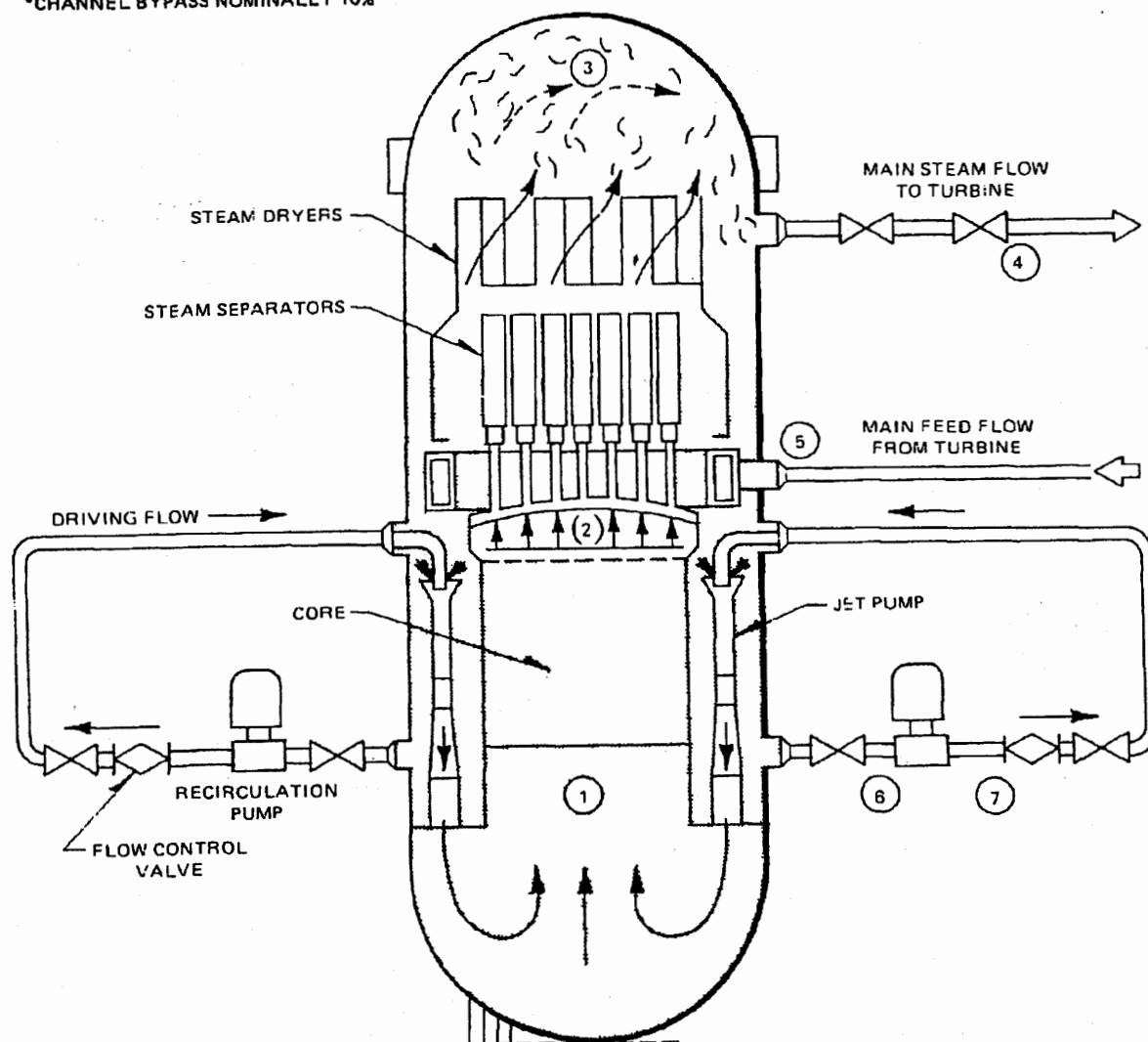


	PRESSURE (psia)	FLOW (lb/hr)	TEMPERATURE (°F)	ENTHALPY (Btu/lb)
1. CORE INLET	1075	104.0×10^6	533	527.4
2. CORE OUTLET	1050	104.0×10^6	550	651.4
3. SEPARATOR OUTLET (STEAM DOME)	1040	16.3×10^6	549	1190.8
4. STEAM LINE (2ND ISOLATION VALVE)	981	16.3×10^6	542	1190.8
5. FEEDWATER INLET (INCLUDES RETURN FLOW)	1065	16.4×10^6	426	403.7
6. RECIRC PUMP SUCTION	1040	32.1×10^6	533	527.2
7. RECIRC PUMP DISCHARGE	1296	32.1×10^6	533.8	528.4

*CHANNEL BYPASS NOMINALLY 10%



(Rev. 12 1/03)

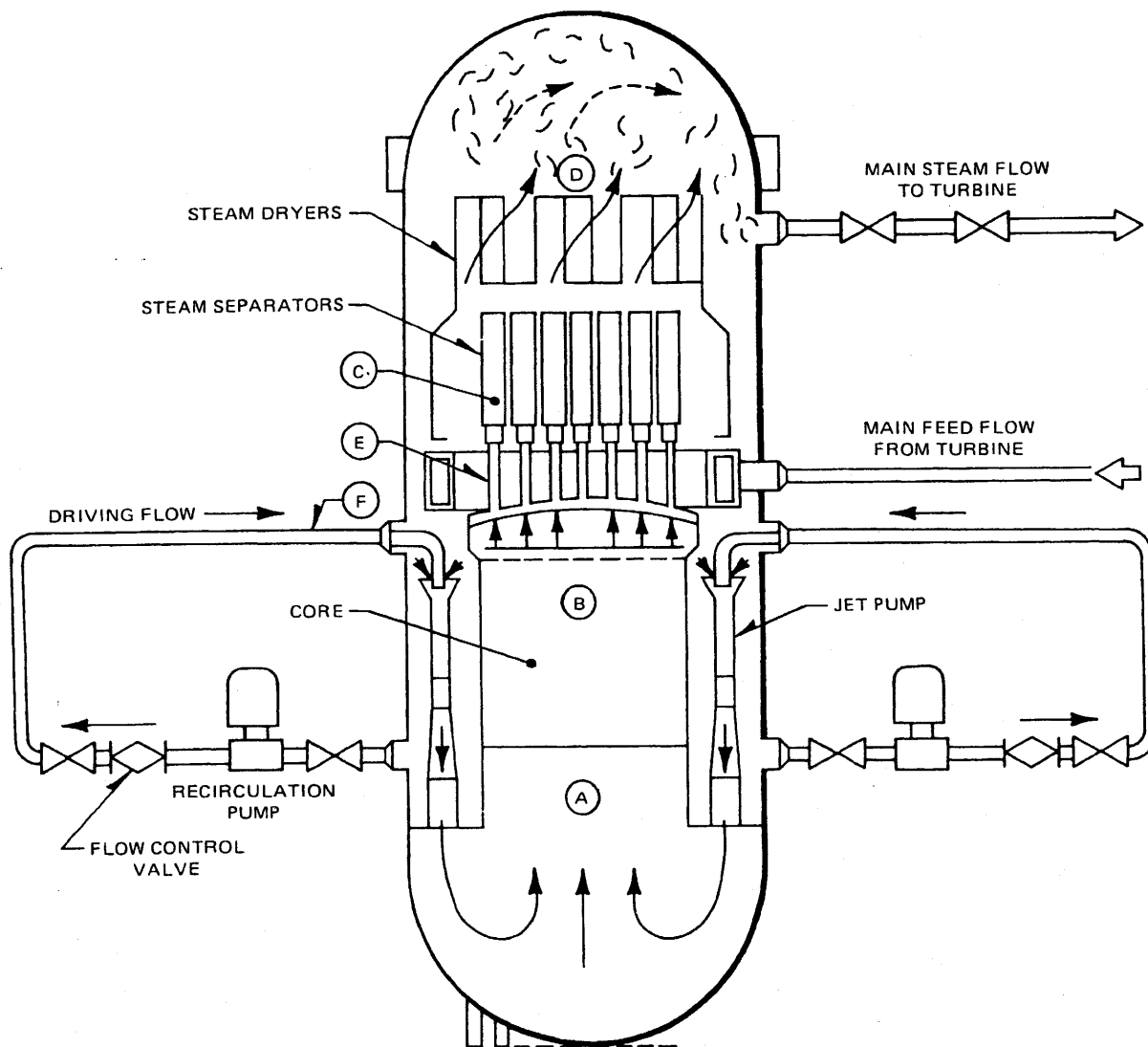


PERRY NUCLEAR POWER PLANT

Rated Operating Conditions of
the Boiling Water Reactor

Figure 5.1-1

	VOLUME OF FLUID (ft ³)
A LOWER PLENUM	3990
B CORE	2020
C UPPER PLENUM AND SEPARATORS	2440
D DOME (ABOVE NORMAL WATER LEVEL)	5700
E DOWNCOMER REGION	4060
F RECIRCULATION LOOPS AND JET PUMPS	960



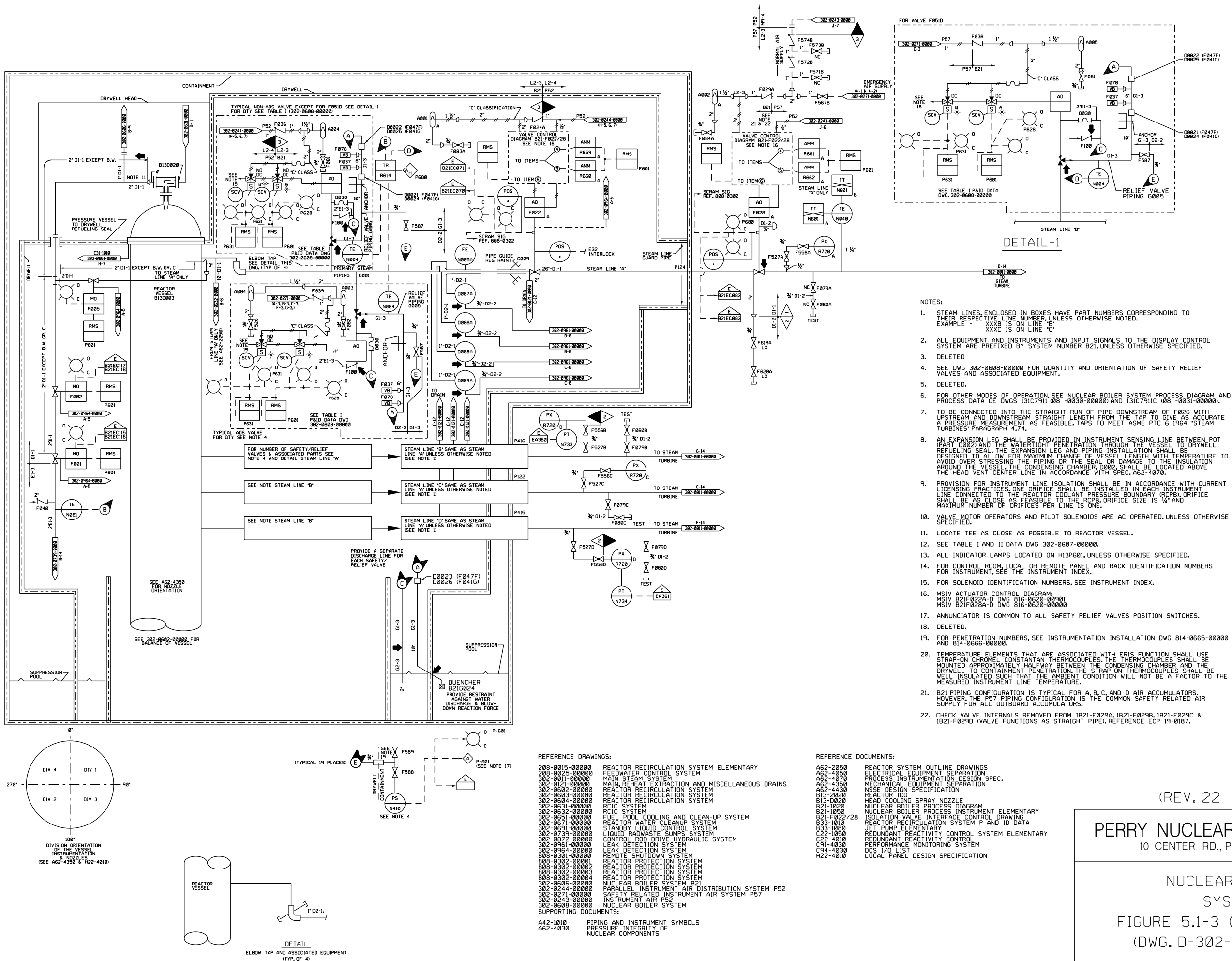
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PERRY NUCLEAR POWER PLANT

Coolant Volumes of the Boiling
Water Reactor

Figure 5.1-2



NUCLEAR
BOILER SYSTEM
FIGURE 5.1-3 (SHEET 2 OF 4)
(DWG. D-302-0606-00000)

FOR RELAY LOGIC ONLY

TABLE I: PRESSURE INSTRUMENT CONTACT UTILIZATION

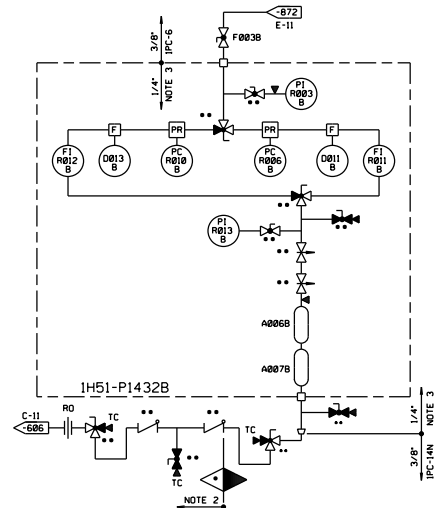
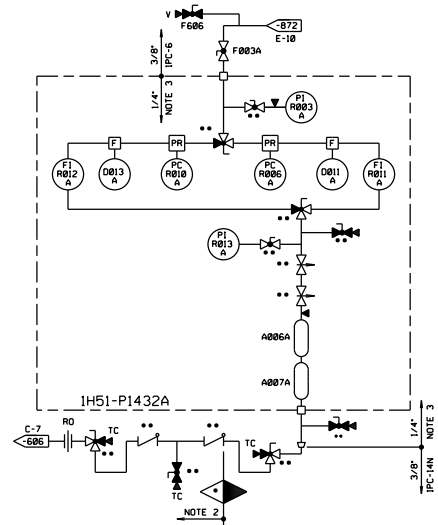
TRANSMITTER	MECH DIV LOC	ELEC DIV		TRIP UNIT	SYSTEM
PT N078A	1	1		PIS N678A PS N679A	RPS (A) NS ⁴ (A)RHR ISOL)
PT N078B	2	2		PIS N678B PS N679B	RPS (B) NS ⁴ (B)RHR ISOL)
PT N078C	3	3		PIS N678C PS N679C	RPS (C) NS ⁴ (C)RHR ISOL)
PT N078D	4	4		PIS N678D PS N679D	RPS (D) NS ⁴ (D)RHR ISOL)
PT N403A	1	1		ATM	RRCS (*)
PT N403E	1	1		ATM	RRCS (*)
PT N403B	2	2		ATM	RRCS (*)
PT N403F	2	2		ATM	RRCS (*)
PT N067C	3	3		PIS N667C	HPCS
PT N067G	3	3		PIS N667G	HPCS
PT N067L	4	3		PIS N667L	HPCS
PT N067R	4	3		PIS N667R	HPCS
PT N094A	1	1		PIS N694A	RHR (A) / LPCS / RCIC
PT N094E	1	1		PIS N694E	RHR (A) / LPCS
PT N094B	2	2		PIS N694B	RHR (B) / RHR (C) / RCIC
PT N094F	2	2		PIS N694F	RHR (B) / RHR (C)
PT N068A	1		1	PIS N668A	PRESS RELIEF
			1	PS N669A	PRESS RELIEF
			1	PS N670A	PRESS RELIEF
			1	PS N617A	RE-OPEN / RE-CLOSE (MID)
			1	PS N618A	RE-OPEN / RE-CLOSE (HIGH)
PT N068B	2		2	PIS N668B	PRESS RELIEF
			2	PS N669B	PRESS RELIEF
			2	PS N670B	PRESS RELIEF
			2	PS N617B	RE-OPEN / RE-CLOSE (MID)
			2	PS N618B	RE-OPEN / RE-CLOSE (HIGH)
PT N076A	1	1		PIS N676A	NS ⁴
PT N076B	2	2		PIS N676B	NS ⁴
PT N076C	3	3		PIS N676C	NS ⁴
PT N076D	4	4		PIS N676D	NS ⁴
PT N075A	1	1		PIS N675A	NS ⁴
PT N075B	2	2		PIS N675B	NS ⁴
PT N075C	3	3		PIS N675C	NS ⁴
PT N075D	4	4		PIS N675D	NS ⁴
dPT N032	-	-		-	CORE PLATE dP
PT N062A	1	1	-	-	POST ACCIDENT MON.
PT N062B	2	2	-	-	POST ACCIDENT MON.
PT N068E	1		1	PIS N668E	PRESS RELIEF
			1	PS N669E	PRESS RELIEF
			1	PS N670E	PRESS RELIEF
			1	PS N616E	RE-OPEN / RE-CLOSE (LOW)
			1	PS N618E	RE-OPEN / RE-CLOSE (HIGH)
PT N068F	2		2	PIS N668F	PRESS RELIEF
			2	PS N669F	PRESS RELIEF
			2	PS N670F	PRESS RELIEF
			2	PS N616F	RE-OPEN / RE-CLOSE (LOW)
			2	PS N618F	RE-OPEN / RE-CLOSE (HIGH)

* REFERENCE C22-4010/ 1050
NS ⁴ - NUCLEAR STEAM SUPPLY SHUTOFF
CONTAINMENT ISOLATION FUNCTION

TABLE II: WATER LEVEL INSTRUMENT CONTACT UTILIZATION

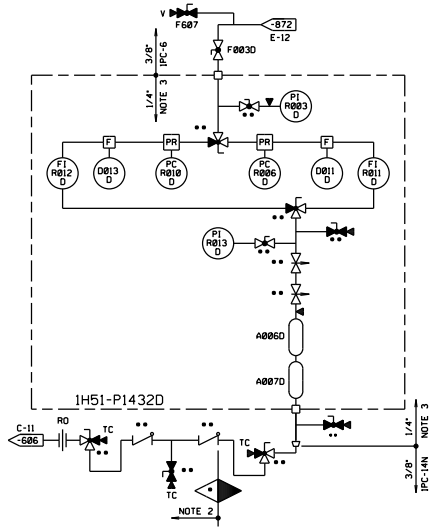
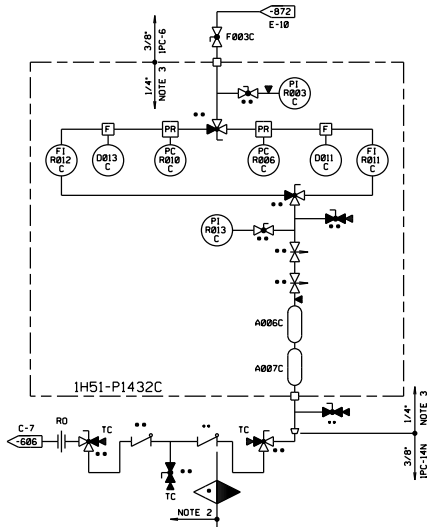
TRANSMITTER	MECH DIV LOC	ELEC DIV	TRANS E/S MPL NUMBER	TRIP UNIT	SYSTEM	LEVEL TRIP POINT
LT N027	2	-	B21-K615	-	SHUTDOWN LEVEL *	-
LT N044C	3	1	-	L1 R610C	FUEL ZONE *	-
LT N044D	4	2	-	L1 R610D	FUEL ZONE *	-
LT N490	4	3	-	LR R615	FUEL ZONE	-
LT N091A	1	1	E21-PS2	L1S N691A	ADS (A) / RHR (A) / LPCS	1
LT N091B	2	2	E12-PS2	LS N692A	RCIC	2
				L1S N691B	ADS (B) / RHR (B) / RHR (C)	1
LT N091E	1	1	E21-PS2	LS N692B	RCIC	2
				L1S N691E	ADS (A) / RHR (A) / LPCS	1
LT N091F	2	2	E12-PS2	LS N692E	RCIC	2
				LS N693E	RCIC	8
				L1S N691F	ADS (B) / RHR (B) / RHR (C)	1
				LS N692F	RCIC	2
LT N073C	3	3	E22-PS2	LS N693F	RCIC	8
				L1S N673C	HPCS ****	2
LT N073G	3	3	E22-PS2	LS N674C	HPCS	8
				L1S N673G	HPCS	2
LT N073L	4	3	E22-PS2	LS N674G	HPCS	8
				L1S N673L	HPCS	2
LT N073R	4	3	E22-PS2	LS N674L	HPCS	8
				L1S N673R	HPCS	2
LT N402A	1	1		ATM	RRCS **	2
LT N402E	3	1		ATM	RRCS **	2
LT N402B	2	2		ATM	RRCS **	2
LT N402F	4	2		ATM	RRCS **	2
LT N095A	1	1	E21-PS2	L1S N695A	ADS (A)	3
LT N095B	2	2	E12-PS2	LS N693A	RCIC	8
				L1S N695B	ADS (B)	3
LT N081A	1	1	C71-K613A	LS N693B	RCIC	8
				L1S N681A	NS ⁴ (MSIV) ***	1
LT N081B	2	2	C71-K613B	LS N682A	NS ⁴	2
				L1S N681B	NS ⁴ (MSIV) ***	1
LT N081C	3	3	C71-K613C	LS N682B	NS ⁴	2
				L1S N681C	NS ⁴ (MSIV) ***	1
LT N081D	4	4	C71-K613D	LS N682C	NS ⁴	2
				L1S N681D	NS ⁴ (MSIV) ***	1
LT N080A	1	1	C71-K613A	LS N682D	NS ⁴	2
				L1S N680A	RPS (A) (RHR ISOLATION)	3
LT N080B	2	2	C71-K613B	LS N683A	RPS (A)	8
				L1S N680B	RPS (B) (RHR ISOLATION)	3
LT N080C	3	3	C71-K613C	LS N683B	RPS (B)	8
				L1S N680C	RPS (C) (RHR ISOLATION)	3
LT N080D	4	4	C71-K613D	LS N683C	RPS (C)	8
				L1S N680D	RPS (D) (RHR ISOLATION)	3
				LS N683D	RPS (D)	8

* REFERENCE B21-1050
** REFERENCE C22-4010/ 1050
ATM - ANALOG TRIP MODULE
*** ADDITIONAL FUNCTIONS
- CLOSE DRYWELL FAN COOLER'S COOLING WATER ISOLATION VALVES
- ISOLATE THE MSIV'S AIR SUPPLY
**** ALSO FEEDS 2-PEN RECORDER R615



- NOTES:
1. FOR NOTES AND REFERENCES, SEE DRAWING D-302-605.
 2. * SAFETY RELATED NON-CODE SEISMIC CATEGORY I.
 3. 1/4\"/>

PURGE CONTROL PANEL	LOCAL CONTROL PANEL	ISOLATION VALVE
H51-P1432A	H22-P004A	B21-F553
H51-P1432B	H22-P027	B21-F514
H51-P1432C	H22-P005	B21-F505
H51-P1432D	H22-P026	B21-F510



(REV. 21 10/2019)

PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

NUCLEAR BOILER SYSTEM

FIGURE 5.1-3 (SHEET 3 OF 4)
(DWG. D-302-0607-00000)

TABLE I - SUFFIX LETTER ASSIGNMENT FOR SAFETY RELIEF VALVES & ASSOCIATED EQUIPMENT

SAFETY/RELIEF VALVE		FO41A	FO41B	FO41C	FO41D	FO41E	FO41F	FO41G	FO41H	FO41I	FO41J	FO41K	FO41L	FO41M	FO41N	FO41O	FO41P	FO41Q	FO41R	FO41S	FO41T	FO41U	FO41V	FO41W	FO41X	FO41Y	FO41Z
FLEXIBLE HOSE		D030	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
TEMP ELEMENT NO04			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
ACCUMULATOR	A004		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD5 A003		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD09 SEE NOTE 3		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
CHECK VALVE	FO36		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD5 FO39		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	FO37		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
VACUUM BREAKER	FO78		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD5		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD5 AD04 F037		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
SRV DISCHARGE PRESS SWITCH	N40		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	ERS COMP INPUT	EC042	EC043	EC044	EC045	EC046	EC047	EC048	EC049	EC050	EC051	EC052	EC053	EC054	EC055	EC056	EC057	EC058	EC059	EC060							
	AD5 MO05 FO81		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
DRAIN VALVE	AD5 AD04 F037		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD04 FO81		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
	AD09 FO81		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
* * * COMPUTER INPUT		B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21	B21
		NC025	NC026	NC027	NC028	NC029	NC030	NC031	NC032	NC033	NC034	NC035	NC036	NC037	NC038	NC039	NC040	NC041	NC042	NC043	NC044	NC045	NC046	NC047	NC048	NC049	NC050
SPRING SET PRESS PSIG		1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165
RELIEF SET PRESSURE PSIG		1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123	1123
PRESSURE INDIC SWITCH	N668																										
	N669																										
	N670																										
	N616																										
	N617																										
PRESSURE SWITCH	N618																										
	N619																										
	N620																										
	N621																										
LOW/LOW SET RECLOSE PRESS. PSIG																											
LOW/LOW SET REOPEN PRESS. PSIG																											

* * * COMPUTER INPUTS FOR VALVE POSITION (REF 4)
 + CONTROL PROVIDED IN REMOTE SHUTDOWN SYSTEM (REF 3)

TABLE II
ELEVATION CORRELATION CHART

REFERENCE	(COLD VESSEL) INCHES ABOVE VESSEL ZERO	DESCRIPTION OF TRIPS	INSTRUMENT(S) PROVIDING TRIP	REACTOR VESSEL LEVEL IDENTITY SEE REF 2	CONTROL ROOM WATER LEVEL INDICATION AND TRIP LEVELS SEE NOTE 2					
					SAFEGUARDS			FEEDWATER		
					FUEL ZONE	WIDE RANGE	NARROW RANGE	UPSET	SHUTDOWN	
					LI R610 C/D	LR R605	LR/PR R623A/B LR/PR R622	C34 LR R608 C34 LR R606A/B/C	C34 LR R608 C34 LR R606A/B/C	LI R605
TOP OF HEAD FLANGE	896.0"									5700"
STEAM LINE NOZZLE	844.5"								3500"	
INSTRUMENT LINE NOZZLE	806.0"									
		TRIP RCIC TURBINE & HPCS INJECTION VALVE CLOSURE SIGNAL. CLOSE MAIN TURBINE STOP VALVES. TRIP FEED PUMPS AND CONDENSATE BOOSTER PUMPS. SCRAM.	TABLE II REF 7 REF 1	8			230"	230"	230"	230"
		HIGH LEVEL ALARM	REF 1	7						205"
		NORMAL WATER LEVEL	REF 1	5						204"
		LOW LEVEL ALARM	REF 1	4						197"
		RUN RECIRC FLOWBACK R SCRAM & CONTRIBUTE TO AUTO DEPRESSURIZATION TRIP RECV PUMPS TO THE CRASH CLOSE RHM SHUTDOWN ISOL VALVES.	TABLE II REF 7 REF 1	3					173"	173"
BOTTOM OF DRYER SHIRT - 15"	529.5"						168"	168"	165"	165"
INSTRUMENT LINE NOZZLE	518.0"	INITIATE RCIC & HPCS CLOSE PRIMARY SYSTEMS ISOL VALVES EXCEPT IN RHM SHUTDOWN ISOL VALVES (RHS/MS/VS, C) DRYWELL FAN COOLERS COOLING WATER ISOL VALVES AND IDMS/IV AIR SUPPLY ISOL VALVES. START DIV 3 STAND-BY DIESEL PROVIDE SIGNAL TO RRC'S. H M	TABLE II REF 7	2				123"		
					50.0"	50.0"				
INSTRUMENT LINE NOZZLE	364.0"	INITIATE RHM AND LRCS CONTRIBUTE TO AUTO DE- PRESSURIZATION START DIV 18 DIV 2 STAND-BY DIESELS CLOSE MS/VS DRYWELL FAN COOLERS COOLING WATER ISOL VALVES AND MS/IV AIR SUPPLY ISOL VALVES.	TABLE II REF 7	1				16.5"		
							5"	5"		
TOP OF ACTIVE FUEL AND WATER LEVEL INSTRUMENT ZERO	363.5"				0	0	0"	0"	0"	0"
					-150.0"	-150.0"				
JET PUMP DIFFUSER TAP	142.8"									
JET PUMP INSTRU- MENT NOZZLE	136.5"									

R FUNCTION IS IN FEEDWATER CONTROL SYS (REF 1) FOR LOSS OF ONE FEED PUMP
 H M FUNCTION IS DEFINED IN REF 6

TABLE I (CONTINUED)

SAFETY/RELIEF VALVE	FO41A	FO41B	FO41C	FO41D	FO41E	FO41F	FO41G	FO41H	FO41I	FO41J	FO41K	FO41L	FO41M	FO41N	FO41O	FO41P	FO41Q	FO41R	FO41S	FO41T	FO41U	FO41V	FO41W	FO41X	FO41Y	FO41Z
ERS SRV INT	EC021	EC022	EC023	EC024	EC025	EC026	EC027	EC028	EC029	EC030	EC031	EC032	EC033	EC034	EC035	EC036	EC037	EC038	EC039	EC040	EC041	EC042	EC043	EC044	EC045	EC046

TABLE CONTINUED BELOW (K-14-K-7)

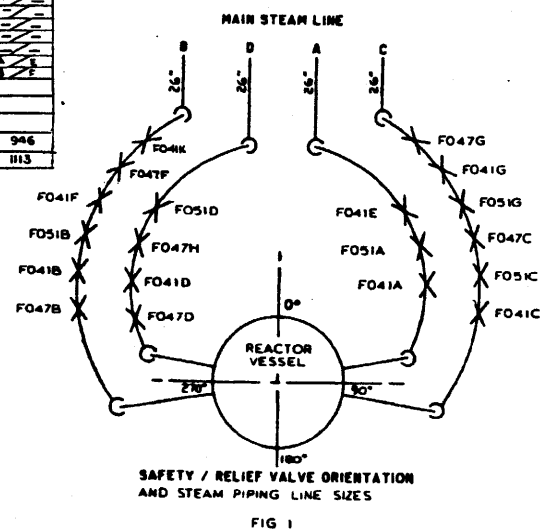
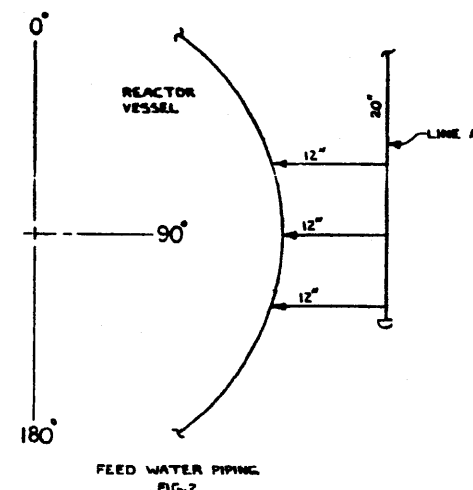


FIG 1

FEED WATER PIPING
FIG. 2

NOTES:

1. MPL NUMBERS AND COMPUTER INPUT NUMBERS ARE PREFIXED BY B21 UNLESS OTHERWISE NOTED.
2. WATER LEVEL INSTRUMENTS FOR VARIOUS RANGES ARE CALIBRATED AS STATED BELOW. ALL WATER LEVEL SWITCH SET POINTS ARE NOMINAL: I.E., THE ANALYSES ARE PERFORMED WITH THE SWITCH TRIP UNCERTAINTY INCLUDED. THE CONTAINMENT BUILDING TEMPERATURE ASSUMED TO BE 90°F.
3. A. FUEL ZONE: THE INSTRUMENTS ARE CALIBRATED FOR SATURATED WATER AND STEAM CONDITIONS 0 PSIG IN THE VESSEL AND THE DRYWELL WITH NO JET PUMP FLOW.
 B. WIDE RANGE: THE INSTRUMENTS ARE CALIBRATED FOR 1025 PSIG IN THE VESSEL, NORMAL OPER. TEMP. IN THE DRYWELL AND 20 BTU/LB SUBCOOLING BELOW THE MIDDLE WATER LEVEL NOZZLE AND SATURATED WATER AND STEAM CONDITIONS ABOVE THE MIDDLE WATER LEVEL NOZZLE WITH NO JET PUMP FLOW.
 C. NARROW RANGE: (SAFEGUARDS AND FEEDWATER): THE INSTRUMENTS ARE CALIBRATED FOR SATURATED WATER AND STEAM CONDITIONS AT 1025 PSIG IN THE VESSEL AND NORMAL OPERATING TEMPERATURE IN THE DRYWELL.
 D. UPSET RANGE: THE INSTRUMENT IS CALIBRATED FOR SATURATED WATER AND STEAM CONDITIONS AT 1025 PSIG IN THE VESSEL AND NORMAL OPERATING TEMP. IN THE DRYWELL.
 E. SHUTDOWN: THE INSTRUMENT IS CALIBRATED FOR 120°F WATER AT 0 PSIG IN THE VESSEL AND 90°F IN THE DRYWELL.
3. THE ACCUMULATOR AD05 DESIGN PRESSURE SHALL BE COMPATIBLE WITH THE ADS PNEUMATIC SUPPLY ACCUMULATOR.

SYSTEM SELECTION OPTIONS ARE INDICATED BY MULTIPLE MPL ITEM NO.

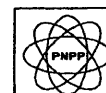
REFERENCES:-

- | MPL ITEM NO. | REFERENCE DOCUMENTS |
|------------------|--|
| 1. D-808-001 | FEEDWATER CONTROL SYSTEM IED |
| 2. B21-4020 | NUCLEAR BOILER SYSTEM DESIGN SPECIFICATION |
| 3. D-808-301 | REMOTE SHUTDOWN SYSTEM IED |
| 4. C91-4030 | PERFORMANCE MONITORING SYSTEM |
| 5. C94-4030 | DCS I/O LIST |
| 6. C12-4010/1050 | RBCS |
| 7. D-302-608 | NUCLEAR BOILER SYSTEM |

LEGEND:-

△ "ERS" SIGNAL LIST FUNCTION

(Rev. 12 1/03)

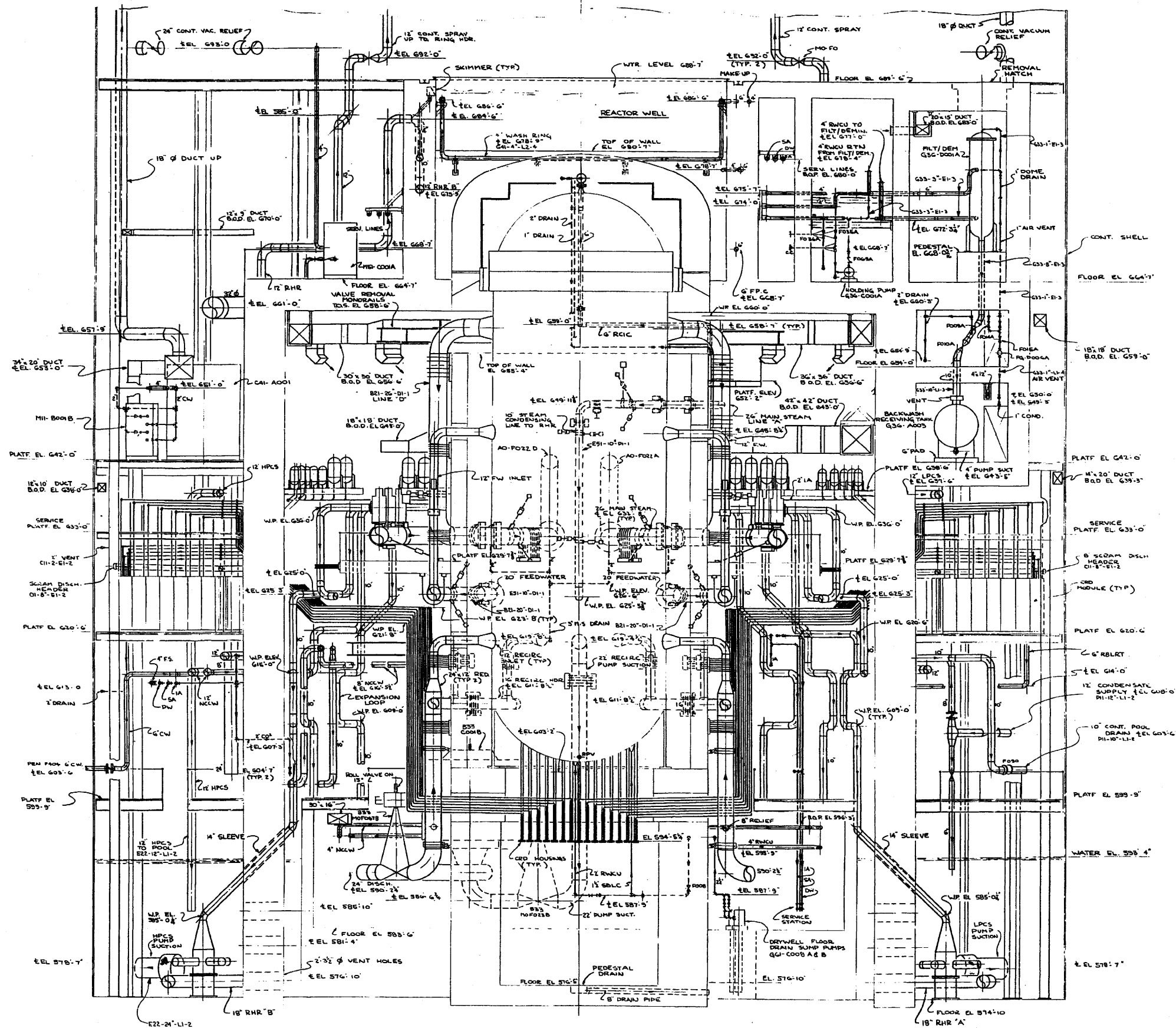


PERRY NUCLEAR POWER PLANT

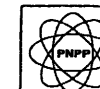
Nuclear Boiler System

Figure 5.1-3 (Sheet 4 of 4)

(Dwg. D-302-608)



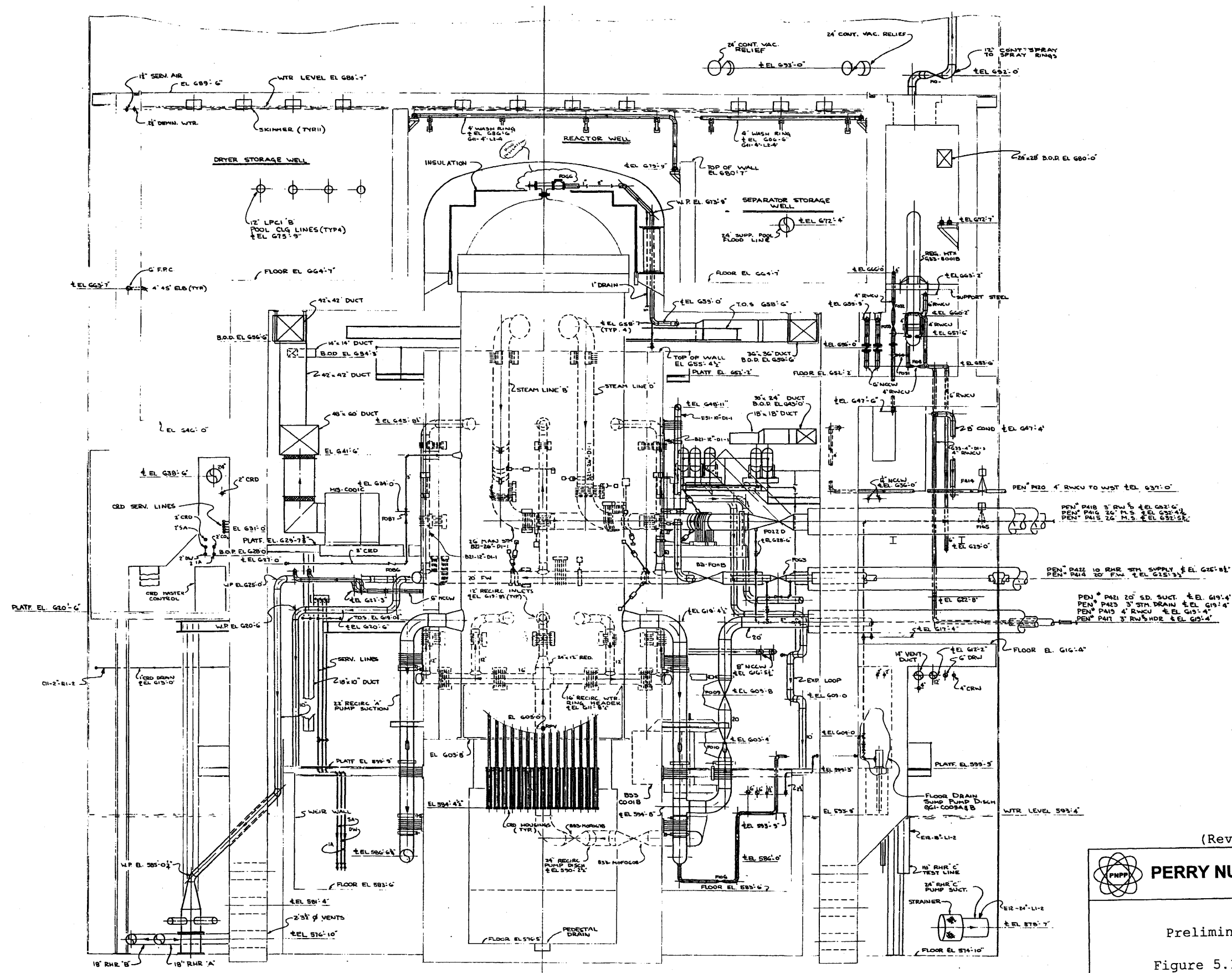
(Rev. 12 1/03)



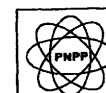
PERRY NUCLEAR POWER PLANT

Preliminary Piping Study

Figure 5.1-4 (Sheet 1 of 2)



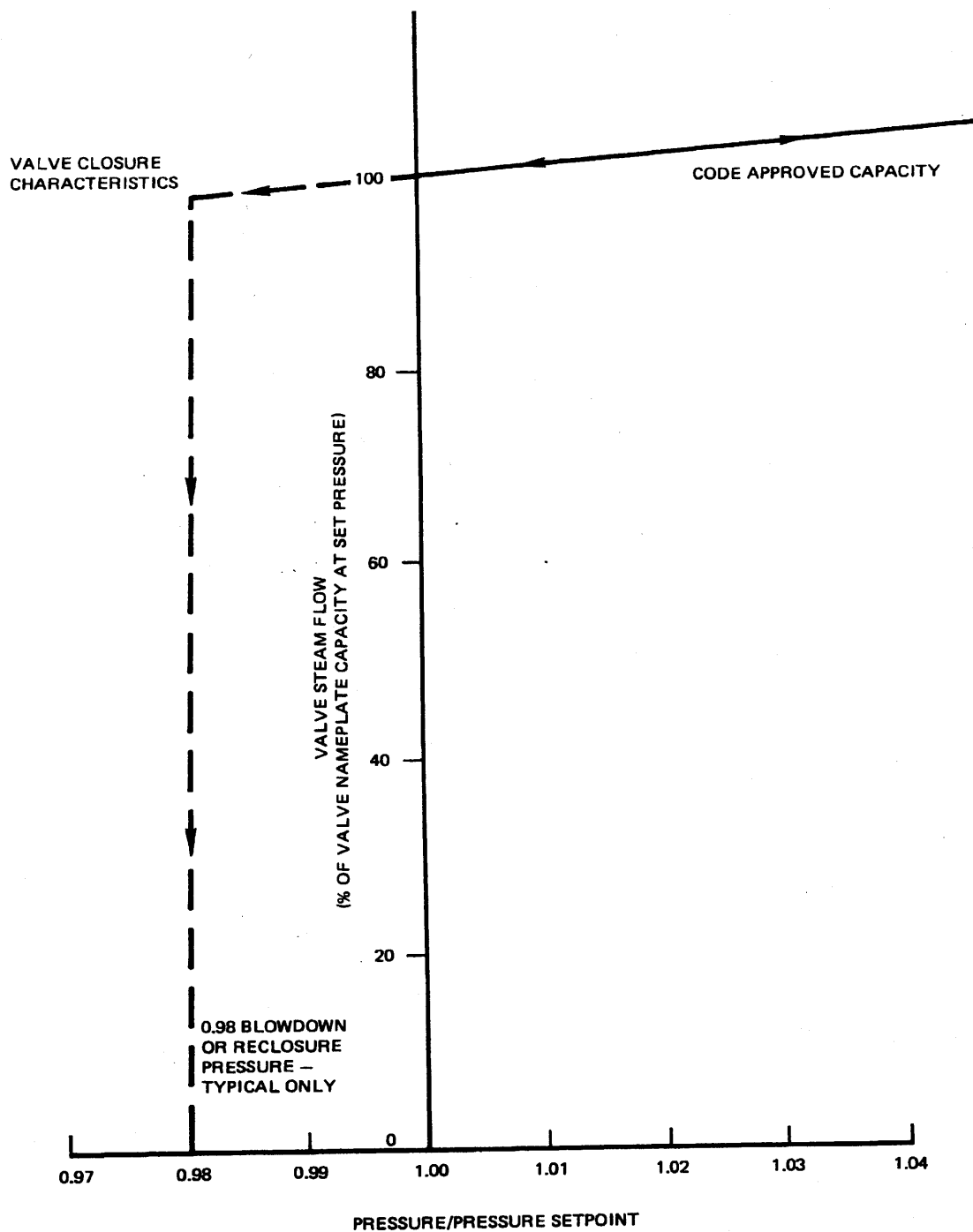
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Preliminary Piping Study

Figure 5.1-4 (Sheet 2 of 2)



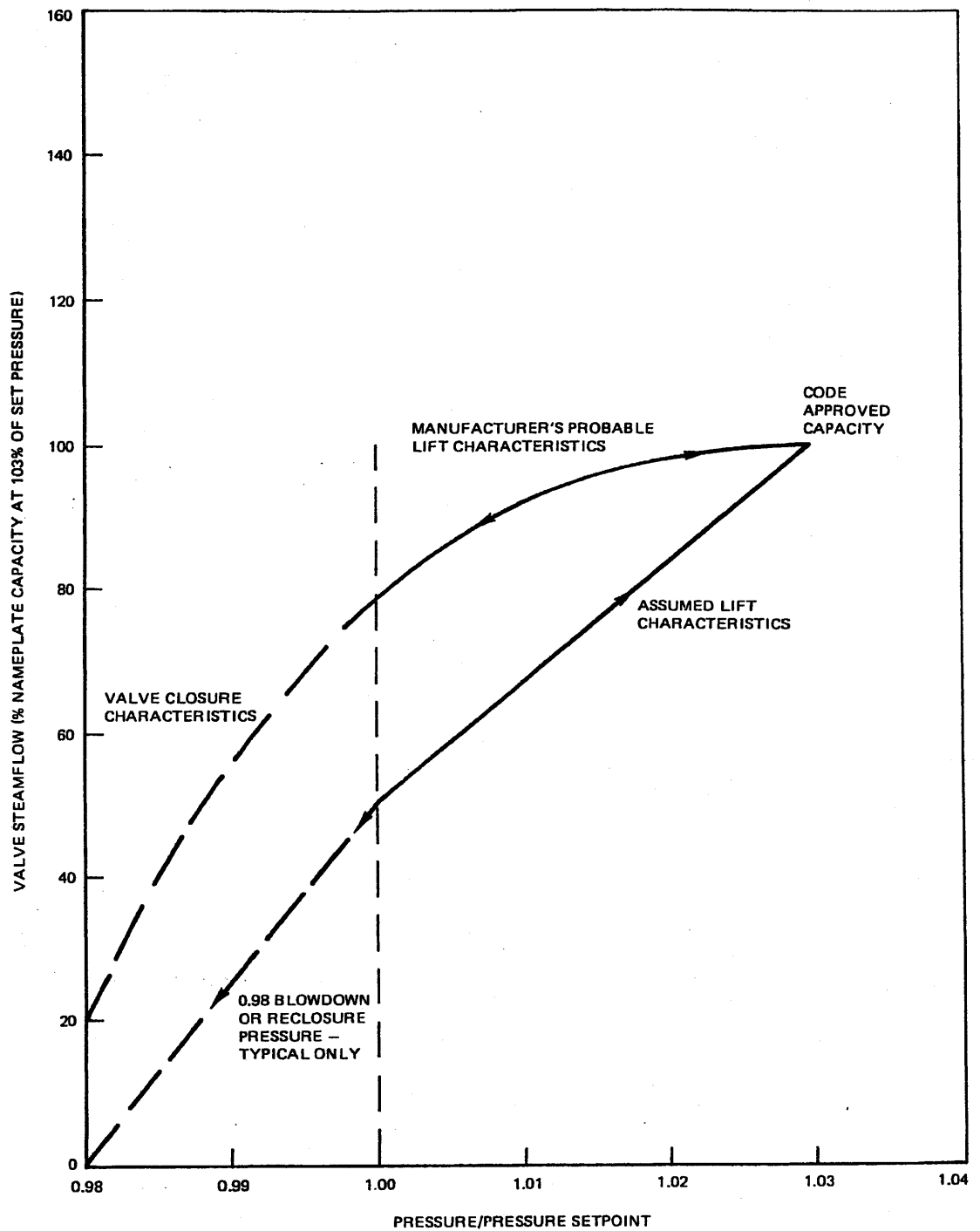
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Typical Dual Safety/Relief Valve
Capacity Characteristics Power -
Actuated Relief Mode

Figure 5.2-1



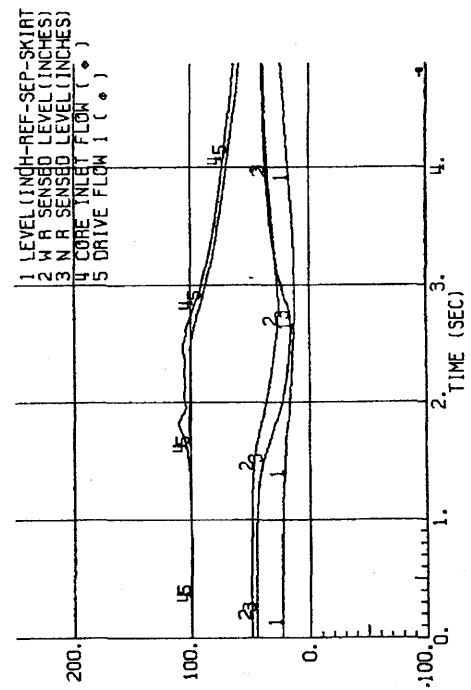
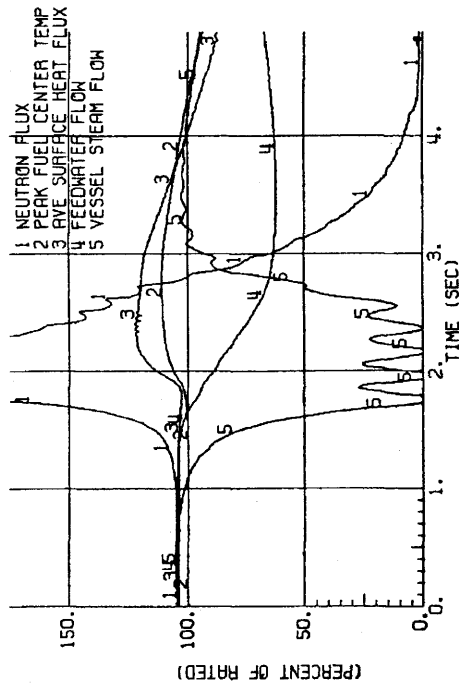
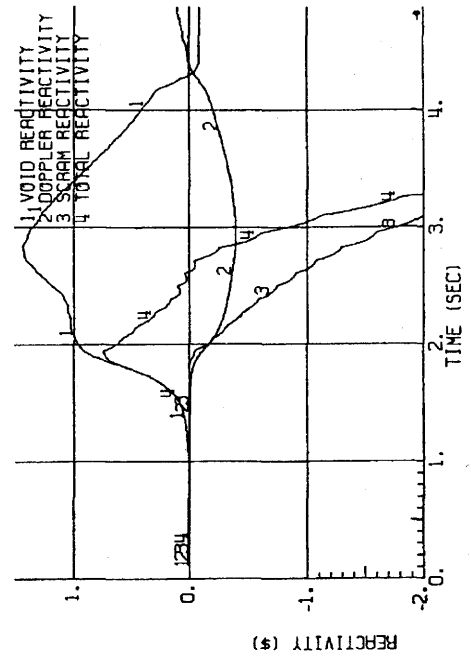
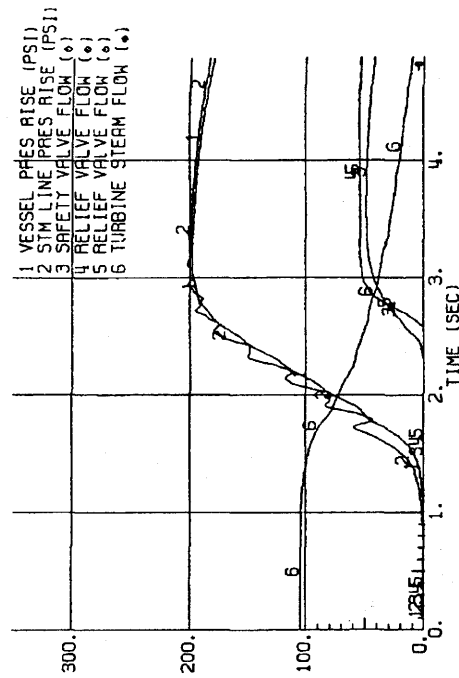
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PERRY NUCLEAR POWER PLANT

Typical Dual Safety/Relief Valve
Capacity Characteristics - Spring
Action Safety Mode

Figure 5.2-2



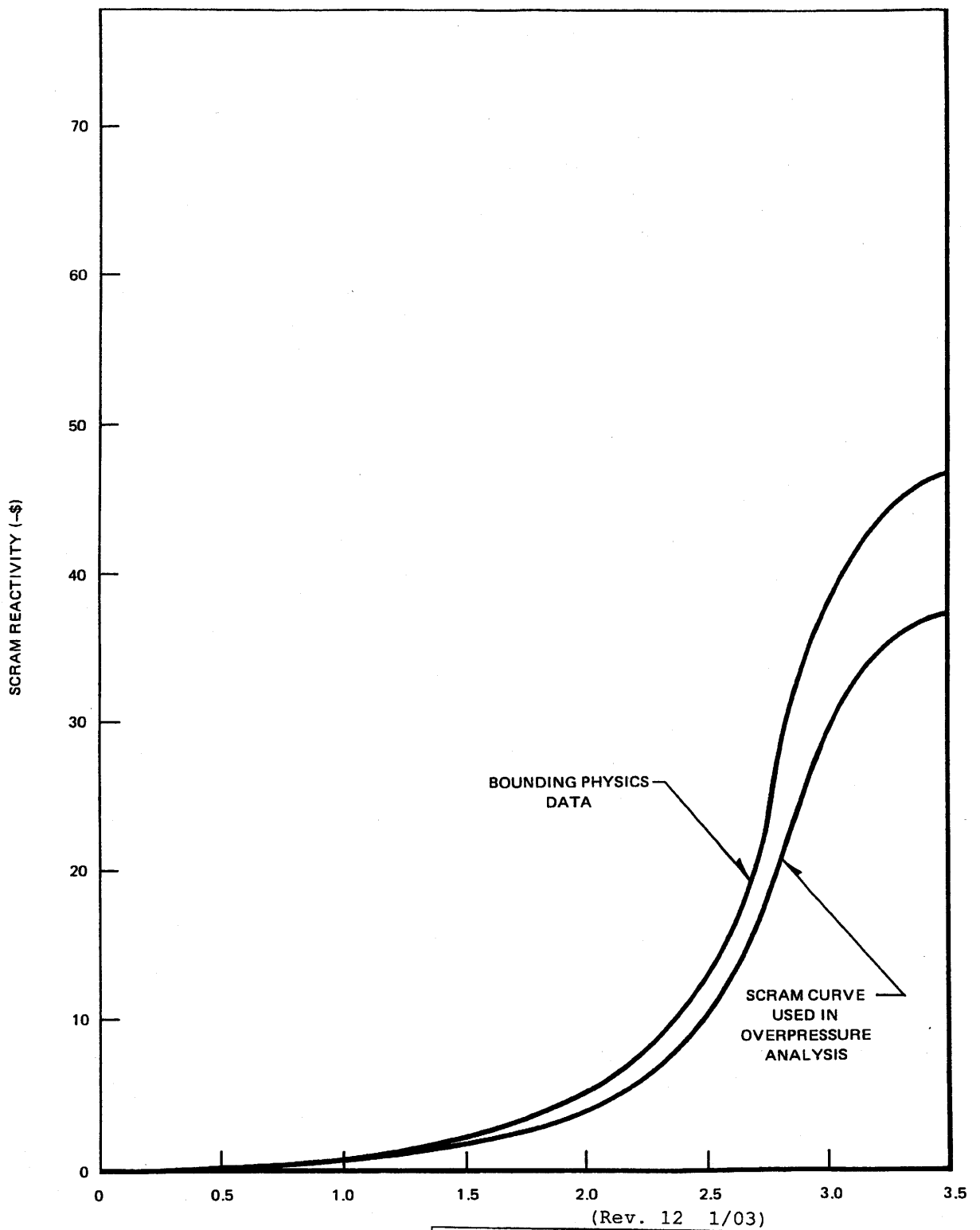
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Initial Cycle MSIV Closure
with Flux Scram and Installed
Safety/Relief Valve
Capacity (Overpressurization
Protection Analysis)

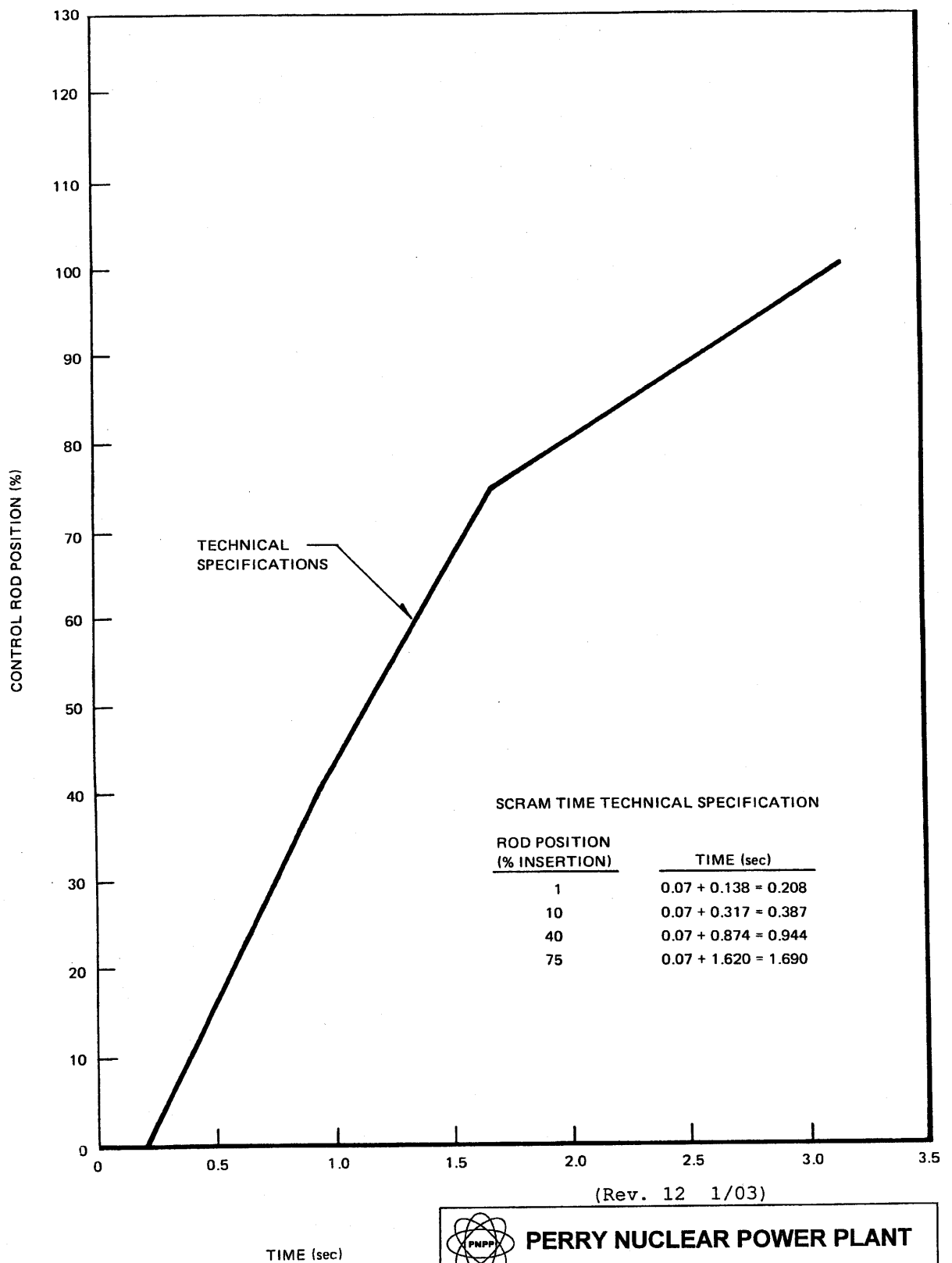
Figure 5.2-3



PERRY NUCLEAR POWER PLANT

Scram Reactivity vs
Time Characteristics

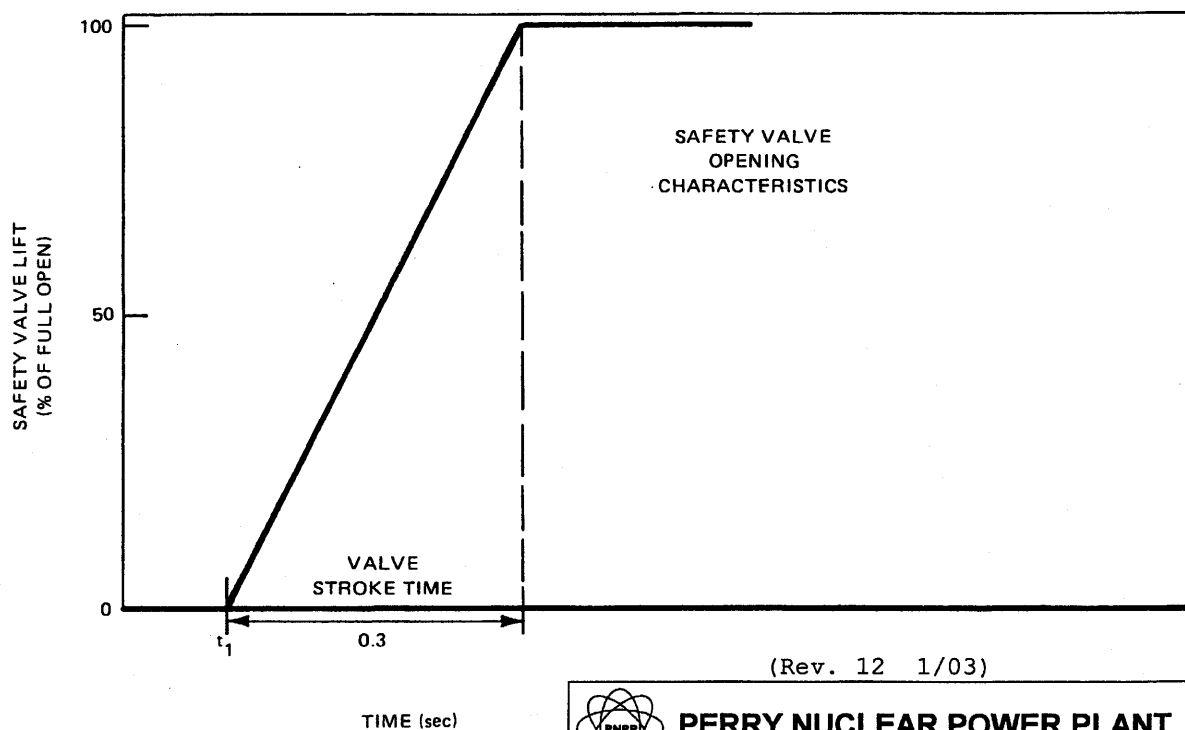
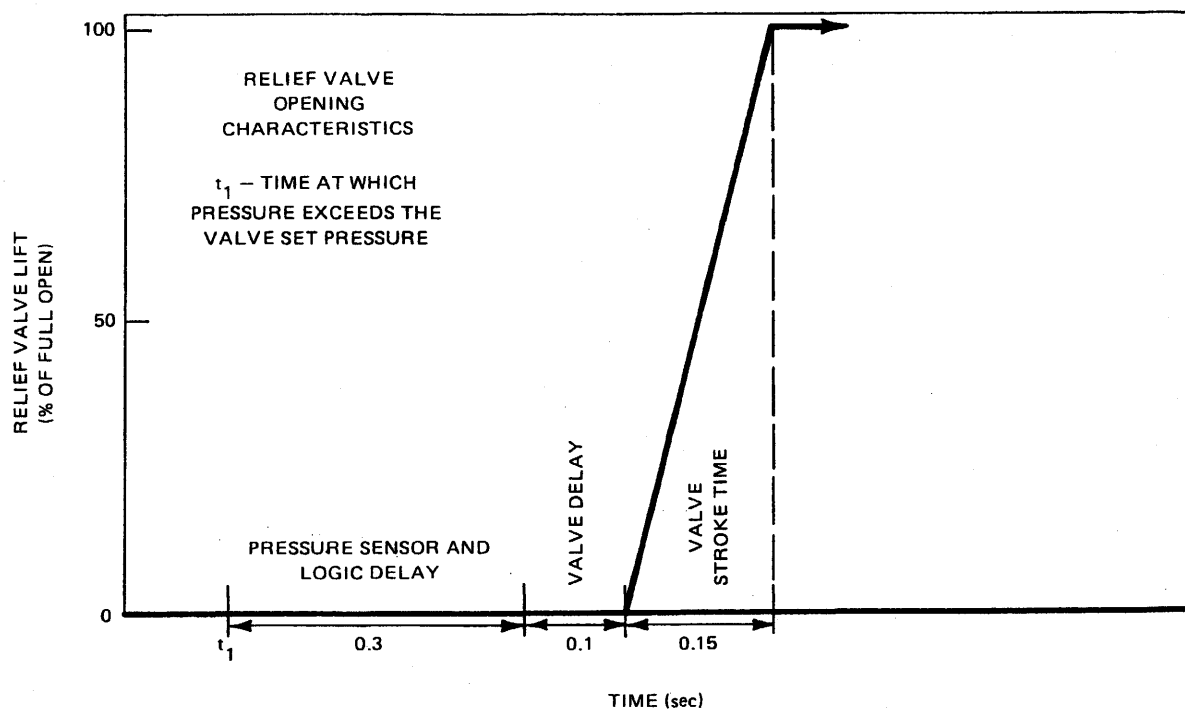
Figure 5.2-4



PERRY NUCLEAR POWER PLANT

Control Rod Drive vs
Time Characteristics

Figure 5.2-5



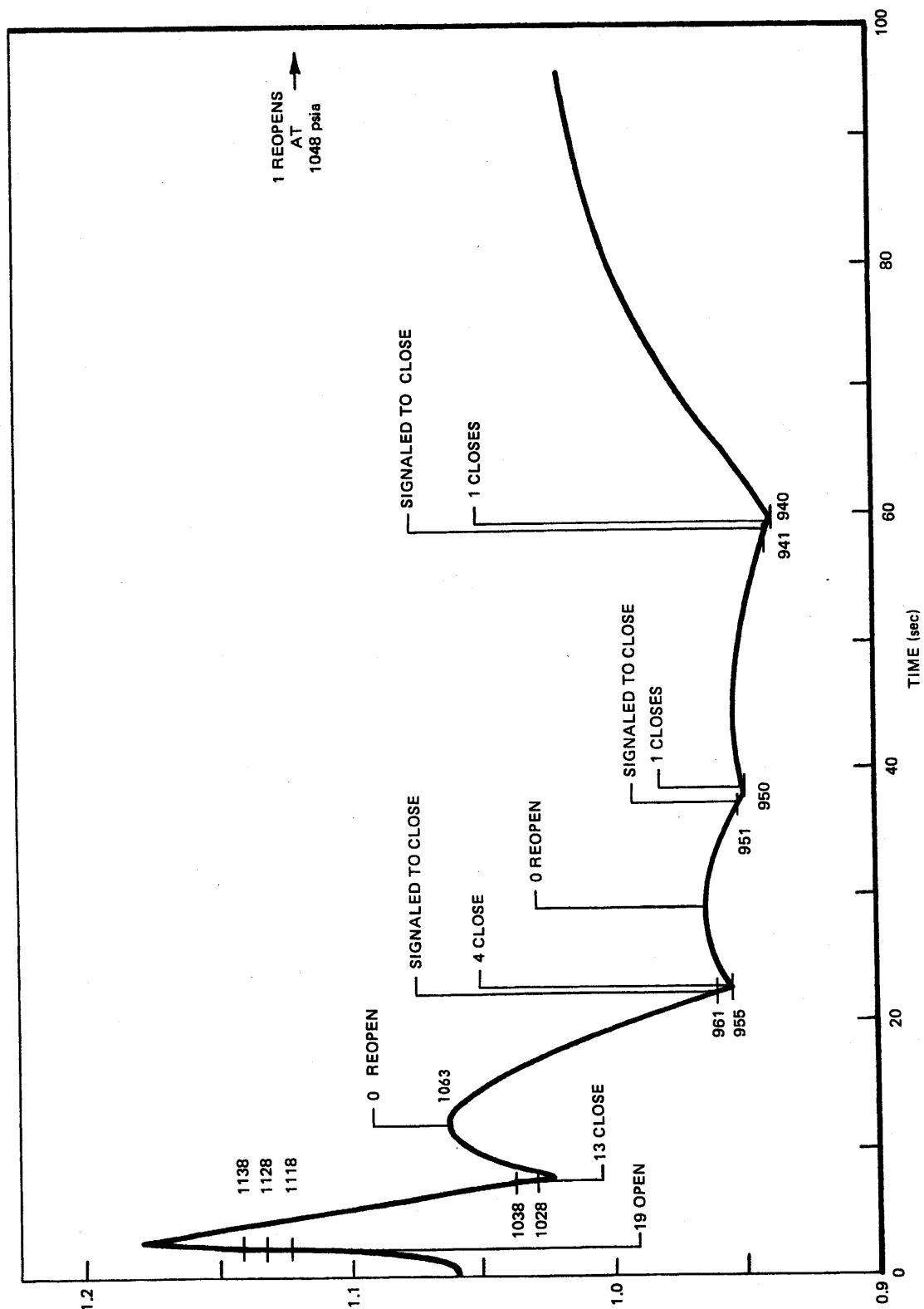
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Power Actuated & Safety Action
Valve Lift Characteristics

Figure 5.2-6a



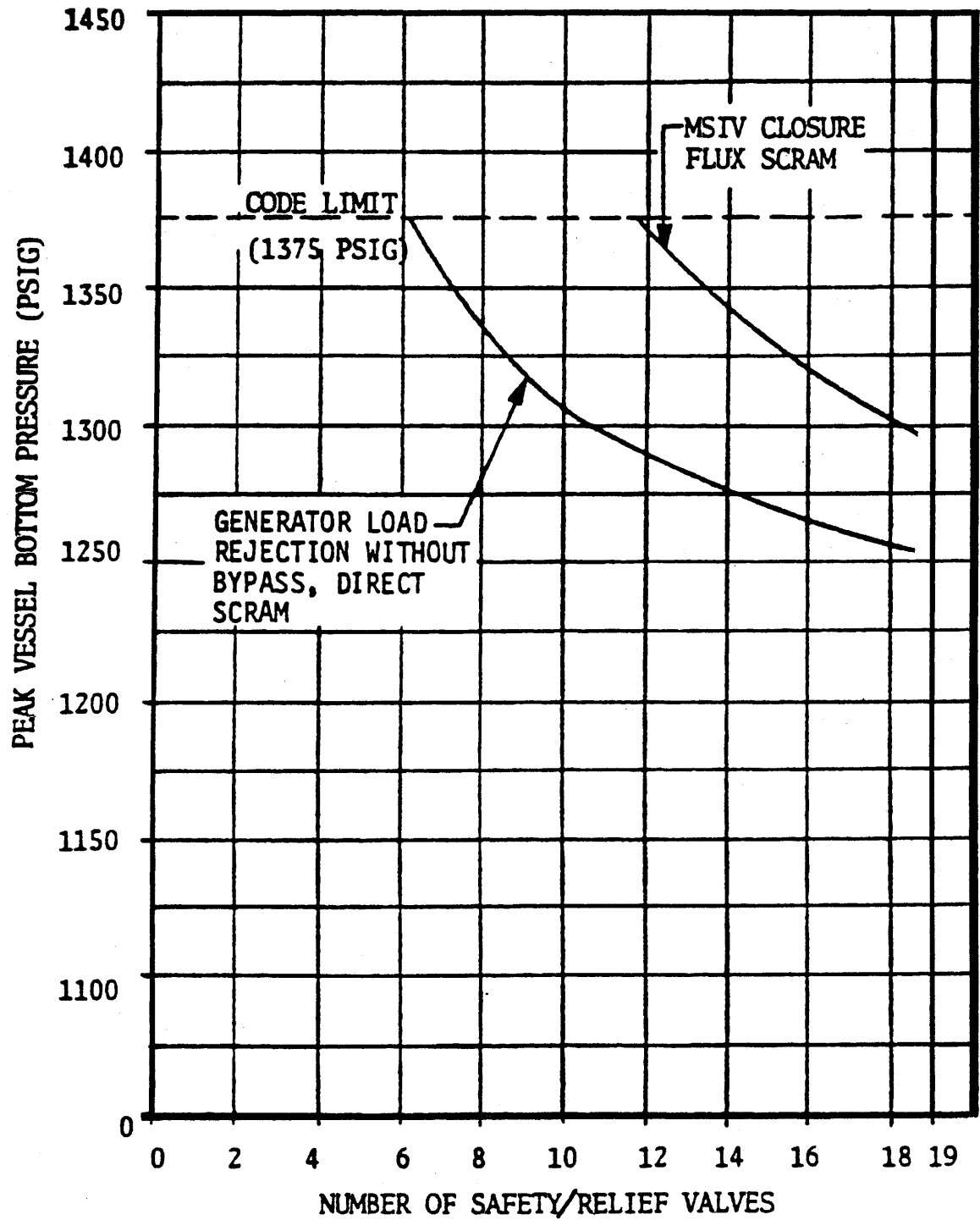
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Reactor Vessel Pressure Following
Transient Isolation Event

Figure 5.2-6b



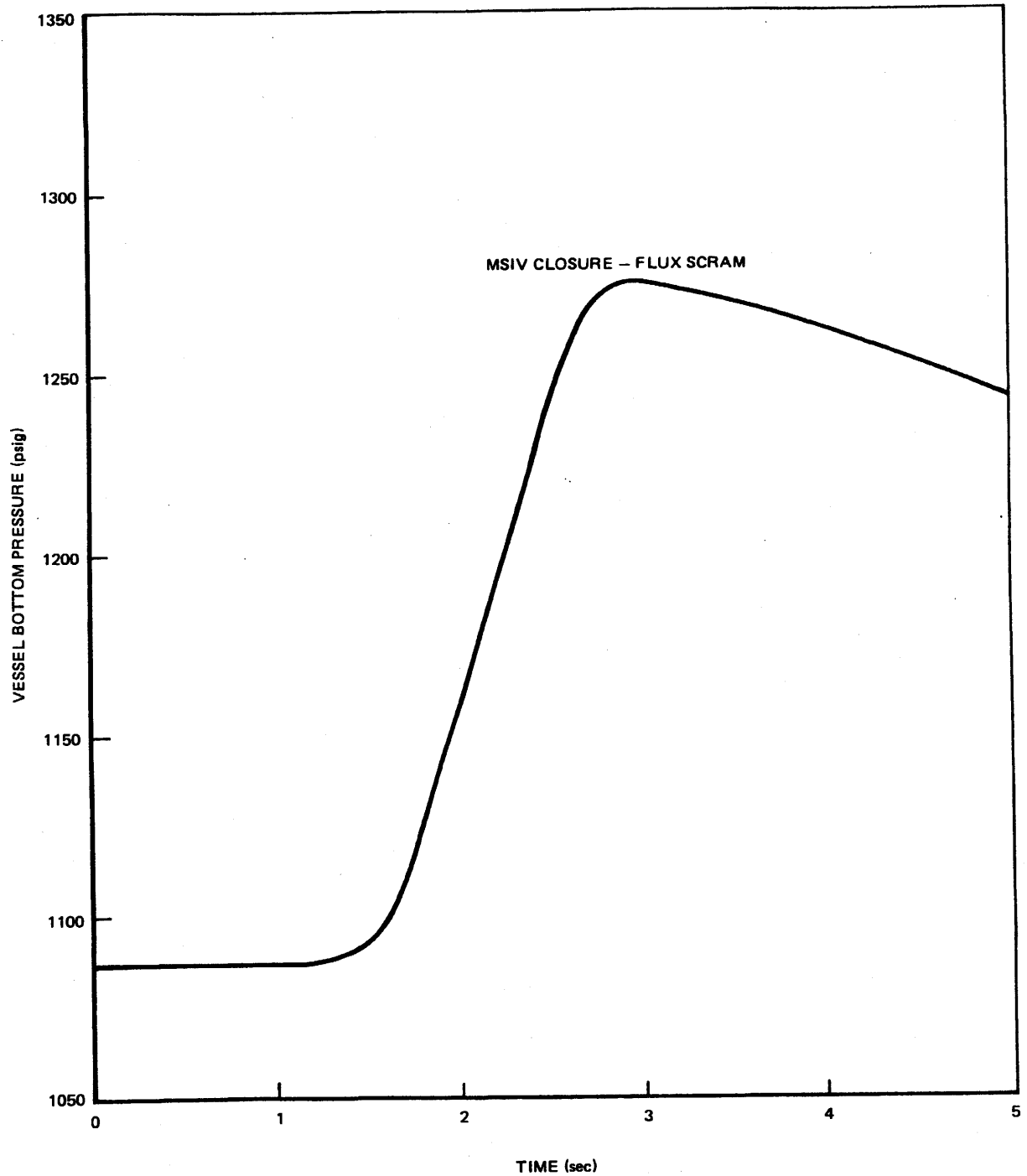
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Peak Vessel Pressure
Versus Safety/Relief Capacity

Figure 5.2-7



TIME (sec)

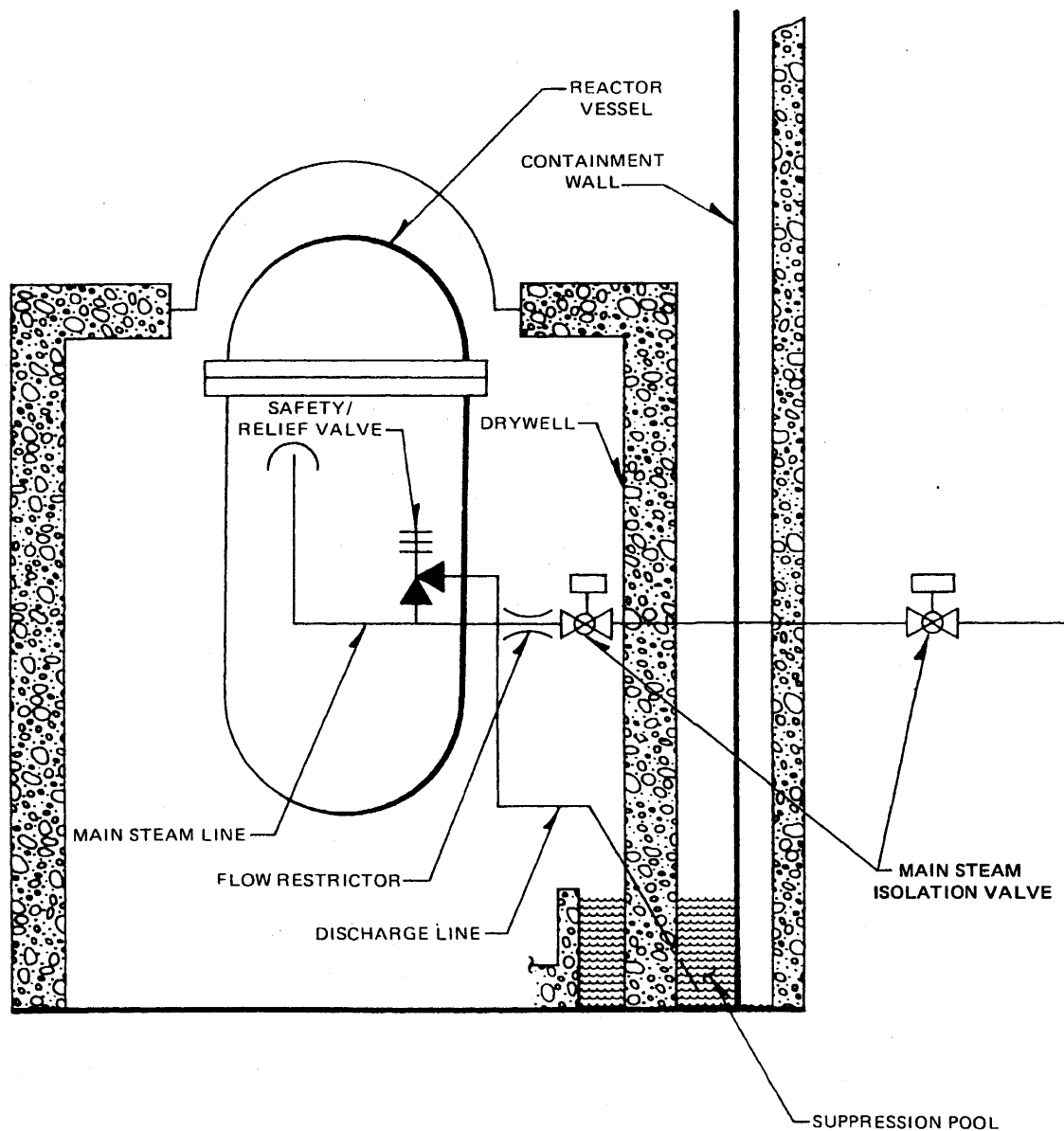
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Initial Cycle
Time Response for Pressurization

Figure 5.2-8



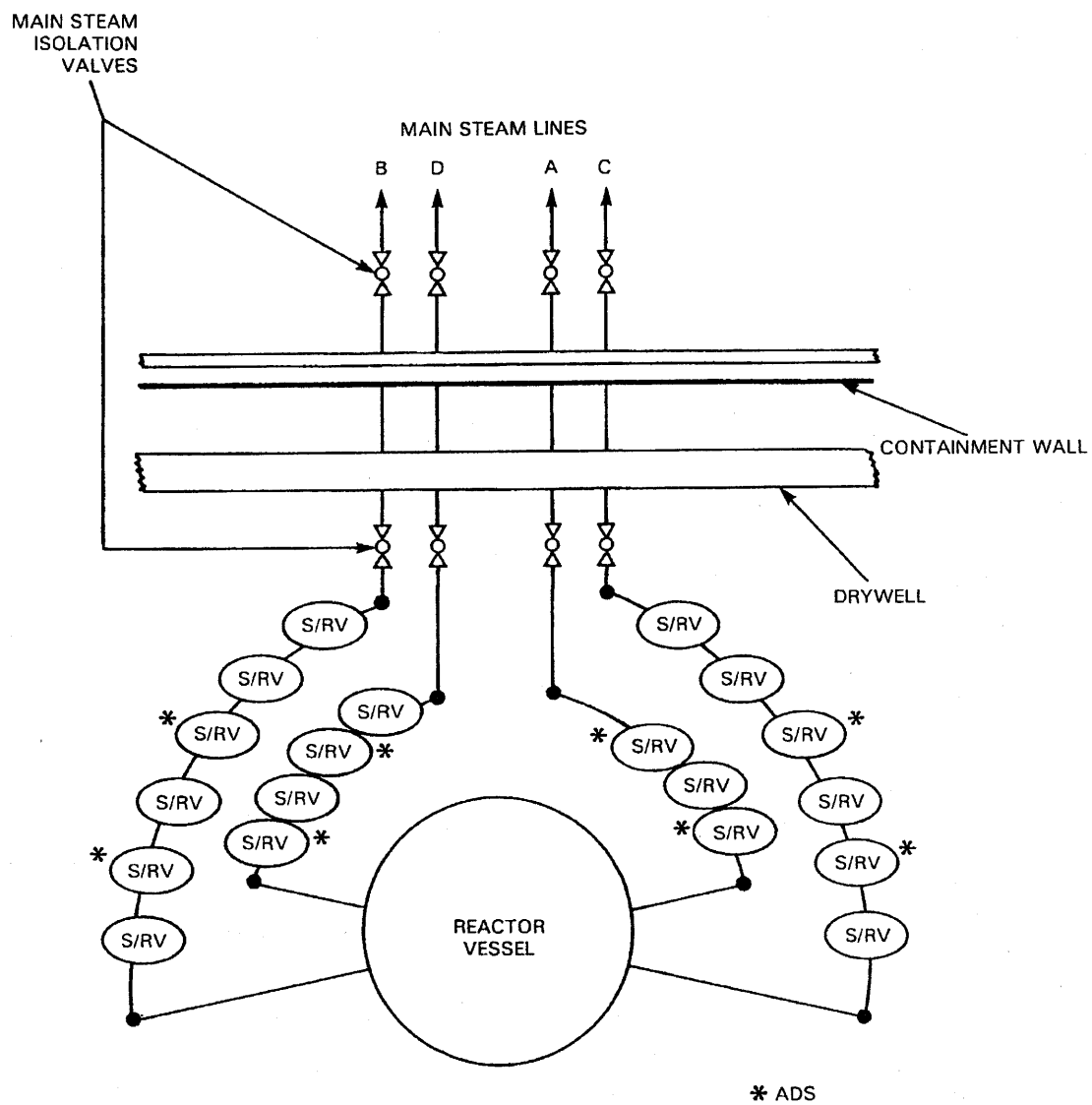
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PERRY NUCLEAR POWER PLANT

Safety/Relief Valve Schematic
Elevation

Figure 5.2-9



SCHEMATIC PLAN

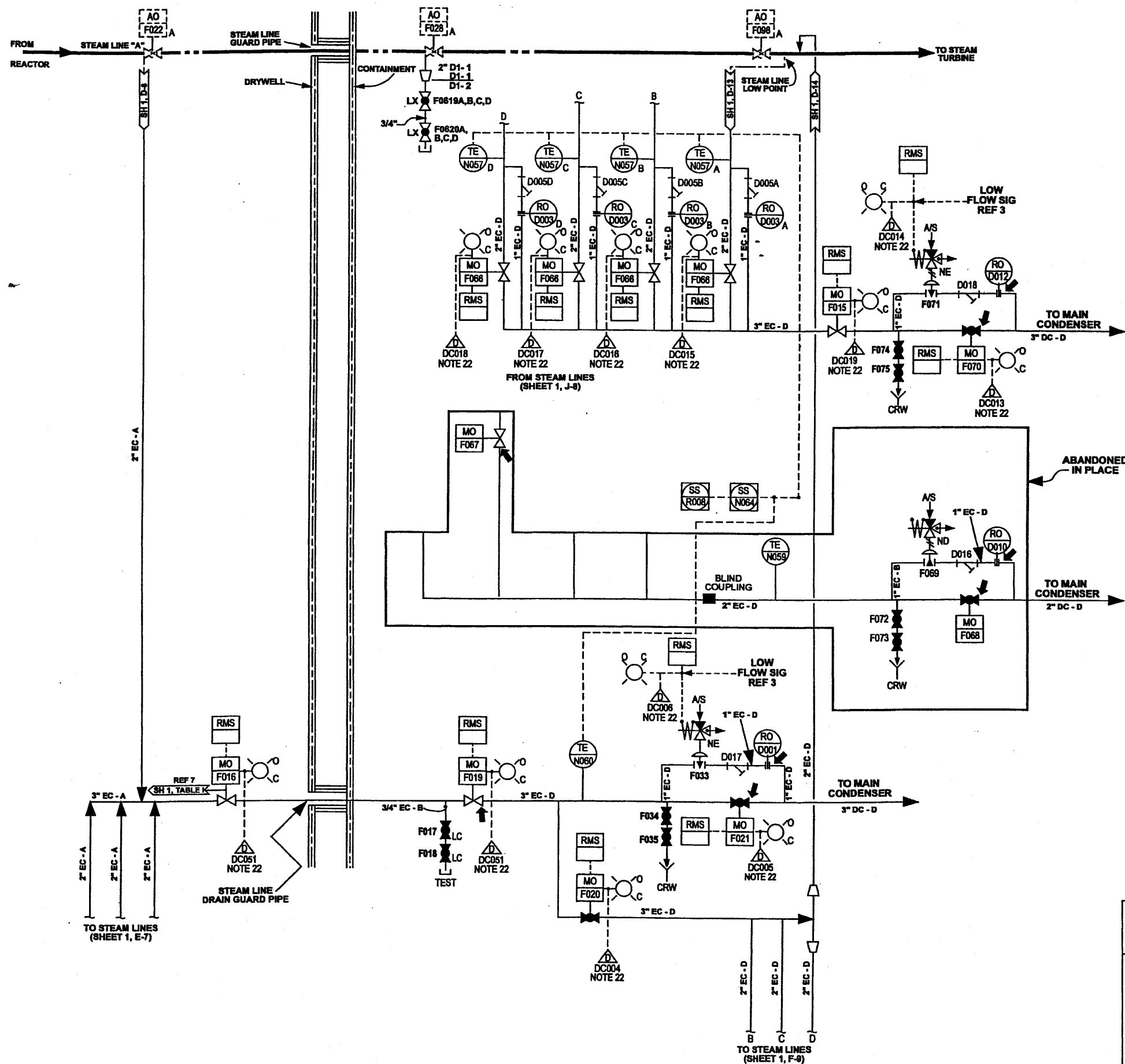
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Safety/Relief Valve and
Steamline Schematic

Figure 5.2-10



Notes: (Continued)

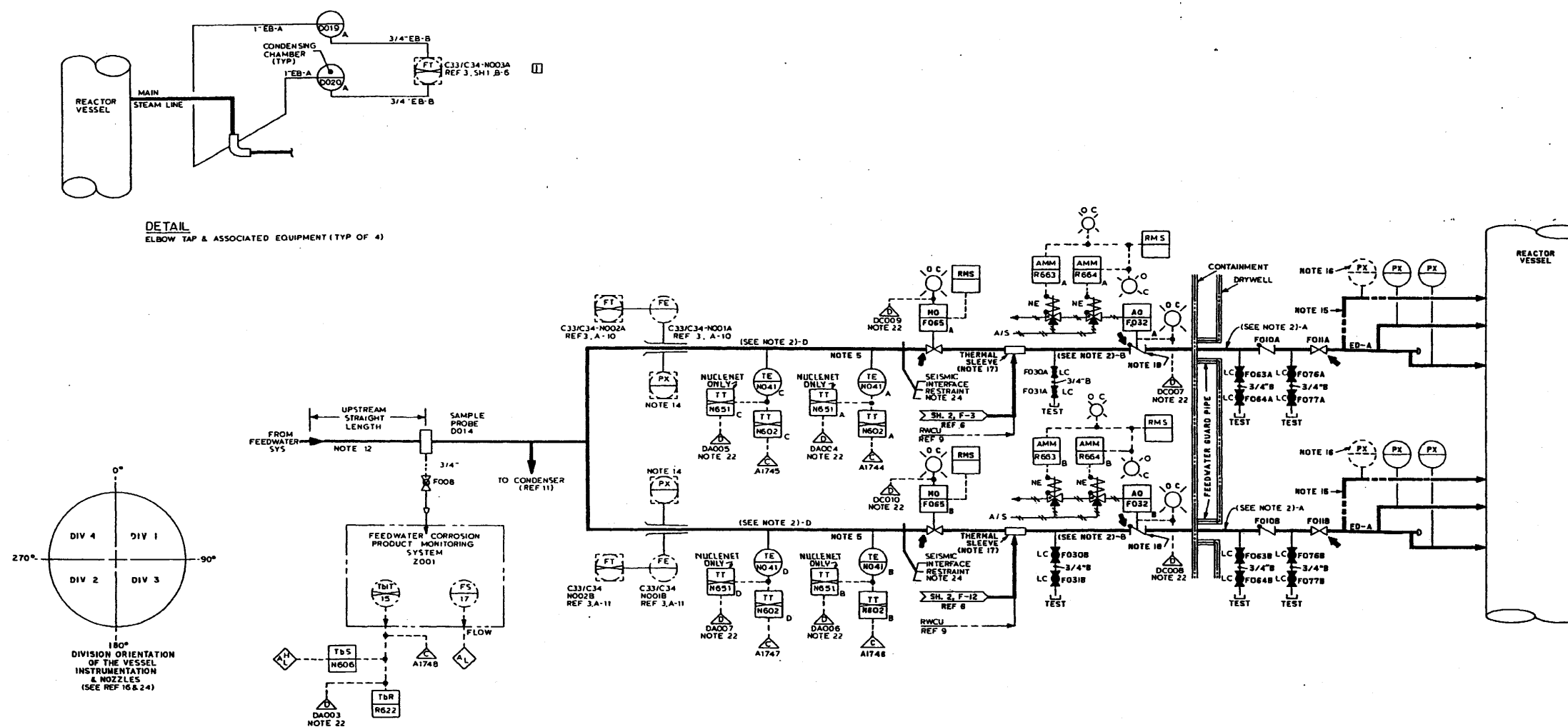
25. Applies to solid state plants only.
26. If no other check valve between the reactor and the feedwater pumps is designed to close prior to appreciable flow reversal, F032 should be interlocked to dump air pressure automatically in the event all feedwater pumps trip.
27. S/RV body vent lines (if required by S/R valve interface control drawing, Ref. 30) shall be stainless steel for approximately the last 15 feet. The outlet of the vent line shall be submerged approximately 10 feet. The balance of the piping shall be 2" schedule 40 carbon steel.
28. Configuration applies to relay plants only. For solid state, R623 receives signals from PIS N678 and LIS N681.

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Nuclear Boiler System

Figure 5.2-11 (Sheet 1 of 2)

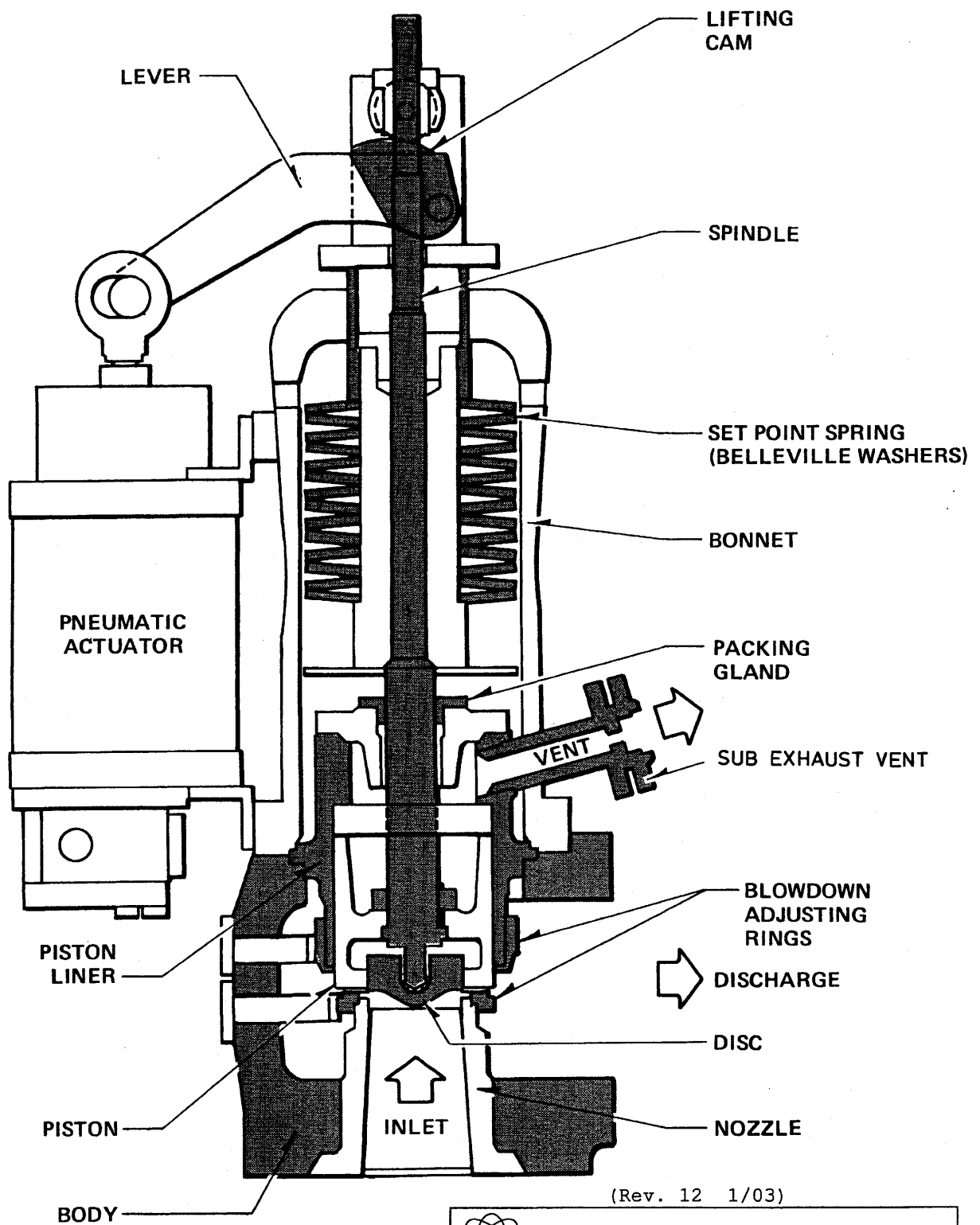


(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

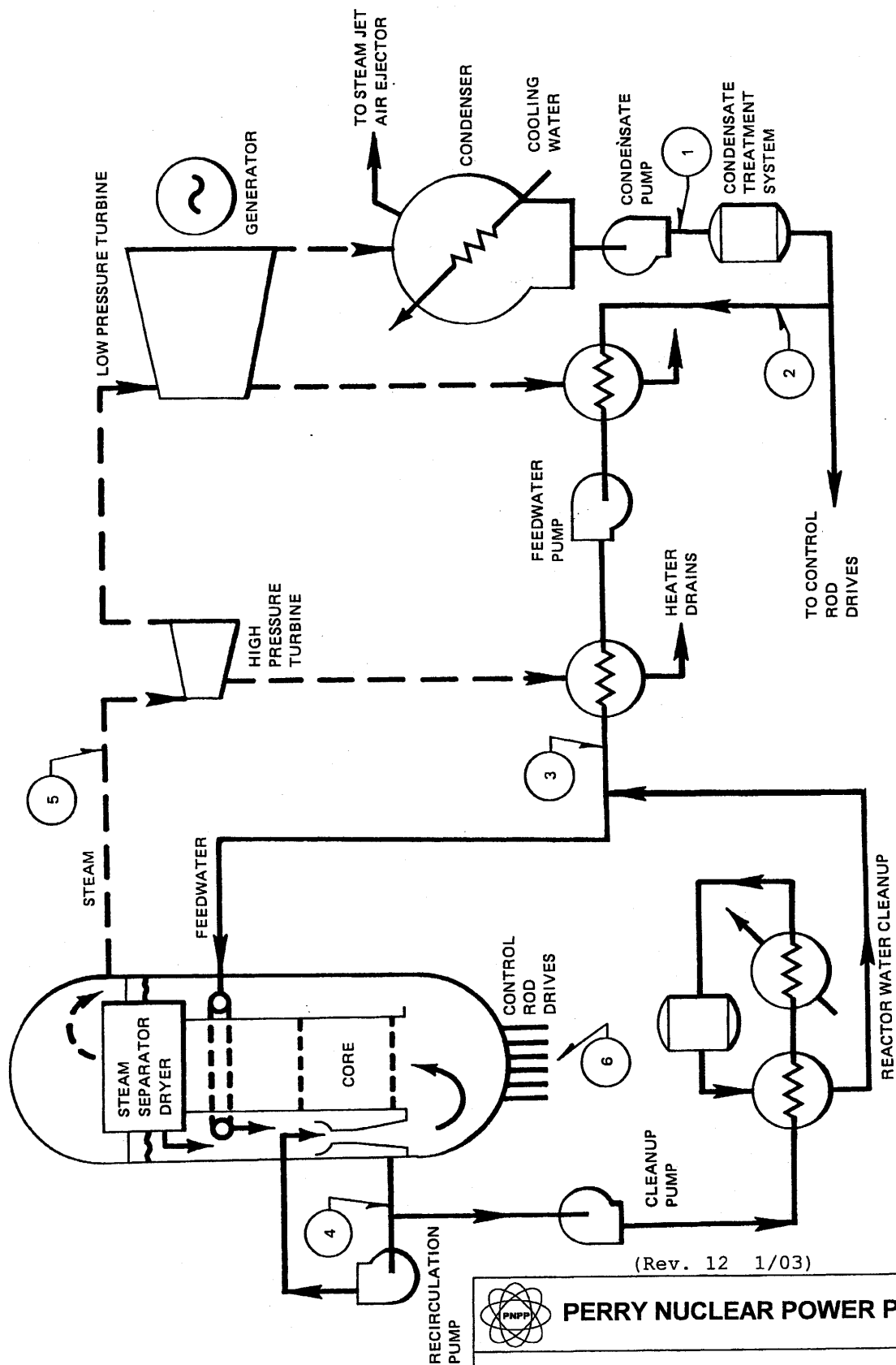
Nuclear Boiler System
Figure 5.2-11 (Sheet 2 of 2)



PERRY NUCLEAR POWER PLANT

Schematic of Safety Valve with
Auxiliary Activating Device

Figure 5.2-12

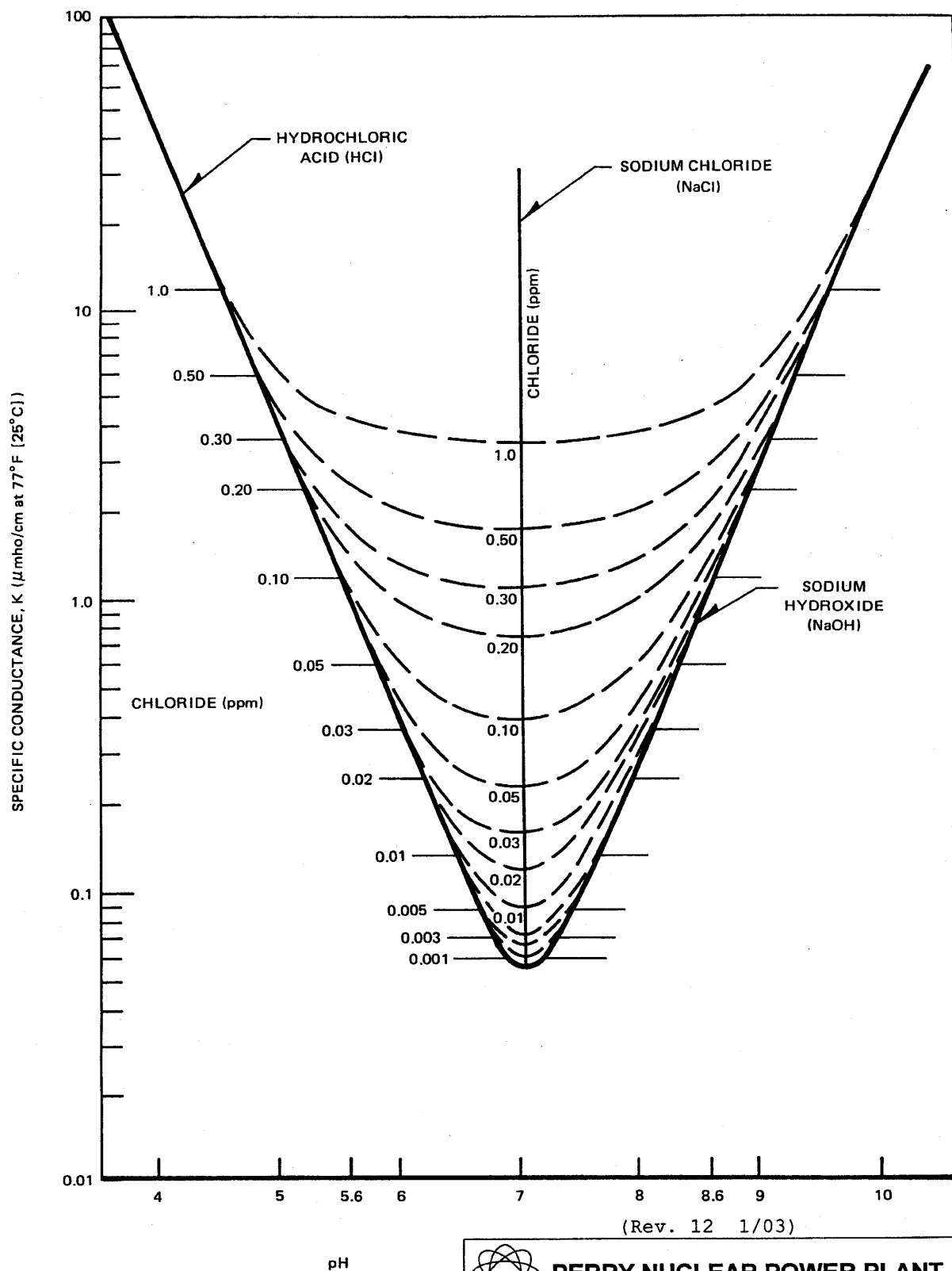


(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Typical BWR Flow Diagram

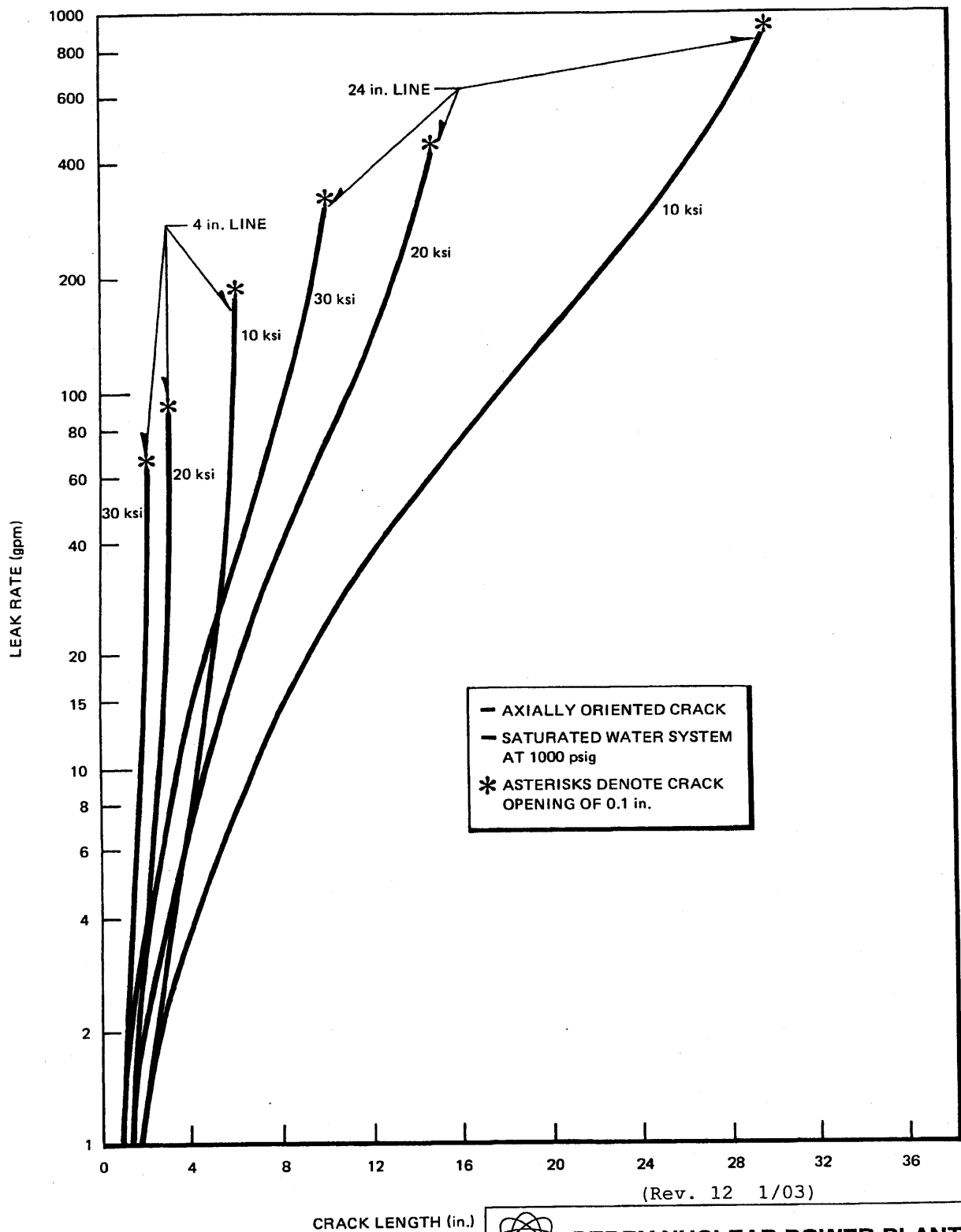
Figure 5.2-13



PERRY NUCLEAR POWER PLANT

Conductivity pH and Chloride
Concentration of Aqueous Solution @
 77°F (25°C)

Figure 5.2-14



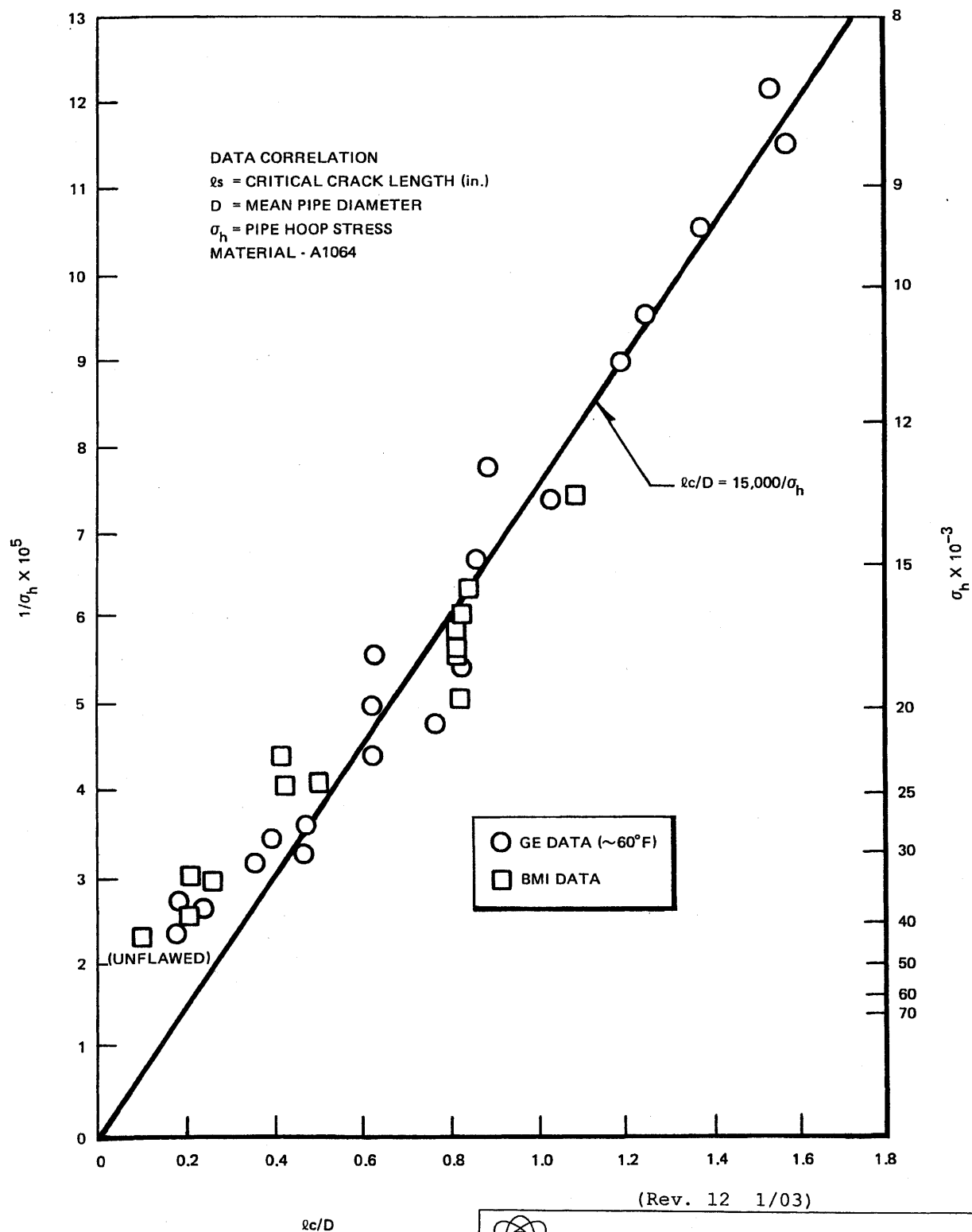
CRACK LENGTH (in.)



PERRY NUCLEAR POWER PLANT

Calculated Leak Rate vs Crack Length as a Function of Applied Hoop Stress

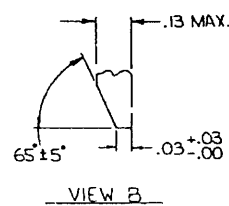
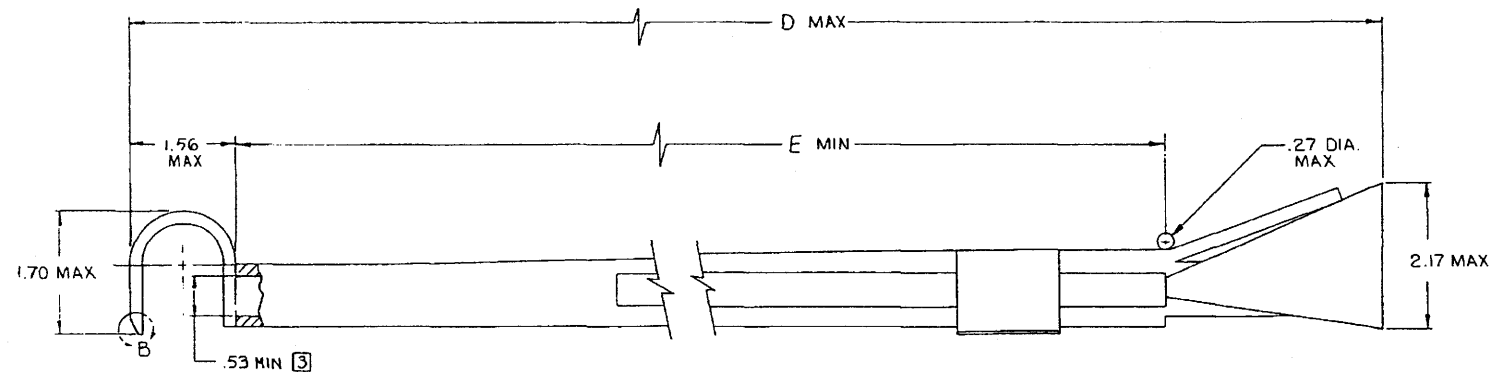
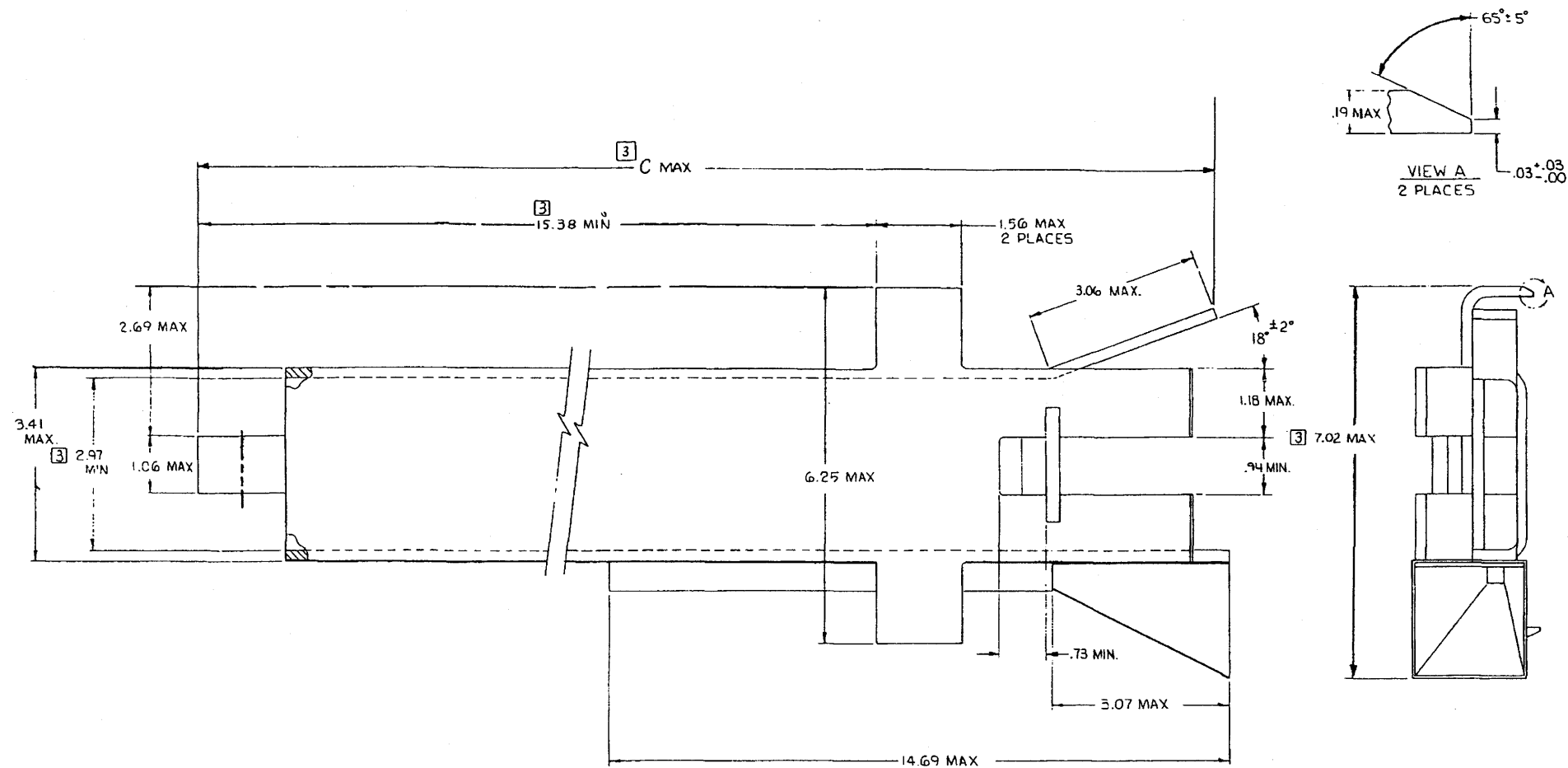
Figure 5.2-15 ...



PERRY NUCLEAR POWER PLANT

Axial Throughwall Crack Length
 Data Correlation

Figure 5.2-16

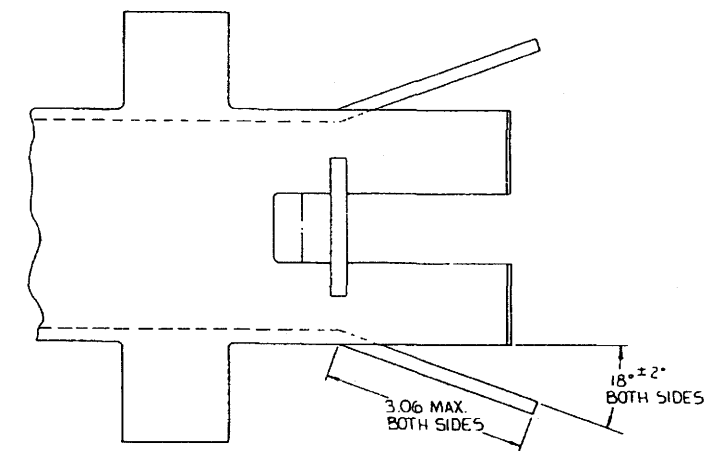


(1) (3) APPROX. WT=6 LBS

PT. NO	C	D	E
1	21.54	21.61	16.92
2	21.54	N A	16.92
3	23.79	22.30	19.17
4	23.79	N A	19.17

NOTES:

1. MATL: AUSTENITIC STN STL UNLESS OTHERWISE INDICATED.
2. ALL DIMENSIONS ARE IN INCHES EXCEPT AS NOTED ON DRAWING
3. ABBREVIATIONS PER ANSI Y1.1



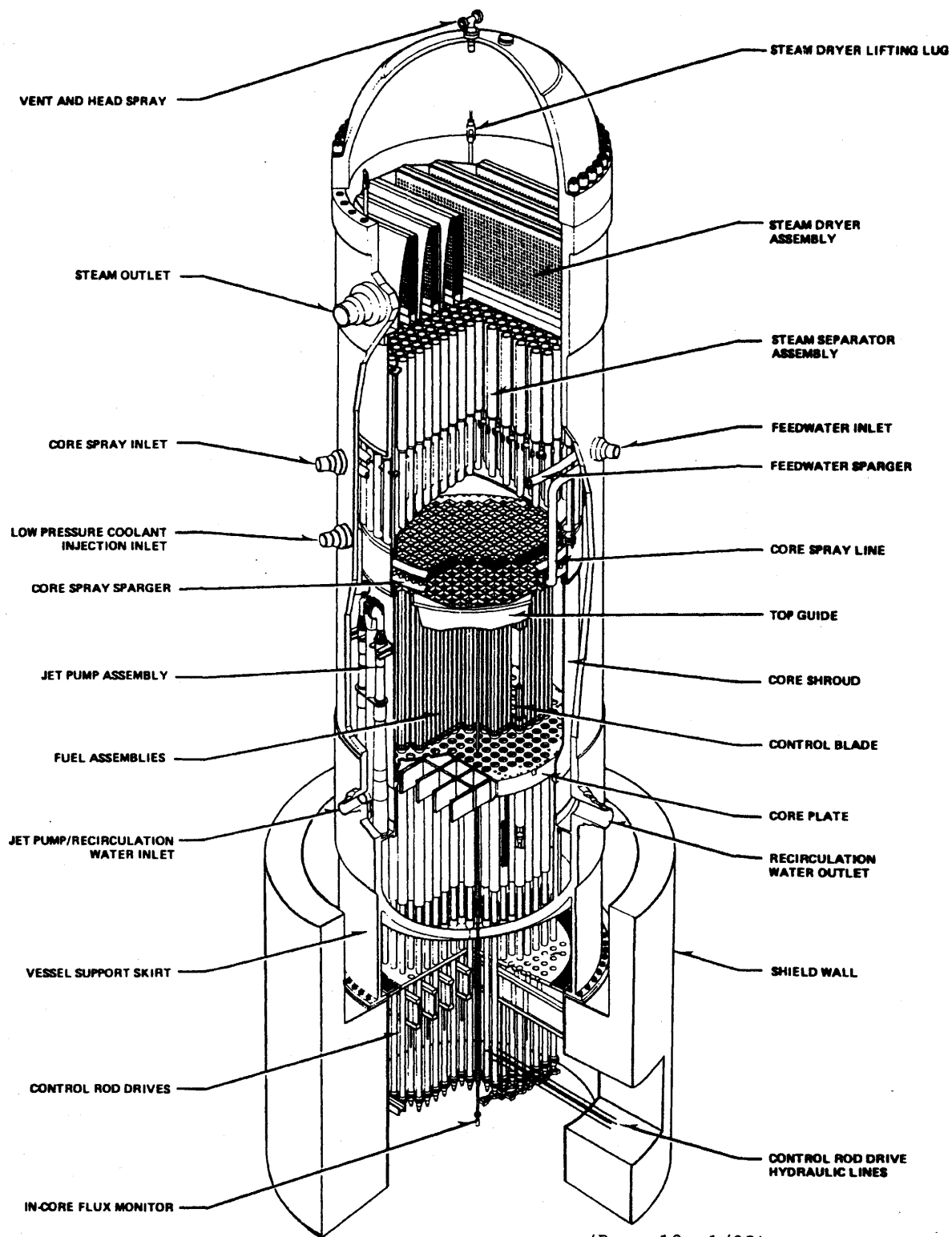
2. OMIT FUNNEL AS SHOWN, OTHERWISE SAME AS PART 1 APPROX. WT=5 LBS
4. OMIT FUNNEL AS SHOWN, OTHERWISE SAME AS PART 3 APPROX. WT=5 LBS.

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Surveillance Bracket

Figure 5.3-1



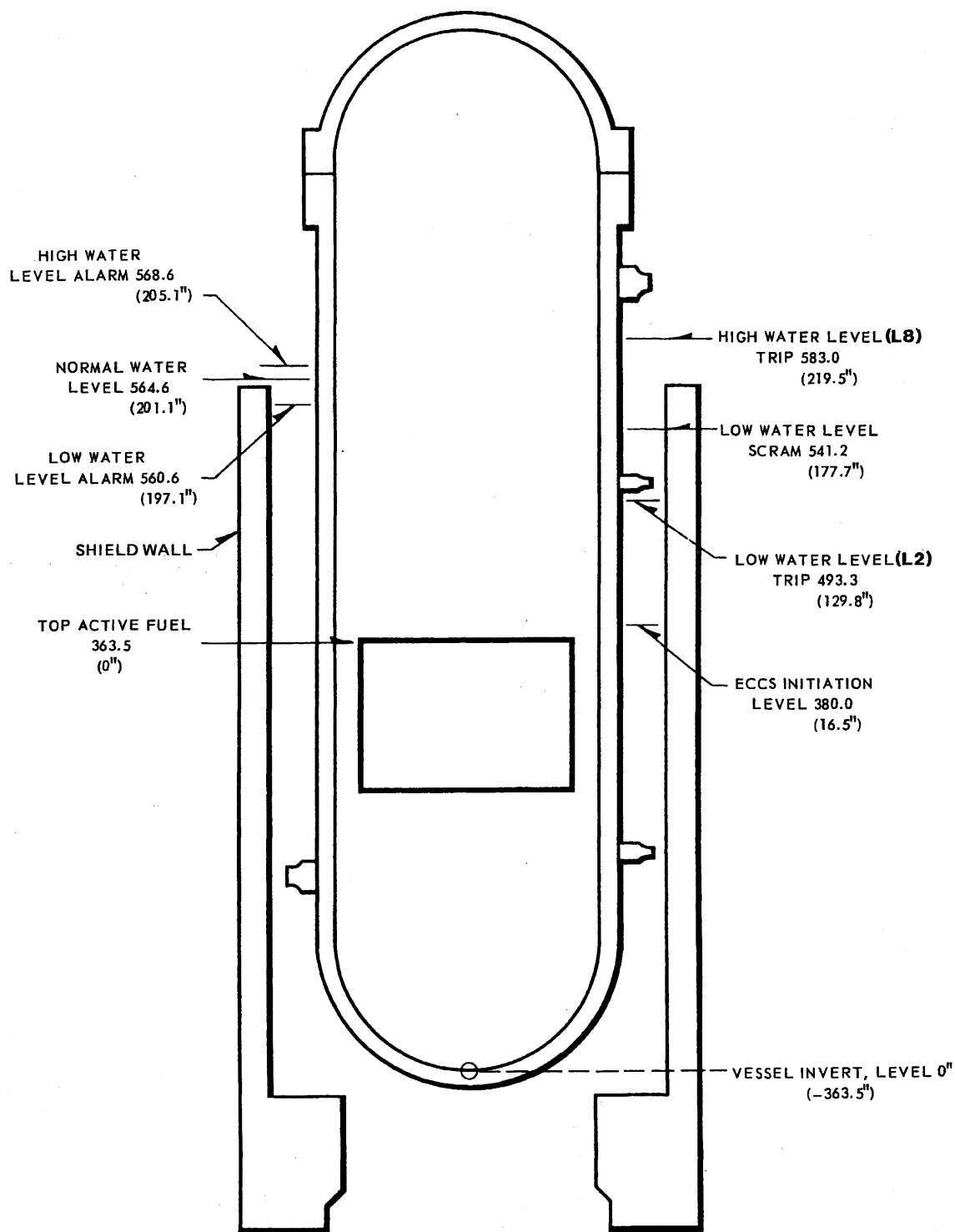
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Reactor Vessel Cutaway Diagram

Figure 5.3-6



(Rev. 12 1/03)

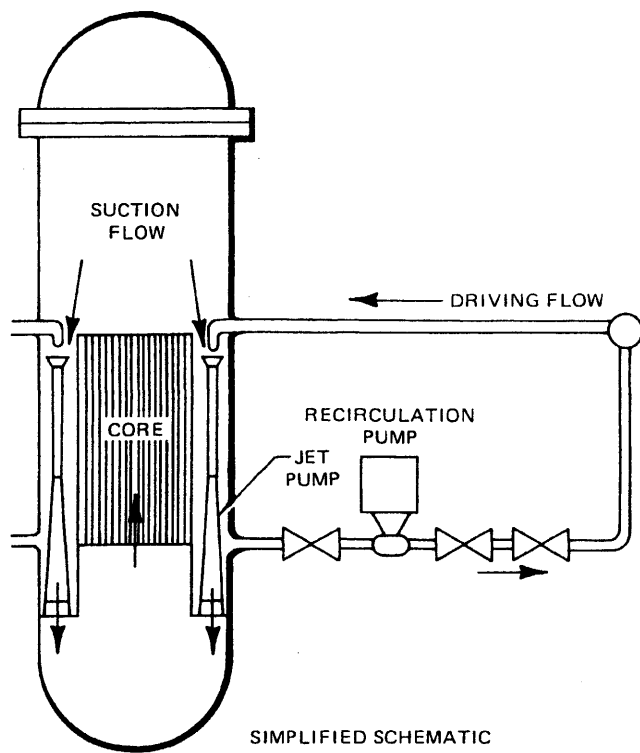
LEGEND:
 WATER LEVEL ABOVE VESSEL INVERT
 (WATER LEVEL ABOVE TOP OF ACTIVE FUEL)



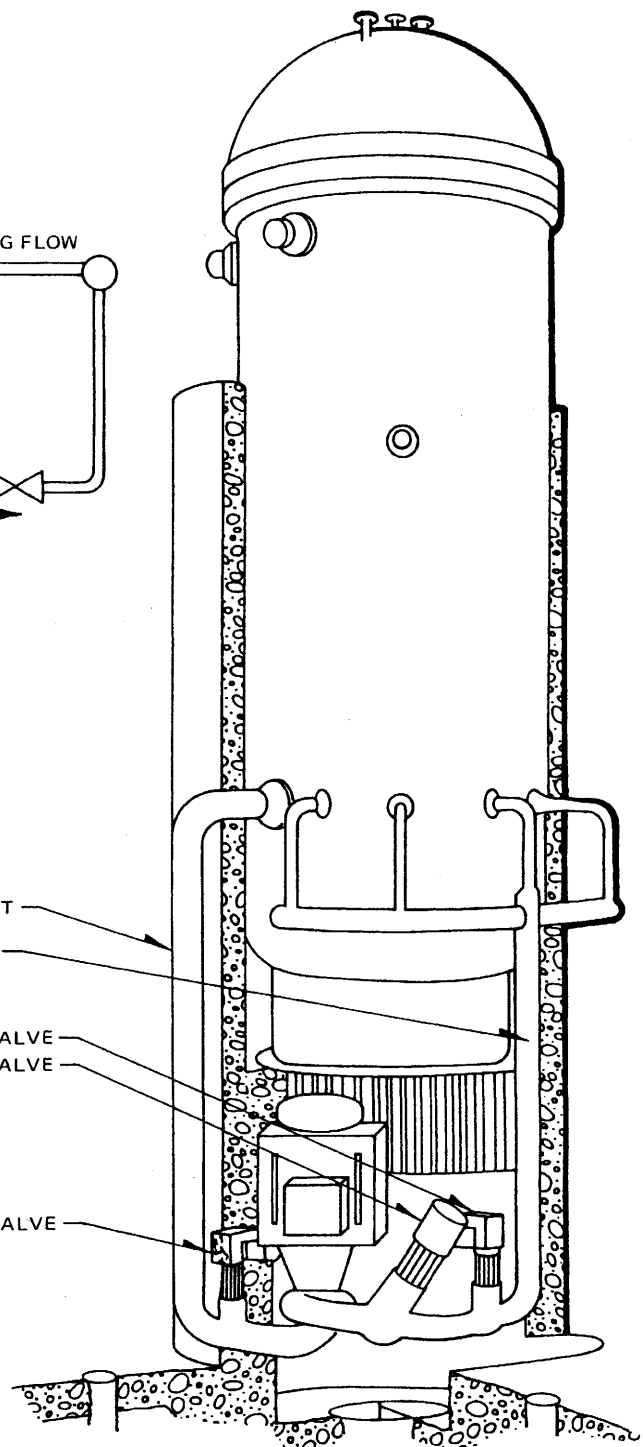
PERRY NUCLEAR POWER PLANT

Reactor Vessel Nominal Water
 Level Trip and Alarm Elevations

Figure 5.3-7



RECIRCULATION OUTLET
 RECIRCULATION INLET
 DISCHARGE SHUTOFF VALVE
 FLOW CONTROL VALVE
 SUCTION SHUTOFF VALVE



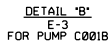
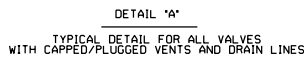
PICTORIAL VIEW
 (Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Recirculation System Elevation
 and Isometric

Figure 5.4-1



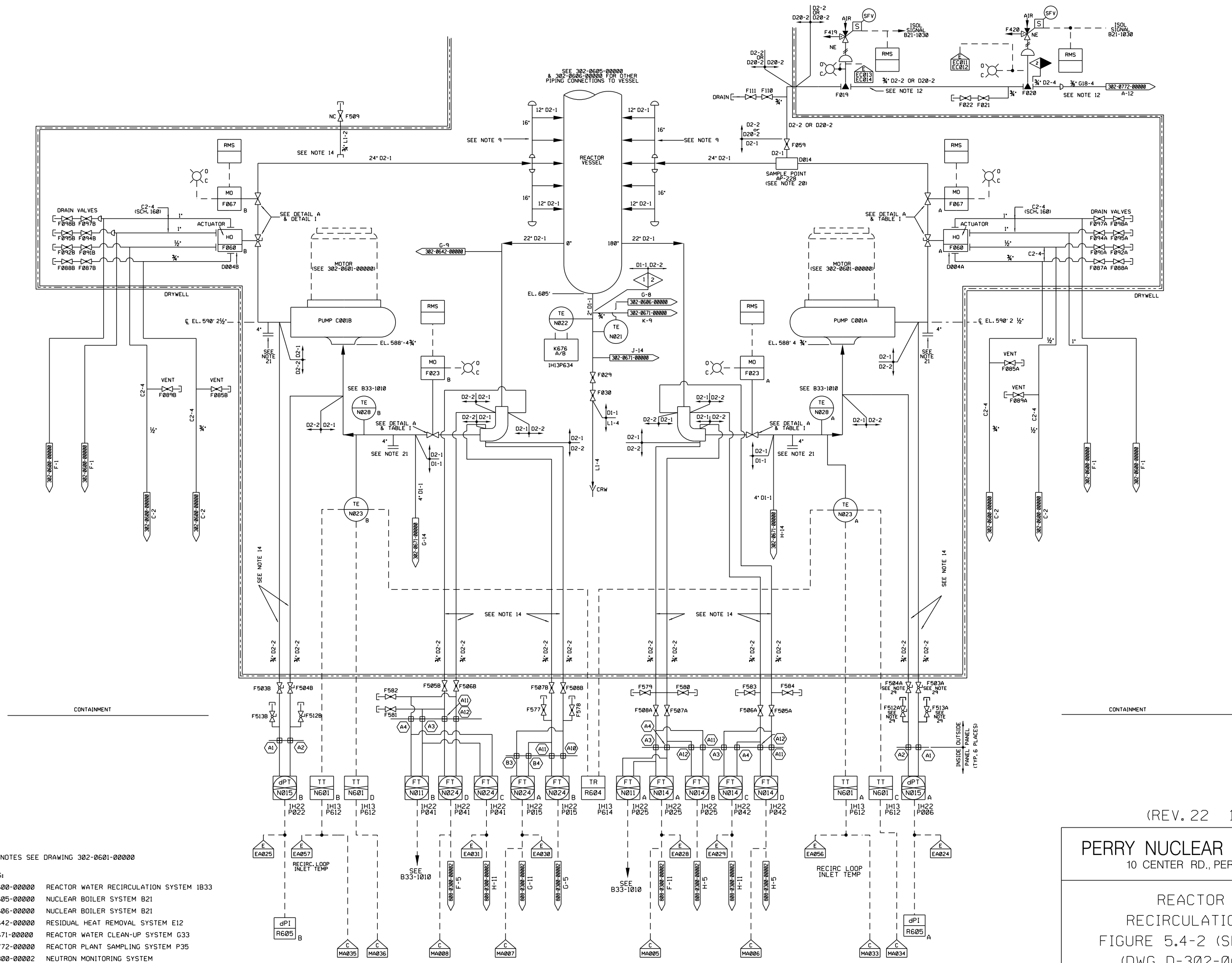
- ALL THERMOCOUPLES ARE TO BE WIRED OUT THROUGH DRYWELL TO T/C JUNCTION BOX.
6. A LEVEL SWITCH IS SUPPLIED WITH EACH COOLER TO DETECT COOLING WATER LEAKAGE OR CONDENSATE BUILDUP IN THE COOLER HOUSING.
7. DELETED
8. ALL MOTOR OPERATED AND AIR OPERATED PILOT SOLENOID VALVES ARE AC, UNLESS NOTED OTHERWISE.
9. FOR NUMBER OF RISERS, JET PUMP INSTRUMENTATION, AND NUMBER AND SIZE OF BOTTOM HEAD DRAIN LINES, SEE REACTOR RECIRCULATION SYSTEM P&ID DATA.
10. THE DESIGN PRESSURE AND TEMPERATURE RATINGS FOR THE RECIRCULATION PIPING AND EQUIPMENT ARE SHOWN IN THE SYSTEM DESIGN SPEC. (B33-4010)
11. CLOSED COOLING WATER TO THE MOTOR BEARING IS TO SERVE BOTH THE MOTOR BEARING AND THE LOWER MOTOR BEARING. THE RETURN FLOWS ARE JOINED UPSTREAM OF THE TEMPERATURE ELEMENT.
12. THE SAMPLE PIPING TO THE SECOND ISOLATION VALVE SHALL BE 3/4 INCH DOUBLE EXTRA STRONG WITH NOMINAL INSIDE DIAMETER OF 0.434 INCHES TO THE SECOND TURBINE FLOW FROM THE SECOND ISOLATION VALVE TO THE SAMPLE STATION 3/8 INCH O.D. X 0.065 INCH WALL SEAMLESS STAINLESS STEEL TUBING SHALL BE USED. SEE A62-4240
13. PIPING DESIGNER SHALL ADD UNION ENDS TO THE PIPING BEFORE AND AFTER THE SWITCH TO PROVIDE MEANS OF CALIBRATING THE FLOW SWITCH AND ALSO FLUSHING THE LINE.
14. A 300LB RESTRICTING ORIFICE COUPLING WITH A BORE DIAMETER OF 1/4 INCH SHALL BE SOCKET WELDED INTO THE DRYWELL SIDE OF THE LINE TO LIMIT MASS LEAKAGE OUTSIDE THE DRYWELL FOLLOWING A LINE BREAK. (RESTRICTING TEE AT F68BA AND B VENT BRANCH).
15. ALL EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY THE SYSTEM B33, UNLESS OTHERWISE SPECIFIED.
16. THIS SYSTEM P&ID DRAWING SHEETS 302-0601-00000 AND 302-0602-00000 WERE PHOTOGRAPHIC COPIES OF G.E. DWG. 7626568 SHEETS 1 AND 2 WHICH ARE HEREBY REPLACED BY G.E. DWG. 7636568 P&ID DRAWINGS 302-0601-00000 AND 302-0604-00000 ARE REPRODUCED FROM G.E. DWG. 7636364, SPECIFIC REVISION BENEATH TITLE BLOCK.
17. THIS INSTRUMENT IS SHOWN FOR COMPLETENESS OF PANEL CONNECTIONS ONLY. FOR INSTRUMENT FUNCTION AND CONNECTION TO SYSTEM, SEE APPROPRIATE SYSTEM DIAGRAM.
18. F060 FLOW CONTROL VALVE ONLY HAS TWO SEAL LEAK-OFF DRAINS WHICH SHALL BE CONNECTED TOGETHER EXTERNALLY.
19. DELETED
20. THE SAMPLE PROBE SHALL BE LOCATED ON A VERTICAL SECTION OF THE RETURN LEG.
21. DECONTAMINATION CONNECTIONS TO BE READILY ACCESSIBLE FOR CONVENIENT AND RAPID CONNECTION OF TEMPORARY PIPING.
22. NON-SAFETY ACTUATION LINES FOR B33-0003A AND B HPUS TO B33-0004A AND B. ACTUATORS SHALL BE SEISMICALLY SUPPORTED THRU THE DRYWELL PENETRATION INCLUDING PIPING ADJACENT TO THE DRYWELL IMMEDIATELY INBOARD AND OUTBOARD OF THE PENETRATION.
23. DELETED
24. INTERSTAGE AND CONTROLLED BLEEDOFF PRESSURE BREAKDOWN LABYRINTHS (1/8 INCH TUBE HELICES IN THE SEAL CARTRIDGE).
25. DELETED
26. FOR VALVES 1B33-F0023A/B, 1B33-F0060A/B AND 1B33-F0067A/B APPENDAGE CAPS/PLUGS SHALL BE ENTIRELY CONFORMED TO LINE SPECIFICATION D2-1 AND D2-2. SEE PIPING ISOMETRIC DWG. 304-0601-00103 FOR DETAILS.
27. HIGH ALARM FOR LEVEL SWITCHES N460 AND N461 ONLY APPLICABLE TO PUMP C001B. ALARM REMOVED FOR PUMP C001A.
28. DRAIN VALVES REMOVED AND LINE PLUGGED OR CAPPED AT VALVE FOR 1B33-F023A/B, 1B33-F060A/B AND 1B33-F067A/B. VENT VALVES REMOVED AND LINE PLUGGED OR CAPPED AT VALVE 1B33-F023A/B, 1B33-F060A/B AND 1B33-F067A/B.
29. DELETED

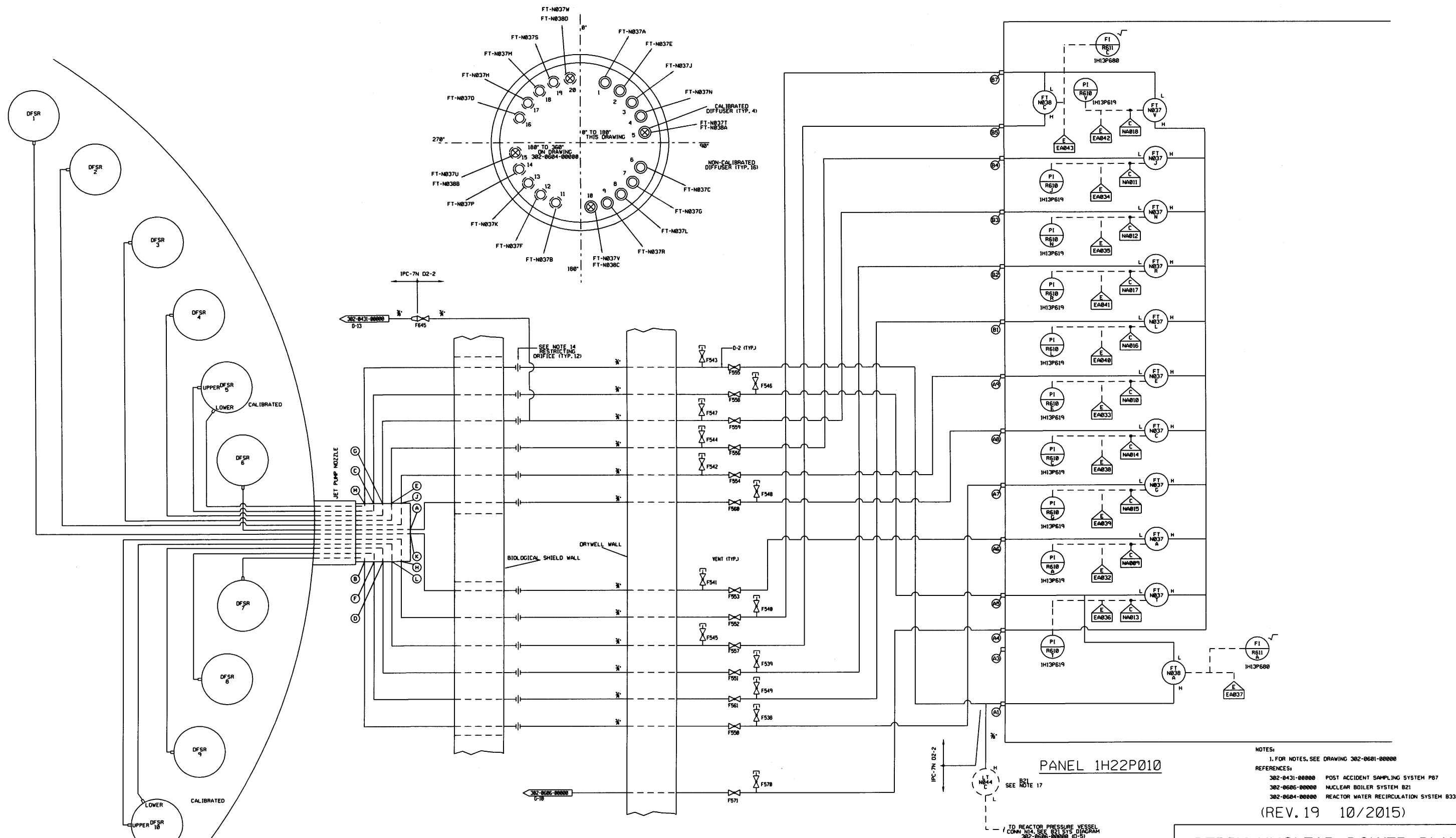
- REFERENCES:
- | | |
|-----------------|---|
| 302-0605-00000 | NUCLEAR BOILER SYSTEM B21 |
| 302-0606-00000 | NUCLEAR BOILER SYSTEM B21 |
| B21-1030 | NUCLEAR BOILER SYSTEM FC0 |
| 302-0642-00000 | RESIDUAL HEAT REMOVAL SYSTEM E12 |
| 302-0647-00000 | REACTOR PLANT SUPPLY SYSTEM P35 |
| 0080-0330-00000 | NEUTRON MONITORING SYSTEM IED |
| 302-0671-00000 | REACTOR WATER CLEAN-UP SYSTEM G33 |
| 302-0664-00000 | LEAK DETECTION SYSTEM E31 |
| 062-0000-00000 | CONTROL ROD DRIVE HYDRAULIC SYSTEM C11 |
| B33-1030 | WATER SAMPLING |
| B33-1030 | REACTOR RECIRCULATION SYSTEM ELEMENTARY DIAGRAM |
| A42-1010 | PIPING AND INSTRUMENT SYMBOLS |
| B33-1010 | REACTOR RECIRCULATION SYSTEM IED AND P&ID DATA |
| B33-1020 | REACTOR RECIRCULATION SYSTEM FC0 |
| B33-1010 | REACTOR RECIRCULATION SYSTEM DESIGN SPECIFICATION |
| 302-0613-00000 | NUCLEAR CLOSED COOLING SYSTEM P43 |
| 911-0601-00000 | REACTOR BLDG DRAINS P68 |
| 112-0604-00000 | CONTAINMENT VESSEL AND DRYWELL PURGE M14 |
| 302-0651-00000 | FUEL COOL LOOP CLEAN-UP SYSTEM G41 |
| 302-0652-00000 | POST ACCIDENT SAMPLING SYSTEM P87 |
| 302-0601-00000 | REACTOR WATER RECIRCULATION SYSTEM |

(REV. 22 10/2021)

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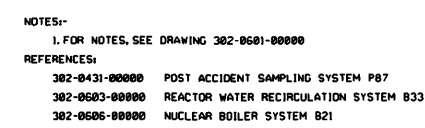
REACTOR WATER
RECIRCULATION SYSTEM
FIGURE 5.4-2 (SHEET 1 OF 4)
(DWG. D-302-0601-000000)





PERRY NUCLEAR POWER PLANT
 10 CENTER RD., PERRY, OHIO 44081

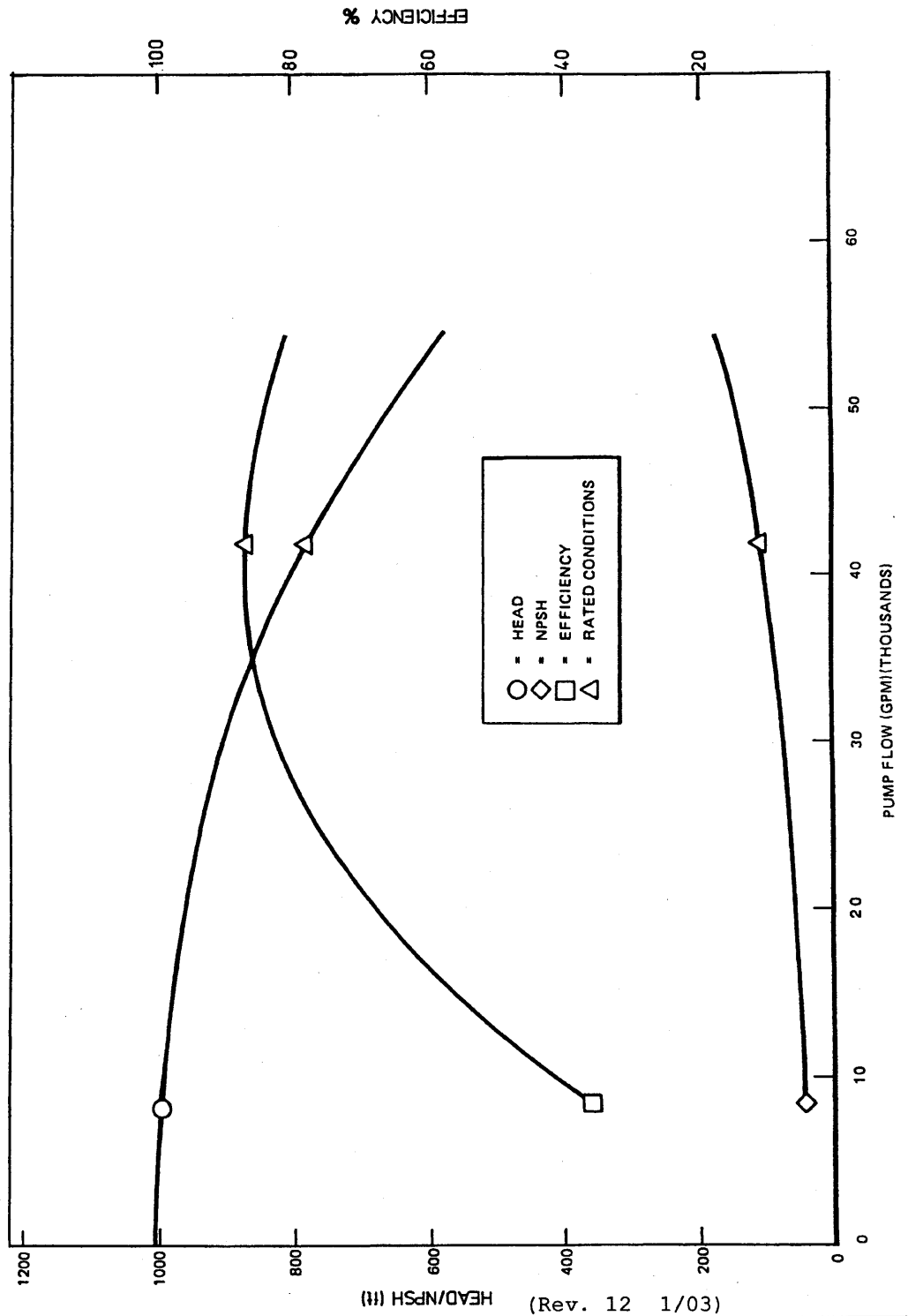
**REACTOR WATER
 RECIRCULATION SYSTEM**
 FIGURE 5.4-2 (SHEET 3 OF 4)
 (DWG. D-302-0603-00000)



PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

REACTOR WATER
RECIRCULATION SYSTEM
FIGURE 5.4-2 (SHEET 4 OF 4)
(DWG. D-302-0604-00000)

PANEL 1H22P009



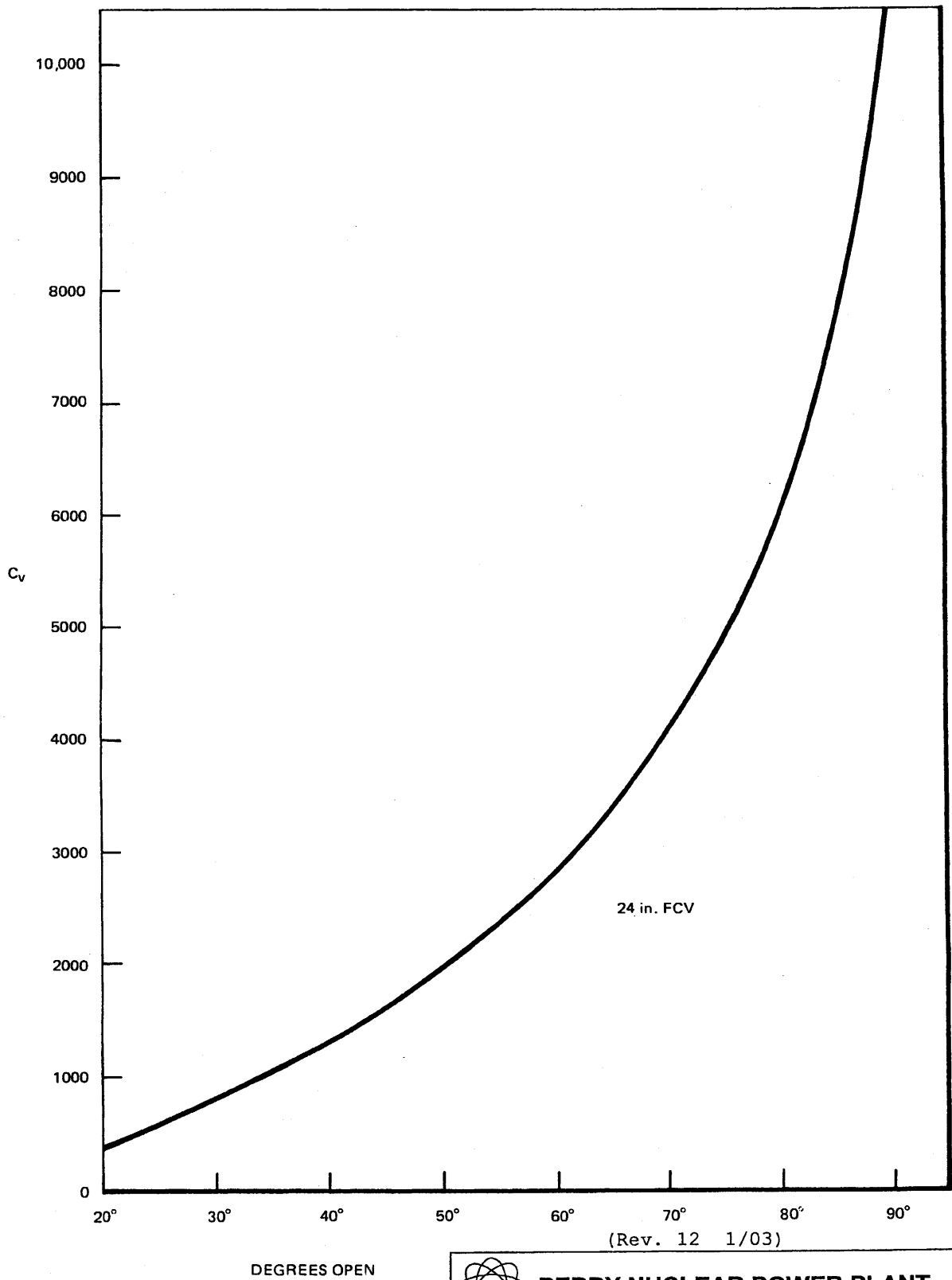
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Typical Recirculation Pump Head,
NPSH, and Efficiency Curves

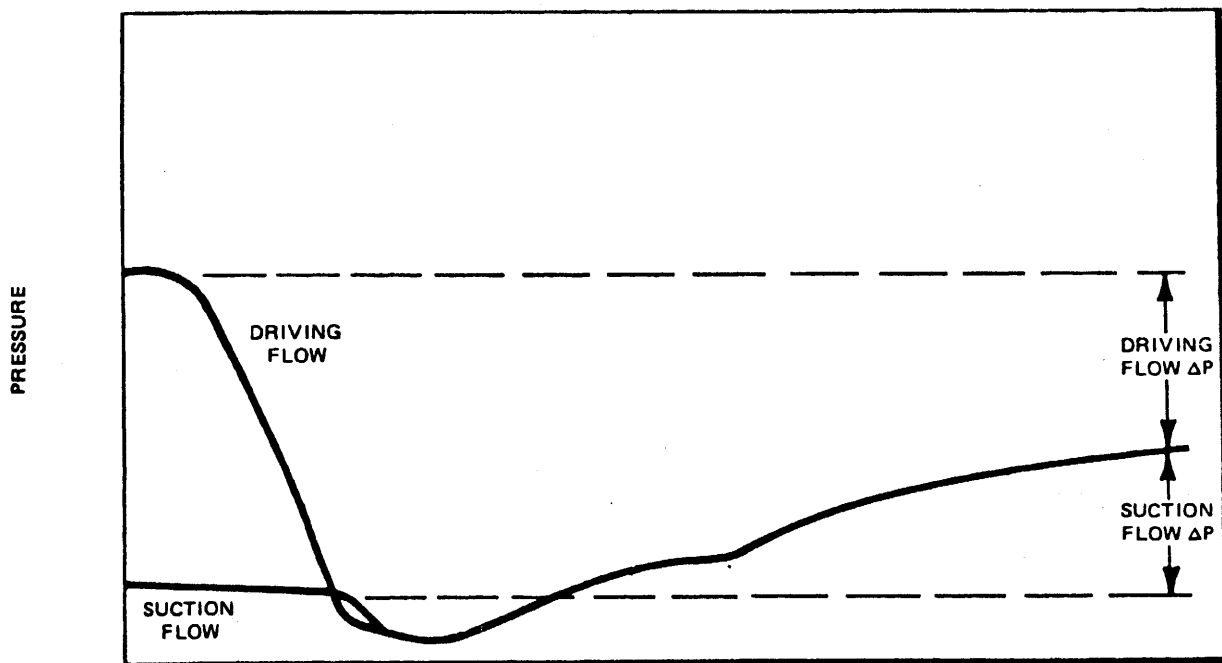
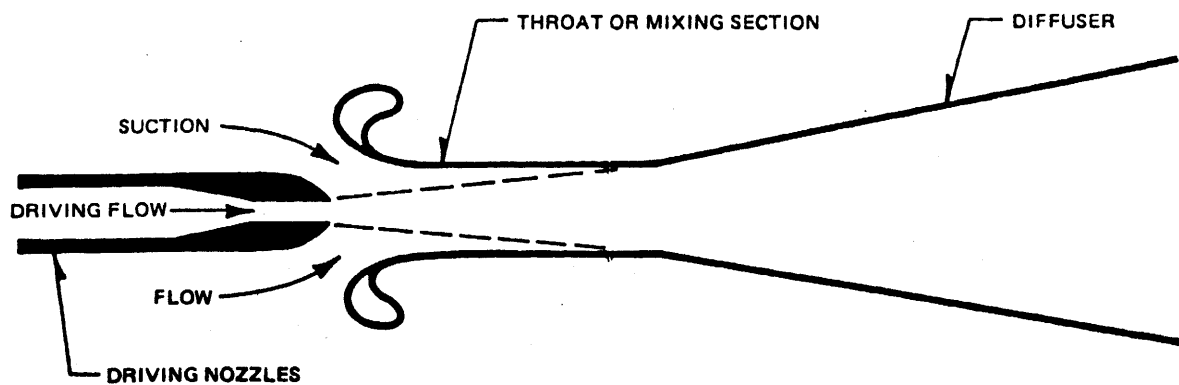
Figure 5.4-3



PERRY NUCLEAR POWER PLANT

Typical Flow Control
Valve Characteristic

Figure 5.4-4



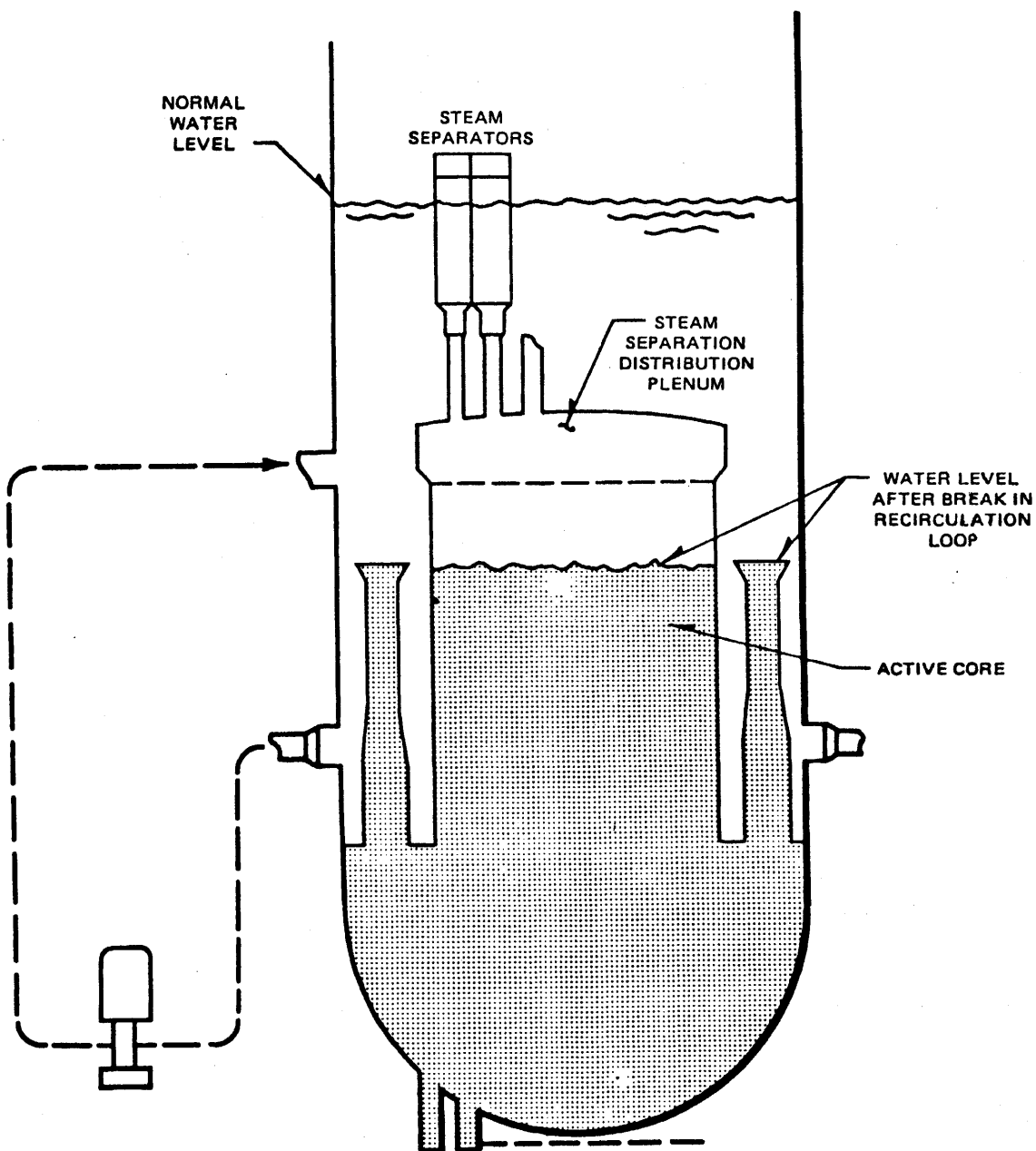
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PERRY NUCLEAR POWER PLANT

Operating Principle of Jet Pump

Figure 5.4-5



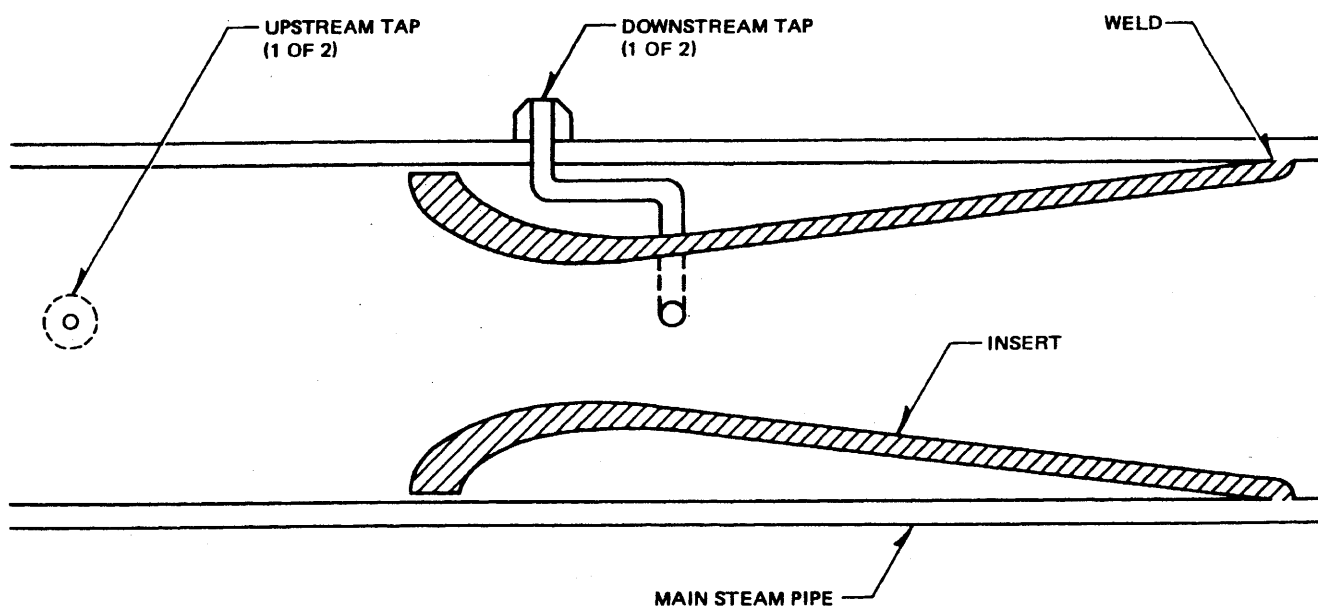
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PERRY NUCLEAR POWER PLANT

Core Flooding Capability of
Recirculation System

Figure 5.4-6



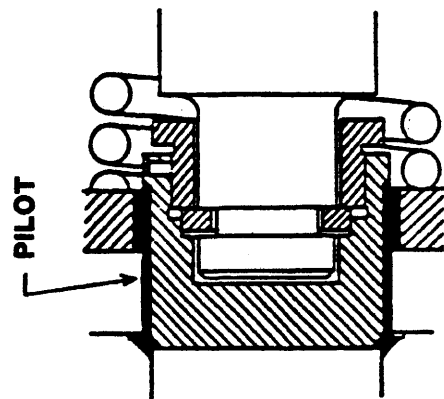
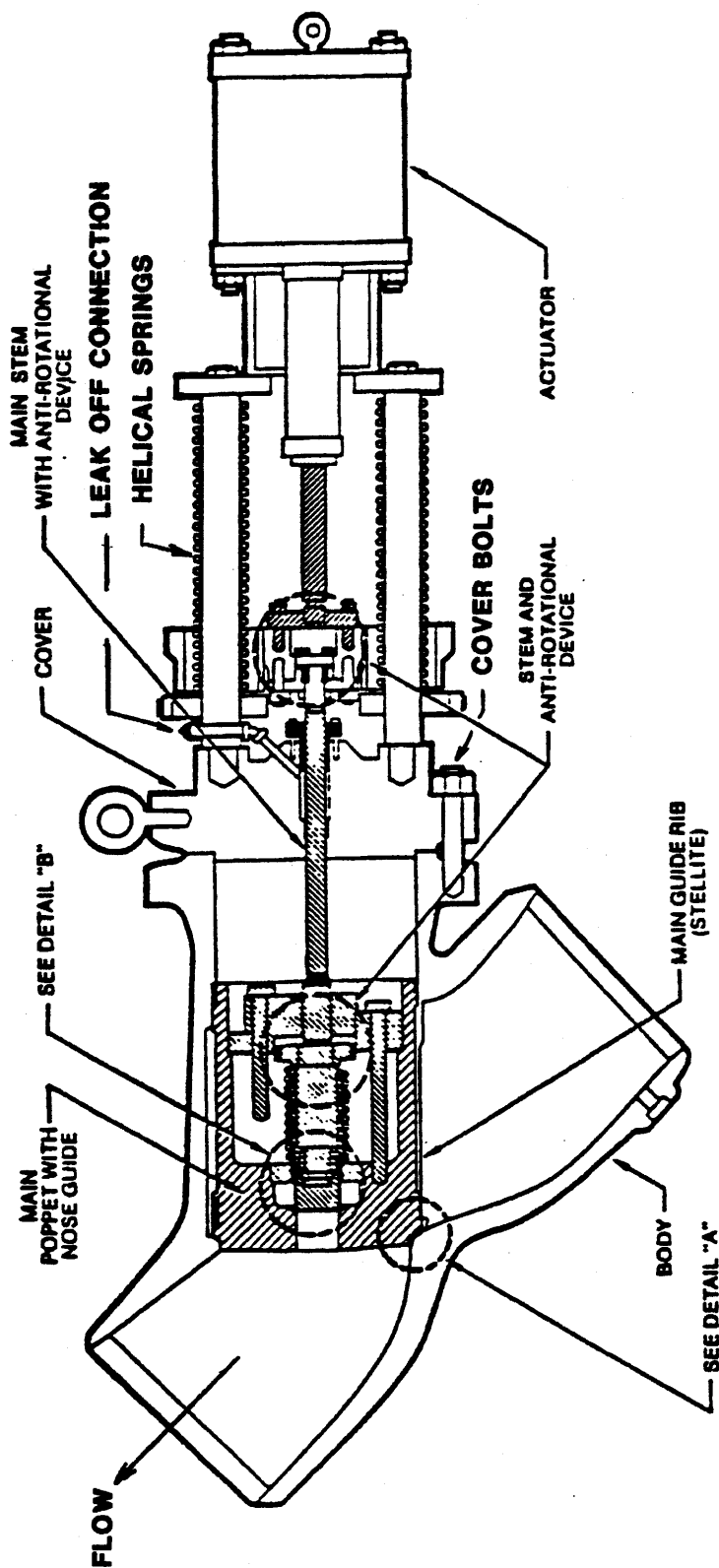
(Rev. 12 1/03)



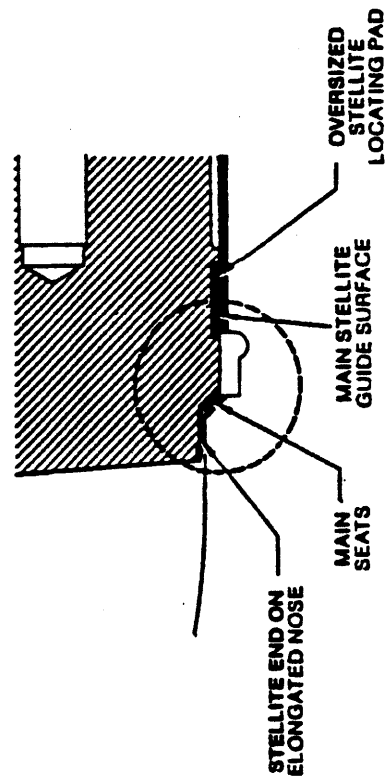
PERRY NUCLEAR POWER PLANT

Main Steamline Flow Restrictor

Figure 5.4-7



DETAIL "B"



DETAIL "A"

NOTE: THIS FIGURE APPLIES TO 1B21F022 & 1B21F028.

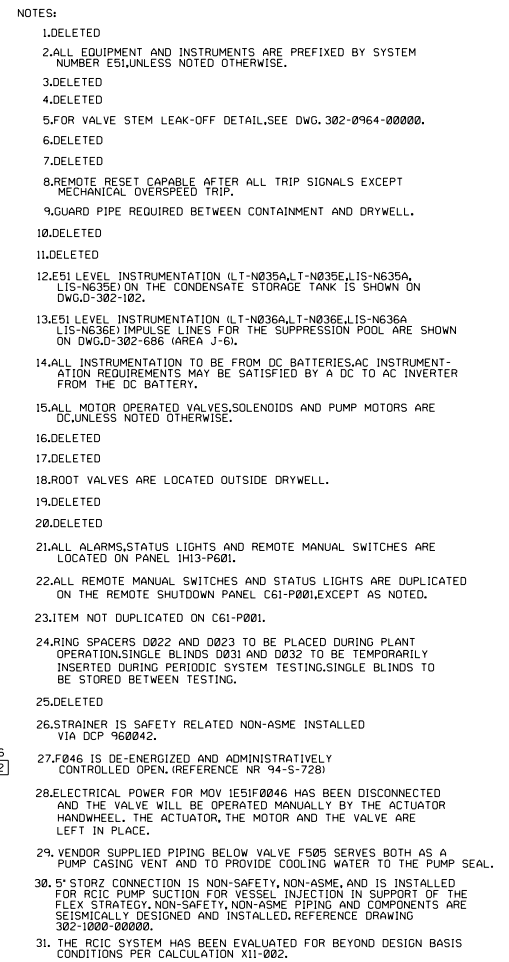
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PERRY NUCLEAR POWER PLANT

Main Steam Isolation Valve

Figure 5.4-8



REFERENCES:

302-0605-00000	NUCLEAR BOILER SYSTEM B21
302-0642-00000	RHR SYSTEM E12
302-0643-00000	RHR SYSTEM E12
302-0964-00000	LEAK DETECTION SYSTEM E31
A62-4350	MECHANICAL EQUIPMENT SEPARATION
302-0102-00000	CONDENSATE TRANSFER SYSTEM P11
302-0124-00000	MAIN, REHEAT, EXTRACTION AND MISCELLANEOUS DRAINS N20
E51-1020	RCIC PROCESS DIAGRAM
E51-1050	RCIC ELEMENTARY DIAGRAM
008-0314 SERIES	RCIC FUNCTIONAL CONTROL DIAGRAM
302-0961-00000	LEAK DETECTION SYSTEM E31
302-0686-00000	SUPPRESSION POOL MAKE-UP
E51-4010 (GE DSP22A6089)	RCIC SYSTEM DESIGN SPEC
A62-4070	PROCESS INSTRUMENTATION DESIGN SPEC
A62-4140	CLEANING OF PIPING & EQUIPMENT
C95-1010	ERIS
C61-4010	RSS DESIGN SPEC
302-0701-00000	HIGH PRESSURE CORE SPRAY
302-0705-00000	LOW PRESSURE CORE SPRAY
302-0713-00000	MIXED BED DEMIN & DIST.
302-0632-00000	REACTOR CORE ISOLATION COOLING SYSTEM,E51
911-0601-00000	REACTOR BUILDING DRAINS SYSTEM,P68
911-0611-00000	AUXILIARY BUILDING DRAINS SYSTEM,P68
302-0574-00000	EMERGENCY CORE COOLING SYSTEM SUCTION STRAINER T21

(REV. 20 10/2017)

PERRY NUCLEAR POWER PLANT
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REACTOR CORE ISOLATION
COOLING SYSTEM
FIGURE 5.4-9 (SHEET 1 OF 2)
(DWG. D-302-0631-00000)

MODE A SUCTION FROM CONDENSATE STORAGE, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT HIGH PRESSURE.

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FLOW (SEE NOTE 2)	700	716	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
PRESSURE (PSIA)	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
TEMPERATURE (°F)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MAX/MIN TEMPERATURE (°F)	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40

MODE B SUCTION FROM CONDENSATE STORAGE, REACTOR AT LOW PRESSURE, SUPPRESSION POOL AT HIGH PRESSURE.

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FLOW (SEE NOTE 2)	700	716	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
PRESSURE (PSIA)	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
TEMPERATURE (°F)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MAX/MIN TEMPERATURE (°F)	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40

MODE C SUCTION FROM SUPPRESSION POOL, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT LOW PRESSURE.

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FLOW (SEE NOTE 2)	700	716	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
PRESSURE (PSIA)	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
TEMPERATURE (°F)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MAX/MIN TEMPERATURE (°F)	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40

MODE D SUCTION FROM SUPPRESSION POOL, REACTOR AT LOW PRESSURE, SUPPRESSION POOL AT LOW PRESSURE.

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FLOW (SEE NOTE 2)	700	716	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
PRESSURE (PSIA)	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
TEMPERATURE (°F)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MAX/MIN TEMPERATURE (°F)	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40

MODE F TEST MODE: SUCTION FROM CONDENSATE STORAGE, REACTOR AT HIGH PRESSURE, SUPPRESSION POOL AT LOW PRESSURE. (SEE NOTE 14)

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
FLOW (SEE NOTE 2)	700	716	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
PRESSURE (PSIA)	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
TEMPERATURE (°F)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
MAX/MIN TEMPERATURE (°F)	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40	100/40

POSITION	1-2	3-3A	3A-4	7-2	8-8A	8A-9	10-11	12-13	13-14	15	16-18A	18A-9	3-20	20-1	19-2
PEAK PRESSURE, PSIG	N/A	1677	1677	N/A	1337	1337	150	1677	N/A	N/A	1677	N/A	1677	N/A	N/A
RECOMMENDED DESIGN PRESSURE, PSIG	75	1525	1525	75	1250	1250	150	1525	150	150	1525	75	1525	75	75
DESIGN TEMPERATURE (°F)	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
ESTIMATED LINE SIZE, IN	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"

PEAK PRESSURE - IS THE MAXIMUM PRESSURE ANTICIPATED DURING A TRANSIENT PERIOD WITH ALL OF THE CONTRIBUTING ELEMENTS AT A MAXIMUM. IT WOULD BE EXPECTED TO OCCUR LESS THAN 1% OF SYSTEM OPERATING TIME.

• THE PRESSURE AT THIS POSITION DEPENDS ON PIPING ARRANGEMENT, AND MAY BE VARIED WITHIN THE FOLLOWING LIMITS.

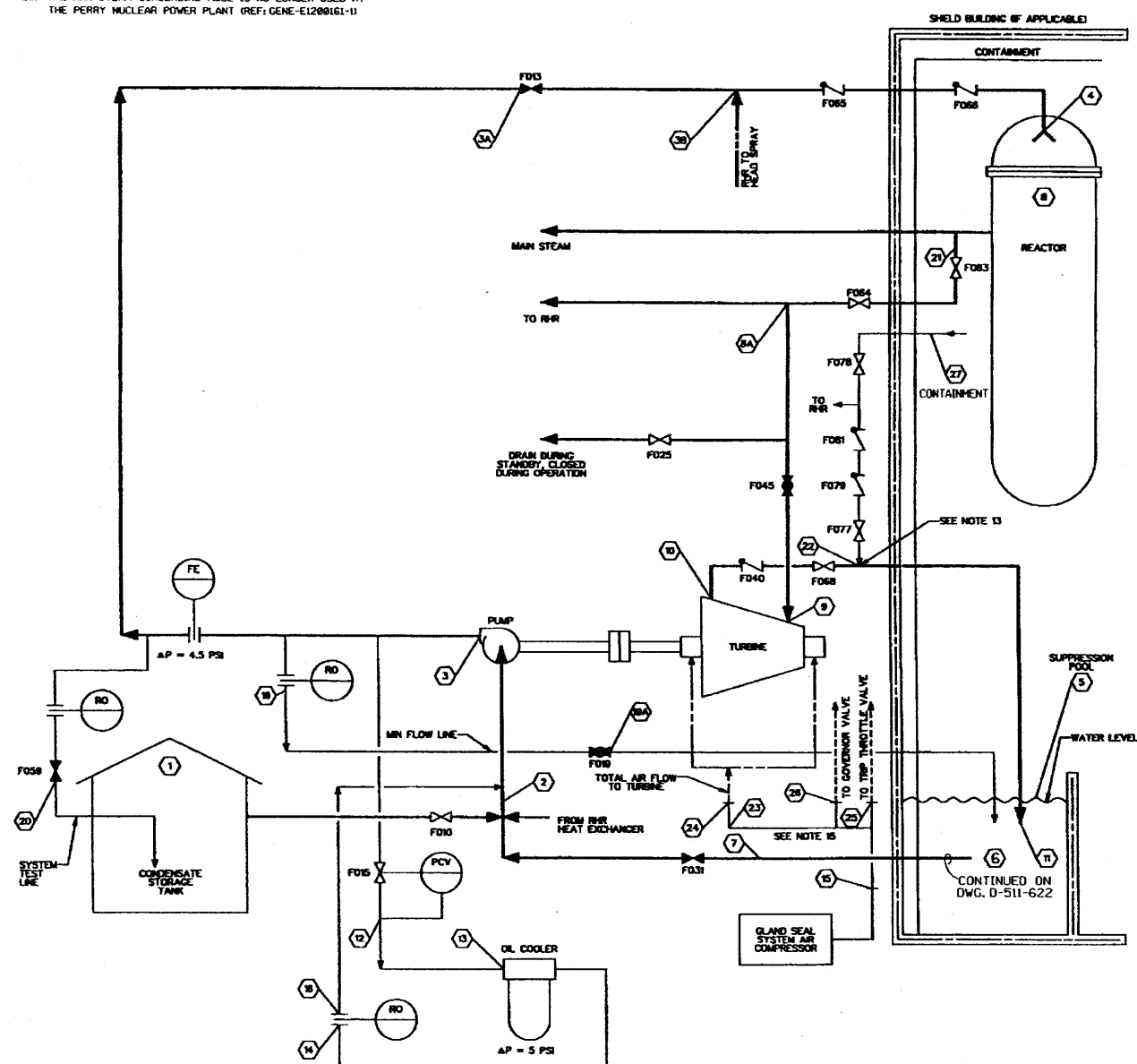
- POSITION
- 2 MINIMUM NPSH AT PUMP SUCTION = 22 FEET @ PUMP SPEED 4600 RPM
- 3 MAXIMUM PUMP TOTAL DYNAMIC HEAD (TDH) 3835 FEET @ PUMP SPEED 4600 RPM FOR MODES A & C 610 FEET FOR MODES B & D
- 8 MAXIMUM PRESSURE DROP BETWEEN POSITION 3 AND 9 = 15 PSI
- 10 MAXIMUM PRESSURE ALLOWED = 25 PSIA
- 12/13 MAXIMUM PRESSURE ALLOWED = 125 PSIA ±1%
- 14 PRESSURE IS 5 PSI LESS THAN POSITION 13
- 16 SUFFICIENT PRESSURE TO RETURN TO SUPPRESSION POOL
- 20 SUFFICIENT PRESSURE TO RETURN TO CONDENSATE STORAGE
- 18 MAXIMUM PRESSURE REQUIRED = 85 PSIA

- MAXIMUM LINE LENGTH BETWEEN POSITION 22 & 27 EQUALS 10 FT. THE INTERNAL CROSS SECTIONAL AREA OF THE VACUUM BREAKER PIPING THAT IS SHOWN BY RCC AND RHR SHALL BE EQUAL TO OR GREATER THAN THE COMBINED INTERNAL CROSS SECTIONAL AREAS OF THE INDIVIDUAL RCC AND RHR VACUUM BREAKER LINES.
- STEAM FLOWS FOR TEST MODE AT POSITIONS 9, 10 & 11 ARE BASED UPON A PUMP TDH OF 2531 FEET.
- REFER TO RCC TURBINE VENDORS DRAWING FOR LINE LENGTHS CONNECTING POINTS 15, 23, 24, 25 AND 28.
- DURING RCC SYSTEM OPERATION A FLOW OF 1/4 GPM OCCURS THROUGH THE TURBINE EXHAUST LINE DRAIN PUT SYSTEM AT 25 PSIA AND 240 °F.
- AIR FLOW FROM GLAND SYSTEM PREVENTS STEAM LEAKAGE OF 250 LB/HR FROM TURBINE.
- DELETED
- THIS REQUIREMENT IS NO LONGER APPLICABLE. THE STRAINER INSTALLED BY OCP 160804Z HAS BEEN DESIGNED TO ENSURE ADEQUATE PUMP NPSH UNDER MAXIMUM POSTULATED LOADING RESULTING FROM LOCA-GENERATED AND PRE-LOCA DEBRIS MATERIALS AND FOR MAXIMUM EXPECTED SUPPRESSION POOL TEMPERATURE.
- THE RHR STEAM CONDENSING MODE IS NO LONGER USED AT THE PERRY NUCLEAR POWER PLANT (REF: GENE-E1200161-1)
- PUMP MINIMUM FLOW REQUIREMENT MAY OCCUR DURING ANY OPERATING MODE. FLOW REQUIREMENT IS 90 GPM MINIMUM WITH TURBINE/PUMP AT MAXIMUM SPEED (E MODE A).
- DELETED
- DURING SYSTEM STANDBY, EQUIPMENT IS NOT OPERATING. INTERMITTENT FLOW OCCURS THROUGH THE STEAM SUPPLY LINE DRAIN TRAP SYSTEM AT 1000 PSIA AND 560 °F.
- HEAD SPRAY NOZZLE PRESSURE DROP IS 15 PSI.
- DESIGN PRESSURE AND TEMPERATURES GIVEN ARE FOR INFORMATION ONLY AND ARE THE BASIS FOR DESIGN OF SUPPLIED EQUIPMENT. ESTIMATED LINE SIZES ARE FOR INFORMATION ONLY. ACTUAL LINE SIZES AS DETERMINED BY PIPING DESIGNER, SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.
- FLOW VALUES SHOWN IN MODES C & D ARE BASED UPON SUCTION PIPING DESIGN PERMITTING THE MINIMUM REQUIRED NPSH TO CONTINUE TO BE PROVIDED TO THE RCC PUMP WHEN THE SUPPRESSION POOL SUCTION STRAINER IS 50 PERCENT PLUGGED. (SEE NOTE 19)

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING:

NOTES:

- ATMOSPHERIC PRESSURE OF 14.7 PSIA WAS USED IN CALCULATIONS.
- WATER FLOWS ARE SHOWN IN GPM, STEAM FLOWS IN 1000 LB/HR, AND AIR FLOW IN SCFH @ 14.7 PSIA AND 80 °F.
- THE UNCOVERED FLOW NOZZLE PRESSURE DROP OF 4.5 PSI IS A FIXED LOSS BETWEEN POSITIONS 13 AND 14.
- THE LUBE OIL COOLER PRESSURE DROP OF 3.0 PSI IS A FIXED LOSS BETWEEN POSITIONS 15 AND 16.
- THE CONTROLLING MODES FOR LINE SIZING AND ARRANGEMENT ARE:
SUCTION FROM CONDENSATE STORAGE: MODE A & B
SUCTION FROM SUPPRESSION POOL: MODE C & D
PUMP DISCHARGE: MODE A & B
STEAM SUPPLY: MODE A & C
TURBINE EXHAUST: MODE A & C
TEST LINE: MODE A
COOLING SYSTEM: MODE A
- SYSTEM OPERATION IS POSSIBLE WITH INTERMEDIATE PRESSURES IN THE REACTOR VESSEL AND THE SUPPRESSION POOL. HOWEVER, THESE CONDITIONS DO NOT CONTROL PIPE OR VALVE SIZING OR SPECIFICATION, AND NO DATA IS SHOWN.



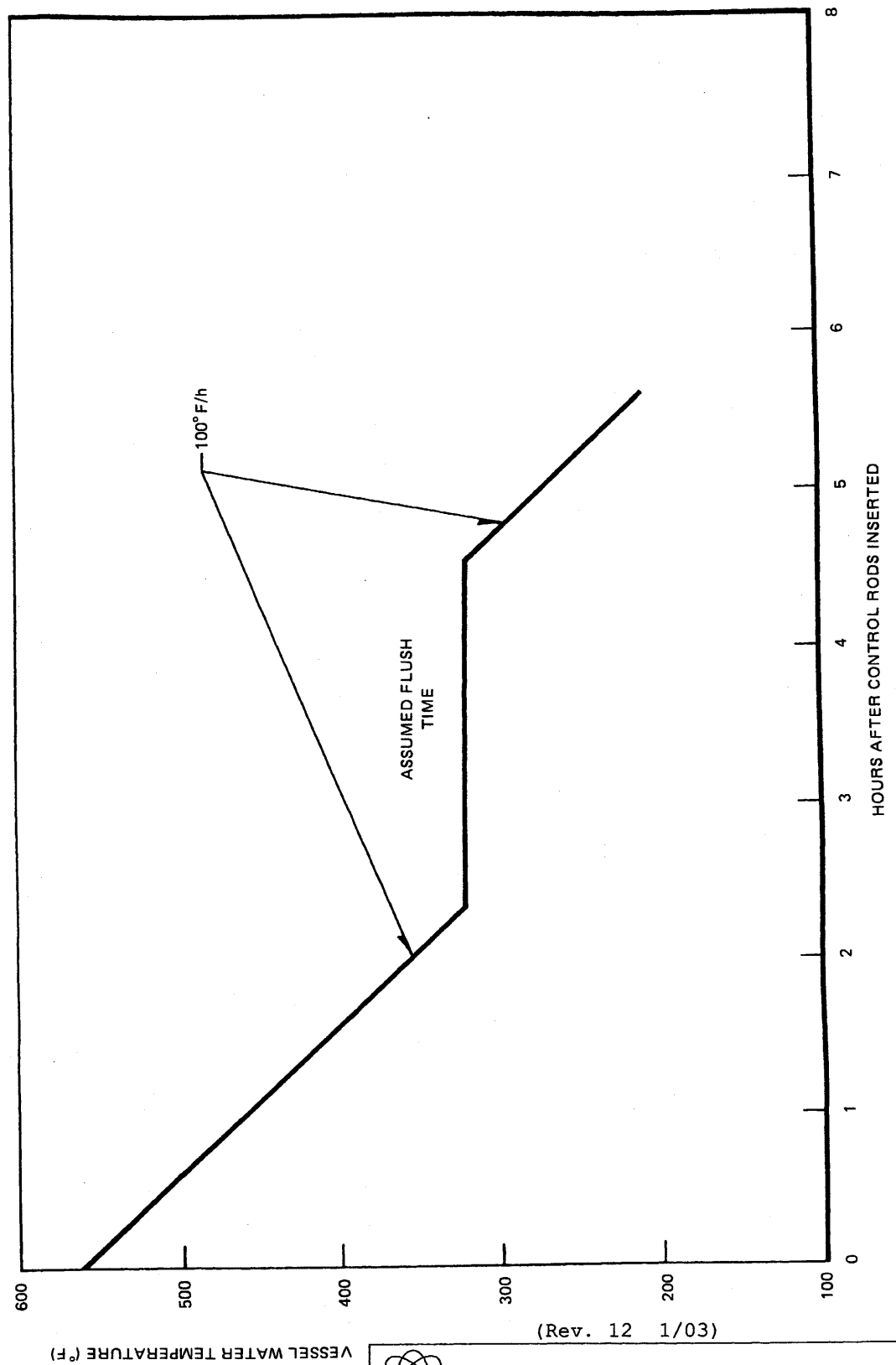
(Rev. 13 12/03)

PERRY NUCLEAR POWER PLANT

Reactor Core Isolation Cooling System

Figure 5.4-10

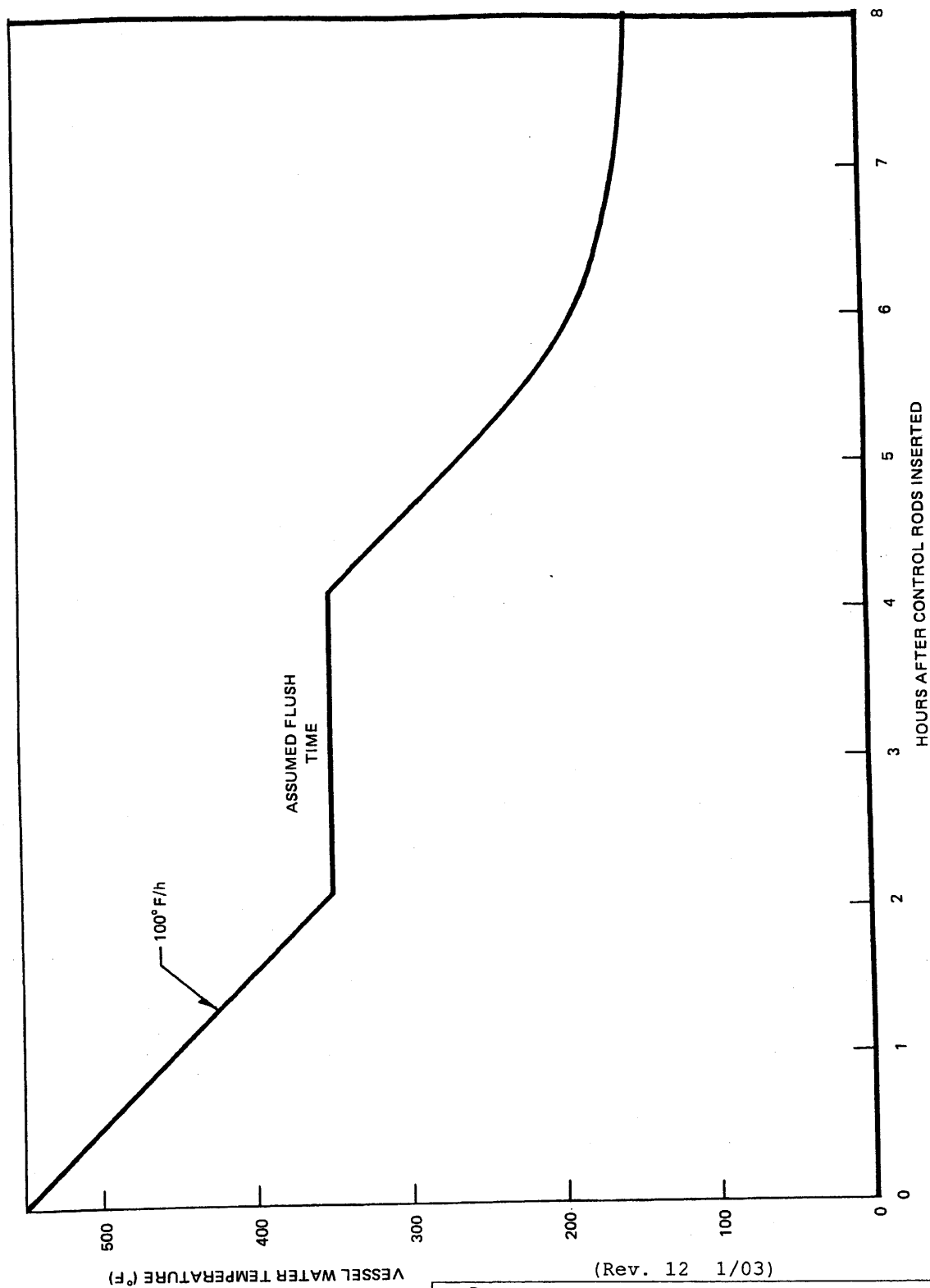
MPL. *E51-1020
REFERENCE G. E. DRAWING *762E421CA REV.1



PERRY NUCLEAR POWER PLANT

Vessel Coolant Temperature vs
Time (Two Heat Exchangers Available)

Figure 5.4-11



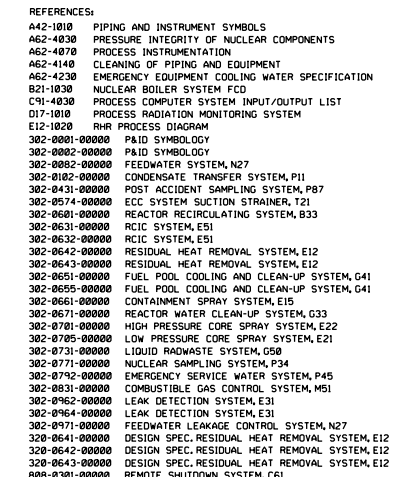
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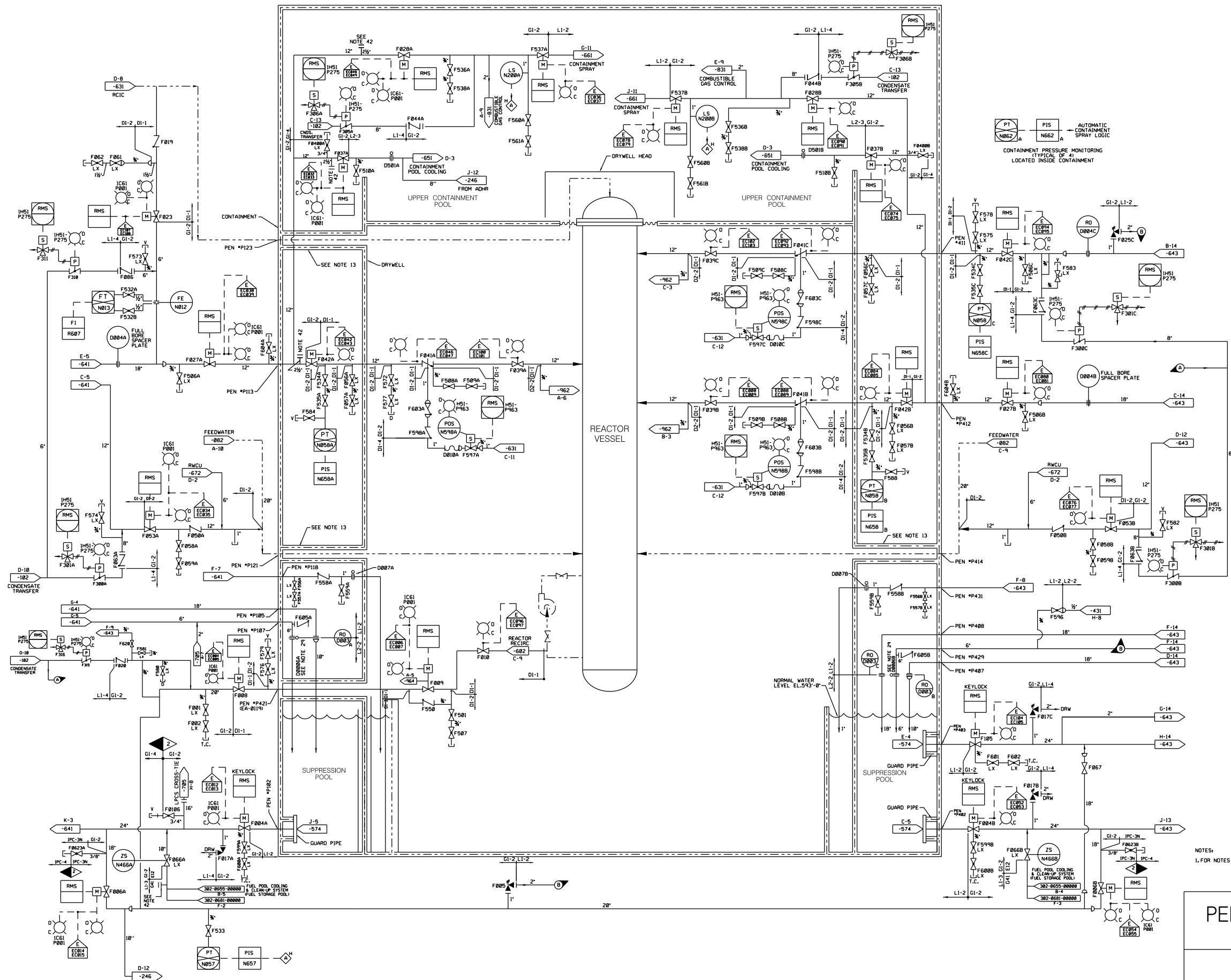
PERRY NUCLEAR POWER PLANT

Vessel Coolant Temperature vs
Time (One Heat Exchanger Available)

Figure 5.4-12



RESIDUAL HEAT
REMOVAL SYSTEM
FIGURE 5.4-13 (SHEET 1 OF 3)
(DWG. D-302-0641-00000)



NOTES:
1. FOR NOTES AND DRAWING REFERENCES SEE DRAWING 302-0641-00000.

(REV. 22 10/2021)

PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

RESIDUAL HEAT REMOVAL
SYSTEM
FIGURE 5.4-13 (2 OF 3)
(DWG. D-302-0642-00000)

MODE A-1 (SEE NOTES 3 & 13)

POSITION	1	2	3	4	5	6	7 _{A,B}	8 _{A,B}	9	10	46	11	29
FLOW GPM	—	7100	—	—	—	—	—	—	—	—	—	7100	—
PRESSURE PSIA	29.7	14.7	—	—	—	—	—	—	—	—	—	53.7	38.7
TEMPERATURE °F	—	170	40	—	—	—	—	—	—	—	—	170	40
MAX. PRESSURE DROP FEET	—	—	—	—	—	—	—	—	—	—	—	—	—

LOOP A & B

LOOP C

SEE NOTE 7 TYP ALL TABLES

MODE A-2 SEE NOTE 13

POSITION	1	2	3	4	5	6	7 _{A,B}	8 _{A,B}	9	10	46	11	29
FLOW GPM	—	8520	—	—	—	—	—	—	—	—	—	8520	—
PRESSURE PSIA	14.7	—	—	—	—	—	—	—	—	—	—	14.7	—
TEMPERATURE °F	—	180	90	—	—	—	—	—	—	—	—	180	90
MAX. PRESSURE DROP FEET	—	—	—	—	—	—	—	—	—	—	—	—	—

LOOP A & B

LOOP C

MODE B-1

SEE NOTE 20

POSITION	1	2 _B	3 _B	4 _B	5 _B	6 _B	18 _B	19 _B	9 _B	10 _B	13 _B	53 _B	44 _B	43 _B	24 _B	1	60 _B	61 _B
FLOW GPM	—	7100	—	—	—	—	—	—	—	—	—	—	—	—	7100	—	—	—
PRESSURE PSIA	29.7	14.7	—	—	—	—	—	—	—	—	—	—	—	—	29.7	14.7	—	—
TEMPERATURE °F	—	185	—	—	—	—	—	—	—	—	—	—	—	—	185	139.4	—	—
MAX. PRESSURE DROP FEET	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(SEE NOTE 20)

HEAT REMOVAL CAPABILITY PER HX LOOP 158.4 X 10⁶ BTU/HR (1 HX OPERATING)

MODE B-2

(SEE NOTE 20)

POSITION	1	2	3 _B	4 _B	5 _B	6 _B	18 _B	19 _B	9 _B	10 _B	16 _B	67 _B	68 _B	69 _B	1	60 _B	61 _B
FLOW GPM	—	5250	—	—	—	—	—	—	—	—	—	—	—	—	5250	—	—
PRESSURE PSIA	29.7	14.7	—	—	—	—	—	—	—	—	—	—	—	—	29.7	14.7	—
TEMPERATURE °F	—	200	—	—	—	—	—	—	—	—	—	—	—	—	200	139.7	—
MAX. PRESSURE DROP FEET	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

HEAT REMOVAL CAPABILITY PER HX LOOP 153 X 10⁶ BTU/HR (1 HX OPERATING)

NOTES:

1.

- PIPING BETWEEN POINTS WITH EMPTY DATA BLANKS (SEE ALSO TABLE 3) SHALL BE SIZED BY CUSTOMER OR AS BASED ON SPECIFIED OPERATING CONDITIONS. EMPTY DATA BLANKS CAN BE FILLED IN BASED ON ACTUAL ARRANGEMENT OR EQUIVALENT HYDRAULIC DATA SUBMITTED TO INRSB FOR REVIEW.
- INDICATES THE DATA IS NOT SIGNIFICANT.
- SHOWN AS TYPICAL FOR ONE LOOP. IF LOOPS ON SIDE 1 AND SIDE 11 ARE NOT SYMMETRICALLY ARRANGED, VALUES FOR BOTH SIDES SHALL BE SUBMITTED.
- ΔH VALUES FOR EQUIPMENT WITHIN GE SCOPE ARE AS NOTED.
- ELEVATIONS ARE NOT INCLUDED IN ΔP VALUES GIVEN. ELEVATIONS SHALL BE INCLUDED WHEN DETERMINING FINAL VALUES FOR THE EMPTY DATA BLANKS.
- INDICATES MAXIMUM (X) AND MINIMUM (Y) VALUES FOR THE MODE SPECIFIED.
- DASHED LINES INDICATE FLOW DOES NOT PASS THRU THESE POINTS. SOLID LINES INDICATE FLOW DOES PASS THRU THESE POINTS.
- THE NPSH AVAILABLE IN MODE A-2 AT A REFERENCE LOCATION 3 FEET ABOVE THE PUMP MOUNTING FLANGE MUST EXCEED 6.2 FEET. ASSUMING SATURATION TEMPERATURE OF 222°F, THE NPSH AVAILABLE IN MODES B-1 & B-2 AT A REFERENCE LOCATION 3 FEET ABOVE THE PUMP MOUNTING FLANGE MUST EXCEED 4 FEET. ASSUMING SATURATION TEMPERATURES OF 212°F AND 200°F, RESPECTIVELY, THE NPSH AVAILABLE AT THE PUMP SUCTION NOZZLE MUST EXCEED THIS VALUE PLUS THE DIFFERENCE IN ELEVATION BETWEEN THE REFERENCE LOCATION AND THE CENTER-LINE OF THE PUMP SUCTION NOZZLE.
- PIPING SYSTEM DESIGN PRESSURE AND TEMPERATURE AND THE ESTIMATED LINE SIZES ARE FOR INFORMATION ONLY. ACTUAL DESIGN PRESSURE AND TEMPERATURE AND LINE SIZES AS DETERMINED BY PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS. REFER TO HARDWARE DWS. FOR NOZZLE SIZES OR GE SUPPLIED EQUIPMENT.
- FUEL POOL CONNECTIONS MUST PROVIDE ADEQUATE NPSH TO AVOID PUMP CAVITATION AND AT THE SAME TIME PROVIDE FOR GREATER THAN MINIMUM PUMP FLOW.
- TABLE 1 INDICATES VALVE POSITION DURING VARIOUS MODES OF OPERATION.
- Balance
- TYPICAL VALUES FOR MAX. SUPPRESSION POOL TEMP SHOWN. FINAL TEMPERATURE DEPENDS ON INITIAL POOL WATER TEMPERATURE & POOL WATER VOLUME.
- WATER FLOWS ARE IN GPM.
- MAXIMUM SGM 700 FEET.

- SERVICE WATER CROSS-TIE SHALL BE SIZED TO FLOW 300 GPM AND ENOUGH HEAD TO FLOOD THE CONTAINMENT.
- THE HEIGHT OF WATER IN THE SHUTDOWN COOLING SUBSYSTEM PIPING, INCLUDING THE HEAT EXCHANGERS AND PUMPS SHALL NOT EXCEED 278,000 LBS AT 75°F TO PREVENT DILUTION OF STANDBY LIQUID CONTROL NEUTRON ABSORBER BELOW MINIMUM REQUIREMENTS.
- SEE REFERENCE 5 FOR SUPPLEMENTAL FLOWS ENTERING DOWNSTREAM OF E12-F05C DURING NORMAL PLANT OPERATIONS.
- FLOW SHOWN IS A MAXIMUM. ACTUAL FLOW WILL BE INDICATED LATER FOR EACH PROJECT.
- MAXIMUM SHELL SIDE FLOW RATE IS 7800 GPM.
- FLOW SHOWN AT POSITION 71 DOES NOT INCLUDE FLOW FROM FUEL POOL COOLING AND CLEANUP SYSTEM.
- SEE SYSTEM DATA SHEET FOR SUGGESTED VALVE SIZING.
- SUCTION TEMPERATURE AND PRESSURE ARE FOR LOOPS A&B ONLY. LOOP C CONDITIONS ARE 0 PSIG VESSEL PRESSURE 125°F.
- THE HX INLET PRESSURE SHALL BE GREATER THAN 60 PSIA TO MINIMIZE THE POSSIBILITY OF FLOW INDUCE VIBRATION.
- FOR LOOPS A AND B, MODE G MAY BE ELIMINATED FROM DESIGN CONSIDERATION DURING SHUTDOWN COOLING IF HOP - F04A IS ELECTRICALLY DISABLED. WHEN SHUTDOWN COOLING IS INITIATED IN THE A+B LOOP, ONLY ONE VALVE SHOULD BE DISABLED AT ANY GIVEN TIME. CUSTOMER ESTABLISHED DESIGN ALTERNATE TO GE STANDARD.
- REFER TO DSW-E12-1-454-00, TABLE L, MODE J, NOTE 5 FOR OPERATING PARAMETERS IN THE SHUTDOWN COOLING HEADER LEAK-OFF LINE PIPING DURING NORMAL OPERATION.
- THE RHR STEAM CONDENSING MODE IS NO LONGER USED AT THE PERRY NUCLEAR POWER PLANT (REF: GEN-EL20061-1).
- THE DIAPHRAGM ACTUATOR BOWNET, TOKE, VALVE STEM AND PLUG HAVE BEEN REMOVED FROM VALVES F05A & F05B AND REPLACED WITH A BLIND BOWNET. (VALVE FUNCTIONS AS STRAIGHT PIPE)
- FOR CORRESPONDING ESW OPERATING DATA REFER TO P&ID 382-4743-00000. ESW OPERATING DATA CORRESPONDING TO RHR MODES B-2 AND D-2 ARE NOT PROVIDED SINCE THESE MODES ARE NOT LISTED FOR ESW. HOWEVER, ESW INLET POSITION ON FLOW RATES AND TEMPERATURES ARE THE SAME FOR MODES B-1 AND B-2 AND MODES D-1 AND D-2.

LEGEND:

- ΔH HEAD LOSS
- ΔP PRESSURE LOSS
- RX PRESS REACTOR VESSEL PRESSURE
- SDH SHUTOFF HEAD
- TDM TOTAL DYNAMIC HEAD

REFERENCE DOCUMENTS

- RECIC SYSTEM PROCESS DIAGRAM
- RECIC SYSTEM DESIGN SPEC DATA
- LOW PRESSURE CORE SPRAY SYSTEM PD
- NUCLEAR BOILER SYSTEM PROCESS DIAGRAM
- REACTOR WATER CLEANUP SYSTEM PD

SUPPORTING DOCUMENTS

- PIPING & INSTRUMENT SYMBOLS

- MPL ITEM NO.
- E51-1020
 - R33-4010
 - E21-1020
 - R21-1020
 - G33-1030

AAZ-1010

MODES:

- A-1 LOW PRESSURE COOLANT INJECTION (LPCI) RECIRCULATION LINE BREAK IN EITHER SIDE AND THREE PUMPS OPERATING, ONE STRAINER 50% PLUGGED.
- A-2 LOW PRESSURE COOLANT INJECTION (LPCI) RECIRCULATION LINE BREAK IN EITHER SIDE AND THREE PUMPS OPERATING, ONE STRAINER 50% PLUGGED, VESSEL PRESSURE-B PSIG.
- B-1 POST ACCIDENT SUPPRESSION POOL COOLING WITH ONE PUMP OPERATION AND STRAINER 50% PLUGGED, PEAK SUPPRESSION POOL TEMPERATURE.
- B-2 POST ACCIDENT CONTAINMENT SPRAY WITH HEAT REJECTION WITH ONE PUMP OPERATION AND STRAINER 50% PLUGGED.
- D-1 INITIATION OF SHUTDOWN COOLING AFTER BLOWDOWN TO MAIN CONDENSER AT 4 HOURS.
- D-2 CONTINUATION OF SHUTDOWN COOLING AT 20 HOURS.
- E-1 CONTINUATION OF SHUTDOWN COOLING AT 20 HOURS AND FUNCTIONAL PUMP TEST AFTER SHUTDOWN.
- E-2 CONTINUATION OF SHUTDOWN COOLING WITH RETURN TO UPPER CONTAINMENT POOL AT GREATER THAN 20 HOURS AND FUNCTIONAL PUMP TEST AFTER SHUTDOWN.
- F RHR SYSTEM TEST DURING PLANT OPERATION.
- G MINIMUM FLOW BYPASS MODE: 2 SUCTION SOURCES.
- S SYSTEM ON STANDBY DUTY.

(Rev. 13 12/03)



PERRY NUCLEAR POWER PLANT

Residual Heat Removal System


Figure 5.4-14 (Sheet 1 of 3)

MODE D-1 RX PRESSURE 118 PSIG															SEE NOTE 29															NOTE 24														
POSITION	29	25	26	25A	25B	18A	18B	16A	50A	50B	27A	27B	14	30	31	66	33	28	27B	28B	29	60A	6																					
FLOW GPM	—	14200	14200	7100	7100	≤ 7100	≤ 7100	7100	7100	7100	7100	7100	700	0	←	→	500	←	125	1100	7100	—	—	6																				
PRESSURE PSIA	125	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	125	—	—	—	—																					
TEMPERATURE °F	344	—	—	—	—	344	304.1	—	—	—	—	—	—	—	—	—	304.1	—	304.1	304.1	—	—	—																					
MAX PRESSURE	118	—	—	—	—	118	118	—	—	—	—	—	—	—	—	—	118	—	118	118	—	—	—																					
DROP FEET	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—																					

HEAT REMOVAL CAPABILITY PER RX LOOP 135.1 X 10⁶ BTU/HR (2 HRS OPERATING)

LOOP B LOOP A WITH HEAD CORRECTION LOOP A WITH HEAD CORRECTION SEE REF 1

HEAT REMOVAL CAPABILITY PER HX LOOP 135.1×10^6 BTU/HR (2 HX'S OPERATING)

MODE 0-2		RE PRESSURE 0 PSIG				SEE NOTE 20												USEC NOTE 24																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
POSITION		29	25	20	5 AS	6 AS	18 AS	19 AS	16 AS	30 AS	27 AS	28 AS	29																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

HEAT REMOVAL CAPABILITY PER HK LOOP 80.5 x 10⁶ BTU/HK (2 HK'S OPERATING)[illegible]


HEAT REMOVAL CAPABILITY PER HX LOOP 46.9×10^6 BTU/Hr (2 HX'S OPERATING)

[illegible]

HEAT REMOVAL CAPABILITY PER MX LOOP $\leq 40.9 \times 10^6$ BTU/HR (2 MX'S OPERATING)

PAGE F		SEE MORE 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13 _{AB}	14 _{AB}	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227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LOOP A & B TEST

MODE C		RX PRESSURE 110 PSIG										SEE NOTE 33 AND NOTE 25									
POSITION		29	25	26	33	4	5	6	6.1	43	34	1	2	3	4	5	6	6.1	43	34	1
FLOW GPM		—	>1250	—	—	—	—	—	—	>1250	—	—	1250	—	—	SEE NOTE 19	—	—	—	1250	—
PRESSURE PSI A		125	—	—	—	—	—	—	—	14.7	—	14.7	—	—	—	—	—	—	—	14.7	—
TEMPERATURE °F		—	346	—	—	—	—	—	—	346	—	120	—	—	—	—	—	—	—	120	—
MAX PRESSURE													60								
DROP FEET									TDR-620									TDR-620			

LOOP A & B SEE NOTE 15

[illegible]

DESIGN PRESSURE AND TEMPERATURE TABLE		SEE NOTE 9																																																																																	
POSITION	3.1	3.2	4	5	6	7	8	9	10	16	46	11	7	7.1	18	19	8	9	10	16	46	11	23	34	28	44B	54B	16	56	27	28	67	70	71	14	30	31	51	66	67	70	68																																									
DESIGN PRESSURE IN PSIG	100	200												500											SEE REF 2	700				500					500	125			500			SEE REF 1	500	100																																							
DESIGN TEMP IN	212	358												358	400										SEE REF 2	358				400				370	212			308			308	212																																									
ESTIMATED LINE SIZE		24"												18"		18"									20"		18"	24"				12"				8"					12"																																										
LPCI LINE LOOP A & B (VIA RHR HX BYPASS)												HEAT EXCHANGER LINE												LPCI LINE LOOP C (DIRECT TO REACTOR)												SHUTDOWN SUCTION												SHUTDOWN ACTING LINES												HEAD SPRAY LINE												CONTAINMENT SPRAY											

DESIGN PRESSURE AND TEMPERATURE TABLE																											SEE NOTE 9									
POSITION		36	36	37	17	18	19	20	38	38	40.1	41	42	40	40.2	44	13	53	24	56	56.1	4C	49	40.1	2A	6	6.1	43	6	6.1	40					
DESIGN PRESSURE IN PSIG	1200	8		D88					580				125	500	125	500	125		700	VOCL	540		125	540	125	500		500	125	500	125					
DESIGN TEMP IN °F	575	49B		308				358				140		358	212	358	212		358	212		212			358	212		358	212		212					
ESTIMATED LINE SIZE	10"	SEE NOTE 23		18"				18"			"			"			18"			18"								LATER			LATER					
	SEE NOTE 27 DAS-22-SS-DS-1							SEE NOTE 27 DAS-22-SS-DS-1						SEE NOTE 27 DAS-22-SS-DS-1	SYSTEM TEST LINES/LOC A & B				SYSTEM TEST SWELION LINE/LOC C				SYSTEM TEST W/INE (LOOC) C			MINIMUM FLOW RATES (LOOC A & B)			MINIMUM FLOW RATES (LOOC C)							

[illegible]

O	VALVE OPEN
T	VALVE THROTTLED
T-C	VALVE THROTTLED OR CLOSED
O-T	VALVE OPEN OR THROTTLED
P	STRAINER PLUGGED
BLANK SPACE INDICATES VALVE IS CLOSED	

NOTE: SYSTEM DATA PROVIDED IN THE ABOVE TABLE REFLECTS NOMINAL DESIGN VALUES FOR SYSTEM MODES A-1, A-2, B-1, AND F, AND DOES NOT ACCOUNT FOR THE FOLLOWING:

- - LPCI FLOW PATH IS SPLIT BETWEEN IE2F8B3A/B AND IE2F8A4A/B
- - IE2F8B2A/B THROTTLING IN SP COOLING AND TESTING FLOWPATHS

[illegible]SEE NOTE 20
 98-06-00000

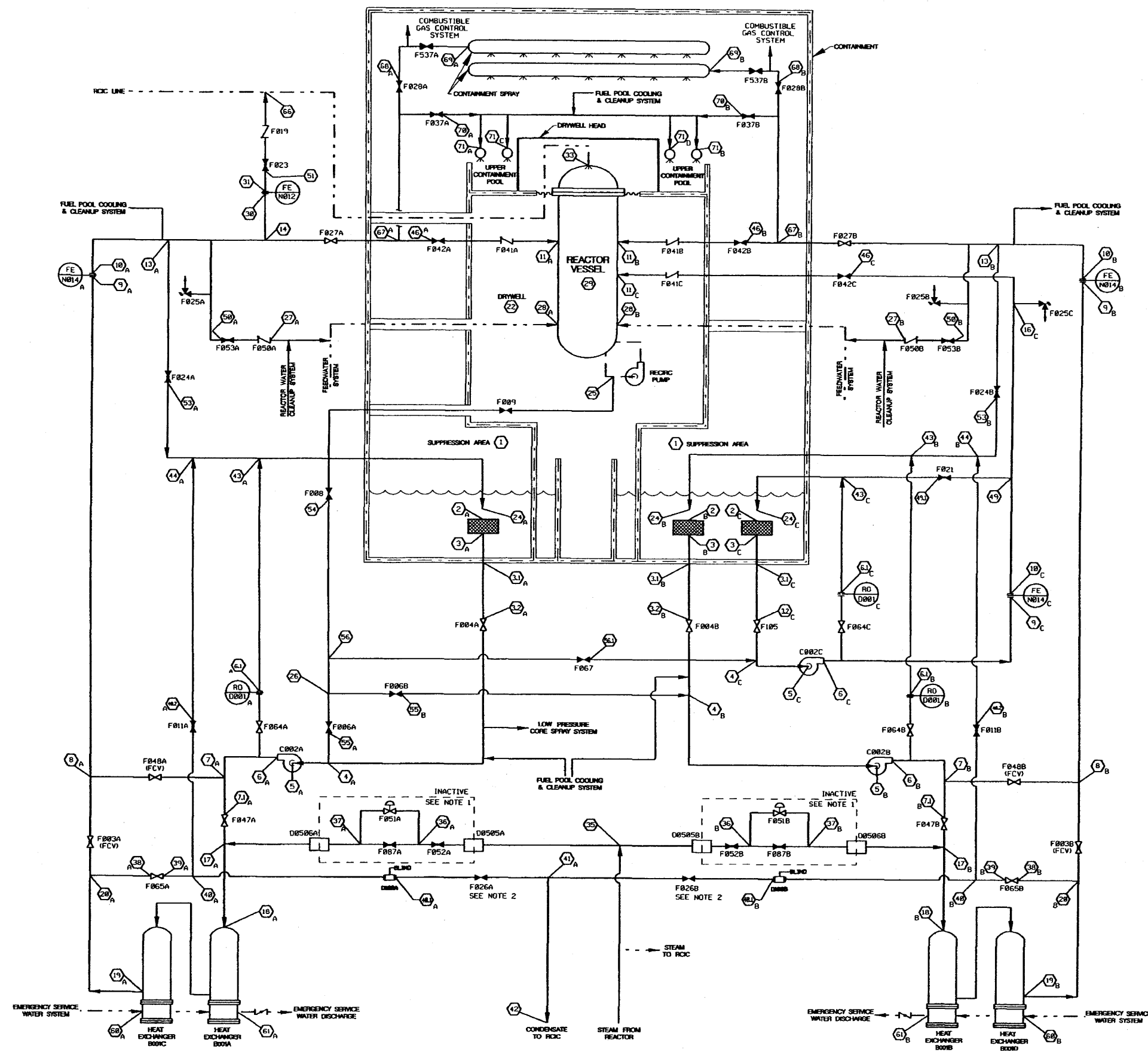
(Rev. 13 12/03)



PERRY NUCLEAR POWER PLANT

Residual Heat Removal System

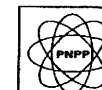
Figure 5.4-14 (Sheet 2 of 3)



NOTES:

1. THE PIPING & COMPONENTS BETWEEN BLINDS D0505A/B & D0506A/B ARE INACTIVE & ARE REQUIRED ONLY FOR THE SEISMIC & STRUCTURAL INTEGRITY OF THE PIPING SYSTEM.
2. VALVES F026A/B HAVE BEEN DETERMINED AT THE MCC COMPARTMENT. THEY ARE REQUIRED TO MAINTAIN THE SEISMIC & STRUCTURAL INTEGRITY OF THE PIPING SYSTEM & TO MAINTAIN A PRESSURE BOUNDARY.

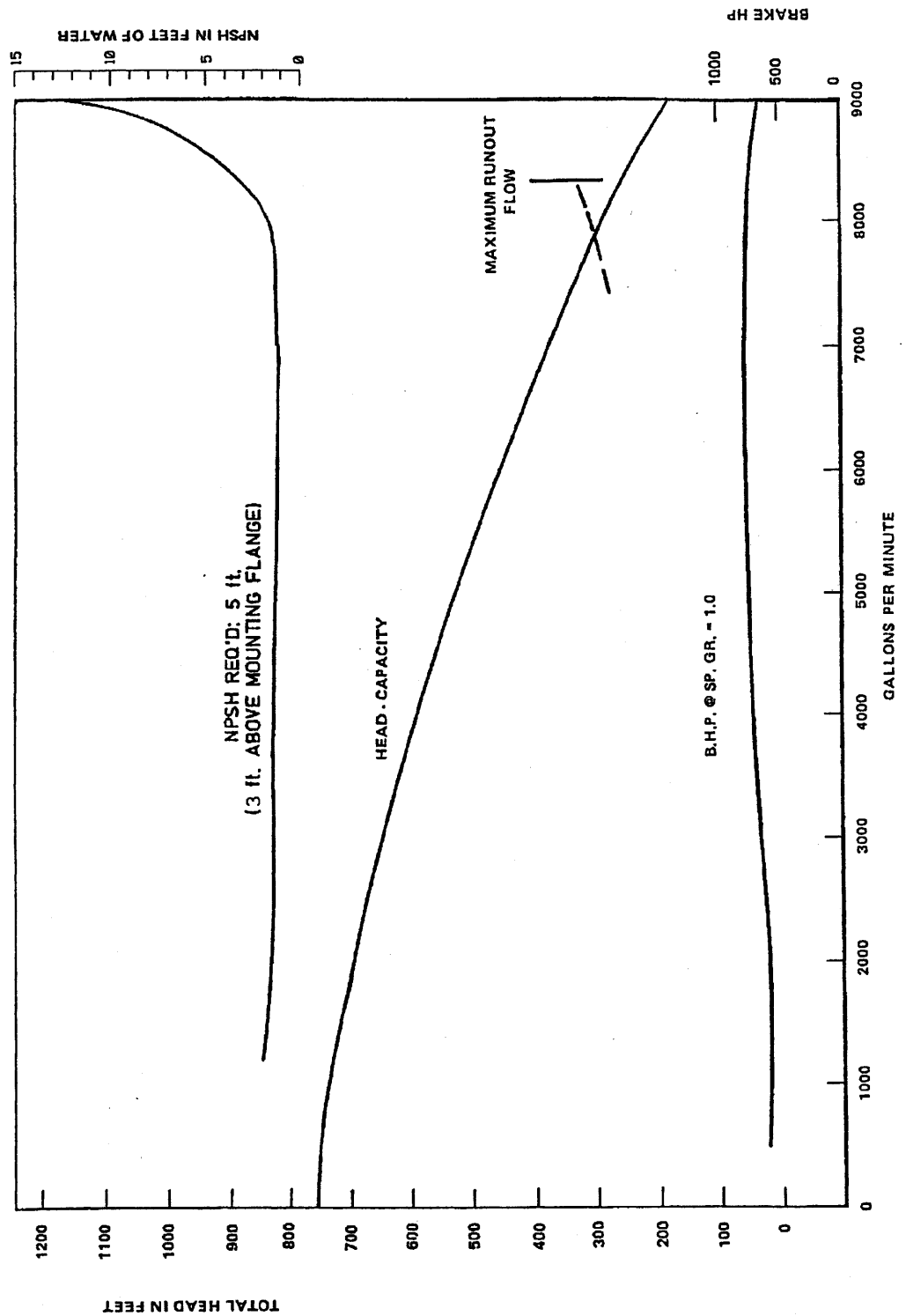
(Rev. 13 12/03)



PERRY NUCLEAR POWER PLANT

Residual Heat Removal System

Figure 5.4-14 (Sheet 3 of 3)



(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

RHR Pump Characteristic Curve

Figure 5.4-15

NOTES:

- EXCEPT AT POINT OF CONNECTION WITH BURS SUPPLIED EQUIPMENT OR PIPING, THE PIPING DESIGNER SHALL SIZE PIPES IN CONFORMANCE WITH THE SYSTEM DESIGN SPECIFICATIONS AND PROCESS DIAGRAM.
- DELETED.
- MOUNT FLOW ELEMENT AS CLOSE TO ISOLATION VALVE AS PRACTICAL, LOCATION TO BE IN ACCORDANCE WITH ASME PTC 19.5.
- ALL SMALL AUXILIARY PIPING CONTAINING PRIMARY FLUID SHALL BE SAME PIPE CLASS AS MAIN PIPING, EXCEPT IF MAIN PIPING IS CLASS 1 AND AUXILIARY PIPING IS 3/4" OR LESS, THEN CLASS 2 PIPING MAY BE USED, SEE A62-4030.
- CHEMICAL CLEANING AND DECONTAMINATION CONNECTIONS SHALL BE PROVIDED TO GIVE OPTIMUM DECONTAMINATION, CONNECTIONS SHALL BE ARRANGED TO PROVIDE DECONTAMINATION OF THE FOLLOWING EQUIPMENT SEPARATELY FROM EACH OTHER.
 - PUMPS
 - HEAT EXCHANGERS - THE TUBE SIDE OF BOTH EXCHANGERS MAY BE CLEANED SEPARATELY FROM THE SHELL SIDE OF THE REGENERATIVE HEAT EXCHANGER OR TOGETHER.
 - FILTER DEMINERALIZERS.
 - PRESSURE TAP CONNECTIONS TO BE PROVIDED AT HEAT EXCHANGER INLET AND OUTLET FOR DETERMINING ΔP ACROSS HEAT EXCHANGER DURING START-UP.
- INSTRUMENT LINE VALVING MUST COMPLY WITH INSTRUMENT PIPING SPECIFICATION, SEE A62-4070.
- ALL EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY THE SYSTEM NUMBER G33, UNLESS OTHERWISE NOTED.
- TEMPORARY STRAINER SCREENS SHALL BE PROVIDED ON THE SUCTION SIDE OF ALL PUMPS IN ACCORDANCE WITH A62-4140.
- ALL LOCATION AND IDENTIFICATION OF INSTRUMENTS, SEE INSTRUMENT DATA SHEET.
- LOCATE ΔP TAPS FOR N0037 SUCH THAT:
 - A FULL RANGE IS NOT EXCEEDED PER INSTRUMENT DATA SHEET.
 - ELEVATION SHOULD BE WITHIN 30 INCHES BELOW VESSEL \emptyset .
- ALL MOTOR OPERATED VALVES ARE AC OPERATED, UNLESS OTHERWISE SPECIFIED.
- PROVISION FOR INSTRUMENT LINE ISOLATION BY CUSTOMER, THIS SHALL INCLUDE A 1/4" ORIFICE INSIDE THE DRYWELL, LINE SPECIFICATION CHANGE SHALL COMPLY WITH A62-4030.
- VENTS AND DRAINS SHALL BE PROVIDED AT ALL HIGH AND LOW POINTS OF THE SYSTEM PIPING, DOUBLE VALVING IS REQUIRED.
- GUARD PIPES TO BE QUALITY GR-B.
- TO AVOID EXCESSIVE HEAT EXCHANGE TUBE VIBRATION, A FLOW METERING DEVICE SHALL BE PROVIDED SO THAT THE COOLING WATER FLOW VALUES SHALL NOT EXCEED THE VALUES SHOWN ON THE PROCESS DATA G33-1030 BY MORE THAN 6%.
- DRAIN CONNECTION FROM HIGH PRESSURE SOURCE SHALL BE DESIGNED TO ASME SECTION III CODE, PARAGRAPH N03612.4.
- DESIGN PRESSURE AND TEMPERATURE TO BE ESTABLISHED BY PIPING DESIGNER BASED ON FEED PUMP SHUTOFF PRESSURE AND SYSTEM ARRANGEMENT.
- THIS DRAWING WAS ADAPTED FROM GE DWG. NUMBER 945614 SHEET 1, REVISION 0.
- ITEMS MARKED "X" ARE FURNISHED WITH ASSOCIATE EQUIPMENT.
- CONDUCTIVITY INSTRUMENTS WITH G33 MPL NUMBERS ARE SHOWN ON THE REACTOR PLANT SAMPLING SYSTEM (P35) DIAGRAM (302-0772-00000).
- FOR CONTROL ROOM, LOCAL OR REMOTE PANEL AND RACK ID NUMBERS FOR INSTRUMENTS, SEE THE INSTRUMENT INDEX.
- PORTIONS OF THE SYSTEM DESIGNATED WITH SAFETY CLASS 3 PIPE LINE SPECIFICATION (E.G. D1-3, E1-3) IN NON-SAFETY CLASS DESIGNATED AREAS (AS IDENTIFIED BY \blacktriangleright FLAG SYMBOL) WILL BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
 - PIPING AND COMPONENTS ARE NON-SAFETY CLASS AND NON-SEISMIC CATEGORY I.
 - PIPING AND COMPONENTS ARE DESIGNED, FABRICATED, INSPECTED, TESTED, AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ASME B AND PV CODE, SECTION III, SUBSECTION NA, ND, AND NF.
 - PIPING SHALL BE INSTALLED BY SPECIFICATION 44.
 - DELETED.

- PROVIDES CONTROL ROOM ISOLATION AND REMOTE SHUTDOWN CONTROL OF G33F0004 FOR APPENDIX R REMOTE SHUTDOWN METHOD A, SWITCHES LOCATED ON MOTOR CONTROL CENTER EF1A07.
- FOR ISOLATION SIGNALS, SEE NS4 ELEMENTARY DIAGRAM 208-0013-00000.
- TEMPORARY STRAINERS D0016A AND B, USED FOR START UP ONLY, ARE REMOVED FOR PLANT OPERATION.
- THE 1" THREADED PLUGS ARE USED TO HELP DECONTAMINATE THE 3" HEADERS PRIOR TO PERFORMING WORK IN THE APPLICABLE AREAS, THEY ARE SIZED TO ALLOW HIGH PRESSURE FLUSHING OF THESE LINES.
- OPERATION OF DOUBLE ISOLATION DRAIN VALVES I033F0505A/B & I033F0506A/B SHALL BE PERFORMED SO AS TO ASSURE THAT NO WATER IS TRAPPED IN THE PIPING BETWEEN THE DOUBLE ISOLATION VALVES.
- RWCU REGENERATIVE / NON-REGENERATIVE HEAT EXCHANGERS AND THE ASSOCIATED INTERCONNECTING PIPING ARE VENDOR SUPPLIED, REF. GEK-90388.
- PIPING, FITTING & COMPONENTS ARE DESIGNED, FABRICATED, INSPECTED & INSTALLED TO ASME B & PV CODE SECTION III, SUBSECTION ND, PIPING LINE DESIGNATED NON-SEISMIC, NON-SAFETY CLASS BUT ANALYZED FOR 2 OVER 1 REQUIREMENTS.

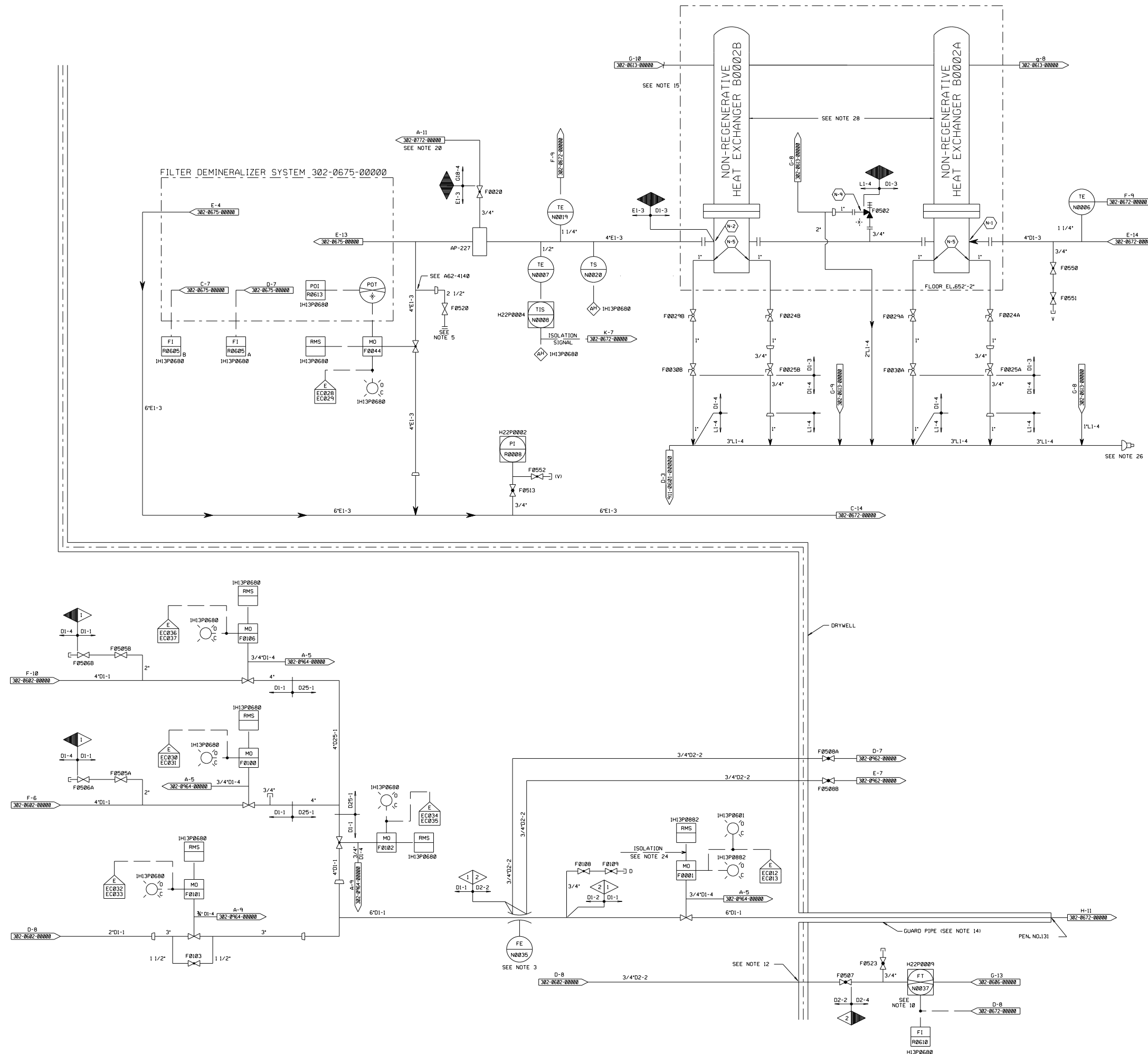
REFERENCES:

302-0102-00000	CONDENSATE TRANSFER AND STORAGE SYSTEM, P11
302-0335-00000	ZINC INJECTION PASSIVATION SYSTEM, P05
302-0602-00000	REACTOR RECIRCULATION SYSTEM, B33
302-0606-00000	NUCLEAR BOILER SYSTEM, B21
302-0642-00000	RESIDUAL HEAT REMOVAL SYSTEM, E12
302-0672-00000	REACTOR WATER CLEANUP SYSTEM, G33
302-0675-00000	FILTER DEMINERALIZER SYSTEM, G36
302-0731-00000	LIQUID RADWASTE SYSTEM, G50
302-0732-00000	LIQUID RADWASTE SYSTEM, G50
302-0772-00000	REACTOR PLANT SAMPLING SYSTEM, P35
302-0962-00000	LEAK DETECTION SYSTEM, E31
302-0964-00000	LEAK DETECTION SYSTEM, E31
911-0601-00000	REACTOR BLDG. DRAINS SYSTEM, P68
911-0617-00000	AUXILIARY BLDG. DRAINS SYSTEM, P68
A62-4030	PRESSURE INTEGRITY OF NUCLEAR COMPONENTS
A62-4070	PROCESS INSTRUMENTATION
A62-4140	CLEANING OF PIPING AND EQUIPMENT
A62-4240	WATER SAMPLING REQUIREMENTS
G33-1020	REACTOR WATER CLEANUP SYSTEM FCD
G33-1030	REACTOR WATER CLEANUP SYSTEM P.D.

(REV. 20 10/2017)

PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

REACTOR WATER
CLEANUP SYSTEM
FIGURE 5.4-16 (SHEET 1 OF 2)
(DWG. D-302-0671-00000)



NOTES:

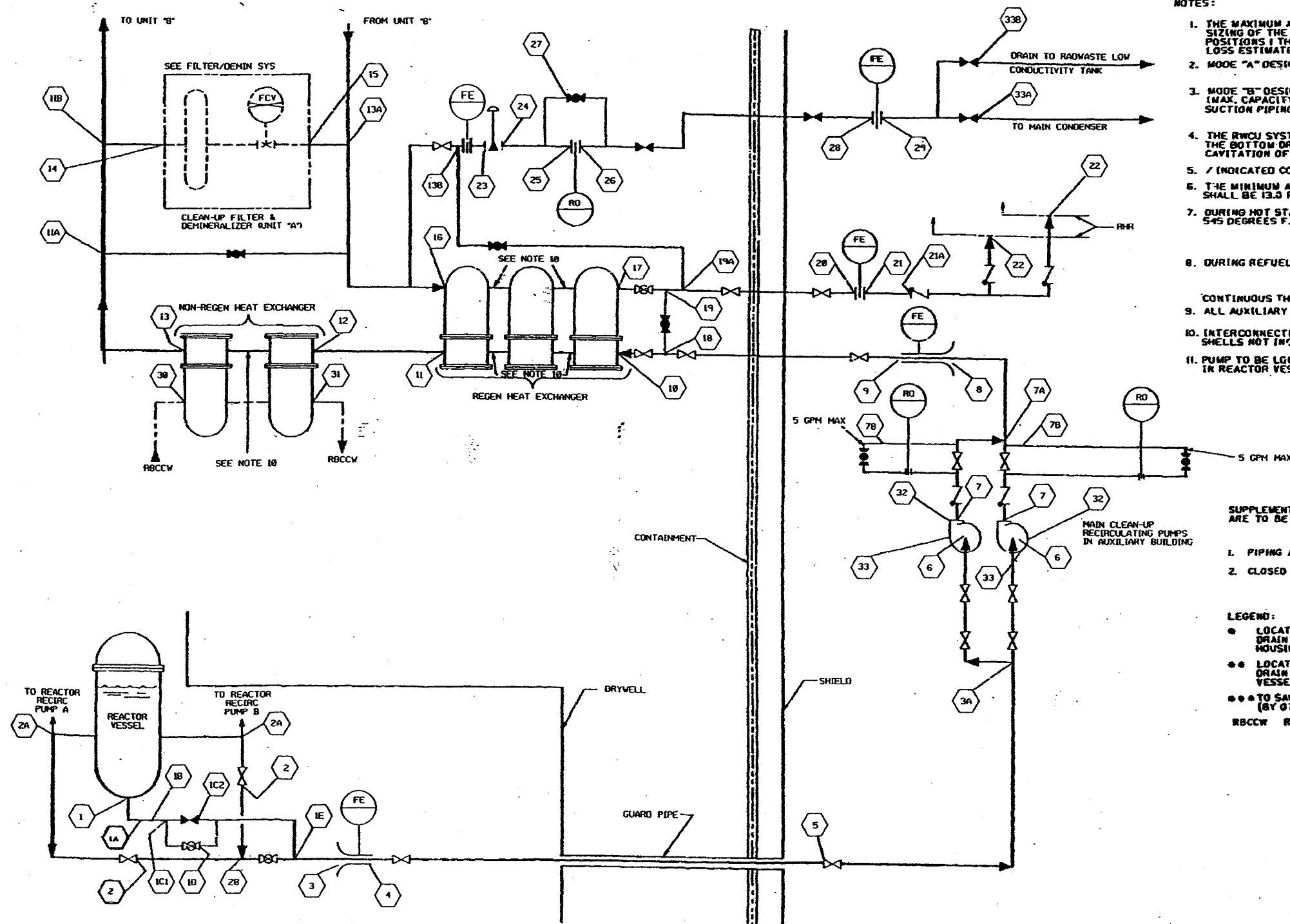
1. THE MAXIMUM ALLOWABLE PIPE FRICTION DROP FOR THE SIZING OF THE CLEANUP RECIRCULATION PUMPS SUCTION PIPING FROM POSITIONS 1 THROUGH 4 SHALL BE CONTROLLED BY MODE "B". SUCTION LOSS ESTIMATED AT 12 PSI.
2. MODE "A" DESIGN BASIS FOR HEAT EXCHANGERS.
3. MODE "B" DESIGN BASIS FOR MAIN CLEANUP PUMP (MAX. CAPACITY AND MIN. NPSH) AND SIZING OF MAIN PUMPS SUCTION PIPING.
4. THE RWCU SYSTEM SHALL NOT OPERATE IN MODE "B" UNLESS THE BOTTOM DRAIN TEMPERATURE IS SUBCOOLED TO PREVENT CAVITATION OF HEAT EXCHANGER BY-PASS VALVE.
5. / INDICATED CONDITIONS FOR 0 FLOW RATE.
6. THE MINIMUM AVAILABLE NPSH OF THE CLEANUP RECIRC. PUMP SHALL BE 13.5 FT. BASED ON CONDITION SHOWN IN MODE "B".
7. DURING HOT STANDBY, WITH ONE CLEANUP PUMP IN OPERATION AT 545 DEGREES F. BLOWDOWN RATE IS APPROX. P1-102.0 GPM.
8. DURING REFUELING WITH THE R.S.S. AT 15 PSIA FLOW RATE IS: P1-311 GPM.
9. CONTINUOUS THROUGHOUT THE SYSTEM.
10. ALL AUXILIARY PIPING IS DESIGNED AT 150 DEGREES F.
11. INTERCONNECTION PIPE FRICTION LOSS BETWEEN HEAT EXCHANGER SHELLS NOT INCLUDED. THIS IS ESTIMATED AT 5 PSI TOTAL.
12. PUMP TO BE LOCATED AT 50 FT. (MIN.) BELOW WATER LEVEL 2 IN REACTOR VESSEL.

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING:

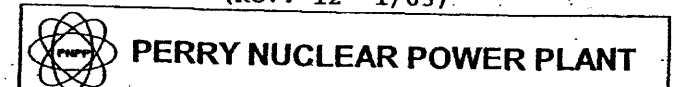
- | | |
|----------------------------------|----------------------|
| 1. PIPING AND INSTRUMENT SYMBOLS | REFERENCE DESIGNATOR |
| 2. CLOSED COOLING WATER | 442-1010 |
| | A62-4250 |

LEGEND:

- LOCATION 1A IS THE POINT WHERE THE BOTTOM DRAIN LINE CONNECTION EXITS FROM THE C.R.D. HOUSING AREA.
 - LOCATION 1B IS THE POINT WHERE THE BOTTOM DRAIN LINE CONNECTION EXITS FROM THE REACTOR VESSEL PEDESTAL.
 - TO SAME CONDITIONS AS THE FEEDWATER PIPING (BY OTHERS).
- RBCW REACTOR BUILDING CLOSED COOLING WATER.



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Reactor Water Cleanup System

Figure 5.4-17 (Sheet 1 of 2)

NOTE A		NORMAL OPERATION										(SEE NOTE 2, SH II)																													
LOCATION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	30	31	30	31	30	31			
FLOW GPM	P.	E3	172	408	408	408	204	204	408	408	408	324	324	317	156	156	311	359	/	/	369	369	185	/	/	/	/	/	/	/	533	542	640	656	704	712	785	796	875	845	
TEMP °F	P.	533	533	533	533	533	533	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	534	
MAX PRESSURE	PI				1.5			185	YDM	2.5			10		10		6.4		10			4									10		10		10		10		10		10
ALLOWABLE PIPE FRICTION DROPS (NOTE 1 SH. II)																																									
PSIO												40																													

DESIGN PRESSURE & TEMPERATURE GIVEN BELOW IS FOR INFORMATION ONLY AND IS THE BASIS FOR PIPING DESIGN. ESTIMATED LINE SIZES ARE FOR INFORMATION ONLY. ACTUAL LINE SIZES ARE DETERMINED BY THE PIPING DESIGNER SHALL MEET THE PROCESS DATA HYDRAULIC REQUIREMENTS.																								
LOCATION	PKET	1A-B	1A-BB	1B-1C1	1C1-1D	1C1-1C2	1C2-1E	2A-2B	2B-3A	3A-E	7A	7A-D	7B	11-12	12-11B	11A-13B	11B-12A	13A-1E	13T-15A	13B-13A	18-19	20-22B	17-21A	21A-22
DESIGN PRESS (PSIG)	P1	1275.	1275.	1275.	1275.	1275.	1275	1250.	1250.	1250.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	1410.	***
DESIGN TEMP (°F)		575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	575.	***
ESTIMATED LINE SIZE (IN)	P1	2.0	2.0	2.0	1.5	3.0	3.0	4.0	6.0	4.0	4.0	4.0	3/4"	4.0	4.0	4.0	4.0	6.3	4.0	4.0	4.0	4.0	6.0	6.0

TABLE I		STATION SERVICES										EXHAUST AIR HAND		PROCESS PIPING SIZING													
TYPE REQUIREMENT		CONDENSATE						SERVICE AIR	RADIOACTIVE AIR		REACTOR WATER	REACTOR WATER & F/D SOLIDS	CND & SOLKA FLOC SLURRY	CND	CND & RESIN SLURRY	CND	REACTOR WATER & F/D SOLIDS	CND	CND	REACTOR WATER OR CND	CND & F/D SOLIDS	CND	WATER SPRAY	WATER & F/D SOLIDS	RAD AIR		
COMMODITY																											
POSITION		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓	㉔		
PROCESS STEP		NORMAL OPER	NORMAL OPER	PRECOAT SLURRY	RESIN SLURRY	RINSE	FILL	FINAL FILL	AIR PRESS	FILL VENT	FINAL FILL VENT	DOVE DRAIN	FIRST AIR BUMP	SOLKA FLOC PRECOAT	PRECOAT RETURN	RESIN PRECOAT	RESIN PUMP	SECOND AIR BUMP	HOLD PRECOAT	PRECOAT RETURN	HOLD	MAIN DRAIN (BKWSH)	HOLD RETURN	WATER SPRAY	WATER SPARGER	VENT	
PRESSURE PSIG	SEE NOTE 1	SEE NOTE 1	80	80	80	80	80	80	80	3	3	80	0-80	40	40	40	—	0-80	40	40	60 TO 80 SYS +20	0-60	40	80	35	ATMOSP	
TEMP OF			80	80	80	80	80	60	60	60	120	120	80	80	80	80	80	80	80	80	80	80 TO 120	0-80	40	80	120	60
FLOW RATE			40 GPM	25 GPM	280 GPM	280 GPM	280 GPM	50 SCFM	37 SCFM	37 SCFM	60 GPM	5000 GPM PEAK	95 GPM	95 GPM	150 GPM	1 GPM	5000 GPM PEAK	100 GPM	150 GPM	50 GPM	280 GPM	100 GPM	100 GPM	100 GPM	100 GPM	102 SCFM MAX.	
FLOW TIME, MIN.			1.5	1	0.5	1.5	2	3	1.5	2	3	0.5	10	10	30	30	0.5	5	30	—	0.5	5	3	5	—	—	
TOTAL FLOW			60 GAL	30 GAL	150 GAL	375 GAL	550 GAL	150 SCF	50 SCF	73 SCF	175 GAL	375 GAL	—	—	—	—	30 GAL	375 GAL	—	—	—	150 GAL	—	300 GAL	—	600 SCF	
TOTAL LBS SOLIDS			20	20	—	—	—	—	—	—	—	45	20	—	20	20	RESIDUAL	—	—	—	RESIDUAL	—	—	—	—	—	

* - SEE NOTE 2

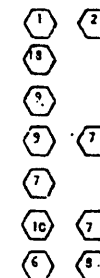
TABLE II

FD AREA = 130 FT²

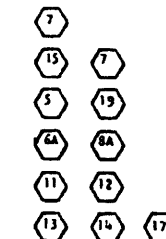
TYPE REQUIREMENT	STATION SERVICES										EXHAUST AIR HAND.	PROCESS PIPING SIZING													
COMMODITY	CONDENSATE						SERVICE AIR	RADIO ACTIVE AIR		REACTOR WATER	REACTOR WATER & F/D SOLIDS	CND & SOLKA FLOC SLURRY	CND	CND & RESIN SLURRY	CND	REACTOR WATER & F/D SOLIDS	CND	CND	REACTOR WATER OR CND	CND & F/D SOLIDS	CND	WATER SPRAY	WATER & F/D SOLIDS	RAD AIR	
POSITION	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓	㉔	
PROCESS STEP	NORMAL OPER	NORMAL OPER	PRECOAT SLURRY	RESIN SLURRY	RINSE	FILL	FINAL FILL	AIR PRESS	FILL VENT	FINAL FILL VENT	DOVE DRAIN	FIRST AIR BUMP	SOLKA FLOC PRECOAT	PRECOAT RETURN	RESIN PRECOAT	RESIN PUMP	SECOND AIR BUMP	HOLD PRECOAT	PRECOAT RETURN	HOLD	MAIN DRAIN (BKWSH)	HOLD RETURN	WATER SPRAY	WATER SPARGER	VENT
PRESSURE PSIG	SEE NOTE 1	SEE NOTE 1	80	80	80	80	80	80	3	3	80	0-80	40	40	40	—	0-80	40	40	60 TO 80	0-80	40	80	35	ATMOSP
TEMP OF			80	80	80	80	80	60	60	60	120	120	80	80	80	80	80	80	80	80 TO 120	0-80	40	80	120	60
FLOW RATE	—	—	40 GPM	25 GPM	400 GPM	400 GPM	400 GPM	50 SCFH	52 SCFH	52 SCFH	60 GPM	5000 GPM PEAK	130 GPM	130 GPM	200 GPM	1.5 GPM	5000 GPM PEAK	130 GPM	100 GPM	65 GPM	400 GPM	130 GPM	100 GPM	140 GPM	102 SCFH MAX
FLOW TIME, MIN.	—	—	2.5	2	0.5	1	1.4	3	1	1.4	—	0.5	10	10	30	30	0.5	5	30	—	0.5	5	3	5	—
TOTAL FLOW	—	—	95 GAL	45 GAL	200 GAL	375 GAL	550 GAL	150 SCF	50 SCF	73 SCF	175 GAL	375 GAL	—	—	—	45 GAL	375 GAL	—	—	—	200 GAL	—	300 GAL	—	600 SCF
TOTAL LBS. SOLIDS	—	—	26	26	—	—	—	—	—	—	—	60	26	—	26	26	RESIDUAL	—	—	—	RESIDUAL	—	—	—	—

FILTER DEMINERALIZER
 BACKWASH & PRECOATING SEQUENCE - SEE NOTE 3

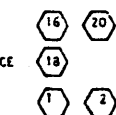
FUNCTIONS:
 SERVICE
 ISOLATE & HOLD
 DEPRESSURIZE
 DOVE DRAIN
 AIR PRESSURIZE
 FIRST AIR BUMP & DRAIN
 FILL & VENT



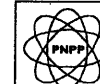
AIR PRESSURIZE
 SECOND AIR BUMP & DRAIN
 RINSE & DRAIN
 FINAL FILL & VENT
 SOLKA FLOC PRECOAT
 RESIN PRECOAT



HOLD PRECOAT
 HOLD UNTIL RETURN TO SERVICE
 SERVICE



(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

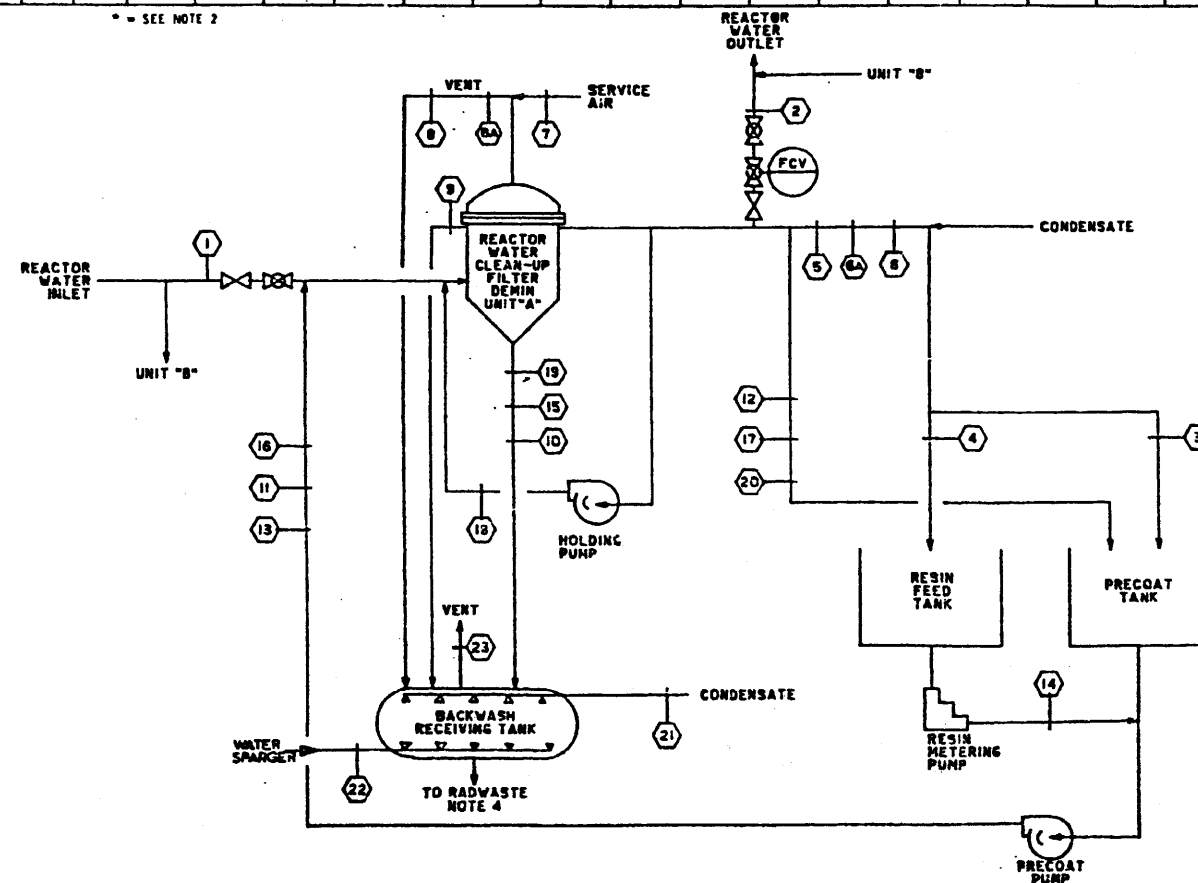
Filter/Demineralizer System,
 Reactor Water Cleanup System

Figure 5.4-18 (Sheet 1 of 2)

TABLE III

TYPE REQUIREMENT	STATION SERVICES								EXHAUST AIR HAND.		PROCESS PIPING SIZING															
COMMODITY	CONDENSATE								SERVICE AIR	RADIOACTIVE AIR	REACTOR WATER	REACTOR WATER & F/D SOLIDS	CNDS & SOLKA FLOC SLURRY	CNDS	CNDS & RESIN SLURRY	CNDS RESIN SLURRY	REACTOR WATER & F/D SOLIDS	CNDS	CNDS	REACTOR WATER OR CNDS	CNDS & F/D SOLIDS	CNDS	WATER SPRAY	WATER & F/D SOLIDS	RAD AIR	
POSITION	①	②	③	④	⑤	⑥	⑥A	⑦	⑧	⑧A	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒	㉓	
PROCESS STEP	NORMAL ORDER	NORMAL ORDER	PRECOAT SLURRY	RESIN SLURRY	RINSE	FILL	FINAL FILL	AIR PRESS	FILL VENT	FINAL FILL VENT	DOME DRTM	FIRST AIR BUMP	SOLKA FLOC PRECOAT	PRECOAT RETURN	RESIN PRECOAT	RESIN PUMP	SECOND AIR BUMP	HOLD PRECOAT	PRECOAT RETURN	HOLD	MAIN DRAIN (BKWSH)	HOLD RETURN	WATER SPRAY	WATER SPARGER	VENT	
PRESSURE PSIG	SEE NOTE 1	SEE NOTE 1	80	80	80	80	80	80	3	3	80	0-80	40	40	40		0-80	40	40	60 TO SYS +20	0-80	40	80	35	ATMOSP	
TEMP °F			80	80	80	80	80	60	60	60	120	120	80	80	80	80	80	80	80	80 TO 120	80	80	80	120	60	
FLOW RATE			40 GPM	25 GPM	560 GPM	560 GPM	560 GPM	50 SCFH	73 SCFH	73 SCFH	60 GPM	5000 GPM PEAK	170 GPM	170 GPM	250 GPM	2 GPM	5000 GPM PEAK	175 GPM	250 GPM	85 GPM	560 GPM	175 GPM	100 GPM	140 GPM	102 SCFH MAX	
FLOW TIME, MIN.			4.3	2.5	0.5	0.7	1.0	3	0.7	1.0	3	0.5	10	10	30	30	0.5	5	30		0.5	5	3	5	10	
TOTAL FLOW			150 GAL	60 GAL	260 GAL	375 GAL	550 GAL	150 SCF	50 SCF	73 SCF	175 GAL	375 GAL				60 GAL	375 GAL				260 GAL		300 GAL		600 SCF	
TOTAL LBS. SOLIDS			34	34								74	34		34	34	RESID- UAL				RESIDUAL					

* = SEE NOTE 2



NOTES:

1. FOR THESE VALUES & REMAINDER OF SYSTEM VALUES, SEE REACTOR WATER CLEAN-UP SYSTEM PROCESS DATA.
2. DRY WEIGHT VALUES FOR RESIN, AS SHIPPED RESINS CONTAIN 50% MOISTURE (APPROXIMATE).
3. NORMAL BACKWASH - PRECOAT FREQUENCY IS EACH VESSEL EVERY 8-14 DAYS.
4. BACK WASH RECEIVING TANK IS PUMPED DOWN EVERY 6-28 DAYS, DEPENDING UPON CYCLE TIME TO RADWASTE.

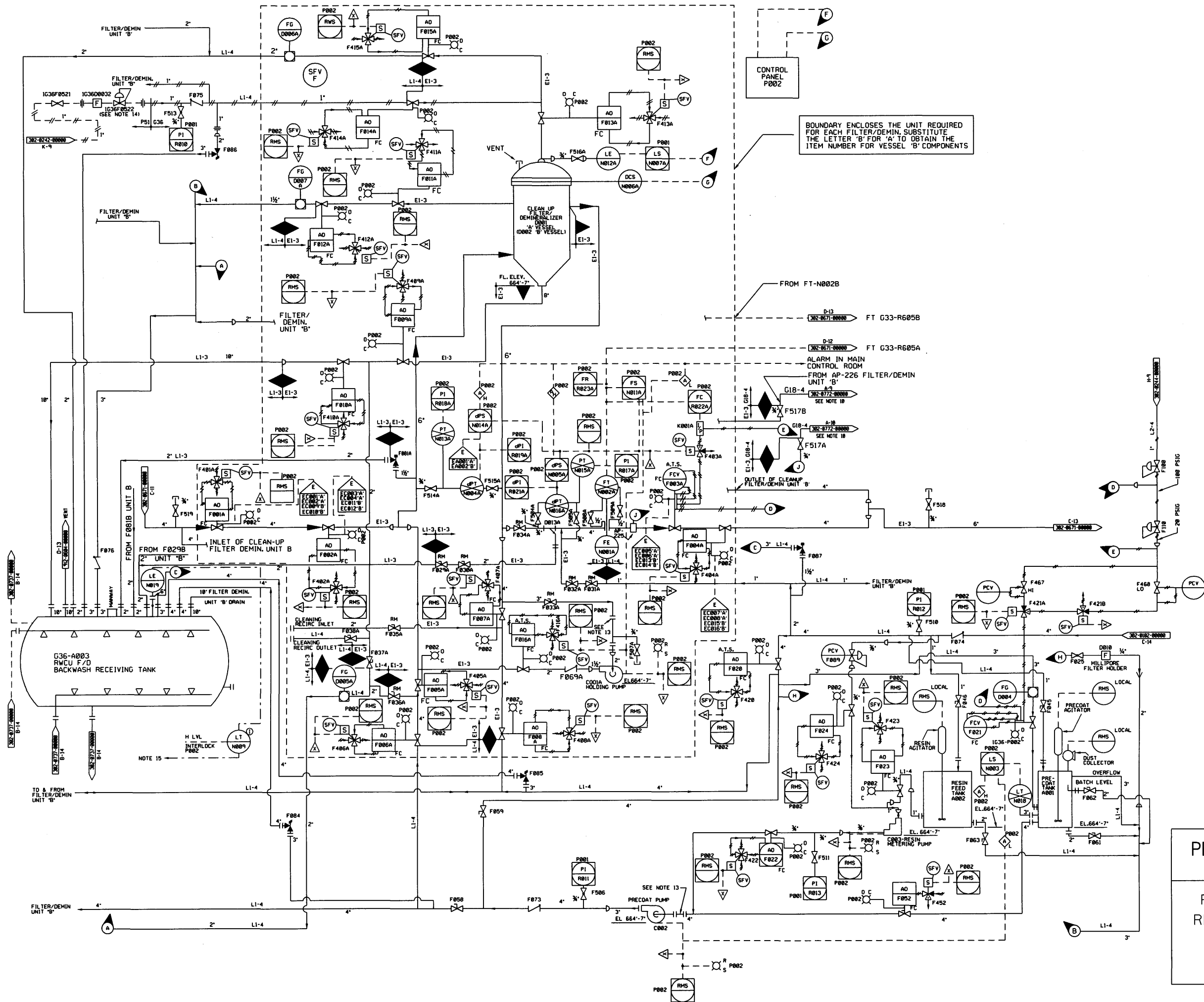
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Filter/Demineralizer System,
Reactor Water Cleanup System

Figure 5.4-18 (Sheet 2 of 2)



- NOTES:
1. ALL PIPING AND FITTINGS SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH A62-4030.
 2. AIR OPERATED VALVES ARE SHOWN IN FILTERING PROCESS STATUS AND ARE FAIL CLOSE ON LOSS OF AIR PRESSURE TO VALVE OPERATOR OR LOSS OF ELECTRICAL POWER TO VALVE.
 3. ALL REMOTE INSTRUMENTS AND CONTROLS WITHIN THE BOUNDARY SHALL BE ARRANGED ON INSTRUMENT PANEL P001 AND CONTROL PANEL P002 IN GROUPS FOR EACH FILTER/DEMINERALIZER UNIT.
 4. ALL INDICATING LIGHTS SHALL BE MOUNTED ON CONTROL PANEL P002.
 5. SYMBOLS AND ABBREVIATIONS:

A.T.S.	: ADJUSTABLE TRAVEL STOP
	: AUTOMATICALLY SEQUENCED CONTROL WITH REMOTE MANUAL CONTROL IN THE SHUTDOWN MODE.
R	: RUNNING
LE	: LEVEL ELEMENT
S	: STOP
DCS	: DOME CLOSURE INTERLOCK SWITCH
	: FOUR-WAY SOLENOID VALVES
 6. INSTALL ALL AIR OPERATED VALVES WITH THE FLOW OVER THE SEAT, UNLESS OTHERWISE NOTED. INSTALL VALVES F001, F002, F003, F005, F007, F014, F020 AND F023 WITH FLOW UNDER THE SEAT.
 7. ALL MPL NUMBERS ARE PREFIXED BY G36, UNLESS OTHERWISE NOTED.
 8. FLUSHING CONNECTIONS SHALL BE PROVIDED IN ACCORDANCE WITH A62-4148. TEMPORARY STRAINER SCREENS SHALL BE PROVIDED ON SUCTION SIDE OF ALL PUMPS IN ACCORDANCE WITH A62-4148.
 9. THIS SYSTEM DIAGRAM IS A PHOTOGRAPHIC REPRODUCTION OF G.E. DRAWING 762E409L. RENUMBERED 7ME709 SPECIFICATION REVISION IS SHOWN BEHIND GAT TITLE BLOCK.
 10. CONDUCTIVITY INSTRUMENTS WITH 0-35 ASSET NUMBERS ARE SHOWN ON THE REACTOR PLANT SAMPLING SYSTEM (P-35) DIAGRAM.
 11. FOR CONTROL ROOM LOCAL OR REMOTE PANEL AND RACK ID NUMBERS FOR INSTRUMENTS, SEE THE INSTRUMENT INDEX.
 12. PORTIONS OF THE SYSTEM DESIGNATED WITH SAFETY CLASS 3 PIPE LINE SPECIFICATION (E.G. D1-3, E1-3) IN NON-SAFETY CLASS DESIGNATED AREAS HAS IDENTIFIED BY 'X' FLAG SYMBOL WILL BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:

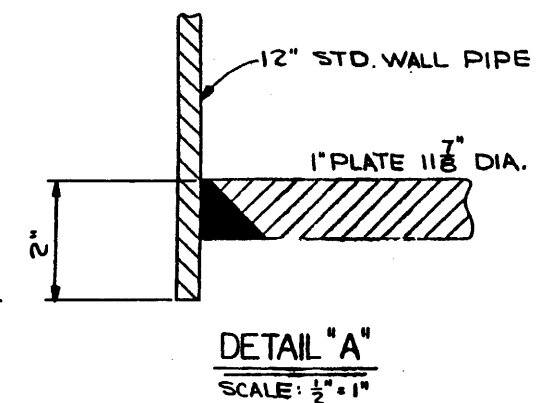
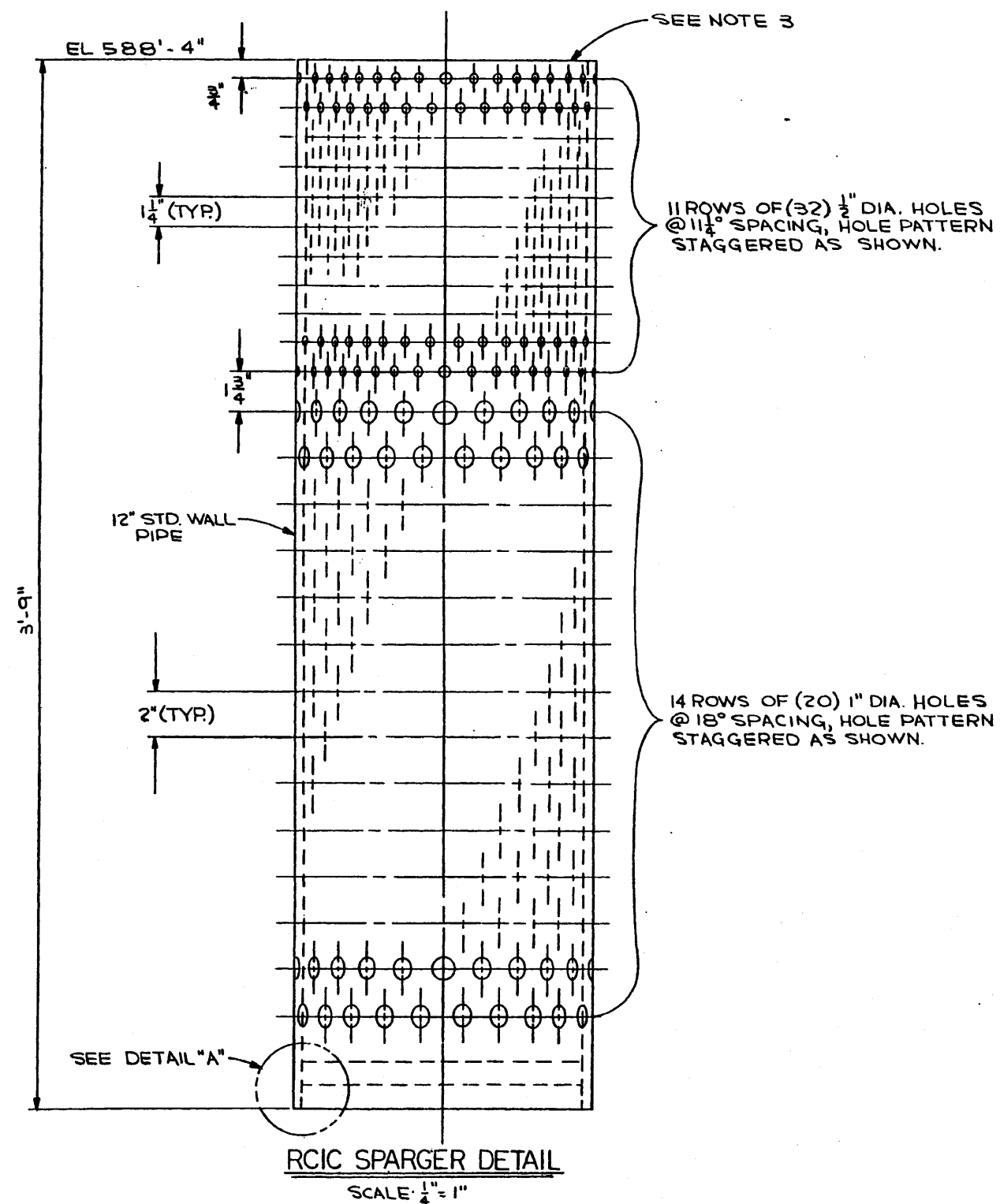
A.	PIPING AND COMPONENTS ARE NON-SAFETY CLASS AND NON-SEISMIC CATEGORY.
B.	PIPING AND COMPONENTS ARE DESIGNED, FABRICATED, INSPECTED, TESTED, AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ASME B AND PV CODE, SECTION III, SUBSECTIONS N/A, ND AND NF.
C.	PIPING SHALL BE INSTALLED BY SPECIFICATION 44.
 13. TEMPORARY STRAINERS D0030, D0031A, AND D0031B USED FOR START-UP ONLY, ARE REMOVED FOR PLANT OPERATION.
 14. FILTER D0032 AND REGULATOR F0522 ARE NON-STANDARD LI-4 PIPING MATERIALS.
 15. INPUT TO THE LIQUID RADWASTE DISTRIBUTED CONTROL SYSTEM.

- REFERENCES:
- | | |
|----------------|--|
| 302-0102-00000 | CONDENSATE TRANSFER SYSTEM P11 |
| 302-0241-00000 | SERVICE AND INSTRUMENT AIR SYSTEM P51, P52 |
| 302-0671-00000 | REACTOR WATER CLEANUP SYSTEM G33 |
| 302-0737-00000 | LIQUID RADWASTE SYSTEM G50 |
| 302-0772-00000 | REACTOR PLANT SAMPLING SYSTEM P35 |
| A62-4030 | PRESSURE INTEGRITY OF NUCLEAR COMPONENTS |
| A62-4148 | CLEANING OF PIPING AND EQUIPMENT |
| A62-4240 | WATER SAMPLING REQUIREMENTS |
| 302-0244-00000 | PARALLEL INSTRUMENT AIR SYSTEM, P52 |
| 302-0242-00000 | SERVICE AIR DISTRIBUTION SYSTEM, P51 |
| 912-0604-00000 | CONTAINMENT VESSEL AND DRYWELL PURGE SYSTEM, M14 |

(REV. 19 10/2015)

PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

FILTER/DEMINERALIZER SYSTEM,
REACTOR WATER CLEANUP SYSTEM
FIGURE 5.4-19
(DWG. D-302-0675-00000)



NOTES: -

1. A. PIPING IS SAFETY CLASS 2.
B. PIPING IS SEISMIC CATEGORY 1.
2. FOR PIPE MATERIAL, SEE GAI SPECIFICATION SP 527-4540-Q0 LINE CLASS L2-2.
3. FOR WELD END DETAIL, SEE GAI DRAWING D-301-001.

REFERENCES: -

D-304-634 RCIC REACTOR BUILDING

NUCLEAR SAFETY RELATED

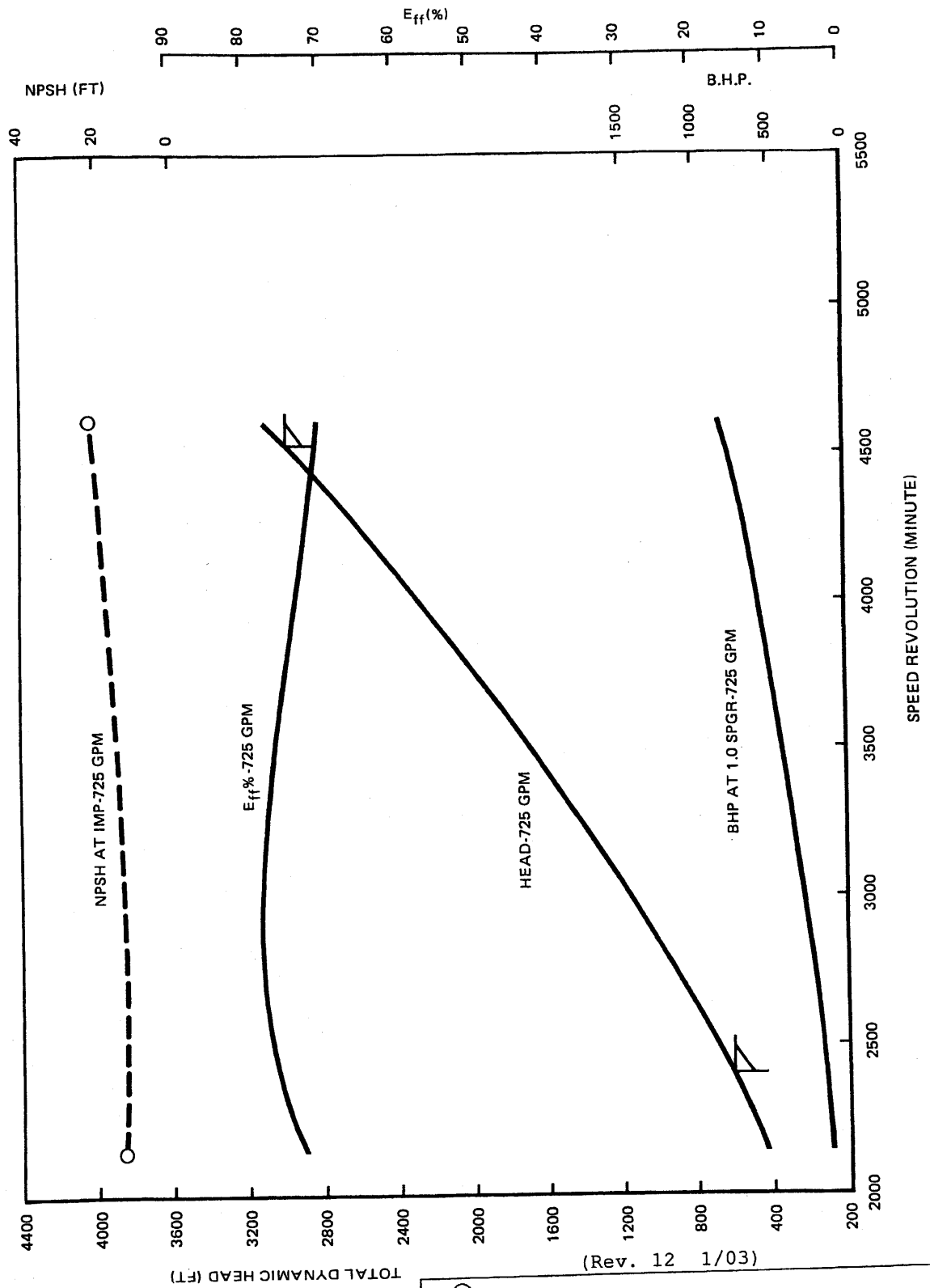
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PERRY NUCLEAR POWER PLANT

RCIC Turbine Exhaust
Sparger Detail

Figure 5.4-20
(Dwg. B-301-726)



PERRY NUCLEAR POWER PLANT

RCIC Pump Performance Curves

Figure 5.4-21