

2. In-Situ Combustible Load 38,100 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 29 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

a. Safe Shutdown Related

2. Zone Access

- One Class A door in the 3-hour rated east wall to the central staircase.
- Two Class A doors in the 3-hour rated east walls to Zone 23A.
- One 7- x 16-foot room air intake opening in the non-rated south wall.
- One non-rated equipment removal hatch in the non-rated ceiling.
- Non-rated grating in the non-rated floor to Zone 21A
- Open to the Train A exhaust stack.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train A diesel generator room essential exhaust fan[a]
- Train A starting air package (air receivers and compressors)
- Train A conduit[a]
- Train A exhaust silencer

a. Safe Shutdown Related

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area V

The following listed equipment is all Train B related. In the event of a fire in Fire Area V, Train A components identified in table 9B.1-4 would be used to safely shutdown the plant.

• M-DGB-H01	Train B diesel engine
• J-DGB-UV-2	Train B cooling water makeup valve
• J-DGB-UV-4	Train B starting air solenoid
• J-DGB-UV-6	Train B starting air solenoid
• J-DGB-UV-8	Train B starting air solenoid
• J-DGB-UV-10	Train B fuel oil control
• J-DGB-UV-12	Train B fuel oil control
• J-DGB-UV-16	Train B starting air solenoid
• J-DGB-SSH-4	Train B overspeed trip
• J-DGB-SSH-6	Train B overspeed trip
• J-DGB-PSL-4	Train B low lube oil pressure trip
• J-DGB-PSL-6	Train B low lube oil pressure trip
• J-DGB-PSL-8	Train B low lube oil pressure trip
• J-DGB-PSL-10	Train B low lube oil pressure trip
• J-DGB-LSLL-12	Train B cooling water makeup control
• J-DGB-LC-2	Train B cooling water makeup control
• E-PEB-G0~~1~~2	Train B diesel generator
• J-DGB-B01	Train B diesel generator control
• J-DGB-B02	Train B diesel generator control and excitation
• J-DGB-B03	Train B diesel generator high voltage cabinet

4. Fire Dampers

   None

5. Protected Raceways

   None

6. Protected Structural Members

   None

C. Safety Related Equipment and Components

- Train B diesel generator controls and excitation[a]
- Train B generator - low voltage control panel
- Train B diesel generator high voltage ~~cubicle~~ cabinet[a]
- Train B cable trays and conduit[a]

D. Non-Safety Related Equipment and Components

- Neutral grounding transformer 13
- Cable trays and conduit

E. Radioactive Material

   None

F. Combustible Loading

1. Quantity/Type
   - 200 pounds of cable insulation (Hypalon)
   - 1,000 pounds of cable insulation (other)
2. In-situ Combustible Load 38,100 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 29 minutes

a. Safe Shutdown Related

2. Zone Access

- One Class A door in the 3-hour rated west wall to the central staircase
- Two Class A doors in the 3-hour rated west walls to Zone 23B.
- One non-rated equipment removal hatch in the non-rated ceiling.
- Open to the Train B exhaust stack.
- One 7- x 16-foot room air intake opening in the non-rated south wall.
- Non-rated grating in the non-rated floor to Zone 21B.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train B diesel generator room essential exhaust fan[a]
- Train B starting air package (air receivers and compressors)

---

a. Safe Shutdown Related

•	J-CHE-PDV-240	Charging system pressure control valve
•	J-SGA-PT-1023A	Train A steam generator No. 2 pressure
•	J-SIC-UV-653	Train A shutdown cooling containment isolation valve
•	J-CHA-UV-516 and J-CHA-UY-516	Train A letdown to regenerative heat exchanger isolation ~~valve~~s and solenoid valves
•	J-CHB-UV-515 and J-CHB-UY-515	Train B letdown to regenerative heat exchanger isolation ~~valve~~s and solenoid valves
•	J-SIA-HV-606	Train A safety injection tank No. 2B vent valve
•	J-SIB-HV-623	Train B safety injection tank No. 2B vent valve
•	J-SIB-UV-624	Train B safety injection tank No. 2B isolation valve
•	J-SGA-LT-1123A	Train A steam generator No. 2 level (wide range)
•	J-SGB-UV-500R and J-SGB-UY-500R	Train B steam generator No. 2 blowdown isolation and solenoid valves
•	J-SIB-UV-652	Train B shutdown cooling suction isolation valve
•	J-SID-UV-654	Train B shutdown cooling containment isolation valve
•	J-SIA-HV-605	Train A safety injection tank No. 2A vent valve
•	J-SIB-HV-613	Train B safety injection tank No. 2A vent valve

13

- J-SIB-UV-614 Train B safety injection tank No. 2A isolation valve
- J-RCA-LT-110X Train A pressurizer level
- J-RCB-LT-110Y Train B pressurizer level
- J-RCA-PT-102A Train A pressurizer pressure
- J-RCB-PT-102B Train B pressurizer pressure
- J-SIA-UV-651 Train A shutdown cooling suction isolation valve
- J-SIA-HV-607 Train A safety injection tank No. 1A vent valve
- J-SIB-HV-633 Train B safety injection tank No. 1A vent valve
- J-SIA-UV-634 Train A safety injection tank No. 1A isolation valve
- J-SGA-LT-1113B Train A steam generator No. 1 level (wide range)
- J-SGA-PT-1013A Train A steam generator No. 1 pressure
- J-SGA-LT-1113A Train A steam generator No. 1 level (wide range)
- J-SGB-PT-1013B Train B steam generator No. 1 pressure
- J-SGA-UV-500P and J-SGA-UY-500P Train A steam generator No. 1 blowdown isolation and solenoid valves
- J-SIA-HV-608 Train A safety injection tank No. 1B vent valve
- J-SIA-HV-643 Train B safety injection tank No. 1B vent valve

FIRE ZONE 66A

C. Safety Related Equipment and Components

- Train B steam generator No. 2 pressure instrumentation[a]
- Train B steam generator No. 2 level (wide range) instrumentation[a]
- Train A safety injection tank No. 2B vent valve[a]
- Train B safety injection tank No. 2B vent valve[a]
- Train A letdown to regenerative heat exchanger isolation ~~valve~~ [a] and solenoid valves [a]
- Train B letdown to regenerative heat exchanger isolation ~~valve~~ [a] and solenoid valves [a]
- Train A steam generator No. 1 hot-leg blowdown sample isolation valve[a]
- Train A steam generator No. 1 cold-leg blowdown sample isolation valve[a]
- Train B steam generator No. 2 hot-leg blowdown sample isolation valve[a]
- Train B steam generator No. 2 cold-leg blowdown sample isolation valve[a]
- Train A steam generator No. 1 downcomer blowdown sample isolation valve[a]
- Train B steam generator No. 2 downcomer blowdown sample isolation valve[a]
- Charging system pressure control valve[a]
- Train A steam generator No. 2 pressure instrumentation[a]
- Train A shutdown cooling containment isolation valve[a]

a. Safe Shutdown Related

to 10CFR50 Appendix R is detailed in section 9B.2.12.1.C.

- M-AFA-P01 and M-AFA-K01 and J-AFA-E01 — Train A auxiliary feedwater pump, turbine, and control panel
- J-AFA-HV-54 and J-AFA-ST-52 — Train A auxiliary feedwater turbine trip and throttle valve
- J-AFA-FT-40A — Train A auxiliary feedwater flow to steam generator No. 1
- 13 J-AFA-HV-32 — Train A auxiliary feedwater regulating valve to steam generator No. 1
- J-AFC-UV-36 — Train A auxiliary feedwater isolation valve to steam generator No. 1
- J-AFA-FT-40B — Train A auxiliary feedwater flow to steam generator No. 2
- J-AFC-HV-33 — Train A auxiliary feedwater regulating valve to steam generator No. 2
- J-AFA-UV-37 — Train A auxiliary feedwater isolation valve to steam generator No. 2
- M-HAA-Z04 — Train A auxiliary feedwater pump room essential air cooling unit

• J-SGB-HV-185 and J-SGB-HY-185A and J-SGD-HY-185B and J-SGB-HY-185C and J-SGB-HY-185R and J-SGD-HY-185S and J-SGB-ZE-185 and J-SGB-ZT-185	Train B steam generator No. 2, line No. 1, atmospheric dump valve, solenoid valves and controller
• J-SGA-HV-184 and 13 J-SGA-HY-184A and J-SGC-HY-184B and J-SGA-HY-184C and J-SGA-HY-184R and J-SGC-HY-184S and J-SGA-ZE-184 and J-SGA-ZT-184	Train A steam generator No. 1, line No. 1, atmospheric dump valve, solenoid valves and controller
• J-SGB-UV-500Q and J-SGB-UY-500Q	Train B steam generator No. 1 blowdown isolation and solenoid valves
• J-SGA-UV-172 and J-SGA-UY-172A ~~and~~ or J-SGA-UY-172B	Train A steam generator No. 1 downcomer feedwater isolation and solenoid valves
• J-SGB-UV-130 and J-SGB-UY-130A ~~and~~ or J-SGB-UY-130B	Train B steam generator No. 1 downcomer feedwater isolation and solenoid valves

• J-SGA-UV-174	Train A steam generator No. 1 economizer feedwater isolation valve
• J-SGB-UV-132	Train B steam generator No. 1 economizer feedwater isolation valve
• J-SGE-UV-170	Steam generator No. 1, line No. 1, main steam isolation valve
• J-SGE-UV-180	Steam generator No. 1, line No. 2, main steam isolation valve
• J-SGE-UV-169 and J-SGA-HY-169A and J-SGB-HY-169B	Steam generator No. 1 MSIV bypass and solenoid valves 13
• J-SGA-UV-134 and J-SGA-UV-134A	Train A steam supply valve to auxiliary feedwater (turbine-driven) pump
• J-SGB-HV-178 and J-SGB-HY-178A and J-SGD-HY-178B and J-SGB-HY-178C and J-SGB-HY-178R and J-SGD-HY-178S and J-SGB-ZE-178 and J-SGB-ZT-178	Train B steam generator No. 1, line No. 2, atmospheric dump valve, solenoid valves and controller

• J-SGA-HV-179 and J-SGA-HY-179A and J-SGC-HY-179B and J-SGA-HY-179C and J-SGA-HY-179R and J-SGC-HY-179S and J-SGA-ZE-179 and J-SGA-ZT-179	Train A steam generator No. 2, line No. 2, atmospheric dump valve, solenoid valves and controller
• J-SGA-UV-500S and J-SGA-UY-500S	Train A steam generator No. 2 blowdown isolation and solenoid valves
• J-SGA-UV-175 and J-SGA-UY-175A ~~and~~ or J-SGA-UY-175B	Train A steam generator No. 2 downcomer feedwater isolation and solenoid valves
• J-SGB-UV-135 and J-SGB-UY-135A ~~and~~ or J-SGB-UY-135B	Train B steam generator No. 2 downcomer feedwater isolation and solenoid valves
• J-SGA-UV-177	Train A steam generator No. 2 economizer feedwater isolation valve
• J-SGB-UV-137	Train B steam generator No. 2 economizer feedwater isolation valve
• J-SGE-UV-171	Steam generator No. 2, line No. 1, main steam isolation valve
• J-SGE-UV-181	Steam generator No. 2, line No. 2, main steam isolation valve

13

- J-SGE-UV-183 and J-SGA-UY-183A and J-SGB-UY-183B — Steam generator No. 2 MSIV bypass and solenoid valves
- J-SGA-UV-138 and J-SGA-UV-138A — Train A steam supply valve to auxiliary feedwater (turbine-driven) pump
- Train A conduit
- Train B conduit

C. Deviations from 10CFR50, Appendix R, Section III.G

1. A deviation is requested from Section III.G.2 to the extent that it requires a three-hour rated barrier between adjacent fire areas separating circuits of redundant trains.

   Discussion:

   The mechanical penetrations in the containment boundary are not rated. Mechanical containment penetrations are fitted with flued heads constructed of steel with a minimum thickness of 1/8-inch. The special construction of the flued heads was designed to maintain the integrity of the Containment Building. 13

   Conclusion:

   The existing design provides equivalent protection to that required by Section III.G.2. The design is standard within the industry.

2. A deviation is requested from Section III.G.2 to the extent that it requires a 1-hour fire barrier between redundant safe shutdown equipment in addition to fire detection and automatic fire suppression.

INSERT (A) TO PAGE 9B.2.12-14

- Train A steam generator No. 1, line No. 1, ADV position[(a)]

- Train B steam generator No. 1, line No. 2, ADV position[(a)]

INSERT (A)

FIRE ZONE 72

- Train A auxiliary feedwater pump room essential air cooling unit[a]
- Train A conduit[a]
- Train B conduit[a]

D. Non-Safety Related Equipment and Components

- Conduit

E. Radioactive Material

None

F. Combustible Loading

1. Quantity/Type

   - 60 pounds of oil
   - 20 pounds of grease
   - 120 pounds of cable insulation (Hypalon)
   - 270 pounds of cable insulation (other)
   - 80 pounds of miscellaneous materials

2. In-Situ Combustible Load 14,000 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 10.5 minutes

G. Fire Detection

Ionization smoke detection system(s) is provided for actuating the deluge valve of the preaction sprinkler system and early warning.

H. Fire Suppression

1. Primary

   Automatic preaction sprinkler system

---

a. Safe Shutdown Related

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

Train A safe shutdown related conduit are covered by 3-hour rated protective wrappings.

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train B auxiliary feedwater pump (motor driven)[a]
- Train B auxiliary feedwater regulating valve to steam generator No. 2[a] 13
- Train B auxiliary feedwater isolation valve to steam generator No. 2[a]
- Train B auxiliary feedwater flow to steam generator No. 2[a]
- Train B auxiliary feedwater pump room essential air cooling unit[a]
- Train B auxiliary feedwater flow to steam generator No. 1[a]
- Train B auxiliary feedwater regulating valve to steam generator No. 1[a]
- Train B auxiliary feedwater isolation valve to steam generator No. 1[a]
- Train A steam generator No. 2, line No. 2, ADV position[a]
- Train B steam generator No. 2, line No. 1, ADV position[a]

a. Safe Shutdown Related

(FIRE ZONE 74A)

C. Safety Related Equipment and Components

- Train A steam generator No. 1, line No. 1, atmospheric dump valve, solenoid valves and controller[a]
- Train B steam generator No. 2, line No. 1, atmospheric dump valve, solenoid valves and controller[a]
- Train B steam generator No. 1 blowdown isolation and solenoid valves[a]
- Train A steam generator No. 1 downcomer feedwater isolation and solenoid valves[a]
- Train B steam generator No. 1 downcomer feedwater isolation and solenoid valves[a]
- 13 Train A steam generator No. 1 economizer feedwater isolation valve[a]
- Train B steam generator No. 1 economizer feedwater isolation valve[a]
- Steam generator No. 1, line No. 1, main steam isolation valve[a]
- Steam generator No. 1, line No. 2, main steam isolation valve[a]
- Steam generator No. 1 MSIV bypass and solenoid valves[a]
- Train A steam supply to auxiliary feedwater (turbine-driven) pump[a]
- Train A nitrogen supply to atmospheric dump valve~~s~~ J-SGA-HV-184[a] ~~and J-SGA-HV-179[a];~~
- Train B nitrogen supply to atmospheric dump valve~~s~~ ~~J-SGB-HV-185 and~~ J-SGB-HV-178[a]

---

a. Safe Shutdown Related

FIRE ZONE 74B

C. Safety Related Equipment and Components

- Train A steam generator No. 2, line No. 2, atmospheric dump valve, solenoid valves and controller[a]
- Train B steam generator No. 1, line No. 2, atmospheric dump valve, solenoid valves and controller[a]
- Train A steam generator No. 2 blowdown isolation and solenoid valves[a]
- Train A steam generator No. 2 downcomer feedwater isolation and solenoid valves[a]
- Train B steam generator No. 2 downcomer feedwater isolation and solenoid valves[a]
- Train A steam generator No. 2 economizer feedwater isolation valve[a] 13
- Train B steam generator No. 2 economizer feedwater isolation valve[a]
- Steam generator No. 2, line No. 1, main steam isolation valve[a]
- Steam generator No. 2, line No. 2, main steam isolation valve[a]
- Steam generator No. 2 MSIV bypass and solenoid valves[a]
- Train A steam supply to auxiliary feedwater (turbine-driven) pump[a]
- Train A nitrogen supply to atmospheric dump valve~~s~~ ~~J-SGA-HV-184 and~~ J-SGA-HV-179[a]
- Train B nitrogen supply to atmospheric dump valve~~s~~ J-SGB-HV-185[a] ~~and J-SGB-HV-178[a]~~

---

a. Safe Shutdown Related

9B.2.18 FIRE AREA XVIII

9B.2.18.1 Fire Area Description

A. Area Boundary Descriptions

Fire Area XVIII (figure 9B-3) contains Train A diesel generator fuel oil storage components found in the outside areas. This fire area includes Zone 78A only (figure 9B-34).

Fire Area XVIII is located to the southwest of the Diesel Generator Building (Fire Area IV). The Unit 1 and Unit 2 Train A and Train B (Fire Area XIX) diesel generator fuel oil storage tanks and pumps are buried side by side. The Unit 3 Train B (Fire Area XIX) tank and pump are buried separate from Fire Area XVIII, to the southeast of the Diesel Generator Building.

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area XVIII 13

The following listed equipment is all Train A related. In the event of a fire in Fire Area XVIII, Train B components identified in table 9B.1-4 would be used to safely shutdown the plant.

- M-DFA-T01 Train A diesel fuel oil storage tank
- M-DFA-P01 ~~and J-DFA-PSL-35~~ Train A diesel fuel oil transfer pump
- Train A conduit

C. Deviations from 10CFR50, Appendix R, Section III.G

See the section 9B.2 introduction for generic deviations.

9B.2.19 FIRE AREA XIX

9B.2.19.1 Fire Area Description

A. Area Boundary Descriptions

Fire Area XIX (figure 9B-3) contains Train B diesel generator fuel oil storage components found in the outside areas. This fire area includes Zone 78B only (figure 9B-33).

Fire Area XIX of Units 1 and 2 is located to the southwest of the Diesel Generator Building (Fire Area IV). The Train A (Fire Area XVIII) and Train B diesel generator fuel oil storage tanks and pumps are buried side by side. The Unit 3 Train B tank and pump are buried separate from Train A (Fire Area XVIII), to the southeast of the Diesel Generator Building (Fire Area V). 13

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area XIX

The following listed equipment is all Train B related. In the event of a fire in Fire Area XIX, Train A components identified in table 9B.1-4 would be used to safely shutdown the plant.

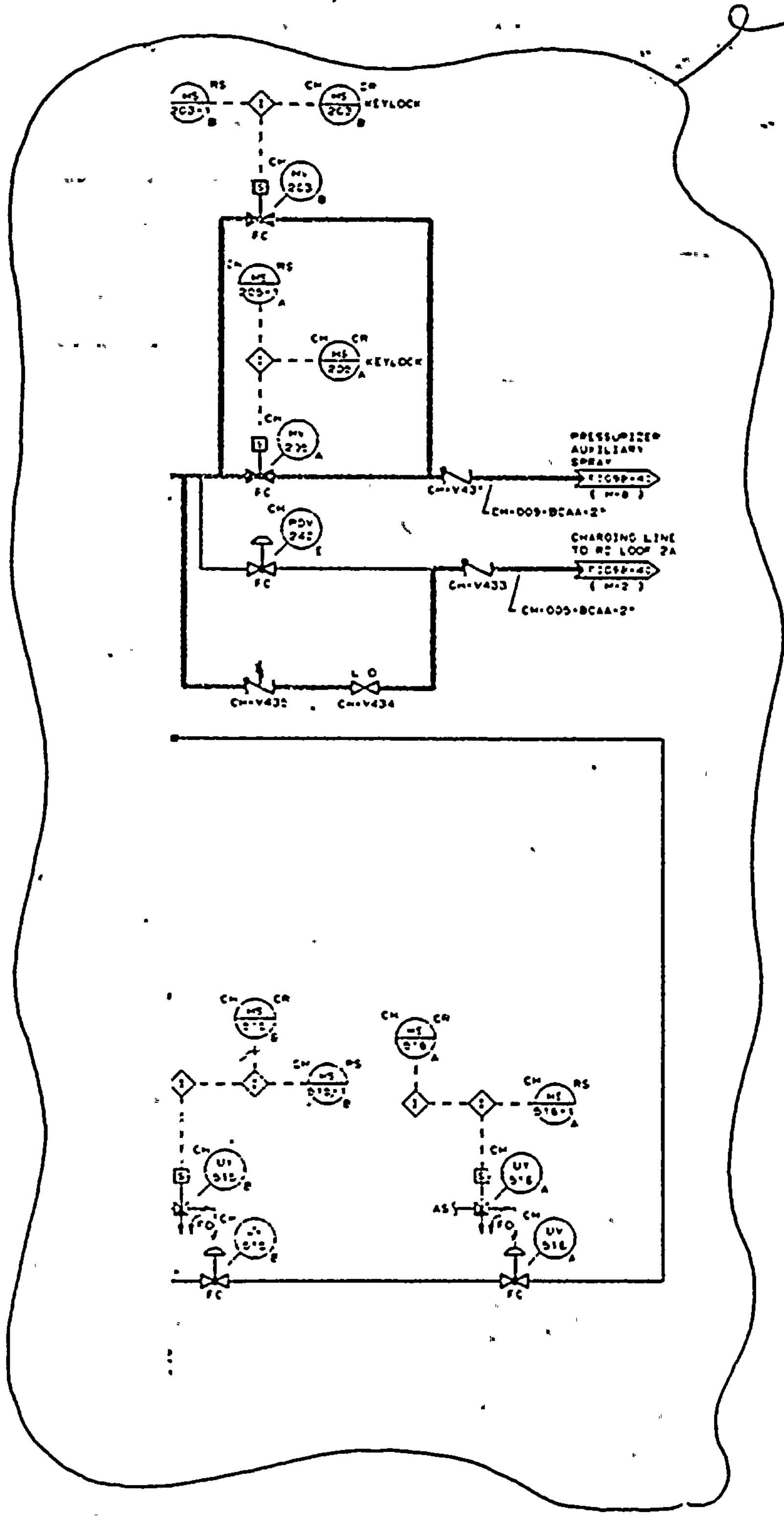
- M-DFB-T01 Train B diesel fuel oil storage tank
- M-DFB-P01 ~~and~~ Train B diesel fuel oil transfer pump

  ~~J-DFB-PSL-35~~
- Train B conduit

C. Deviations From 10CFR50, Appendix R, Section III.G

See the section 9B.2 introduction for generic deviations.

REPLACE
W/ ATTACHED
FIG 9B-41

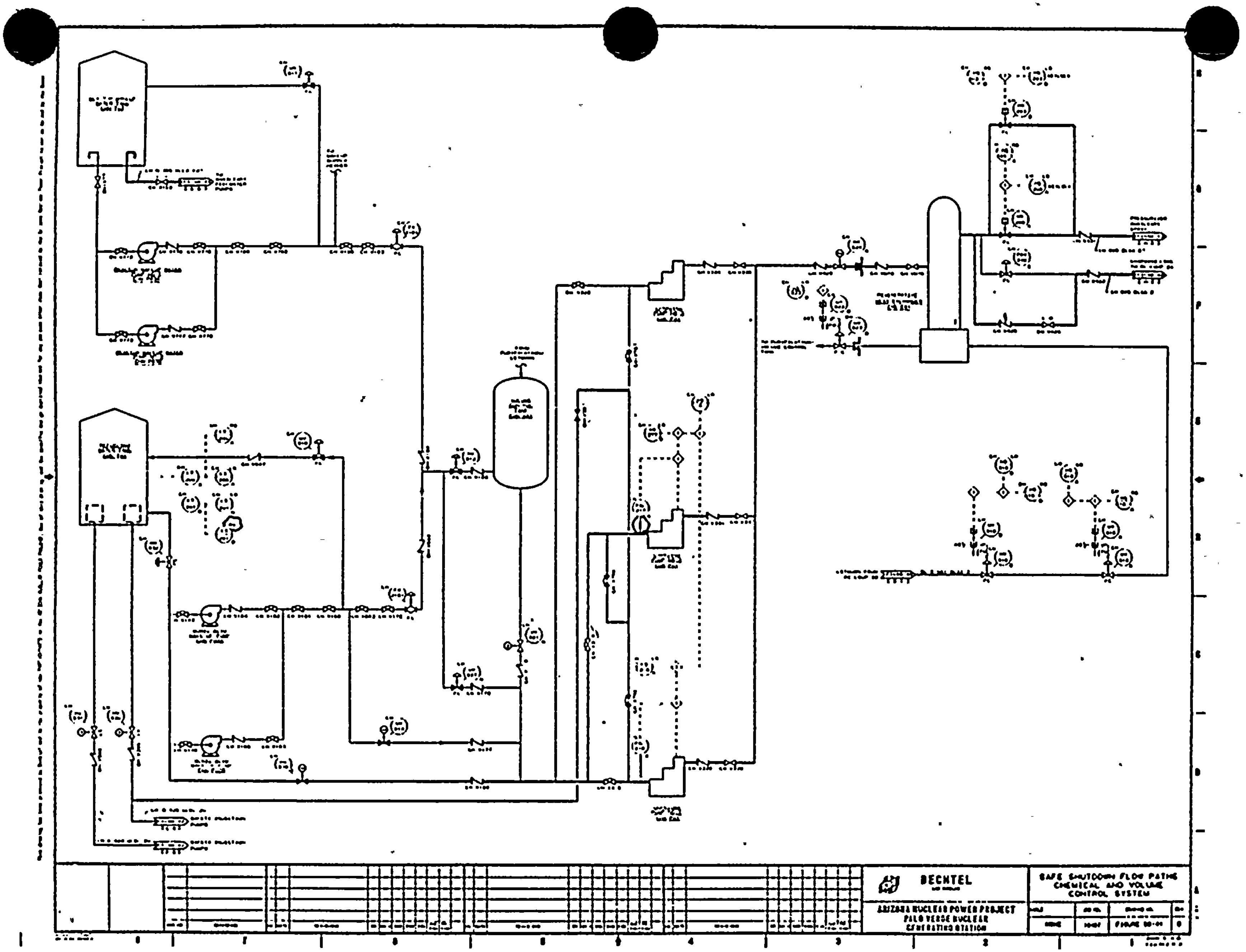


13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
CHEMICAL AND VOLUME
CONTROL SYSTEM

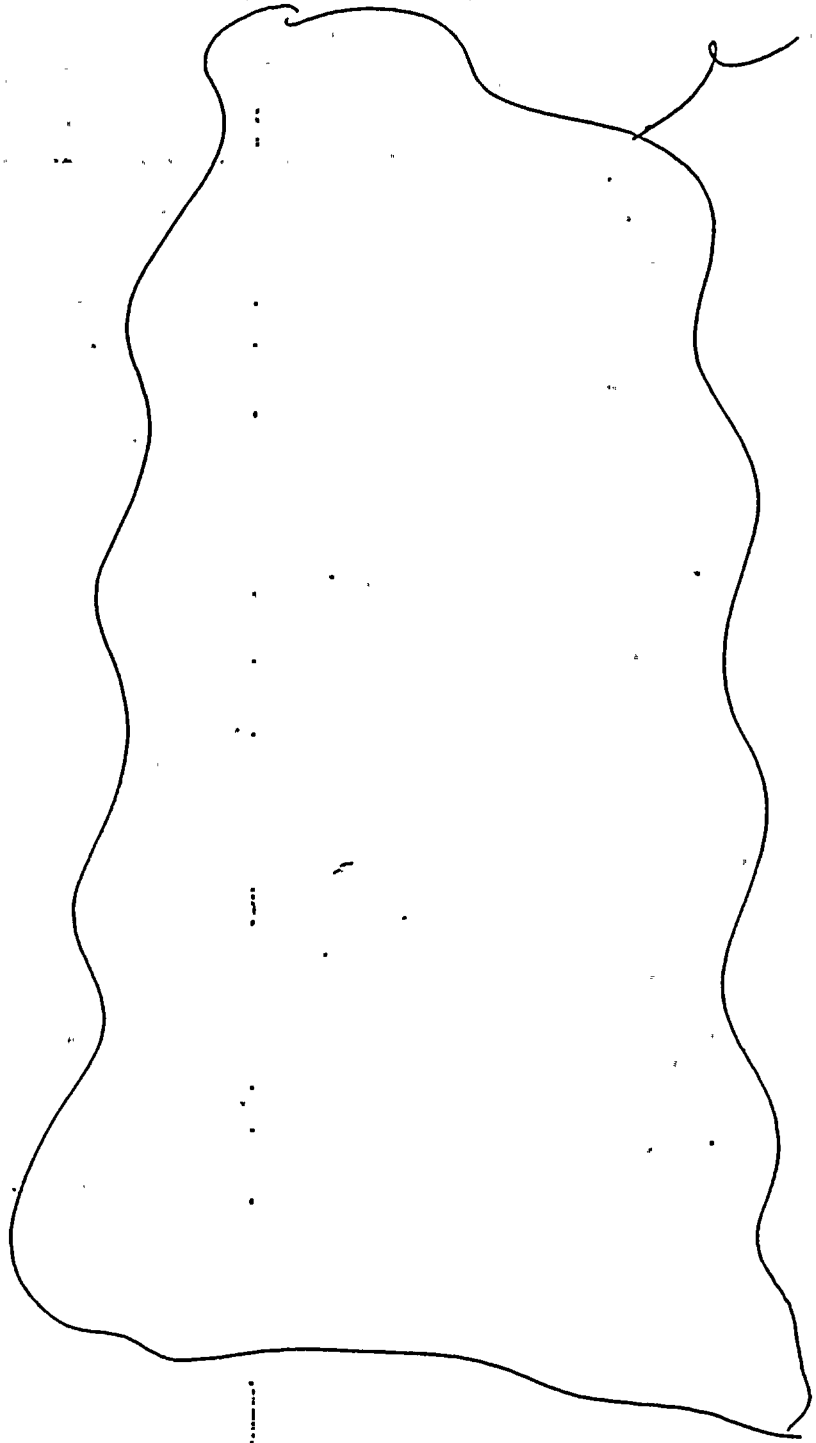
Figure 9B-41



CHANGE

FIG 9B-41

REPLACE
w/ATTACHED
FIG. 9B-42

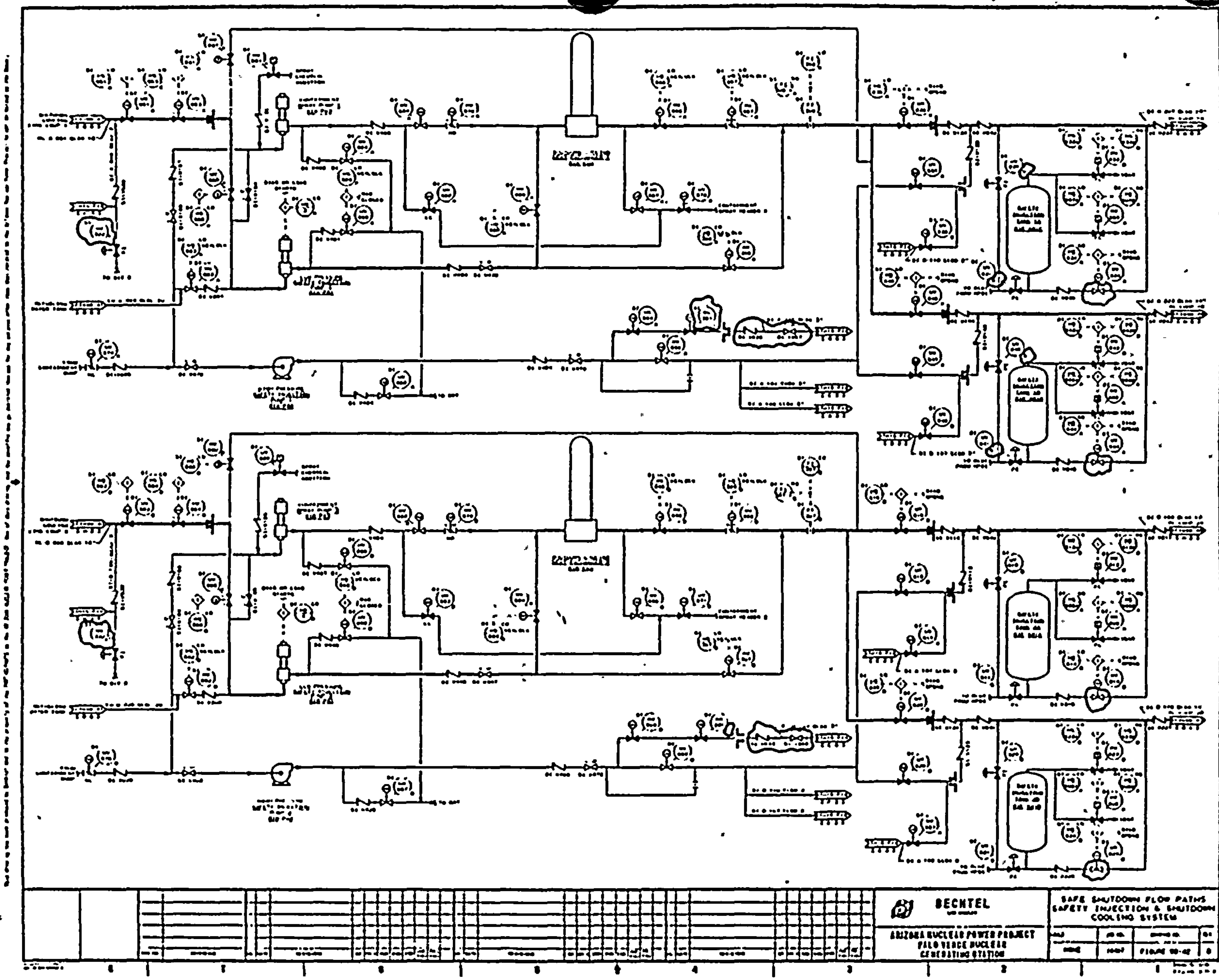


13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
SAFETY INJECTION & SHUTDOWN
COOLING SYSTEM

Figure 9B-42



CHANGE

FIG 9B-42

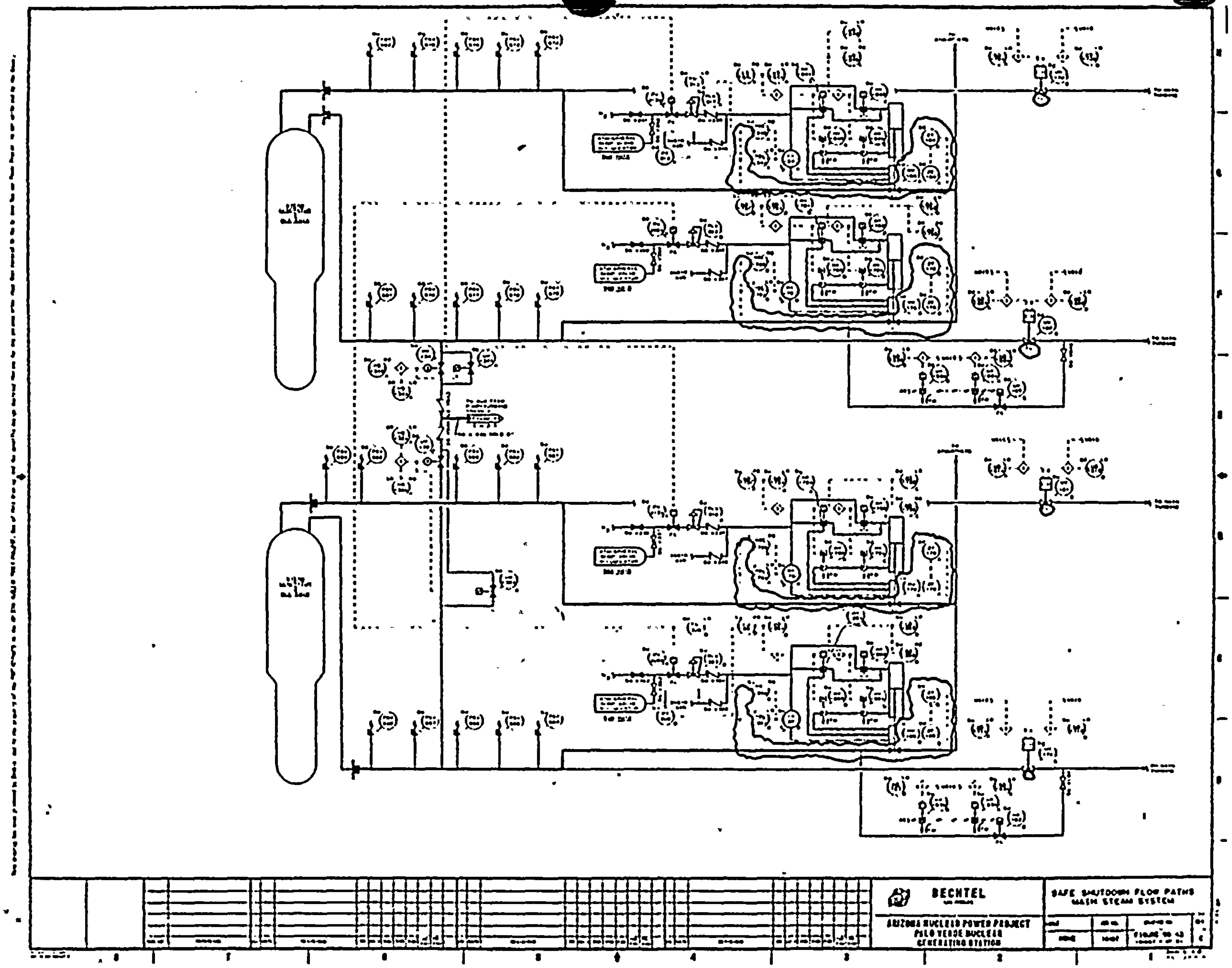
REPLACE
w/ ATTACHED
FIG 9B-43 sheet 1/2

13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
MAIN STEAM SYSTEM

Figure 9B-43
(Sheet 1 of 2)



CHANGE

FIG 9B-43
(sht 1 of 2)

REPLACE WITH
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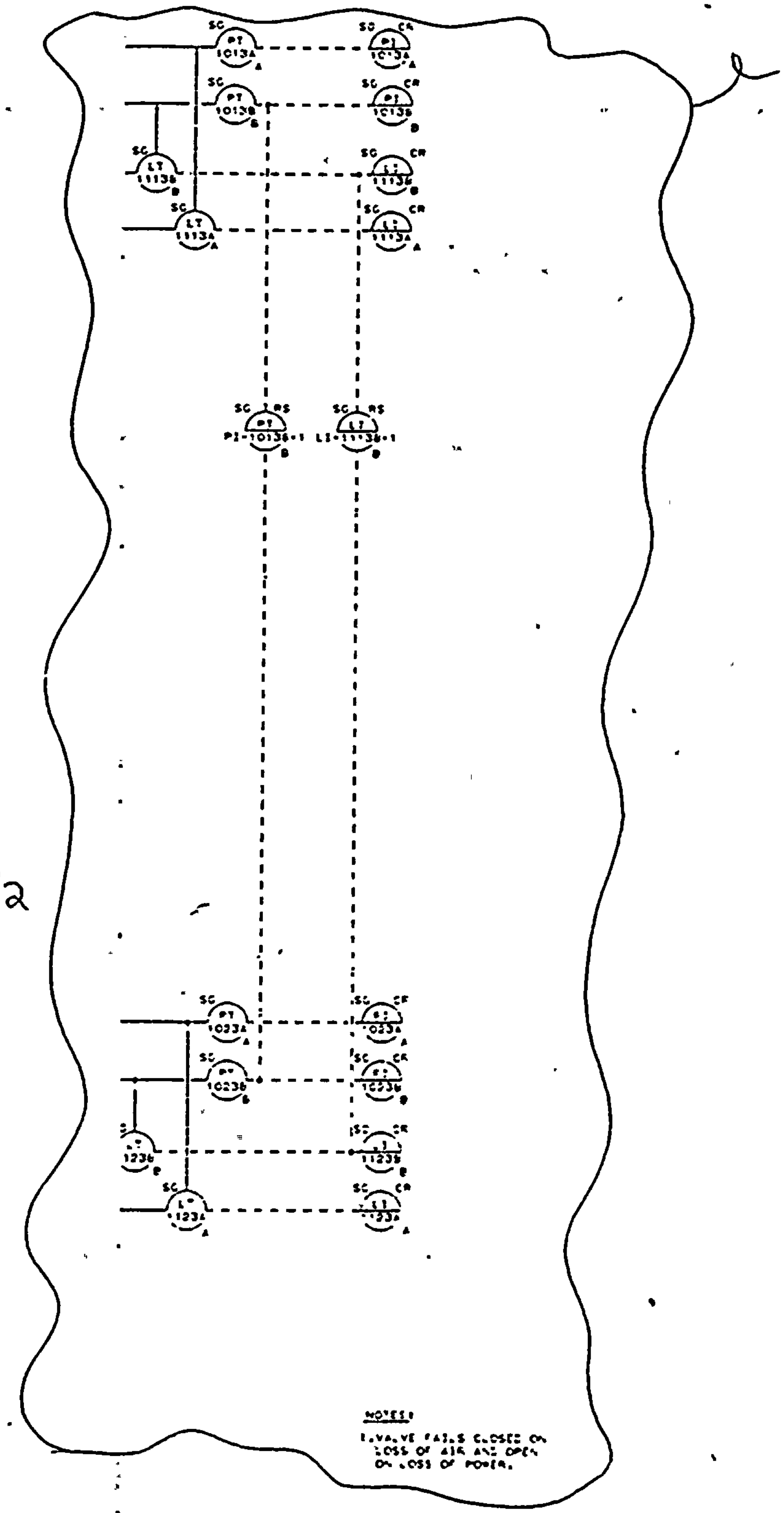
FIG. 9B-43 sheet 2/2

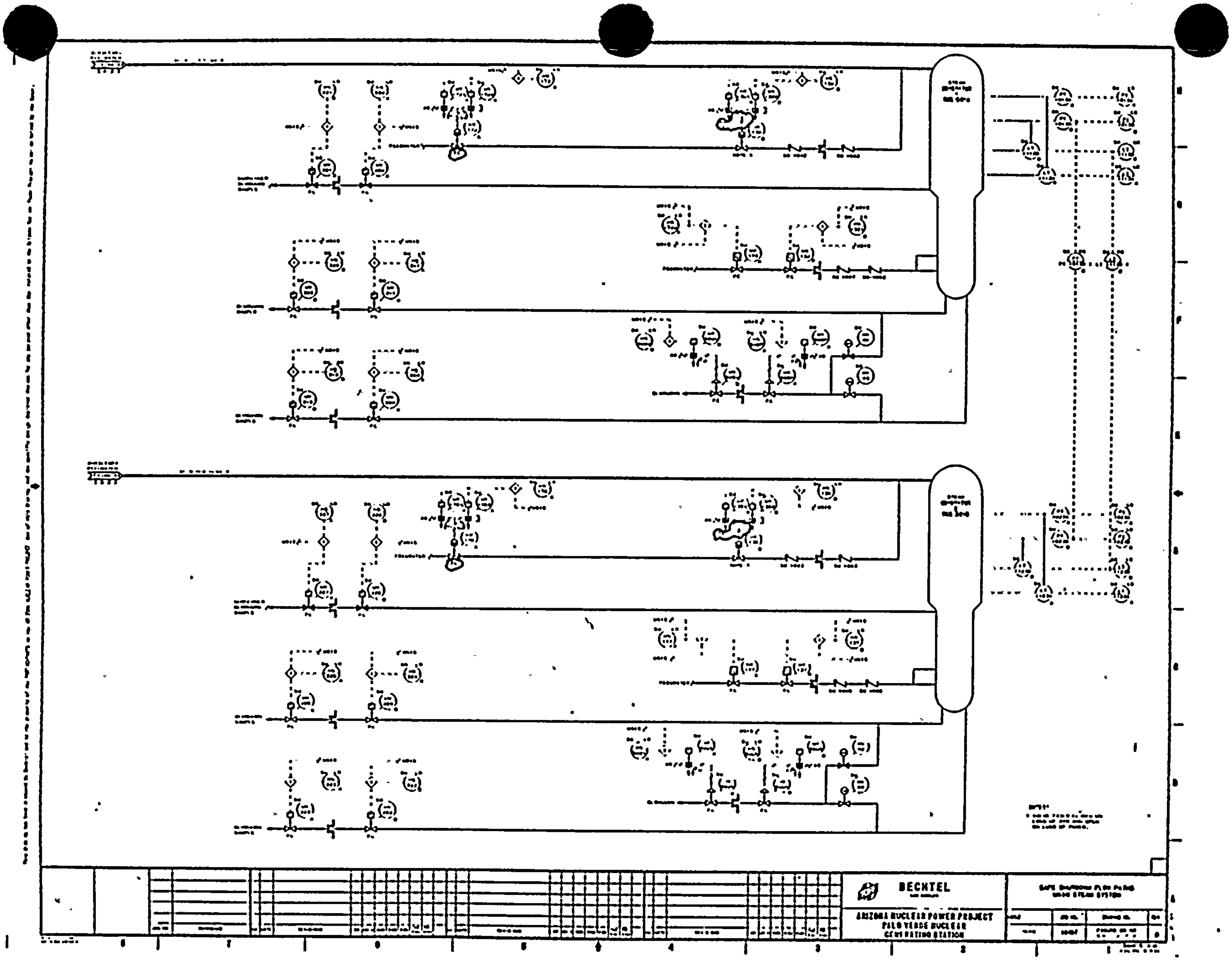


13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
MAIN STEAM SYSTEM

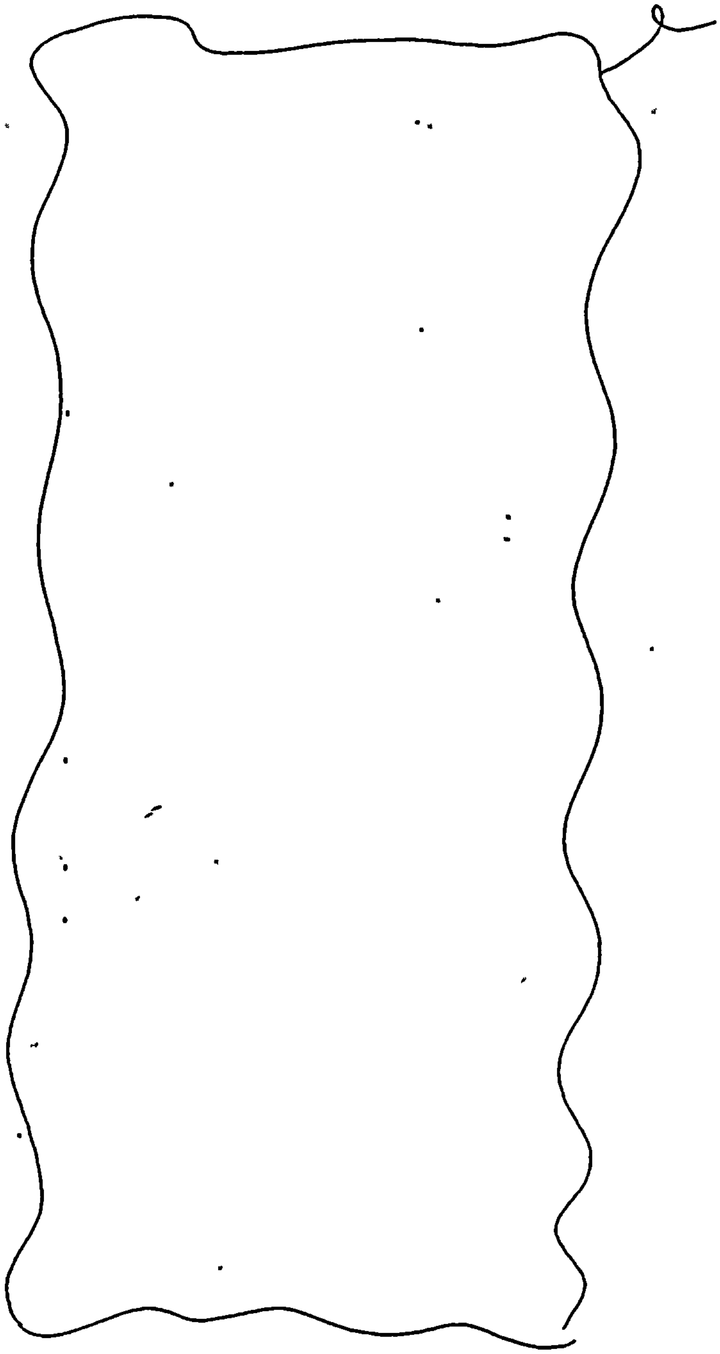
Figure 9B-43
(Sheet 2 of 2)



CHANGE

FIG 9B-43
(sht 2/2)

REPLACE
w/ ATTACHED
FIG 9B-44



13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
AUXILIARY FEEDWATER AND
CONDENSATE STORAGE
AND TRANSFER SYSTEM
Figure 9B-44

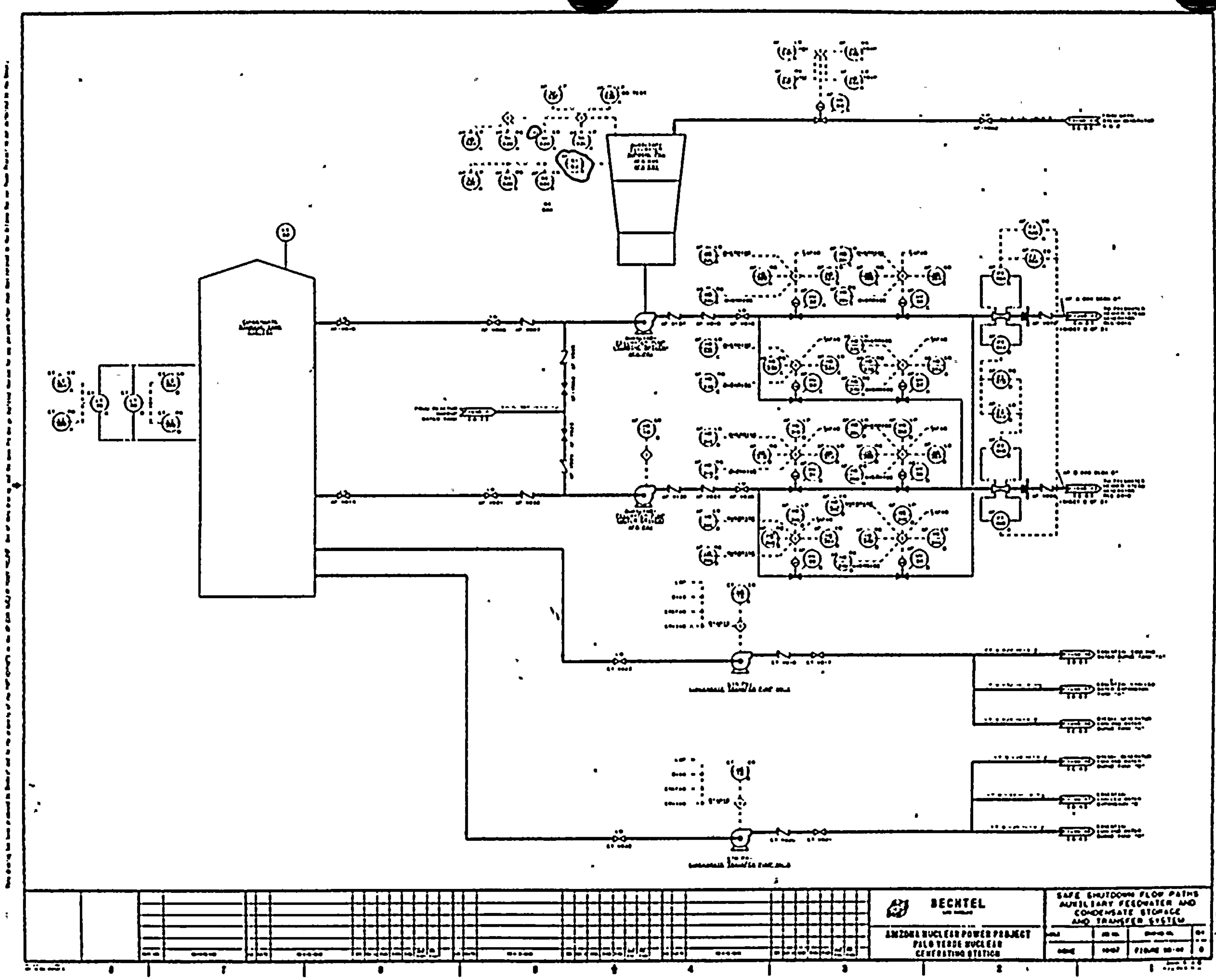
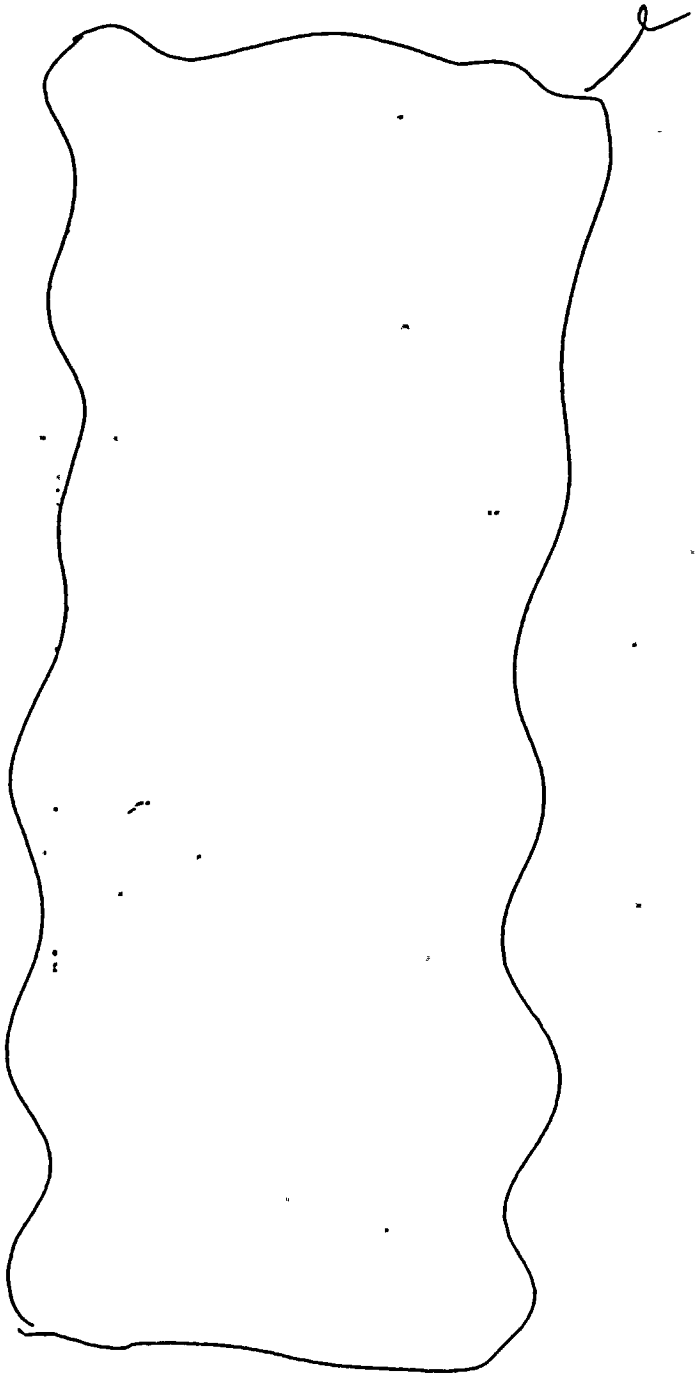


FIG 9B-44

CHANGE

REPLACE
w/ ATTACHED
FIG 9B-46



13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
ESSENTIAL COOLING WATER SYSTEM

Figure 9B-46

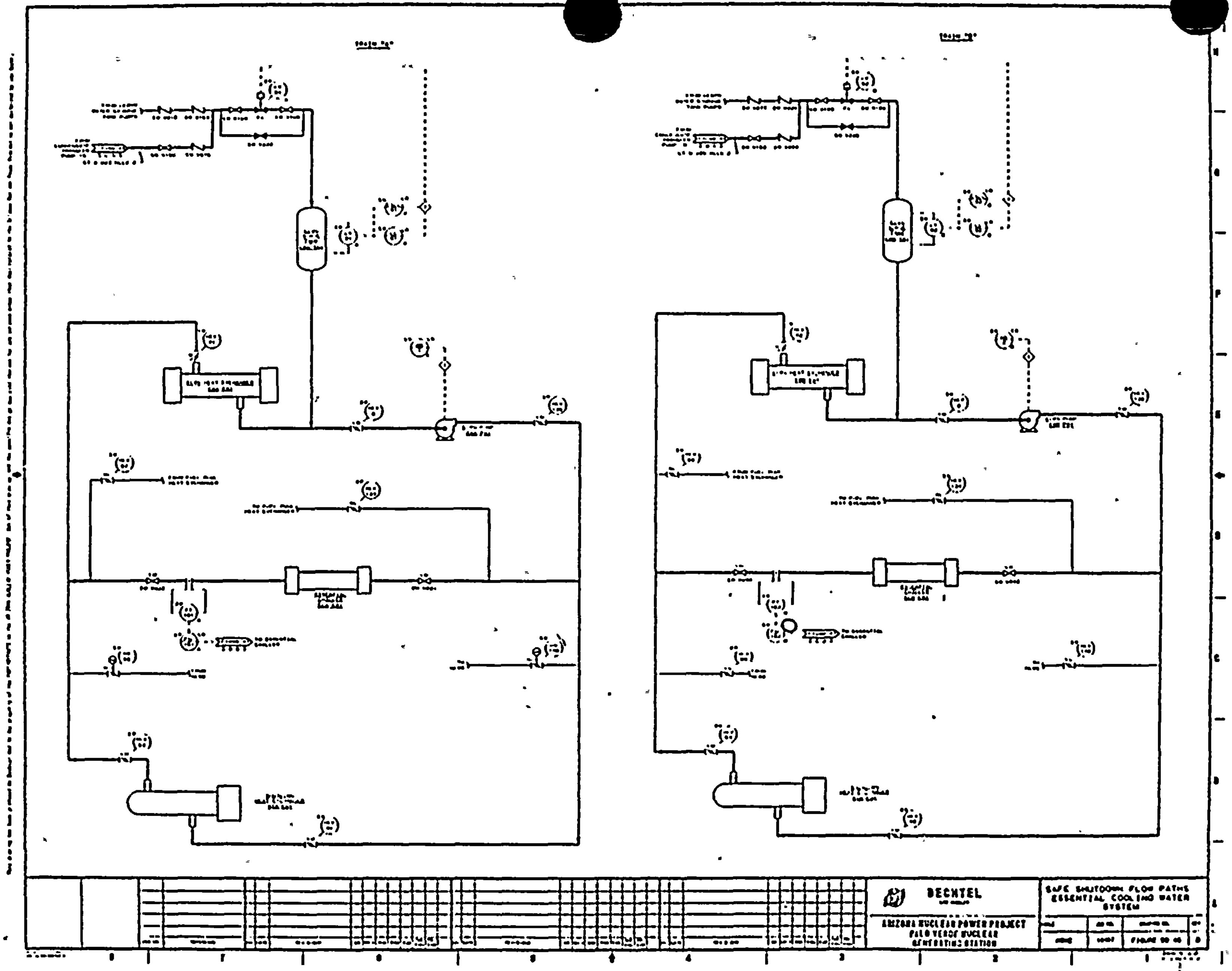
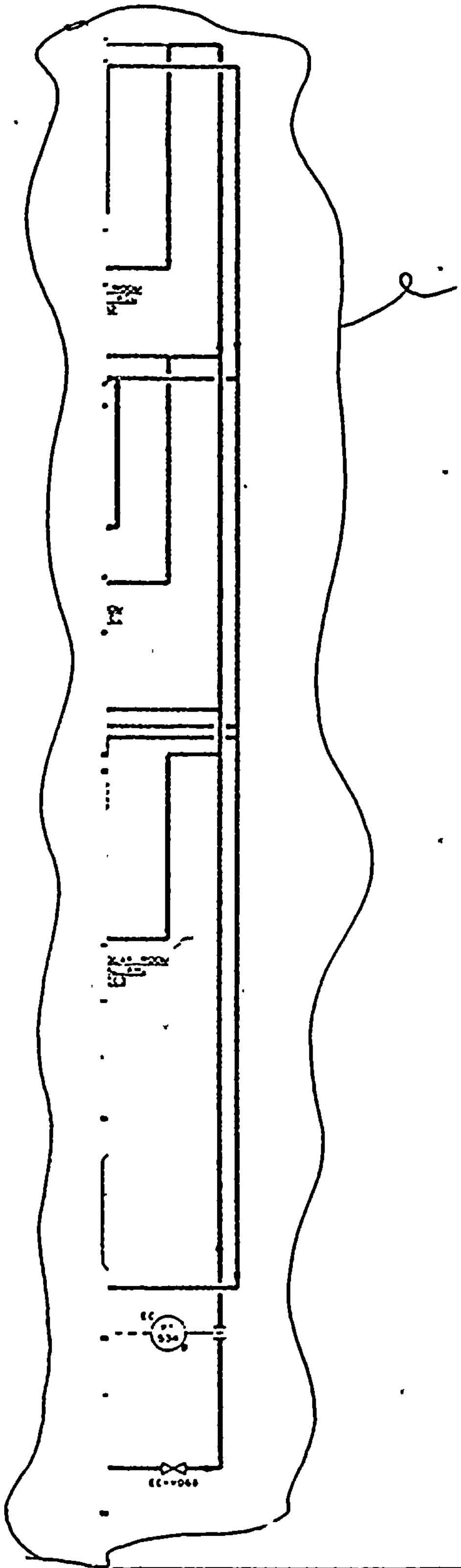


FIG 9B-46

CHANGE

REPLACE
w/ ATTACHED
FIG 9B-47



Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
ESSENTIAL CHILLED
WATER SYSTEM

Figure 9B-47

13

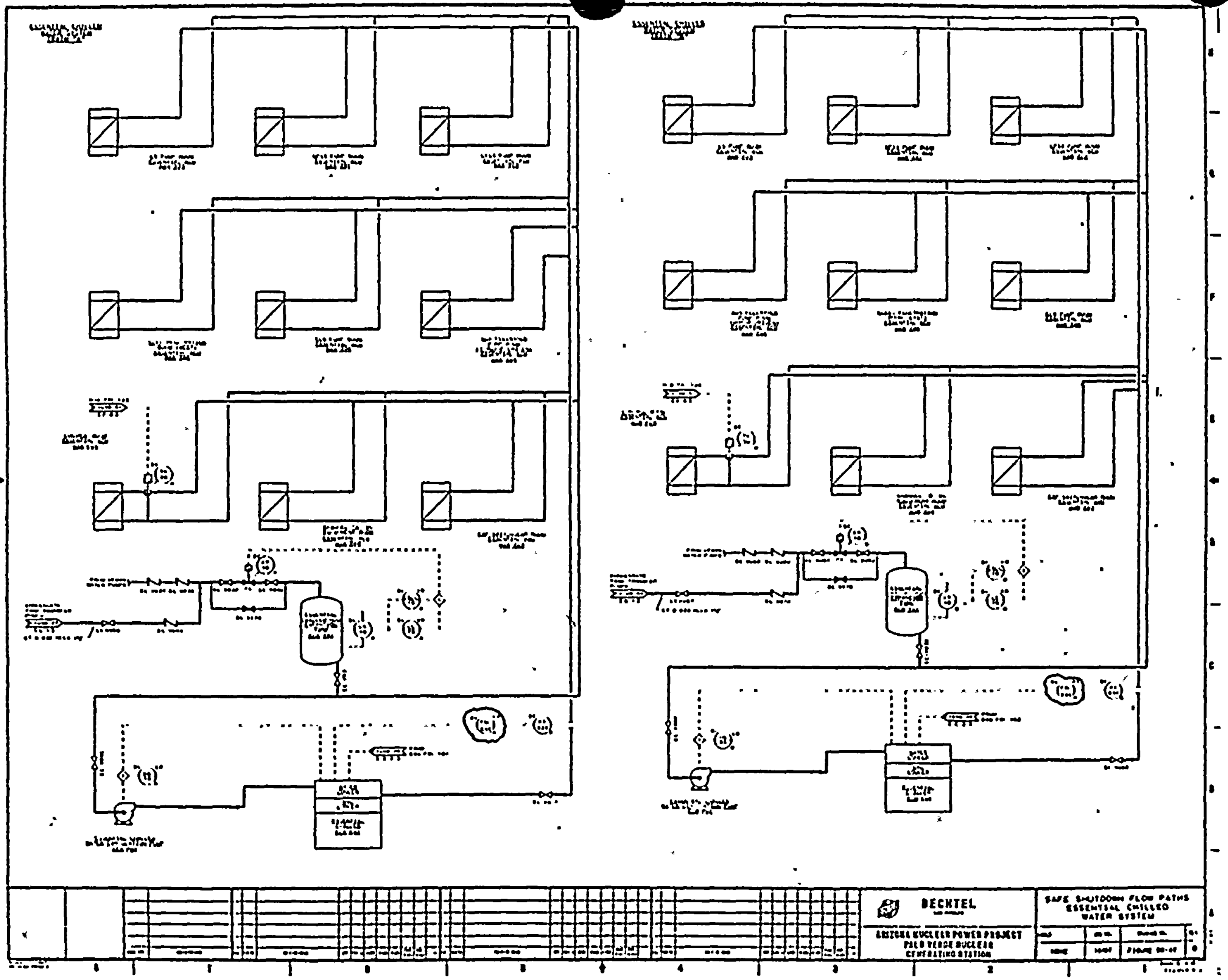
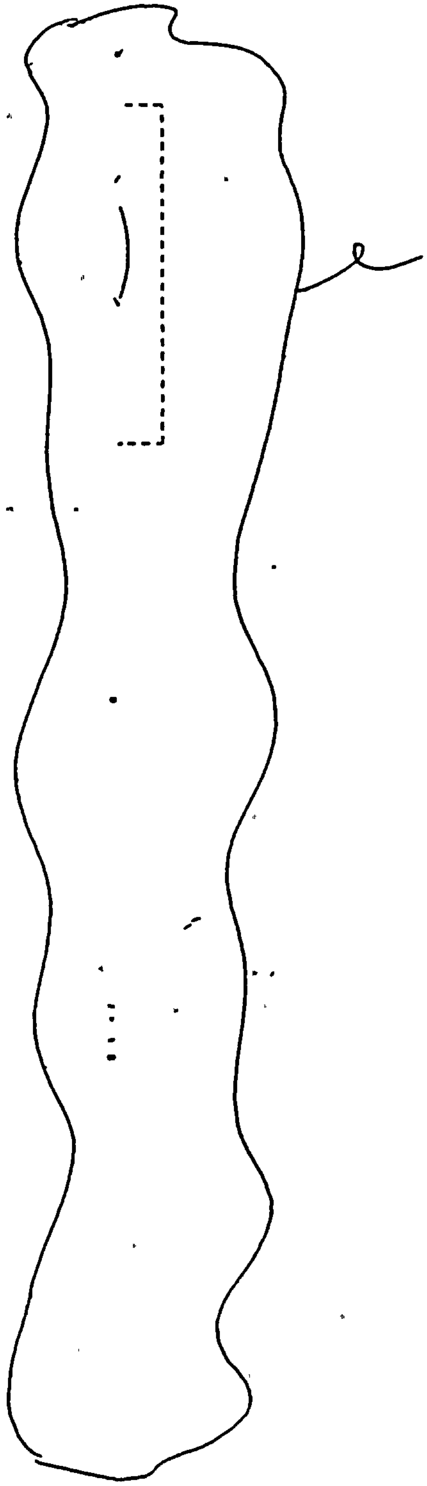


FIG 9B-47

CHANGE

REPLACE
W/ ATTACHED
FIG 9B-48



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Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
DIESEL SYSTEM

Figure 9B-48

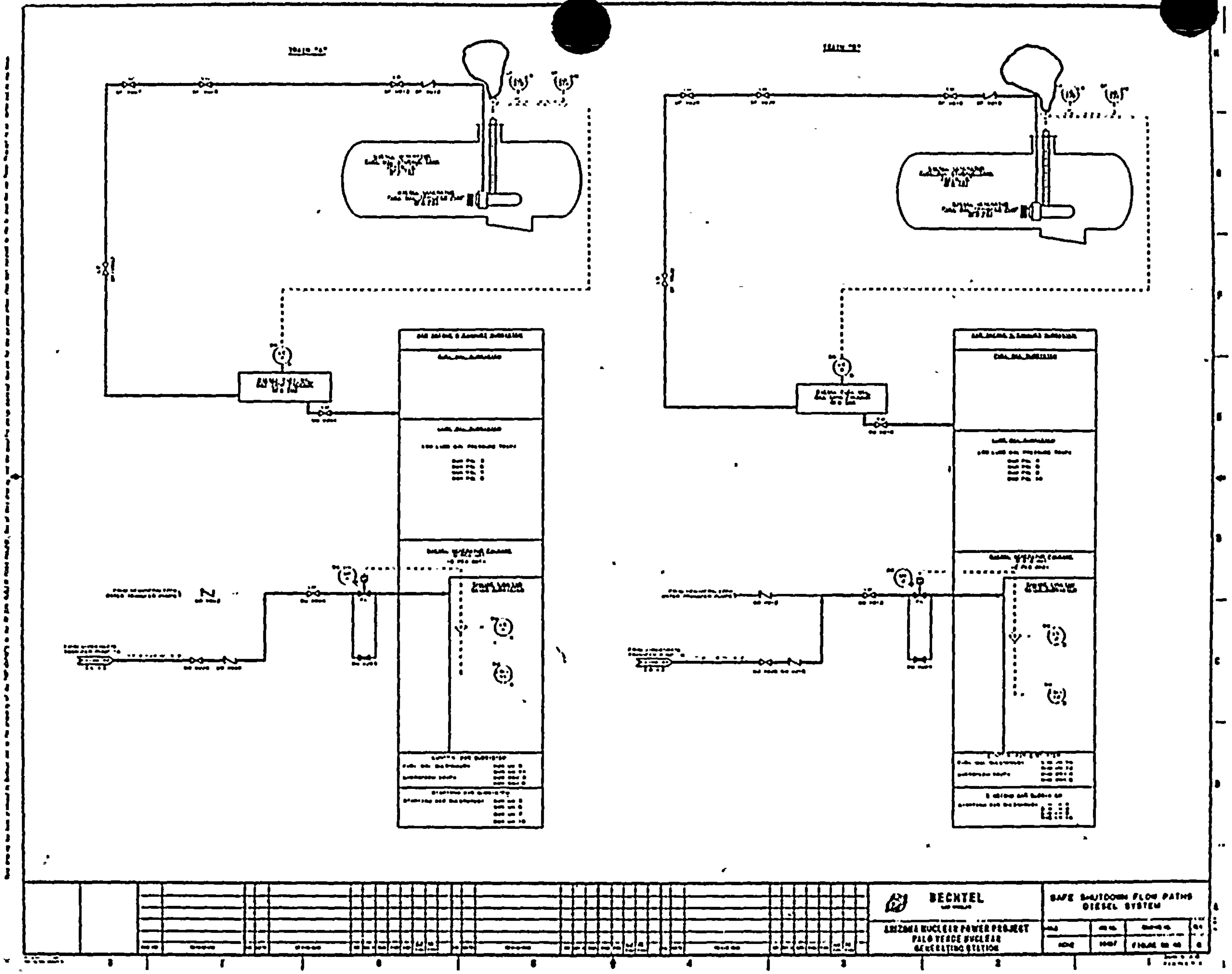


FIG 9B-48

CHANGE

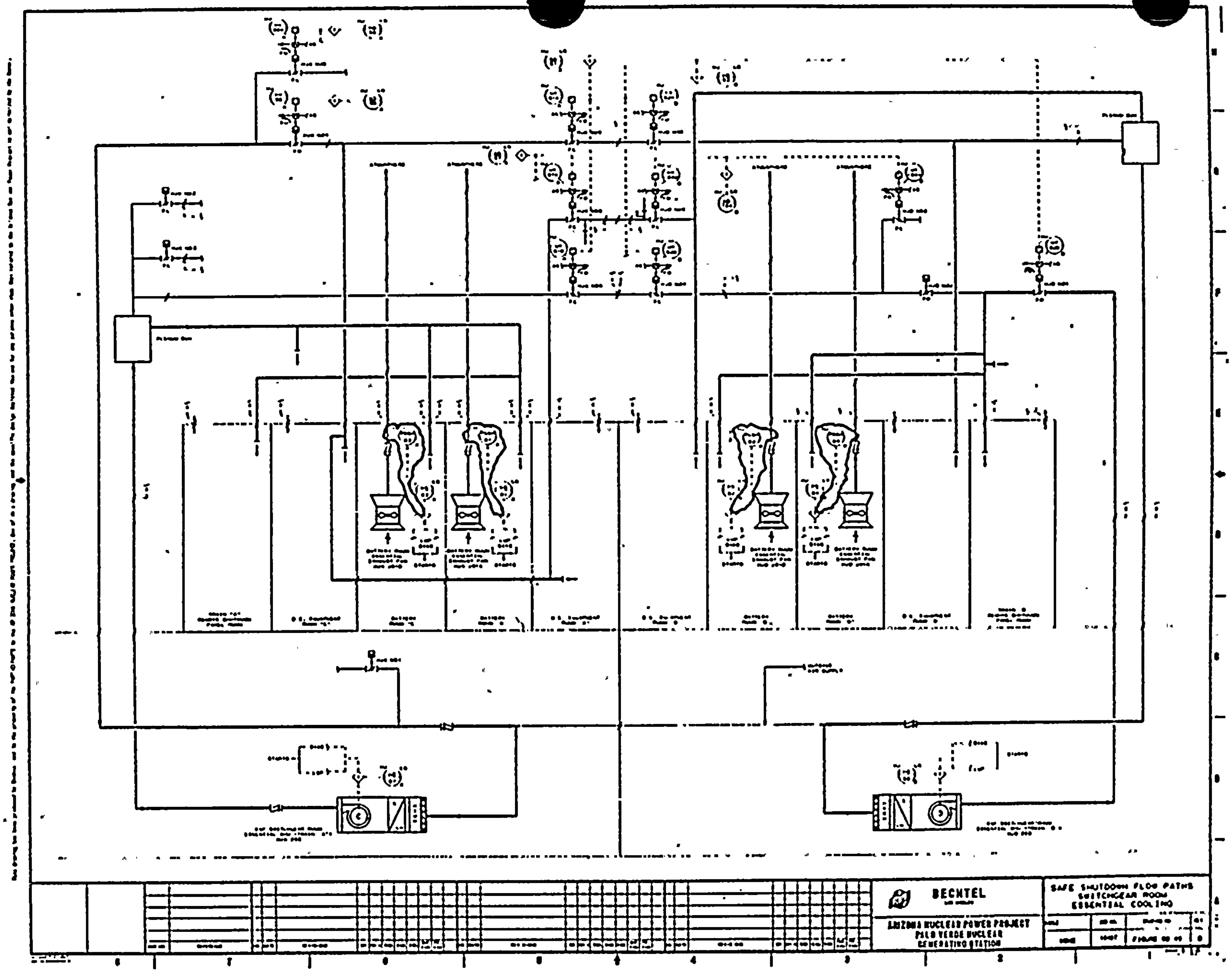
REPLACE
W/ ATTACHED
FIG 9B-49

13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
SWITCHGEAR ROOM
ESSENTIAL COOLING

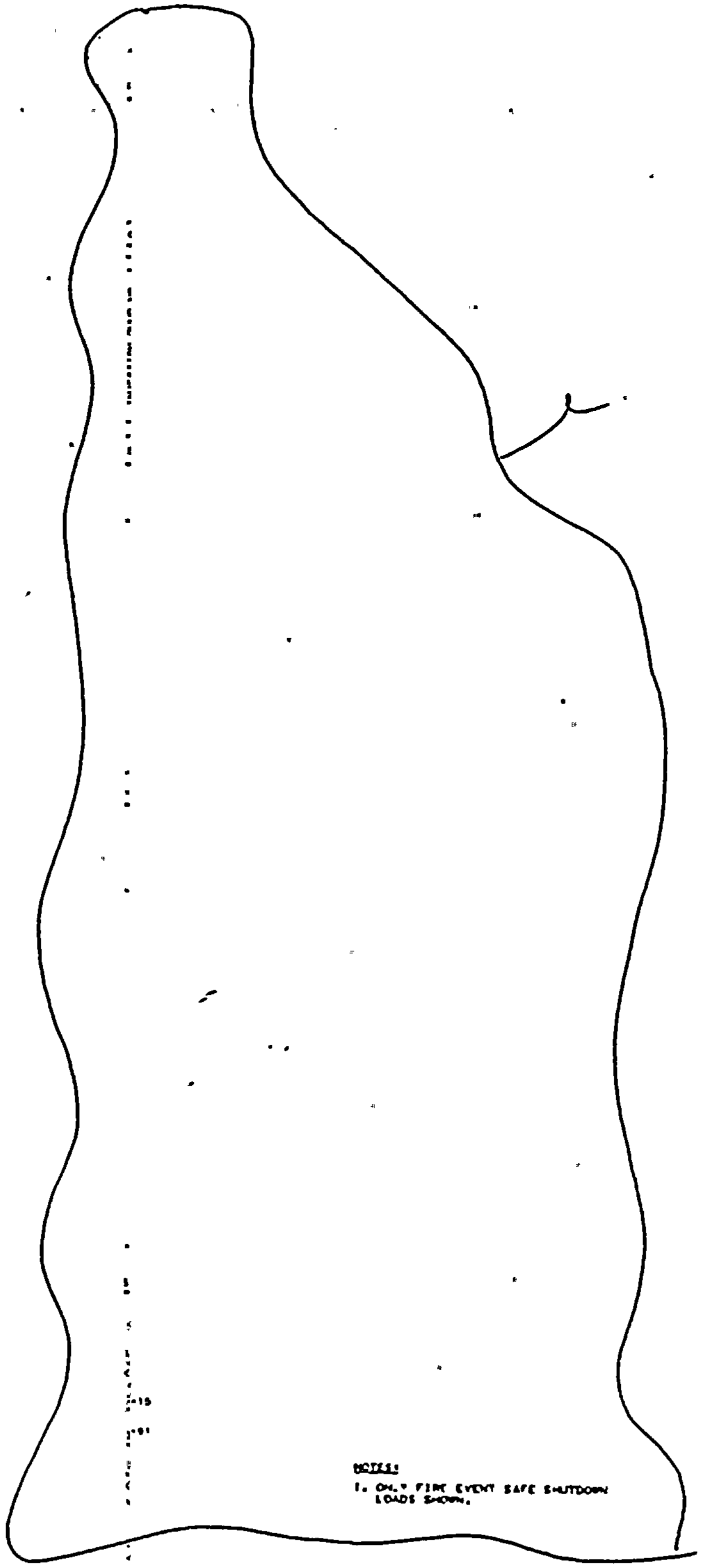
Figure 9B-49



CHANGE

FIG 9B-49

REPLACE
w/ ATTACHED
FIG 9B-52.

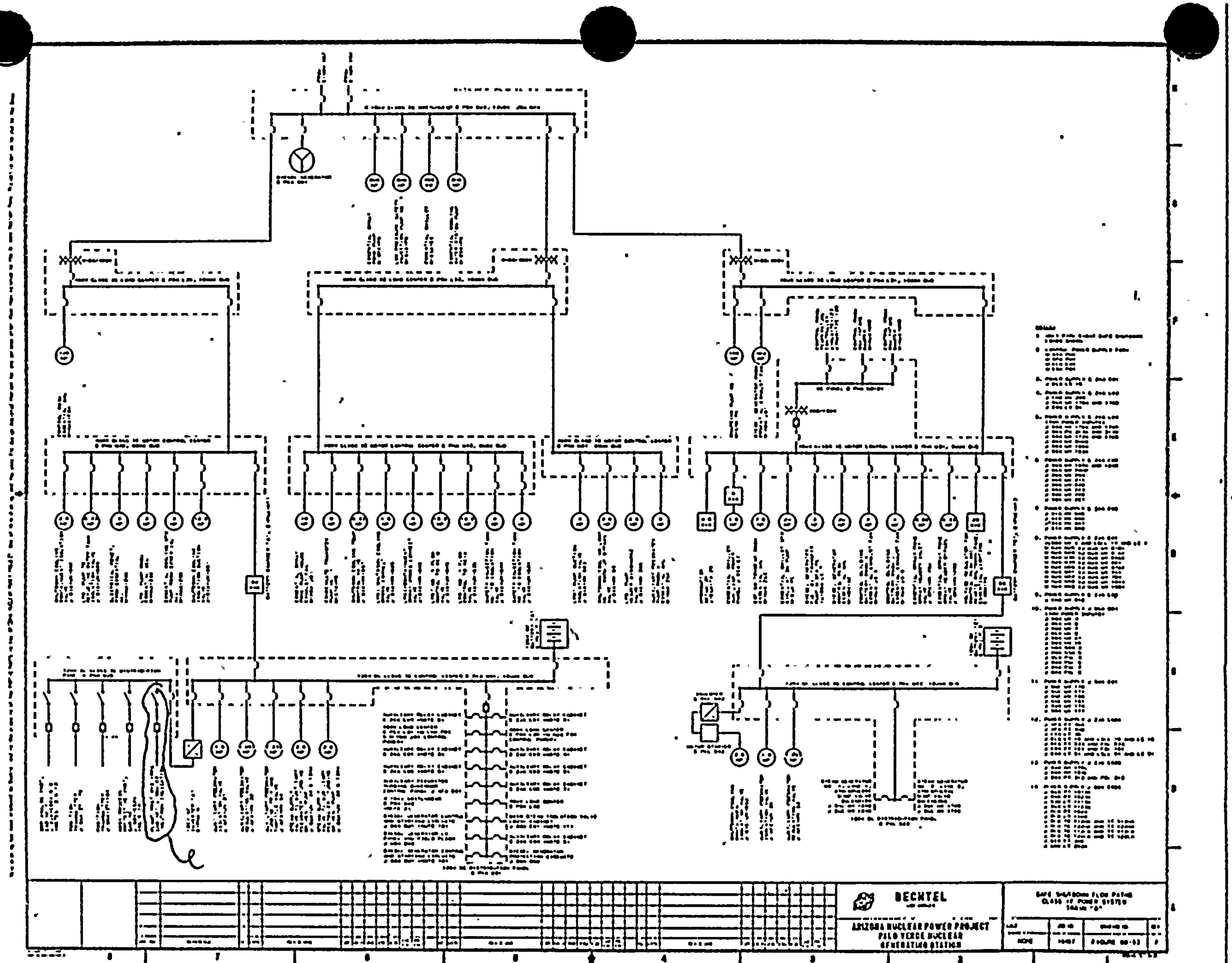


13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
CLASS 1E POWER SYSTEM
TRAIN "A"

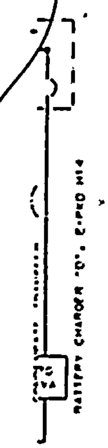
Figure 9B-52



NEXT
ADMEN
#

FIG 8B-52

REPLACE
W/ ATTACHED
FIG 9B-53



NOTES:

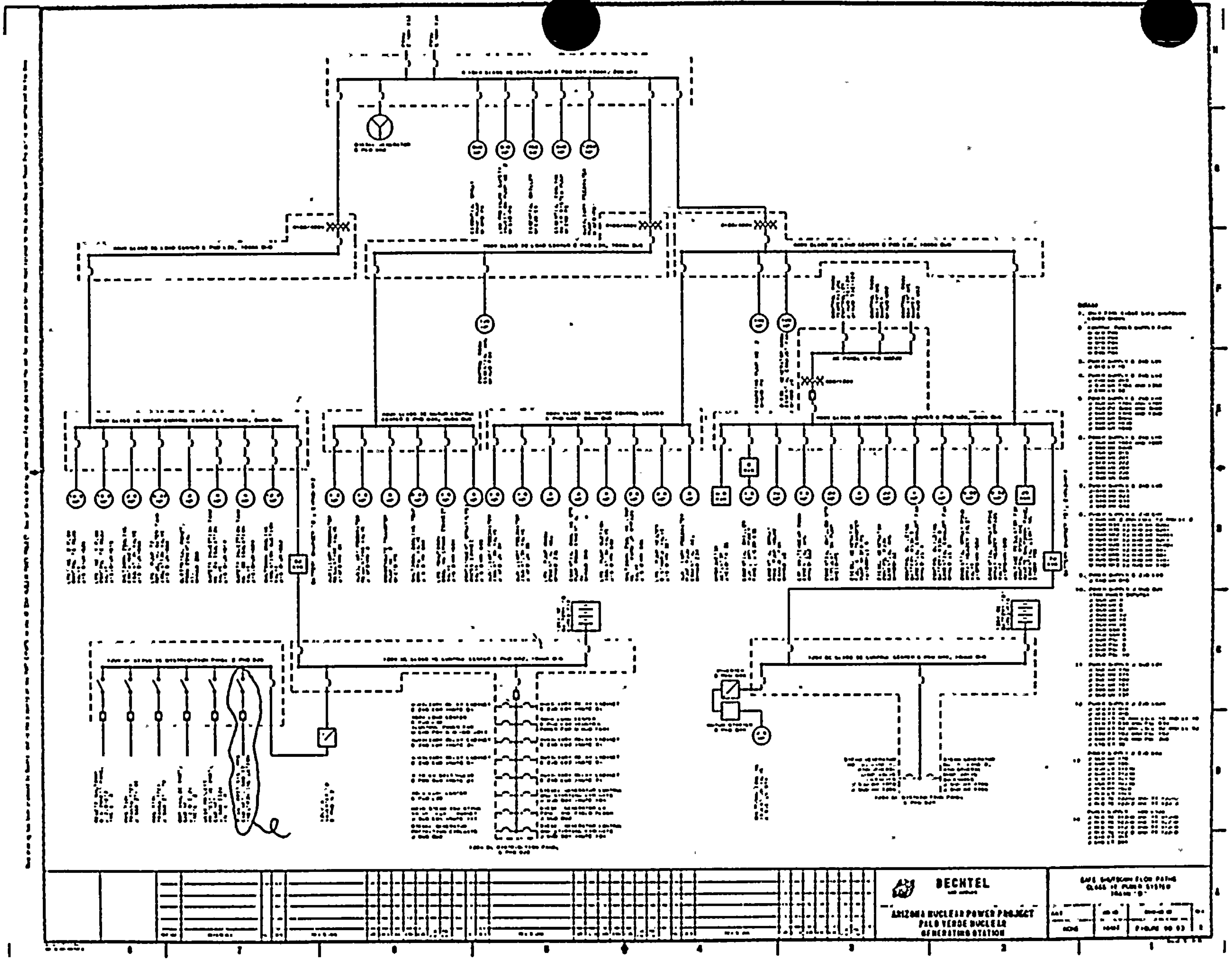
1. ONLY FIRE EVENT SAFE SHUTDOWN LOADS SHOWN.
2. CONTROL POWER SUPPLY FOR:
   M-AFB-P01
   M-SIB-P01
   M-SPB-P01
   M-ECB-E01
   M-EWB-P01
3. POWER SUPPLY E-ZAB-C01
   J-ECB-LV-16
4. POWER SUPPLY E-ZAB-C03
   J-CHB-HV-203
   J-SGB-UV-135
   J-EWB-LV-92
5. POWER SUPPLY E-ZAB-C04
   J-SGB-HV-178A AND 178B
   J-SGB-PV-306A AND 306B
   J-SGB-UV-130
   J-SGB-UV-5300
   J-SGE-UV-183
   J-SGE-UV-169
6. POWER SUPPLY E-ZAB-C06
   J-SGB-HY-185A AND 185B
   J-SGB-UV-500B
   J-SGB-UV-219
   J-SGB-UV-221
   J-SGB-UV-222
   J-SGB-UV-224
   J-SGB-UV-226
   J-SGB-UV-228
7. POWER SUPPLY E-ZAB-C06
   J-SIB-HV-613
   J-SIB-HV-623
   J-SIB-HV-633
   J-SIB-HV-643
8. POWER SUPPLY E-ZJB-C01
   J-DGB-UV-2
   M-HJB-M34
   M-HJB-M36
   M-HJB-M32
   M-HJB-M31
   M-HJB-M28
   M-HJB-M21
   M-HJB-M55
   M-HJB-M10
   M-HJB-M13
   M-HJB-M03
   M-HJB-M02
9. POWER SUPPLY E-ZJB-C03
   J-CHB-UV-515
10. POWER SUPPLY J-DGB-B01
    J-DGB-UV-4
    J-DGB-UV-6
    J-DGB-UV-8
    J-DGB-UV-10
    J-DGB-UV-12
    J-DGB-UV-16
    J-DGB-SSH-4
    J-DGB-SSH-6
    J-DGB-PSL-4
    J-DGB-PSL-6
    J-DGB-PSL-8
    J-DGB-PSL-10
    J-DGB-PSL-12
    J-DGB-LC-2
11. POWER SUPPLY J-SGB-C01
    J-SGE-UV-170
    J-SGE-UV-171
    J-SGE-UV-180
    J-SGE-UV-181
    J-SGB-UV-132
    J-SGB-UV-137
12. POWER SUPPLY J-ZJB-C02A
    J-AFB-FT-41A
    J-AFB-FT-41B
    J-ECB-LT-16 AND LSLL-16 AND LC-16
    J-ECB-FT-534
    J-EWB-LT-92 AND LSLL-92 AND LC-92
    J-EWB-FT-152 AND FSL-152
    J-SGB-PT-306 AND PSL-306
    J-CTB-LT-36
13. POWER SUPPLY J-ZJB-E02
    J-SGB-HY-178C
    J-SGB-HY-185C
    J-SGB-LT-1113B
    J-SGB-LT-1123B
    J-SGB-PT-1013B
    J-SGB-PT-1023B
    J-RCB-PT-102B
    J-RCB-LT-110Y
    J-RCB-TE-122H2 AND TT-122H2
    J-RCB-TE-122C2 AND TT-122C2
14. POWER SUPPLY J-SBB-C02A
    J-RCB-TE-112HB AND TT-112HB
    J-RCB-TE-122HB AND TT-122HB
    J-RCB-TE-112CB AND TT-112CB
    J-RCB-TE-122CB AND TT-122CB
    J-SIB-FT-307
    J-CHB-LT-201

13

Palo Verde Nuclear Generating Station
FSAR

SAFE SHUTDOWN FLOW PATHS
CLASS IE POWER SYSTEM
TRAIN "B"

Figure 9B-53



NEXT ADMEN NO.

FIG 9B-53

6 The pressure-temperature effects resulting from cracks in the main feedwater, steam generator blowdown, and steam generator downcomer feed lines are bounded by the results from the main steam line break analysis.

Pressure-temperature analyses of the Auxiliary Building were performed as discussed in amended section 3.6.2.1.2.2. The worst case pressure loading resulting from an AS line break was 1.5 psig and from the CVCS letdown was 0.8 psig. The temperature profiles resulting from the worst case postulated ruptures in the AS and CVCS lines indicated a thermal spike of 317.8F and 213.4F, respectively. However, the subcompartments experiencing the thermal spikes contain no safe-shutdown equipment.

Blowdown from the AS line is automatically terminated several seconds after the postulated break by isolation
8 valves closed by high differential pressure within the affected subcompartments. Blowdown of the CVCS letdown line is terminated by operator action within ten minutes of the initiation of one of three alarms in the control room:

- Regenerative heat exchanger high exit temperature
- Letdown line ~~low flow and~~ low pressure
- Low flow in the process radiation monitor and boronometer.

Also see QUESTION 3A.19 (NRC Question 410.4).

number of fluorescent fixtures which are fed from ~~the~~ an uninter-
12 ruptible power supply (UPS) and some self-contained battery
powered-emergency lighting units. The emergency lighting
system fixtures in the control room horseshoe suspended ceil-
ing are normally fed from the essential lighting system con-
8 nected from the redundant Class 1E buses through isolation
transformers. In the event of loss of Class 1E ac power
source, the fixtures are energized through ~~the~~ UPS's each consisting
12 of an inverter, a charger, and ~~an~~ 8-hour rated batteries.
(See section 9.5.3.2.2.2 Essential Lighting.)

8 The batteries are designed to provide rated lighting for a
2 minimum continuous period of 8 hours. Spare self-contained
battery pack units will readily be available to areas as
required should there be a need for dc lighting in excess of
2 8 hours.

9.5.3.3 Safety Evaluation

The safety evaluations are numbered to correspond to the safety design bases and are as follows:

A. Safety Evaluation One

Emergency lighting systems that serve the control
8 room and the remote shutdown room and all supports
of other lighting systems installed in Category I structures are designed in accordance with Seismic Category I requirements as specified in section 3.2 and are consistent with the recommendations of Regulatory Position C.1.n. of Regulatory Guide 1.29. The components and supporting structures of any system, equipment, or structure that are not Seismic Category I and whose collapse could result in the loss of a required lighting system function through either impact or flooding are checked to determine that the lighting system integrity is maintained.

INSERT A

Insert A

The batteries, UPS unit, and lighting fixtures of the control room horseshoe suspended ceiling in the control building are capable of withstanding the safe shutdown earthquake (SSE), and are seismically qualified by analysis and/or testing in accordance with IEEE Standard 344-1975. In accordance with positions C.1.n and C.2 of Regulatory Guide 1.29 self-contained units above safety-related equipment are installed in such a manner that during and after an SSE, their failure will not incapacitate the operator nor cause crippling damage to needed safety-related equipment. ~~and meet Seismic Category IX requirements.~~ The lighting units in the control room and other areas are not required to function during or after a seismic event.

B. Safety Evaluation Two

Reliable lighting is provided to permit the operators to shut down the unit safely and to maintain it in a safe shutdown condition at any time. The lighting system is designed to provide lighting in those areas used during a reactor shutdown or emergency.

Lighting in the control room, remote shutdown panel room, and associated local control stations are fed from Class IE buses. The lighting is arranged so that alternate fixtures are fed by redundant buses to maximize the coverage of remaining fixtures in the event of a loss of one Class IE bus. Physical separation is provided to maintain independence of the redundant essential lighting systems.

If the normal (preferred) source to a Class IE bus fails, the associated diesel generator is started automatically. During the diesel starting period, the emergency lighting system provides illumination. Lighting in the control room and remote shutdown area is automatically restored during diesel generator sequencing. In the event that ac power is lost, illumination in the control room (except for the control 8
room horseshoe suspended ceiling) and remote shutdown area is provided by the dc emergency lighting system consisting of self-contained emergency lighting fixtures. In the control room panel area, upon loss of ac power, the dc emergency lighting system is energized automatically. Additionally, the UPS will 12
supply power to selected fluorescent fixtures. In the control room suspended ceiling area, ~~a~~ UPS's each consisting of ~~containing~~ an inverter, charger, and separately installed 8-hour rated battery) suppl~~ies~~y power to fixtures upon loss of 8
ac power.

A single failure analysis is provided in table 9.5-5.

exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.

Provisions shall be included to minimize the probability of losing electric power from any of the remaining sources as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power sources.

RESPONSE:

For each nuclear power unit of PVNGS an onsite electric power system and an offsite electric power system provide power for electric loads important to safety. Two completely independent and redundant electric load groups important to safety are provided for each unit. Each load group has sufficient capability, independent of the other load group for the same unit, to ensure that:

A. Specified acceptable fuel design limits and design conditions of the RCPB are not exceeded as a result of anticipated operational occurrences.

B. The core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

Each redundant load group is provided with two offsite preferred electric power sources, a diesel generator onsite electric power source, and two sets of batteries. These provide sufficient independence, redundancy, and testability to perform their safety functions, assuming a single failure.

(subject to the limitations of power system development section 8.2.1.2.1).

2. Any circuit breaker can be isolated for maintenance without interrupting the power or protection to any circuit (subject to limitations of power system development section 8.2.1.2.1). 9

3. Short circuits on a section of bus can be isolated without interrupting service to any circuit other than that connected to the faulty bus section.

G. The offsite sources from the 525 kV switchyards to the startup transformers are separate and independent. The failure or structural collapse of one system or structure does not affect other offsite sources.

H. The offsite sources from the startup transformers to the 13.8 kV switchgear located at the units are independently and separately routed.

I. Two physically independent circuits are provided for offsite power to the onsite distribution system for each unit. The offsite source normally connected to each ESF bus is immediately available to supply components important to safety following a postulated loss-of-coolant accident. Either of the two offsite sources to each ESF bus, if available, can be connected by control switch operation in the control room. 9

8.2.1.3.2 Criterion 18--Inspection and Testing of Electric Power Systems

The 13.8 kV and 4.16 kV circuit breakers can be inspected, maintained, and tested on a routine basis. This can be accomplished without removing the generators, transformers, or transmission lines from service (subject to limitations of power system development section 8.2.1.2.1). 9

(subject to the limitations of power system development section 8.2.1.2.1).

shutdown, and maintenance under normal and emergency conditions. The design bases of these systems are:

A. An electronic private automatic branch exchange (EPABX) telephone system, a sound power ed telephone system, an stet intercom feature which is a part of the Radio Control Consoles, ~~system,~~ UHF radio, and a public address system are provided to Two-way accomplish onsite systems communication between the control room and various plant locations.

B. Public and private telephone systems and a VHF radio system ~~to the~~ for LLEA (Maricopa County Sheriff Dept) are provided to permit plant-to-offsite communication on a continuous basis.

C. The plant has a Private Ringdown telephone communication link~~s~~ Via APS Microwave system to the Arizona Public Service ~~and Salt River Project~~ dispatching center~~s~~ and A alternate links, via the ~~microwave systems.~~ Plant PABX. are provided by dial Telephones

D. An emergency evacuation alarm system is designed to warn personnel to evacuate the exclusion area in the event of a DBA.

E. Communication systems are provided with ~~uninterruptible~~ reliable Back-up power supplies ~~(UPS)~~ for each subsystem as noted in table 9.5-3. ~~The main equipment cabinets and power supplies are located in separate areas.~~

F. The communication systems ~~conform~~ comply with applicable local codes, standards, ordinances, and Federal Communications Commission regulations.

G. ~~The communication systems will be capable of performing under conditions of maximum plant noise levels being generated during the various operating conditions, including accident conditions.~~

H. ~~Protective relays are protected so as not to be inadvertantly tripped by Communication Transmission.~~

In High Noise areas (greater than 95 dB) flashing Blue strobe lights are Provided for alerting personnel in case of a plant Accident.

Table 9.5-3

COMMUNICATION SYSTEMS POWER SUPPLIES

System	Power Supply
EPABX telephone system	UPS (Battery[a] & charger)
PA system	~~UPS~~ (Battery[a] & charger)
Microwave equipment (APS/SRP)	Communication battery[a] in microwave building (APS/SRP)
Sound ~~Second~~-powered telephone	None required
Two-way radio (base station)	UPS (Battery[a] & charger)
Two-way radio (mobile units)	Self-contained battery packs
Radio Remote Control Consoles	Diesel Generator Backed up
~~Intercom~~	~~With radio~~
Emergency evacuation alarm system (unit)	UPS (Battery[b] stet & charger)
Emergency evacuation alarm system (Area ~~site~~)	Solar panels with Battery[c] Backup ~~AC power from 480V non-Class IE MCC~~

a. 8 hour operation

~~b. 2 hour operation~~ stet

c. 30 Minute operation

Table 9.5-3A

SUMMARY OF ONSITE COMMUNICATIONS SYSTEM CAPABILITIES AND NOISE CONSIDERATIONS DURING TRANSIENTS AND/OR ACCIDENTS

Deleted in its entirety.

Station	Maximum Anticipated Sound Levels[a] (dBA)	Communication Systems Available and Maximum Background Noise for Effective Communication[b]				
		EPABX Telephone (dBA)	EPABX Telephone Jack (dBA)	Public Address Public Address (dBA)[c]	Sound Power Phones (d & e) (dBA)	Portable UHF Radio (dBA)
Control room	70	92	-	-	118	95
Remote shutdown panel	75	92	-	102	118	95
Safety injection pump rooms	111	92	118	102	-	95
Shutdown heat exchanger rooms	90	92	118	102	-	95
ESF switchgear rooms	75	92	118	102	-	95
Piping penetration rooms	100	92	118	102	-	95
Radwaste building	102	92	118	102	-	95
Auxiliary feedwater pump rooms	110	92	118	102	-	95

a. Subject to verification during startup
b. Reference 1
c. Based on data supplied by vendors
d. Telephone headset
e. Telephone headset

I. ~~No fixed repeaters are utilized within the generating station.~~

J. ~~The security protective relaying and fire systems are not affected by the portable communication systems.~~

9.5.2.2 System Description

The plant communications systems are illustrated schematically in figures 9.5-2 through 9.5-5. Locations of telephones and public address speakers are shown on the station lighting and communication plan drawings. Connections to offsite communications are shown in figure 9.5-6.

9.5.2.2.1 Intra-Plant Communication Systems

9.5.2.2.1.1 EPABX Telephone System. The primary means of communications within the plant is the EPABX system (refer to figure 9.5-2.

The EPABX system provides station-to-station private line communications with any EPABX telephone on site, including the main control room, and between the plant and the external public system. Interconnection to the PA system is also provided. Cables between the EPABX exchange, located in the service building, and each unit communication room area distribution frames are routed underground in concrete-encased duct banks to protect the cable from being severed accidentally. Communication cables within the plant have fire resistant insulation and are routed in conduit or non-safety-related cable trays.

The EPABX exchange is powered by a 48-volt battery located in the battery room of the service building. The main control rooms are provided with alarms to indicate failure of the battery or its charger.

9.5.2.2.1.2 Public Address System. The ~~paging~~ Public Address system (refer to figure 9.5-3) consists of cabinets with 50 watt, ~~seven central rack~~ ~~48~~ 24-volt, d.c. amplifiers powered by ~~individual UPS~~ Batteries with an 8-hour capacity. P.A. ~~Paging~~ speakers utilize self-contained matching transformers and are distributed between amplifiers for increased reliability in the event a given amplifier or speaker fails. Access to the PA system may be obtained from any plant PABX telephone using ~~a~~ dedicated numbers, ~~or by a priority override~~ from the operators' telephone. Override feature is available.

The ~~seven~~ amplifier racks are located in the areas they serve as follows:

- Unit 1 ~~microwave and telemetering room~~ Control Building, Communications Room, 120' Elev.
- Unit 2 ~~telemetering room~~ — " —
- Unit 3 ~~telemetering room~~ — " —
- Administration building communications room (Serves Guard house)
- Water reclamation facility (WRF) communications room
- EOF Comms. Room (Serves TSC and Admin. Annex.)
- Service Building Comms. Room.

9.5.2.2.1.3 Emergency Evacuation Alarm System. ~~A site area evacuation alarm system (refer to figure 9.5-4) consisting of a centrally located roof-mounted electrically driven siren is provided to alert the entire site. The siren is initiated manually from a pushbutton located in the office of the shift supervisor for each unit.~~ See Insert!

A unit evacuation alarm system for each unit is provided. Each unit system consists of an electronic siren with amplifier/projectors (speakers) located throughout the unit area. Actuation of the system is initiated manually from the unit communications console located in the Control Room. A microphone is provided to permit the system to be used as a back-up ~~paging~~ P.A. system. Each unit emergency evacuation alarm system is provided with ~~a UPS~~ Batteries with a 2-hour capacity. In high noise work areas (greater than 95dB) flashing blue strobe lights are furnished to provide visual alarms in conjunction with the audible evacuation and accountability alarms of the unit evacuation system.

9.5.2.2.1.4 Sound Powered Telephone System. A private direct-line sound powered telephone system is provided between the fuel building and the main control panel in the control Room ~~operation console~~ for each unit. ~~A~~ second independent system is provided between the Main control Room ~~operator's console~~ and maintenance control points throughout the unit. The systems can be connected together by a Merge switch located in the control building, 140' elevation ~~on the operator's console~~.

9.5.2.2.1.5 Radio Intercom. A Intercom feature ~~service~~ is provided on the Radio Control-consoles ~~between the main control rooms, the security consoles, and the WRF communications room as an adjunct to the control units of the radio system.~~ Refer to fig. 9.5-5

9.5.2.2.1.6 Two-Way Radio. Radio voice communications throughout the site is provided by single ~~two dual~~ frequency base stations (refer to figure 9.5-5), ~~two~~ Multiple ~~dual~~ frequency mobile transceivers, and ~~single and dual frequency~~ multiple frequency portable transceivers.

See Insert 'B'

~~One frequency is assigned to a security function while the other frequency is assigned to plant maintenance. Each base station and associated frequencies serve as a back-up for the other. Radio communication into the containment is provided by single frequency base stations at each unit containment building. Base stations are provided with UPS with an 8-hour capacity.~~ The portable units are provided with rechargeable batteries. Portable radios stored in recharger units in selected locations throughout the plant provide additional emergency radio communications.

9.5.2.2.2 Plant-to-Offsite Communication Systems

9.5.2.2.2.1 Public Offsite Communications System. The EPABX interconnects with the Mountain Bell Telephone System to provide communications with the local, Buckeye area, Litchfield and Phoenix from

~~selected~~ EPABX extensions in the plant, ~~administration building~~ Ancillary buildings, including EOF and TSC ~~and the control rooms.~~ This provides direct dialing to locations outside the plant.

The ~~main control rooms and~~ security centers (CAS and SAS) have ~~are also provided with~~ lines directly connected to the public telephone system as a backup to the EPABX connected trunks. Refer to figure 9.5-6.

9.5.2.2.2.2 Private Offsite Communications System. The private offsite communications system provides communications via APS ~~and SRP~~-owned microwave systems. Private VHF radio facilities also provide communications with the office of the Maricopa County Sheriff (LLEA). Microwave Ringdown ~~Direct dedicated~~ telephone ~~lines~~ links provide communications with APS ~~and SRP~~ dispatch offices.

9.5.2.2.2.3 Security Force Communications. The security force communications are UHF radio described as part of the two-way radio system and VHF radio described in sections 9.5.2.2.1.6 and 9.5.2.2.2.2, respectively.

9.5.2.2.2.4 Emergency Communication Systems — See Insert 'C'

9.5.2.2.3 System Operation

Diverse systems are provided to ensure means of intra-plant-to-offsite communications under operating conditions. Intra-plant communication systems have adequate flexibility to keep
13 plant personnel informed of plant operational status. Refer to Fig. 9.5-5 to determine availability of various communication systems in the power block.

INSERT. A

9.5.2.2.1.3 EMERGENCY EVACUATION ALARM SYSTEM

A site area evacuation system (refer to figure 9.5-4) consisting of six pole-mounted Electronic outdoor warning sirens, powered by solar powered Batteries, located outside each power block is provided to alert all personnel within the security boundaries of PVNGS. All sirens (both unit and area) are initiated from pushbuttons provided on the area/unit evacuation command unit in the control Room, 140' elev.

INSERT. B

9.5.2.2.1.6 TWO-WAY RADIO

One frequency is assigned to a security function ~~while~~ and each unit is assigned a unique plant maintenance frequency. The plant maintenance base stations serve as emergency back-up to the security base station. Plant maintenance and security communications inside the containment structure of each unit is provided by a single frequency base station on the respective unit plant maintenance frequency. Base stations are provided with UPS with an 8-hour capacity.

INSERT. C

9.5.2.2.2.4 EMERGENCY COMMUNICATION SYSTEM

Emergency Communication system consists of a Back-up Switchboard located at EOF building to interconnect telephone Instruments at various emergency facilities and control Rooms (See Emergency plan, section 7) as illustrated in fig. 9.5-6A (sheets 1 and 2)

14B.35 IN PLANT COMMUNICATIONS SYSTEM

1.0 OBJECTIVE

To demonstrate the adequacy of the Inplant Communications System to provide communications between vital plant areas and to test the operability of the emergency evacuation alarms.

2.0 PREREQUISITES

2 2.1 All construction activities on the Inplant Communications System are complete.

2.2 Support systems required for operation of the Inplant Communications System are available.

2.3 ~~All possible plant equipment that contributes to the ambient noise level should be in operation.~~

3.0 TEST METHOD

Unit/area Evacuation

3.1 Verify the ~~Federal-Siratrol-alarm~~-system functions properly.

9 2 9 3.2 Verify that the ~~NEAX-31~~ telephone system functions properly, that each station is assigned to the current restriction class.

3.3 Verify the sound powered phone system functions properly.

2 3.4 Verify the radio communication system functions properly.

3.5 Verify the Public Address system functions Properly.

4.0 ACCEPTANCE CRITERIA

The Inplant Communications System operates as described in section 9.5.2 when using above test methods.

14B.36 ~~PRIVATE~~ LLEA OFFSITE COMMUNICATION SYSTEMS

1.0 OBJECTIVE

To demonstrate the proper operation of the ~~Private~~ LLEA Offsite Communication Systems.

2.0 PREREQUISITES

2.1 All construction activities have been completed on the ~~Private~~ LLEA Offsite Communication Systems.

2.2 Support systems required for operation of the ~~Private~~ LLEA Offsite Communication System are available.

2

3.0 TEST METHOD

3.1 Verify proper operation of the Local Law Enforcement Agency VHF Radio.

3.2 Verify proper operation of the Local Law Enforcement Agency Land Lines.

3.3 Verify proper operation of 115V ac power sources for the Local Law Enforcement Agency Land Line.

4.0 ACCEPTANCE CRITERIA

The ~~private~~ LLEA offsite Communications Systems operate as described in section 9.5.2 when using above test methods.

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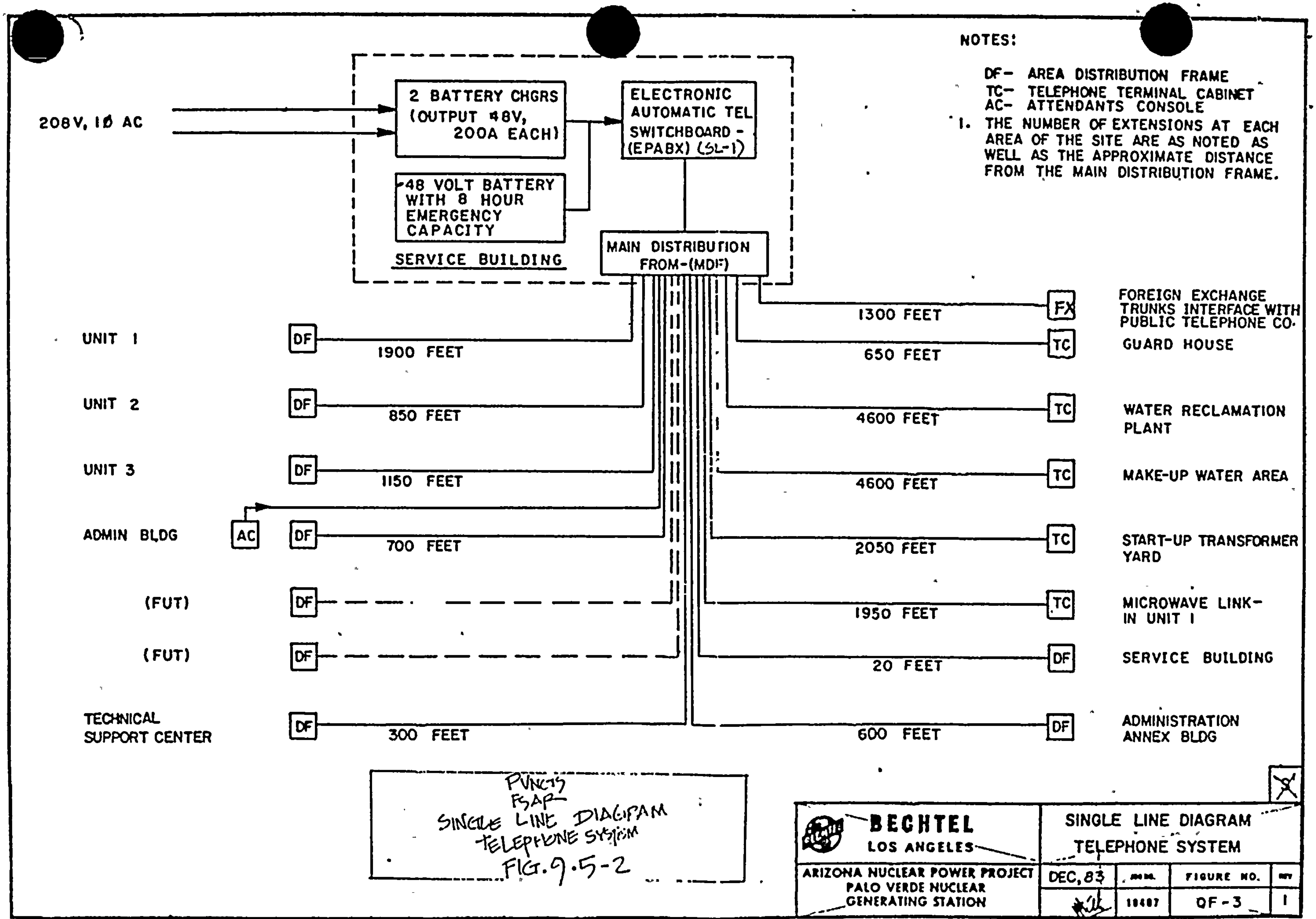

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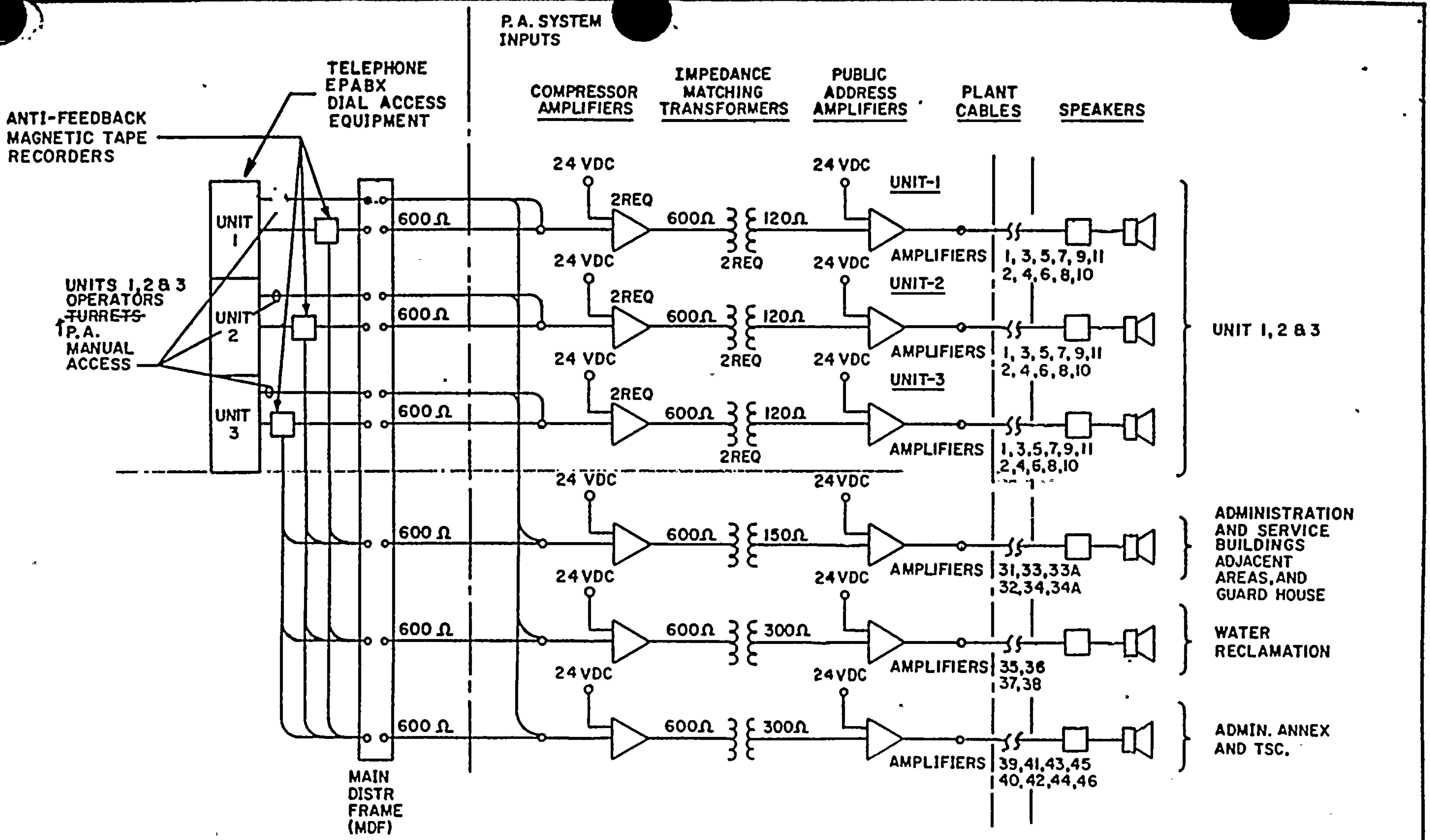

PVNGS
FSAR
SCHEMATIC DIAGRAM
PUBLIC ADDRESS EQUIPMENT
FIG. 9.5-3

BECHTEL LOS ANGELES	SCHEMATIC DIAGRAM PUBLIC ADDRESS EQUIPMENT		
ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	DEC. 83 / JOB NO. 10407	FIGURE NO. QF-2	REV 1

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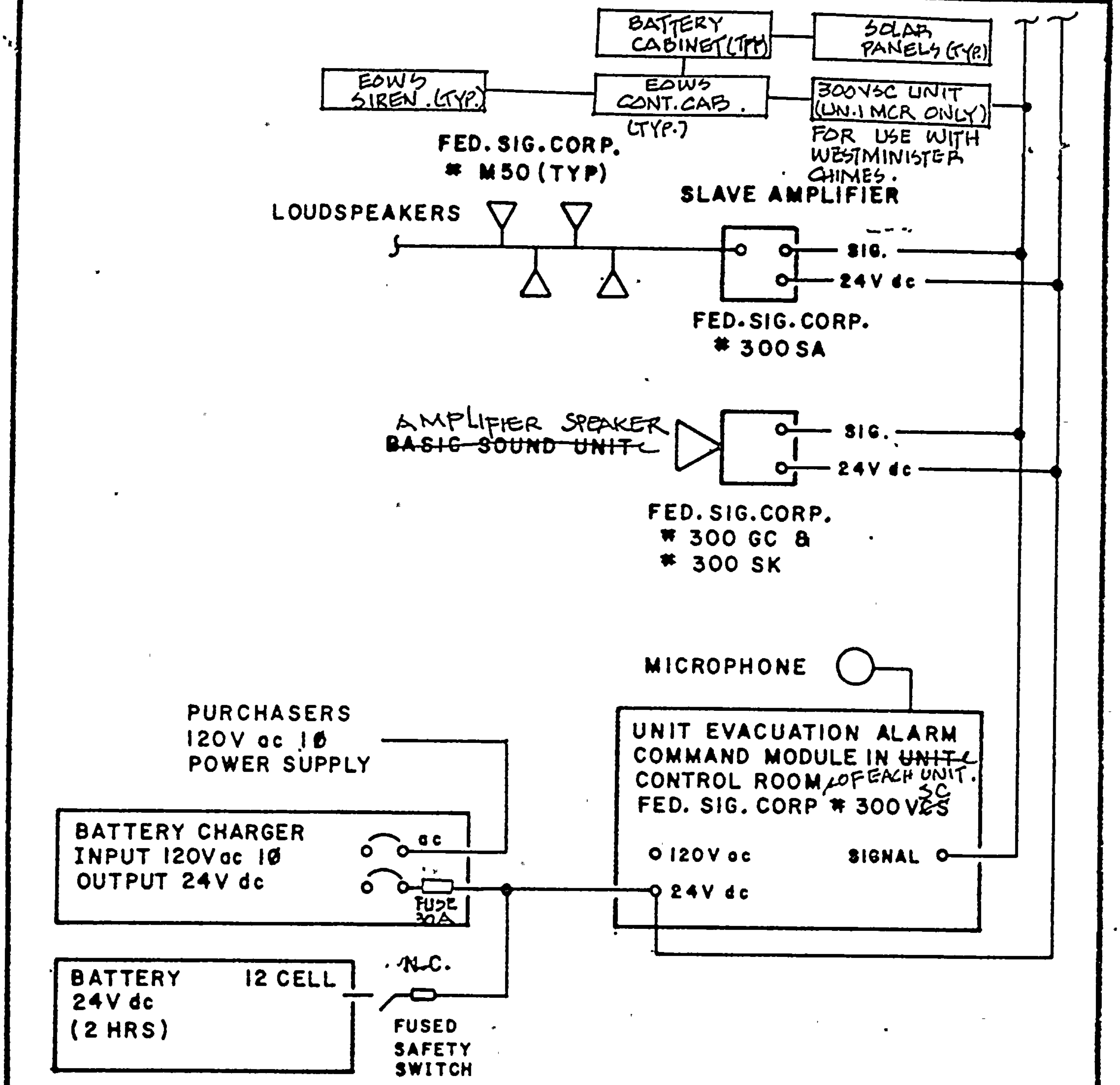
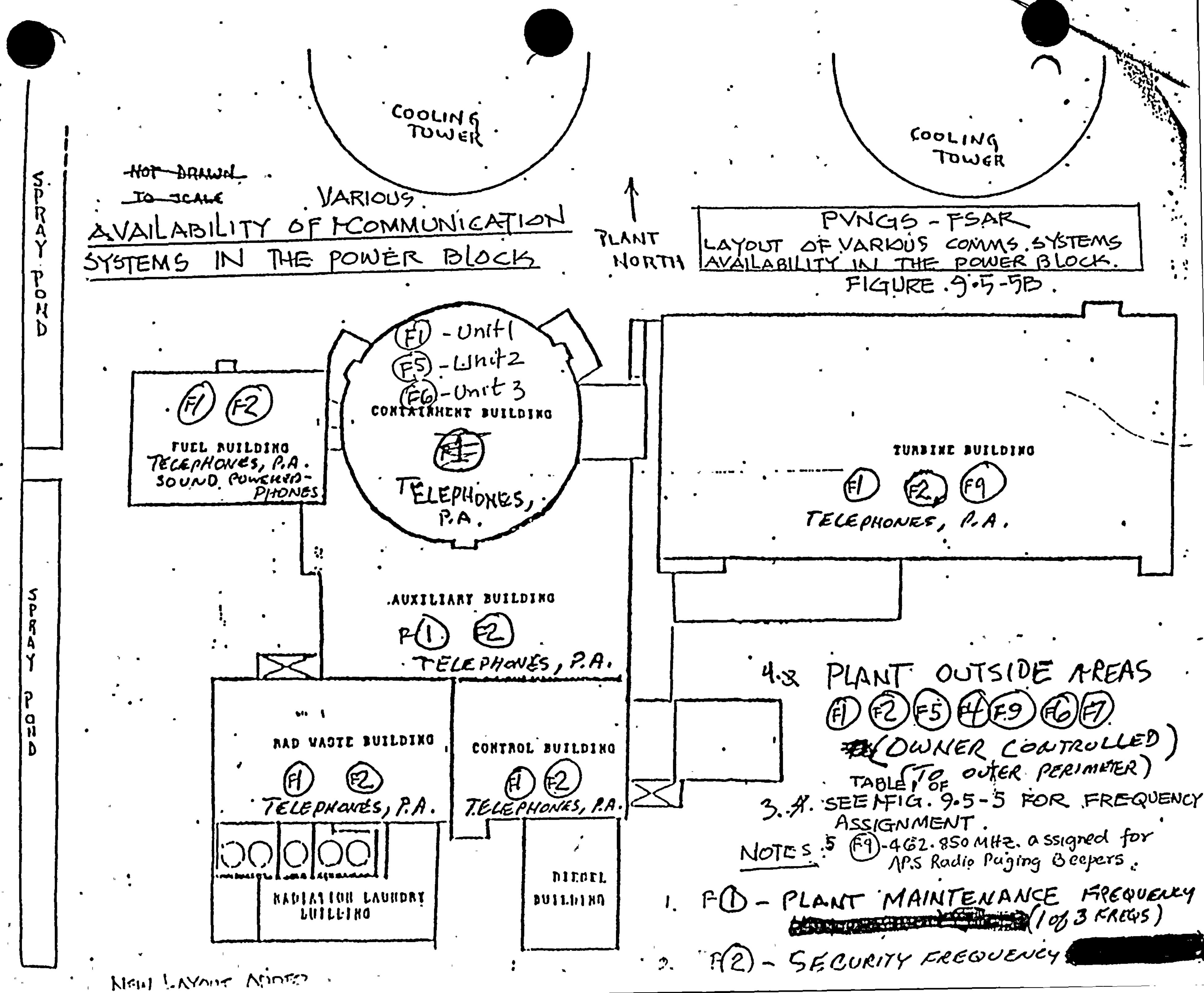


EOWS - ELECTRONIC OUTDOOR WARNING SIREN.

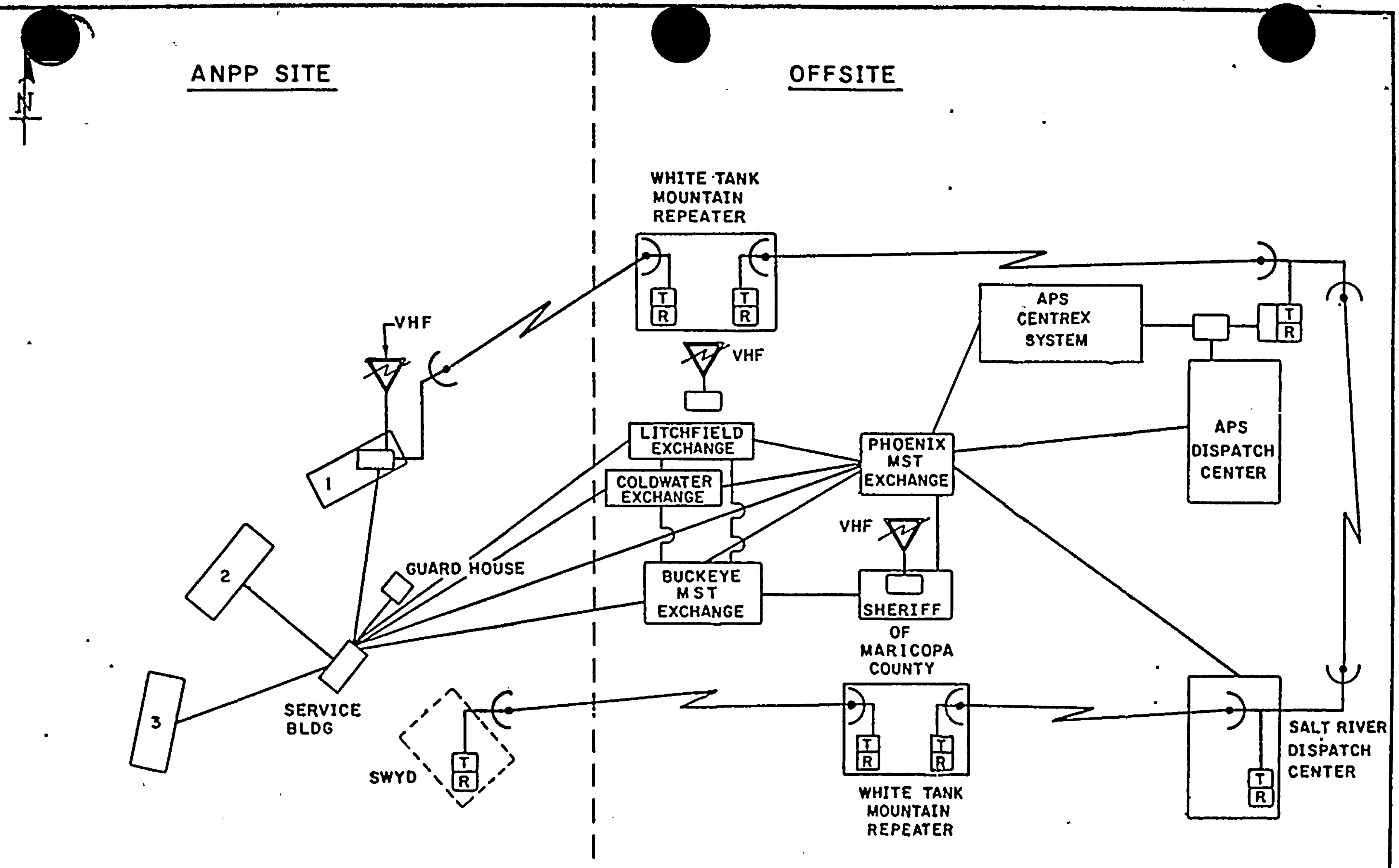
PVNGS
FSAR
BLOCK DIAGRAM
AREA/UNIT EVACUATION SYSTEM
FIG. 9.5-4

BECHTEL	ARIZONA ~~NUCLEAR POWER~~ PROJECT PALO VERDE NUCLEAR ~~GENERATING STATION~~	BLOCK DIAGRAM UNIT ~~EVACUATION~~ SYSTEM		
		JOB NO.	FIGURE NO.	REV
		10407	~~9F-1~~	~~0~~ 1

REPLACE EXISTING LAYOUT WITH THIS NEW LAYOUT



~~NOT DRAWN TO SCALE~~
VARIOUS
AVAILABILITY OF COMMUNICATION SYSTEMS IN THE POWER BLOCK
COOLING TOWER
COOLING TOWER
PLANT NORTH
PVNGS - FSAR
LAYOUT OF VARIOUS COMMS. SYSTEMS AVAILABILITY IN THE POWER BLOCK.
FIGURE 9.5-5B.
SPRAY POND
SPRAY POND
F1 - Unit 1
F5 - Unit 2
F6 - Unit 3
CONTAINMENT BUILDING
~~F1~~
TELEPHONES, P.A.
F1 F2
FUEL BUILDING
TELEPHONES, P.A.
SOUND POWERED-PHONES
TURBINE BUILDING
F1 F2 F9
TELEPHONES, P.A.
AUXILIARY BUILDING
F1 F2
TELEPHONES, P.A.
RAD WASTE BUILDING
F1 F2
TELEPHONES, P.A.
CONTROL BUILDING
F1 F2
TELEPHONES, P.A.
RADIATION LAUNDRY BUILDING
DIESEL BUILDING
4.8 PLANT OUTSIDE AREAS
F1 F2 F5 F4 F9 F6 F7
(OWNER CONTROLLED)
(TO OUTER PERIMETER)
3.4. SEE TABLE OF FIG. 9.5-5 FOR FREQUENCY ASSIGNMENT.
NOTES: 5 F9 - 462.850 MHz. assigned for APS Radio Paging Beepers.
1. F1 - PLANT MAINTENANCE FREQUENCY [redacted] (1 of 3 FREQS)
2. F2 - SECURITY FREQUENCY [redacted]
New Layout Added



MST: MOUNTAIN STATES TELEPHONE

PVNGS
FSAR
BLOCK DIAGRAM
OFFSITE COMMUNICATIONS
FIG. 9.5-6

BECHTEL LOS ANGELES	OFFSITE COMMUNICATIONS			
ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	JUNE 84	[illegible]	FIGURE NO.	REV
	[illegible]	10407	OE-1	2

Replace existing layout with this New one.

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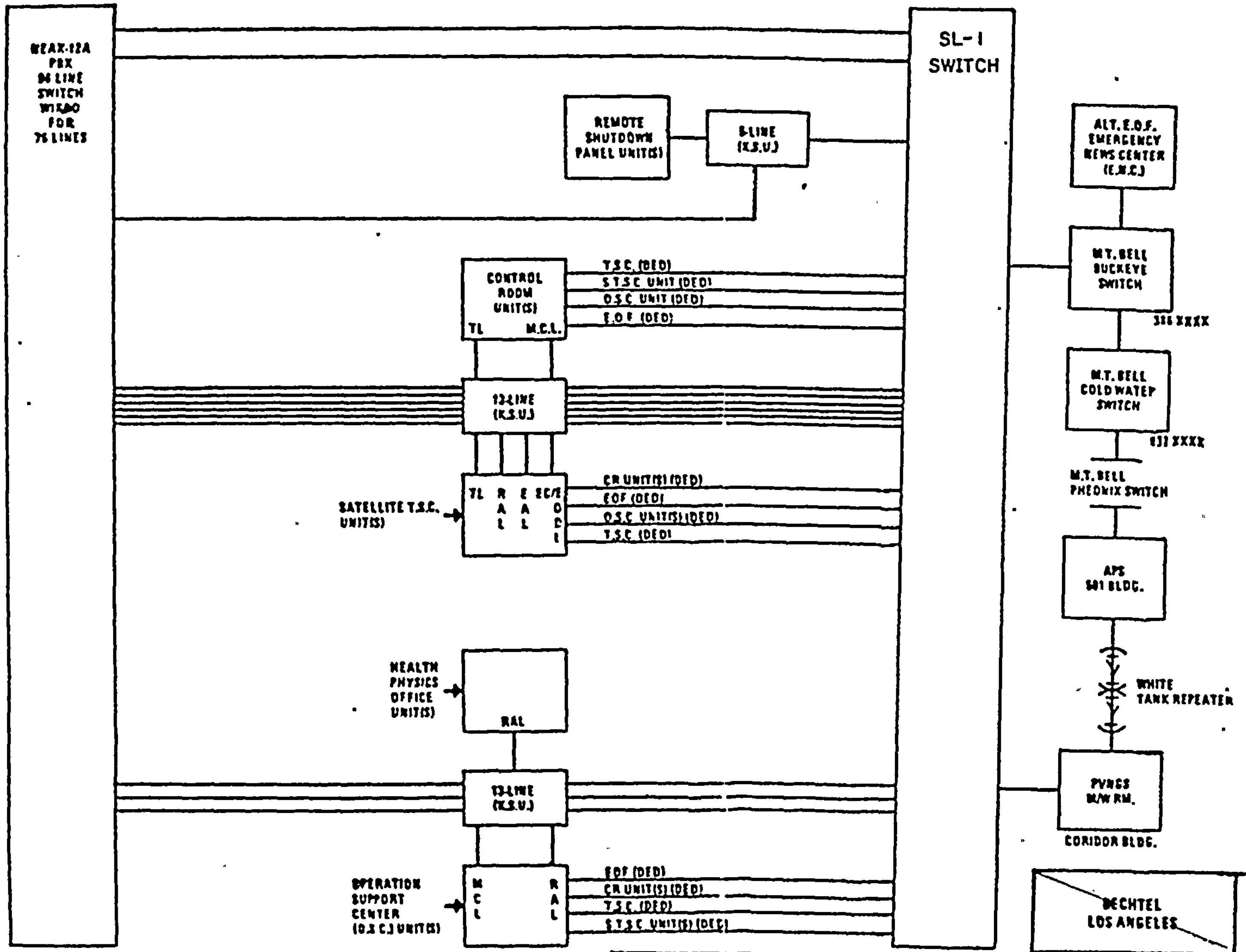


PVNGS
FSAR
BLOCK DIAGRAM
EMERGENCY COMMUNICATION SYSTEMS
FIG. 9.5-6A (SHT. 1 OF 2)

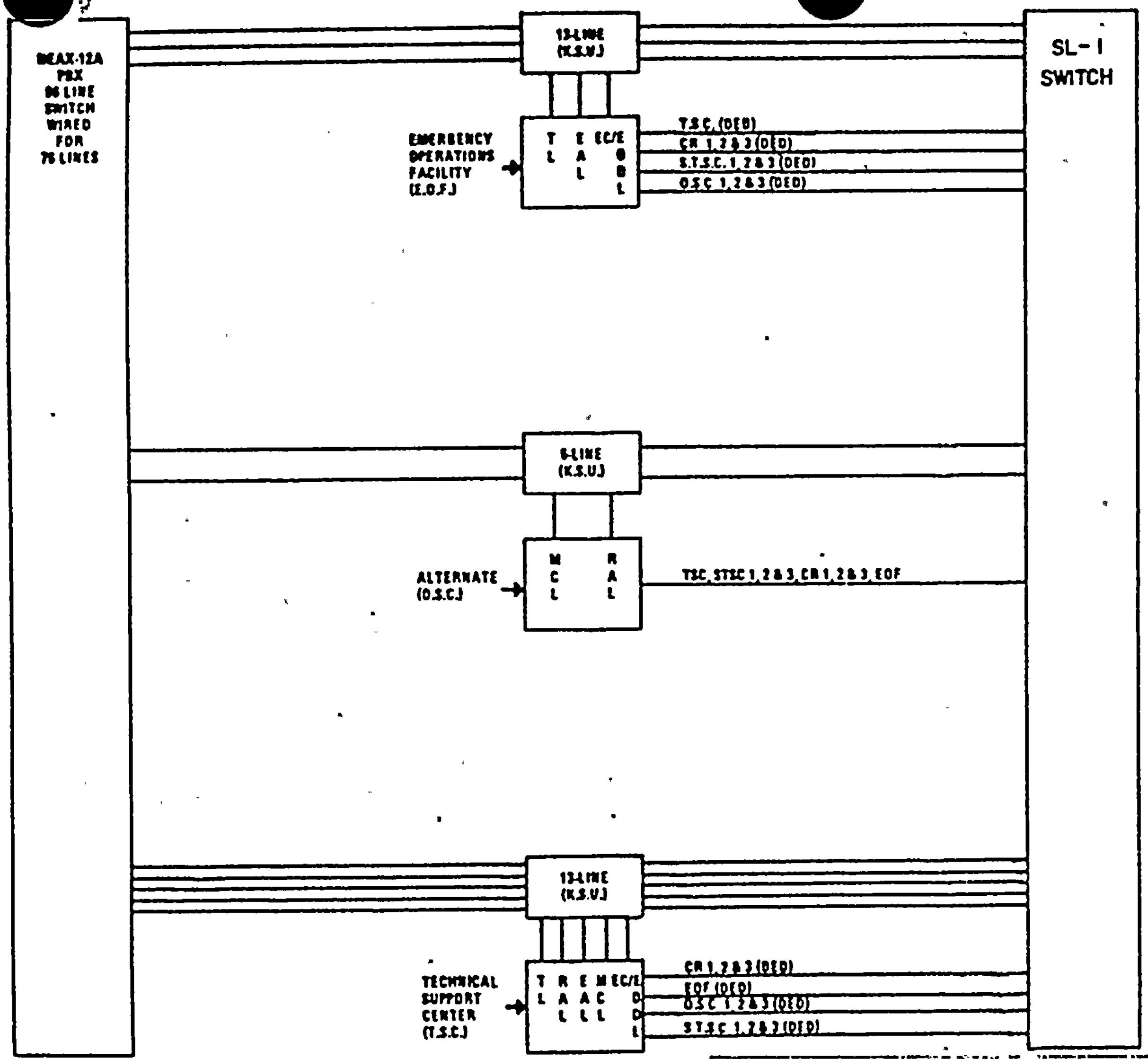
~~BECHTEL
LOS ANGELES~~

~~BLOCK DIAGRAM
EMERGENCY COMMUNICATION
SYSTEM (E.C.S.) (Sheet 1 of 2)~~

ARIZONA NUCLEAR POWER PROJECT
PALO VERDE NUCLEAR GENERATING STATION

	JOB NO	FIGURE	REV.
~~DEC, 83~~	10407	~~QF-5~~	0

NEW FIGURES
ADDED



PVNGS
FSAR
BLOCK DIAGRAM
EMERGENCY COMMUNICATION SYSTEM
FIG. 9.5-6A (SHT. 2 OF 2)

BECHTEL
LOS ANGELES

BLOCK DIAGRAM
EMERGENCY COMMUNICATION
SYSTEM (E.C.S.) (Sheet 2 of 2)

ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	DEC. 83	JOB NO. 10407	ATTACHMENT QF-5	REV. 0

NEW FIGURES NEEDED

C. Power Generation Design Basis Three

Lighting fixtures containing aluminum or aluminum alloys are not used inside the containment building.

9.5.3.1.3 Codes and Standards

Design and installation of the plant lighting systems uses the guidance provided by the National Electrical Code (NFPA No. 70-1975/ANSI C1-75) and the Handbook of the Illuminating Engineering Society.

, requiring operator access to achieve safe shutdown in the event of fire,

9.5.3.2 <u>System Description</u>

9.5.3.2.1 General Description

Unit lighting is divided into three subsystems: normal; essential; and emergency. The normal system is supplied from non-Class IE ac buses. The essential system is connected to Class IE ac buses. The emergency lighting system, consisting of batteries, battery chargers, and lamps, are fed from the same 8
supply as the essential lighting and function upon loss of ac power. Refer to table 9.5-4 for a list of areas served by both the essential and emergency lighting systems.

9.5.3.2.2 Component Description

The three lighting categories are described briefly in the following sections.

9.5.3.2.2.1 <u>Normal Lighting</u>. The normal lighting system is that system which provides illumination for the entire station. In each unit, the lighting load is distributed equally between two non-Class IE lighting load centers, each consisting of 1000 KVA 13,800 - 480/277-volt dry type transformers with 208/120 and 480/277-volt distribution subsystems. Areas remote

Table 9.5-4

AREAS REQUIR~~ED~~ING BOTH EMERGENCY AND ESSENTIAL LIGHTING FOR SAFE ~~REACTOR~~ SHUTDOWN IN THE EVENT OF FIRE

Area
Auxiliary Building
Safety injection pump rooms
Shutdown heat exchanger rooms
Piping penetration room
Boric acid makeup pump room
CVCS charging pump room (Train B only)
13 Essential cooling water surge tanks
Essential cooling water pump rooms
Access corridors to above rooms
Control Building
Main control room
Remote shutdown room
ESF switchgear room
Access corridors to above rooms
Main Steam Support Structure
Turbine driven auxiliary feedwater pump room
Motor driven auxiliary feedwater pump room
13 Atmospheric dump valves operating deck (el 140')
Access to above rooms
Diesel Generator Building
13 Diesel generator control rooms
Access corridors to above rooms

INSERT A

INSERT (A) to pg 9.5-48, (1/3)

Auxiliary Building

Reactor makeup water and boric acid makeup pumps room
Train A piping penetration room
Train B piping penetration room
Train A (Channel A) electrical penetration room
Train A (Channel C) electrical penetration room
Train B (Channel B) electrical penetration room
Train B (Channel D) electrical penetration room
Train B charging pump valve gallery room
Train B essential cooling water surge tank and south corridor area
Volume control tank valve gallery room
East corridors at elevation 120'0"
East corridors at elevation 51'6"
Hot laboratory
Access to above locations

Diesel Generator Building

Train B diesel generator room
Train B diesel generator control room
Access to above locations

INSERT (A), continued. (2/3) to page 9.5-48

Control Building

Train B essential chiller room
Train A ESF switchgear room
Train B ESF switchgear room
Train A (Channel A) DC equipment room
Train A (Channel C) DC equipment room
Train B (Channel B) DC equipment room
Train B (Channel D) DC equipment room
Train A remote shutdown room
Train B remote shutdown room
Control room
Access to above locations

Main Steam Support Structure

Turbine driven auxiliary feedwater pump room
Motor driven auxiliary feedwater pump room
Train A main steam isolation and dump valves area
Train B main steam isolation and dump valves area
Access to above locations

INSERT (A), continued (3/3) to page 9.5-48

Non-Power Block Areas

Condensate storage tank pump house
Access to above location

from the lighting load center are fed from local power sources. Lighting transformers for the system are solidly grounded at neutrals.

9.5.3.2.2.2 Essential Lighting. The essential lighting system supplements the normal lighting and provides a minimum level of illumination throughout each unit in the event of a failure of the normal lighting system. The essential lighting system supplies the lighting in the main control room and the remote shutdown room. Redundancy is provided in the essential
lighting system in the control room and remote shutdown panel room, 10
to shut down and maintain the unit in a hot shutdown condition.
The essential lighting system serving the control room and remote shutdown panel area is fed from Class IE MCCs, via Class IE isolation transformers, and is not tripped on SIAS. The remainder of the essential lighting feeders for the plant area are tripped on SIAS and can be manually reconnected after diesel generator sequencing. The essential lighting system is normally energized and is supplied from two redundant Class IE load centers.

9.5.3.2.2.3 Emergency Lighting. The dc-powered emergency
lighting system is provided in the main control room (except 8
the control room horseshoe suspended ceiling), at the
remote shutdown panel room, associated local control stations, and along emergency exit routes where emergency maintenance is expected to be required. In the event of the loss of essential lighting sources, the dc emergency lighting system is energized
automatically. The dc emergency lighting units, except in the 8
control room, consist of fixtures that have self-contained batteries, battery chargers, and switches that automatically energize the fixtures from their batteries in the event of the
loss of the ac source for their battery chargers. In the control 12
room panel area, the emergency lighting system consists of a

INSERT (B)　　INSERT (B)

INSERT (B) TO Pg 9.5-49 (USED TWICE)

, the Control Building AC switchgear and DC equipment areas, and the Auxiliary Building Channels A and B electrical penetration rooms,

number of fluorescent fixtures which are fed from the uninter-
12 ruptible power supply (UPS) and some self-contained battery
powered-emergency lighting units. The emergency lighting fluorescent
~~system~~ fixtures ~~in the control room horseshoe suspended ceil-~~
~~ing~~ are normally fed from the essential lighting system con-
8 nected from the redundant Class 1E buses through isolation
transformers. In the event of loss of Class 1E ac power
source, the fixtures are energized through the UPS consisting
12 of an inverter, a charger, and an 8-hour rated battery.
(See section 9.5.3.2.2.2 Essential Lighting.)

8 The batteries are designed to provide rated lighting for a
2 minimum continuous period of 8 hours. Spare self-contained
battery pack units will readily be available to areas as
required should there be a need for dc lighting in excess of
2 8 hours.

9.5.3.3 Safety Evaluation

The safety evaluations are numbered to correspond to the safety design bases and are as follows:

A. Safety Evaluation One

Emergency lighting systems that serve the control
8 room and the remote shutdown room and all supports
of other lighting systems installed in Category I
structures are designed in accordance with Seismic
Category I requirements as specified in section 3.2
and are consistent with the recommendations of
Regulatory Position C.1.n. of Regulatory Guide 1.29.
The components and supporting structures of any system,
equipment, or structure that are not Seismic Category I
and whose collapse could result in the loss of a
required lighting system function through either impact
or flooding are checked to determine that the lighting
system integrity is maintained.

2. In-Situ Combustible Load 35,500 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 26.6 minutes

G. Fire Detection

Ionization smoke detector systems are provided for early warning, and in a cross-zoned mode will actuate an automatic CO_2 gas system.

H. Fire Suppression

1. Primary

Automatic CO_2 total flooding

2. Secondary

One manual hose reel

Two portable CO_2 fire extinguishers 13

I. Ventilation

Manually controlled smoke exhaust venting to outside.

J. Drainage

ZONE 5A

Two 4-inch drains

K. Emergency Lighting

~~Egress~~ gLighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

2. In-Situ Combustible Load — 55,700 Btu/ft^2

3. Transient Combustible Load — ..

4. Equivalent Fire Severity — 41.8 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 5A.

13 2. Secondary

Two portable CO_2 fire extinguishers are located in Zone 5A.

I. Ventilation

Refer to Appendix 9A response to Question 9A.70. Portable fans exhaust the smoke to adjacent rooms where smoke exhaust fans exhaust to outside air.

J. Drainage

None

ZONE 6A

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communication

Sound powered phone jack(s) is provided.

G. Fire Detection

Ionization smoke detectors system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 5A.

2. Secondary

Two portable CO_2 fire extinguishers are located in adjacent Zone 5A. 13

I. Ventilation

Refer to Appendix 9A response to Question 9A.70. Portable fans exhaust the smoke to adjacent rooms where smoke exhaust fans exhaust to outside air.

J. Drainage

None

ZONE 7A

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

H. Fire Suppression

1. Primary

One manual hose reel

2. Secondary

Two portable CO_2 fire extinguishers

I. Ventilation

13 Smoke venting to outside. (Manual smoke exhaust fan)

J. Drainage

Seven 4-inch drains

ZONE 2

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation
of safe shutdown equipment

3. Transient Combustible Load

4. Equivalent Fire Severity 28.3 minutes

G. Fire Detection

Ionization smoke detector systems are provided for early warning, and in a cross-zoned mode will actuate an automatic CO_2 gas system.

H. Fire Suppression

1. Primary

Automatic CO_2 total flooding

2. Secondary

13 One manual hose reel and one portable CO_2 fire extinguisher. One portable CO_2 fire extinguisher and one manual hose reel are located in the adjacent Corridor Building.

I. Ventilation

Smoke venting to outside. (Manual Smoke Exhaust Fan)

J. Drainage

Two 4-inch drains

ZONE 5B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

2. In-Situ Combustible Load 35,600 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 26.6 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 5B.

2. Secondary

One portable CO_2 fire extinguisher is located in adjacent zone 5B. One portable CO_2 fire extinguisher and one manual hose reel are located in adjacent Corridor Building near Zone 5B. 13

I. Ventilation

(Refer to Appendix 9A response to Question 9A.70). Portable fans exhaust the smoke to adjacent rooms where smoke exhaust fans exhaust to outside air.

J. Drainage

None

ZONE 6B

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

ZONE 7B

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications 13

Sound powered phone jack(s) is provided.

G. Fire Detection

Actuation of the ultra-violet or thermal detector systems activates the automatic preaction water sprinkler system.

H. Fire Suppression

1. Primary

Automatic pre-action water sprinkler system

2. Secondary

One portable CO_2 fire extinguisher. Additionally, one manual hose reel is located in adjacent Control Building at elevation 100'0". 13

I. Ventilation

Flow through air filtration unit to outside by way of silencer room (engine operating).

J. Drainage

Seven 4-inch drains

ZONE 21B

K. Emergency Lighting

~~Egress~~ Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

None

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One portable CO_2 fire extinguisher

2. Secondary

One manual hose reel is located in the Control Building at elevation 100'0".

13 I. Ventilation

Flow through diesel generator room and silencer room to the outside (generator running). (Refer to Appendix 9A response to Question 9A.86).

J. Drainage

Two 4-inch drains

ZONE 22B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

F. Combustible Loading

1. Quantity/Type

- 20 pounds of cable insulation (Hypalon)
- 120 pounds of cable insulation (other)
- 20 pounds of oil and grease

2. In-Situ Combustible Load 3,500 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 2.6 minutes

G. Fire Detection

Smoke detectors are located in the pump house.

13 H. Fire Suppression

Manual hose streams from hydrants on the fire yard main.

I. Ventilation

Natural convection

J. Drainage

ZONE 83

None

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

None

2. Secondary

   One portable CO_2 fire extinguisher

I. Ventilation

   Flow to outside.

J. Drainage

   One 4-inch drain Zone 72

K. Emergency Lighting

   ~~Egress~~ lighting with 8-hour battery unit(s) is provided. 13

L. Emergency Communications

   Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

2. Secondary

One portable CO_2 fire extinguisher is located in adjacent Zone 72.

I. Ventilation

Flow to outside

J. Drainage

One 4-inch drain

Zone 73

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided. 13

L. Emergency Communications

Sound powered phone jack(s) is provided.

I. Ventilation

Flow to outside

J. Drainage

One 4-inch drain is provided at elevation 100'0"

Zone 74A

13 K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

I. Ventilation

Flow to outside

J. Drainage

One 4-inch drain Zone 74B 13

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

H. Fire Suppression

1. Primary

Two manual hose reels

2. Secondary

Two portable ABC powder fire extinguishers

I. Ventilation

Flow from the corridors to the rooms and then to the outside 13

J. Drainage

Five 4-inch drains

Zone 88B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

None

positioned for the operation of safe shutdown equipment

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 37A.

2. Secondary

Two portable ABC powder fire extinguishers are located in adjacent Zone 37A.

13 I. Ventilation

Flow through air filtration unit to outside

J. Drainage

One 4-inch drain

Zone 36

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

E. Radioactive Material

In process piping

F. Combustible Loading

1. Quantity/Type

- 990 pounds of cable insulation (Hypalon)
- 3,700 pounds of cable insulation (other)
- 60 pounds of oil and grease

2. In-Situ Combustible Load 21,000 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 15.7 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

Two manual hose reels

2. Secondary

Two portable ABC powder fire extinguishers.

I. Ventilation

Flow from the corridors to the rooms and then to outside

J. Drainage

Seven 4-inch drains

Zone 37A

K. Emergency Lighting

~~Egress~~ g lighting with 8-hour battery unit(s) positioned for access to safe shutdown equipment is provided.

L. Emergency Communications

None

H. Fire Suppression

1. Primary

Three manual hose reels

2. Secondary

Three portable ABC powder fire extinguishers.

I. Ventilation

Flow from the corridors to the rooms and then to the outside 13

J. Drainage

Ten 4-inch drains

Zone 37B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for access to safe shutdown equipment

F. Combustible Loading

1. Quantity/Type

- 390 pounds of cable insulation (Hypalon)
- 1,600 pounds of cable insulation (other)
- 50 pounds of oil and grease

2. In-Situ Combustible Load 21,600 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 16.2 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 37A. 13

2. Secondary

One portable ABC powder fire extinguisher is located in adjacent Zone 37A.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

One 4-inch drain Zone 37C

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 37B.

2. Secondary

One portable ABC powder fire extinguisher is located in adjacent Zone 37B.

I. Ventilation

Flow through air filtration unit to outside 13

J. Drainage

One 4-inch drain Zone 37D

K. Emergency Lighting

~~Egress~~ g lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

H. Fire Suppression

1. Primary

Automatic preaction water sprinkler system, covering cable trays only.

2. Secondary

Two manual hose reels and two portable CO_2 fire extinguishers.

I. Ventilation

13 Flow from the corridors to the rooms and then through air filtration unit to outside

J. Drainage

Eight 4-inch drains Zone 42C

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for access to safe shutdown equipment

G. Fire Detection

Actuation of ionization smoke detector system(s) activates the automatic preaction water sprinkler system. The detector system(s) provide early warning capability. (Refer to Appendix 9A reponse to Question 9A.116).

H. Fire Suppression

1. Primary

Automatic preaction water sprinkler system

2. Secondary

One manual hose reel and one portable CO_2 fire extinguisher are located in adjacent Zone 42C. 13

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Three 4-inch drains

Zone 46B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

F. Combustible Loading

1. Quantity/Type

- 290 pounds of cable insulation (Hypalon)
- 980 pounds of cable insulation (other)

2. In-Situ Combustible Load 10,100 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 7.6 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

1. Primary

One manual hose reel

NOTE

The passage to Fire Area X through the 3-hour rated south wall is protected by a fixed sprinkler system water curtain. 13

2. Secondary

One portable CO_2 fire extinguisher.

I. Ventilation

Flow from corridors to rooms and then through air filtration unit to outside

J. Drainage

Four 4-inch drains

Zone 48

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Two 4-inch drains

Zone 50B

K. Emergency Lighting

~~Egress~~ l lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided. 13

L. Emergency Communications

None

H. Fire Suppression

1. Primary

One manual hose reel is located in adjacent Zone 53.

2. Secondary

One portable CO_2 fire extinguisher is located in adjacent Zone 53.

I. Ventilation 13

Flow to outside

J. Drainage

None

Zone 51B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

None

positioned for access to safe shutdown equipment

G. Fire Detection

Actuation of either ionization smoke detector system(s) or line-type thermal detector system(s) activates the automatic preaction water sprinkler system and will pressurize the piping with water. Either detector system alone can provide early warning.

H. Fire Suppression

1. Primary

   Automatic preaction water sprinkler system covering the cable trays only (excluding corridor adjacent to the west elevator and stairwell).

2. Secondary 13

   One manual hose reel and two portable CO_2 fire extinguishers.

I. Ventilation

Flow from the corridors to the rooms and through air filtration unit to outside

J. Drainage

Four 4-inch drains

Zone 52A

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

positioned for access to safe shutdown equipment

L. Emergency Communications

None

H. Fire Suppression

1. Primary

Automatic preaction water sprinkler system~~,~~ covering cable trays only except in northeast corner (north of column line A3) which has area coverage.

2. Secondary

Two manual hose reels and two portable CO_2 fire extinguishers.

I. Ventilation 13

Flow from the corridors to the rooms and through the air filtration unit to outside

J. Drainage

Eight 4-inch drains Zone 52D

K. Emergency Lighting

~~Egress~~ L lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

None

2. Secondary

One portable CO_2 fire extinguisher

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

13 Four 4-inch drains Zone 53

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

positioned for access to safe shutdown equipment

L. Emergency Communications

Sound powered phone jack(s) is provided.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

None

Zone 55C

K. Emergency Lighting

~~None~~

Lighting with 8-hour battery unit(s) positioned for access to safe shutdown equipment is provided.

L. Emergency Communications

None

13

- 100 pounds of rubber
- 2,900 pounds of Mipolam flooring

2. In-Situ Combustible Load 26,400 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 20 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning.

H. Fire Suppression

13 1. Primary

Two ABC powder and one CO_2 fire extinguishers.

2. Secondary

One manual hose reel is located in adjacent 57N.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Three 4-inch drains

Zone 57A

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided

positioned for the operation of safe shutdown equipment

F. Combustible Loading

1. Quantity/Type

- 400 pounds of cable insulation (Hypalon)
- 1,400 pounds of cable insulation (other)
- 200 pounds of papers and fabrics
- 400 pounds of rubber
- 4,400 pounds of Mipolam flooring

2. In-Situ Combustible Load 21,700 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 16 minutes

G. Fire Detection

Ionization smoke detector system(s) is provided for early warning. 13

H. Fire Suppression

1. Primary

Five manual hose reels

2. Secondary

One pressurized water fire extinguisher.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

None

Zone 57Ne

K. Emergency Lighting

~~Egress~~ L lighting with 8-hour battery unit(s) positioned for access to safe shutdown equipment is provided.

L. Emergency Communications

None

F. Combustible Loading

1. Quantity/Type

- 1,500 pounds of cable insulation (Hypalon)
- 6,600 pounds of cable insulation (other)

2. In-Situ Combustible Load 55,300 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 41.5 minutes

G. Fire Detection

Actuation of either the ionization smoke detector or the line-type thermal detector systems activates an early warning alarm and the automatic preaction system.

H. Fire Suppression

1. Primary

Automatic preaction sprinkler system

2. Secondary

One manual hose reel and one portable CO_2 fire extinguisher are located in adjacent Zone 42D.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Two 4-inch drains Zone 42A

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

J. Drainage

Three 4-inch drains

Zone 47A

K. Emergency Lighting

13 ~~Egress~~ lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Two 4-inch drains

Zone 42B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided. 13

L. Emergency Communications

Sound powered phone jack(s) is provided.

G. Fire Detection

Actuation of either ionization smoke detector or the line-type thermal detector system(s) activates the automatic preaction water sprinkler system and will pressurize the piping with water. Either detector system can provide early warning capability.

H. Fire Suppression

1. Primary

Automatic preaction water sprinkler system covering cable trays and structural members only.

13 2. Secondary

One portable CO_2 fire extinguisher and one manual hose reel are located in adjacent Zone 52D.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Three 4-inch drains Zone 47B

K. Emergency Lighting

~~Egress~~ lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

positioned for the operation of safe shutdown equipment

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13

Table 9B.3-1

COMPARISON OF PALO VERDE NUCLEAR GENERATING STATION TO APPENDIX A OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1 (Sheet 3 of 68)

A. OVERALL REQUIREMENTS OF NUCLEAR PLANT FIRE PROTECTION PROGRAM (CONTINUED)

APPLICATION DOCKETED BUT CONSTRUCTION PERMIT NOT RECEIVED AS OF 7/1/76	PLANTS UNDER CONSTRUCTION AND OPERATING PLANTS	PVNGS POSITION AND BASIS FOR NON-COMPLIANCE ITEMS
4. Single Failure Criterion A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena. However, in the event of the most severe earthquake, i.e., the Safe Shutdown Earthquake (SSE), the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown. The fire protection systems should, however, retain their original design capability for (1) natural phenomena of less severity and greater frequency (approximately once in 10 years) such as tornadoes, hurricanes, floods, ice storms, or small intensity earthquakes which are characteristic of the site geographic region and (2) for potential man-created site related events such as oil barge collisions, aircraft crashes which have a reasonable probability of occurring at a specific plant site.	4. Single Failure Criterion A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena.	4. Single Failure Criterion PVNGS complies with the "single failure criterion" based on the definition of "backup" fire suppression being interpreted as follows for each specific hazard: NOTE: Postulated fires or fire protection system failures are not considered concurrent with other plant accidents or the most severe natural phenomena. • For hazards which depend upon water as both primary and backup suppression, PVNGS has redundant fire water pumps with independent power supplies. Piping between fire pumps and any of the several buildings within the plant is routed such that two separate flow paths exist, with sectional valves located such that a failure in either flow path can be isolated. • For any building which loses internal fire water protection due to a single failure of the fire water piping within the building, backup suppression capability is available from outside hydrants and/or inside portable extinguishers. • Specifically for the AUXILIARY AND Control Buildings, a single failure of the internal fire water piping does not impair both automatic sprinkler/spray systems and all of the internal fire water hose stations for any fire zone; i.e., if the failure for any specific hazard impairs the automatic sprinkler systems, at least one Class II hose station is still available in the fire zone. 13 • Specifically for the Auxiliary Building, a single failure of the internal fire water piping does not impair the suppression capability (either automatic or manual) of both Train A and Train B; i.e. after any single failure has occurred within the building, all areas of one safety related train will retain their total fire suppression capability. • Specifically for the Turbine Building, a single failure of any fire water piping still allows full coverage of any location by either automatic sprinkler systems or by internal fire water hose stations.
The effects of lightning strikes should be included in the overall plant fire protection program.	The effects of lightning strikes should be included in the overall plant fire protection program.	PVNGS minimizes the effects of lightning strikes by providing lightning protection for the structure in accordance with the Underwriters' Laboratory Master Labeled Lightning Protection Program. All startup transformers, main transformers, and 13.8 kV switchgear are protected with appropriate lightning arrestors. (See Appendix 9A response to Question 9A.66.)

Table 9B.3-1

COMPARISON OF PALO VERDE NUCLEAR GENERATING STATION TO APPENDIX A OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1 (Sheet 16 of 68)

D. GENERAL GUIDELINES FOR PLANT PROTECTION

APPLICATION DOCKETED BUT CONSTRUCTION PERMIT NOT RECEIVED AS OF 7/1/76	PLANTS UNDER CONSTRUCTION AND OPERATING PLANTS	PVNGS POSITION AND BASIS FOR NON-COMPLIANCE ITEMS
1. Building Design	1. Building Design	1. Building Design
(a) Plant Layouts should be arranged to:		(a) Plant Layouts:
(1) Isolate safety related systems from unacceptable fire hazards, and	(1) SAME	(1) Safety related systems are isolated from unacceptable fire hazards. For detailed descriptions of the protection and isolation of safety related systems, see section 9B.2, "Fire Hazards Analysis".
(2) Separate redundant safety related systems from each other so that both are not subject to damage from a single fire hazard.	(2) Alternatives: (a) Redundant safety related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant coatings and fire suppression systems, or (b) a separate system to perform the safety function should be provided.	(2) PVNGS separates redundant safety related systems from each other so that both are not subject to damage from a single fire hazard. Redundant safety related systems are generally located in separate fire areas and/or have sufficient spatial separation which meet the requirements of Section III.G of 10CFR50, Appendix R, as explained in section 9B.2 of this report. For an area-by-area description of the separation of redundant safety related equipment, refer to section 9B.2. (See Appendix 9A responses to Questions 9A.73, 9A.74, 9A.77, 9A.95, 9A.101, 9A.102, 9A.121 and 9A.130.) REDUNDANT SAFETY-RELATED EQUIPMENT REQUIRED TO SHUT DOWN THE UNIT PER THE DESIGN BASES OF SECTION A.4 ARE SEPARATED PER THE REQUIREMENTS OF 10CFR50, APPENDIX R
(b) In order to accomplish 1.(a) above, safety related systems and fire hazards should be identified throughout the plant. Therefore, a detailed fire hazard analysis should be made. The fire hazards analysis should be reviewed and updated as necessary.	(b) SAME - Additional fire hazards analysis should be done after any plant modification.	(b) PVNGS complies and the detailed "Fire Hazards Analysis" is provided by section 9B.2. The "Fire Hazards Analysis" identifies safety related systems and fire hazards. The fire hazards analysis is reviewed and updated after plant modifications as necessary.

Table 9B.3-1

COMPARISON OF PALO VERDE NUCLEAR GENERATING STATION TO APPENDIX A OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1 (Sheet 38 of 68) 13

E. FIRE DETECTION AND SUPPRESSION (CONTINUED)

APPLICATION DOCKETED BUT CONSTRUCTION PERMIT NOT RECEIVED AS OF 7/1/76	PLANTS UNDER CONSTRUCTION AND OPERATING PLANTS	PVNGS POSITION AND BASIS FOR NON-COMPLIANCE ITEMS
2. Fire Protection Water Supply Systems (Cont)	2. Fire Protection Water Supply Systems (Cont)	2. Fire Protection Water Supply Systems (Continued)
		(4) This design feature will ensure immediate operator attention in isolating and valving off the tank or the pipe section from where leak is occurring. The main plant fire water supply capacity is capable of refilling either tank in eight hours.
(e) The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 1,000 gpm for manual hose streams plus the greater of: (1) all sprinkler heads opened and flowing in the largest designed fire area; or (2) the largest open head deluge system(s) operating.	(e) SAME	(e) Two fire water supply tanks, each with dedicated 300,000 gallons fire water capacity, have been provided [see Section E.2.(d) of this table]. The flow rate is based on 500 gal/min for manual hose stream plus the hydraulically calculated demand for the largest fire sprinkler or deluge system. 13 PVNGS COMPLIES
(f) Lakes or fresh water ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied: (1) The additional fire protection water requirements are designed into the total storage capacity; and	(f) SAME	(f) Not applicable to PVNGS

Table 9B.3-1

COMPARISON OF PALO VERDE NUCLEAR GENERATING STATION TO APPENDIX A OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1 (Sheet 40 of 68) 13

E. FIRE DETECTION AND SUPPRESSION (CONTINUED)

APPLICATION DOCKETED BUT CONSTRUCTION PERMIT NOT RECEIVED AS OF 7/1/76	PLANTS UNDER CONSTRUCTION AND OPERATING PLANTS	PVNGS POSITION AND BASIS FOR NON-COMPLIANCE ITEMS
3. Water Sprinklers and Hose Standpipe Systems	3. Water Sprinklers and Hose Standpipe Systems	3. Water Sprinklers and Hose Standpipe Systems
(a) Each automatic sprinkler system and manual hose station standpipe should have an independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.	(a) SAME	(a) PVNGS complies by providing headers that are fed from each end for the Control, Auxiliary and Turbine Buildings. These headers serve multiple sprinkler systems and also the hose rack/reel stations for each respective building, and no single failure will result in any of the following situations: Q • For the Auxiliary Building, the suppression capability for both Train A and Train B impaired at once. • For the Auxiliary and Control Buildings, primary water spray systems and all hose stations for any specific fire zone impaired at once. • For the Turbine Building, primary sprinkler system and backup hose stations impaired at once. • For the Diesel Generator Building, no single failure can impair both trains or both primary and backup fire protection system. Separate headers from the Control Building feed the automatic preaction sprinkler systems. Each diesel generator train is fed separately. The hose stations, connected to each header, are located in the Control Building. • For the Main Steam Support Structure, no single failure can impair both the primary and backup suppression capability. The backup hose streams are available from hydrant on the yard main and hose station No. 63 in the Turbine Building adjacent to the Main Steam Support Structure. (see Appendix 9A response to Question 9A.100). In the Fuel Building, sprinkler system and manual hose stations are fed from a single header connected to the plant underground yard main. Q In the Radwaste Building, the sprinkler system and hose stations are fed from a single header connected to the plant underground yard main. In the Containment Building, all of the hose stations and the sprinklers for the charcoal filters are fed from a single header from the Auxiliary Building. The supply header piping is Seismic Category I. (see Appendix 9A response to Question 9A.97). 13

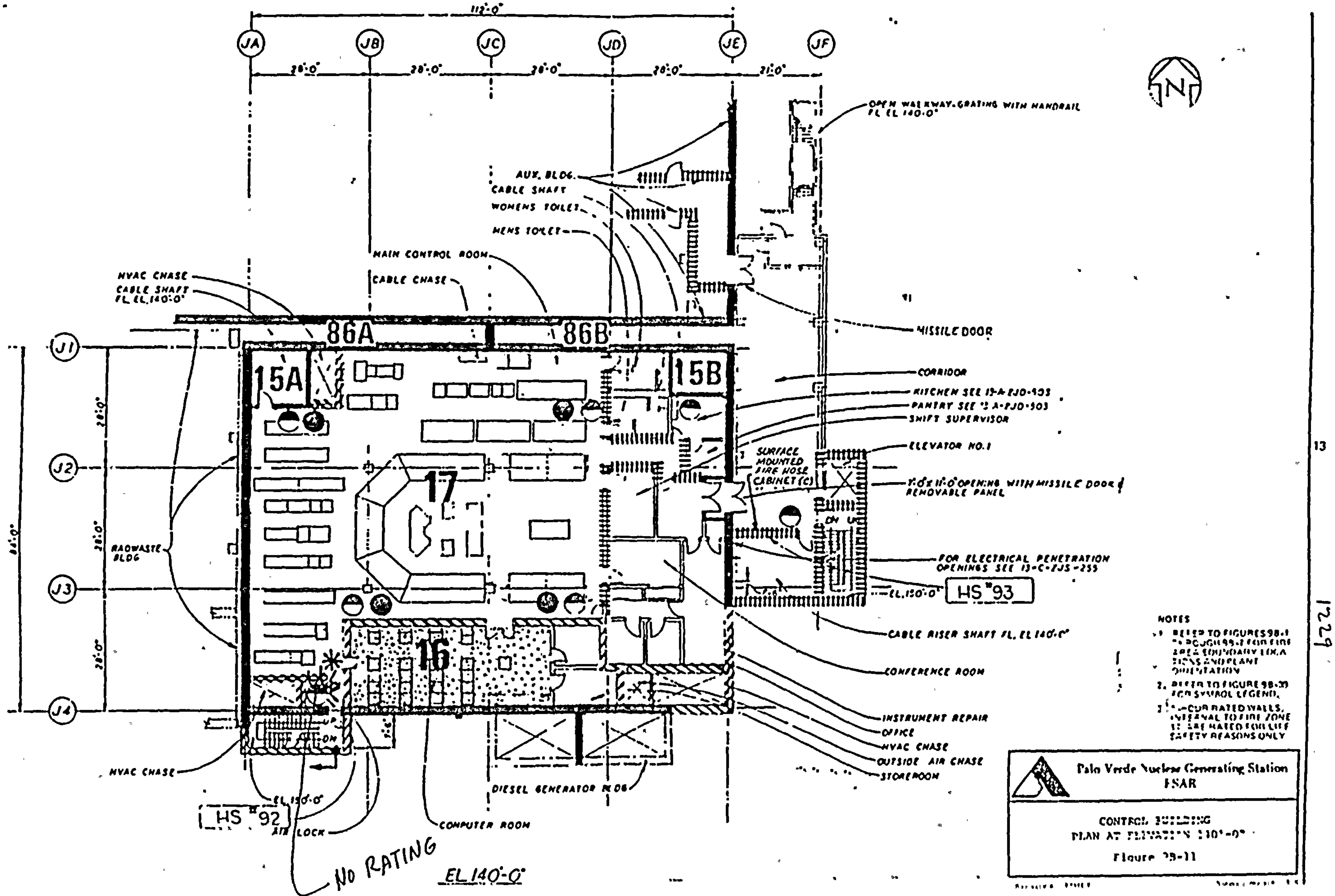
placed in a configuration to isolate the hazard area from any flow of outside air. The closing of dampers will be timed relative to the CO_2 discharge such that overpressurization of the hazard area will not occur.

The alarm condition is maintained until the system relay is reset manually. The control pilot valve also may be operated manually to activate the system. A supervised 1/4-inch ball valve is provided to deactivate the system when personnel occupy the room. The storage capacity of the system is adequate to permit two separate discharges within the largest single protected area immediately after complete purging of the main generator with carbon dioxide.

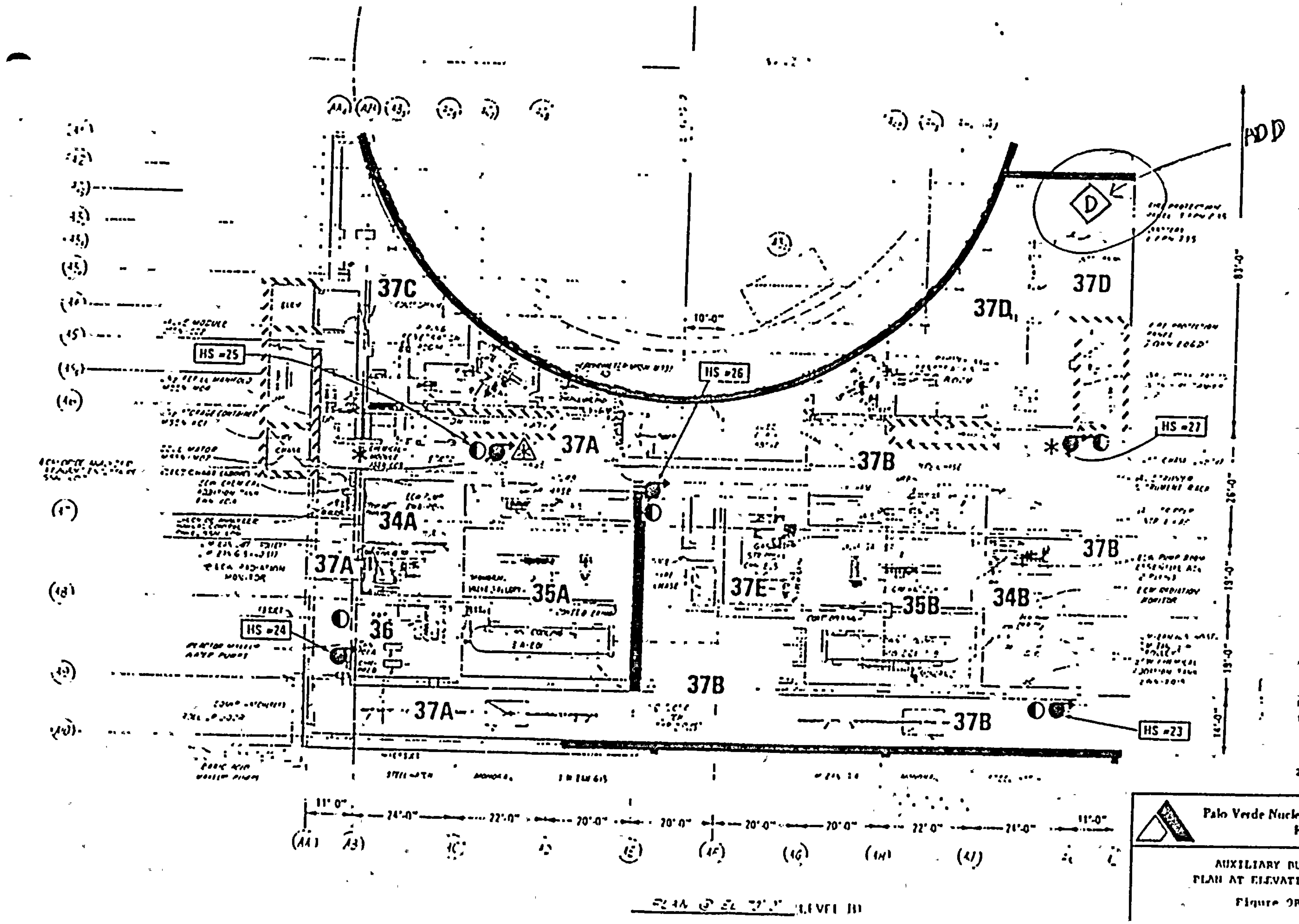
Operation of CO_2 hose reels for local application is initiated by manually removing the playpipe from its support bracket, thereby causing the master valve at the storage tank to open and charge the piping up to the nozzle. ~~Removal of the playpipe also trips a limit switch which registers an alarm condition in the control room.~~ DELETE Discharge of CO_2 is controlled by the hose operation by utilizing the squeeze-type valve at the nozzle. Replacement of the playpipe on its support shuts the master valve~~s and returns the limit switch to normal.~~ DELETE

I. Halon 1301 Systems

Halon 1301 system operation is initiated by the product of combustion detectors (operation type) which are cross-zoned. Actuation of the first circuit (or loop),



112'-0"
JA
JB
JC
JD
JE
JF
28'-0"
21'-0"
OPEN WALKWAY-GRATING WITH HANDRAIL FL EL 140'-0"
AUX. BLDG.
CABLE SHAFT
WOMENS TOILET
MENS TOILET
MAIN CONTROL ROOM
CABLE CHASE
HVAC CHASE
CABLE SHAFT FL. EL. 140'-0"
86A
86B
MISSILE DOOR
J1
J2
J3
J4
15A
15B
17
16
CORRIDOR
SHIFT SUPERVISOR
ELEVATOR NO. 1
SURFACE MOUNTED FIRE HOSE CABINET (C)
RADWASTE BLDG
FOR ELECTRICAL PENETRATION OPENINGS SEE 13-C-ZJS-255
EL. 150'-0"
HS #93
CABLE RISER SHAFT FL. EL 140'-0"
CONFERENCE ROOM
INSTRUMENT REPAIR
OFFICE
HVAC CHASE
OUTSIDE AIR CHASE
STOREROOM
DIESEL GENERATOR BLDG
COMPUTER ROOM
AIR LOCK
EL 150'-0"
HS #92
NO RATING
EL 140'-0"
NOTES
Palo Verde Nuclear Generating Station
FSAR
CONTROL BUILDING
Figure 9B-11
13
1229



NOTES

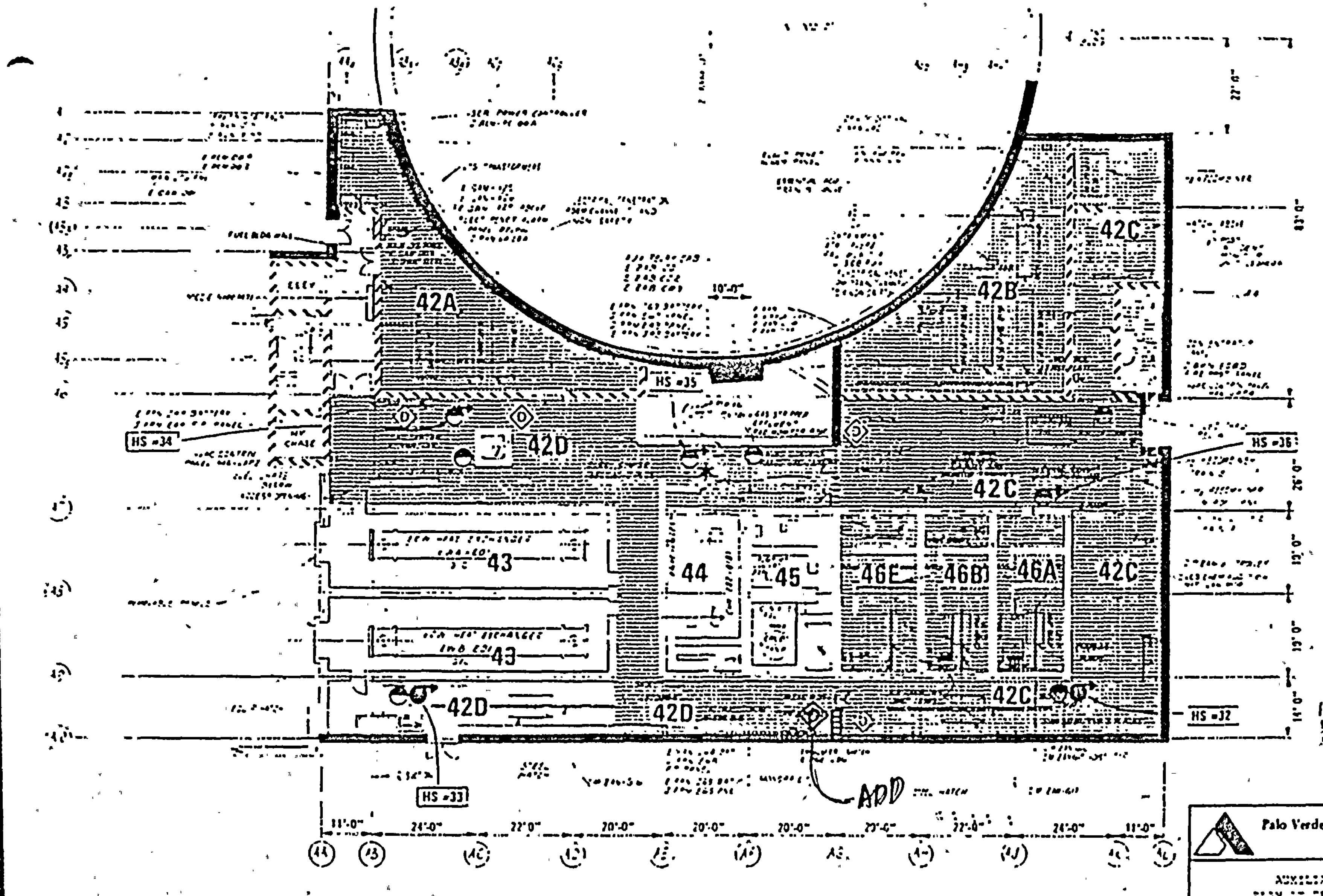
1 REFER TO FIGURES 9B-1 THROUGH 9B-? FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION

2 REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND

Palo Verde Nuclear Generating Station
FSAR

AUXILIARY BUILDING
PLAN AT ELEVATION 70'-0"

Figure 9B-19



NOTES:

1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-19 FOR SYMBOL LEGEND

Palo Verde Nuclear Generating Station
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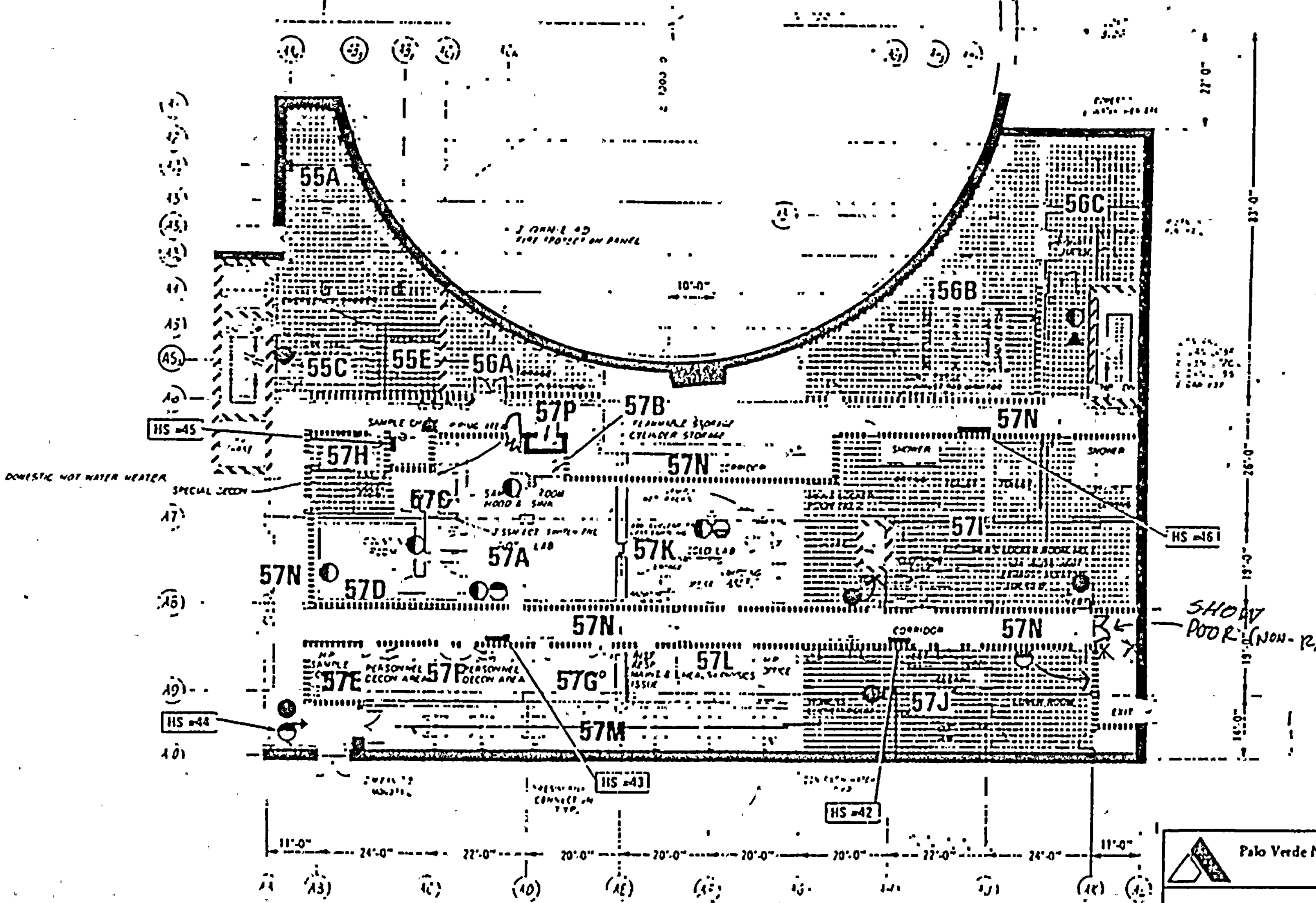
AUXILIARY BUILDING
PLAN AT ELEVATION 100'-0"

Figure 9B-21

Amendment 11

13



(1-HOUR WALLS RATED FOR LIFE SAFETY)

SHOW DOOR (NON-RATED)

NOTES

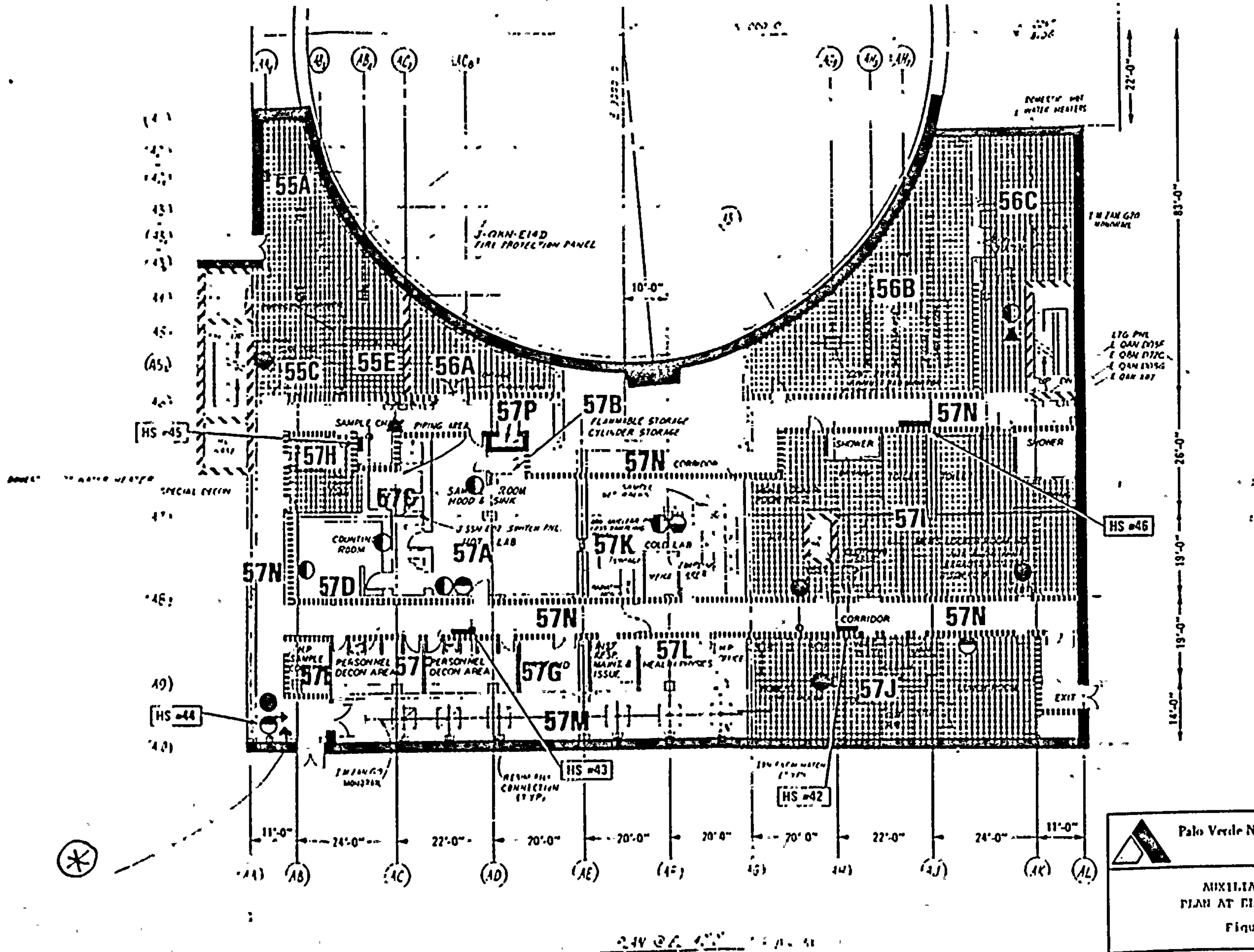
1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND
3. 1-HOUR RATED CORRIDOR WALLS ARE RATED FOR LIFE SAFETY REASONS ONLY

13

Palo Verde Nuclear Generating Station
FSAR

AUXILIARY BUILDING
PLAN AT ELEVATION 140'-0"

Figure 9B-23

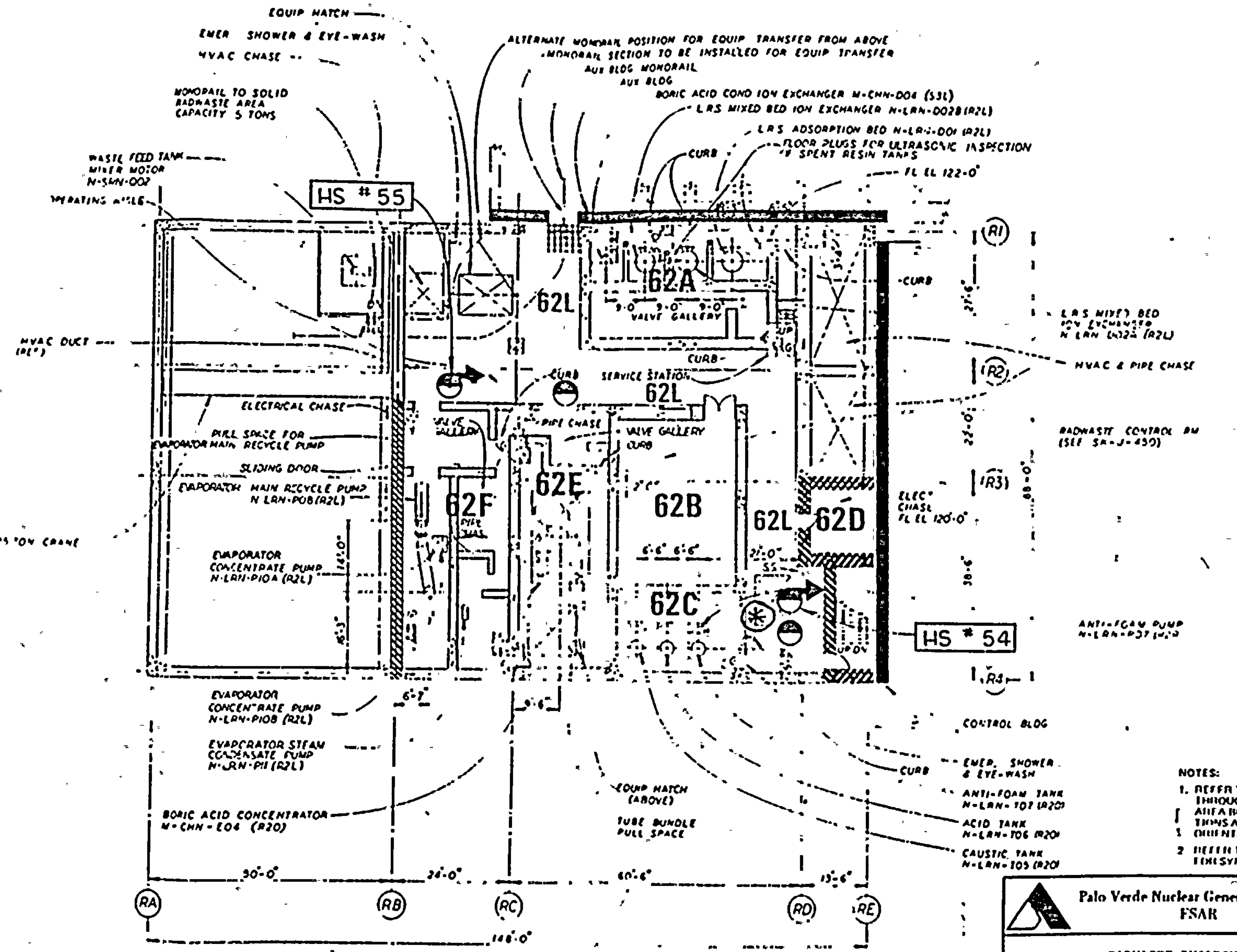


NOTES:

1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION.
2. REFER TO FIGURE 9B-30 FOR SYMBOL LEGEND.
3. 1-HOUR RATED CORRIDOR WALLS ARE RATED FOR LIFE SAFETY REASONS ONLY.

Palo Verde Nuclear Generating Station
FSAR

AUXILIARY BUILDING
PLAN AT ELEVATION 140'-0"
Figure 9B-23



PLAN AT FL. 120'-0"

NOTES:

1. REFER TO FIGURES 98-1 THROUGH 98-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION.
2. REFER TO FIGURE 98-39 FOR SYMBOL LEGEND.

Palo Verde Nuclear Generating Station
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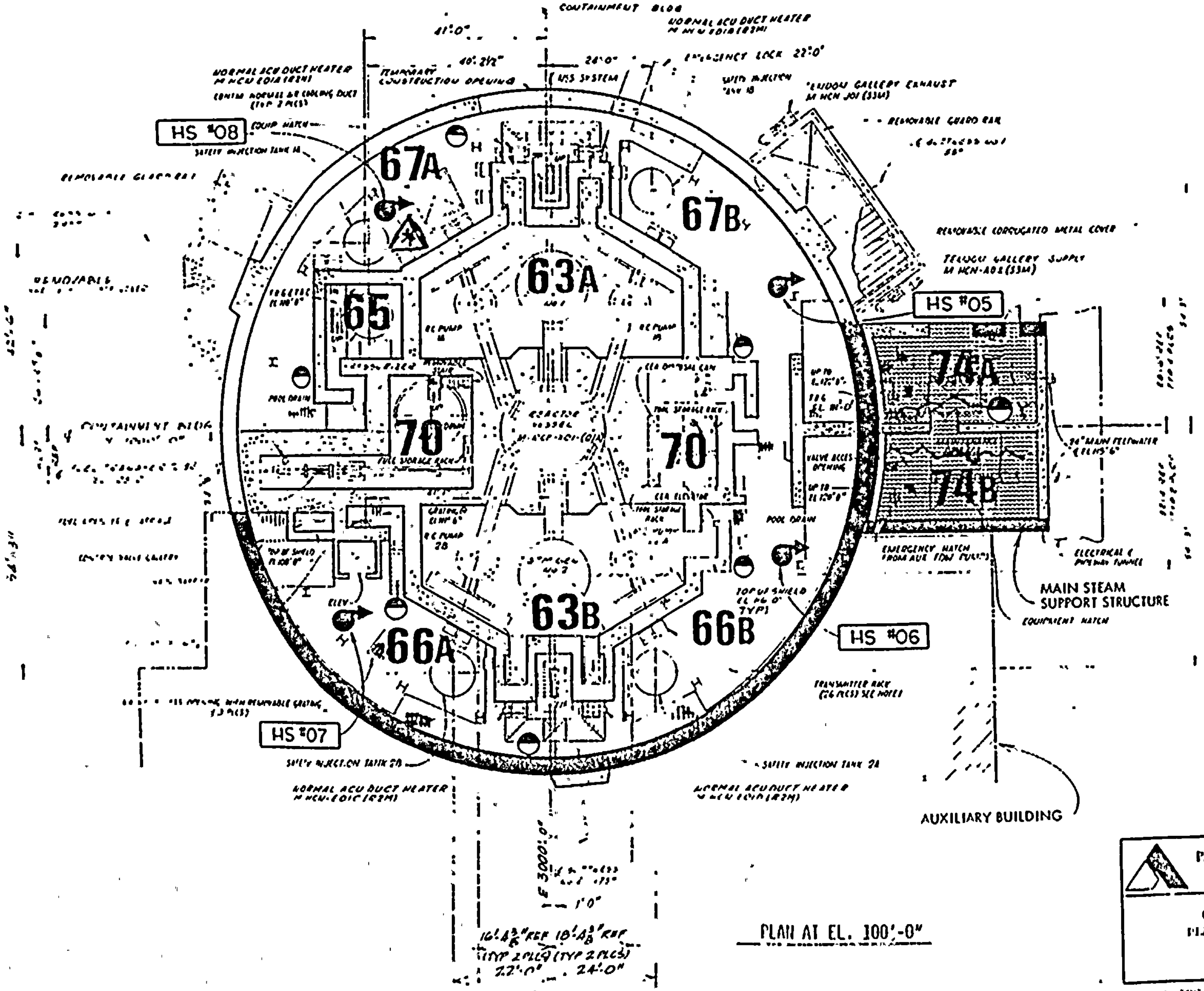
RADWASTE BUILDING
PLAN AT ELEVATION 120'-0"
Figure 98-26



NOTES:

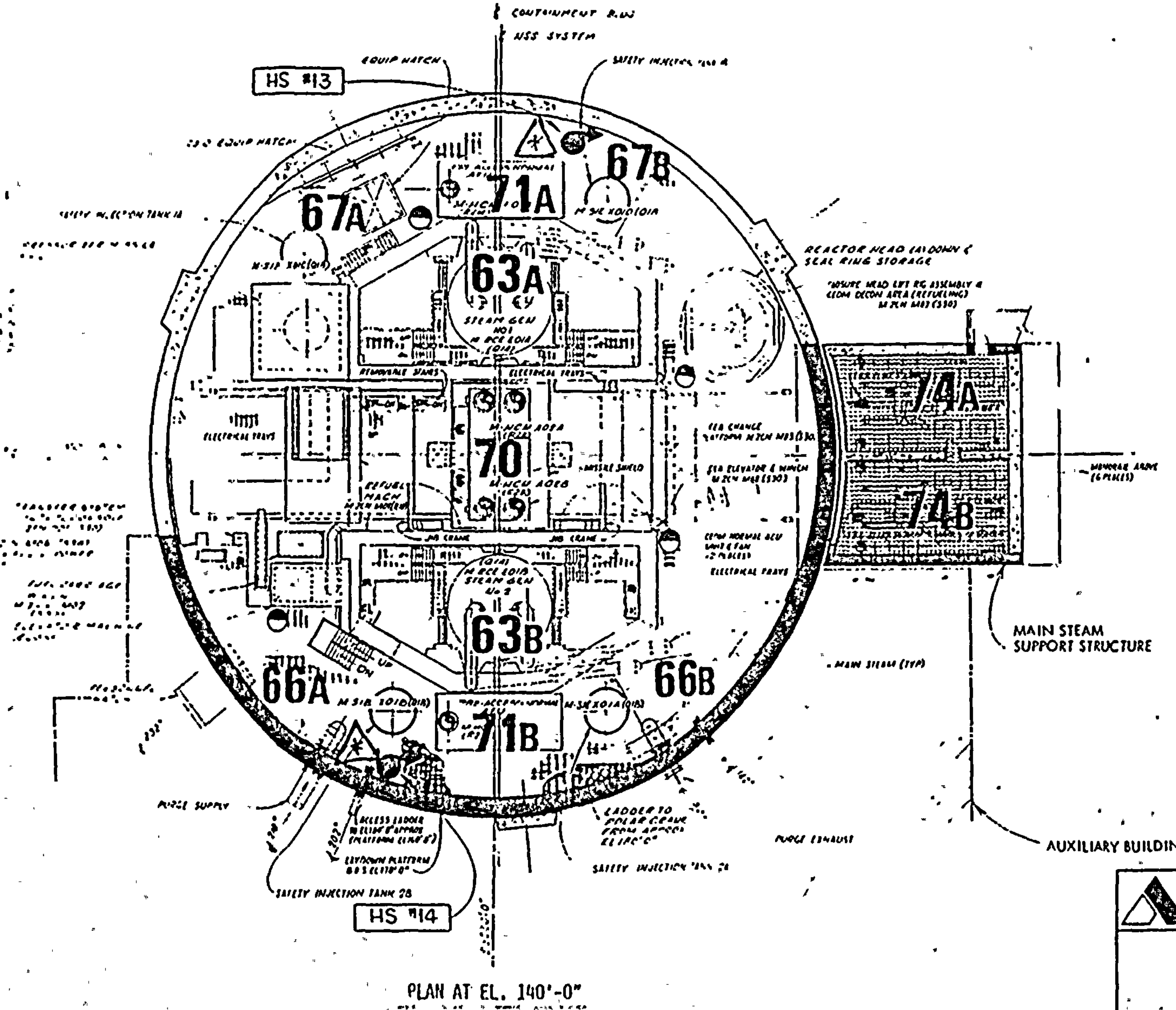
1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND

Palo Verde Nuclear Generating Station
FSAR

CONTAINMENT BUILDING
PLAN AT ELEVATION 100'-0"

Figure 9B-30

August 1984 Amendment 13



NOTES:
1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND

Palo Verde Nuclear Generating Station
FSAR

CONTAINMENT BUILDING
PLAN AT ELEVATION 140'-0"
Figure 9B-32

August 1984 Amendment 13

LEGEND

= ALARM CHECK VALVE FOR WET PIPE SPRINKLER SYSTEM

= DELUGE VALVE FOR WATER SPRAY OR PRE-ACTION SYSTEM

= ONE HOUR BARRIER (WITH "C" LABEL DOORS)*

= TWO HOUR BARRIER (WITH "B" LABEL DOORS)*

= THREE HOUR BARRIER (WITH "A" LABEL DOORS)*

= AUTOMATIC PRE-ACTION SPRINKLER SYSTEM

= DELUGE WATER SPRAY SYSTEM

= WET PIPE SPRINKLER SYSTEM

= HALON 1301

= CO_2 FLOODING

= SELECTOR VALVE FOR FIXED CO_2 SYSTEM

HS = HOSE STATION (REEL OR CABINET)

= FULLY RECESSED FIRE HOSE CABINET

= SEMI-RECESSED FIRE HOSE CABINET

= SURFACE MOUNTED FIRE HOSE CABINET

FIRE HOSE CABINETS WITH HOSE RACK FOR 75 FT OF 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE A-B-C (UNLESS INDICATED THUS: (C) FOR CLASS NOZZLE C ONLY) AND A 2-1/2 GAL. PRESSURIZED WATER (2-A) PORTABLE FIRE EXTINGUISHER.

= HOSE REEL WITH 75 FT LONG, 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE A-B-C.

= HOSE REEL WITH 75 FT LONG, 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE C.

= HOSE STATION WITH 100 FT HOSE

= HOSE STATION WITH 125 FT HOSE

= HOSE STATION WITH 150 FT HOSE

= CO_2 HOSE REEL

= PORTABLE FIRE EXT. - 2-1/2 GAL. PRESSURIZED WATER, 2-A

= PORTABLE FIRE EXT. - CO_2 - 20 LB, 10-B:C

= PORTABLE FIRE EXT. - "ABC" POWDER, 20 LB, 10A-40-B:C MINIMUM

= WHEELED TYPE, FIRE EXTINGUISHER, 350 LB, 4A-240 B:C MINIMUM

* NOTE:
DOOR "A" LABEL = 3 HRS
DOOR "B" LABEL = 1 1/2 HRS
DOOR "C" LABEL = 3/4 HR

FOR INFO ONLY
(3 of 3)

13

Palo Verde Nuclear Generating Station
FSAR

FIRE PROTECTION
LEGEND AND SYMBOLS
Figure 9B-39

August 1984 Amendment 13

9B.2.15.53 Fire Area XV, Fire Zone 57A, Hot Laboratory

A. Location

Fire Zone 57A (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of metal lath and plaster common to Zone 57B.
1-hour rated wall common to Zone 57N.

South: 1-hour wall common to Zone 57N at column A8

East: Non-rated wall of heavy concrete con-
13 struction common to Zone 57K at column AE.

Non-rated wall of metal lath and plaster common to Zone 57B at column line AD.

2 ~~3~~-hour rated wall common to Zone 57P at column line AD.

West: Non-rated walls of heavy concrete construction common to Zones 57C and 57D.

Floor: Non-rated barrier of heavy concrete construction common to Zones 49H and 52A.

Ceiling: Non-rated area boundary roof of heavy concrete construction.

2. Zone Access

- One Class C door in the 1-hour rated north wall to Zone 57N
- One non-rated door in the non-rated east wall to Zone 57B
- One non-rated door in the non-rated west wall to Zone 57C

9B.2.15.54 <u>Fire Area XV, Fire Zone 57B, Cylinder Storage Area</u>

A. Location

Fire Zone 57B (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 2 ~~3~~-hour rated wall common to Zone 57P.

South: Non-rated wall of metal lath and plaster construction common to Zone 57A.

East: 1-hour rated wall common to Zone 57N.

West: Non-rated wall of metal lath and plaster construction common to Zone 57A at column line AD. 13

OK Floor: Non-rated barrier of heavy concrete construction common to Zone 52A.

OK Ceiling: Non-rated area boundary roof of heavy concrete construction.

2. Zone Access

Non-rated door in the non-rated west wall to Zone 57A.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

None

9B.2.15.66 Fire Area XV, Fire Zone 57N, Corridor Area

A. Location

Fire Zone 57N (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North:	North Corridor	- 1-hour rated walls common to Zones 55C, 55E, 56A and 56B at column line A6.
		2-hour rated area boundary wall common to the east stairwell at column line A6.
		Open to Zone 56C at column line A6.
		Non-rated area boundary walls of heavy concrete construction common to the south access shaft. 13
	South Corridor	- 1-hour rated wall common to Zones 57A, 57D, 57I and 57K at column line A8.
South:	North Corridor	- 1-hour rated walls common to Zones 57A, 57B, 57C, 57H, and 57I and 57K.
		2 ~~3~~-hour rated walls common to Zone 57P.
	South Corridor	- 1-hour rated wall common to Zones 57E, 57F, 57G, 57J and 57L.
	West Corridor	- 3-hour rated area boundary wall common to Fire Area X at column line A10.

- One Class C door in the 1-hour rated wall to Zone 57K
- Two Class C doors in the 1-hour rated wall to Zone 57L
- One Class C door (pair) in the 1-hour rated wall to Zone 57M
- One Class A door (pair) in the ~~3~~ 2-hour rated wall to Zone 57P
- One Class A door (pair) in the 3-hour rated wall to Fire Area X
- One Class A door (pair) in the 3-hour rated wall to the Corridor Building

3. Sealed Penetrations

   Seals equal or exceed fire barrier ratings.

4. Fire Dampers

   13 Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

   None

6. Protected Structural Members

   None

C. Safety Related Equipment and Components

Train A conduit[a]

D. Non-Safety Related Equipment and Components

Cable trays and conduit

E. Radioactive Material

None

a. Safe Shutdown Related

9B.2.15.67 <u>Fire Area XV, Fire Zone 57P, Flammable Storage Area</u>

A. Location

Fire Zone 57P (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 2~~3~~-hour rated wall common to Zone 57N.

South: 2~~3~~-hour rated wall common to Zone 57B.

East: 2~~3~~-hour rated wall common to Zone 57N.

West: 2~~3~~-hour rated wall common to Zone 57A.

Floor: Non-rated barrier of heavy concrete construction common to Zone 52A.

13 Ceiling: Non-rated area boundary roof of heavy concrete construction.

2. Zone Access

One Class A door (pair) in the 2~~3~~-hour rated north wall to Zone 57N

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings

4. Fire Dampers

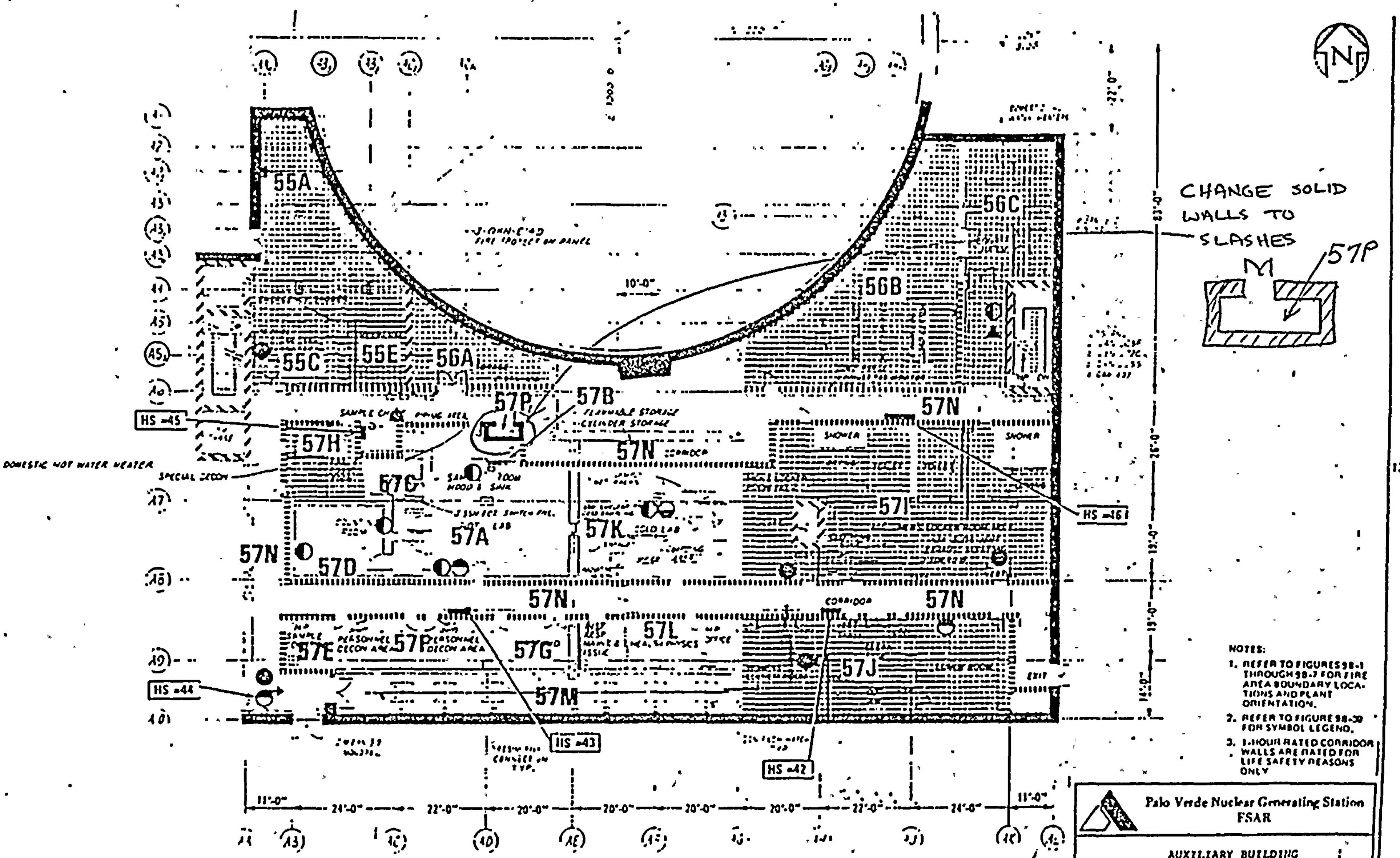
Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

None

6. Protected Structural Members

None



NOTES:

1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION.
2. REFER TO FIGURE 9B-30 FOR SYMBOL LEGEND.
3. 1-HOUR RATED CORRIDOR WALLS ARE RATED FOR LIFE SAFETY REASONS ONLY

Palo Verde Nuclear Generating Station
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AUXILIARY BUILDING
PLAN AT ELEVATION 140'-0"
Figure 9B-23

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Ceiling: Non-rated barrier of heavy concrete construction common to Zones 29. ~~and 29A.~~ 3-hour rated barrier common to Zone 29A.

2. Zone Access

- Two non-rated missile proof doors in the non-rated west wall to Zone 27
- Open corridor to Zone 27
- One Class B door in the 2-hour rated south-east stairwell south wall
- One Class A door in the 3-hour rated east wall to Fire Area XV
- One non-rated door in the non-rated south exterior wall

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings. 13

4. Fire Dampers

None

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train A spent fuel pool heat exchanger
- Train B spent fuel pool heat exchanger
- Train A spent fuel cooling system pump
- Train B spent fuel cooling system pump
- Train A conduit
- Train B conduit

East: Non-rated area boundary exterior walls of heavy concrete construction at column line FF.

3-hour rated area boundary wall common to Fire Areas XV and XVI at elevation 140'0" at the southeast corner.

2-hour rated walls about the southeast stairwell at elevation 140'0".

West: Non-rated wall of heavy concrete construction common to Zone 27 and about the cask loading pit at elevations 100'0" and 120'0".

Non-rated area boundary exterior wall of heavy concrete construction at column line FA and elevation 140'0".

Floor: Non-rated area boundary basemat of heavy concrete construction for the spent fuel pool.

Non-rated barriers of heavy concrete construction for the new fuel inspection pit.

Non-rated barrier of heavy concrete construction common and partially open to Zone 27.

2-hour rated new fuel storage rack cover at elevation 140'0".

Ceiling: Non-rated area boundary barrier of heavy concrete construction common to the roof.

3-hour rated barrier beneath the new fuel storage racks area, common to Zone 28.

9B.2.15 FIRE AREA XV

9B.2.15.1 Fire Area Description

A. Area Boundary Descriptions

Fire Area XV (figures 9B-1, 9B-2, 9B-3, 9B-4, and 9B-5) contains Train A and Train B components found in the Auxiliary Building. This fire area includes Zones 33A, 33B, 87A, 87B, 89, 90, 88A, 88B, 34A, 34B, 35A, 35B, 36, 37A, 37B, 37C, 37D, 37E, 39A, 39B, 42C, 42D, 43, 44, 45, 46A, 46B, 46E, 48, 49A, 49B, 49C, 49D, 49E, 49F, 49G, 49H, 50A, 50B, 51A, 51B, 52A, 52D, 53, 54, 55A, 55C, 55E, 56A, 56B, 56C, 57A, 57B, 57C, 57D, 57E, 57F, 57G, 57H, 57I, 57J, 57K, 57L, 57M, 57N and 57P (figures 9B-17, 9B-18, 9B-19, 9B-20, 9B-21, 9B-22, and 9B-23).

At elevations 40'0" and 51'6", Fire Area XV is below grade and annular in shape, enclosing Fire Areas XIII
and XIV by 3-hour rated barriers. Fire Area XV is 13
bounded to the north, south, east and west by non-rated exterior walls. The basemat is non-rated.

At elevation 70'0", Fire Area XV is below grade, bounded to the north by both non-rated and 3-hour rated barriers common to the south access shaft, a non-rated exterior wall, and 3-hour rated barriers common to Fire Areas XI and XII, to the south by 3-hour rated barriers common to Fire Areas I, II and X, and a non-rated exterior wall, to the east by 2-hour rated barriers common to the east stairwell and non-rated exterior walls, and to the west by a 2-hour rated barrier common to the west elevator, stairwell and HVAC chase, and non-rated exterior walls. Portions of the floor are 3-hour rated barriers common to Fire Areas XIII and XIV.

A portion of the north corridor ceiling, which is common to the south access shaft, is a 3-hour rated barrier.

West: Non-rated area boundary exterior wall of heavy concrete construction at column line AC.

Floor: Non-rated barrier of heavy concrete construction common to Zone 87A.

Ceiling: Non-rated barrier of heavy concrete construction common to Zones 35A, ~~and~~ 37A, and 37B.

~~3-hour rated barrier common to Zone 37B (north corridor) between column lines AE and AF.~~

3-hour rated area boundary barrier common to the south access shaft.

2. Zone Access

- One Class B door in the 2-hour rated east wall of the northwest stairwell. 13
- One Class A door in the 3-hour rated north corridor east wall to Zone 88B
- One Class A door in the 3-hour rated central corridor east wall to Zone 30A
- One Class A door in the 3-hour rated north corridor south wall to Zone 31A
- One Class A door in the 3-hour rated south corridor north wall to Zone 32A
- Open doorway in the non-rated south corridor east wall to Zone 90
- Stairwell through the non-rated north corridor floor to Zone 87A
- Stairwell through the non-rated south corridor floor to Zone 87A

Ceiling: Non-rated barrier of heavy concrete construction common to Zones 48, 49A, 49B, 49D, 49E, 49G, 49H, 50A, ~~and~~ 52A, and 52D.

~~3-hour rated barrier common to Zone 52D.~~

2. Zone Access

- One Class B door (pair) in the 2-hour rated north corridor east wall to Zone 42A
- One Class B door (pair) in the 2-hour rated north corridor north wall to Zone 42A
- One non-rated door (pair) in the non-rated north corridor north wall to the access shaft
- One Class A door (pair) in the one-hour rated north corridor east wall to Zone 42C
- One non-rated door in the non-rated north corridor south wall to Zone 43 13
- One open doorway in the non-rated north corridor south wall to Zone 44
- One open doorway in the non-rated north corridor south wall to Zone 45
- Two non-rated doors in the non-rated central corridor west wall to Zone 43
- One non-rated door in the non-rated south corridor north wall to Zone 43
- One 3-hour rated door (pair) in the 3-hour rated south corridor south wall to Fire Area X
- One Class A door (pair) in the one-hour rated south corridor east wall to Zone 42C

9B.2.15.26 Fire Area XV, Fire Zone 45, Crud Pump and Crud Tank Rooms

A. Location

Fire Zone 45 (figure 9B-21) is located in the Auxiliary Building at elevation 100'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 42D at column line A7.

South: Non-rated wall of heavy concrete construction common to Zone 42D at column line A9.

Non-rated wall of heavy concrete construction common to a pipe chase. 13

East: Non-rated wall of heavy concrete construction common to Zone 46E at column line AG.

Non-rated wall of heavy concrete construction common to a pipe chase.

West: Non-rated wall of heavy concrete construction common to Zone 44 at column line AF.

Floor: Non-rated barrier of heavy concrete construction common to Zones 39B and 37E.

Ceiling: Non-rated barrier of heavy concrete construction common to Zones 50A and 51A.

~~3-hour-rated barrier common to Zone 51A.~~

2. Zone Access

Open doorway in the non-rated north wall to Zone 42D

9B.2.15.40 <u>Fire Area XV, Fire Zone 50B, Valve Gallery</u>

A. Location

Fire Zone 50B (figure 9B-22) is located in the Auxiliary Building at elevation 120'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 52D at column line A7.

South: Non-rated wall of heavy concrete construction common to Zone 51B at column line A8.

East: Non-rated wall of heavy concrete construction common to Zone 53 at column line AH.

West: Non-rated wall of heavy concrete construction common to Zone 51A at column line AG.

Floor: Non-rated barrier of heavy concrete construction common to Zone 46E. 13

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zone 57I.

2. Zone Access

One non-rated gate in the non-rated south wall to Zone 51B.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

5. Protected Raceways

None

6. Protected Structural Members

None

9B.2.15.41 Fire Area XV, Fire Zone 51A, Volume Control Tank Room

A. Location

Fire Zone 51A (figure 9B-22) is located in the Auxiliary Building at elevation 120'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 52D at column line A7.

South: Non-rated wall of heavy concrete construction common to Zone 50A at column line A8.

East: Non-rated wall of heavy concrete construction common to Zone 50B at column line AG.

West: 3-hour rated wall common to the central stairwell at column line AF.

Floor: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zone 45.

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zone 57K.

2. Zone Access

None

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

5. Protected Raceways

None

6. Protected Structural Members

None

9B.2.15.42 Fire Area XV, Fire Zone 51B, Spray Chemical Storage Tank Room

A. Location

Fire Zone 51B (figure 9B-22) is located in the Auxiliary Building at elevation 120'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 50B at column line A8.

South: 3-hour rated area boundary wall common to Fire Area I at column line A10.

East: Non-rated wall of heavy concrete construction common to Zone 53 at column line AH. 13

West: 3-hour rated wall common to Zones 49G and 50A at column line AG.

Floor: Non-rated barrier of heavy concrete construction common to Zones 42C and 46E.

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zones 57J and 57N.

2. Zone Access

- One non-rated gate in the non-rated north wall to Zone 50B
- One open doorway in the non-rated west wall to Zone 53

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

2-hour rated area boundary wall common to Fire Area XVII, Zone 47B.

Floor: ~~3-hour-rated-barrier-common-to-Zone-42D.~~

Non-rated barrier of heavy concrete construction common to Zones 42C ~~.~~ and 42D.

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zones 56C, 57I, 57K, and 57N.

2. Zone Access

- One Class B door (pair) in the 2-hour rated west wall to Zone 47B
- One Class A door (pair) in the 1-hour rated west wall to Zone 52A
- One Class B door in the 2-hour rated east wall to the east stairwell
- One Class B door in the 2-hour rated north wall to Zone 47B 13
- Open stairwell in the non-rated south wall leading up to Zone 50A
- Open to Zone 53
- One Class B door (pair) in the non-rated south wall to Zone 54

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

Some Train A conduit is protected by wrappings with 1-hour ratings.

9B.2.15.45 Fire Area XV, Fire Zone 53, Process Radiation Monitor and Boronometer Room

A. Location

Fire Zone 53 (figure 9B-22) is located in the Auxiliary Building at elevation 120'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Open to Zone 52D at column line A7.

South: 3-hour rated area boundary wall common to Fire Area II at column line A10.

East: Non-rated walls of metal lath and plaster construction common to Zone 54.

West: Non-rated wall of heavy concrete construction common to Zones 50B and 51B at column line AH.

Floor: Non-rated barrier of heavy concrete construction common to Zones 42C and 46B.

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zones 57I, 57J and 57N.

2. Zone Access

- Open to Zone 52D
- Two non-rated doors (pairs) in the non-rated east wall to Zone 54.
- Open doorway in the non-rated west wall to Zone 51B

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

9B.2.15.46 Fire Area XV, Fire Zone 54, Reactor Trip Switchgear Room and CEDM Control System

A. Location

Fire Zone 54 (figure 9B-22) is located in the Auxiliary Building at elevation 120'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated walls of metal lath and plaster construction common to Zone 52D.

Non-rated wall of heavy concrete construction common to Zone 52D at column line A7.

South: 3-hour rated area boundary wall common to Fire Area II at column line A10.

East: 3-hour rated area boundary exterior wall at column line AL 13

3-hour rated area boundary wall common to the Corridor Building at column line AL.

West: Non-rated walls of metal lath and plaster construction common to Zone 53

Floor: Non-rated barrier of heavy concrete construction common to Zones 42C and 46B.

Non-rated barrier of heavy concrete construction common to Zone 46A.

Ceiling: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zones 57I, 57J and 57N.

2. Zone Access

- One Class A door (pair) in the 3-hour rated east wall to the Corridor Building
- Two Class B doors (pairs) in the non-rated west wall to Zone 53

9B.2.15.52 Fire Area XV, Fire Zone 56C, Northeast Corridor

A. Location

Fire Zone 56C (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 3-hour rated area boundary common to Fire Area XII.

South: Open to Zone 57N at column line A6.

East: 3-hour rated area boundary exterior wall at column line AL.

2-hour rated area boundary walls common to the east stairwell.

West: 1-hour rated wall common to Zone 56B. Non-rated wall of heavy concrete construction common to Zone 56B. 13

Floor: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zone 52D.

Ceiling: Non-rated area boundary roof of heavy concrete construction.

2. Zone Access

- One Class C door in the 2-hour rated west wall of the east stairwell.
- One Class C door (pair) in the 1-hour rated west wall to Zone 56B.
- Open to Zone 57N.
- One non-rated steel hatch in the 3-hour rated floor over Zone 52D.

3. Sealed Penetrations

Will equal or exceed fire barrier ratings

9B.2.15.61 Fire Area XV, Fire Zone 57I, Clothing Issue and Men's Locker Rooms

A. Location

Fire Zone 57I (figure 9B-23) is located in the Auxiliary Building at elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 1-hour rated walls common to Zone 57N.

South: 1-hour rated wall common to Zone 57N at column line A8.

East: 3-hour rated area boundary exterior wall at column line AL.

West: Non-rated wall of heavy concrete
13 construction common to Zone 57K at column line AG. of heavy concrete construction

Floor: ~~3-hour~~ Non rated barrier common to Zones 50B, 52D and 54. 53

Ceiling: Non-rated area boundary roof of heavy concrete construction.

NOTE

The HVAC chase near column lines A7 and AH is surrounded by 2-hour rated walls.

2. Zone Access

- Two Class C doors in the 1-hour rated north wall to Zone 57N
- Three Class C doors (1 pair) in the 1-hour rated south wall to Zone 57N

3. Sealed Penetrations

Seals equal or exceed fire barrier rating

9B.2.15.62 Fire Area XV, Fire Zone 57J, Women's Locker, Clean Storage and Lunch Rooms

A. Location

Fire Zone 57J (figure 9B-23) is located in the Auxiliary Building at Elevation 140'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 1-hour rated wall common to Zone 57N.

South: 3-hour rated area boundary wall common to Fire Areas I and II at column line A10.

East: 1-hour rated wall common to Zone 57N at column line AK. 13

West: Non-rated wall of heavy concrete construction common to Zones 57L and 57M at column line AG.

Floor: ~~3-hour~~ Non-rated barrier of heavy concrete construction common to Zones 51B, 53 and 54.

Ceiling: Non-rated area boundary roof of heavy concrete construction.

2. Zone Access

- Four Class C doors (one pair) in the 1-hour rated north wall to Zone 57N
- One Class C door in the 1-hour rated east wall to Zone 57N

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

9B.2.17 FIRE AREA XVII

9B.2.17.1 Fire Area Description

A. Area Boundary Descriptions

Fire Area XVII (figures 9B-3 and 9B-4) contains the Train B electrical penetration rooms of the Auxiliary Building at elevations 100'0" and 120'0". This fire area includes Zones 42B and 47B (figures 9B-21 and 9B-22).

Fire Area XVII is bounded to the north by 3-hour rated barriers common to Fire Areas XI and XII, and to the west by a 2-hour rated barrier common to the south access shaft. Fire Area XVII is bounded to the south and east by 2-hour rated barriers common to the north corridors of Fire Area XV. The floor and ceiling are 1-hour and ~~2~~-hour rated barriers respectively, common to Fire Area XV. 13

B. Safe Shutdown Equipment Subject to Loss in the Event of a Fire in Fire Area XVII

The following listed equipment is all Train B related with the exception of some Train A conduit. The Train A conduit has been covered by protective wrappings of 1-hour rating, and full area fire detection and suppression is present. In the event of a fire in Fire Area XVII, Train A components identified in Table 9B.1-4 would be used to safely shutdown the plant.

- M-HAB-Z06 — Train B electrical penetration room essential air cooling unit
- E-PHB-M34 — Train B 480V ac Class IE motor control center
- E-PHB-M36 — Train B 480V ac Class IE motor control center

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

None

D. Non-Safety Related Equipment and Components

- Laboratory equipment
- Conduit

E. Radioactive Material

Area containing radioactive materials.

F. Combustible Loading

1. Quantity/Type

13
- 190 pounds of cable insulation (Hypalon)
- 110 pounds of cable insulation (other)

2. In-Situ Combustible Load 8,900 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 7 minutes

G. Fire Detection

None

H. Fire Suppression

1. Primary

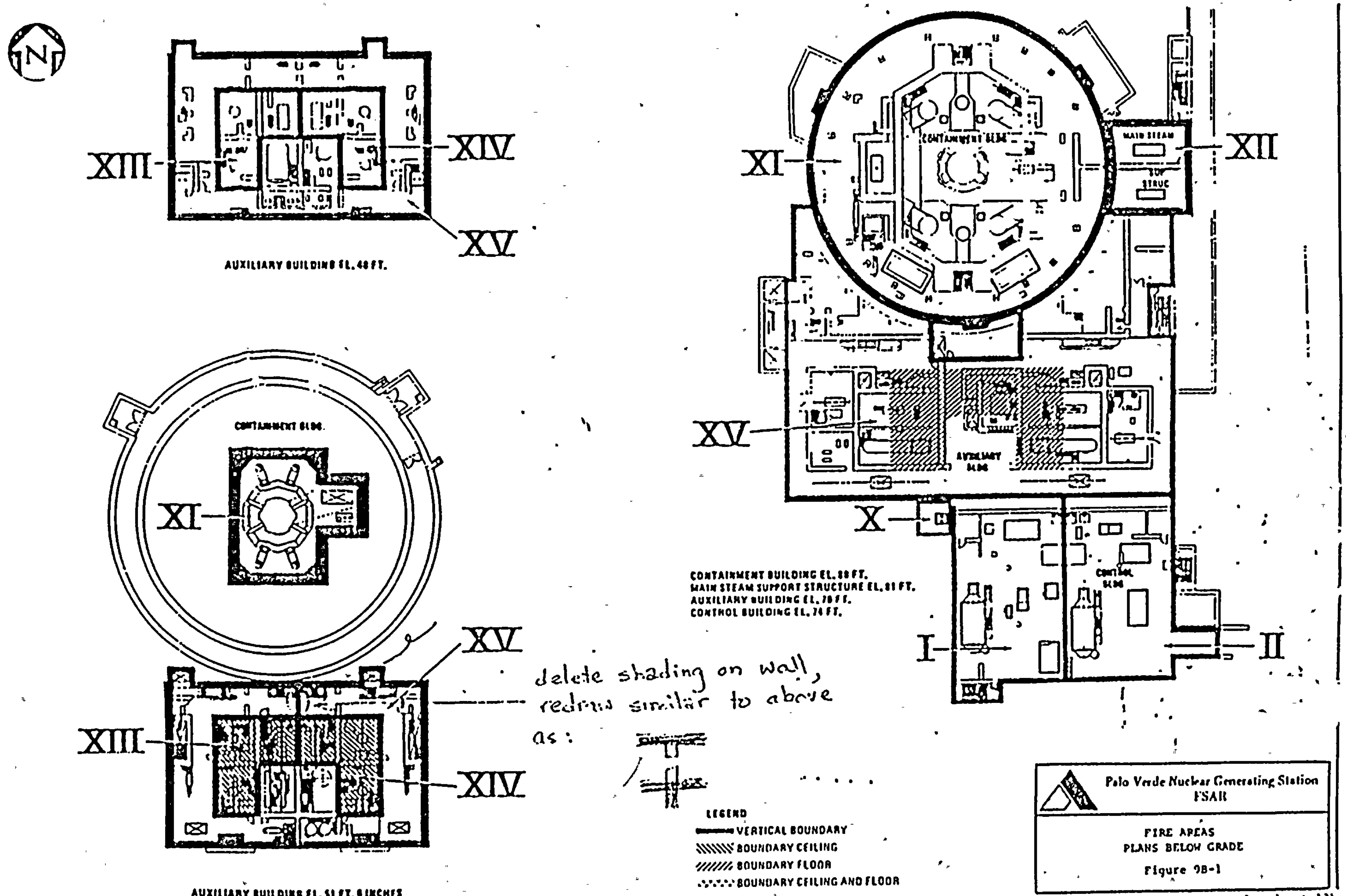
~~Two~~ One portable ABC powder fire extinguisher~~s~~ and one portable CO_2 fire extinguisher

2. Secondary

One manual hose reel is located in Zone 57N.

I. Ventilation

Flow through air filtration unit to outside



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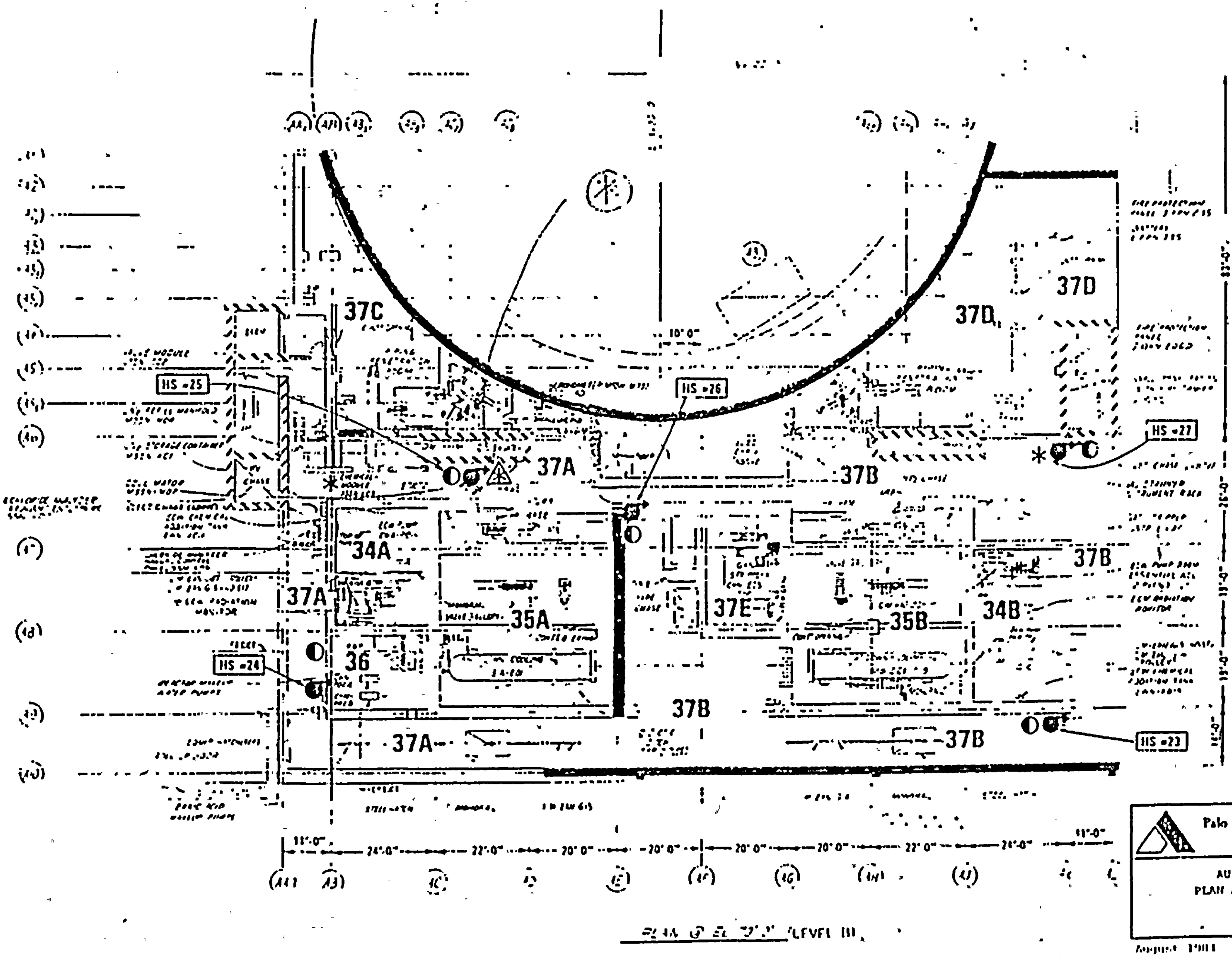
FIRE AREAS
PLANS BELOW GRADE

Figure 9B-1



NOTES:
1. REFER TO FIGURES 9B-1 THROUGH 9B-17 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-19 FOR SYMBOL LEGEND

PLAN @ EL ... (LEVEL III)

Palo Verde Nuclear Generating Station
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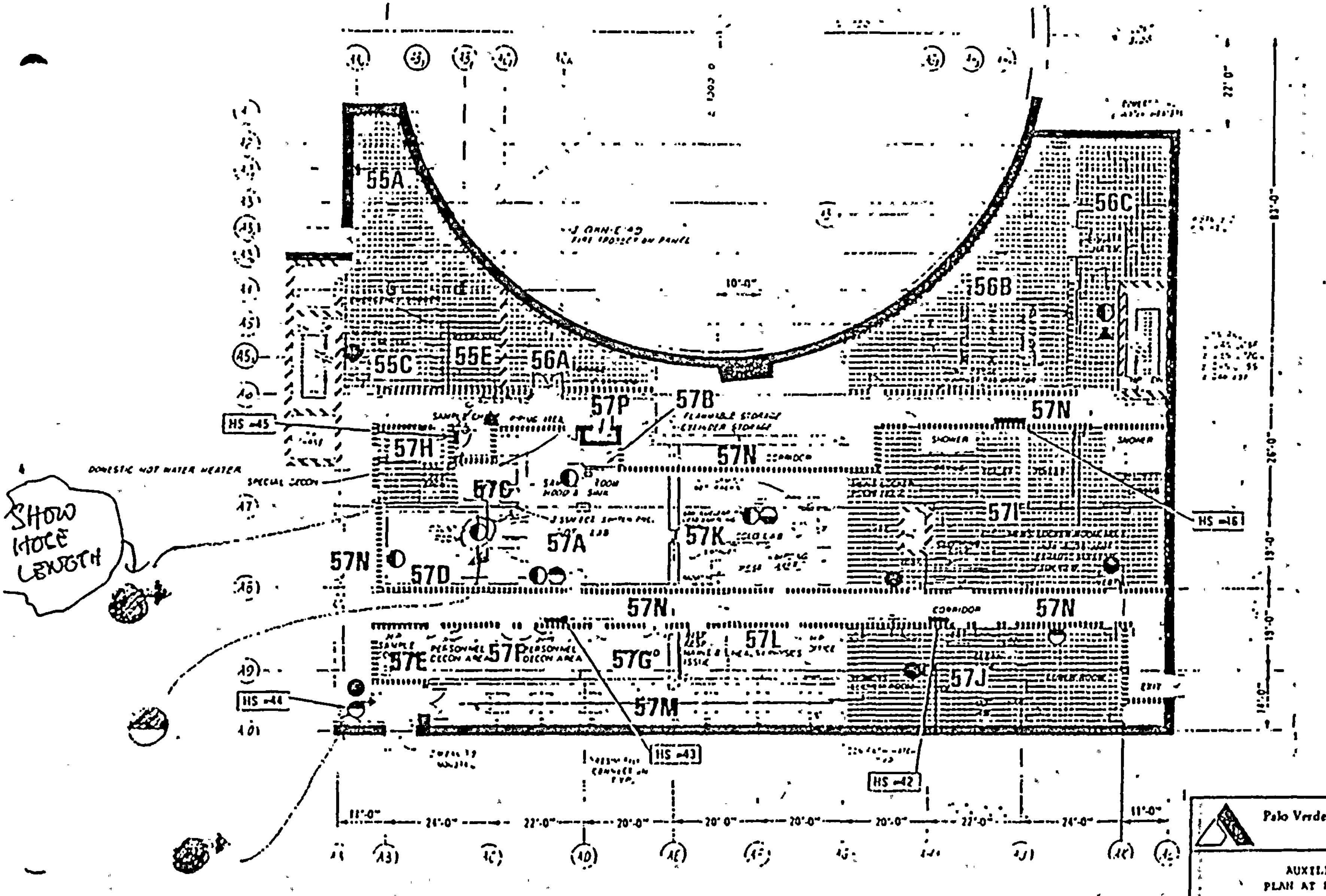
AUXILIARY BUILDING
PLAN AT ELEVATION ...
Figure 9B-19



NOTES.
1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND
3. 1-HOUR RATED CORRIDOR WALLS ARE RATED FOR LIFE SAFETY REASONS ONLY

Palo Verde Nuclear Generating Station
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AUXILIARY BUILDING
PLAN AT ELEVATION 140'-0"

Figure 9B-23

1984

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FOR INFO. ONLY

LEGEND

- = ALARM CHECK VALVE FOR WET PIPE SPRINKLER SYSTEM
- = DELUGE VALVE FOR WATER SPRAY OR PRE-ACTION SYSTEM
- = ONE HOUR BARRIER (WITH "C" LABEL DOORS)*
- = TWO HOUR BARRIER (WITH "B" LABEL DOORS)*
- = THREE HOUR BARRIER (WITH "A" LABEL DOORS)*
- = AUTOMATIC PRE-ACTION SPRINKLER SYSTEM
- = DELUGE WATER SPRAY SYSTEM
- = WET PIPE SPRINKLER SYSTEM
- = HALON 1301
- = CO_2 FLOODING
- = SELECTOR VALVE FOR FIXED CO_2 SYSTEM
- HS = HOSE STATION (REEL OR CABINET)

- = FULLY RECESSED FIRE HOSE CABINET
- = SEMI-RECESSED FIRE HOSE CABINET
- = SURFACE MOUNTED FIRE HOSE CABINET

FIRE HOSE CABINETS WITH HOSE RACK FOR 75 FT OF 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE A-B-C (UNLESS INDICATED THUS: (C) FOR CLASS NOZZLE C ONLY) AND A 2-1/2 GAL. PRESSURIZED WATER (2-A) PORTABLE FIRE EXTINGUISHER.

- = HOSE REEL WITH 75 FT LONG, 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE A-B-C.
- = HOSE REEL WITH 75 FT LONG, 1-1/2" Ø LINED POLYESTER HOSE WITH CLASS NOZZLE C.
- = HOSE STATION WITH 100 FT HOSE
- = HOSE STATION WITH 125 FT HOSE
- = HOSE STATION WITH 150 FT HOSE
- = CO_2 HOSE REEL
- = PORTABLE FIRE EXT. - 2-1/2 GAL. PRESSURIZED WATER, 2-A
- = PORTABLE FIRE EXT. - CO_2 - 20 LB, 10-B:C
- = PORTABLE FIRE EXT. - "ABC" POWDER, 20 LB, 10A-40-B:C MINIMUM
- = WHEELED TYPE, FIRE EXTINGUISHER, 350 LB, 4A-240-B:C MINIMUM

* NOTE:
DOOR "A" LABEL = 3 HRS
DOOR "B" LABEL = 1 1/2 HRS
DOOR "C" LABEL = 3/4 HR

Palo Verde Nuclear Generating Station
FSAR

FIRE PROTECTION
LEGEND AND SYMBOLS
Figure 9B-39

common to Fire Area V, the central staircase.

2. Zone Access

- One Class ~~B~~ A roll-up fire door in the 2-hour rated north wall to Zone 22A
- One non-rated missile proof door in the non-rated west exterior wall.
- Non-rated removable missile proof panels in the non-rated south exterior wall.
- Non-rated grating in the non-rated ceiling to Zone 25A.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings. 13

4. Fire Dampers

None

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train A diesel engine[a]
- Train A cooling water makeup valve[a]
- Train A starting air solenoids[a]
- Train A fuel oil controls[a]
- Train A overspeed trips[a]
- Train A low lube oil pressure trips[a]

a. Safe Shutdown Related

9B.2.4.3 Fire Area IV, Fire Zone 22A, Train A Diesel Generator Control Room

A. Location

Fire Zone 22A (figure 9B-13) is located in the Diesel Generator Building at elevation 100'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 3-hour rated area boundary wall common to Fire Areas I and II at column line G1.

South: 2-hour rated wall common to Zone 21A at column line G2.

East: 3-hour rated area boundary wall common to Fire Area V, the central staircase.

West: Non-rated area boundary exterior wall of heavy concrete construction at column line. GA.

Floor: Non-rated area boundary basemat of heavy concrete construction.

Ceiling: Non-rated barrier of heavy concrete construction common to Zone 24A.

2. Zone Access

- One Class A door in the 3-hour rated east wall to the central staircase
- One Class ~~B~~ A roll-up fire door in the 2-hour rated south wall to Zone 21A

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

3-hour rated barrier common to Zone 23B

3-hour rated barrier common to the central staircase.

2. Zone Access

- One Class ~~B~~ A roll-up fire door in the 2-hour rated north wall to Zone 22B
- One non-rated missile proof door in the non-rated east exterior wall
- Non-rated removable missile proof panels in the non-rated south wall
- Non-rated grating in the non-rated ceiling to Zone 25B

3. Sealed Penetrations 13

Seals equal or exceed fire barrier ratings.

4. Fire Dampers

None

5. Protected Raceways

None

6. Protected Structural Members

None

C. Safety Related Equipment and Components

- Train B diesel engine[a]
- Train B cooling water makeup valve[a]
- Train B starting air solenoids[a]
- Train B fuel oil controls[a]
- Train B overspeed trips[a]

a. Safe Shutdown Related

9B.2.5.3 Fire Area V, Fire Zone 22B, Train B Diesel Generator Control Room

A. Location

Fire Zone 22B (figure 9B-13) is located in the Control Building at elevation 100'0".

B. Fire Prevention Features

1. Fire Boundaries and Rated Fire Barriers

North: 3-hour rated area boundary wall common to Fire Area II at column line G1.

South: 2-hour rated wall common to Zone 21B at column line G2.

East: Non-rated area boundary exterior wall
13 of heavy concrete construction at column line GC.

West: 3-hour rated wall common to the central staircase.

Floor: Non-rated area boundary basemat of heavy concrete construction including pipe trench to elevation 94'0".

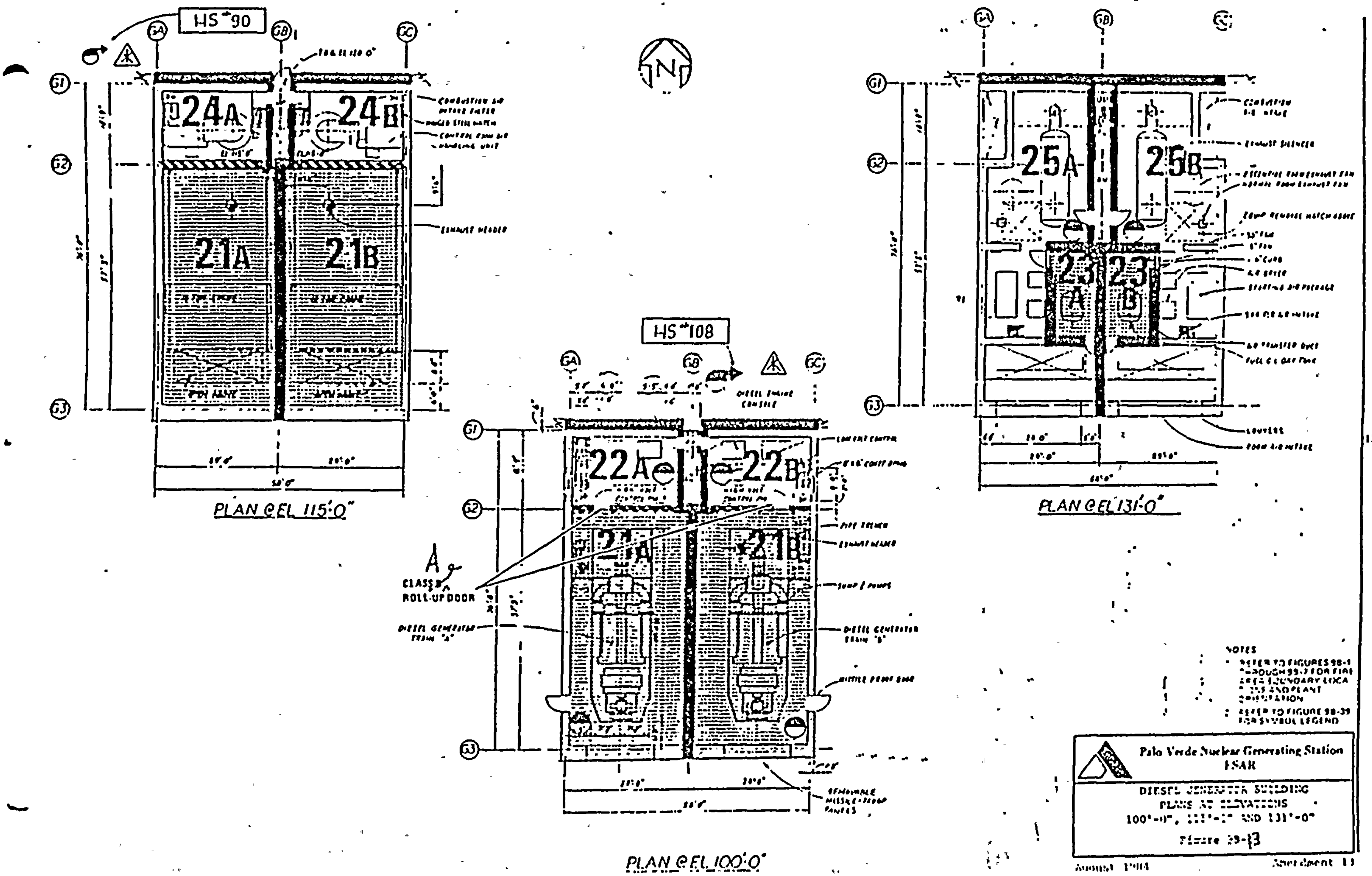
Ceiling: Non-rated barrier of heavy concrete construction common to Zone 24B.

2. Zone Access

- One Class A door in the 3-hour rated west wall to the central staircase
- One Class ~~B~~ A roll-up fire door in the 2-hour rated south wall to Zone 21B

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.



Palo Verde Nuclear Generating Station
FSAR

DIESEL GENERATOR BUILDING
PLANS AT ELEVATIONS
100'-0", 115'-0" AND 131'-0"

Figure 9B-13

Amendment 13

9B.2.15.15 Fire Area XV, Fire Zone 37A, West Corridors and Electrical Chases

A. Location

Fire Zone 37A (figures 9B-19 and 9B-20) is located in the Auxiliary Building at elevations 70'0" and 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

ADD INSERT A

North:	North Corridor	- Non-rated walls of heavy concrete construction common to Zone 37C at column line A6.
		2-hour rated walls common to the north stairwell.
	South Corridor	- Non-rated wall of heavy concrete construction common to Zones 35A and 36 at column line A9.
South:	North Corridor	- Non-rated wall of heavy concrete construction common to Zone 35A at column line A7.
		Non-rated wall of heavy concrete construction common to Zone 34A.
		Non-rated walls of heavy concrete construction common to a pipe chase.
	South Corridor	- Non-rated area boundary exterior wall of heavy concrete construction at column line A10.
		3-hour rated area boundary wall common to Fire Area X at column line A10. 13

INSERT (A) TO PG. 9B.2.15-65

NOTE

Fire Zone 37A includes the two west electrical chases located at elevation 88'0". These chases are enclosed by 3-hour rated walls and ceilings, with floors open to the west corridors of elevation 70'0". The following description applies to the Zone 37A west corridors.

9B.2.15.16 Fire Area XV, Fire Zone 37B, East Corridors

A. Location

Fire Zone 37B (figures 9B-19 and 9B-20) is located in the Auxiliary Building at elevations 70'0" and 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

add Insert B

North:	North Corridor	- Non-rated area boundary walls of heavy concrete construction common to the south access shaft.
		2-hour rated walls common to the north stairwell.
		Non-rated walls of heavy concrete construction common to Zone 37D at column line A6.
		2-hour rated area boundary wall common to the east stairwell at column line A6. 13
	South Corridor	- Non-rated wall of heavy concrete construction common to Zones 34B and 35B at column line A9.
South:	North Corridor	- Non-rated wall of heavy concrete construction common to Zone 37E.
		Non-rated walls of heavy concrete construction common to a pipe chase.
		Non-rated wall of heavy concrete construction common to Zones 34B and 35B at column line A7.

INSERT (B) TO PG. 9B.2.15-69

NOTE

Fire Zone 37B includes the two east electrical chases located at elevation 88'0". These chases are enclosed by 3-hour rated walls and ceilings, with floors open to the east corridors of elevation 70'0". The following description applies to the Zone 37B east corridors.

9B.2.15.17 <u>Fire Area XV, Fire Zone 37C, Train A Piping Penetration Room</u>

A. Location

Fire Zone 37C (figures 9B-19 and 9B-20) is located in the Auxiliary Building at elevations 70'0" and 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 3-hour rated area boundary wall common to Fire Area XI.

Non-rated area boundary exterior wall of heavy concrete construction at column line A1.

South: Non-rated wall of heavy concrete construction at column line A6 common to:

13 • Zone 37A at elevation 70'0"
- Zone 39A at elevation 88'0".

2-hour rated wall common to the north corridor north stairwell at column line A6 and elevation 70'0".

3-hour rated wall common to the Zone 37A electrical chase at elevation 88'0".

East: Non-rated area boundary wall of heavy concrete construction common to the south access shaft.

West: Non-rated area boundary exterior wall of heavy concrete construction at column line AA4.

2-hour rated area boundary wall common to the west elevator and stairwell at column line AA.

9B.2.15.18 Fire Area XV, Fire Zone 37D, Train B Piping Penetration Room

A. Location

Fire Zone 37D (figures 9B-19 and 9B-20) is located in the Auxiliary Building at elevations 70'0" and 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 3-hour rated area boundary wall common to Fire Area XI.

3-hour rated area boundary wall common to Fire Area XII.

South: 2-hour rated wall common to the north stairwell at elevation 70'0" and at column line A6.

13 Non-rated walls of heavy concrete construction common to Zone 37B at elevation 70'0" and at column line A6.

3-hour rated wall common to ~~an~~ the Zone 37B electrical chase at elevation 88'0" and at column line A6.

Non-rated wall of heavy concrete construction common to Zone 39B at elevation 88'0" and at column line A6.

2-hour rated area boundary wall common to the east stairwell.

East: Non-rated area boundary exterior wall of heavy concrete construction at column line AL.

2-hour rated area boundary wall common to the east stairwell.

9B.2.15.20 <u>Fire Area XV, Fire Zone 39A, Train A Pipeway</u>

A. Location

Fire Zone 39A (figure 9B-20) is located in the Auxiliary Building at elevation 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 37C at column line A6.

3-hour rated walls common to the Zone 37A electric chase.

3-hour rated area boundary wall common to the south access shaft.

South: Non-rated area boundary exterior wall of heavy concrete construction at column line A10. 13

3-hour rated area boundary wall common to Fire Area X at column line A10.

East: Open to Zone 39B at column line AE.

Non-rated wall of heavy concrete construction common to Zone 39B at column line AE between column lines A7 and A8.

West: Non-rated area boundary exterior wall of heavy concrete construction at column line AA.

2-hour rated area boundary wall common to the west stairwell and HVAC chase.

3-hour rated walls common to the Zone 37A west electrical chase.

9B.2.15.21 **Fire Area XV, Fire Zone 39B, Train B Pipeway**

A. Location

Fire Zone 39B (figure 9B-20) is located in the Auxiliary Building at elevation 88'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: Non-rated wall of heavy concrete construction common to Zone 37D at column line A6.

3-hour rated walls common to the Zone 37B ~~two~~ electrical chases.

2-hour rated area boundary wall common to the east stairwell at column line A6.

13 3-hour rated area boundary wall common to the south access shaft.

South: 3-hour rated area boundary wall common to Fire Areas I and II at column line A10.

East: Non-rated area boundary exterior wall of heavy concrete construction at column line AL.

West: Open to Zone 39A at column line AE.

Non-rated wall of heavy concrete construction common to Zone 39A at column line AE, between column lines A7 and A8.

Floor: Non-rated barrier of heavy concrete construction common to Zones 34B, 35B, 37B and 37E.

3-hour rated area boundary wall common to the Corridor Building at column line AL.

2-hour rated area boundary walls common to the east stairwell.

West: North Corridor - 1-hour rated wall common to Zone 42D at column line AG.

3-hour rated area boundary wall common to the south access shaft at column line AG.

South Corridor - 1-hour rated wall common to Zone 42D at column line AG.

East Corridor - 2-hour rated wall common to Zone 42B.

Non-rated wall of heavy concrete construction common to Zone 46A. 13

Floor: Non-rated barrier of heavy concrete construction common to Zones 37D and 39B.

3-hour rated barriers common to the Zone 37B electrical chases.

Ceiling: Non-rated barrier of heavy concrete construction common to Zones 51B, 52D, 53 and 54.

2. Zone Access

- One Class B door (pair) in the 2-hour rated east corridor west wall to Zone 42B
- One Class B door in the 2-hour rated north corridor north wall to Zone 42B
- One Class A door (pair) in the 1-hour rated north corridor west wall to Zone 42D
- One Class C door (pair) in the 1-hour rated south corridor west wall to Zone 42D

East: North Corridor - 1-hour rated wall common to Zone 42C at column line AG.

2-hour rated area boundary wall common to Fire Area XVI, Zone 42A, at column line AB.

South Corridor - 1-hour rated wall common to Zone 42C at column line AG.

Central Corridor - Non-rated wall of heavy concrete construction common to Zone 44 at column line AE.

West: North Corridor - 2-hour rated area boundary wall common to the west stairwell, HVAC chase and elevator at column line AA.

13 3-hour rated area boundary wall common to Fire Area VI at column line AA.

Non-rated area boundary exterior wall of heavy concrete construction at column line AA.

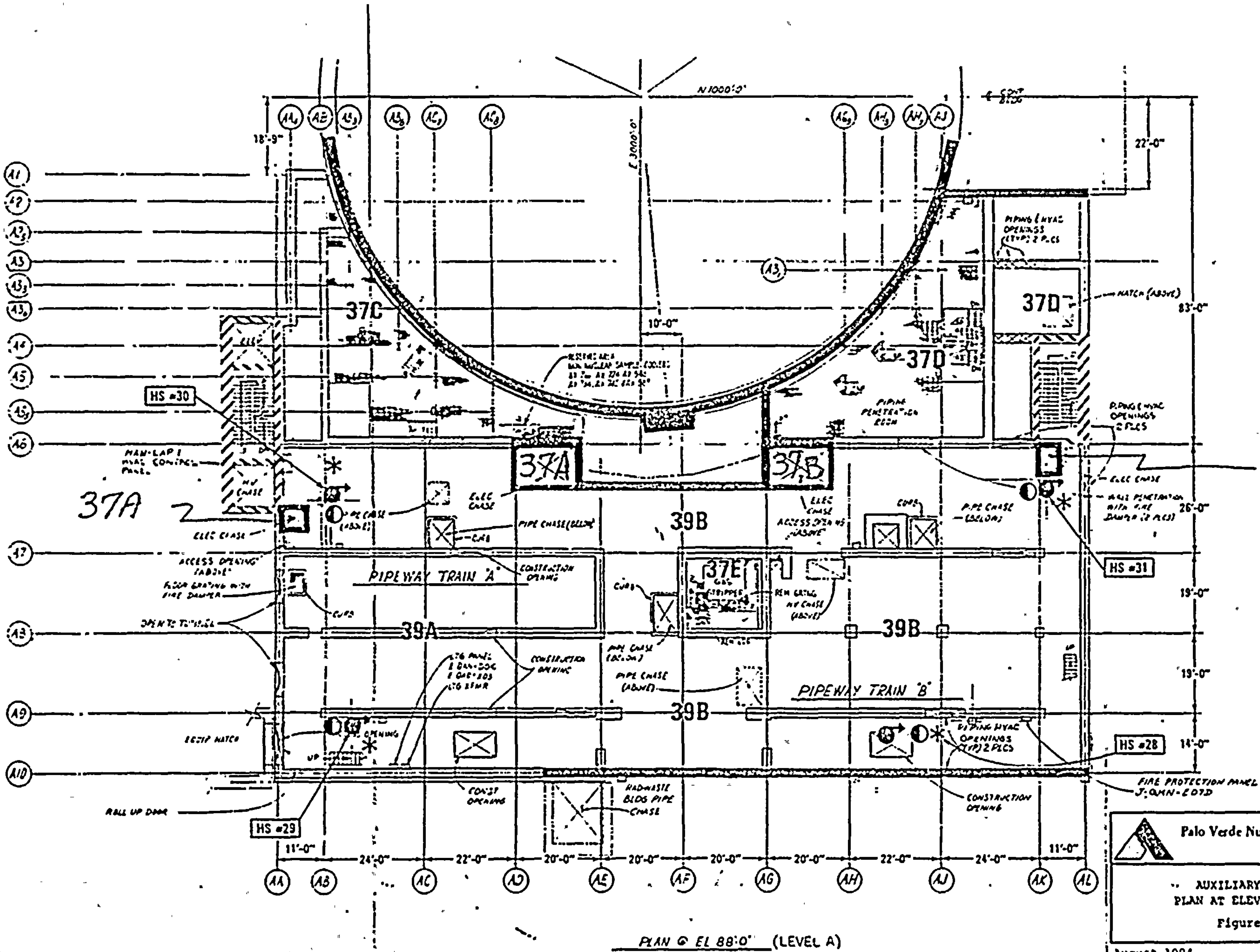
South Corridor - Non-rated area boundary exterior wall of heavy concrete construction at column line AA.

Central Corridor - Non-rated wall of heavy concrete construction common to Zone 43.

Floor: Non-rated barrier of heavy concrete construction common to Zone 39A.

Non-rated barrier of heavy concrete construction common to Zone 39B.

3-hour rated barriers common to the Zone 37A electrical chases.



NOTES:

1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION.
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND.

Palo Verde Nuclear Generating Station
FSAR

AUXILIARY BUILDING
PLAN AT ELEVATION 88'-0"

Figure 9B-20

August 1984 Amendment 13

13

H. Station Security Procedures

Station security procedures provide for the implementation of the Security Plan (refer to section 13.6).

I. Fire Protection Procedures

Fire protection procedures are provided to instruct ~~all~~ APPLICABL station personnel in methods of fire prevention, fire fighting, and maintenance of fire protection equipment. Procedures provide specific instructions to members of the fire team in fire fighting techniques.

(4) Fireproofing

F X701 for columns
N706 for beams

(5) Doors and frames will bear the appropriate UL
13 or FM fire rating label

(6) Floors and roof slabs exceed minimum required
F thicknesses for structural reasons. No UL
design is applicable.

(7) Gypsum board partitions

13 U-411 (UBC Table 43B #71) - two hours

(Refer to the response to Question 9A.109).

b. Fire dampers and fire doors

F Test method and acceptance criteria for dampers are
in accordance with ASTM Standard E-152. Typically
the devices carry the UL label and are installed in
F sleeves which are attached to the duct work and
13 supported by the walls. The devices are positioned
F between the two wall surfaces. A failure of the
duct on either side will not violate the fire
barrier. There are a few cases where the damper is
not installed in the tested configuration. The
dampers are mounted off the centerline of the wall
or on the surface of the wall and are supported in
INSERT (A) part or totally by structural steel attached to the
fire wall. ~~In all cases the structural steel will
13 be protected from an exposure fire by designs using
thermolag. In addition, the first HVAC duct support
on the side of the wall of the fire damper will be
coated with fire retardant material of a rating
equal to that of the wall, prior to the fuel load
of each unit. Although UL labels are not attached
to these dampers, they provide an equivalent level
of fire protection.~~ Typically 3-hour dampers are

¶

G. Fire Detection

None

H. Fire Suppression

1. Manual hose stream from a hydrant on the yard fire main is available.

I. Ventilation

Flow through air filtration unit to outside

13 J. Drainage

None

K. Emergency Lighting

None

L. Emergency Communications

None

1. Primary

One pressurized water fire extinguisher

2. Secondary

- 100 pounds of paper and fabric
- 1,200 pounds of rubber

2. In-Situ Combustible Load 16,600 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 12.4 minutes

G. Fire Detection

None

H. Fire Suppression

~~Manual hose stream from a hydrant on the yard fire main is available.~~ 13

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Five 4-inch drains

K. Emergency Lighting

None

L. Emergency Communications

None

1. Primary

One portable CO_2 and one pressurized water fire extinguisher

2. Secondary

5. Protected Raceways

   None

6. Protected Structural Members

   None

C. Safety Related Equipment and Components

None

D. Non-Safety Related Equipment and Components

- Tools and Supplies
- Conduit

E. Radioactive Material

None

F. Combustible Loading

1. Quantity/Type
   - 20 pounds of cable insulation (Hypalon)
   - 50 pounds of cable insulation (other)
2. In-Situ Combustible Load 4,700 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 3.6 minutes

G. Fire Detection

None

H. Fire Suppression

Manual hose stream from a hydrant on the yard fire main is available.

Two portable CO_2 and two pressurized water fire extinguishers are located in adjacent Zone 91D.

13

 13

- Steamerette
- Pressure washer
- 2-ton monorail
- Sump and pump
- Conduit

E. Radioactive Material

Area designed to clean contaminated parts and equipment.

F. Combustible Loading

1. Quantity/Type
   - 30 pounds of cable insulation (Hypalon)
   - 50 pounds of cable insulation (other)
2. In-Situ Combustible Load 940 Btu/ft^2
3. Transient Combustible Load
4. Equivalent Fire Severity 1 minute

G. Fire Detection

None

H. Fire Suppression

Manual hose stream from a hydrant on the yard fire main is available.

I. Ventilation

Flow through air filtration unit to outside

J. Drainage

Nine 4-inch drains

1. Primary

Two portable CO_2 and two pressurized water fire extinguishers

2. Secondary

13

 13

Table 9.5-1

FIRE PROTECTION FOR AREAS AND EQUIPMENT[(a)] (Sheet 3 of 9) 4

Areas or Equipment	Primary Fire Protection	Backup Fire Protection	Detection Device for Primary Fire Protection	Safety-Related Area	Accessibility Restrictions: Heat	Accessibility Restrictions: Radiation	Accessibility Restrictions: Toxic Combustion Products	
Control Building - Elev. 100 Ft								
• ESF Switchgear Rm., Train A&B	CD	WHS,PX	I	Yes	P	O	P	4
• Remote Shutdown Rms	H ~~WHS~~	WHS,PX ~~PX~~	I, HAD	Yes	P	O	P	
• Battery Rm. CH C	CD	WHS,PX	I,HAD	Yes	P	O	P	13
• DC Equip. Rm., CH C	WHS	PX	I	Yes	P	O	P	4
• Battery Rm., CH D	CD	WHS,PX	I,HAD	Yes	P	O	P	13
• DC Equip. Rm., CH D	WHS	PX	I	Yes	P	O	P	4
• Battery Rm., CH A	CD	WHS,PX	I,HAD	Yes	P	O	P	13
• DC Equip. Rm., CH A	WHS	PX	I	Yes	P	O	P	4
• Battery Rm., CH B	CD	WHS,PX	I,HAD	Yes	P	O	P	13
• DC Equip. Rm., CH B	WHS	PX	I	Yes	P	O	P	
• Cable Shaft, Train A	WHS	PX	I	Yes	P	O	P	4
• Cable Shaft, Train B	WHS	PX	I	Yes	P	O	P	
Control Building -								13
Elev. 120 Ft								4
• Lower Cable Spreading Rm.	PA	WHS,PX	I,L,S	Yes	P	O	P	13
• Cable Shaft, Train A	WHS	PX	I	Yes	P	O	P	4
• Communications Rm.	H	PX,WHS	I	Yes	P	O	P	13
• Cable Shaft, Train B	WHS	PX	I	Yes	P	O	P	4
• Inverter Rm.	H	PX,WHS	I	Yes	P	O	P	13

placed in a configuration to isolate the hazard area from any flow of outside air. The closing of dampers will be timed relative to the CO_2 discharge such that overpressurization of the hazard area will not occur.

The alarm condition is maintained until the system relay is reset manually. The control pilot valve also may be operated manually to activate the system. A supervised 1/4-inch ball valve is provided to deactivate the system when personnel occupy the room. The storage capacity of the system is adequate to permit two separate discharges within the largest single protected area immediately after complete purging of the main generator with carbon dioxide.

Operation of CO_2 hose reels for local application is initiated by manually removing the playpipe from its support bracket, thereby causing the master valve at the storage tank to open and charge the piping up to the nozzle. Removal of the playpipe also trips a limit switch which registers an alarm condition in the control room. Discharge of CO_2 is controlled by the hose operation by utilizing the squeeze-type valve at the nozzle. Replacement of the playpipe on its support shuts the master valves and returns the limit switch to normal.

I. Halon 1301 Systems

ACTUATED BY

PREALARMED

Halon 1301 system operation is ~~initiated~~ by the product

AND THERMAL DETECTORS ~~WHICH ARE CROSS-ZONED~~

of combustion ~~detectors (operation type) which are cross-zoned.~~ Actuation of the first circuit (or loop),

IN THE REMOTE SHUTDOWN ~~HALLS~~ ROOMS, AND BY PRODUCT OF COMBUSTION DETECTORS WHICH ARE CROSS-ZONED IN THE COMPUTER, COMMUNICATION AND INVERTER ROOMS.

on the cross-zones system, accomplishes the following function: 8

- Energizes an audible and visual alarm

The actuation of second circuit (or loop), on the cross-zoned system shall accomplish the following functions:

- Audible and visual alarm energized.
- HVAC dampers closed. 8
- Magnetic door holders released, if applicable (i.e., if the doors are not normally closed).
- Halon discharged.

A 20-second delay is provided before release of Halon 1301. MANUAL PULL STATIONS ARE ~~ALSO~~ CONVENIENTLY ~~IS~~ LOCATED FOR SYSTEM ACTUATION. The detection system trips the release valve assembly in the control head of the pilot storage cylinder to discharge the total capacity of the agent storage cylinders. In this manner a minimum (maximum) Halon 1301 concentration of 5% (7%) is 13 achieved in the area to be protected. Alarms are also provided in the control room for Halon discharge and Halon system malfunctions. A concentration level of up to 7% Halon 1301 in the computer room may be inhaled by 13 personnel for 4 or 5 minutes without risk of serious effects. The control room will remain habitable at all times.

J. Standpipes and Hoses

Inside hose stations are intended to be operated by plant personnel for the manual control of small fires. Adjustable spray nozzles are used for areas where non-electrical fires might occur, and approved fog nozzles (Class C) are used in areas where electrical fires might occur.

INSERT (A) TO PAGE 9B.2.1-11:

6. A deviation is requested from Section III.G.2 to the extent that it requires three-hour rated barriers to separate circuits of redundant trains.

Discussion:

¶ The east wall of Fire Zone 10A is a 2-hour rated barrier common to Fire Area II, Fire Zone 10B. The wall, which separates the two remote shutdown panel rooms, is of metal lath and plaster construction and contains a ~~2~~ 3-hour rated fire door. This fire area boundary is not rated at 3-hours due to the lack of a tested configuration featuring a 3-hour rated door frame installed in a 3-hour rated metal lath and plaster wall. Only Train A circuitry is routed through Zone 10A. Zone 10B contains both Train B circuitry and some Train A conduit. That Train A raceway required for safe shutdown, LOCATED IN ZONE 10B, is protected by a 3-hour rated wrapping.

INSERT (A) CONTINUED

¶ The equivalent fire severities in Zones 10A and 10B are approximately 42 and 28 minutes, respectively. Each of the fire Zones is protected by smoke detectors AND THERMAL DETECTORS. A Halon 1301 suppression SYSTEM, PREALARMED BY ~~actuated by both~~ smoke and ACTUATED BY thermal detectors is to be installed in each fire zone. Fire brigade response (within 30 minutes) is expected before significant degradation of the existing fire barriers would occur. Access to each of Zones 10A and 10B is possible through the adjacent ESF switchgear rooms.

Conclusion:

¶ The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to a 3-hour rating would not significantly enhance the protection currently provided.

<u>Conclusion</u>:

The existing design provides equivalent protection to that required by Section III.G.2, and upgrading the existing design to a 1-hour rating plus suppression would not significantly enhance protection currently provided. 13

7 5. See section 9B.2.2 for a deviation common to Fire Area II and the section 9B.2 introduction for generic deviations.

ADD INSERT A

(NOTE: DEVIATION #5 WAS CREATED BY SARCN 1225, AND FORWARDED TO THE NRC BY ANPP-30291-EEVBJr/TFQ/DKN DATED AUGUST 21, 1984)

9B.2.1.10 Fire Area I, Fire Zone 10A, Train A Remote Shutdown Room

A. Location

Fire Zone 10A (figure 9B-9) is located in the Control Building at elevation 100'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North: 3-hour rated wall common to Zone 7A.

3-hour rated area boundary wall common to Fire Area II, Zone 7B.

South: 3-hour rated area boundary wall common to Fire Area IV at column line J4

13 East: ~~3~~ 2-hour rated area boundary wall common to Fire Area II, Zone 10B.

West: 1-hour rated wall common to Zone 5A.

Floor: 3-hour rated barrier common to Zone 1.
3-hour rated area boundary barrier common to Fire Area II, Zone 2.

Ceiling: 3-hour rated area boundary barrier common to Fire Area II, Zone 14.

2. Zone Access

STET

- One Class A door in the ~~3~~ 2-hour rated east wall to Zone 10B
- One Class C door in the 1-hour rated west wall to Zone 5A.

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings.

G. Fire Detection

Ionization smoke detector system(s) is provided for early WARNING AN ~~warning~~ ~~and~~ IN ADDITION ~~in area are zoned~~ [illegible] THERMAL DETECTORS will actuate the automatic Halon 1301 gas system.

H. Fire Suppression

1. Primary

   Automatic Halon 1301 FIRE EXTINGUISHING ~~gas~~ system

   ~~One manual hose reel is located in adjacent Zone 5A.~~

2. Secondary

   One manual hose reel and ~~T~~two portable CO_2 fire extinguishers are located in adjacent Zone 5A.

13 I. Ventilation

Refer to Appendix 9A response to Question 9A.70. Portable fans exhaust smoke to adjacent rooms where smoke exhaust fans exhaust to outside air.

J. Drainage

None

K. Emergency Lighting

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

9B.2.2.10 Fire Area II, Fire Zone 10B, Train B Remote Shutdown Room

A. Location

Fire Zone 10B (figure 9B-9) is located in the Control Building at elevation 100'0".

B. Fire Prevention Features

1. Zone Boundaries and Rated Fire Barriers

North:	3-hour rated wall common to Zone 7B.
South:	3-hour rated area boundary wall common to Fire Area IV at column line J4.
East:	1-hour rated wall common to Zone 5B.
West:	3-hour rated area boundary wall common to Fire Area I, Zone 10A.
Floor:	3-hour rated barrier common to Zone 2.
Ceiling:	3-hour rated barrier common to Zone 14.

2. Zone Access STET

- One Class A door in the 3-hour rated west wall to Zone 10A
- One Class A door in the 1-hour rated east wall to Zone 5B

3. Sealed Penetrations

Seals equal or exceed fire barrier ratings

4. Fire Dampers

Duct penetrations in the rated fire barriers are provided with fire dampers of equal or greater rating.

5. Protected Raceways

Train A conduit are covered by 3-hour rated protective wrappings.

G. Fire Detection

Ionization smoke detector system(s) is provided for EARLY WARNING AND THERMAL DETECTION ~~early warning~~ ~~and in ADDITION a cross zoned [illegible]~~ will actuate the automatic Halon 1301 gas system.

H. Fire Suppression

1. Primary

Automatic Halon 1301 ~~gas~~ FIRE EXTINGUISHING system.
~~One manual hose reel is located in adjacent Zone 5B.~~

2. Secondary

One manual hose reel and one portable CO_2 fire extinguisher ~~is~~ are located in adjacent Zone 5B. One portable CO_2 fire extinguisher and one manual hose reel are located in adjacent Corridor Building near Zone 5B.

13

I. Ventilation

Refer to Appendix 9A response to Question 9A.70. Portable fans exhaust smoke to adjacent rooms where smoke exhaust fans exhaust to outside air.

J. Drainage

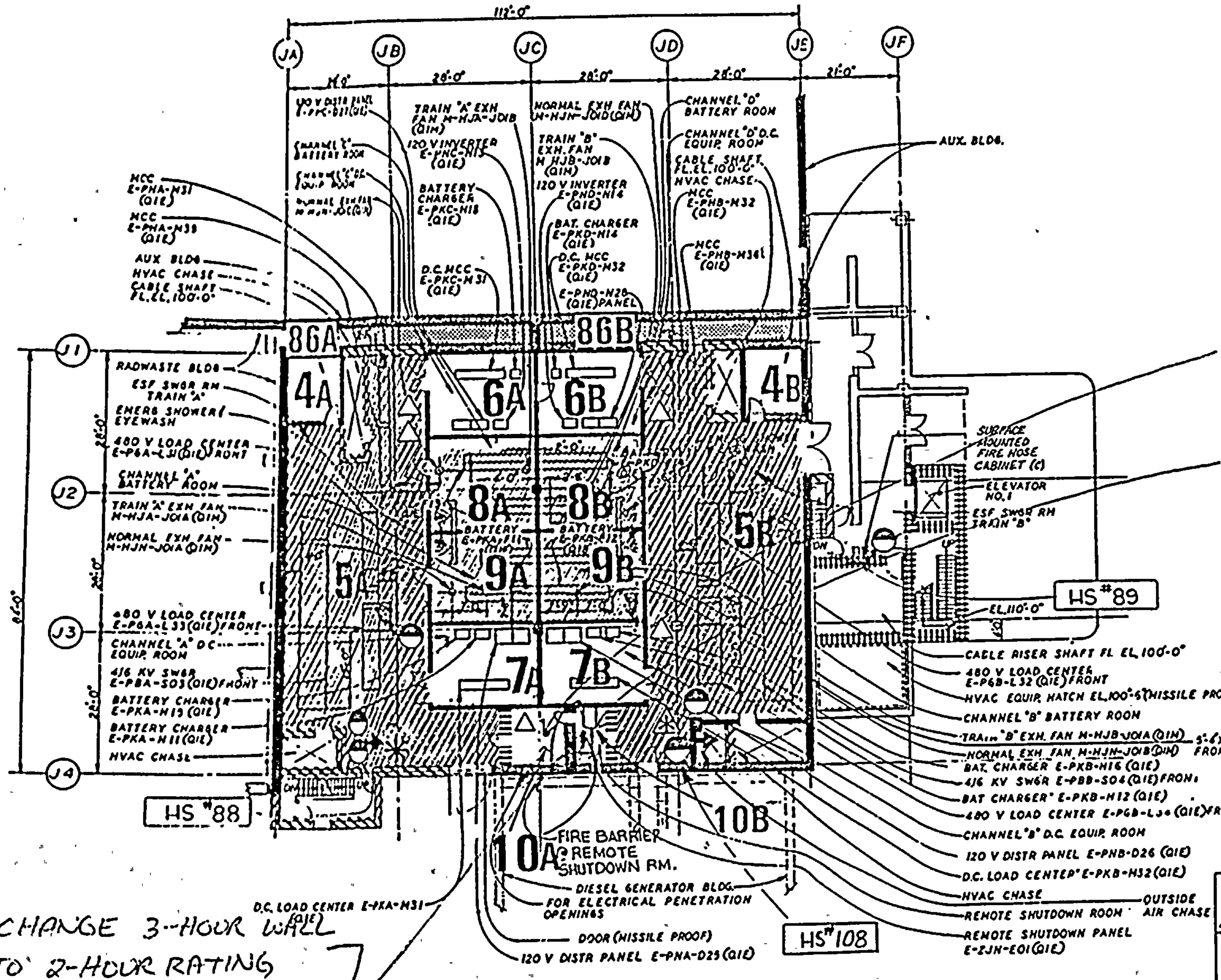
None

K. Emergency Lighting

Lighting with 8-hour battery unit(s) positioned for the operation of safe shutdown equipment is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.



ADD HALON 1301 SYMBOLS TO ZONES 10A + 10B AS:

(SEE FIG 9B-39)

13

NOTES:

1. REFER TO FIGURES 9B-1 THROUGH 9B-7 FOR FIRE AREA BOUNDARY LOCATIONS AND PLANT ORIENTATION.
2. REFER TO FIGURE 9B-39 FOR SYMBOL LEGEND.

CHANGE 3-HOUR WALL TO 2-HOUR RATING AS "".

Palo Verde Nuclear Generating Station
FSAR

CONTROL BUILDING
PLAN AT ELEVATION 100'-0"

Figure 9B-9

2. In-Situ Combustible Load 35,500 Btu/ft^2

3. Transient Combustible Load

4. Equivalent Fire Severity 26.6 minutes

G. Fire Detection

~~Ionization smoke detector systems are provided for early warning, and in a cross-zoned mode will actuate an automatic CO_2 gas system.~~

H. Fire Suppression

1. Primary

Automatic CO_2 total flooding

2. Secondary

One manual hose reel

Two portable CO_2 fire extinguishers

I. Ventilation

Manually controlled smoke exhaust venting to outside.

J. Drainage

Two 4-inch drains

K. Emergency Lighting

Egress lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided. 13

Actuation of the ionization smoke detector system(s) and the thermal detector system(s) activates the automatic CO_2 gas system. Either detector system alone ~~can~~ provides early warning.

3. Transient Combustible Load

4. Equivalent Fire Severity 28.3 minutes

G. Fire Detection

~~Ionization smoke detector systems are provided for early warning, and in a cross-zoned mode will actuate an automatic CO_2 gas system.~~

H. Fire Suppression

1. Primary

Automatic CO_2 total flooding

2. Secondary

13 One manual hose reel and one portable CO_2 fire extinguisher. One portable CO_2 fire extinguisher and one manual hose reel are located in the adjacent Corridor Building.

I. Ventilation

Smoke venting to outside. (Manual Smoke Exhaust Fan)

J. Drainage

Two 4-inch drains

K. Emergency Lighting

Egress lighting with 8-hour battery unit(s) is provided.

L. Emergency Communications

Sound powered phone jack(s) is provided.

Activation of the ionization smoke detector system(s) and the thermal detector system(s) activates the automatic CO_2 gas system. Either detector system alone ~~or~~ provides early warning.

placed in a configuration to isolate the hazard area from any flow of outside air. The closing of dampers will be timed relative to the CO_2 discharge such that overpressurization of the hazard area will not occur.

ACHIEVE THE DESIGN CONCENTRATION INCLUDING EXTENDED

The alarm condition is maintained until the system relay is reset manually. The control pilot valve also may be operated manually to activate the system. A supervised 1/4-inch ball valve is provided to deactivate the system when personnel occupy the room. The storage capacity of the system is adequate to ~~permit two separate~~ discharge~~s~~ within the largest single protected area immediately after complete purging of the main generator with carbon dioxide.

Operation of CO_2 hose reels for local application is initiated by manually removing the playpipe from its support bracket, thereby causing the master valve at the storage tank to open and charge the piping up to the nozzle. Removal of the playpipe also trips a limit switch which registers an alarm condition in the control room. Discharge of CO_2 is controlled by the hose operation by utilizing the squeeze-type valve at the nozzle. Replacement of the playpipe on its support shuts the master valves and returns the limit switch to normal.

I. Halon 1301 Systems

Halon 1301 system operation is initiated by the product of combustion detectors (operation type) which are cross-zoned. Actuation of the first circuit (or loop),