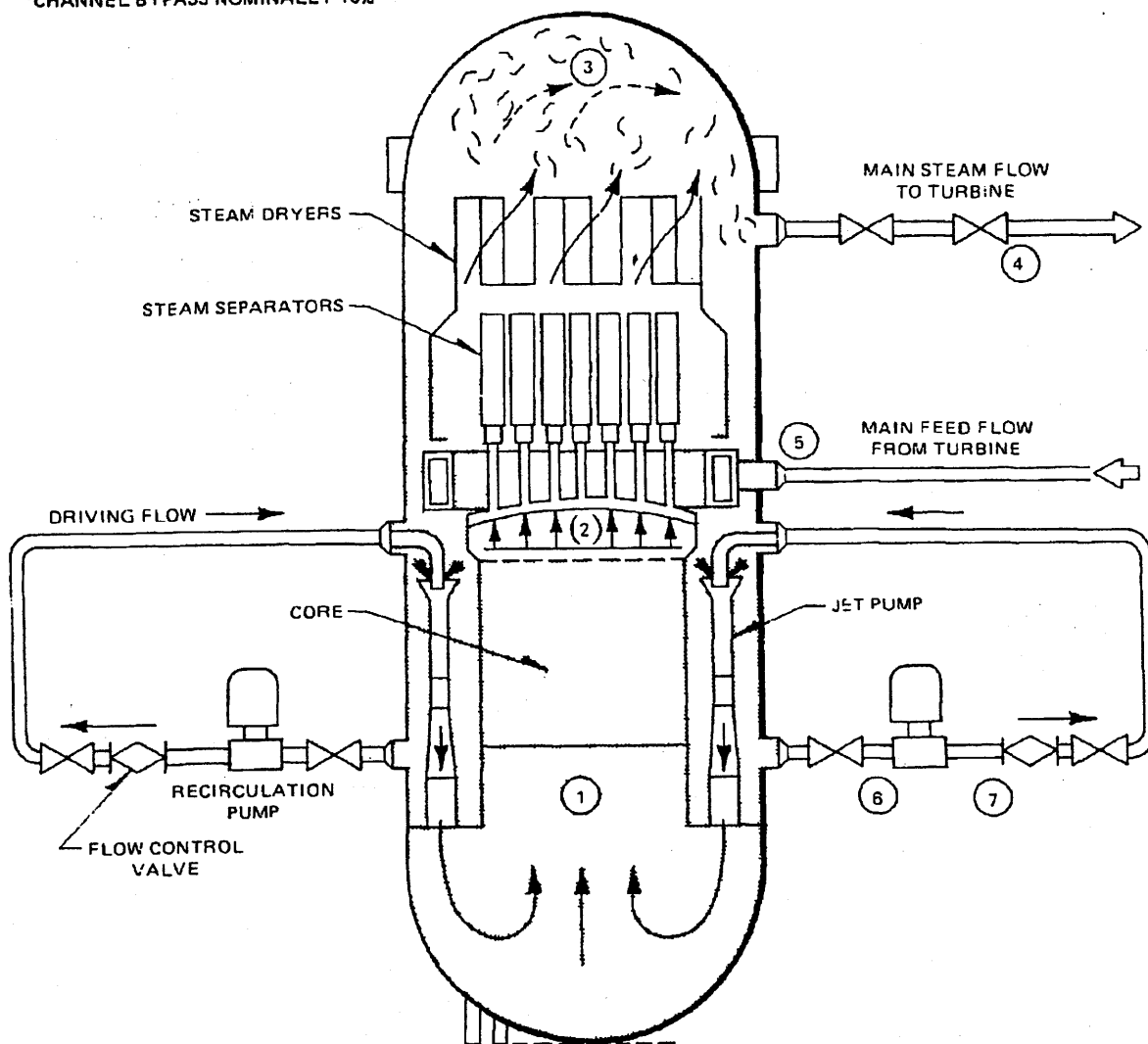


	PRESSURE (psia)	FLOW (lb/hr)	TEMPERATURE (°F)	ENTHALPY (Btu/lb)
1. CORE INLET	1075	104.0×10^6	533	527.4
2. CORE OUTLET	1060	104.0×10^6	550	651.4
3. SEPARATOR OUTLET (STEAM DOME)	1040	16.3×10^6	549	1190.8
4. STEAM LINE (2ND ISOLATION VALVE)	981	16.3×10^6	542	1190.8
5. FEEDWATER INLET (INCLUDES RETURN 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%



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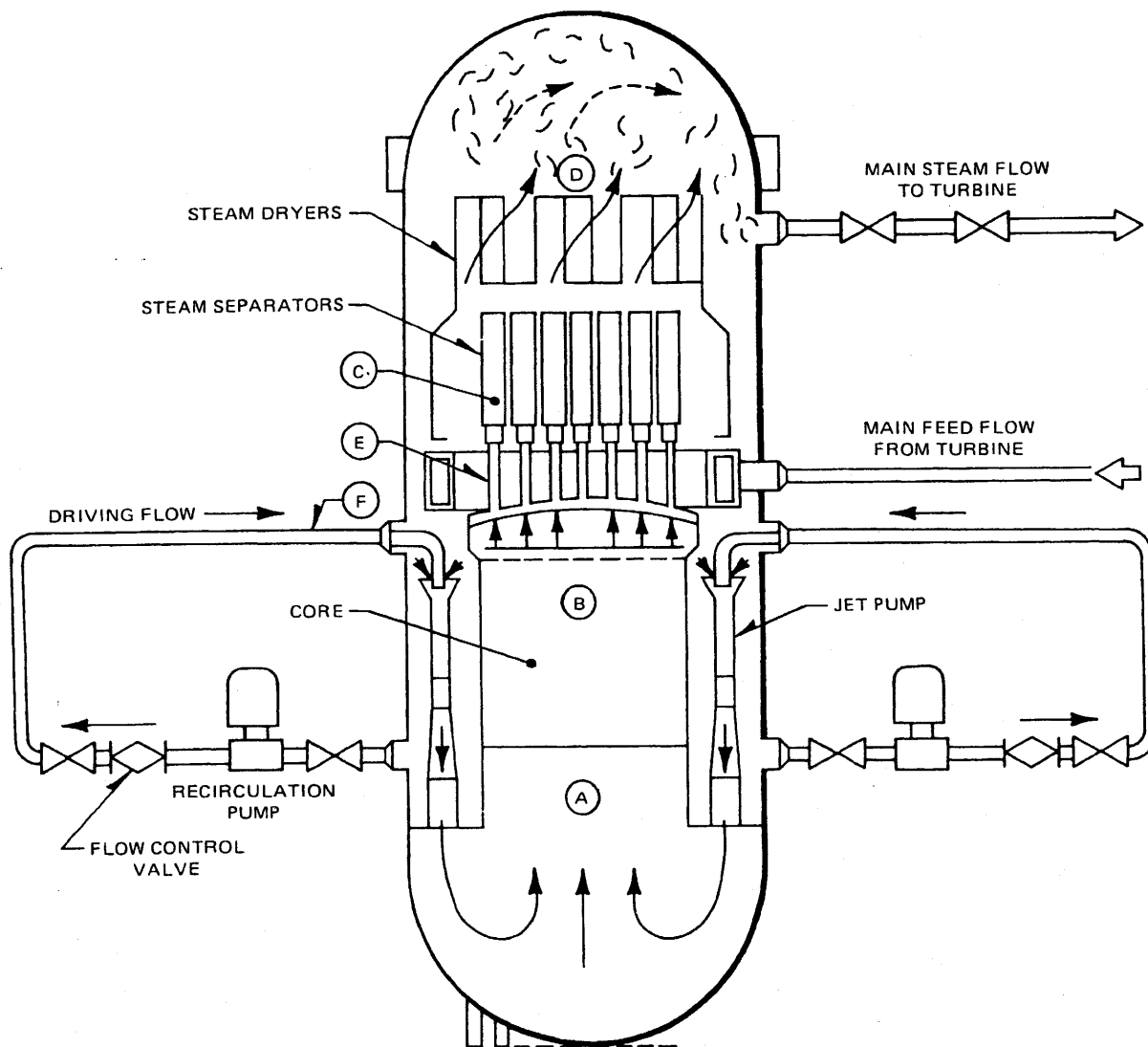


PERRY NUCLEAR POWER PLANT

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



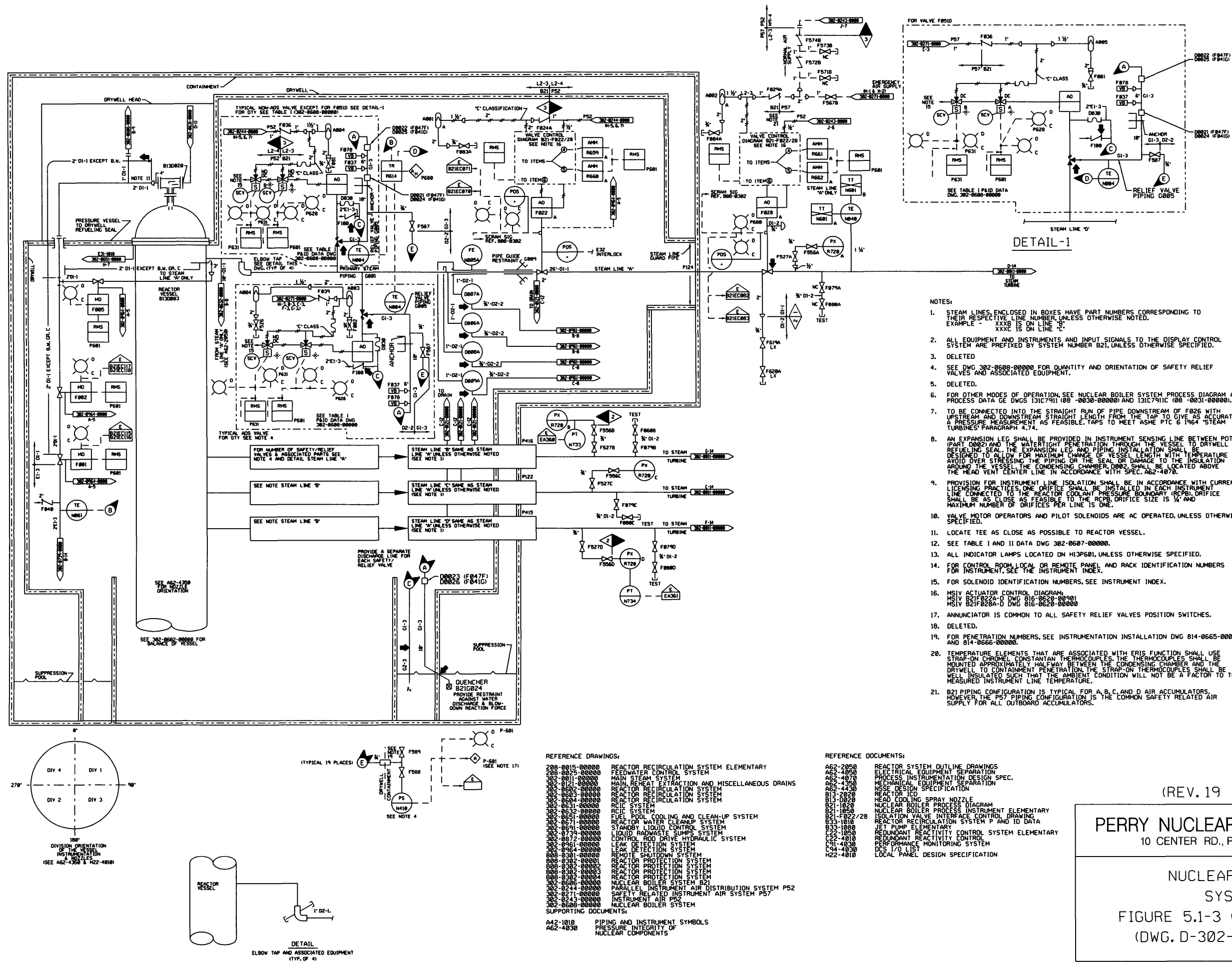
(Rev. 12 1/03)

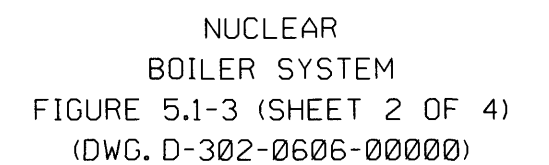


PERRY NUCLEAR POWER PLANT

Coolant Volumes of the Boiling
Water Reactor

Figure 5.1-2





FOR RELAY LOGIC ONLY

TABLE I: PRESSURE INSTRUMENT CONTACT UTILIZATION

TRANSMITTER	MECH DIV LOC	ELEC DIV	TRIP UNIT	SYSTEM
PT N078A	1	1	PIS N078A	RPS (A)
			PS N078A	NS* (A) (RHR ISOL)
PT N078B	2	2	PIS N078B	RPS (B)
			PS N078B	NS* (B) (RHR ISOL)
PT N078C	3	3	PIS N078C	RPS (C)
			PS N078C	NS* (C) (RHR ISOL)
PT N078D	4	4	PIS N078D	RPS (D)
			PS N078D	NS* (D) (RHR ISOL)
PT N043A	1	1	ATH	RRCS (A)
PT N043E	1	1	ATH	RRCS (E)
PT N043B	2	2	ATH	RRCS (B)
PT N043F	2	2	ATH	RRCS (F)
PT N067C	3	3	PIS N067C	HPCS
PT N067G	3	3	PIS N067G	HPCS
PT N067L	4	3	PIS N067L	HPCS
PT N067R	4	3	PIS N067R	HPCS
PT N094A	1	1	PIS N094A	RHR (A) / LPCS / RCIC
PT N094E	1	1	PIS N094E	RHR (A) / LPCS
PT N094B	2	2	PIS N094B	RHR (B) / RHR (C) / RCIC
PT N094F	2	2	PIS N094F	RHR (B) / RHR (C)
			PIS N068A	PRESS RELIEF
			PS N068A	PRESS RELIEF
			PS N070A	PRESS RELIEF
			PS N017A	RE-OPEN / RE-CLOSE (HIGH)
			PS N018A	RE-OPEN / RE-CLOSE (HIGH)
			PIS N068B	PRESS RELIEF
			PS N068B	PRESS RELIEF
			PS N070B	PRESS RELIEF
			PS N017B	RE-OPEN / RE-CLOSE (HIGH)
			PS N018B	RE-OPEN / RE-CLOSE (HIGH)
PT N075A	1	1	PIS N075A	NS*
PT N075B	2	2	PIS N075B	NS*
PT N075C	3	3	PIS N075C	NS*
PT N075D	4	4	PIS N075D	NS*
PT N032	-	-	-	COLE PLATE UP
PT N062A	1	1	-	POST ACCIDENT MON.
PT N062B	2	2	-	POST ACCIDENT MON.
			PIS N068E	PRESS RELIEF
			PS N068E	PRESS RELIEF
			PS N070E	PRESS RELIEF
			PS N018E	RE-OPEN / RE-CLOSE (LOW)
			PS N018E	RE-OPEN / RE-CLOSE (HIGH)
			PIS N068F	PRESS RELIEF
			PS N068F	PRESS RELIEF
			PS N070F	PRESS RELIEF
			PS N018F	RE-OPEN / RE-CLOSE (LOW)
			PS N018F	RE-OPEN / RE-CLOSE (HIGH)

* REFERENCE C22-4010/ 1050

NS* - NUCLEAR STEAM SUPPLY SHUTOFF
CONTAINMENT ISOLATION FUNCTION

TABLE II: WATER LEVEL INSTRUMENT CONTACT UTILIZATION

TRANSMITTER	MECH DIV LOC	ELEC DIV	TRANS E/S HP NUMBER	TRIP UNIT	SYSTEM	LEVEL TRIP POINT
LT N027	2	-	B21-KB15	-	SHUTDOWN LEVEL *	-
LT N044C	3	1	-	LT N010C	FUEL ZONE *	-
LT N044D	4	2	-	LT N010D	FUEL ZONE *	-
LT N480	4	3	-	LR N015	FUEL ZONE *	-
LT N091A	1	1	E21-PS2	LTS N091A	AOS (A) / RHR (A) / LPCS	1
				LS N092A	RCIC	2
LT N091B	2	2	E12-PS2	LTS N091B	AOS (B) / RHR (B) / RHR (C)	1
				LS N092B	RCIC	2
LT N091E	1	1	E21-PS2	LTS N091E	AOS (A) / RHR (A) / LPCS	1
				LS N092E	RCIC	2
				LS N093E	RCIC	8
LT N091F	2	2	E12-PS2	LTS N091F	AOS (B) / RHR (B) / RHR (C)	1
				LS N092F	RCIC	2
				LS N093F	RCIC	8
LT N073C	3	3	E22-PS2	LTS N073C	HPCS *****	2
				LS N074C	HPCS	8
LT N073D	3	3	E22-PS2	LTS N073D	HPCS	2
				LS N074D	HPCS	8
LT N073L	4	3	E22-PS2	LTS N073L	HPCS	2
				LS N074L	HPCS	8
LT N073R	4	3	E22-PS2	LTS N073R	HPCS	2
				LS N074R	HPCS	8
LT N402A	1	1	-	ATH	RRCS **	2
LT N402E	3	1	-	ATH	RRCS **	2
LT N402B	2	2	-	ATH	RRCS **	2
LT N402F	4	2	-	ATH	RRCS **	2
LT N095A	1	1	E21-PS2	LTS N095A	AOS (A)	3
				LS N093A	RCIC	8
LT N095B	2	2	E12-PS2	LTS N095B	AOS (B)	3
				LS N092B	RCIC	8
LT N091A	1	1	C71-KB13A	LTS N091A	NS* (HSIV) ***	1
				LS N092A	NS*	2
LT N091B	2	2	C71-KB13B	LTS N091B	NS* (HSIV) ***	1
				LS N092B	NS*	2
LT N091C	3	3	C71-KB13C	LTS N091C	NS* (HSIV) ***	1
				LS N092C	NS*	2
LT N091D	4	4	C71-KB13D	LTS N091D	NS* (HSIV) ***	1
				LS N092D	NS*	2
LT N090A	1	1	C71-KB13A	LTS N090A	RPS (A) (RHR ISOLATION)	3
				LS N093A	RPS (A)	8
LT N090B	2	2	C71-KB13B	LTS N090B	RPS (B) (RHR ISOLATION)	3
				LS N093B	RPS (B)	8
LT N090C	3	3	C71-KB13C	LTS N090C	RPS (C) (RHR ISOLATION)	3
				LS N093C	RPS (C)	8
LT N090D	4	4	C71-KB13D	LTS N090D	RPS (D) (RHR ISOLATION)	3
				LS N093D	RPS (D)	8

* REFERENCE B21-1050

** REFERENCE C22-4010/ 1050

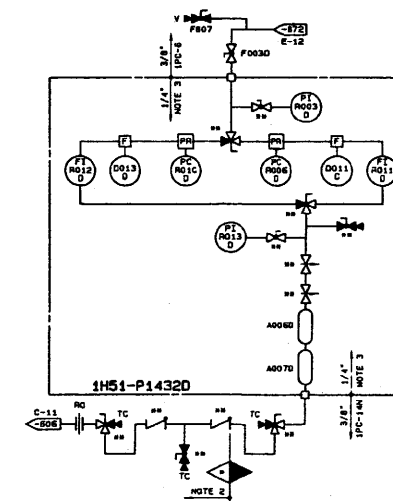
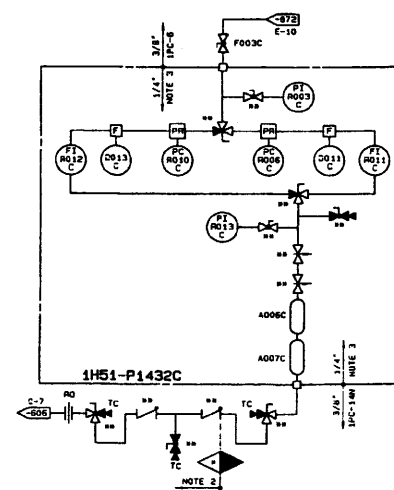
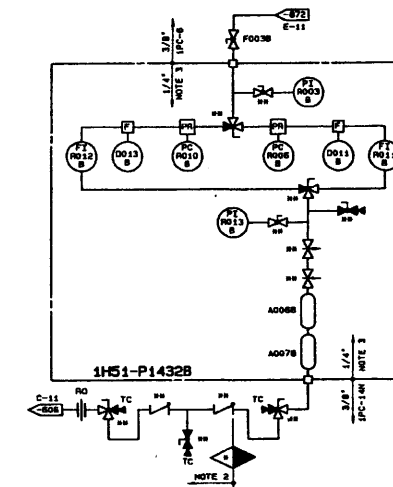
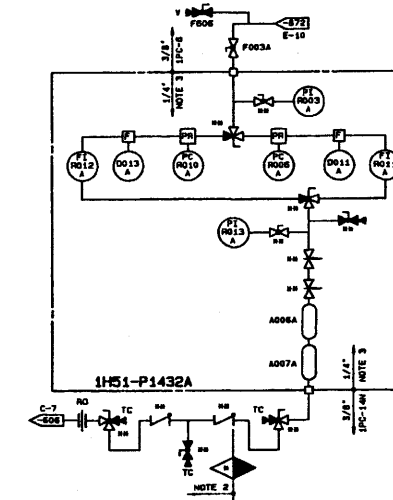
ATH - ANALOG TRIP MODULE

*** ADDITIONAL FUNCTIONS

- CLOSE DRYWELL FAN COOLER'S COOLING WATER ISOLATION VALVES

- ISOLATE THE NSIV'S AIR SUPPLY

*** ALSO FEEDS 2-PEN RECORDER R615



NOTES:

- FOR NOTES AND REFERENCES, SEE DRAWING D-302-605.
- * SAFETY RELATED NON-CODE SEISMIC CATEGORY I.
- 1/4" O.D. x .049 WALL SEAMLESS STAINLESS STEEL TUBING
ASTM A213 TP-304.
- ** THESE VALVES ARE TAGGED PER THE APPROPRIATE
903 SERIES DRAWING.
- THE FOLLOWING REACTOR VESSEL LEVEL PURGE CONTROL PANELS
SHALL BE ISOLATED FROM THE PARENT LOCAL CONTROL PANELS
PRIOR TO CLOSING THE ASSOCIATED PENETRATION ISOLATION VALVES:

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

THIS DRAWING REDRAWN TO INCORPORATE
THE FOLLOWING DRAWING:
D-302-607, REV. J

NUCLEAR SAFETY RELATED

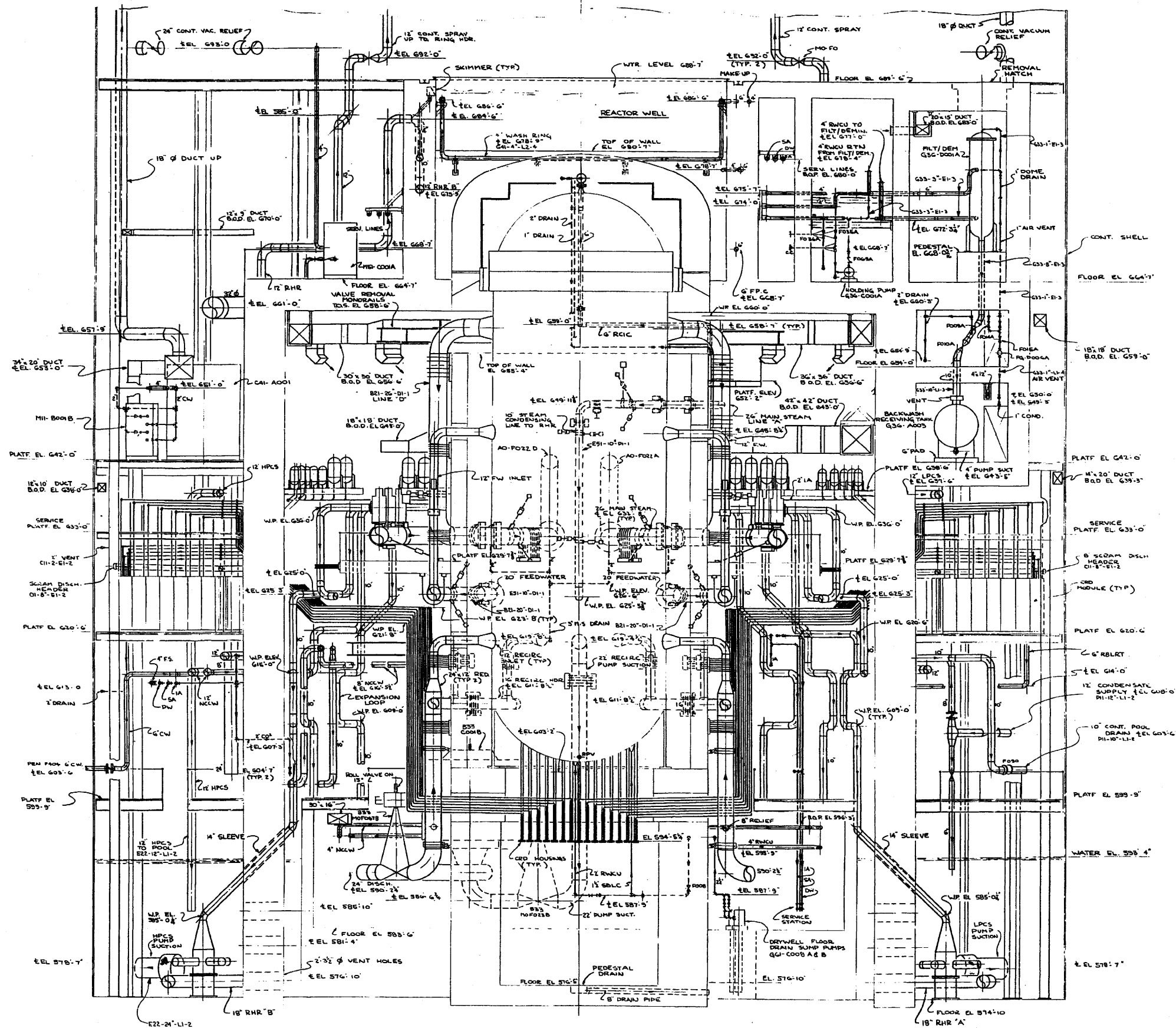
(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

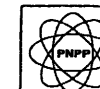
Nuclear Boiler System

Figure 5.1-3 (Sheet 3 of 4)

(Dwg. D-302-607)



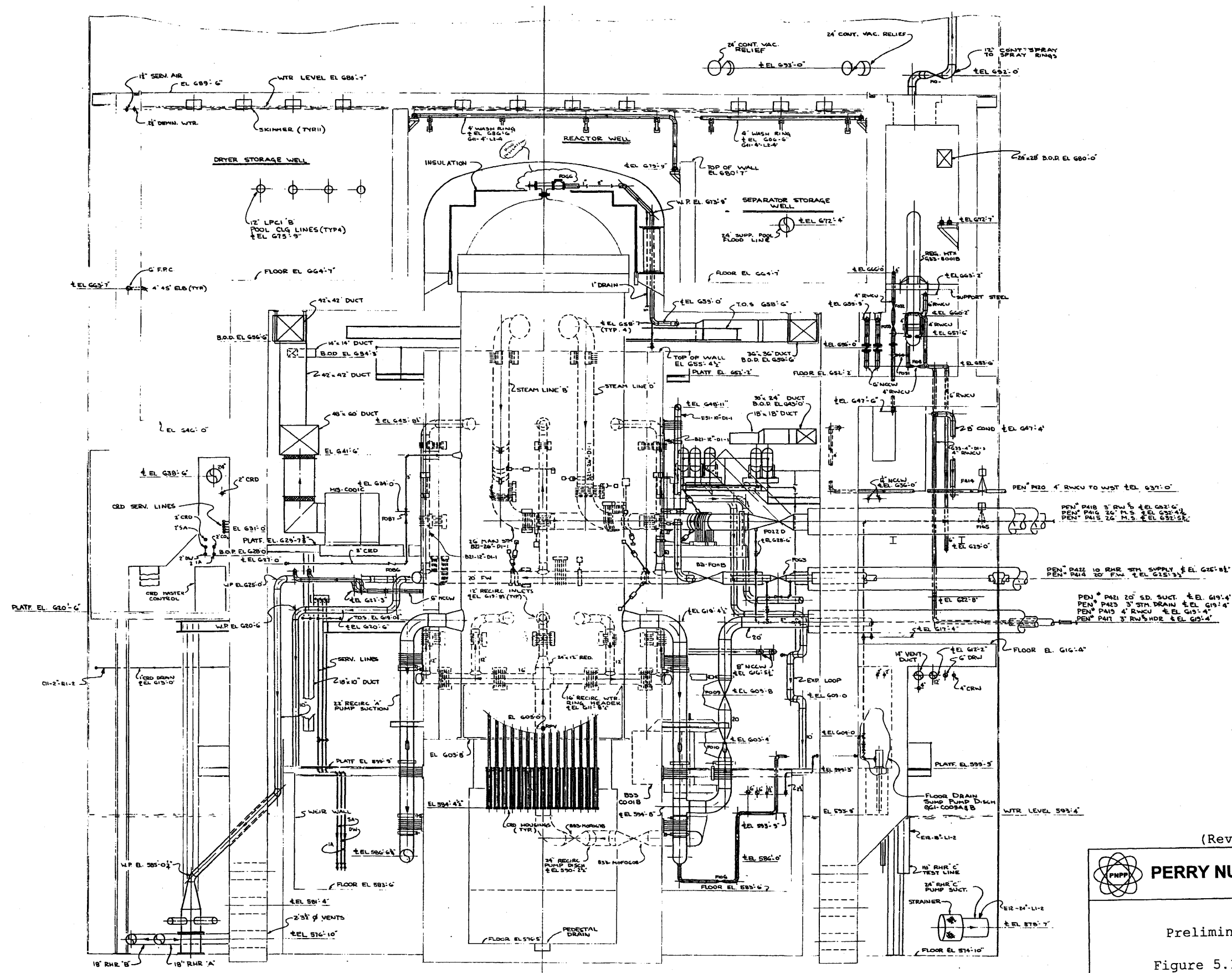
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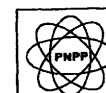
PERRY NUCLEAR POWER PLANT

Preliminary Piping Study

Figure 5.1-4 (Sheet 1 of 2)



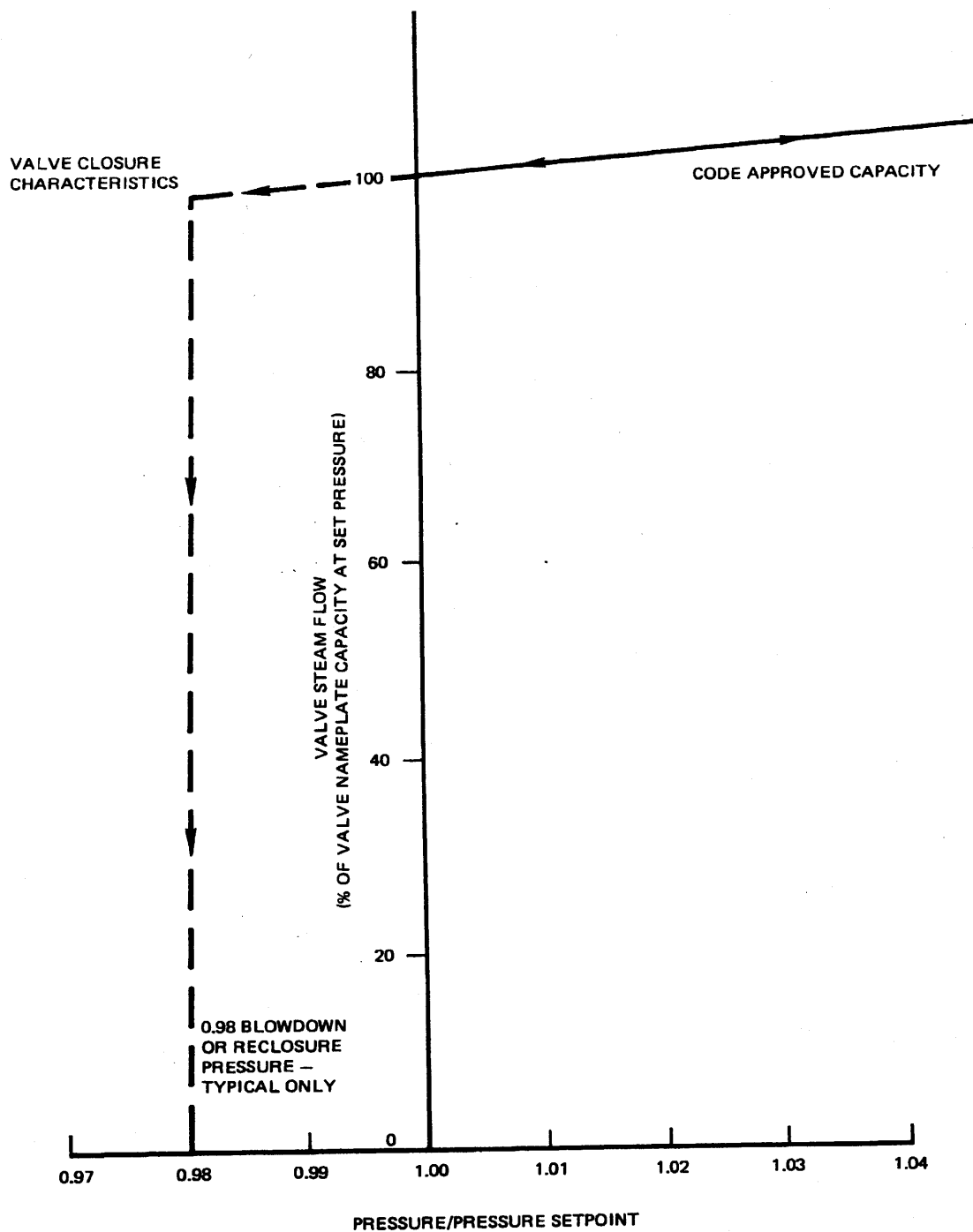
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Preliminary Piping Study

Figure 5.1-4 (Sheet 2 of 2)



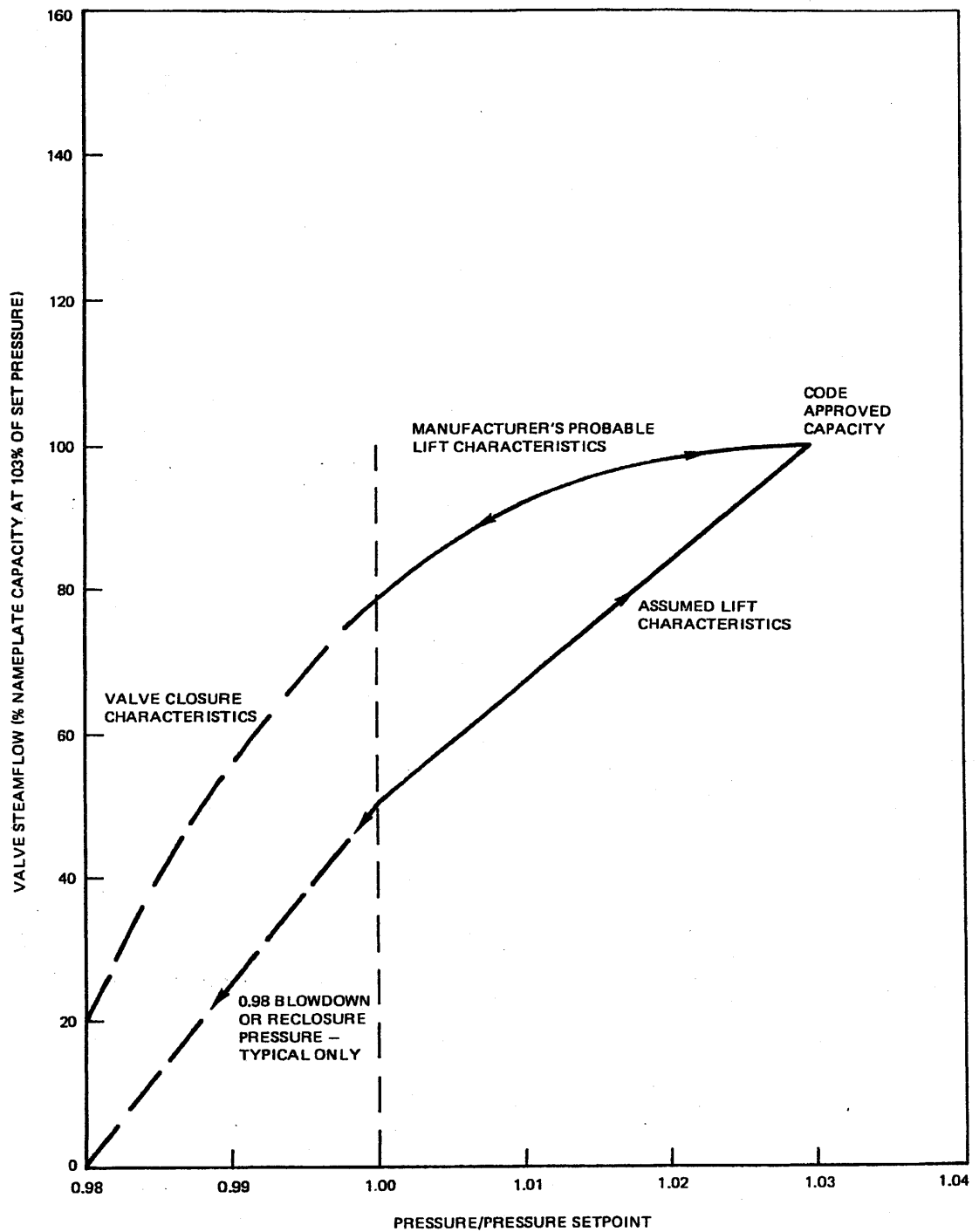
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PERRY NUCLEAR POWER PLANT

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

Figure 5.2-1



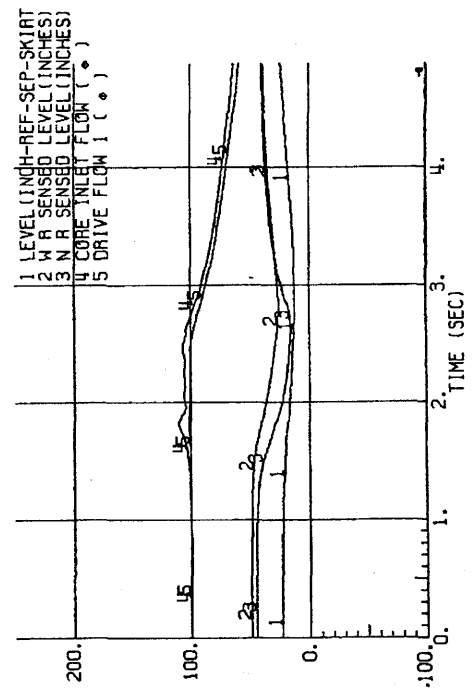
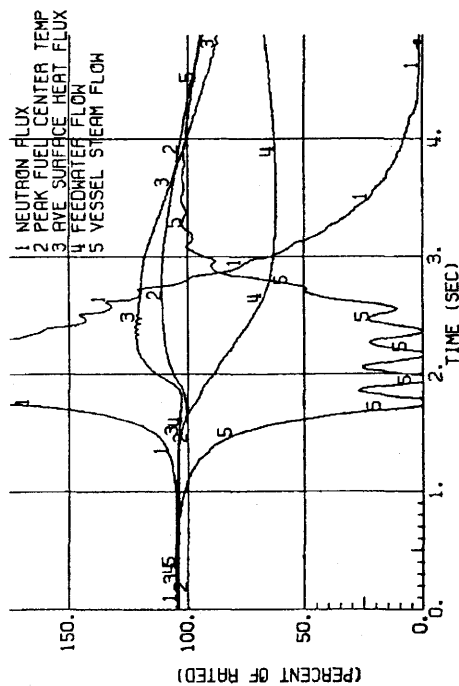
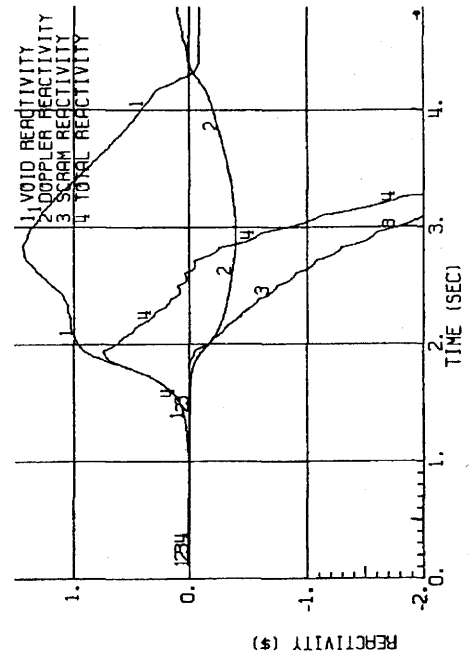
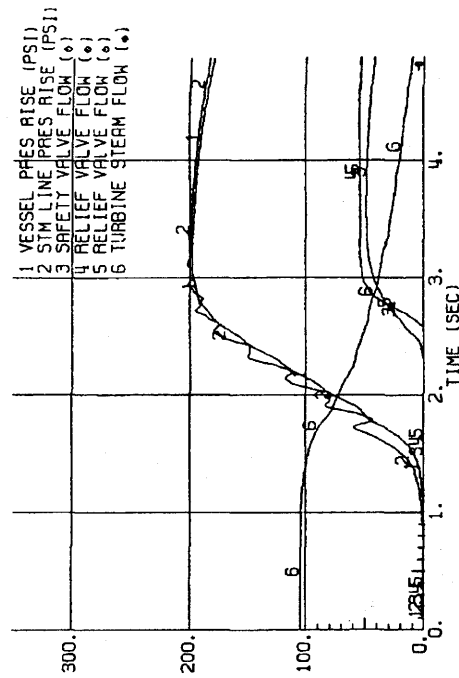
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

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

Figure 5.2-2



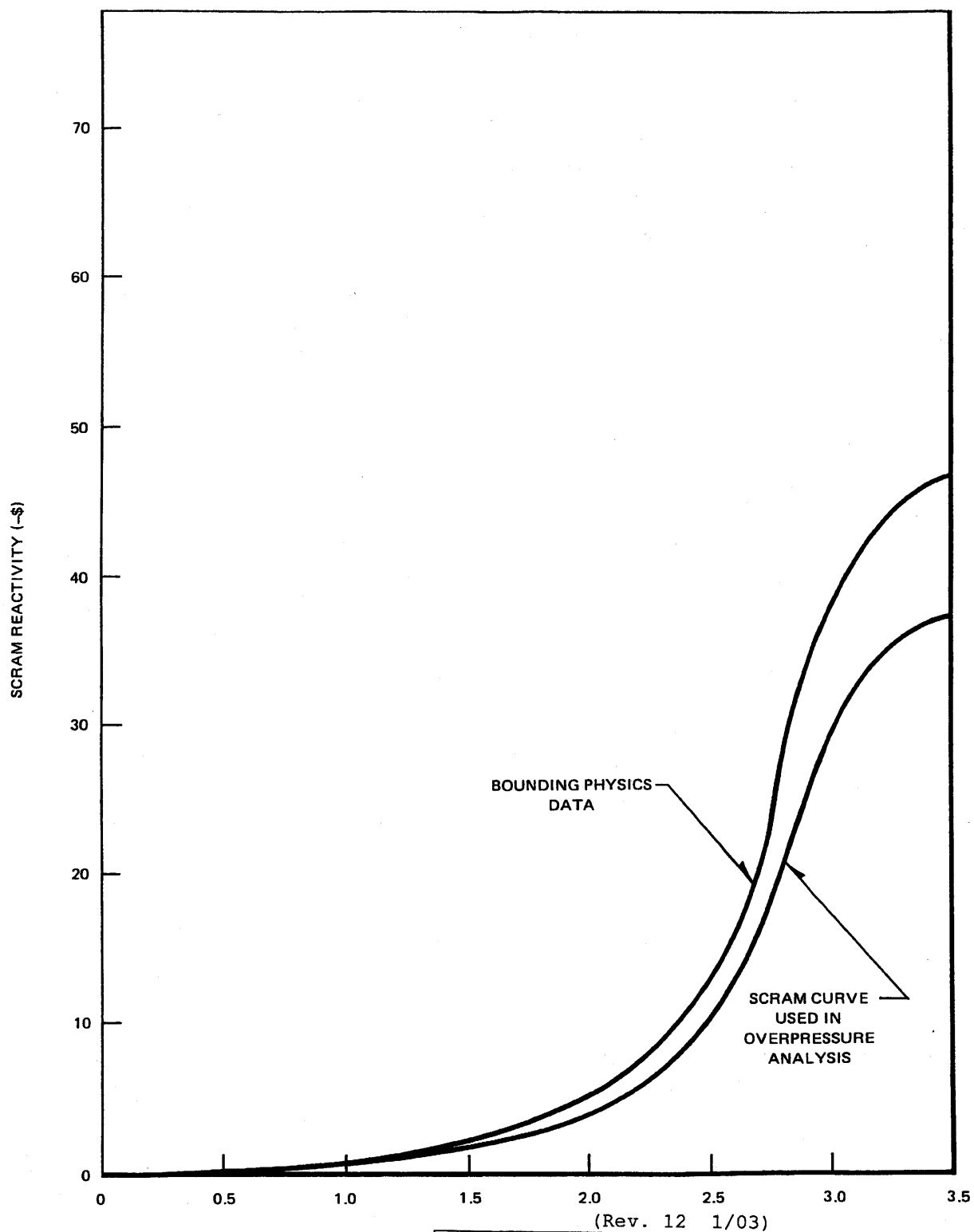
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

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

Figure 5.2-3



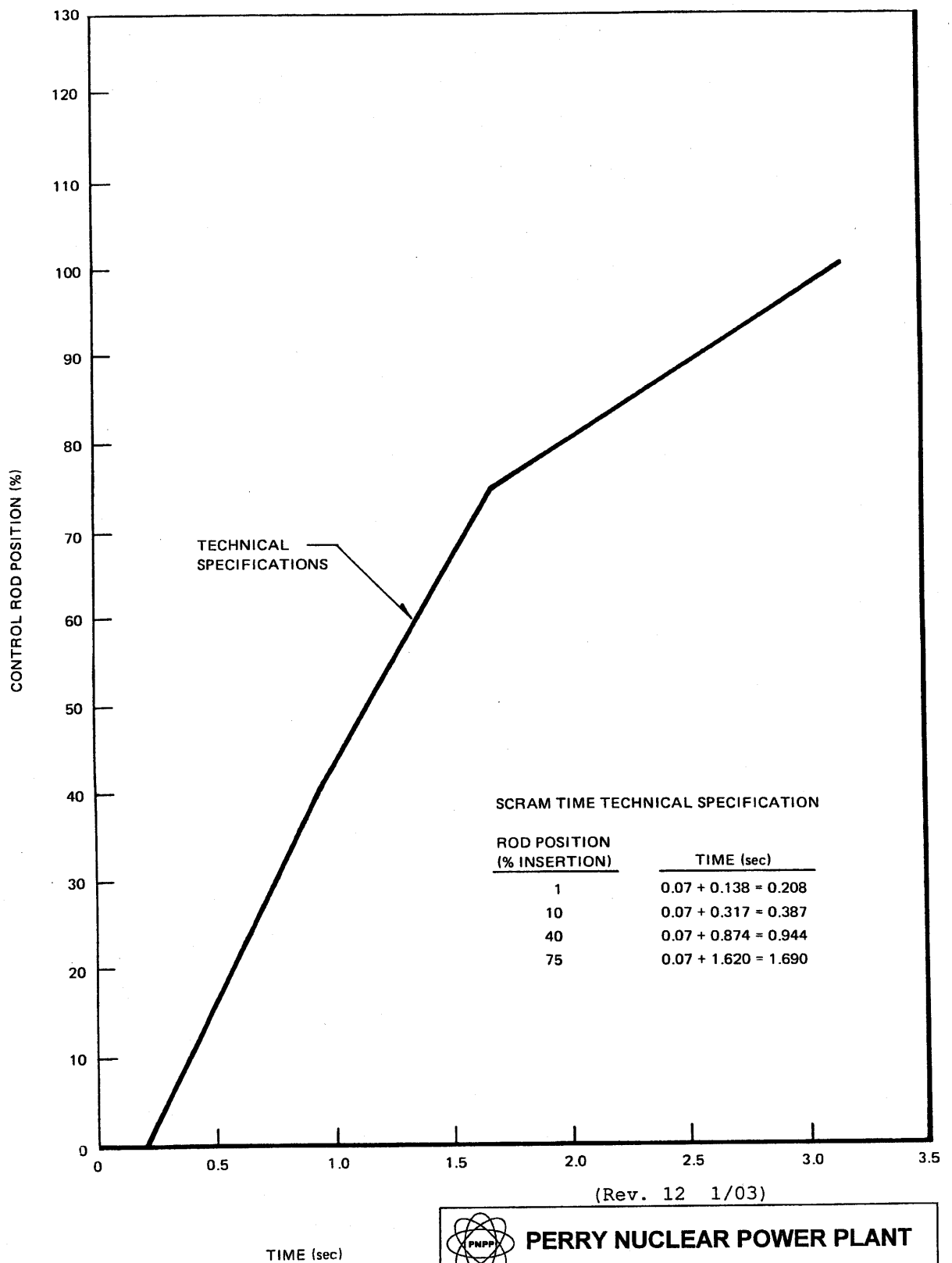
TIME (sec)



PERRY NUCLEAR POWER PLANT

Scram Reactivity vs
Time Characteristics

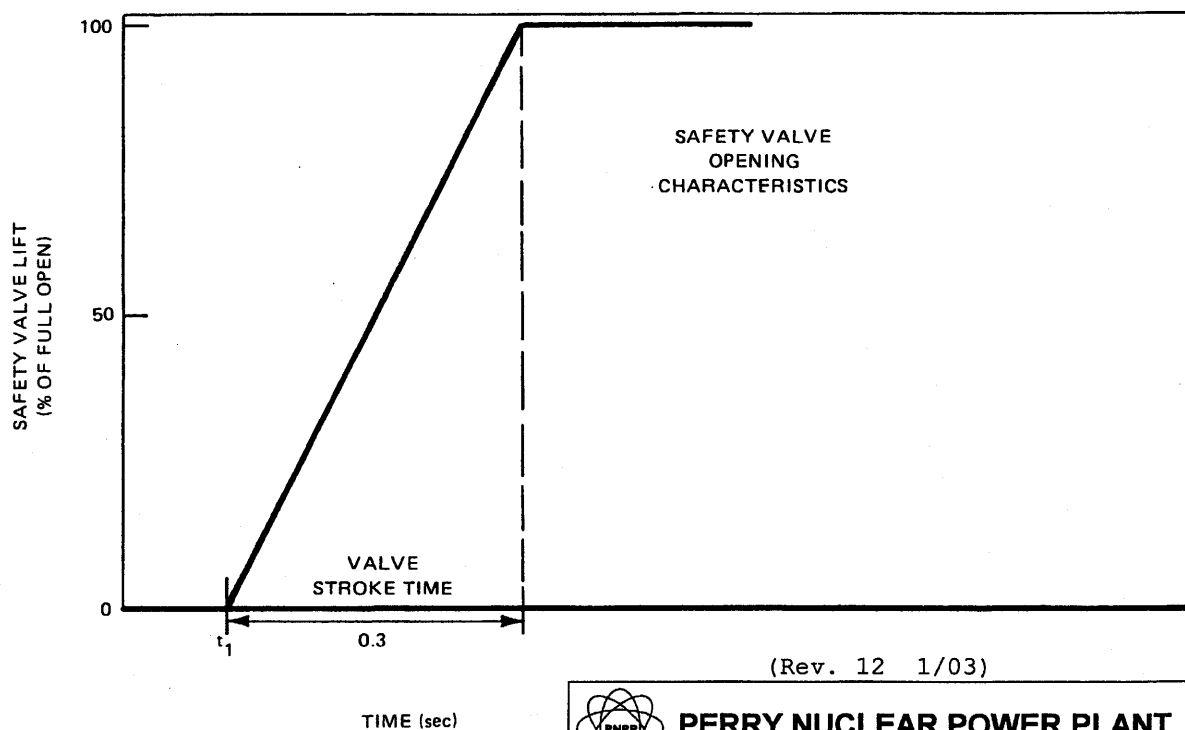
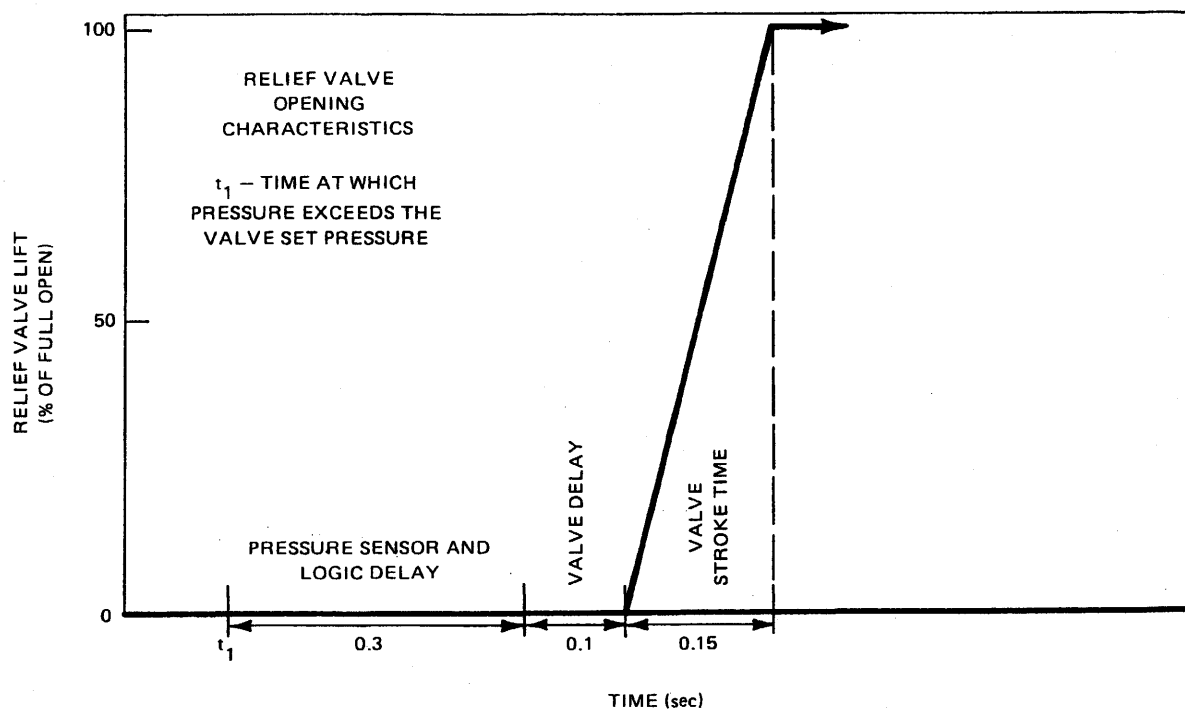
Figure 5.2-4



PERRY NUCLEAR POWER PLANT

Control Rod Drive vs
Time Characteristics

Figure 5.2-5



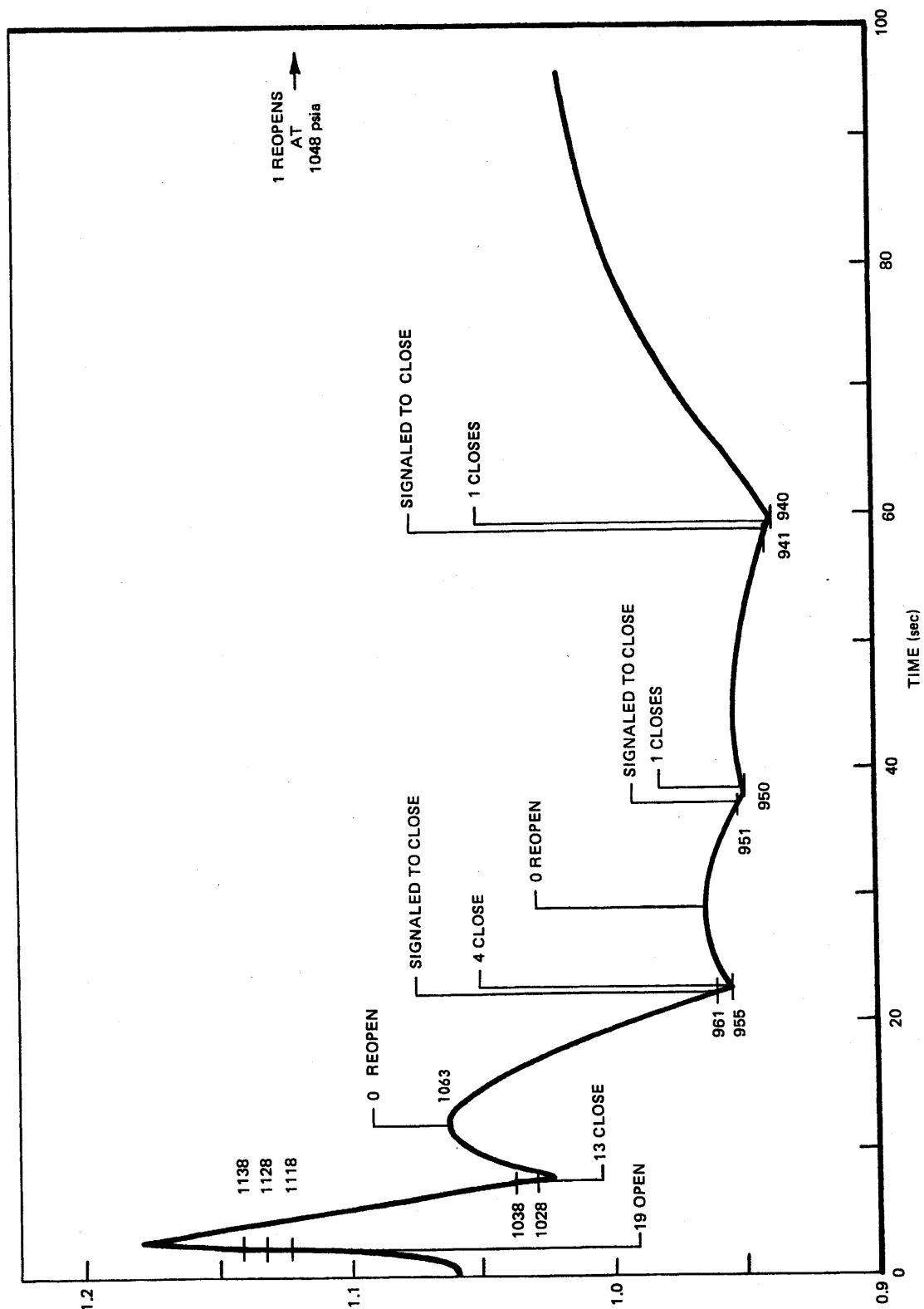
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PERRY NUCLEAR POWER PLANT

Power Actuated & Safety Action
Valve Lift Characteristics

Figure 5.2-6a



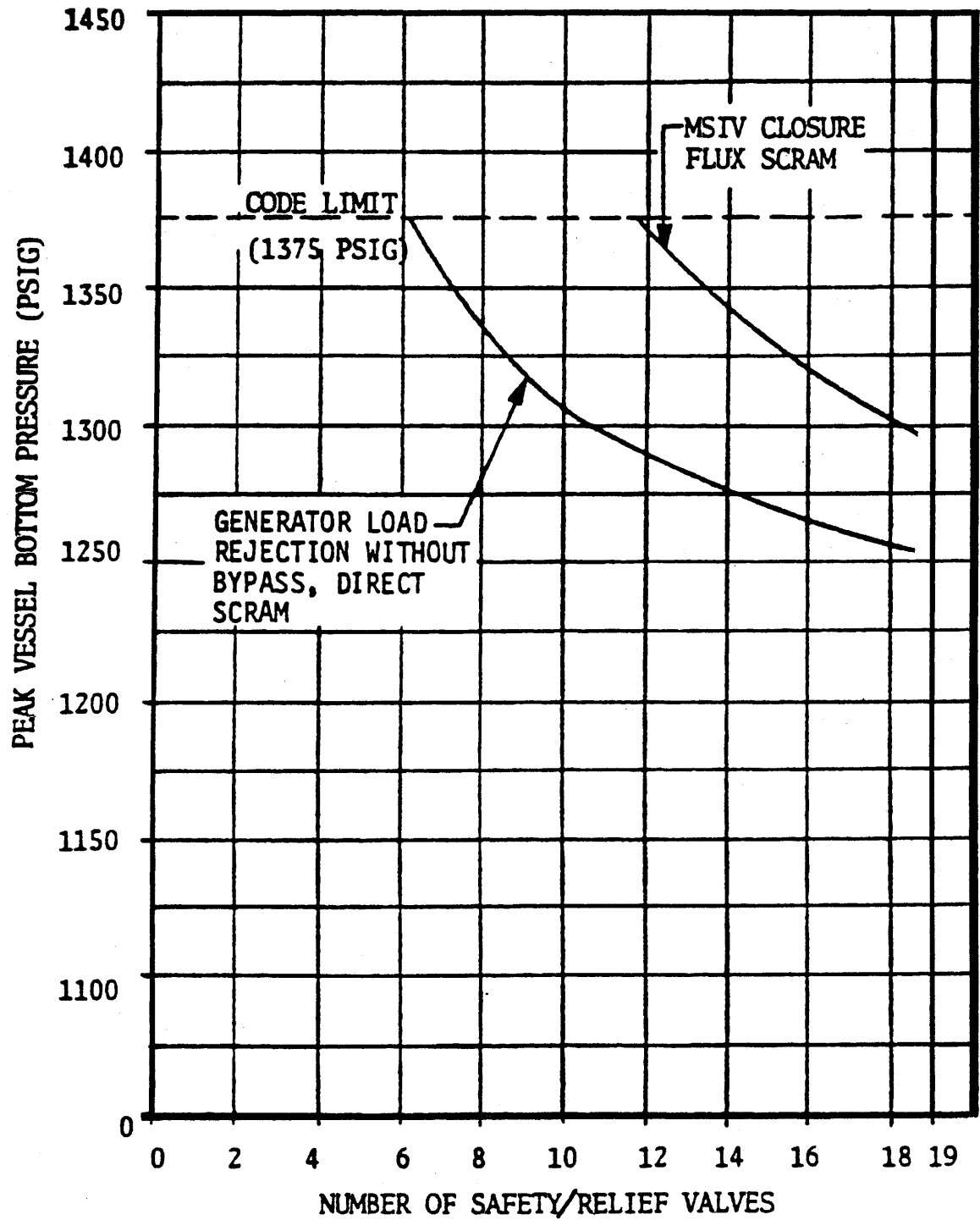
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PERRY NUCLEAR POWER PLANT

Reactor Vessel Pressure Following
Transient Isolation Event

Figure 5.2-6b



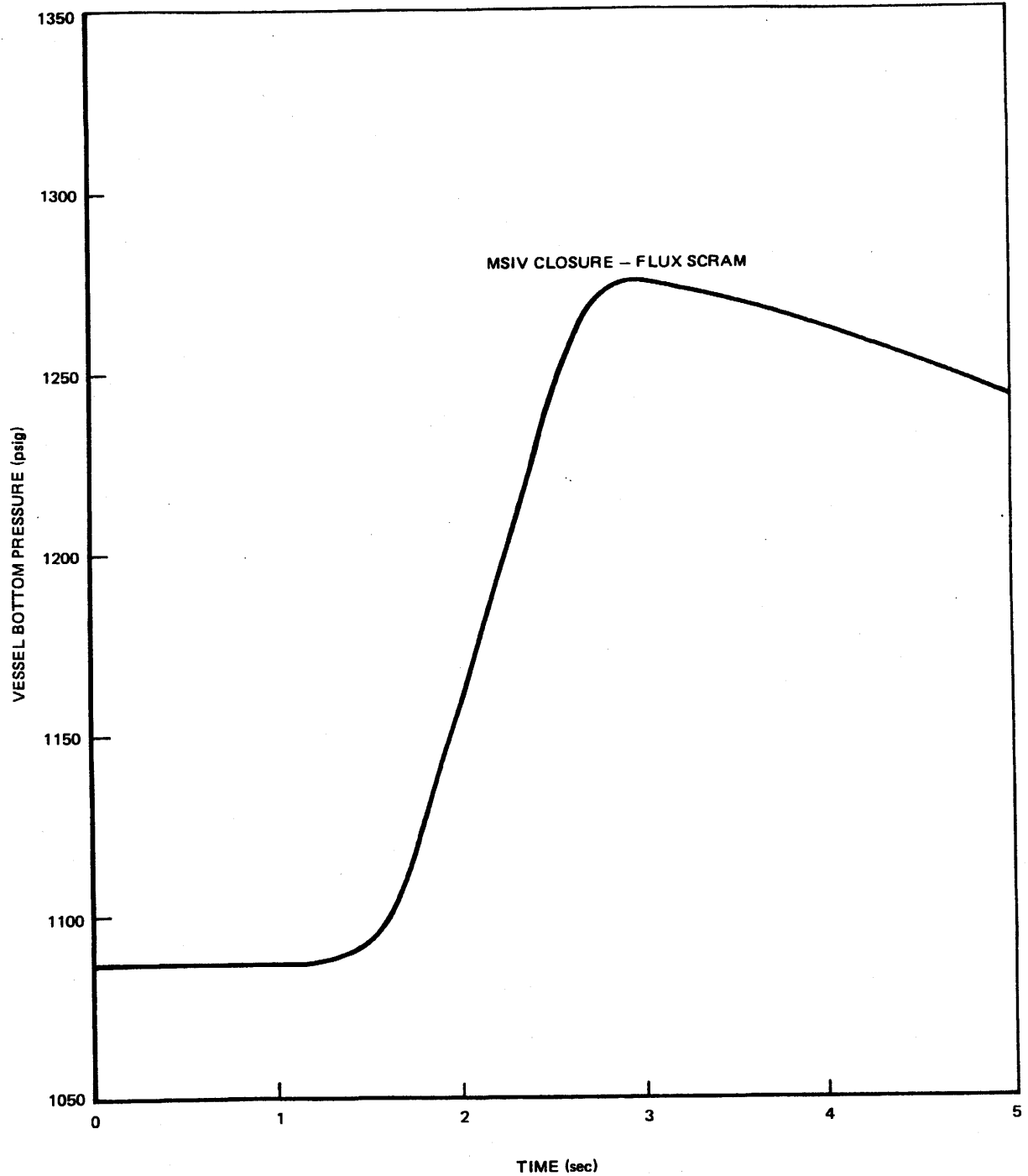
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PERRY NUCLEAR POWER PLANT

Peak Vessel Pressure
Versus Safety/Relief Capacity

Figure 5.2-7



TIME (sec)

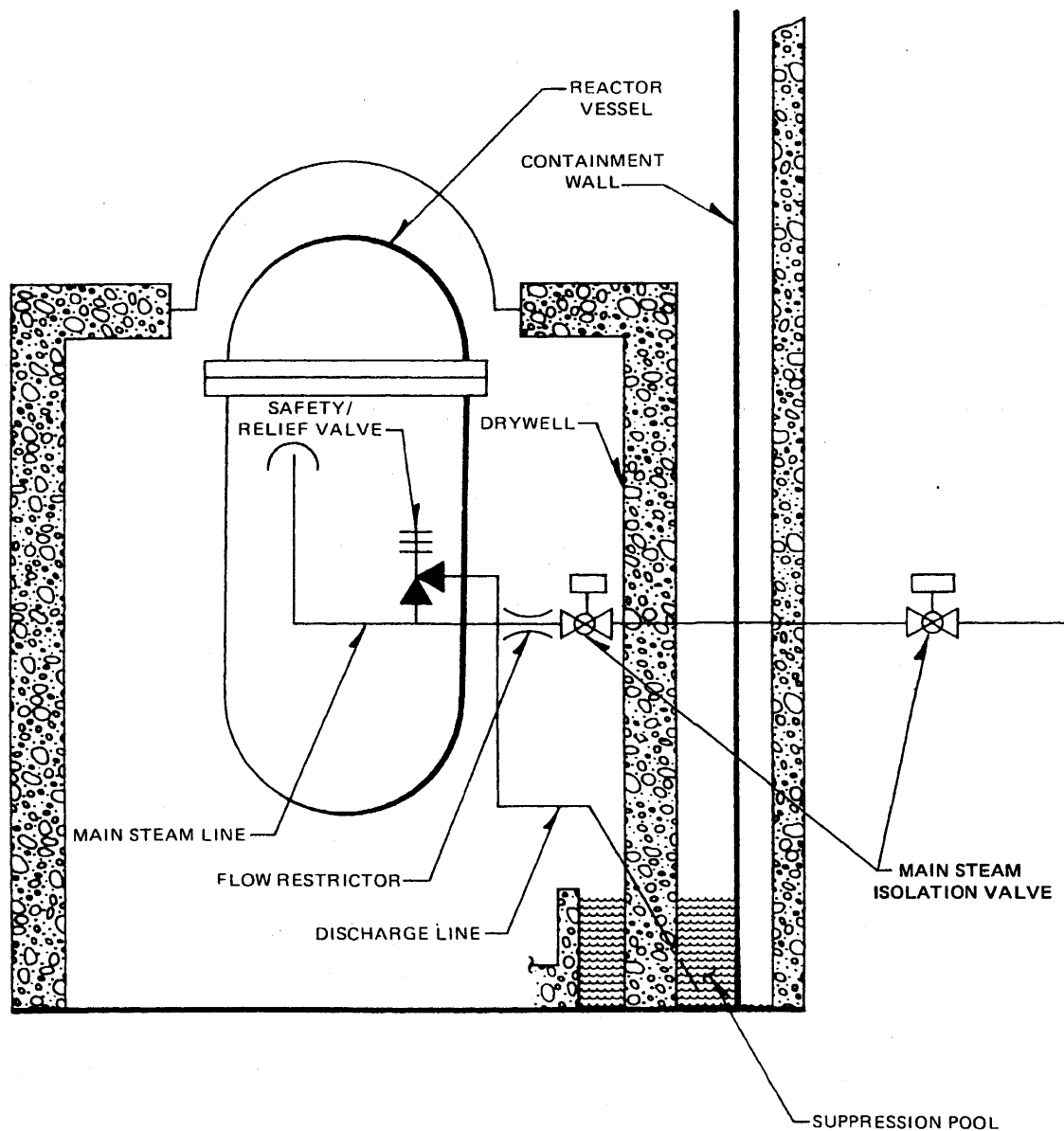
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PERRY NUCLEAR POWER PLANT

Initial Cycle
Time Response for Pressurization

Figure 5.2-8



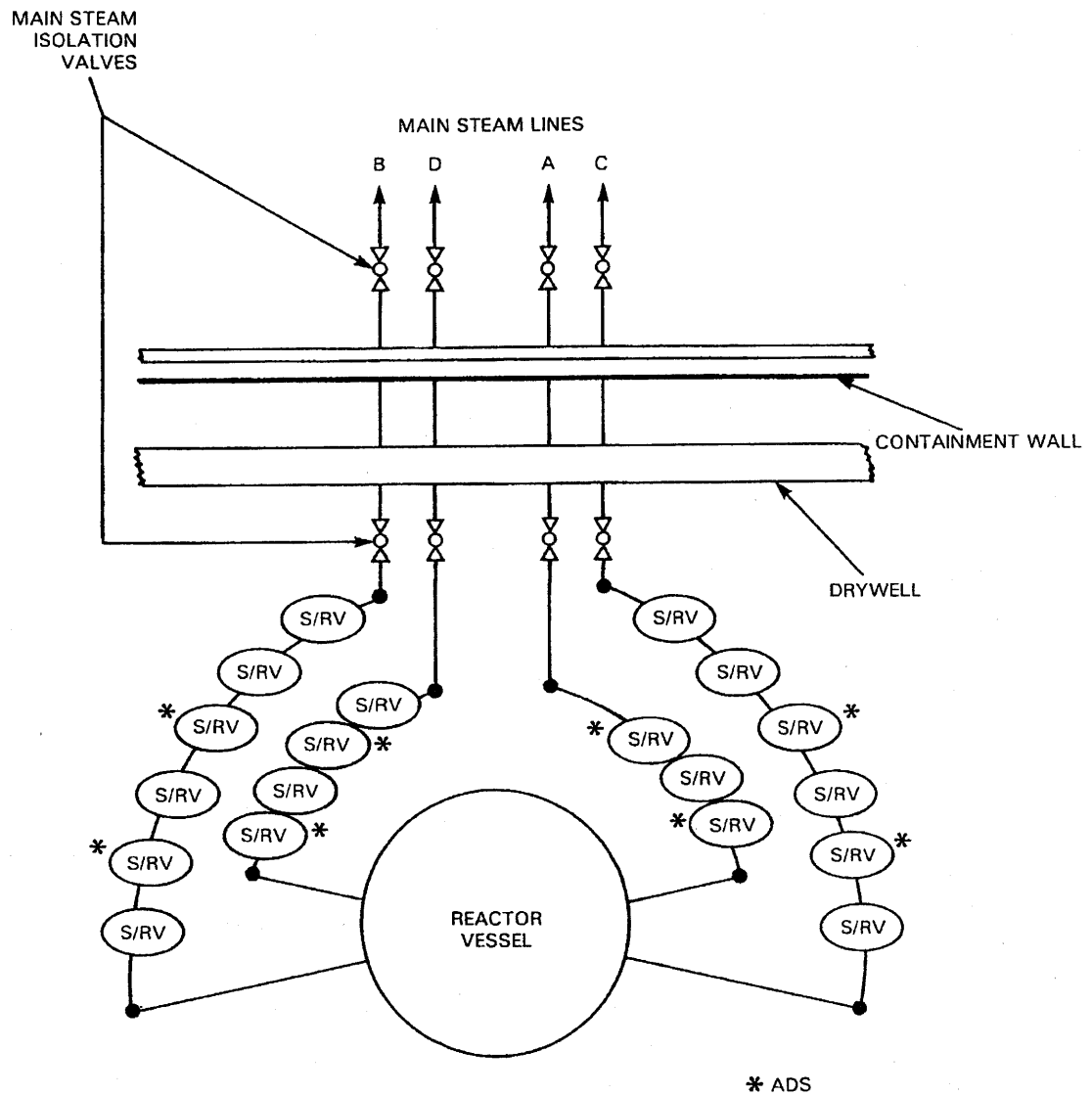
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PERRY NUCLEAR POWER PLANT

Safety/Relief Valve Schematic
Elevation

Figure 5.2-9



SCHEMATIC PLAN

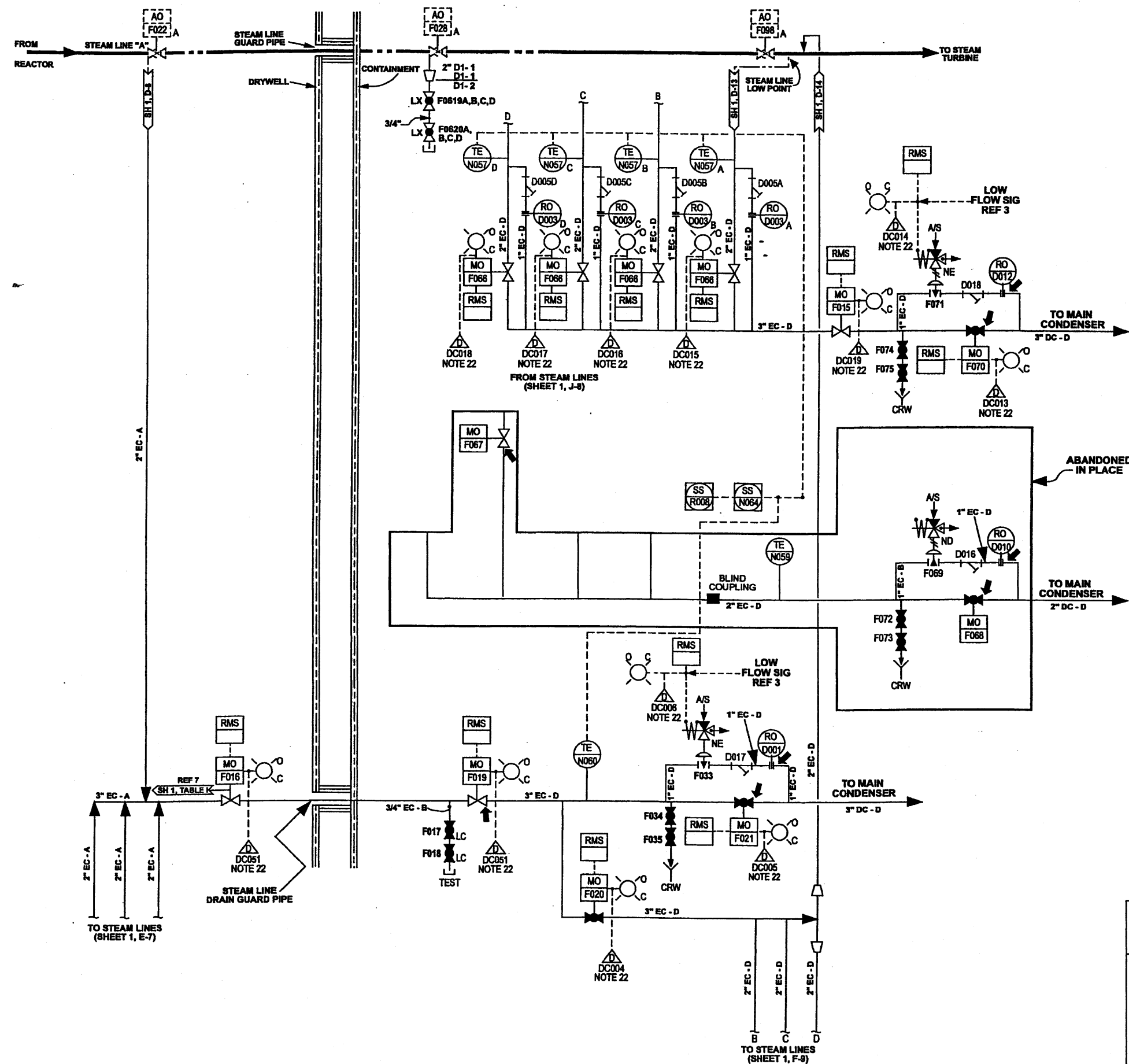
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PERRY NUCLEAR POWER PLANT

Safety/Relief Valve and
Steamline Schematic

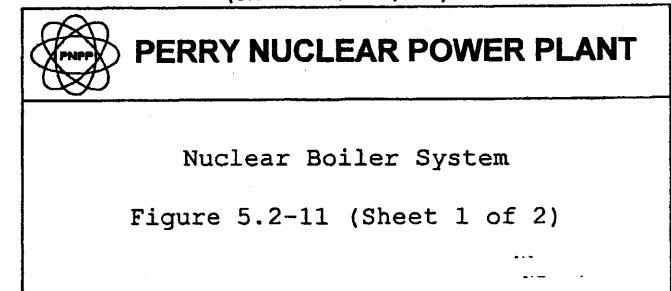
Figure 5.2-10

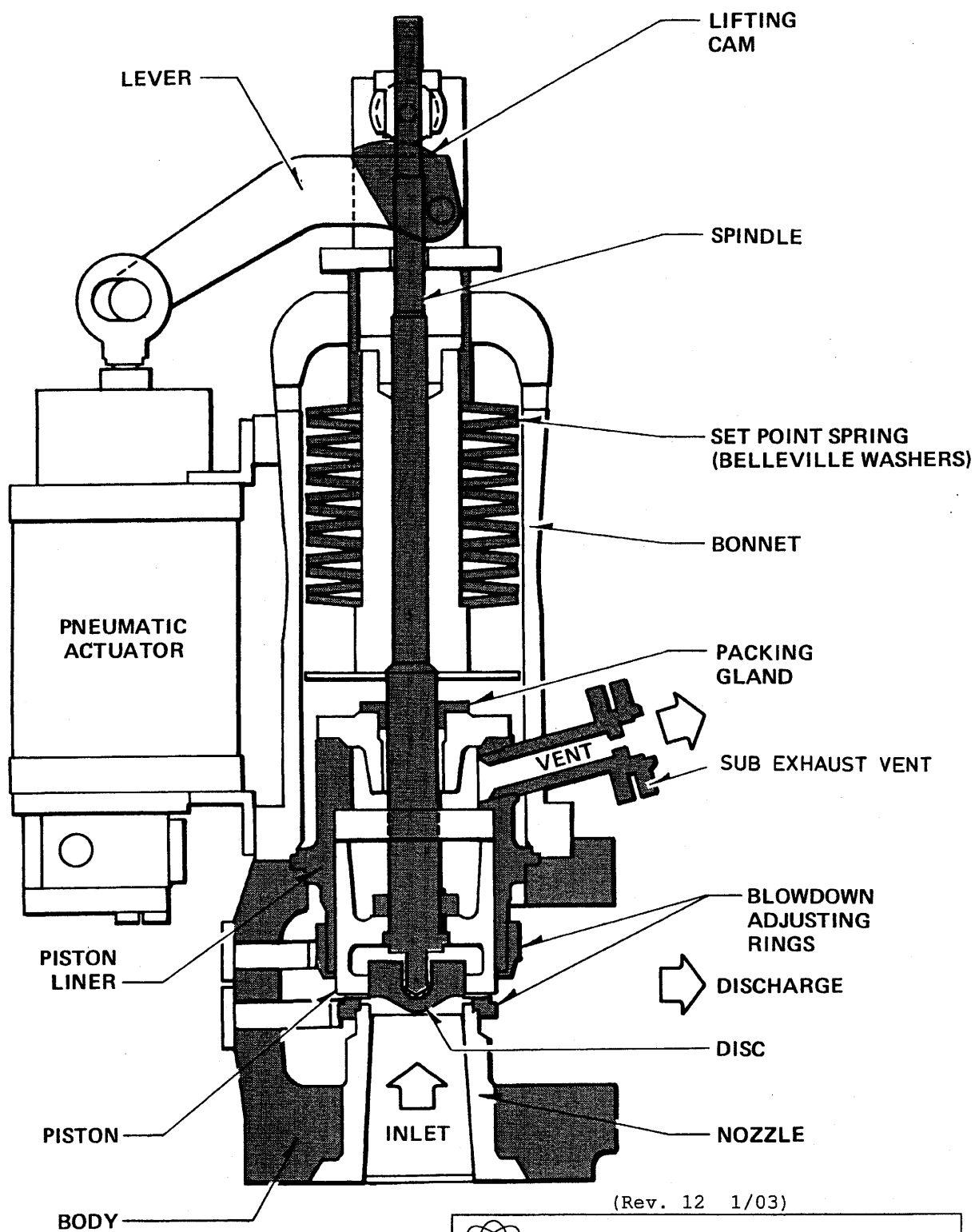


Notes: (Continued)

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.

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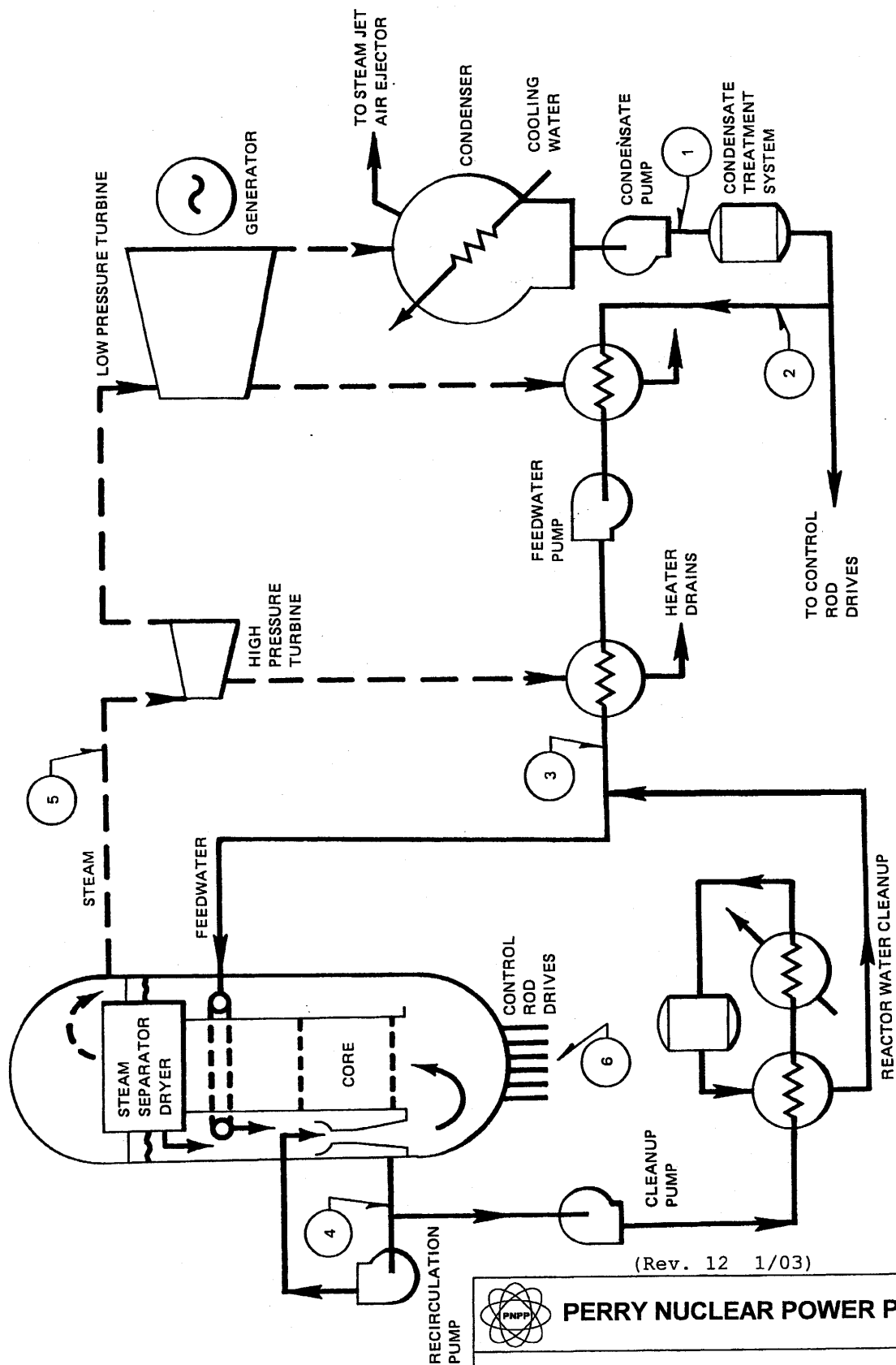




PERRY NUCLEAR POWER PLANT

Schematic of Safety Valve with
Auxiliary Activating Device

Figure 5.2-12



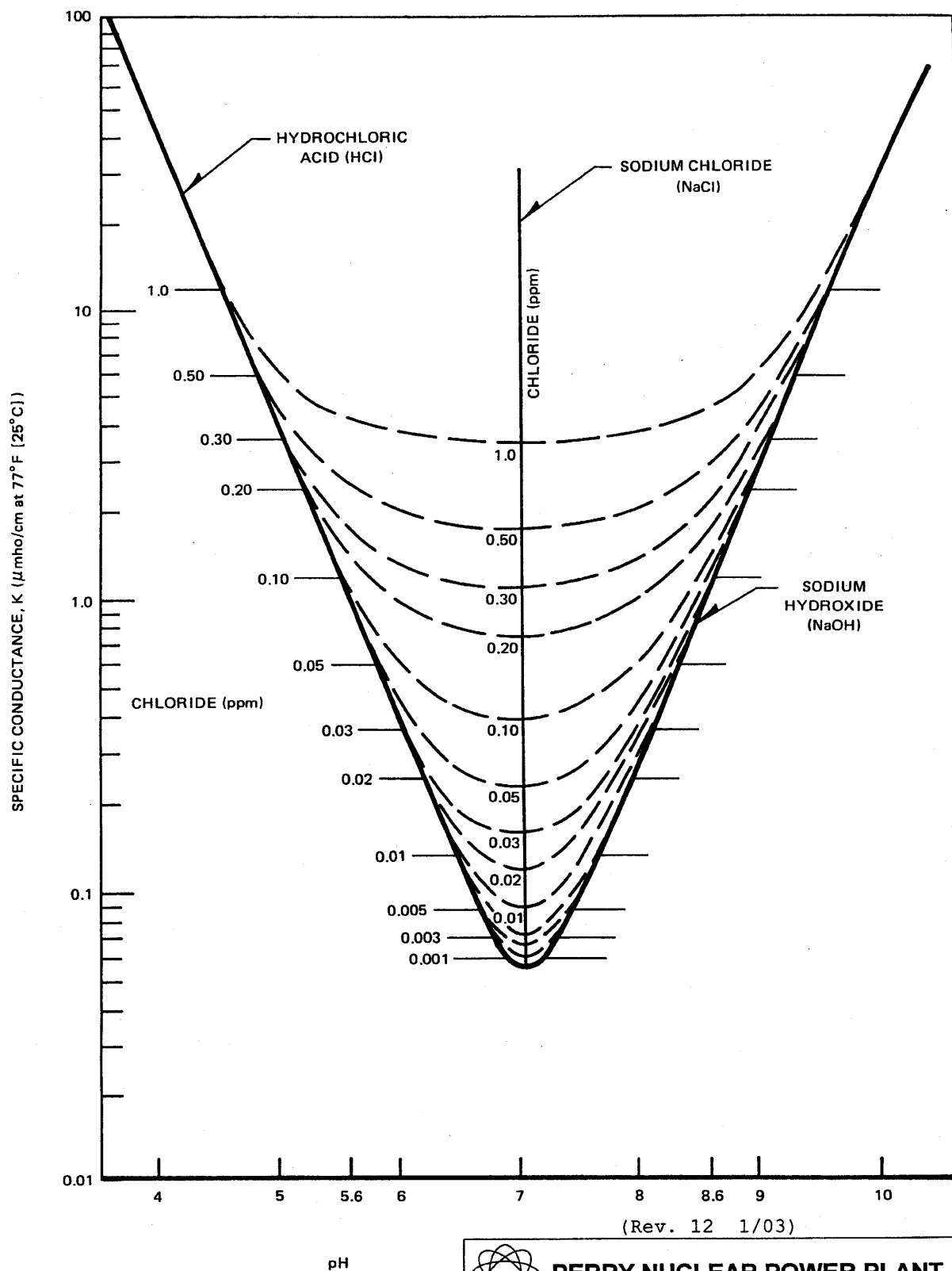
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PERRY NUCLEAR POWER PLANT

Typical BWR Flow Diagram

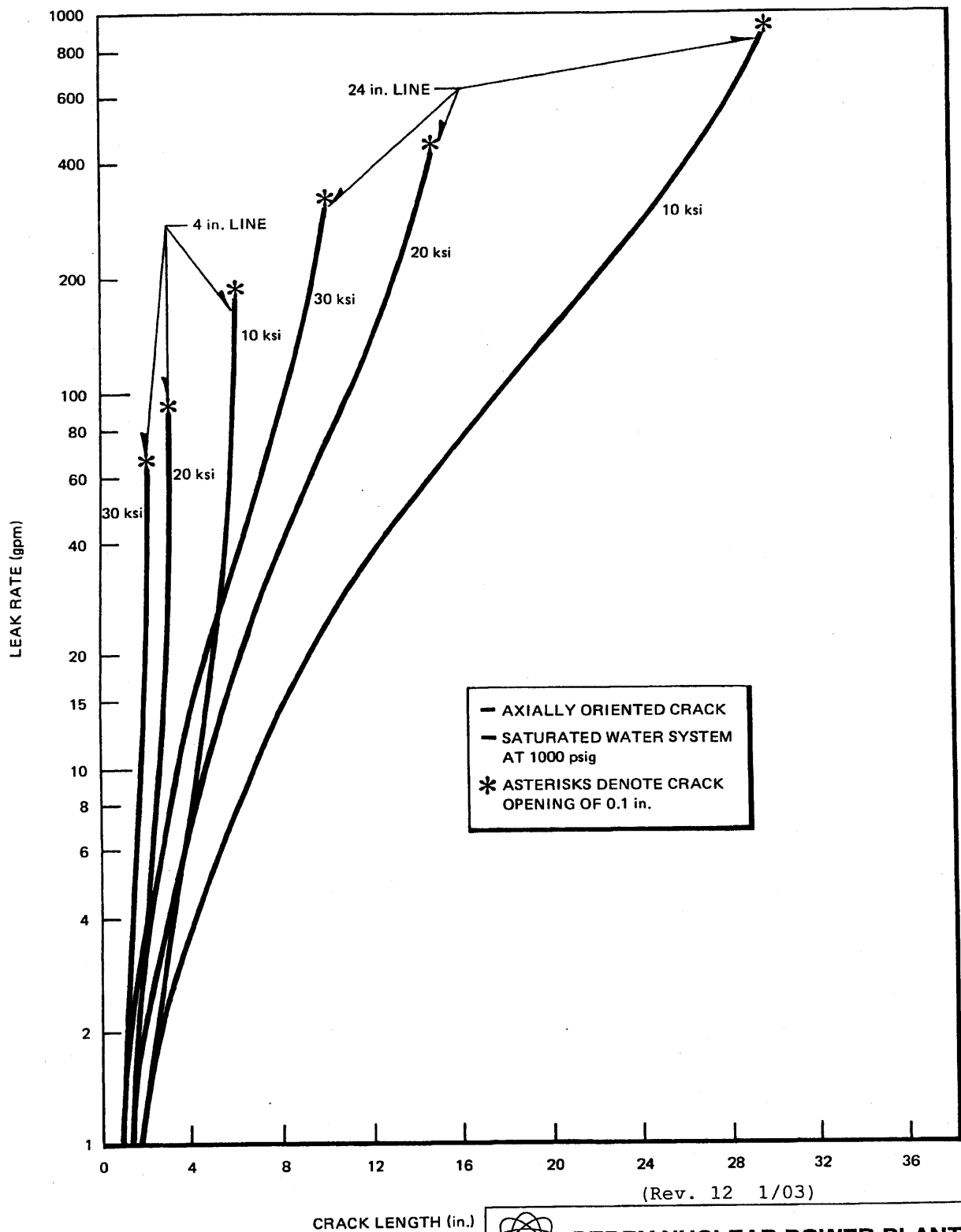
Figure 5.2-13



PERRY NUCLEAR POWER PLANT

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

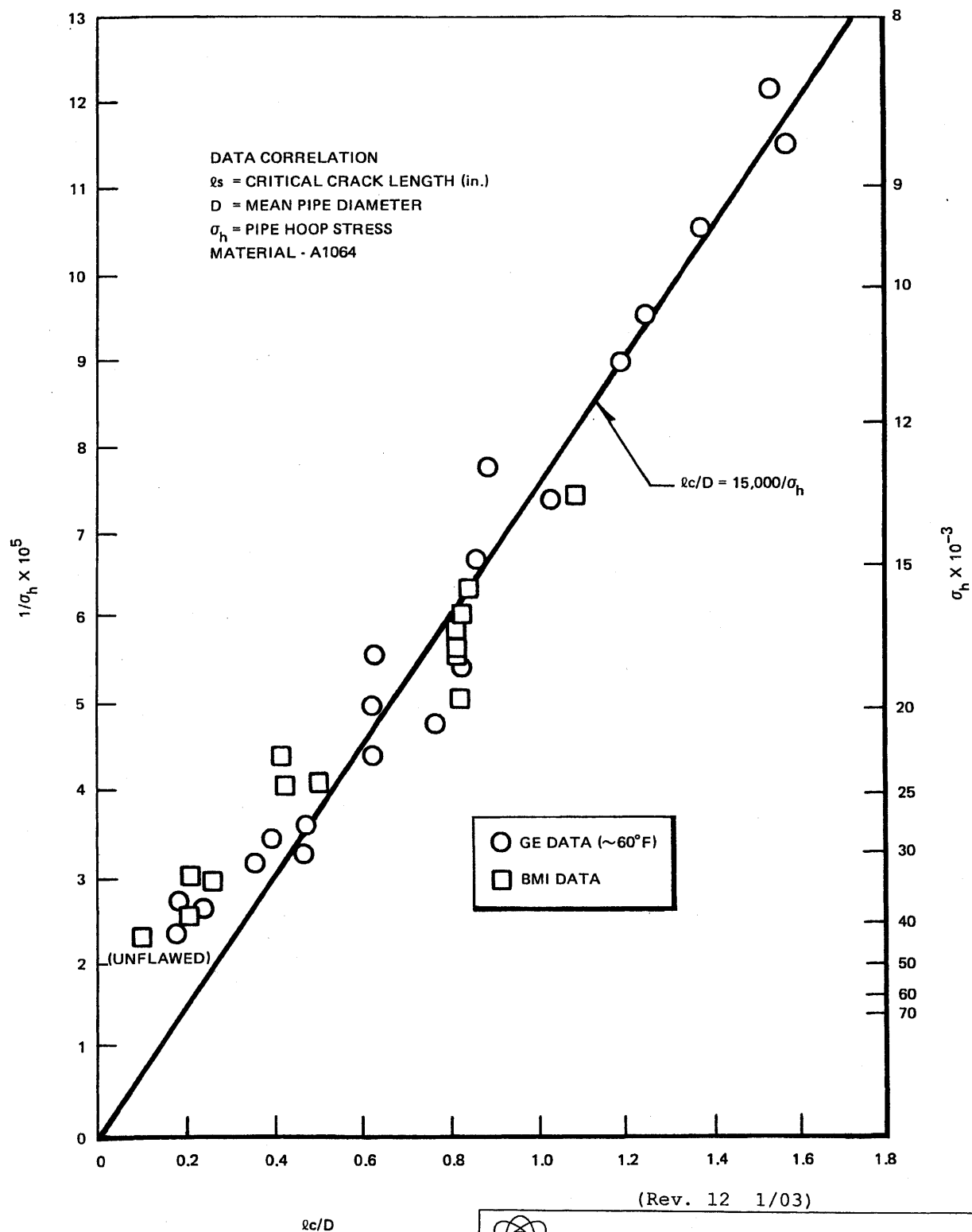
Figure 5.2-14



PERRY NUCLEAR POWER PLANT

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

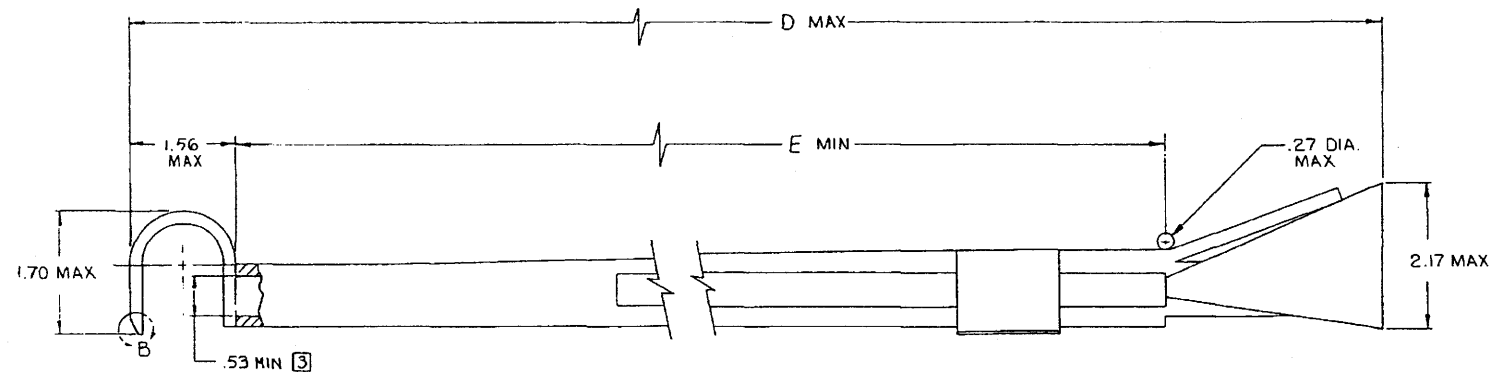
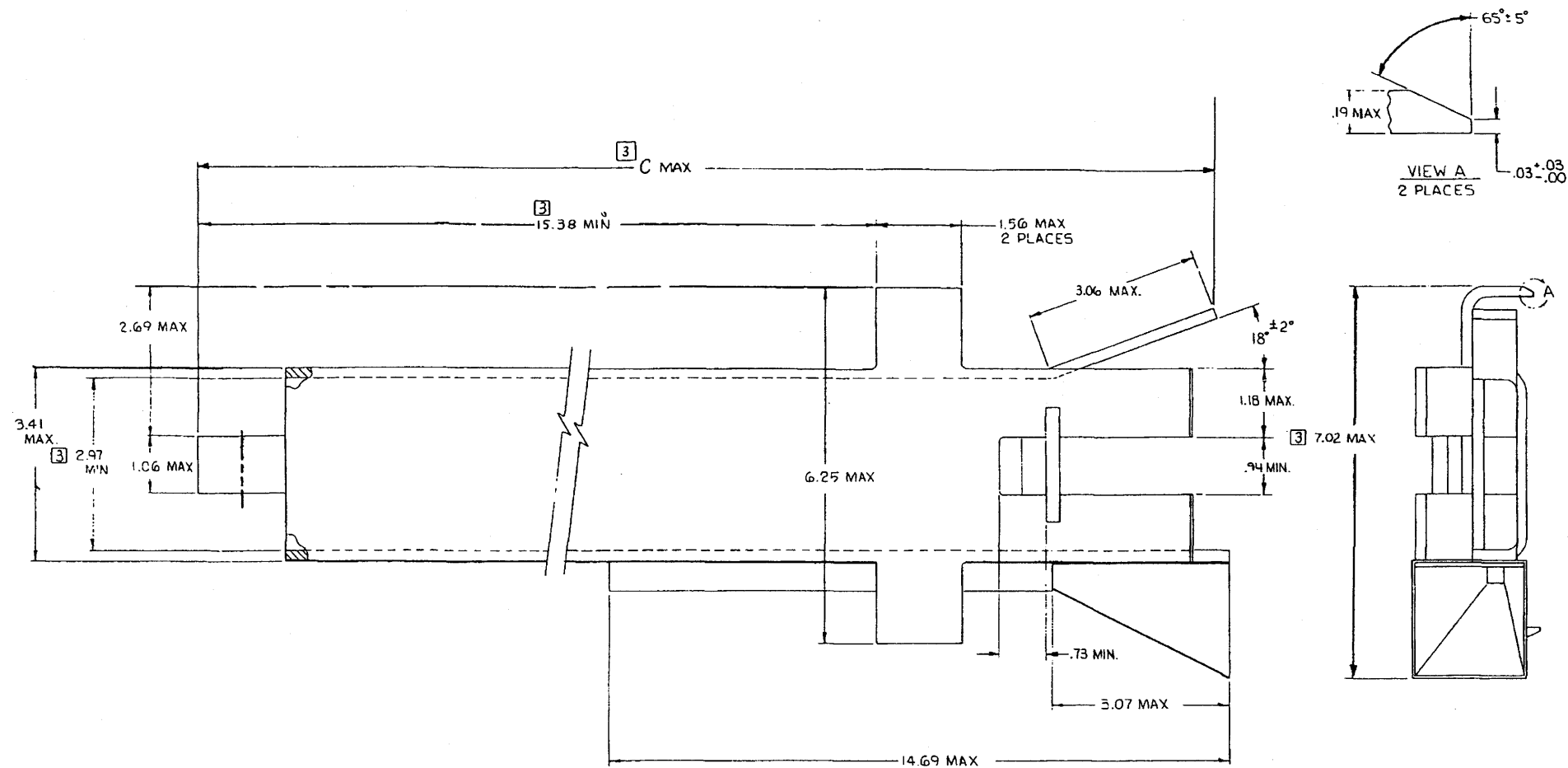
Figure 5.2-15 ...



PERRY NUCLEAR POWER PLANT

Axial Throughwall Crack Length
 Data Correlation

Figure 5.2-16

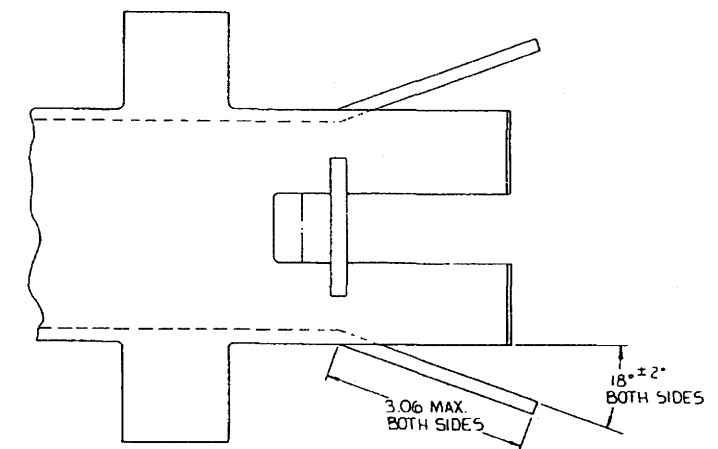


(1) (3) APPROX. WT=6 LBS

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



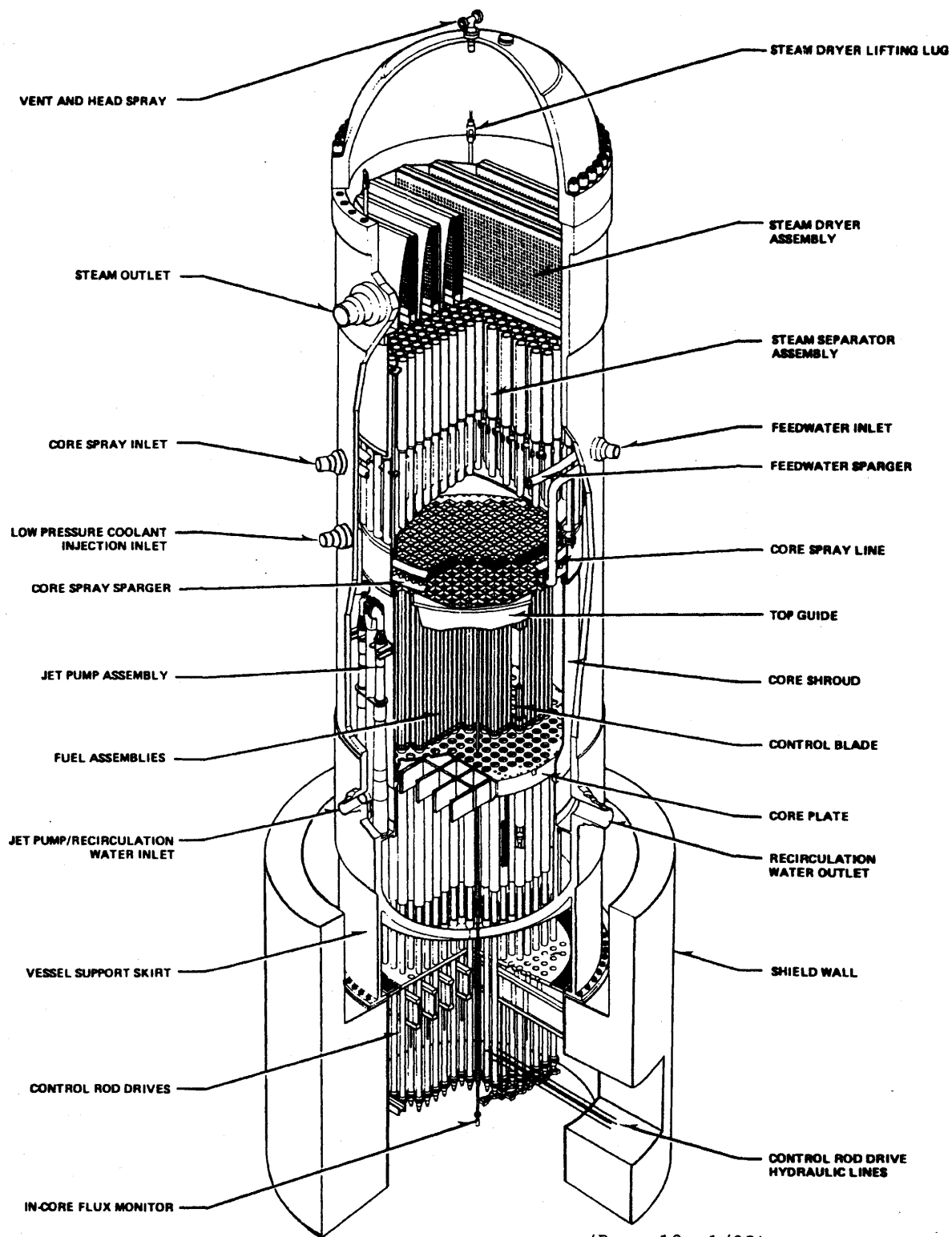
2. OMIT FUNNEL AS SHOWN, OTHERWISE SAME AS PART 1 APPROX. WT=5 LBS
4. OMIT FUNNEL AS SHOWN, OTHERWISE SAME AS PART 3 APPROX. WT=5 LBS.

(Rev. 12 1/03)

PERRY NUCLEAR POWER PLANT

Surveillance Bracket

Figure 5.3-1



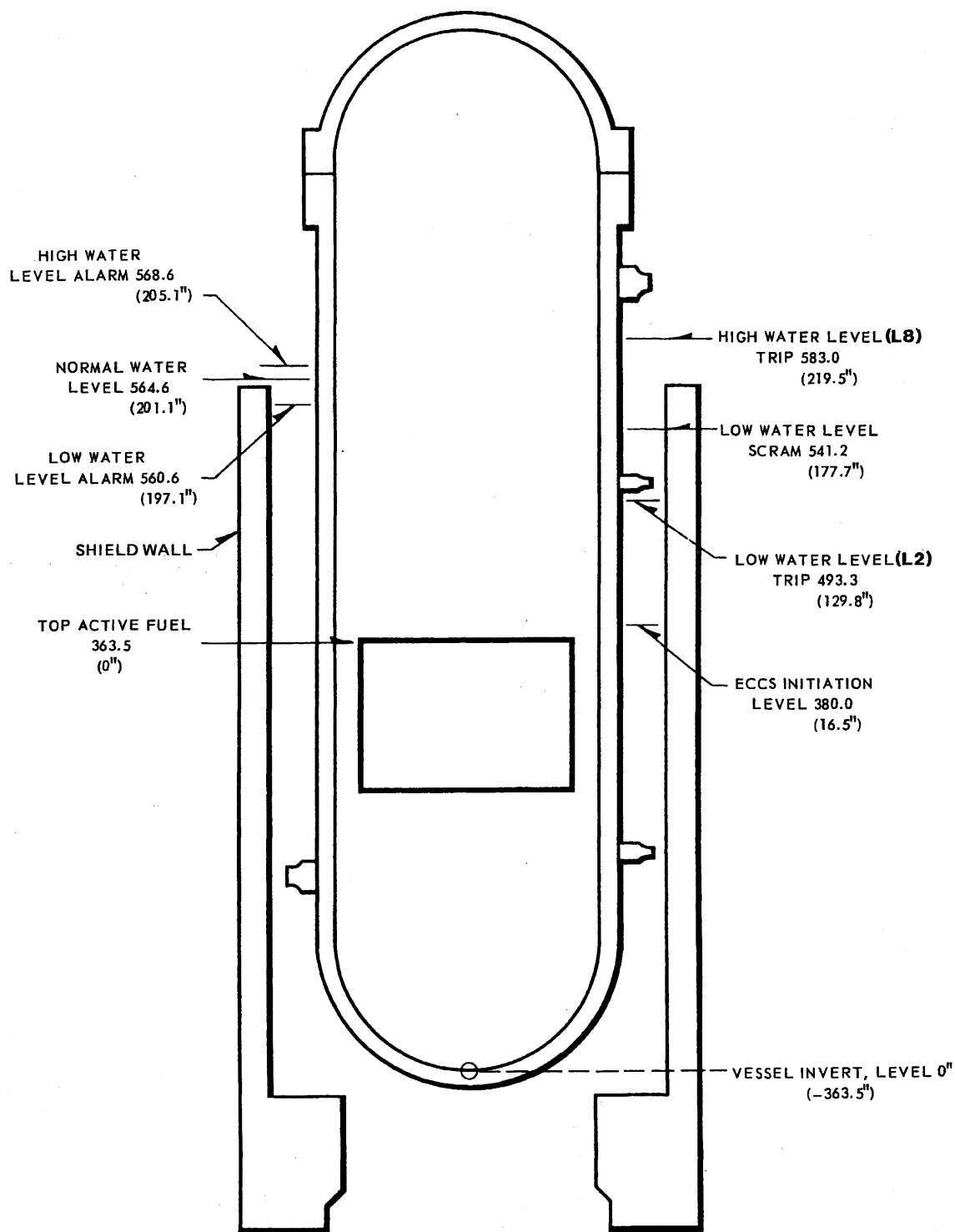
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Reactor Vessel Cutaway Diagram

Figure 5.3-6



(Rev. 12 1/03)

LEGEND:

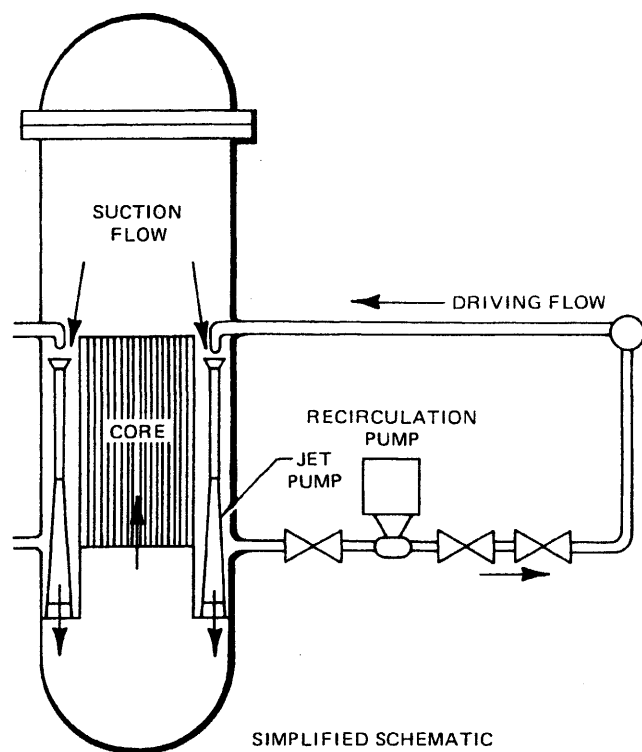
WATER LEVEL ABOVE VESSEL INVERT
(WATER LEVEL ABOVE TOP OF ACTIVE FUEL)



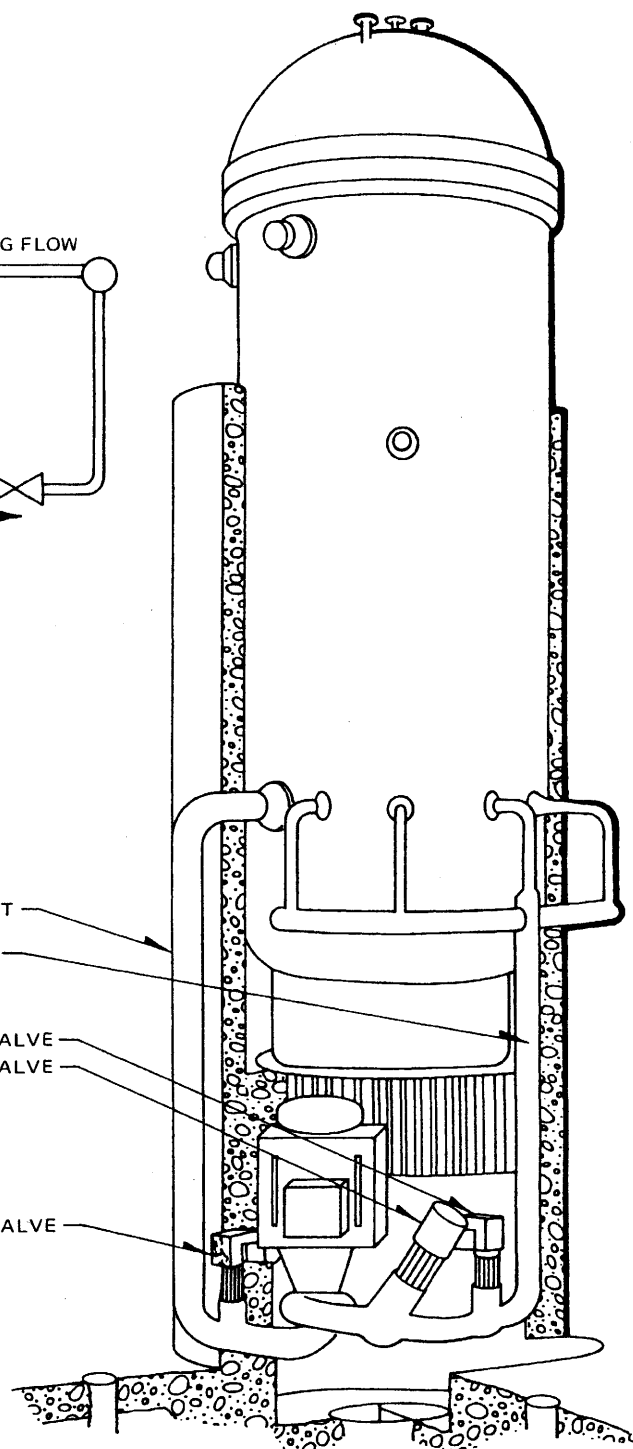
PERRY NUCLEAR POWER PLANT

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

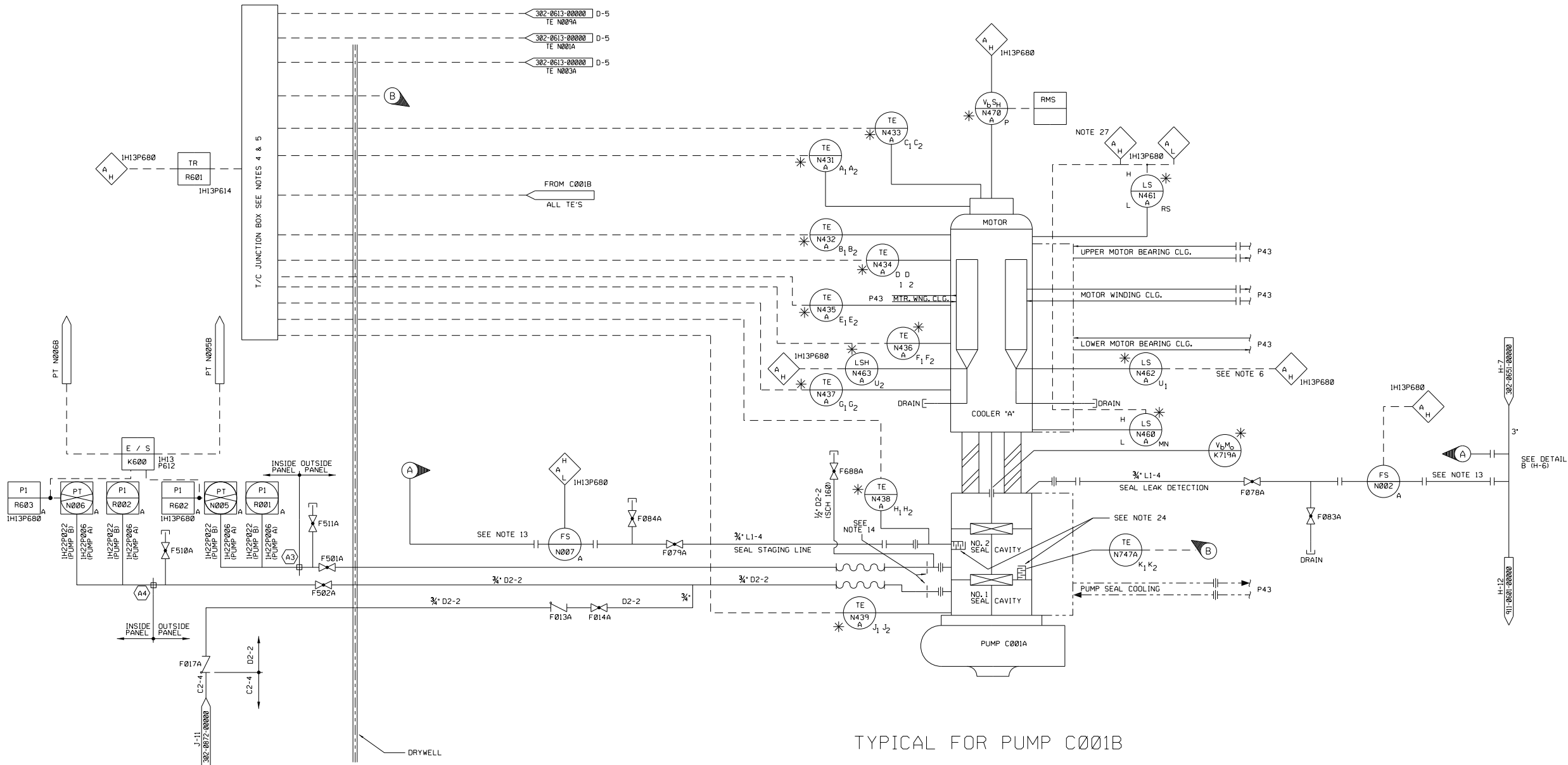
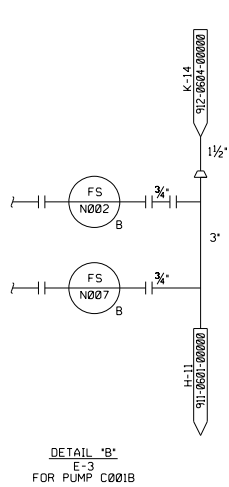
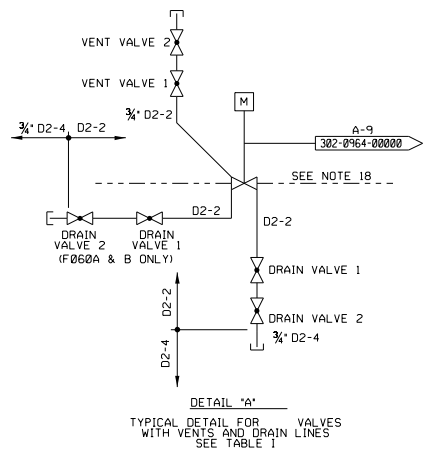


TABLE 1

"A" LOOP				
REMOTE OPERATED VALVES	VENT VALVE		DRAIN VALVE	
	1	2	1	2
F023A	SEE NOTE 23	SEE NOTE 23	F027A	F028A
F067A	SEE NOTE 23	SEE NOTE 23	F070A	F071A
FLOW CONTROL VALVE F060A	SEE NOTE 28	SEE NOTE 28	F686A	F687A
			F065A	F066A
"B" LOOP				
REMOTE OPERATED VALVES	VENT VALVE		DRAIN VALVE	
	1	2	1	2
F023B	SEE NOTE 23	SEE NOTE 23	SEE NOTE 28	SEE NOTE 28
F067B	SEE NOTE 23	SEE NOTE 23	F070B	F071B
FLOW CONTROL VALVE F060B	SEE NOTE 28	SEE NOTE 28	F065B	F066B
			F686B	F687B



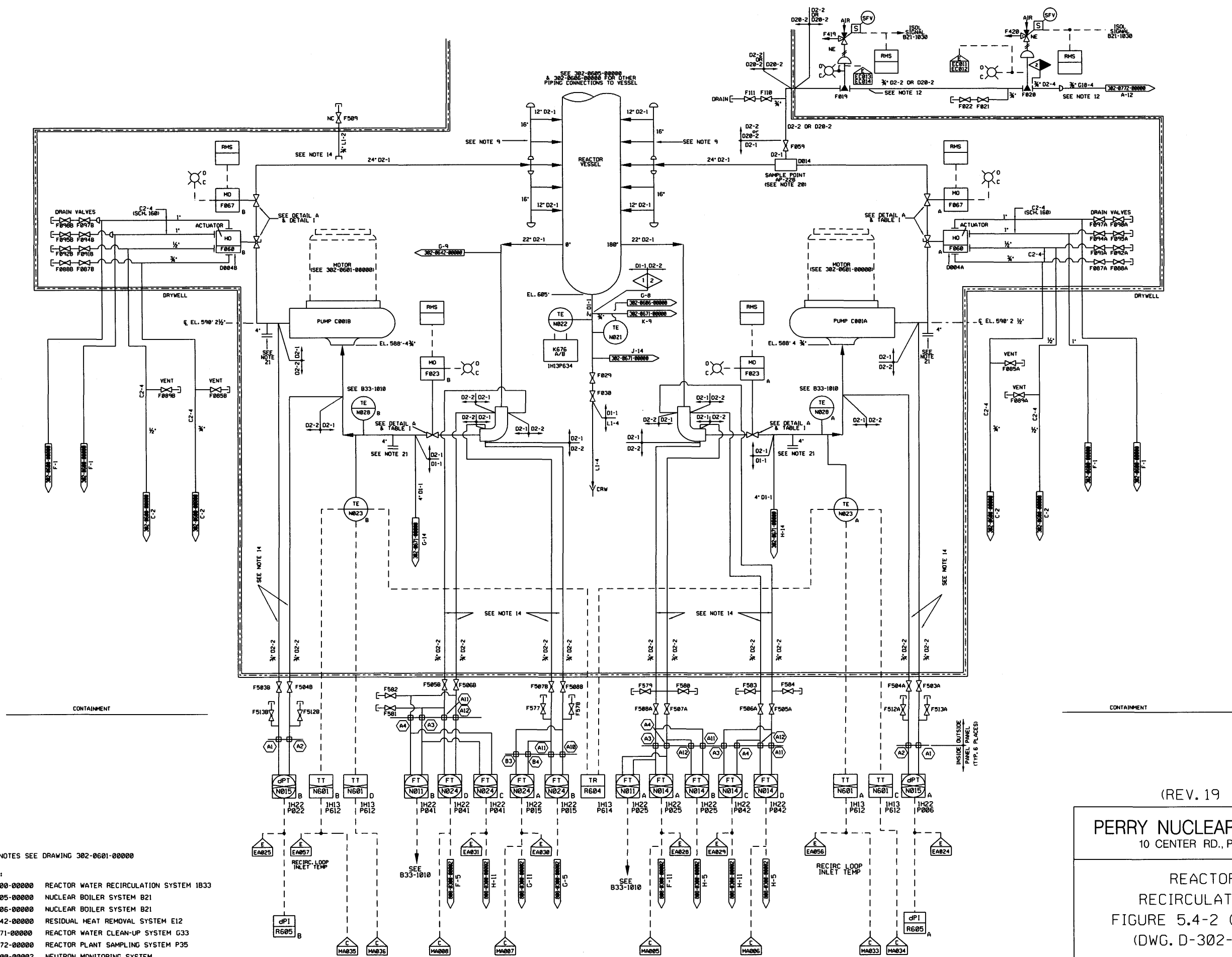
- REFERENCES:
- 302-0605-00000 NUCLEAR BOILER SYSTEM B21
 - 302-0606-00000 NUCLEAR BOILER SYSTEM B21
 - B21-1030 NUCLEAR BOILER SYSTEM FCO
 - 302-0642-00000 RESIDUAL HEAT REMOVAL SYSTEM E12
 - 302-0772-00000 REACTOR PLANT SAMPLING SYSTEM P35
 - 808-0300-00000 NEUTRON MONITORING SYSTEM IED
 - 302-0671-00000 REACTOR WATER CLEAN-UP SYSTEM G33
 - 302-0964-00000 LEAK DETECTION SYSTEM E31
 - 302-0872-00000 CONTROL ROD DRIVE HYDRAULIC SYSTEM C11
 - A62-4240 WATER SAMPLING REQUIREMENT
 - 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 FCO
 - B33-4010 REACTOR RECIRCULATION SYSTEM DESIGN SPECIFICATION
 - 302-0613-00000 NUCLEAR CLOSED COOLING SYSTEM P43
 - 911-0601-00000 REACTOR BLDG DRAINS P68
 - 912-0604-00000 CONTAINMENT VESSEL AND DRYWELL PURGE M14
 - 302-0651-00000 FUEL POOL COOLING AND CLEAN-UP SYSTEM G41
 - 302-0431-00000 POST ACCIDENT SAMPLING SYSTEM P87

- NOTES:
- DELETED
 - FOR LOCATION AND IDENTIFICATION OF INSTRUMENTS, SEE INSTRUMENT DATA SHEET LISTED IN MPL.
 - CLOSED COOLING WATER SYSTEM TO AND FROM THE RECIRCULATION PUMP SHALL BE CAPABLE OF CONTINUOUS OPERATION INCLUDING PERIODS OF DRYWELL ISOLATION.
 - WHERE THERMOCOUPLES ARE DESIGNATED A₁, A₂, ETC. A₂ IS A SPARE ELEMENT.
 - LIST OF PUMP AND MOTOR AUXILIARY INSTRUMENTATION (* SUPPLIED W/ C001):
 - TE/A₁A₂ - THRUST BEARING UPPER FACE
 - TE/B₁B₂ - THRUST BEARING LOWER FACE
 - TE/C₁C₂ - UPPER GUIDE BEARING
 - TE/D₁D₂ - MOTOR WINDING A
 - TE/E₁E₂ - MOTOR WINDING B
 - TE/F₁F₂ - MOTOR WINDING C
 - TE/G₁G₂ - LOWER GUIDE BEARING
 - TE/H₁H₂ - NO. 2 SEAL CAVITY
 - TE/J₁J₂ - NO. 1 SEAL CAVITY
 - TE/N009 - MOTOR WINDING COOLING WATER DISCHARGE (MPL* B33N009A&B)
 - TE/N001 - MOTOR BEARING OIL COOLING WATER DISCHARGE (MPL* B33N001A&B)
 - TE/N003 - PUMP SEAL COOLING WATER DISCHARGE (MPL* B33N003A&B)
 - LS_M/MN - MOTOR LOWER BEARING OIL HIGH/LOW LEVEL SWITCH
 - TE/K₁K₂ - SEAL INTERSTAGE PRESSURE BREAKDOWN OUTLET
 - V_bS_H/P - MOTOR VIBRATION SWITCH
 - LS_H/RS - MOTOR UPPER BEARING OIL HIGH/LOW LEVEL SWITCH
 - LS_M/U₁ - MOTOR COOLING COILS DRAIN HIGH LEVEL SWITCH
 - FS_L/N008 - MOTOR WINDING LOW FLOW SWITCH
 - LS_H/U₂ - MOTOR COOLING COILS DRAIN HIGH LEVEL SWITCH
 - FS/N004 - PUMP SEAL COOLING WATER LOW FLOW SWITCH
 - FS_H/L/N007 - PUMP SEAL STAGING LINE HIGH AND LOW FLOW SWITCH
 - FS_H/N002 - PUMP SEAL LEAKAGE HIGH FLOW SWITCH
 - V_bM_b - SHAFT VIBRATION MONITOR
- ALL THERMOCOUPLES ARE TO BE WIRED OUT THROUGH DRYWELL TO T/C JUNCTION BOX.
- A LEVEL SWITCH IS SUPPLIED WITH EACH COOLER TO DETECT COOLING WATER LEAKAGE OR CONDENSATE BUILDUP IN THE COOLER HOUSING.
 - DELETED
 - ALL MOTOR OPERATED AND AIR OPERATED PILOT SOLENOID VALVES ARE AC, UNLESS NOTED OTHERWISE.
 - FOR NUMBER OF RISERS, JET PUMP INSTRUMENTATION, AND NUMBER AND SIZE OF BOTTOM HEAD DRAIN LINES, SEE REACTOR RECIRCULATION SYSTEM P&ID DATA.
 - THE DESIGN PRESSURE AND TEMPERATURE RATINGS FOR THE RECIRCULATION PIPING AND EQUIPMENT ARE SHOWN IN THE SYSTEM DESIGN SPEC. (B33-4010)
 - CLOSED COOLING WATER TO THE MOTOR BEARING IS TO SERVE BOTH THE UPPER BEARING AND THE LOWER MOTOR BEARING. THE RETURN FLOWS ARE JOINED UPSTREAM OF THE TEMPERATURE ELEMENT.
 - 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 MAXIMIZE TURBULENT 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.
 - 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.
 - A 3000LB 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 RELEASE OUTSIDE THE DRYWELL FOLLOWING A LINE BREAK. (RESTRICTING TEE AT F688A AND B VENT BRANCH)
 - ALL EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY THE SYSTEM B33, UNLESS OTHERWISE SPECIFIED.
 - THIS SYSTEM P&ID DRAWING SHEETS 302-0601-00000 AND 302-0602-00000 WERE PHOTOGRAPHIC COPIES OF G.E. DWG 762E268 SHEETS 1 AND 2 WHICH WERE SUBSEQUENTLY REPLACED BY G.E. DWG 765E369 P&ID DRAWINGS 302-0603-00000 AND 302-0604-00000 ARE REPRODUCED FROM G.E. DWG 769E369A. SPECIFIC REVISION BENEATH TITLE BLOCK.
 - THIS INSTRUMENT IS SHOWN FOR COMPLETENESS OF PANEL CONNECTIONS ONLY. FOR INSTRUMENT FUNCTION AND CONNECTION TO SYSTEM, SEE APPROPRIATE SYSTEM DIAGRAM.
 - F060 FLOW CONTROL VALVE ONLY HAS TWO SEAL LEAK-OFF DRAINS WHICH SHALL BE CONNECTED TOGETHER EXTERNALLY.
 - DELETED
 - THE SAMPLE PROBE SHALL BE LOCATED ON A VERTICAL SECTION OF THE RETURN LEG.
 - DECONTAMINATION CONNECTIONS TO BE READILY ACCESSIBLE FOR CONVENIENT AND RAPID CONNECTION OF TEMPORARY PIPING.
 - NON-SAFETY ACTUATION LINES FOR B33-D003A AND B HPU'S TO B33-D004A AND B. ACTUATORS SHALL BE SEISMICALLY SUPPORTED THRU THE DRYWELL PENETRATION INCLUDING PIPING ADJACENT TO THE DRYWELL IMMEDIATELY INBOARD AND OUTBOARD OF THE PENETRATION.
 - VENT VALVES REMOVED AND LINE PLUGGED/CAPPED AT VALVE FOR 1B33-F023A/B AND 1B33-F067A/B.
 - INTERSTAGE AND CONTROLLED BLEEDOFF PRESSURE BREAKDOWN LABYRINTHS (1/8 INCH TUBE HELICES IN THE SEAL CARTRIDGE.)
 - THE PIPE NIPPLE ATTACHMENT FROM VALVE 1B33F0660B TO VENT VALVE 1B33F0647B IS SCHEDULE 160.
 - THE PIPING AND VALVES IN THE VENT/DRAIN APPENDAGE (AS DENOTED IN TABLE 1) DO NOT ENTIRELY CONFORM TO LINE SPECIFICATION D2-2. SEE PIPING ISOMETRIC DWG. 304-0601-00103 FOR DETAILS.
 - HIGH ALARM FOR LEVEL SWITCHES N460 AND N461 ONLY APPLICABLE TO PUMP C001B. ALARM REMOVED FOR PUMP C001A.
 - DRAIN VALVES REMOVED AND LINE PLUGGED AT VALVE FOR 1B33-F023B. VENT VALVES REMOVED AND LINE PLUGGED AT VALVE 1B33-F060A/B.

(REV. 20 10/2017)

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

REACTOR WATER
RECIRCULATION SYSTEM
FIGURE 5.4-2 (SHEET 1 OF 4)
(DWG. D-302-0601-00000)



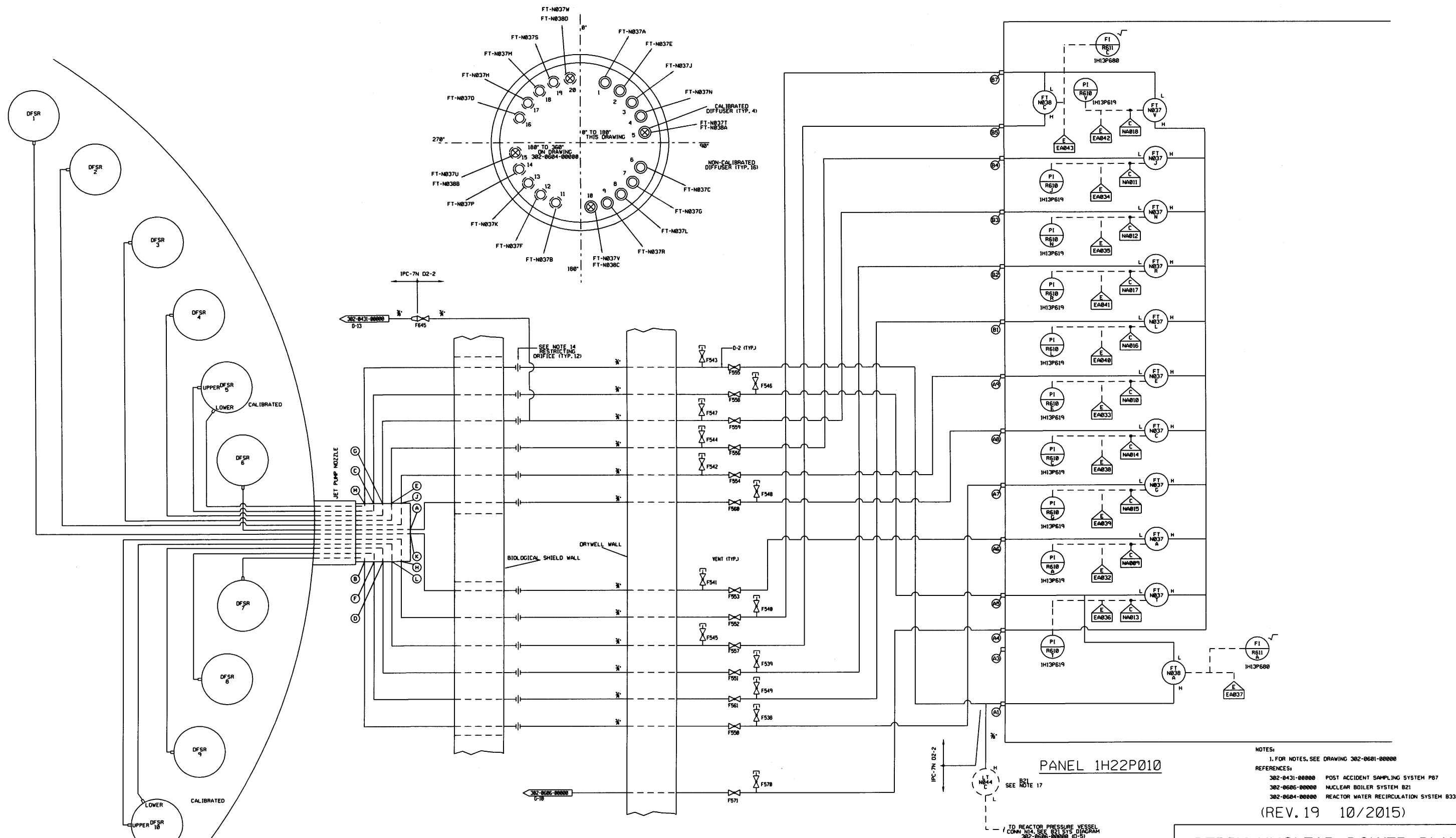
NOTES:
1. FOR NOTES SEE DRAWING 302-0601-00000

REFERENCES:
302-0600-00000 REACTOR WATER RECIRCULATION SYSTEM IB33
302-0605-00000 NUCLEAR BOILER SYSTEM B21
302-0606-00000 NUCLEAR BOILER SYSTEM B21
302-0642-00000 RESIDUAL HEAT REMOVAL SYSTEM E12
302-0671-00000 REACTOR WATER CLEAN-UP SYSTEM G33
302-0772-00000 REACTOR PLANT SAMPLING SYSTEM P35
808-0300-00002 NEUTRON MONITORING SYSTEM

(REV. 19 10/2015)

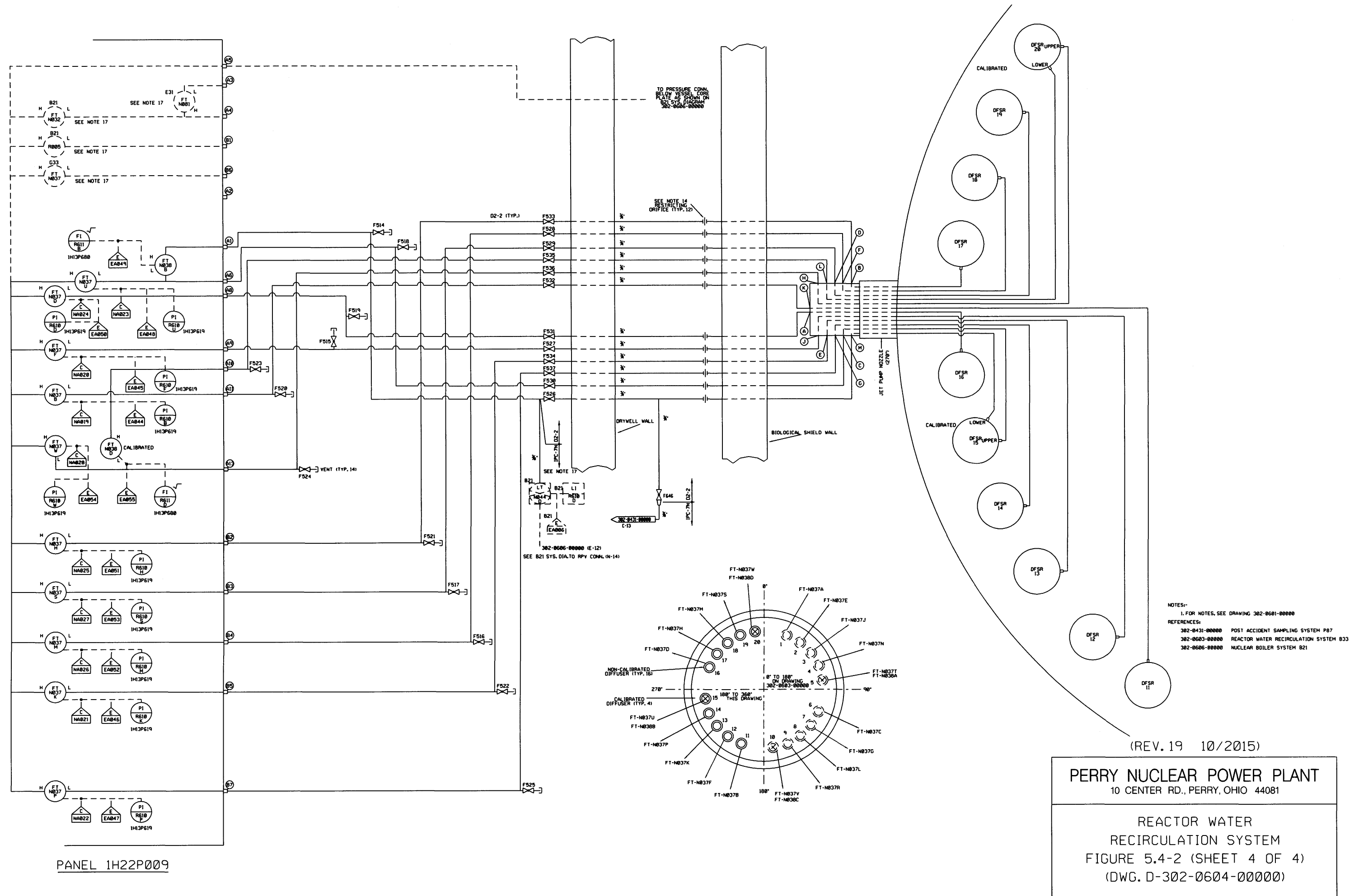
PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

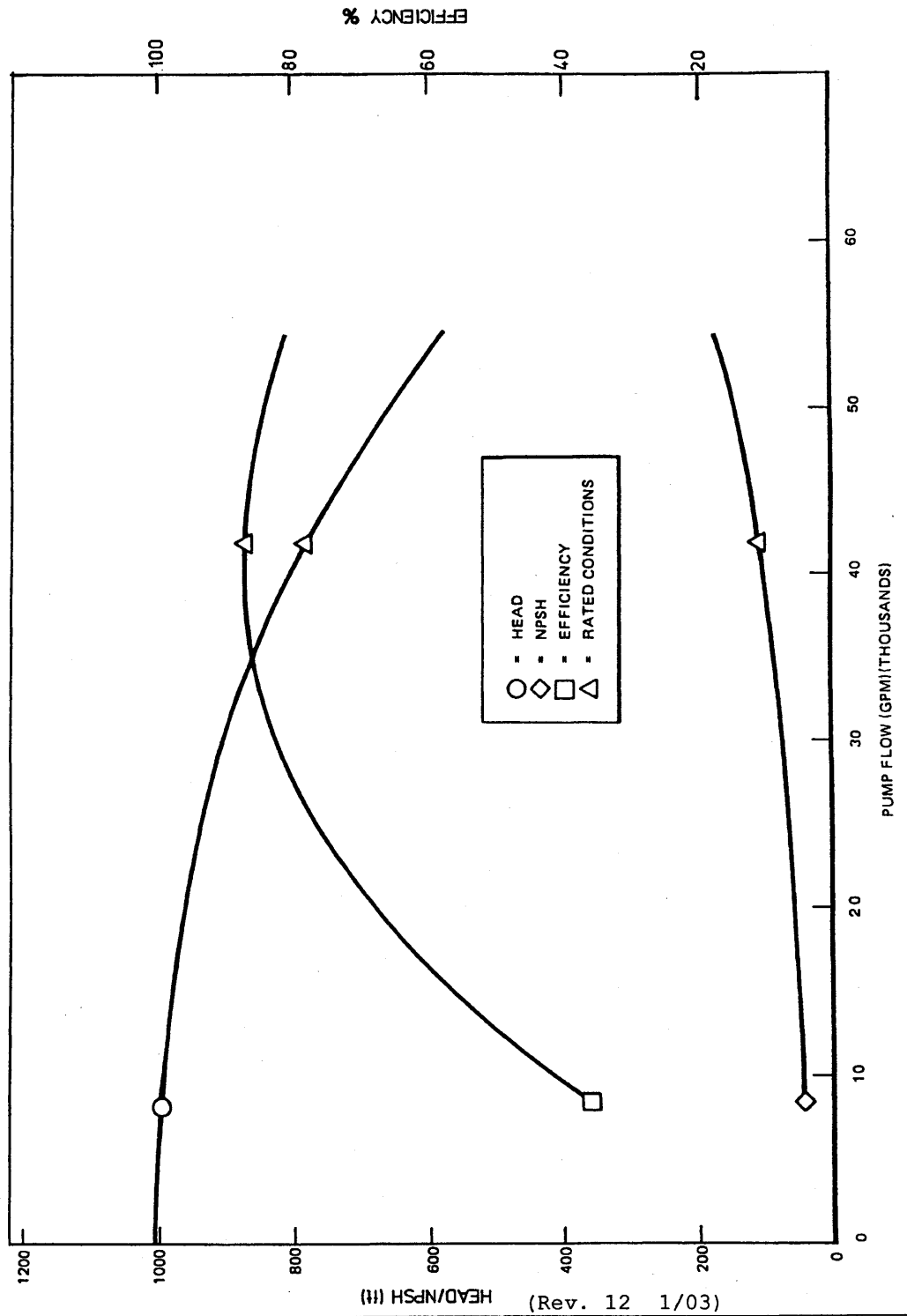
REACTOR WATER
RECIRCULATION SYSTEM
FIGURE 5.4-2 (SHEET 2 OF 4)
(DWG. D-302-0602-00000)



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)





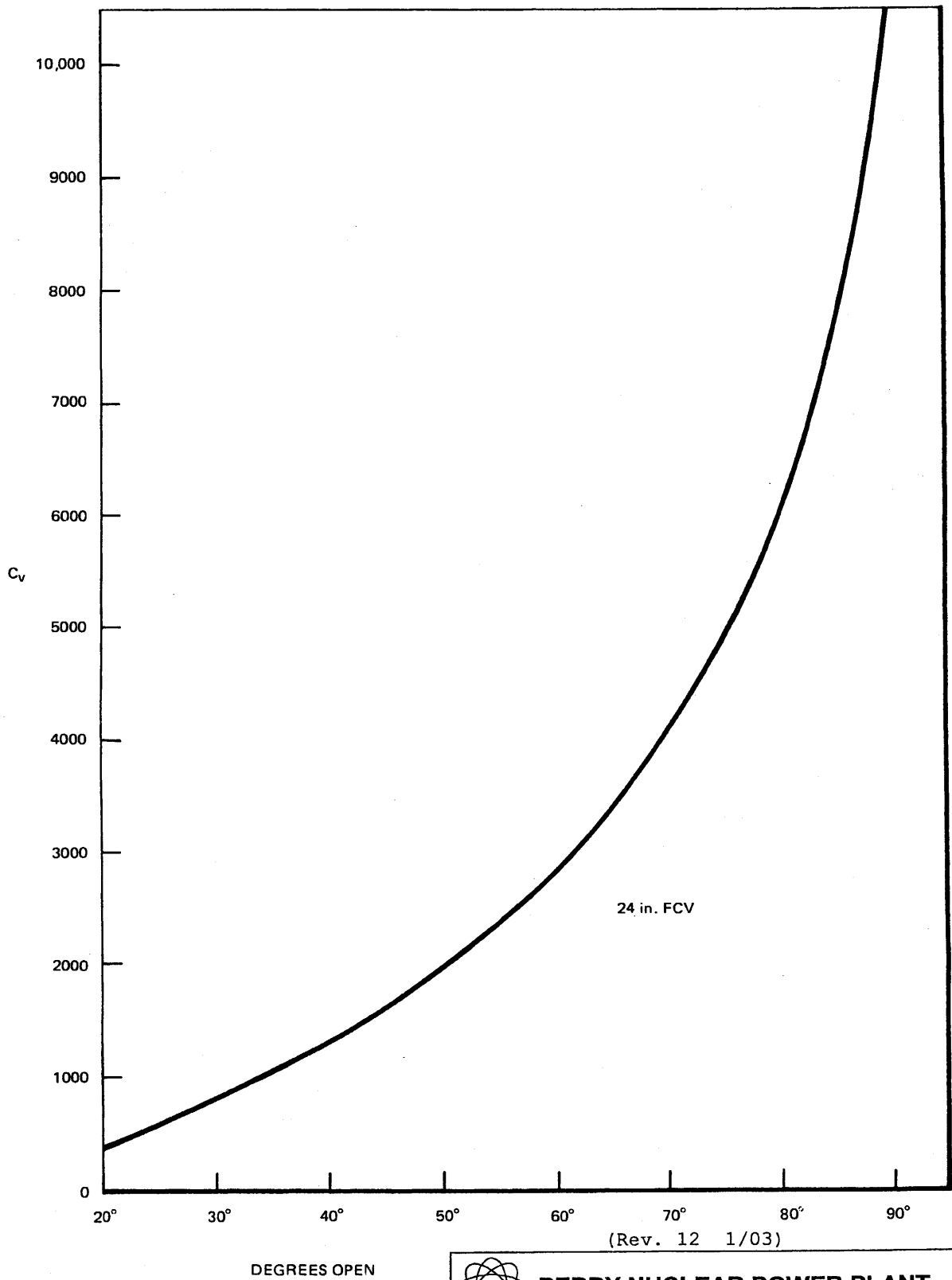
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Typical Recirculation Pump Head,
NPSH, and Efficiency Curves

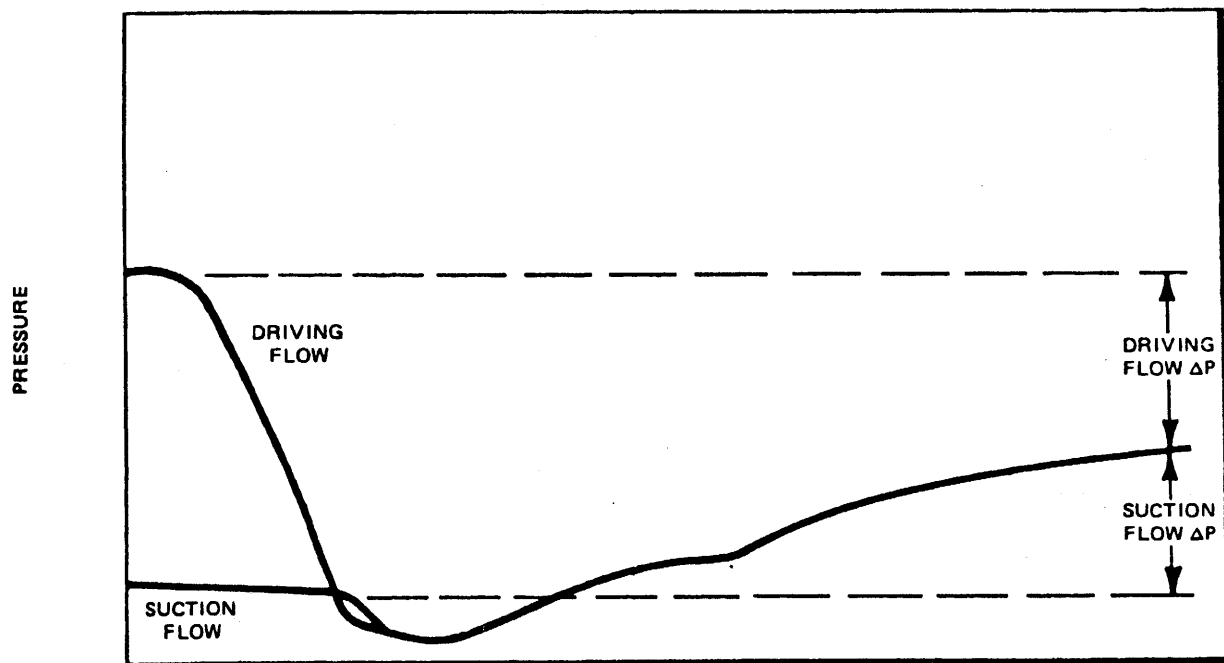
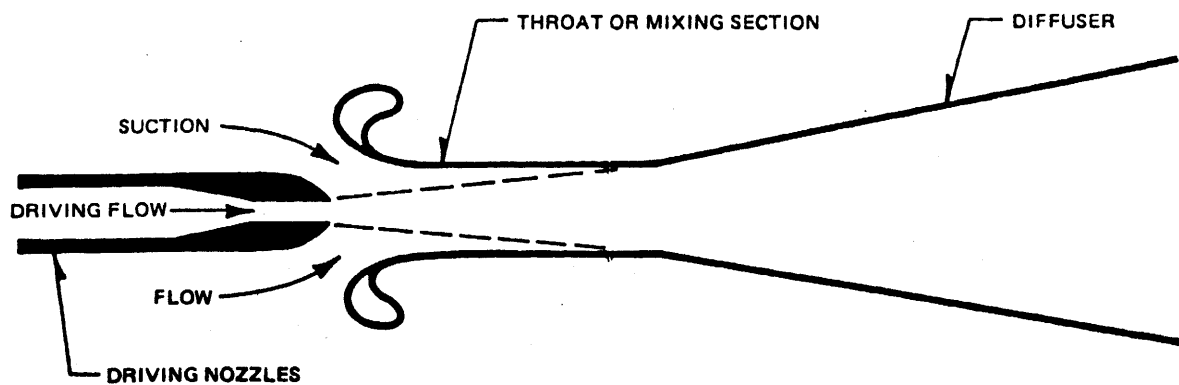
Figure 5.4-3



PERRY NUCLEAR POWER PLANT

Typical Flow Control
Valve Characteristic

Figure 5.4-4



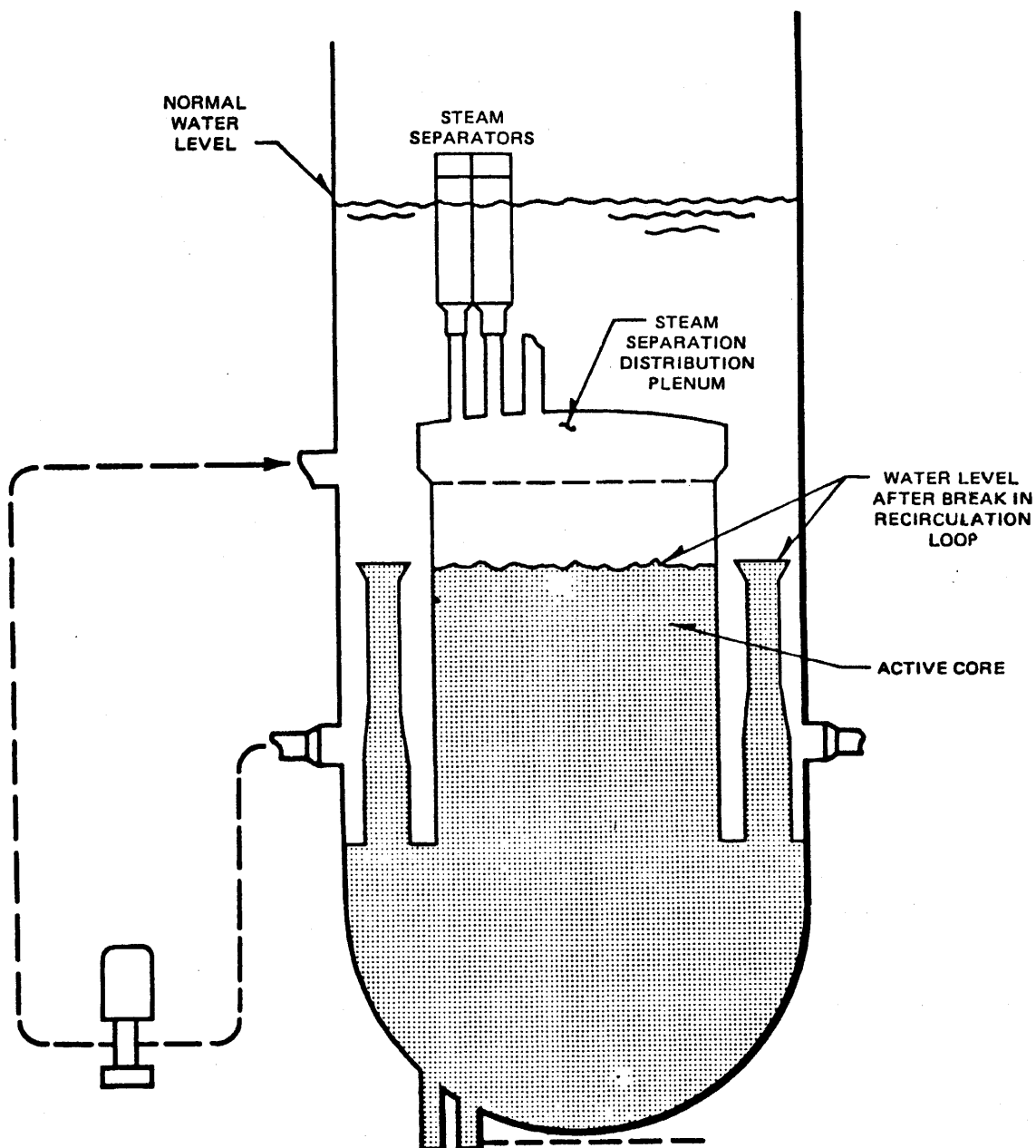
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Operating Principle of Jet Pump

Figure 5.4-5



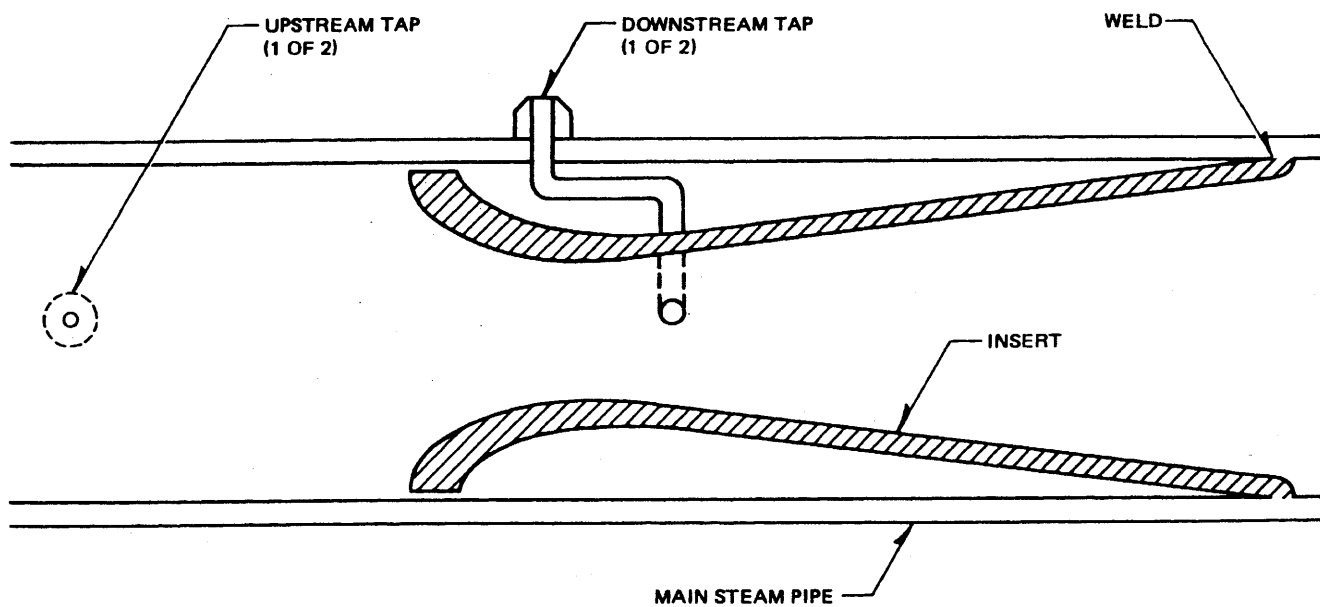
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Core Flooding Capability of
Recirculation System

Figure 5.4-6



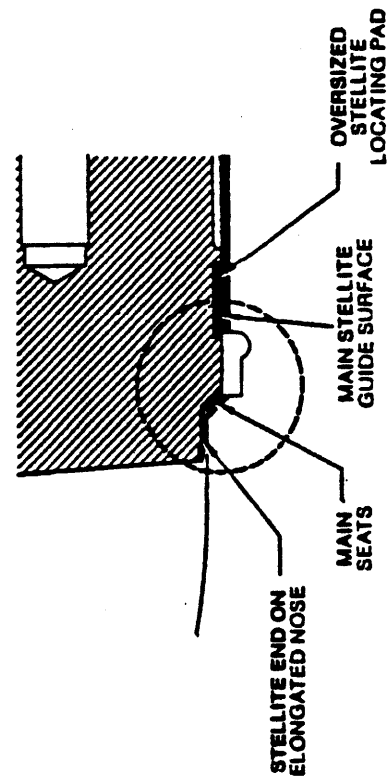
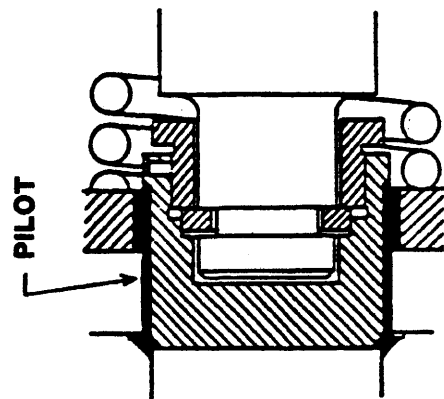
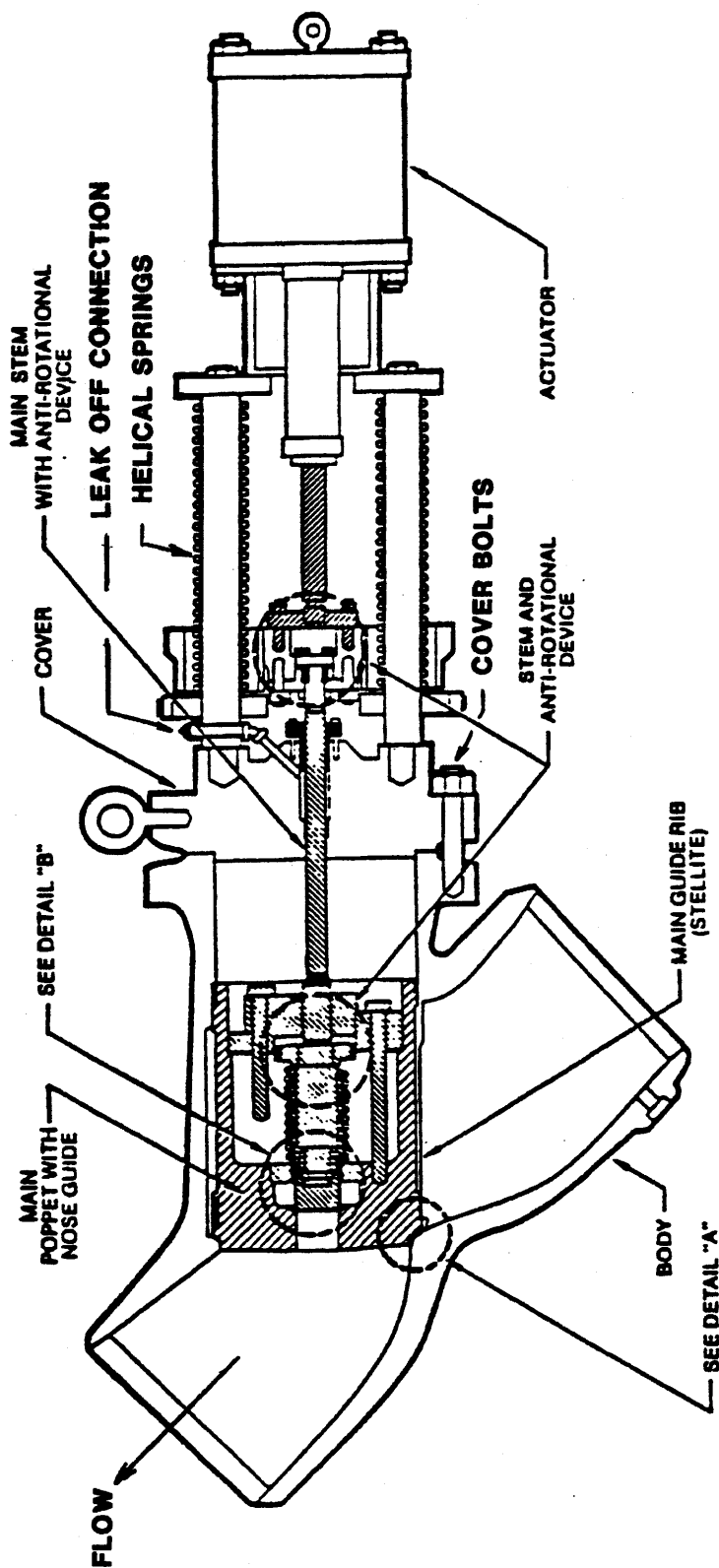
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Main Steamline Flow Restrictor

Figure 5.4-7



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

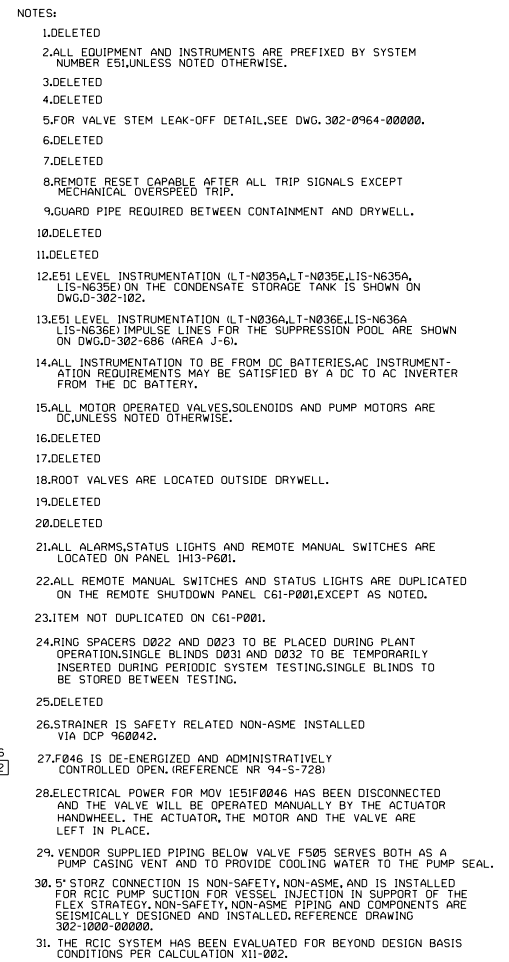
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Main Steam Isolation Valve

Figure 5.4-8



REFERENCES:

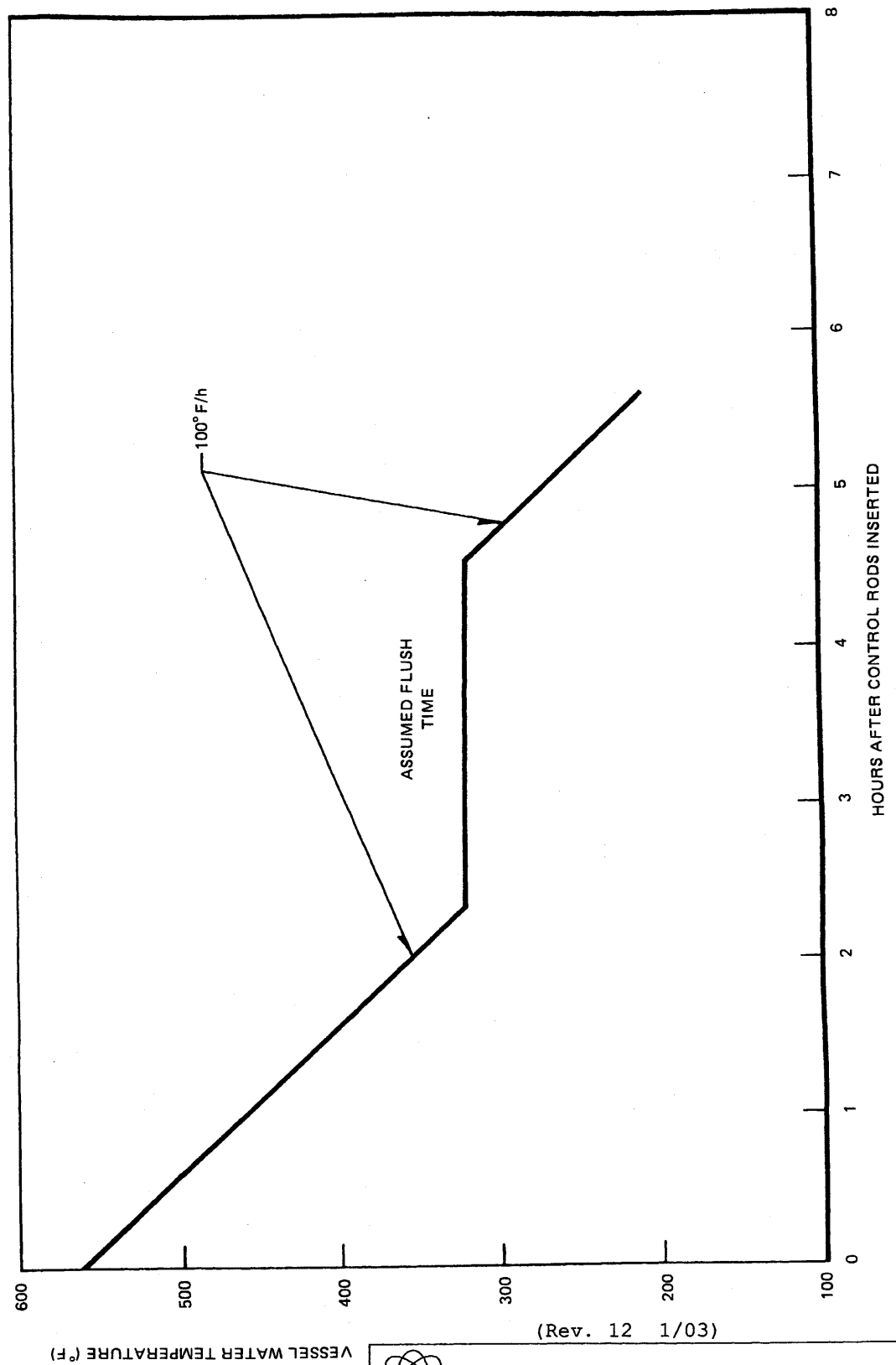
302-0605-00000	NUCLEAR BOILER SYSTEM B21
302-0642-00000	RHR SYSTEM E12
302-0643-00000	RHR SYSTEM E12
302-0964-00000	LEAK DETECTION SYSTEM E31
A62-4350	MECHANICAL EQUIPMENT SEPARATION
302-0102-00000	CONDENSATE TRANSFER SYSTEM P11
302-0124-00000	MAIN, REHEAT, EXTRACTION AND MISCELLANEOUS DRAINS N21
E51-1020	RCIC PROCESS DIAGRAM
E51-1050	RCIC ELEMENTARY DIAGRAM
808-0314 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
911-0617-00000	AUXILIARY BUILDING DRAINS SYSTEM,P68
302-0574-00000	EMERGENCY CORE COOLING SYSTEM SUCTION STRAINER T21

(REV. 20 10/2017)

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

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

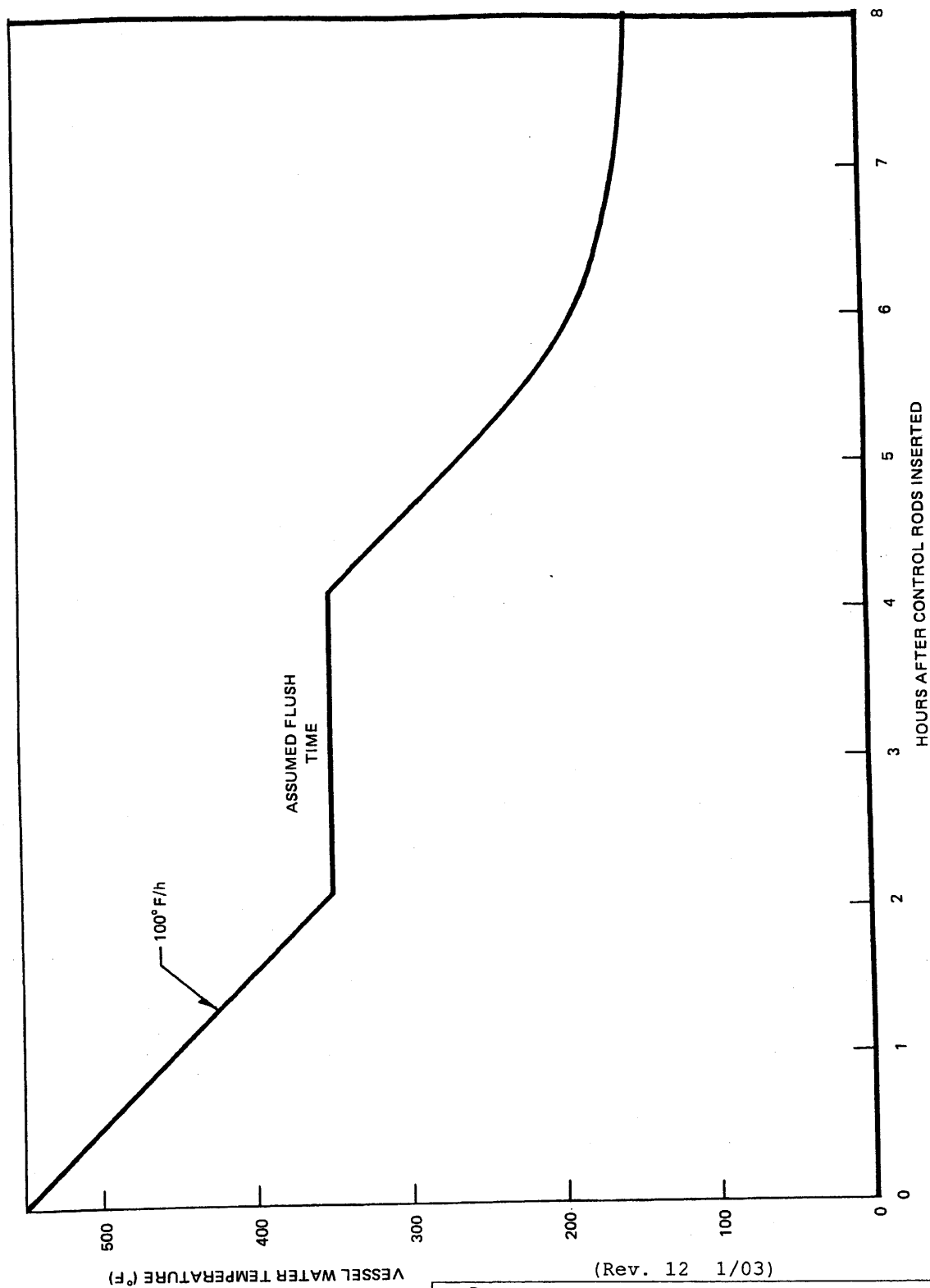
Figure 5.4-9 (Sheet 2 of 2)
(Dwg. D-302-632)



PERRY NUCLEAR POWER PLANT

Vessel Coolant Temperature vs
Time (Two Heat Exchangers Available)

Figure 5.4-11



(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Vessel Coolant Temperature vs
Time (One Heat Exchanger Available)

Figure 5.4-12

- NOTES:
1. DELETED.
 2. DELETED.
 3. DELETED.
 4. DELETED.
 5. DELETED.
 6. ALL EQUIPMENT AND INSTRUMENTS ARE PREFIXED BY SYSTEM E12, UNLESS OTHERWISE NOTED.
 7. ALL MOTOR OPERATED VALVES ARE AC OPERATED, UNLESS OTHERWISE NOTED.
 8. DELETED.
 9. VALVE SHOULD BE INSTALLED WITH PACKING GLAND(S) ON UPSTREAM SIDE OF DISK. ALTERNATIVELY, THE PACKING GLAND(S) CAN BE ON THE DOWNSTREAM SIDE OF THE DISK PROVIDED THE PACKING IS TESTED FOR LEAKAGE.
 10. DELETED.
 11. DELETED.
 12. PROVISION FOR CONTAINMENT ISOLATION SHALL BE IN ACCORDANCE WITH CURRENT LICENSING REQUIREMENTS.
 13. GUARD PIPE REQUIRED BETWEEN DRYWELL WALL AND CONTAINMENT.
 14. DELETED.
 15. DELETED.
 16. DELETED.
 17. DELETED.
 18. DELETED.
 19. DELETED.
 20. DELETED.
 21. DELETED.
 22. DELETED.
 23. FOR DESCRIPTION OF SAMPLE TYPES, SEE DWG. D-302-771.
 24. HIGH CONTAINMENT PRESSURE SIGNAL IN CONJUNCTION WITH A LOCA SIGNAL (AND 10 MINUTE TIME DELAY) OPENS IMOI F020A & B AND IMOI F537A & E.
 25. DELETED.
 26. ALL REMOTE MANUAL SWITCHES, ALARMS, AND INDICATING LIGHTS ARE LOCATED ON H13-P601, UNLESS OTHERWISE NOTED.
 27. DELETED.
 28. LOCKED OPEN TO PREVENT OVERPRESSURIZATION VIA LEAKAGE ACROSS F071B.
 29. RING SPACERS D050A AND B TO BE PLACED DURING PLANT OPERATION. SINGLE BLINDS D008A AND B TO BE TEMPORARILY INSERTED DURING PERIODIC SYSTEM TESTING. SINGLE BLINDS TO BE STORED IN BETWEEN TESTS.
 30. VALVES F010A AND C TO BE THROTTLED TO ACHIEVE REQUIRED PUMP MINIMUM FLOW OF 1050 GPM (INDICATED) BASED ON APPROPRIATE CERTIFIED PUMP CURVE FOR EACH LOOP AND LOCKED IN THAT POSITION. THE DESIGN MINIMUM PERMITTED PUMP FLOW IS 1250 GPM.
 31. DELETED.
 32. STRAINER T21E0001 IS SAFETY RELATED NON-ASME.
 33. DELETED.
 34. EIGHT (8) STRAP-ON RTD'S UTILIZED FOR RHR HEAT EXCHANGER PERFORMANCE TESTING (B9-13), TYPICAL 6 PLACES.
 35. CHECK VALVE INTERNALS REMOVED FROM I12F046B (VALVE FUNCTIONS AS STRAIGHT PIPE).
 36. D051A & B TO USE BLANK FLANGE DURING NORMAL OPERATION AND SPACER DURING REFUEL OPERATION.
 37. THE DIAPHRAGM ACTUATOR, BONNET, YOKE, VALVE STEM AND PLUG HAVE BEEN REMOVED FROM VALVES F050A & F050B AND REPLACED WITH A BLIND BONNET. (VALVE FUNCTIONS AS STRAIGHT PIPE.)
 38. VALVES F026A/B HAVE BEEN DETERMINATED AT THE MCC COMPARTMENT. THEY ARE REQUIRED TO MAINTAIN THE STRUCTURAL AND SEISMIC INTEGRITY OF THE PIPING SYSTEM AND TO MAINTAIN A PRESSURE BOUNDARY.
 39. THE PIPING AND COMPONENTS BETWEEN BLINDS D0505A/B AND D0506A/B ARE INACTIVE AND ARE REQUIRED ONLY FOR THE SEISMIC AND STRUCTURAL INTEGRITY OF THE PIPING SYSTEM.
 40. VALVE DISK MODIFIED TO ADDRESS OVER PRESSURE PROTECTION.
 41. RHR A/B PUMP BYPASS LINES, INCLUDING VALVES I12F0011A/B, ARE SEISMICALLY QUALIFIED. REFER TO ECP 13-0519. VALVE I12F0025A IS ALSO SEISMICALLY QUALIFIED.
 42. HYDROLASE CONNECTION INSTALLED PER ISS-2000.

REFERENCES:

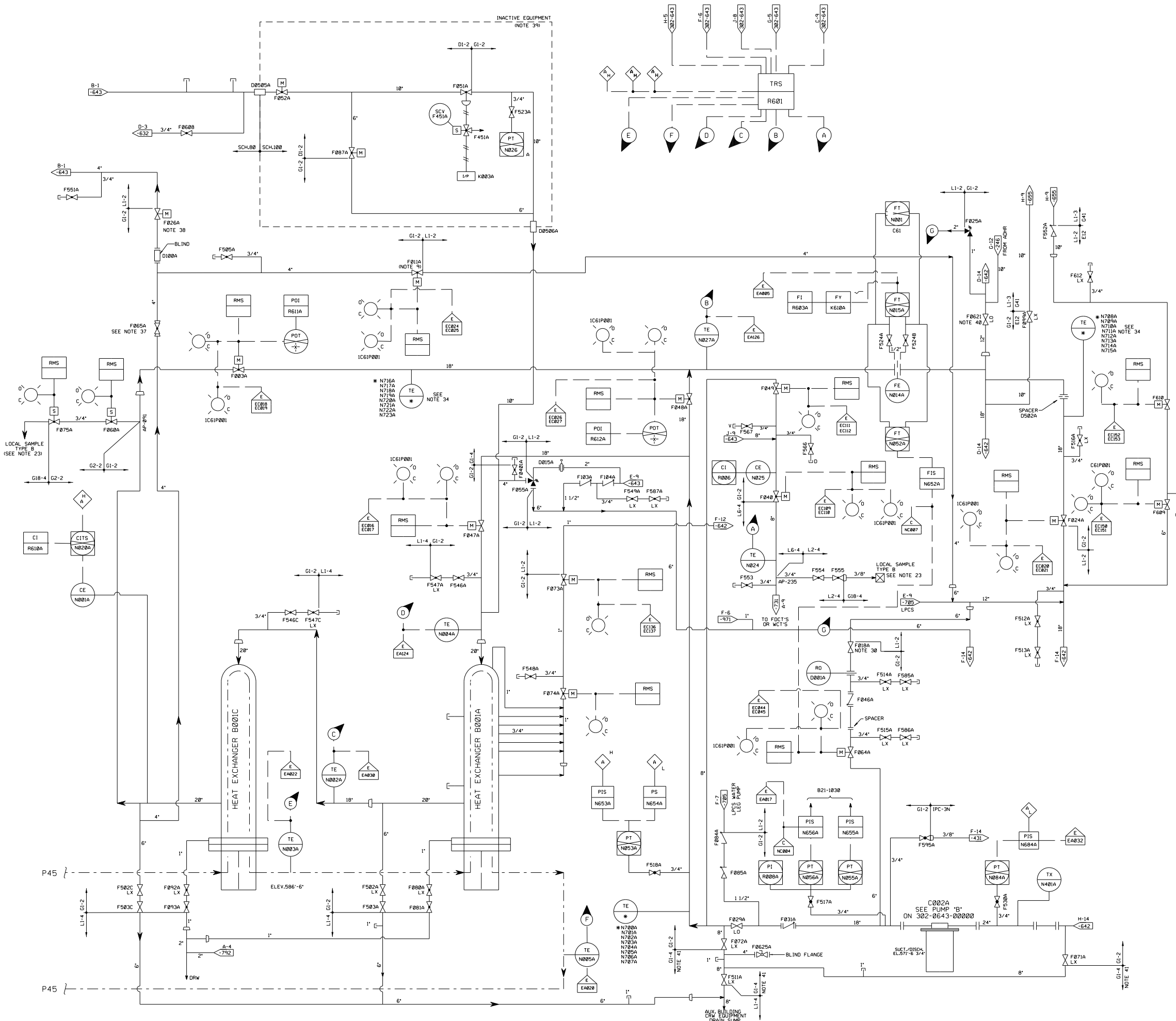
- A42-1010 PIPING AND INSTRUMENT SYMBOLS
A62-4030 PRESSURE INTEGRITY OF NUCLEAR COMPONENTS
A62-4070 PROCESS INSTRUMENTATION
A62-4140 CLEANING OF PIPING AND EQUIPMENT
A62-4230 EMERGENCY EQUIPMENT COOLING WATER SPECIFICATION
B21-1030 NUCLEAR BOILER SYSTEM FCD
C91-4030 PROCESS COMPUTER SYSTEM INPUT/OUTPUT LIST
D17-0108 PROCESS RADIATION MONITORING SYSTEM
E12-1020 RHR PROCESS DIAGRAM
302-0001-00000 PAID SYMBOLOLOGY
302-0002-00000 PAID SYMBOLOLOGY
302-0002-00000 FEEDWATER SYSTEM, N27
302-0102-00000 CONDENSATE TRANSFER SYSTEM, P11
302-0431-00000 POST ACCIDENT SAMPLING SYSTEM, P87
302-0574-00000 ECC SYSTEM SUCTION STRAINER, T21
302-0601-00000 REACTOR RECIRCULATING SYSTEM, B33
302-0631-00000 RCIC SYSTEM, E51
302-0632-00000 RCIC SYSTEM, E51
302-0642-00000 RESIDUAL HEAT REMOVAL SYSTEM, E12
302-0643-00000 RESIDUAL HEAT REMOVAL SYSTEM, E12
302-0651-00000 FUEL POOL COOLING AND CLEAN-UP SYSTEM, G41
302-0655-00000 FUEL POOL COOLING AND CLEAN-UP SYSTEM, G41
302-0661-00000 CONTAINMENT SPRAY SYSTEM, E15
302-0671-00000 REACTOR WATER CLEAN-UP SYSTEM, G33
302-0701-00000 HIGH PRESSURE CORE SPRAY SYSTEM, E22
302-0705-00000 LOW PRESSURE CORE SPRAY SYSTEM, E21
302-0731-00000 LIQUID RADWASTE SYSTEM, O50
302-0771-00000 NUCLEAR SAMPLING SYSTEM, P34
302-0782-00000 EMERGENCY SERVICE WATER SYSTEM, P45
302-0831-00000 COMBUSTIBLE GAS CONTROL SYSTEM, M51
302-0962-00000 LEAK DETECTION SYSTEM, E31
302-0964-00000 LEAK DETECTION SYSTEM, E31
302-0971-00000 FEEDWATER LEAKAGE CONTROL SYSTEM, N27
320-0641-00000 DESIGN SPEC. RESIDUAL HEAT REMOVAL SYSTEM, E12
320-0642-00000 DESIGN SPEC. RESIDUAL HEAT REMOVAL SYSTEM, E12
320-0643-00000 DESIGN SPEC. RESIDUAL HEAT REMOVAL SYSTEM, E12
800-0301-00000 REMOTE SHUTDOWN SYSTEM, G51

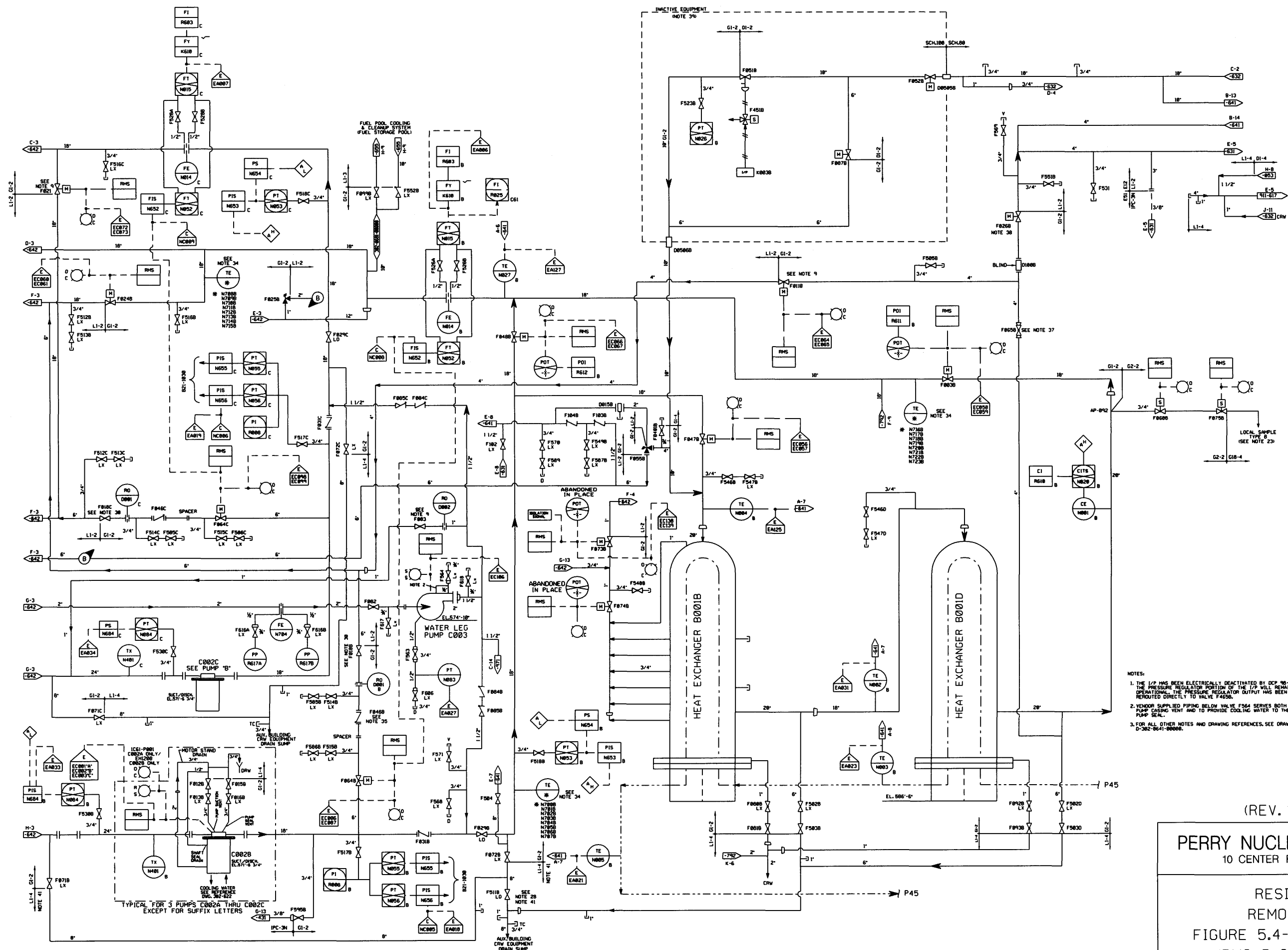
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PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

RESIDUAL HEAT
REMOVAL SYSTEM

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





- NOTES:
1. THE I/P HAS BEEN ELECTRICALLY DEACTIVATED BY DCP 98-0024. THE PRESSURE REGULATOR PORTION OF THE I/P WILL REMAIN OPERATIONAL. THE PRESSURE REGULATOR OUTPUT HAS BEEN REROUTED DIRECTLY TO VALVE F405B.
 2. VENDOR SUPPLIED PIPING BELOW VALVE F564 SERVES BOTH AS A PUMP CASING VENT AND TO PROVIDE COOLING WATER TO THE PUMP SEAL.
 3. FOR ALL OTHER NOTES AND DRAWING REFERENCES, SEE DRAWING D-302-0641-00000.

(REV. 19 10/2015)

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

**RESIDUAL HEAT
 REMOVAL SYSTEM**

FIGURE 5.4-13 (SHEET 3 OF 3)
 (DWG. D-302-0643-00000)

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 EQUAL OR 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 EQUAL OR EXCEED 4 FEET. ASSUMING SATURATION TEMPERATURES OF 212°F AND 200°F, RESPECTIVELY, THE NPSH AVAILABLE AT THE PUMP SUCTION NOZZLE MUST EQUAL OR 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 CROSSTIE 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 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, YOKO, 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
- TDH - 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 110 PSIG SEE NOTE 20

POSITION	29	25	26	5 _{AB}	6 _{AB}	18 _{AB}	19 _{AB}	16 _{AB}	50 _{AB}	27 _{AB}	28 _{AB}	29	14	30	31	66	33	29	27 _B	28 _B	29	60 _{AB}	61 _{AB}
FLOW GPM	14200	14200	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
PRESSURE PSIA	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
TEMPERATURE °F	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
MAX PRESSURE	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
DROP FEET	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

HEAT REMOVAL CAPABILITY PER HK LOOP 130.1 X 10⁶ BTU/Hr (12 HK'S OPERATING)

MODE D-2 RX PRESSURE 0 PSIG SEE NOTE 20

POSITION	29	25	26	5 _{AB}	6 _{AB}	18 _{AB}	19 _{AB}	16 _{AB}	50 _{AB}	27 _{AB}	28 _{AB}	29	14	30	31	66	33	29	27 _B	28 _B	29	60 _{AB}	61 _{AB}
FLOW GPM	14200	14200	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
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	14.7	14.7	14.7
TEMPERATURE °F	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
MAX PRESSURE	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
DROP FEET	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

HEAT REMOVAL CAPABILITY PER HK LOOP 100.5 X 10⁶ BTU/Hr (12 HK'S OPERATING)

MODE E-1 RX PRESSURE 0 PSIG SEE NOTE 20

POSITION	29	25	26	5 _{AB}	6 _{AB}	18 _{AB}	19 _{AB}	16 _{AB}	50 _{AB}	27 _{AB}	28 _{AB}	29	14	30	31	66	33	29	27 _B	28 _B	29	60 _{AB}	61 _{AB}
FLOW GPM	14200	14200	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
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	14.7	14.7	14.7
TEMPERATURE °F	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
MAX PRESSURE	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
DROP FEET	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1

HEAT REMOVAL CAPABILITY PER HK LOOP 40.9 X 10⁶ BTU/Hr (12 HK'S OPERATING)

MODE E-2 RX PRESSURE 0 PSIG SEE NOTE 20

POSITION	29	25	26	5 _{AB}	6 _{AB}	18 _{AB}	19 _{AB}	16 _{AB}	50 _{AB}	27 _{AB}	28 _{AB}	29	14	30	31	66	33	29	27 _B	28 _B	29	60 _{AB}	61 _{AB}
FLOW GPM	14200	14200	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
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	14.7	14.7	14.7
TEMPERATURE °F	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
MAX PRESSURE	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1
DROP FEET	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1	104.1

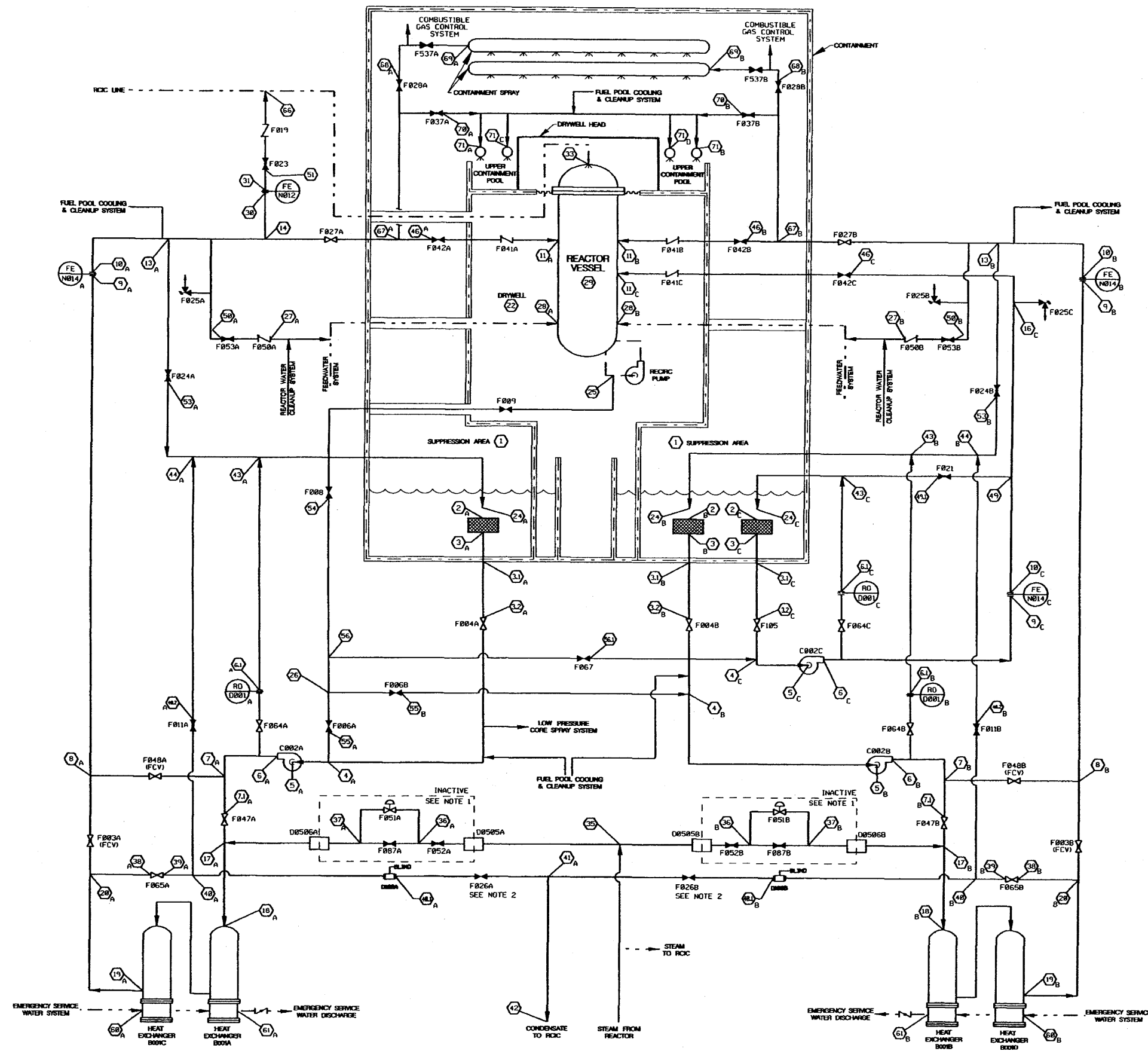
HEAT REMOVAL CAPABILITY PER HK LOOP 40.9 X 10⁶ BTU/Hr (12 HK'S OPERATING)

MODE F SEE NOTE 3																											
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	25		
FLOW GPM	---	7100	←																						7100	→	
PRESSURE PSIA	14.7																								14.7		
TEMPERATURE °F	---	120	40	←																					120	40	→
MAX PRESSURE																											
DROP FEET																											

10min 775

LOOP A & B TEST

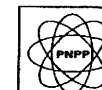
LOOP C TEST



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.

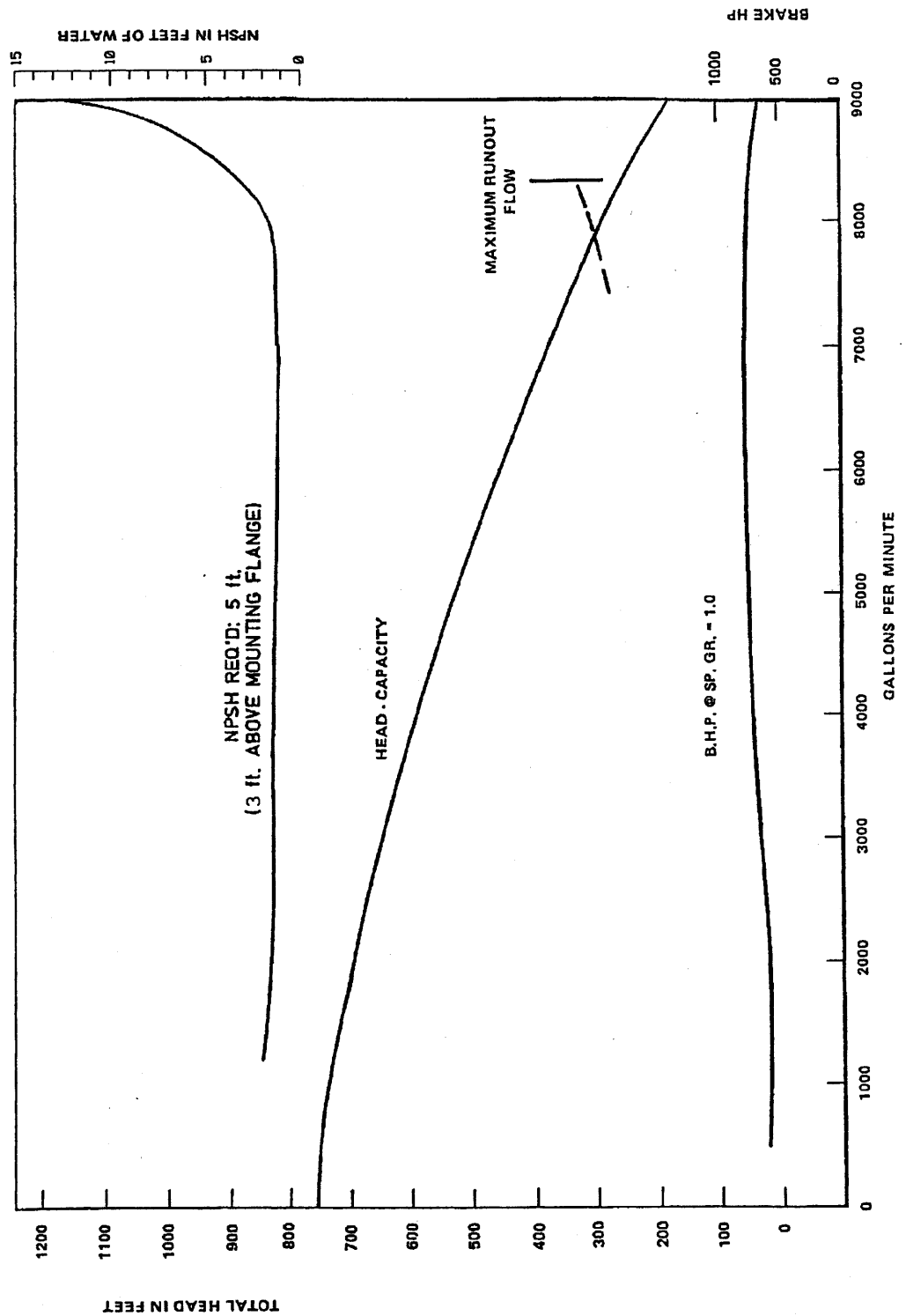
(Rev. 13 12/03)



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.

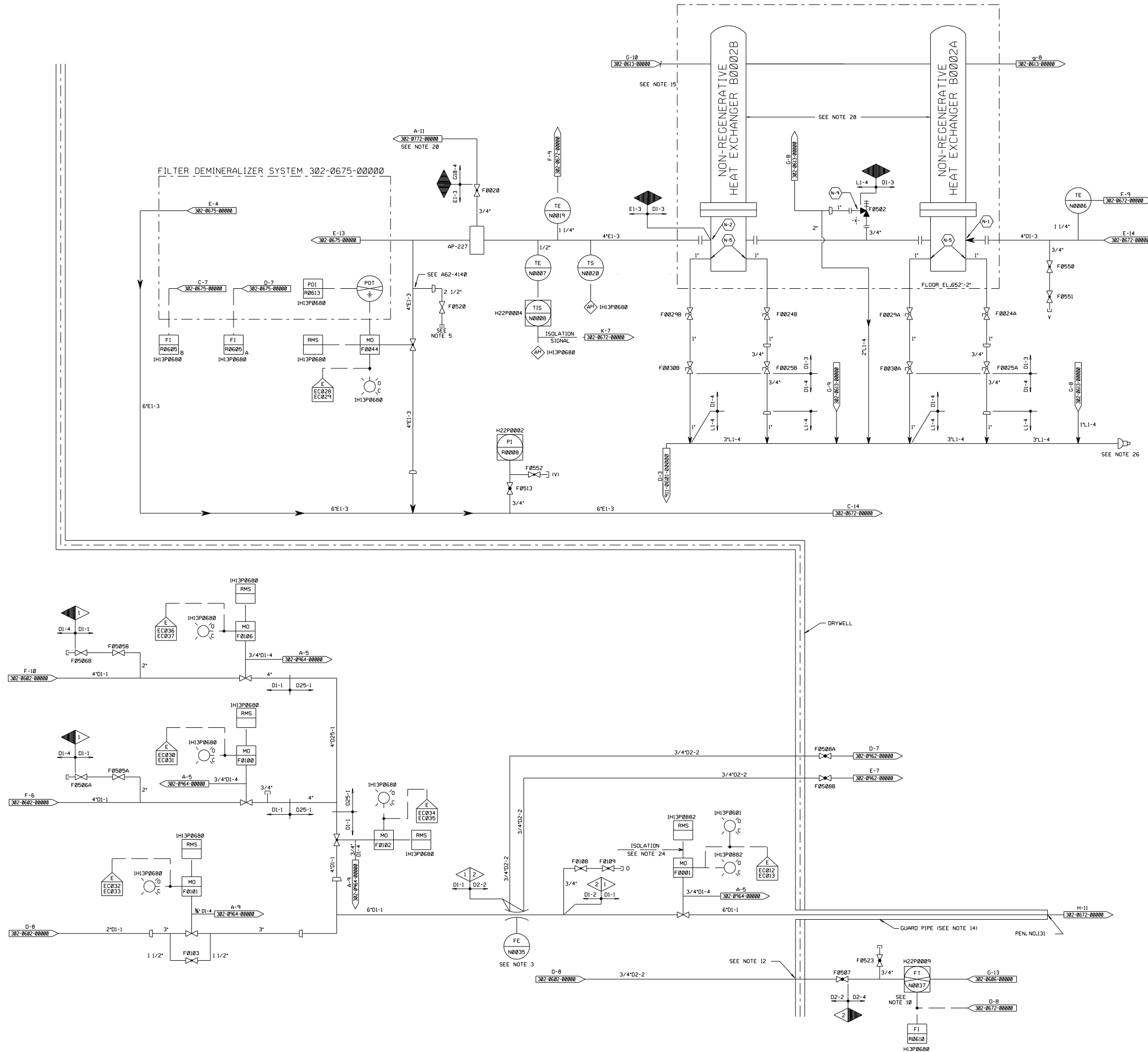
REFERENCES:

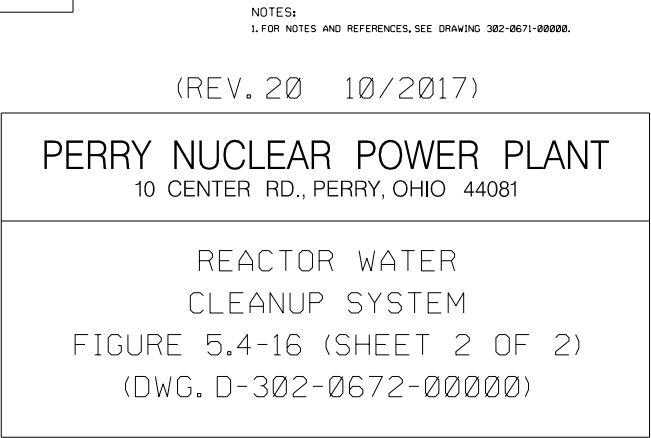
302-0102-00000	CONDENSATE TRANSFER AND STORAGE SYSTEM, P11
302-0335-00000	ZINC INJECTION PASSIVATION SYSTEM, P05
302-0602-00000	REACTOR RECIRCULATION SYSTEM, B33
302-0606-00000	NUCLEAR BOILER SYSTEM, B21
302-0642-00000	RESIDUAL HEAT REMOVAL SYSTEM, E12
302-0672-00000	REACTOR WATER CLEANUP SYSTEM, G33
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.

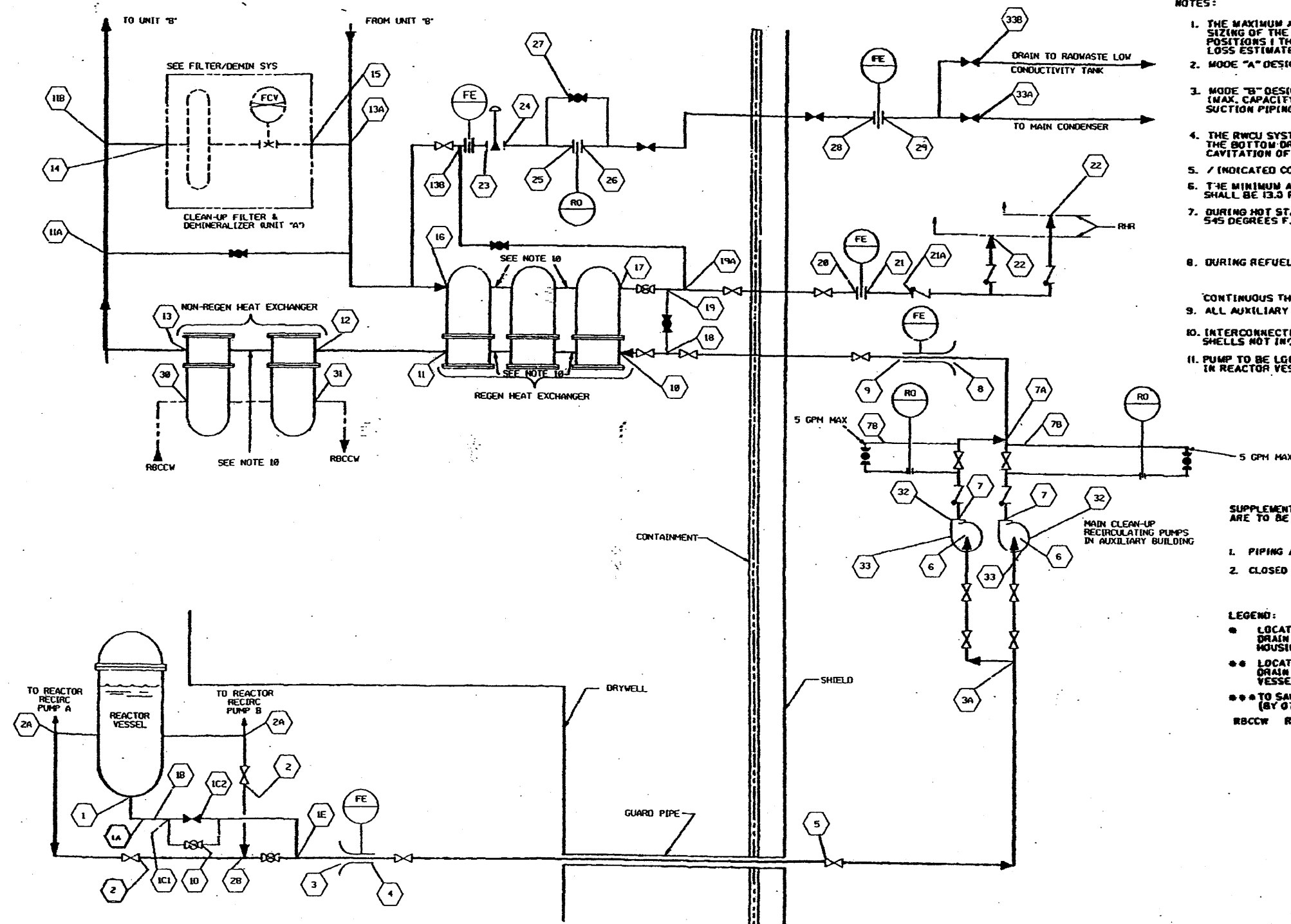
(REV. 20 10/2017)

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 442-1010 |
| 2. CLOSED COOLING WATER | 462-4250 |

LEGEND:

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

(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Reactor Water Cleanup System

Figure 5.4-17 (Sheet 1 of 2)

TABLE I		F/D AREA = 97 FT ²																										
TYPE REQUIREMENT	STATION SERVICES										EXHAUST AIR HANDLING		PROCESS PIPING SIZING															
COMMODITY	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
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	㉕	㉖	㉗	
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 (BOWSH)	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 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	280 GPM	280 GPM	280 GPM	50 SCFH	37 SCFH	37 SCFH	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	140 GPM	102 SCFH 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 HANDLING		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 & RESIN SLURRY	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 SYS + 20	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	①	②
ISOLATE & HOLD	⑩	
DEPRESSURIZE	⑨	
DOVE DRAIN	⑨	⑦
AIR PRESSURIZE	⑦	
FIRST AIR BUMP & DRAIN	⑩	⑦
FILL & VENT	⑥	⑨
AIR PRESSURIZE	⑦	
SECOND AIR BUMP & DRAIN	⑮	⑦
RINSE & DRAIN	⑤	⑮
FINAL FILL & VENT	⑥	⑧
SOLKA FLOC PRECOAT	⑪	⑫
RESIN PRECOAT	⑬	⑭ ⑰

HOLD PRECOAT	⑮	⑲
HOLD UNTIL RETURN TO SERVICE	⑮	
SERVICE	①	②

(Rev. 12 1/03)


PERRY NUCLEAR POWER PLANT

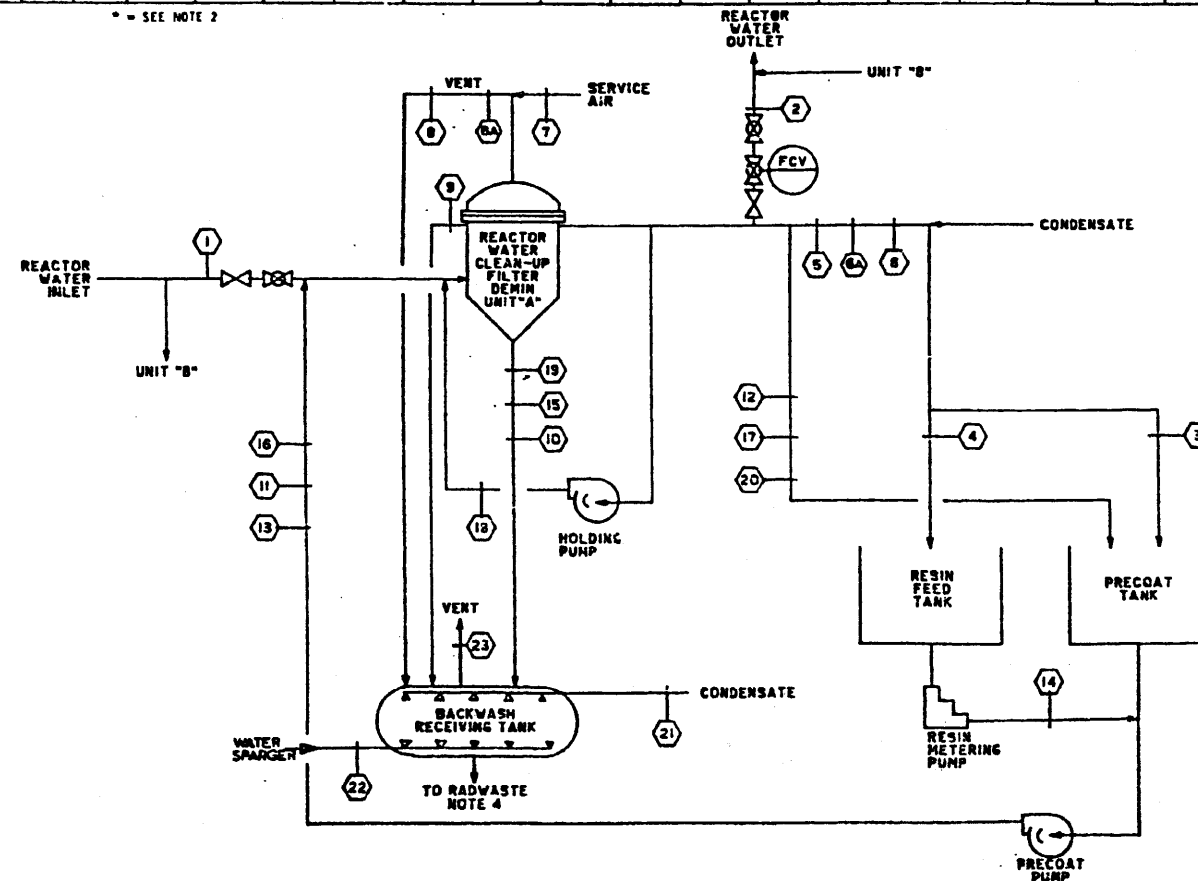
Filter/Demineralizer System,
 Reactor Water Cleanup System

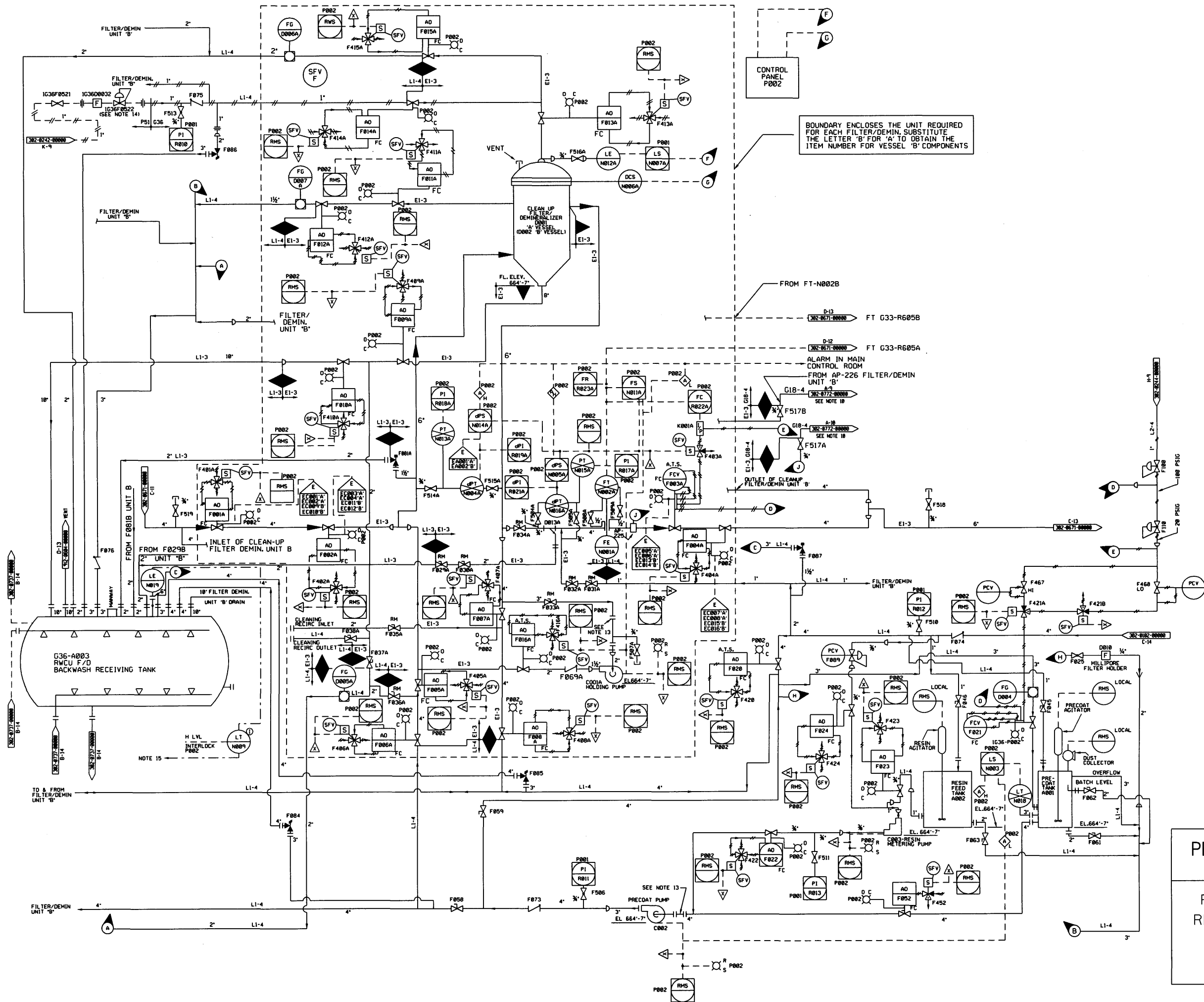
Figure 5.4-18 (Sheet 1 of 2)

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	CMDS & SOLKA FLOC SLURRY	CMDS	CMDS & RESIN SLURRY	CONC RESIN SLURRY	REACTOR WATER & F/D SOLIDS	CMDS	CMDS	REACTOR WATER OR CMDS	CMDS & F/D SOLIDS	CMDS	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 DRYTH	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	RESIDUAL				RESIDUAL				

* = SEE NOTE 2





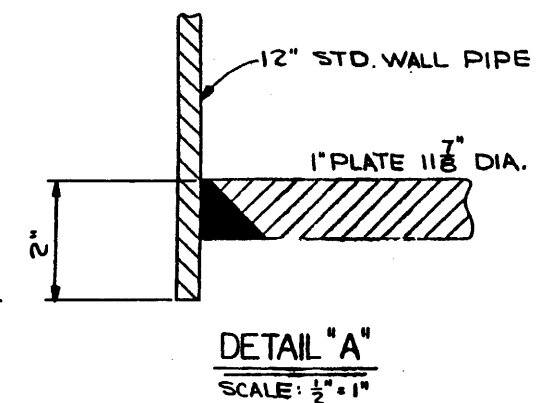
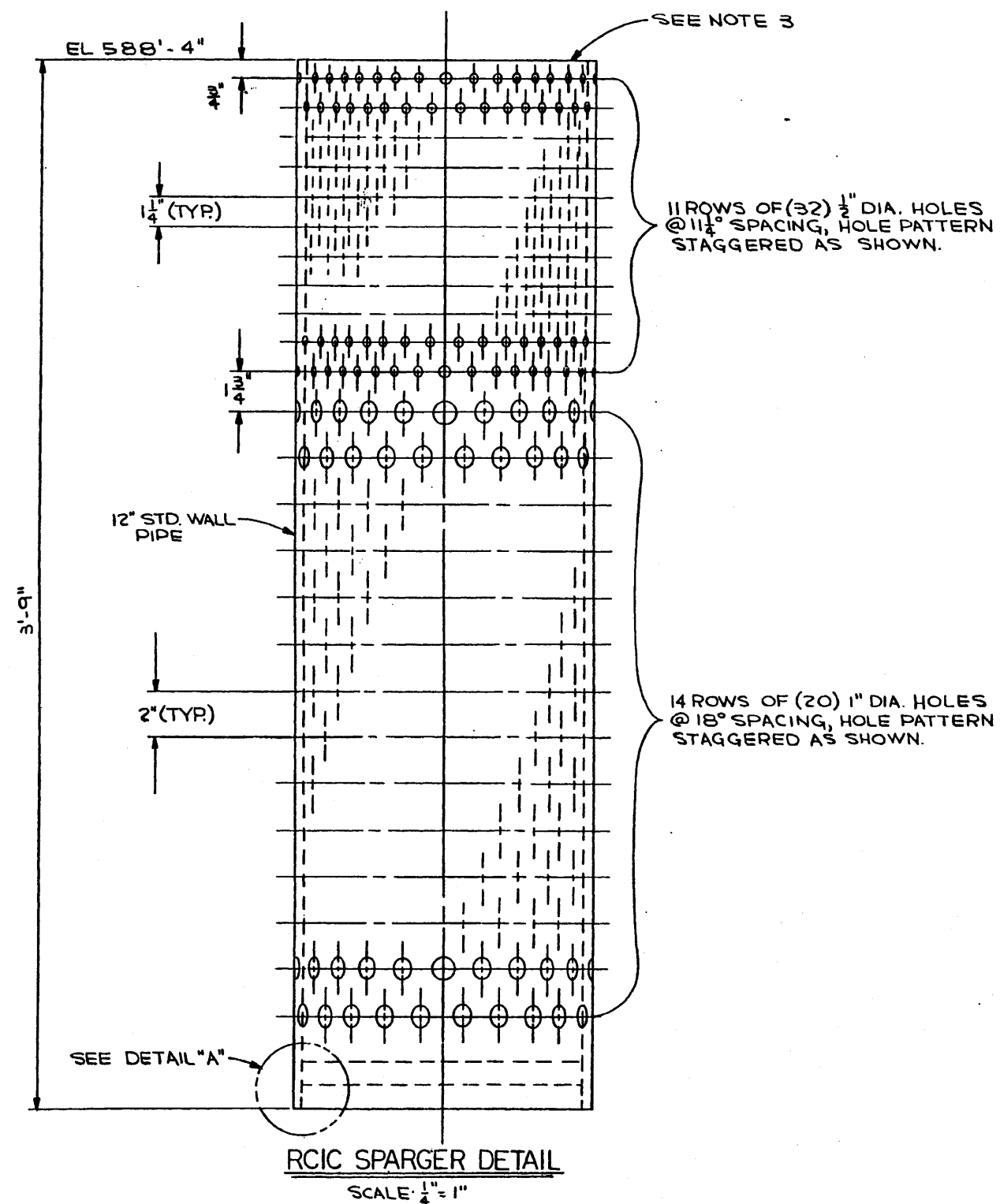
- NOTES:
1. ALL PIPING AND FITTINGS SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH A62-4030.
 2. AIR OPERATED VALVES ARE SHOWN IN FILTERING PROCESS STATUS AND ARE FAIL CLOSE ON LOSS OF AIR PRESSURE TO VALVE OPERATOR OR LOSS OF ELECTRICAL POWER TO VALVE.
 3. ALL REMOTE INSTRUMENTS AND CONTROLS WITHIN 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 |
| SFV | : 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, D AND H.
 - C. PIPING SHALL BE INSTALLED BY SPECIFICATION 44.
 13. TEMPORARY STRAINERS D030, D031A, AND D031B 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

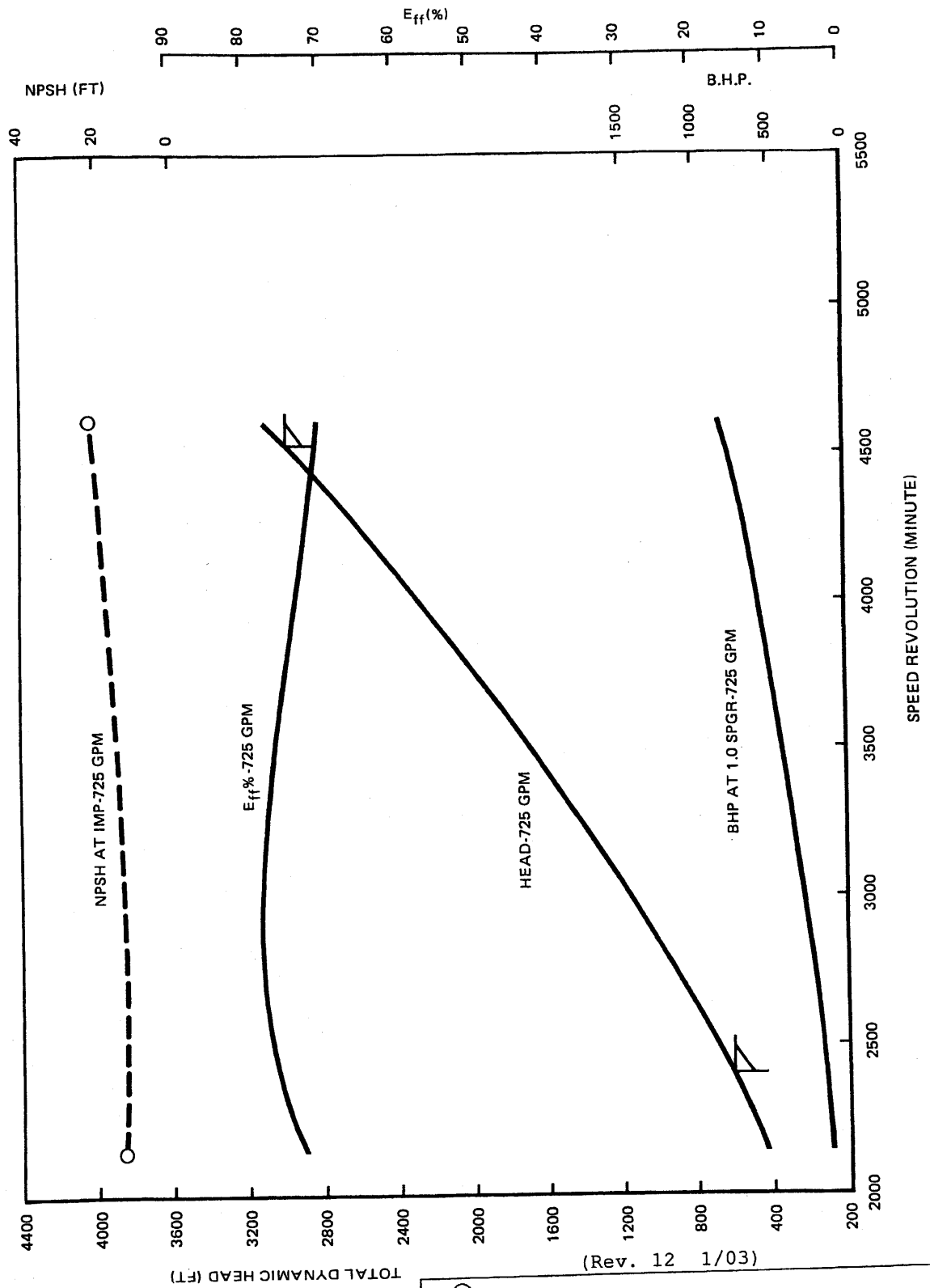
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PERRY NUCLEAR POWER PLANT

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