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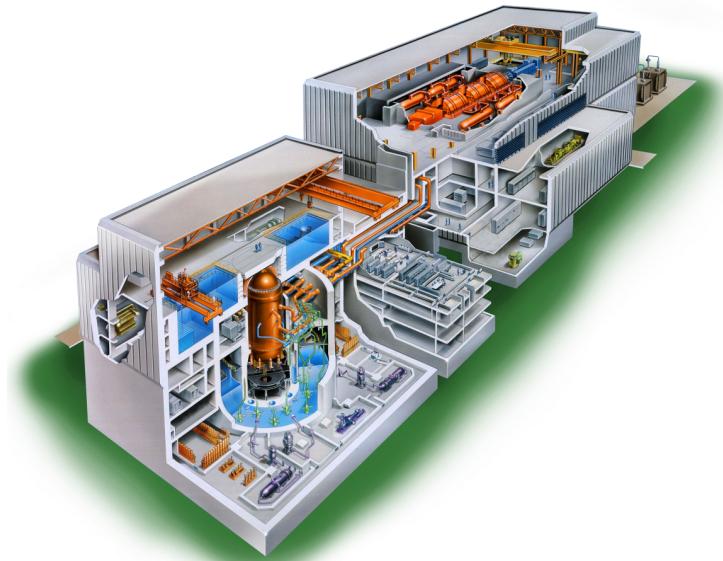
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Chapter 21

Volume 8

Chapter 21 Volume 8

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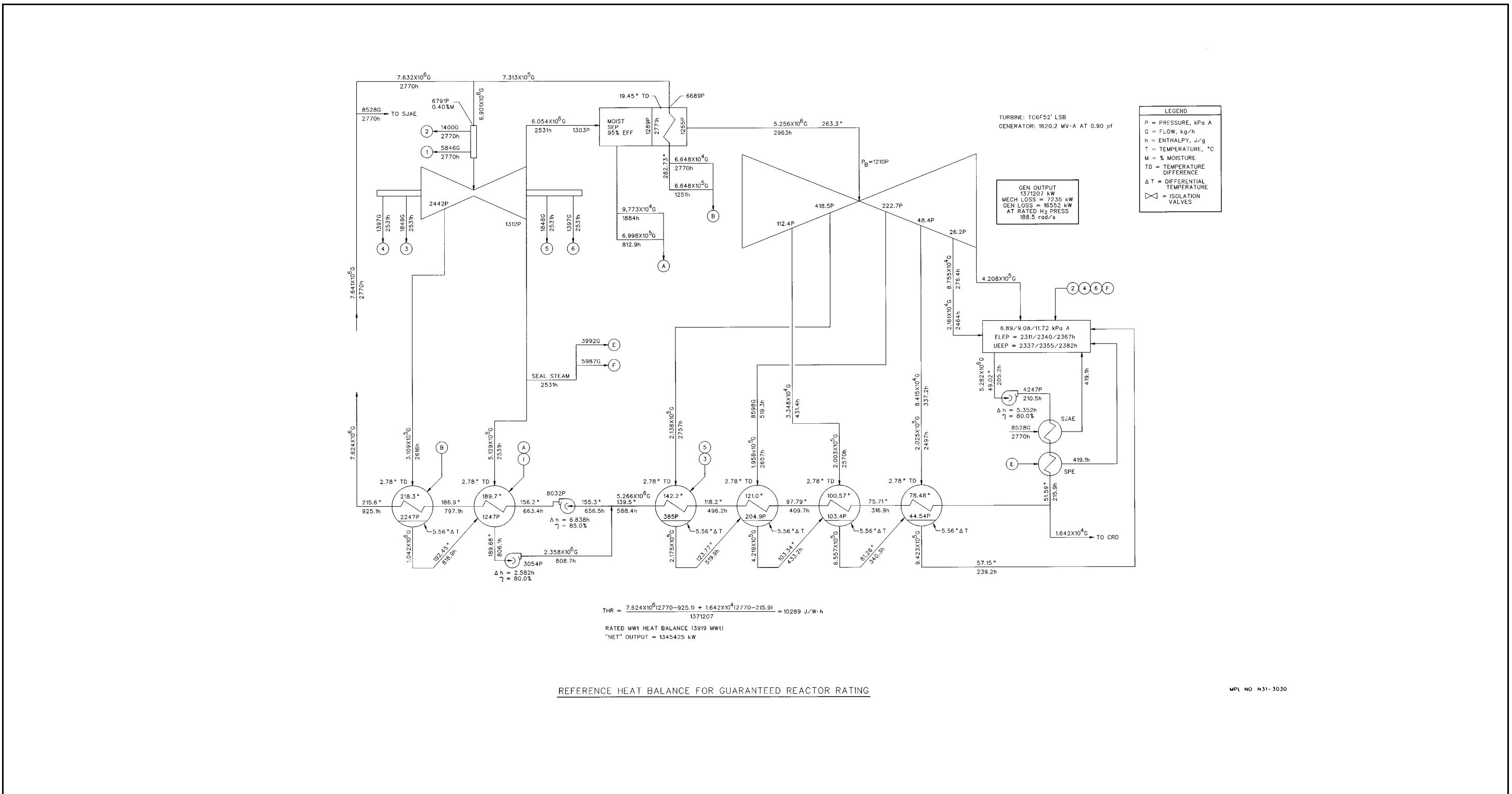


Figure 10.1-2 Reference Heat Balance for Guaranteed Reactor Rating

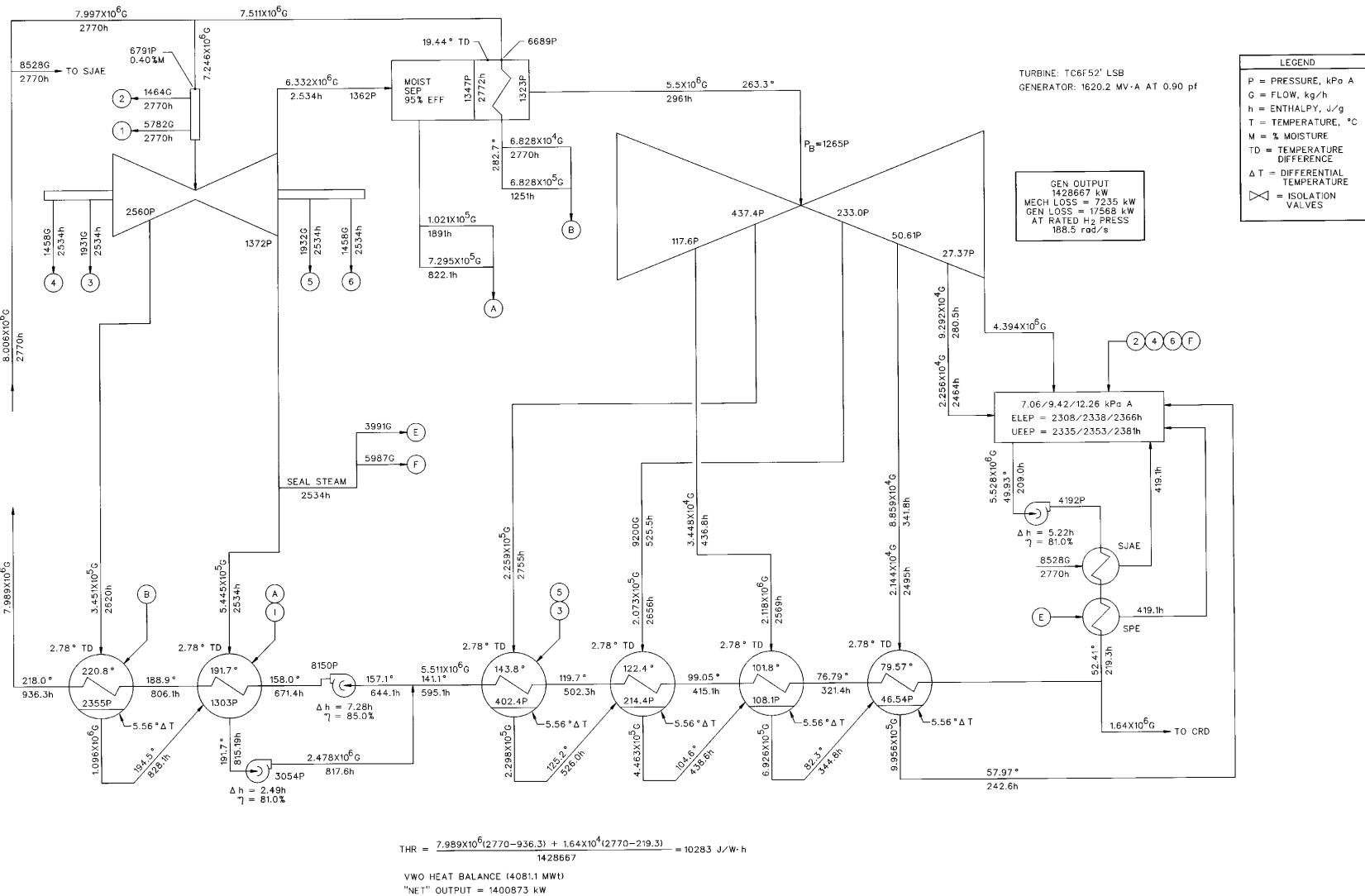


Figure 10.1-3 Reference Heat Balance for Valves-Wide-Open (VWO)

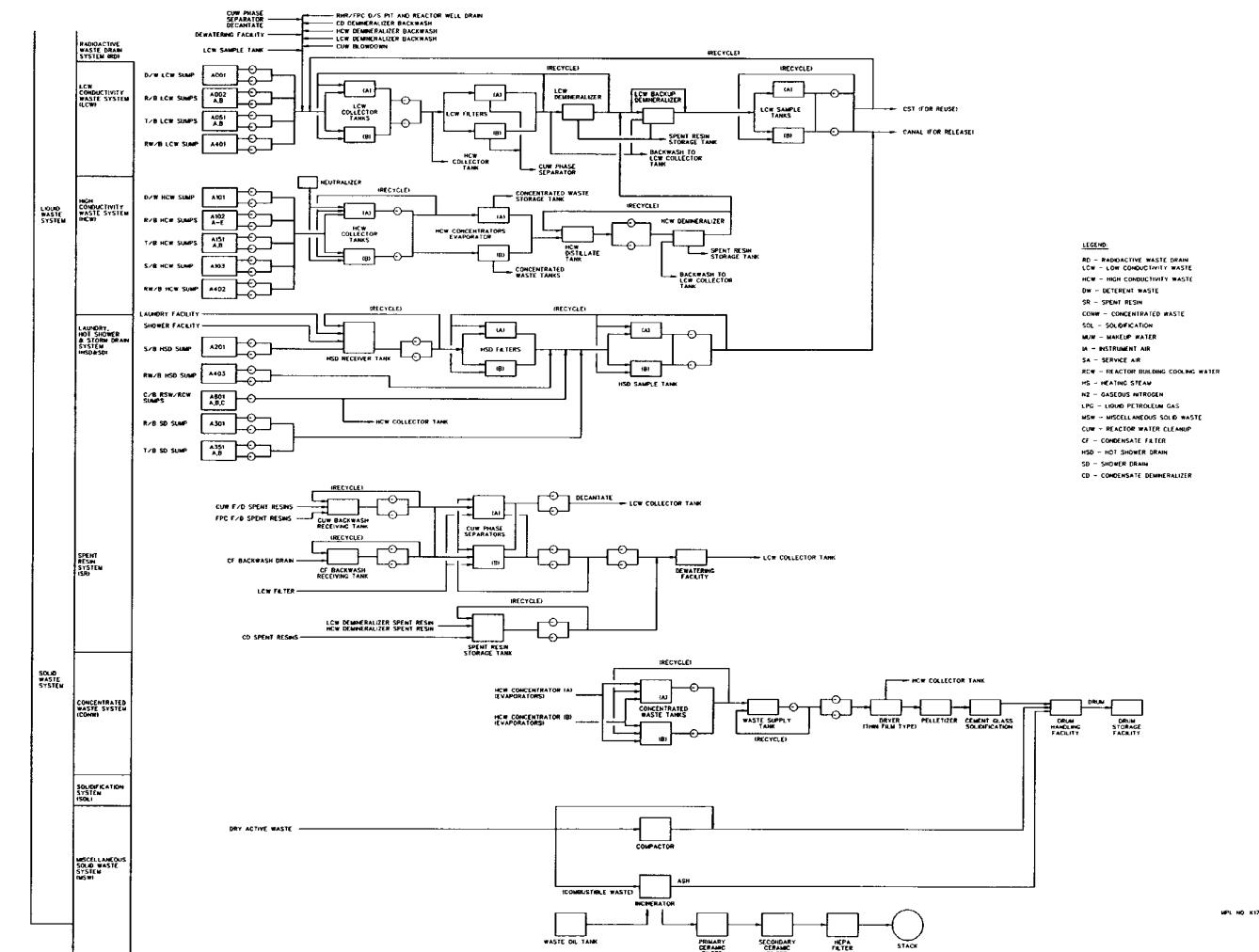


Figure 11.2-1 Radwaste System PFD

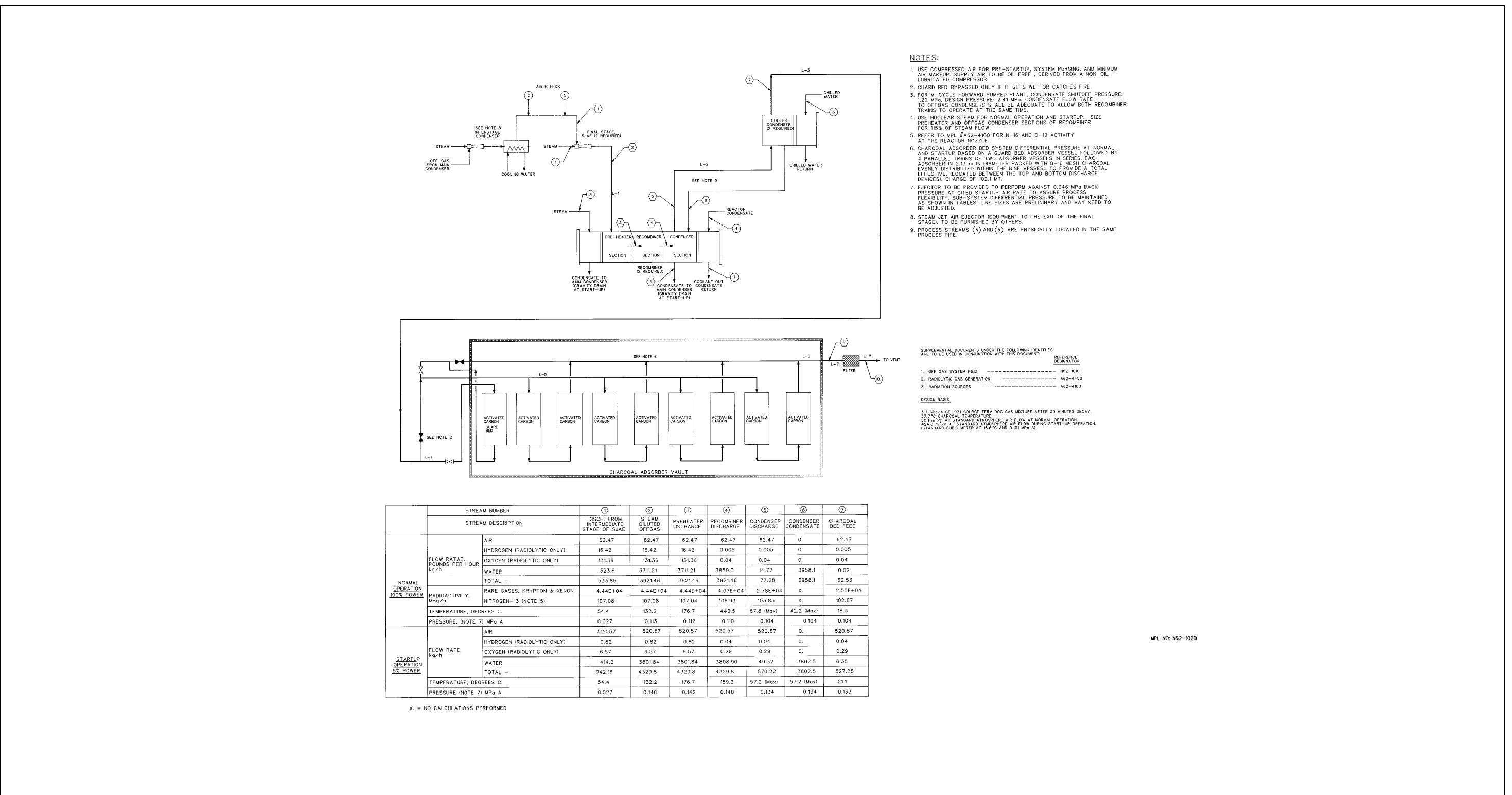


Figure 11.3-1 Offgas System PFD (Sheet 1 of 2)

	STREAM NUMBER	(1)	(2)	(3)
		COOLER CONDENSATE	CHARCOAL DISCHARGE	FILTER DISCHARGE
	AIR	0	62.4#	62.4#
	HYDROGEN (RADOLYTIC ONLY)	0	0.005	0.005
	OXYGEN (RADOLYTIC ONLY)	0	0.04	0.04
	WATER	13.98	0.80	0.80
	TOTAL -	13.98	63.3	63.3
NORMAL OPERATION	RARE GASES, KRYPTON & XENON	X.	3.52	3.52
	RADIOACTIVITY, MBq/s	X.	0.00	0.00
	NITROGEN-13 (NOTE 5)	X.		
	TEMPERATURE, DEGREES C	18.3	37.8	37.8
	PRESSURE, INOTE 71 MPa A	0.104	0.102	0.102
STARTUP OPERATION	AIR	0	519.89	519.89
	HYDROGEN (RADOLYTIC ONLY)	0	0.036	0.036
	OXYGEN (RADOLYTIC ONLY)	0	0.290	0.290
	WATER	42.62	6.34	6.34
	TOTAL -	42.62	526.56	526.56
	TEMPERATURE, DEGREES C	31.7	45.3	45.3
	PRESSURE, INOTE 71 MPa A	0.134	0.106	0.103

X = NO CALCULATIONS PERFORMED

EQUIPMENT SUMMARY - PROCESS STREAM PRESSURE DROP				
PART NO	EQUIPMENT PIECE	DESIGN CONDITIONS		START-UP
		PRESS MPa	TEMP °C	
D005	MULTIPURPOSE VESSEL	2.41	232.2	0.009
B010	COOLER-CONDENSER	2.41	121.1	0.008
D012	CHARCOAL ADSORBER	2.41	4.4/121.1	0.014
D016	FILTER	2.41	10.0/121.1	0.003

PIPE LENGTH SUMMARY (D)		
LINE NO.	BETWEEN	EQUIVALENT PIPE LENGTH m
L-1	EXIT OF SJAE AIR ENTRANCE TO PRE-HEATER SECTION	71
L-2	EXIT OF CONDENSER AND ENTRANCE TO COOLER CONDENSER	1.5
L-3	EXIT OF COOLER CONDENSER AND LINE TO CHARCOAL VAULT	71
L-4	COMMON LINE TEE AND ENTRANCE TO CHARCOAL VAULT	7.1
L-5	ENTRANCE TO CHARCOAL VAULT AND ENTRANCE TO CHARCOAL VESSELS	15
L-6	EXIT OF CHARCOAL VESSELS AND EXIT FROM CHARCOAL VAULT	15
L-7	EXIT OF CHARCOAL VAULT AND ENTRANCE TO FILTER	71
L-8	EXIT OF FILTER TO VENT	91

(D) - EQUIVALENT LENGTHS ARE FOR PIPE, FITTINGS, AND VALVES, BETWEEN POINTS NOTED.

	STREAM NUMBER	(1)	(2)	(3)	(4)	(5)	(6)
		DILUTION STEAM INOTE 4.71	AIR BLEED INOTE II	PREFILTER STEAM INOTE 4	REACTOR CONDENSATE INOTE 3	AIR PURGE INOTE B	CHELED WATER
	AIR	0	12.7	0	0	2.04	0
	HYDROGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	OXYGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	WATER	3383.2	0	376.5	0.104E+7	2.04	33.883.9
	TOTAL -	3383.2	12.7	376.5	0.104E+7	2.04	33.883.9
	TEMPERATURE, DEGREES C	170.0	211	207.8	56.7 MAX	211	15.6
	PRESSURE, INOTE 71 MPa A	0.790	0.173	183	0.965	0.173	0.414
NORMAL OPERATION	AIR	0	12.5	0	0	2.04	0
	HYDROGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	OXYGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	WATER	3382.2	0	376.5	0.34E+06	0	33.883.9
	TOTAL -	3382.2	12.5	376.5	0.34E+06	2.04	33.883.9
	TEMPERATURE, DEGREES C	170.0	211	207.8	+3.3 MAX	211	15.6
	PRESSURE, INOTE 71 MPa A	0.790	0.173	183	0.965	0.173	0.414
STARTUP OPERATION	AIR	0	12.5	0	0	2.04	0
	HYDROGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	OXYGEN (RADOLYTIC ONLY)	0	0	0	0	0	0
	WATER	3382.2	0	376.5	0.34E+06	0	33.883.9
	TOTAL -	3382.2	12.5	376.5	0.34E+06	2.04	33.883.9
	TEMPERATURE, DEGREES C	170.0	211	207.8	+3.3 MAX	211	15.6

Figure 11.3-1 Offgas System PFD (Sheet 2 of 2)

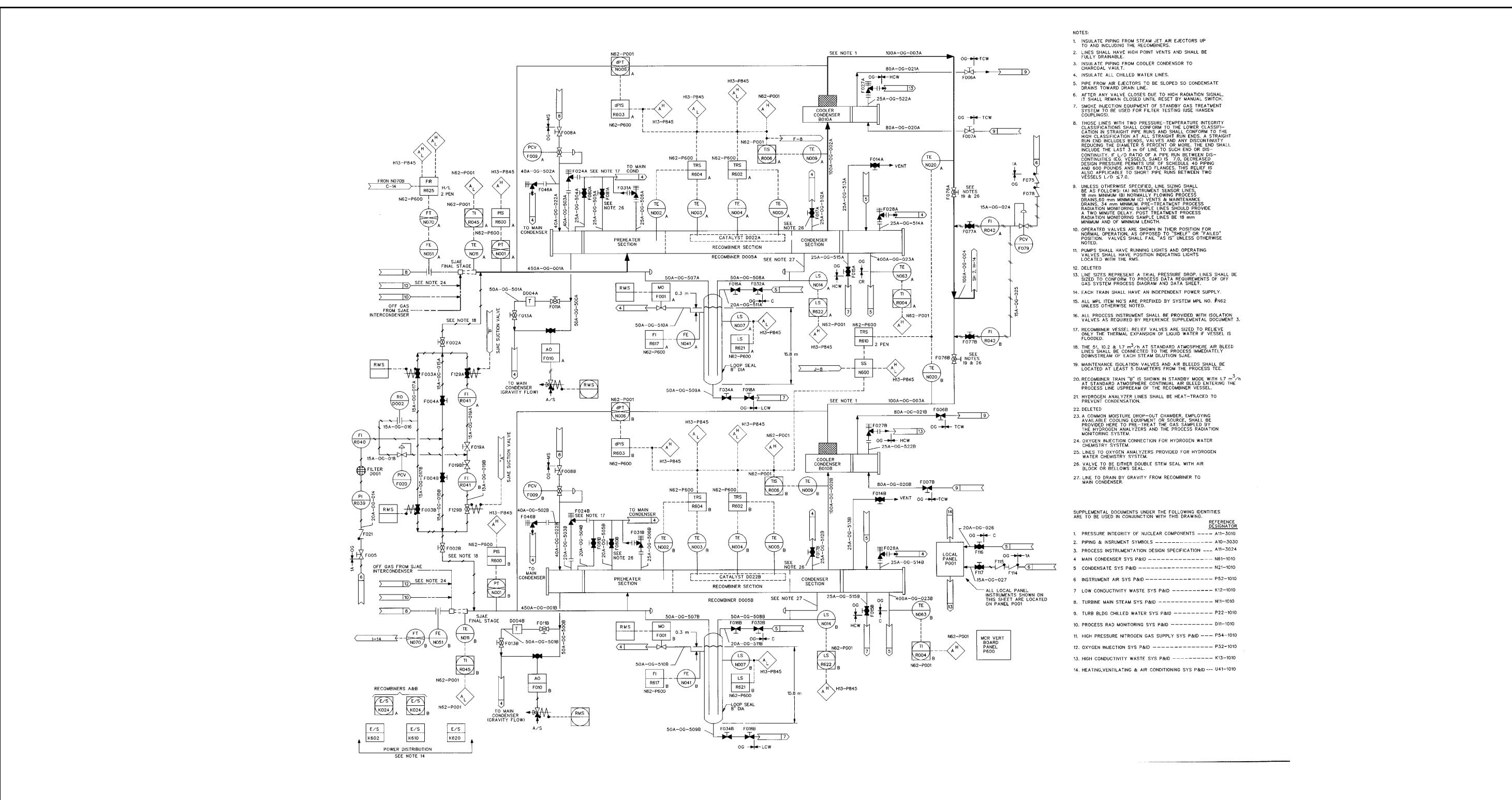


Figure 11.3-2 Offgas System P&ID (Sheet 1 of 3)

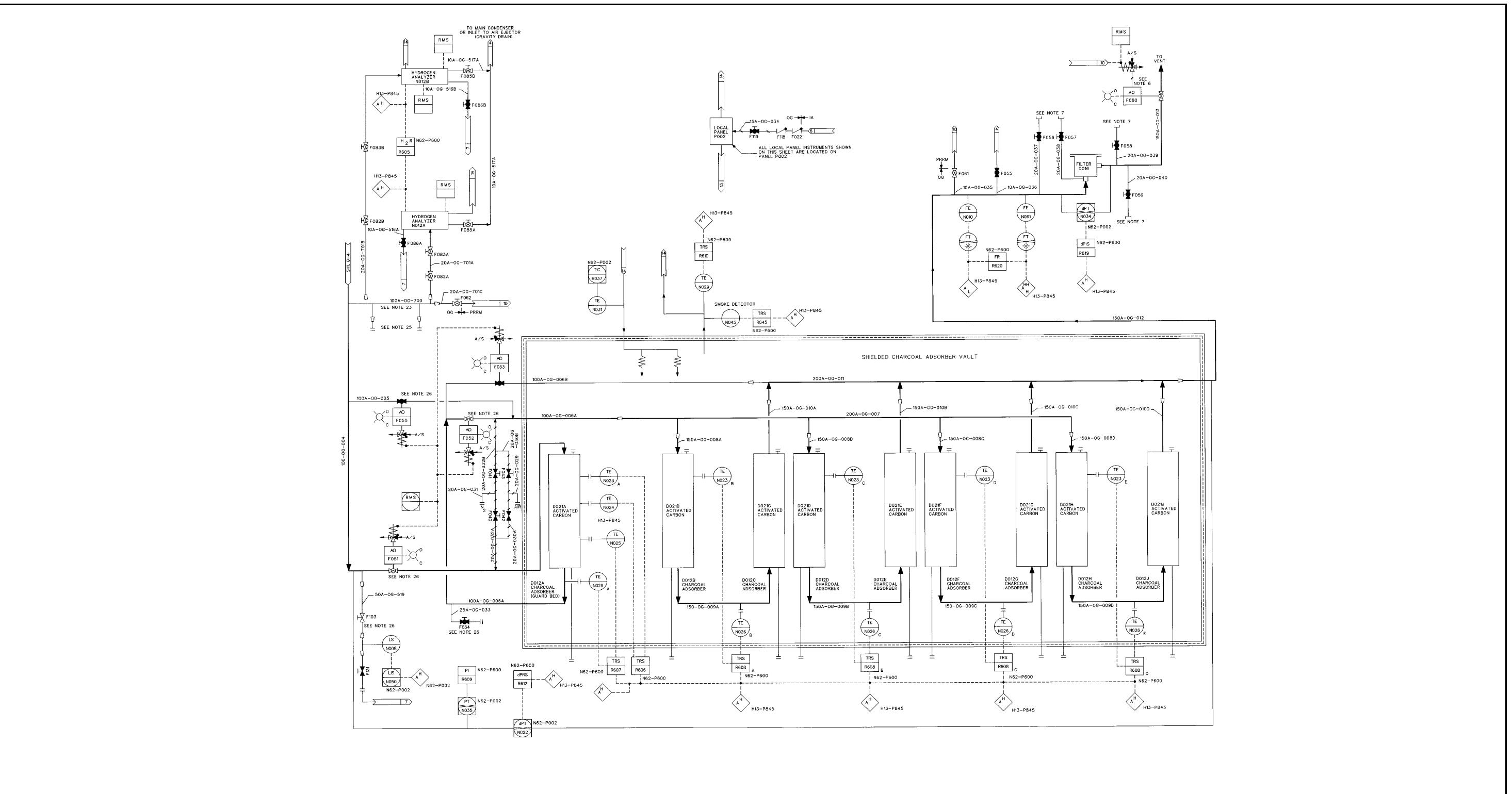


Figure 11.3-2 Offgas System P&ID (Sheet 2 of 3)

TABLE I: MAIN CONTROL ROOM ANNUNCIATOR ALARMS

FUNCTION	PRIMARY SENSOR	SET POINT
DILUTION STEAM FLOW	FE-N051	AH 10%
PREHEATER INLET PRESSURE	PT-N001	AH 0.045 MPa
RECOMBINER INLET TEMPERATURE	TE-H002,N003	AL 149 °C
RECOMBINE TEMPERATURE PROFILE	TE-H004,N005	AH 44.7 °C AL 149 °C
CONDENSER LOOP SEAL WATER LEVEL	LS-N007	AL -0.3 m
CONDENSER DRAIN LINE WATER LEVEL	LS-N014	AH 0.5 m
HYDROGEN ANALYZER	HZE-N012	AH 2%
COOLER CONDENSER EXIT TEMPERATURE	TE-H020	AH 21.7 °C
PREHEATER TO COOLER CONDENSER EXIT PRESSURE DROP	dPT-N006	AH 0.011 MPa
CHARCOAL ADSORBER PRESSURE DROP	dPT-N022	AH 0.015 MPa
CHARCOAL VESSEL TEMPERATURE	TE-H023,N025	AH 34 °C
CHARCOAL VAULT AIR TEMPERATURE	TE-H029	AL 25.7 °C AH 43.3 °C
CHARCOAL VAULT SMOKE LEVEL	N045	----
AFTER FILTER PRESSURE DROP	dPT-N034	AH (2cm w.c.)
PROCESS FLOW (AT STANDARD ATMOSPHERE)	FE-H010,N061	AL 10.2 m ³ /h AH 68 m ³ /h AHH 425 m ³ /h

TABLE II: PIPING SPECIFICATIONS

PIPE No.	SCHEDULE	MATERIAL	FLUID
001A-B	160	CS	S
002A-B	160	CS	A,W
003A-B	80	CS	A
004	80	CS	A
005A	80	CS	A
006A-B	80	CS	A
007	80	CS	A
008A-D	80	CS	A
009A-D	80	CS	A
010A-D	80	CS	A
011	80	CS	A
012	80	CS	A
013	80	CS	A
014	40	CS	A
015A-B	40	CS	A
016	40	CS	A
017A-B	40	CS	A
018	40	CS	A
019A-B	40	CS	A
020A-B	40	CS	W
021A-B	40	CS	W
022A-B	160	CS	S
023A-B	100	CS	W
024	40	CS	A
025	40	CS	A
026	40	CS	W
027	40	CS	A
028	80	CS	A
029	40	CS	A
030A-B	160	CS	A
031	40	CS	W
032A-B	160	CS	W
033	160	CS	A
034	160	CS	A
035	80	CS	A
036	80	CS	A
037	80	CS	A
038	80	CS	A
039	80	CS	A
040	80	CS	A
500A-B	160	CS	W
501A-B	160	CS	W
502A-B	160	CS	S
503A-B	160	CS	S,A
504A-B	160	CS	A
505A-B	160	CS	A
506A-B	160	CS	A
507A-B	160	CS	W
508A-B	160	CS	W
509A-B	80	CS	W
510A-B	160	CS	W
511A-B	160	CS	W
512A-B	160	CS	A
513A-B	160	CS	A
514A-B	80	CS	A,W
515A-B	40	CS	W
516A-B	40	SS	W
517A-B	40	SS	A
518	160	CS	W
519	160	CS	W
700	40	SS	A
701A-B	40	SS	A

Figure 11.3-2 Offgas System P&ID (Sheet 3 of 3)

Figure 12.3-1 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation -8200 mm (B3F)

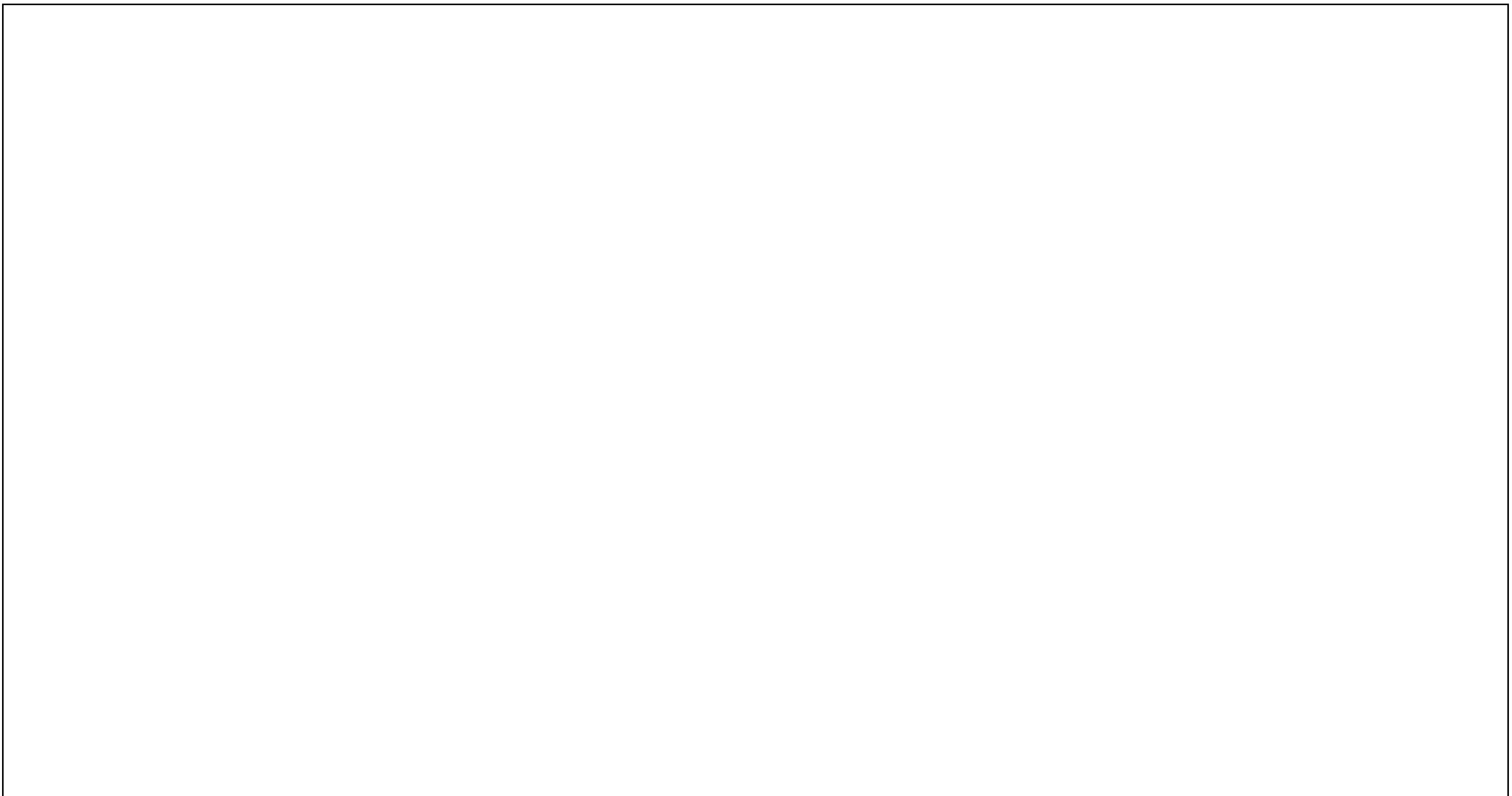


Figure 12.3-2 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation -1700 mm (B2F)

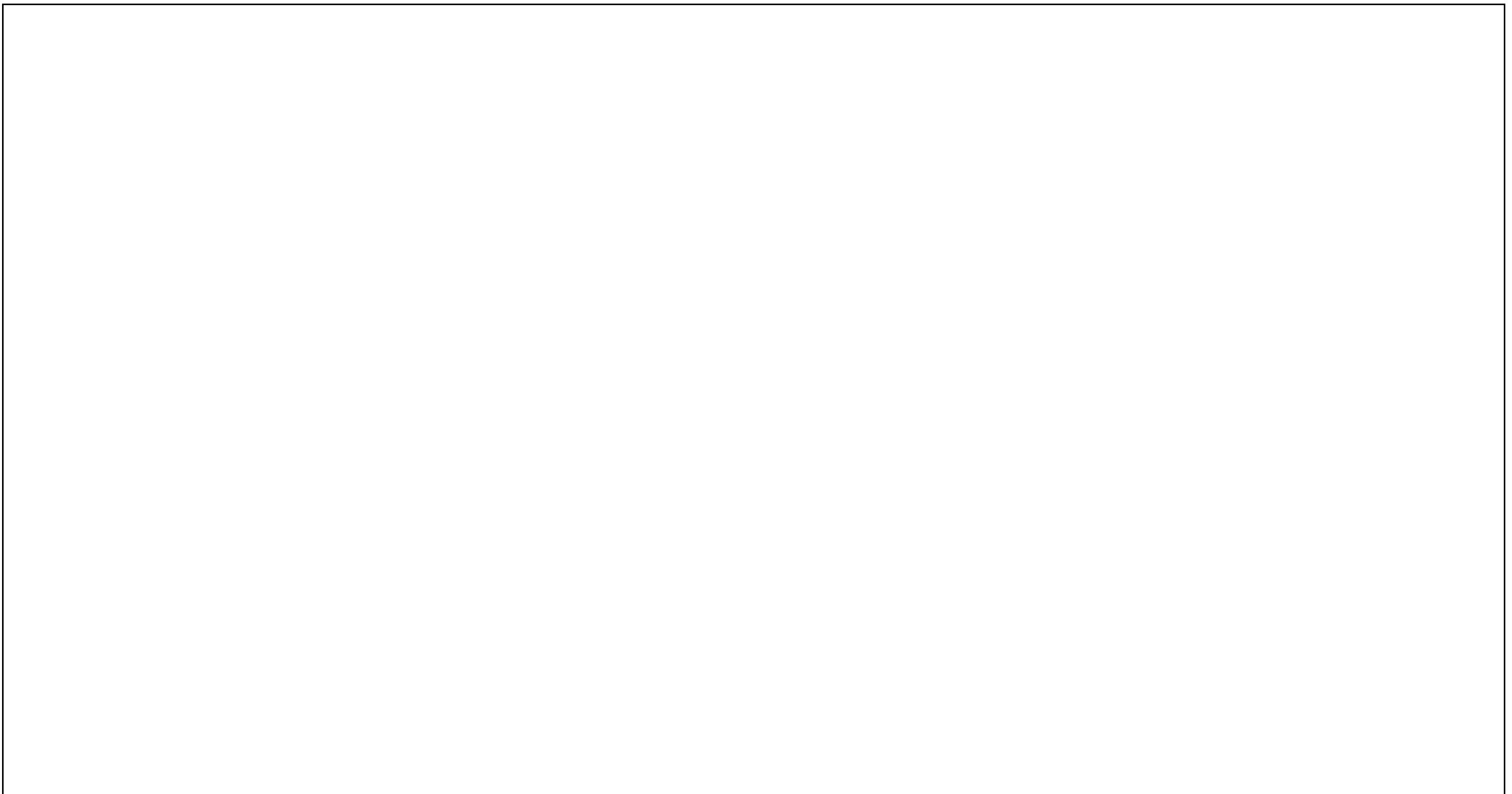


Figure 12.3-3 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 4800/8500 mm (B1F)

Figure 12.3-5 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 12300 mm (1F)

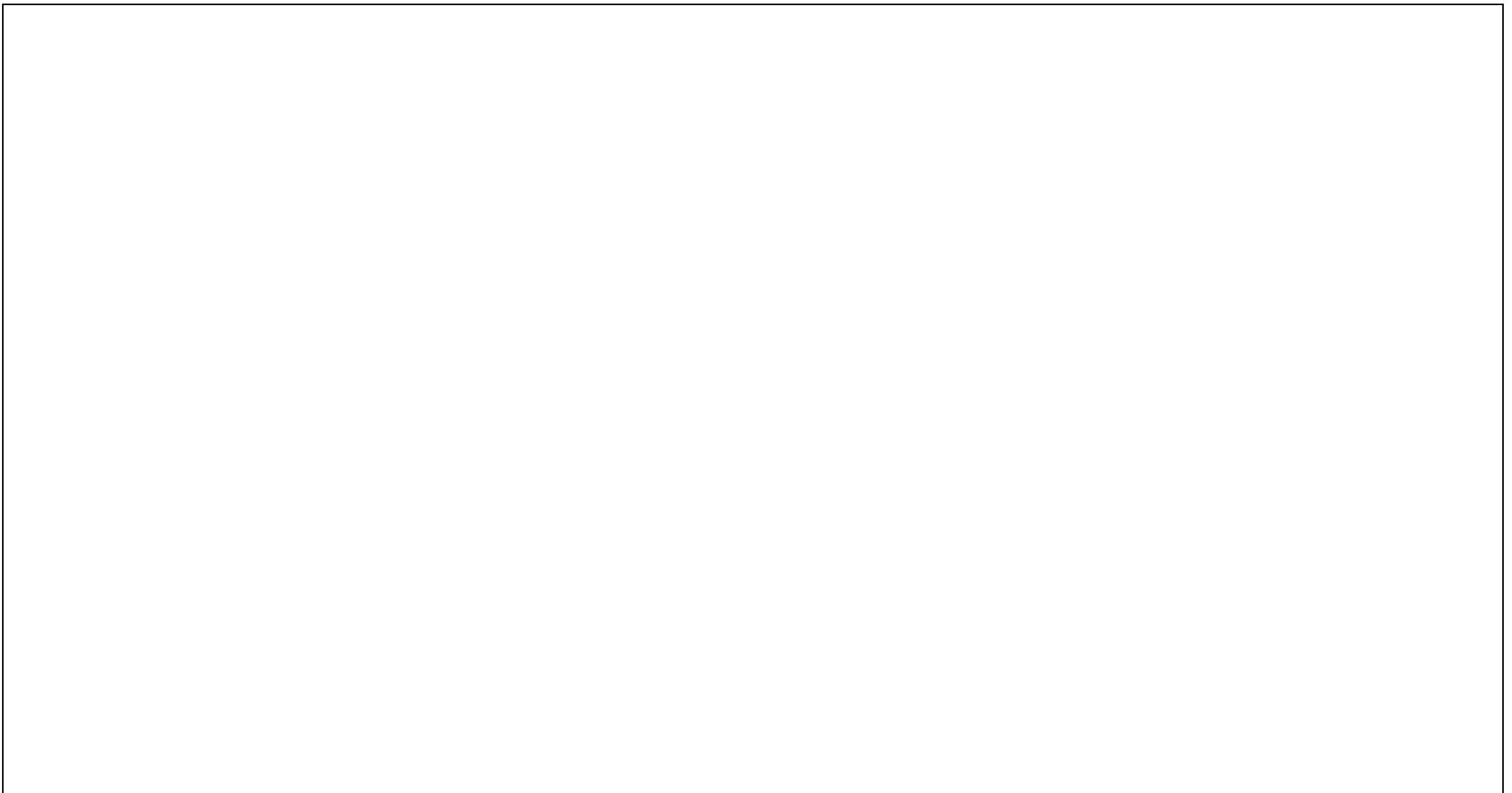


Figure 12.3-6 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 18100 mm (2F)

Figure 12.3-7 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 23500 mm (3F)

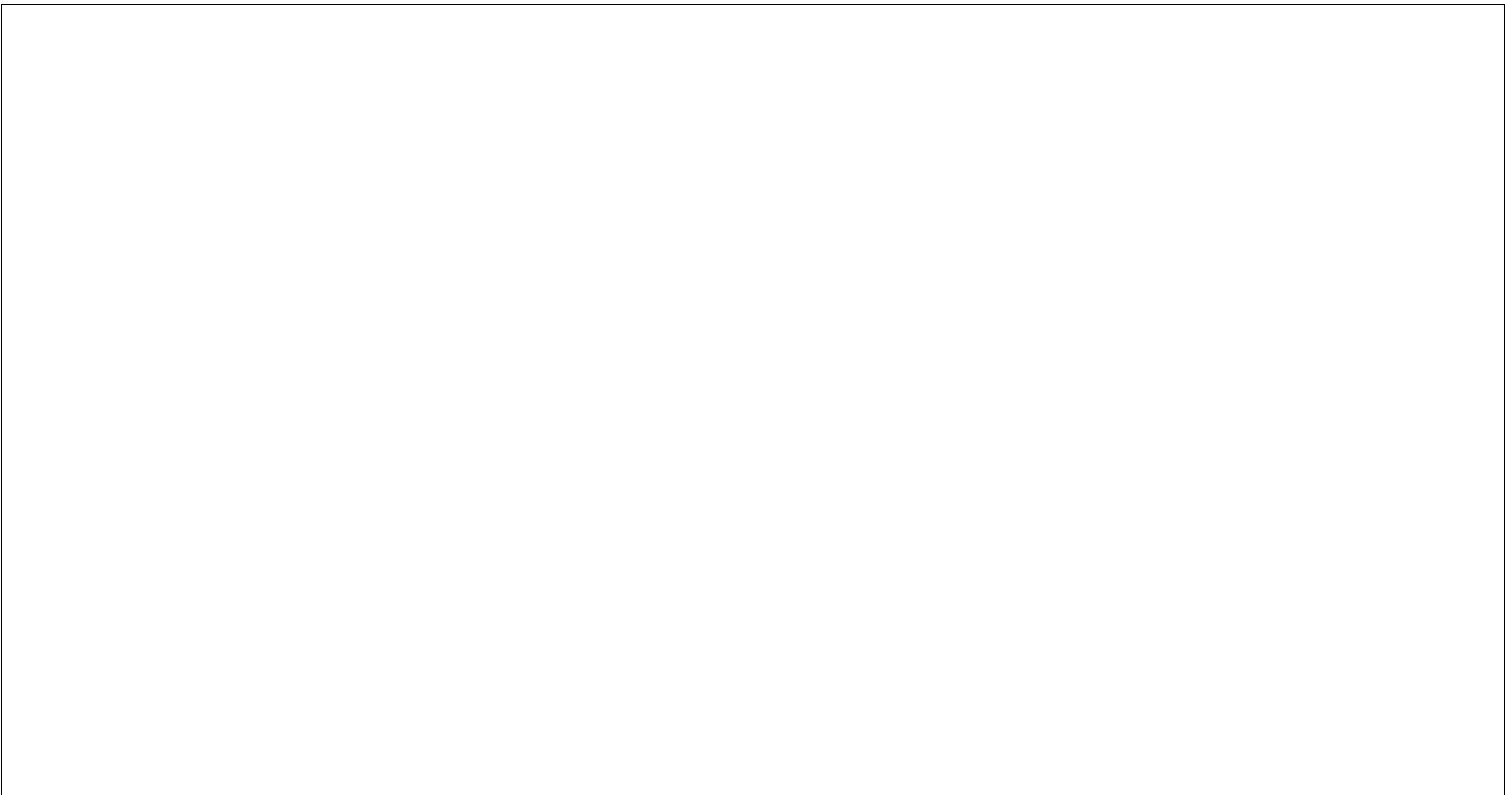


Figure 12.3-8 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 27200 mm (3.5F)

Figure 12.3-9 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation at Elevation 31700/38200 mm (4FM)

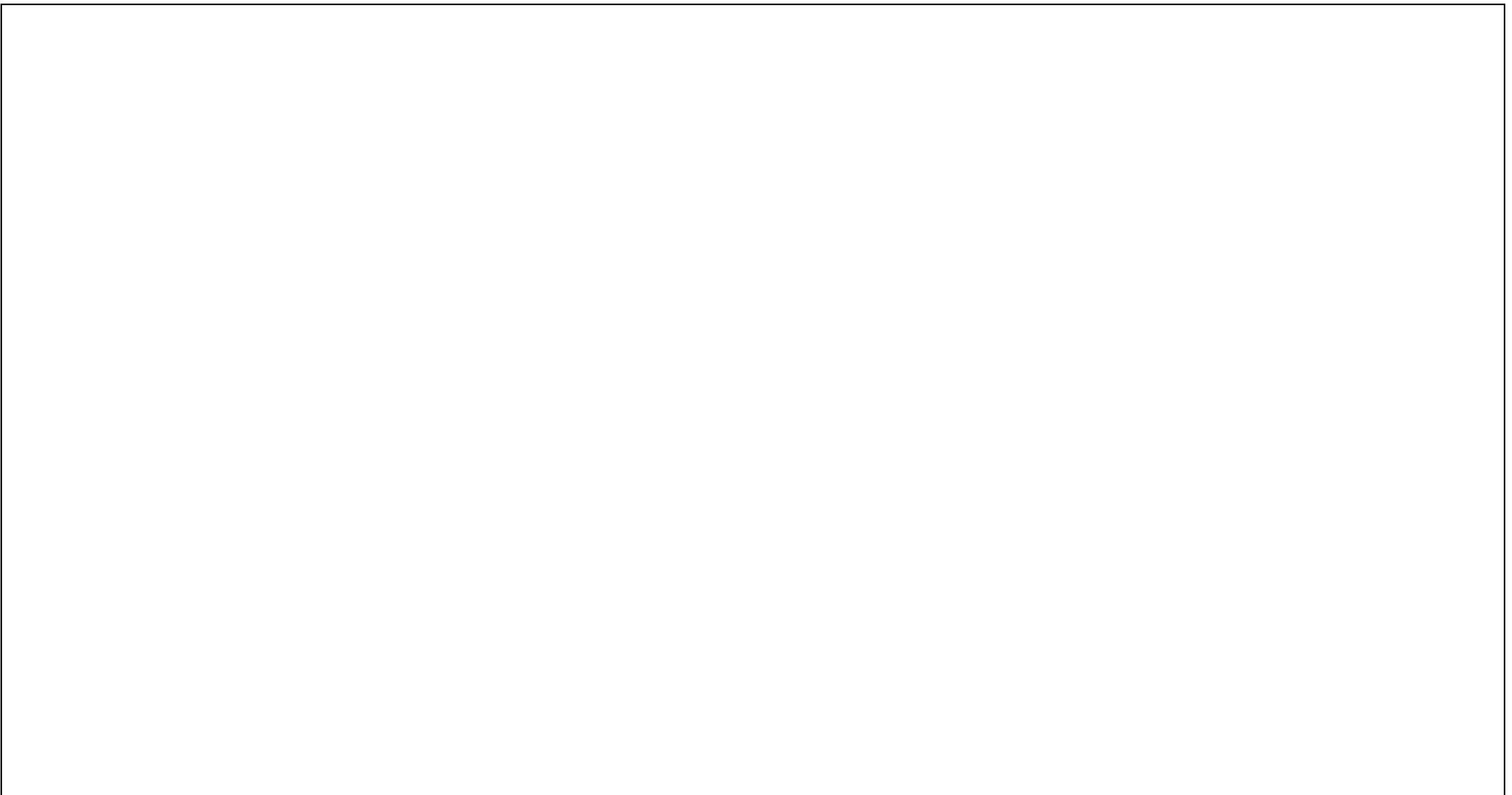


Figure 12.3-10 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation, Section A-A

Figure 12.3-11 Reactor Building Radiation Zone Map for Full Power and Shutdown Operation, Section B-B

Figure 12.3-12 Reactor Building Radiation Zone Map Post LOCA at Elevation -8200 mm (B3F)

Figure 12.3-13 Reactor Building Radiation Zone Map Post LOCA at Elevation -1700 mm (B2F)

Figure 12.3-14 Reactor Building Radiation Zone Map Post LOCA at Elevation 4800/8500 mm (B1F)

Figure 12.3-16 Reactor Building Radiation Zone Map Post LOCA at Elevation 12300 mm (1F)

Figure 12.3-17 Reactor Building Radiation Zone Map Post LOCA at Elevation 18100 mm (2F)

Figure 12.3-18 Reactor Building Radiation Zone Map Post LOCA at Elevation 23500 mm (3F)

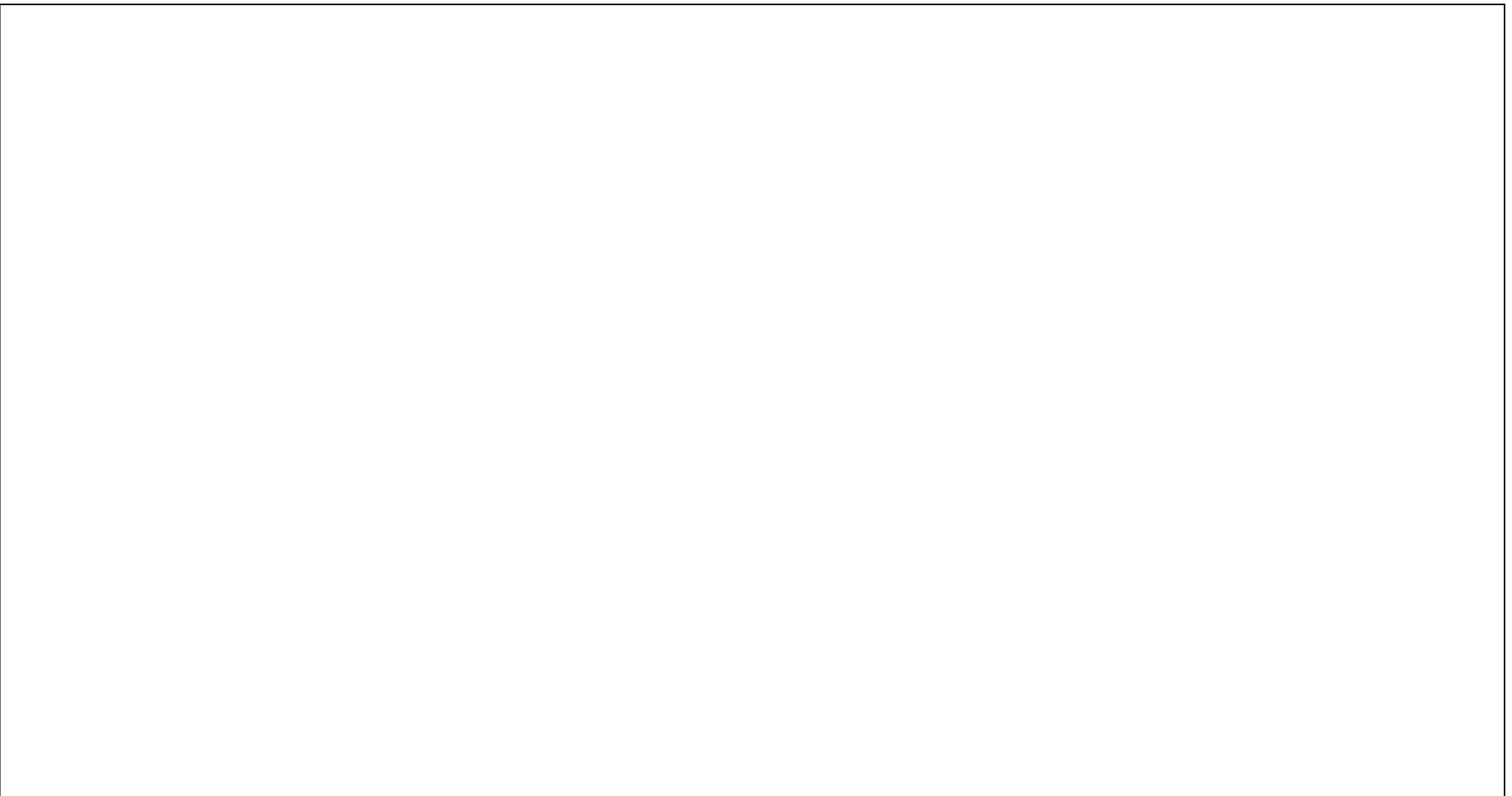


Figure 12.3-19 Reactor Building Radiation Zone Map Post LOCA at Elevation 27200 mm (3.5F)

Figure 12.3-20 Reactor Building Radiation Zone Map Post LOCA at Elevation 31700/38200 mm (4FM)

Figure 12.3-21 Reactor Building Radiation Zone Map Post LOCA, Section A-A

Figure 12.3-22 Reactor Building Radiation Zone Map Post LOCA, Section B-B

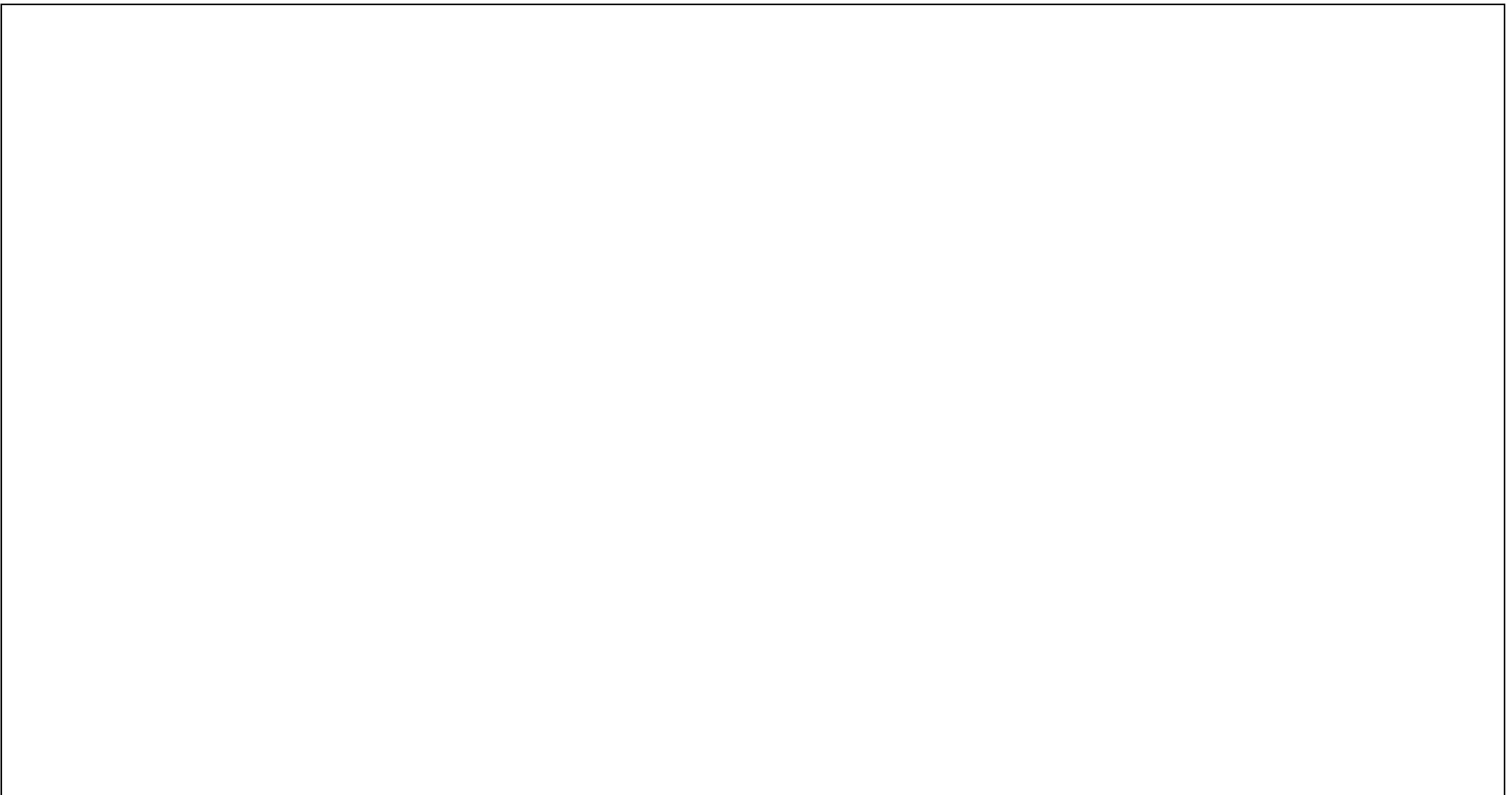


Figure 12.3-37 Radwaste Building, Radiation Zone Map, Normal Operation at Elevation -1500 mm

Figure 12.3-38 Radwaste Building, Radiation Zone Map, Normal Operation at Elevation -4800 mm

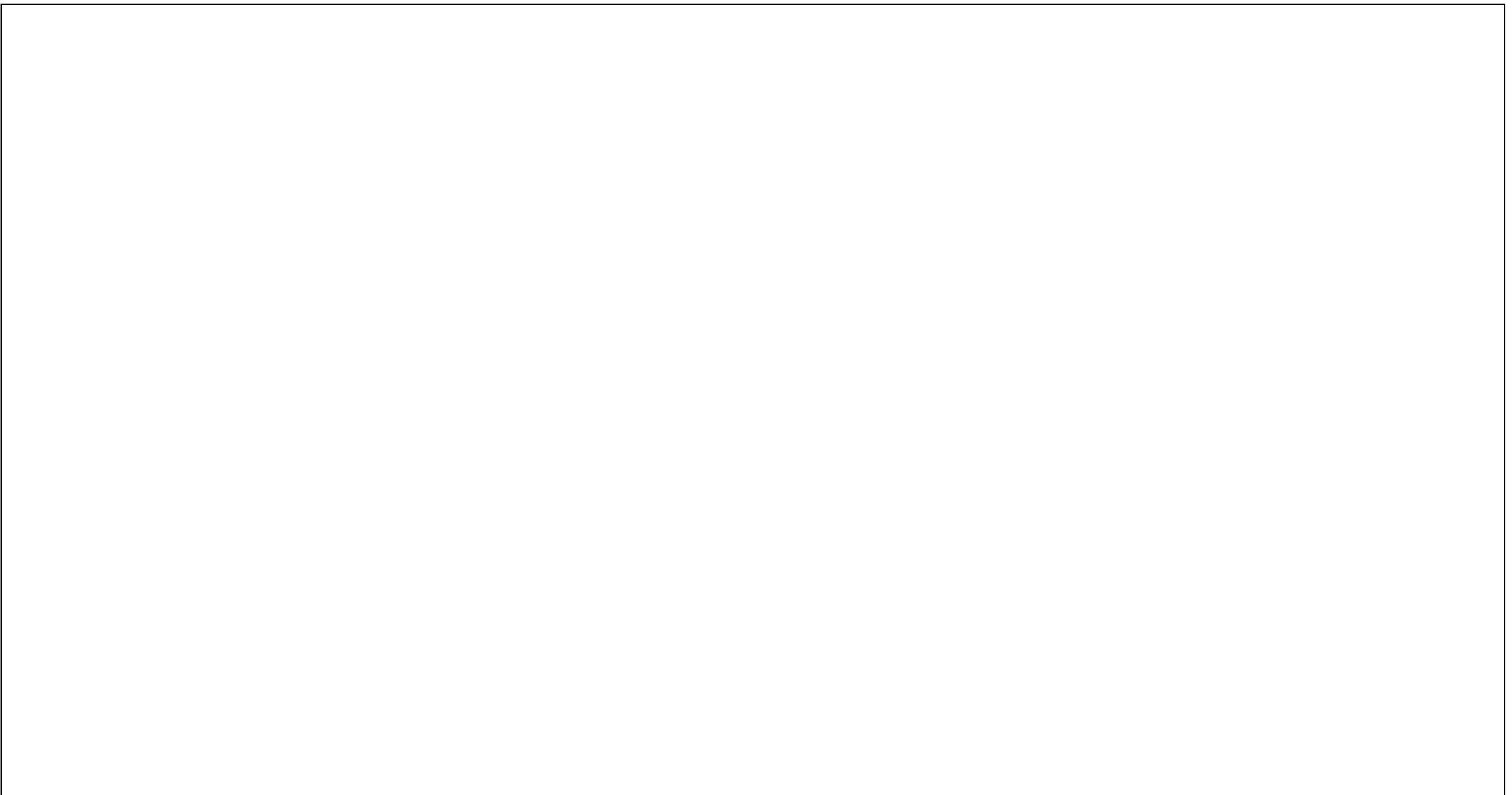


Figure 12.3-39 Radwaste Building, Radiation Zone Map, Normal Operation at Elevation 12300 mm

Figure 12.3-40 Radwaste Building, Radiation Zone Map, Normal Operation at Elevation 21000 mm

Figure 12.3-41 Radwaste Building, Radiation Zone Map, Normal Operation, Section A-A

Figure 12.3-42 Control Building, Radiation Zone, Normal Operation at Elevation -8200 mm

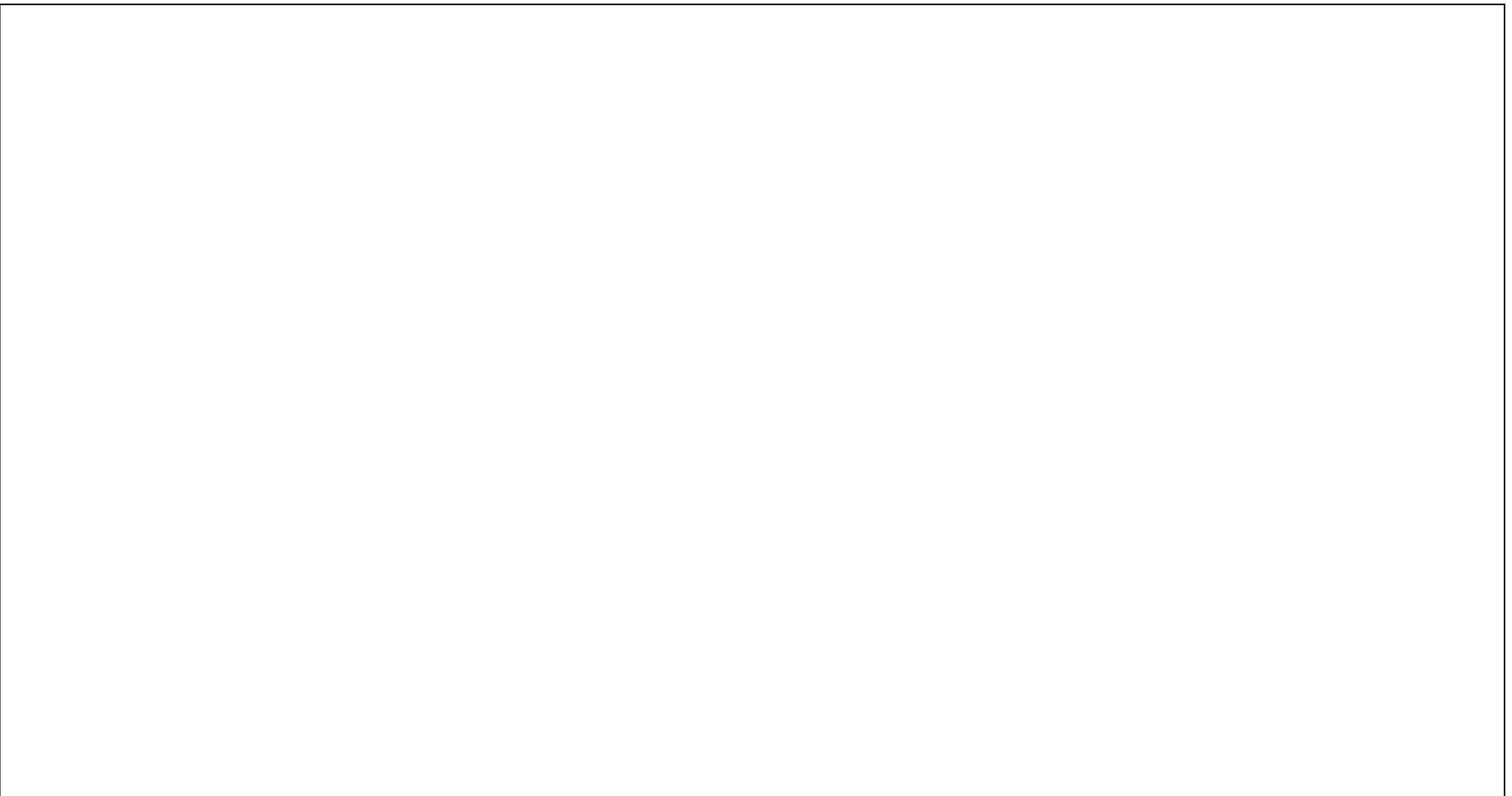


Figure 12.3-43 Control and Service Building, Radiation Zone, Normal Operation at Elevation -2150 mm

Figure 12.3-44 Control and Service Building, Radiation Zone, Normal Operation at Elevation 3500 mm

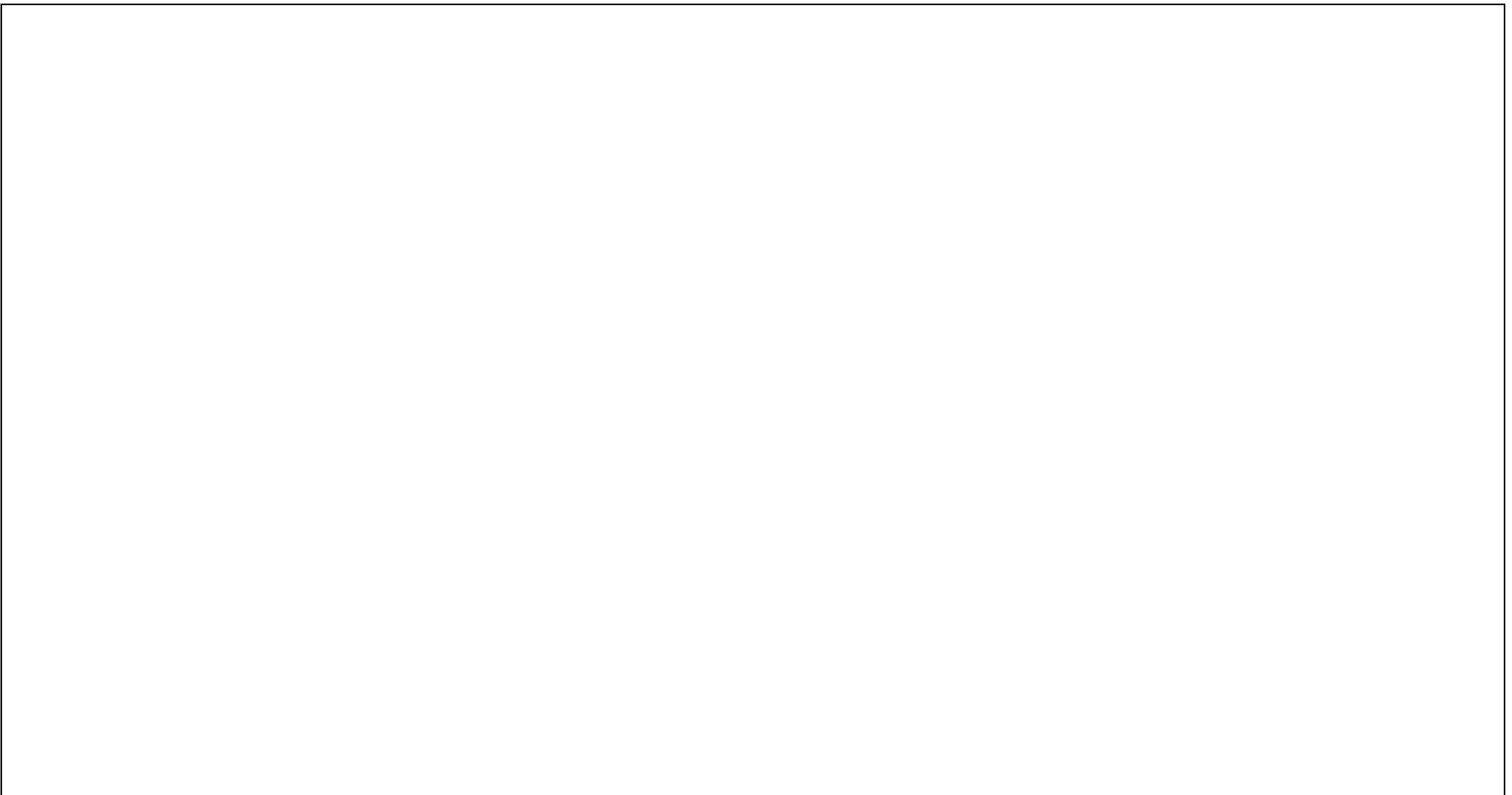


Figure 12.3-45 Control and Service Building, Radiation Zone, Normal Operation at Elevation 7900 mm

Figure 12.3-46 Control and Service Building, Radiation Zone, Normal Operation at Elevation 12300 mm

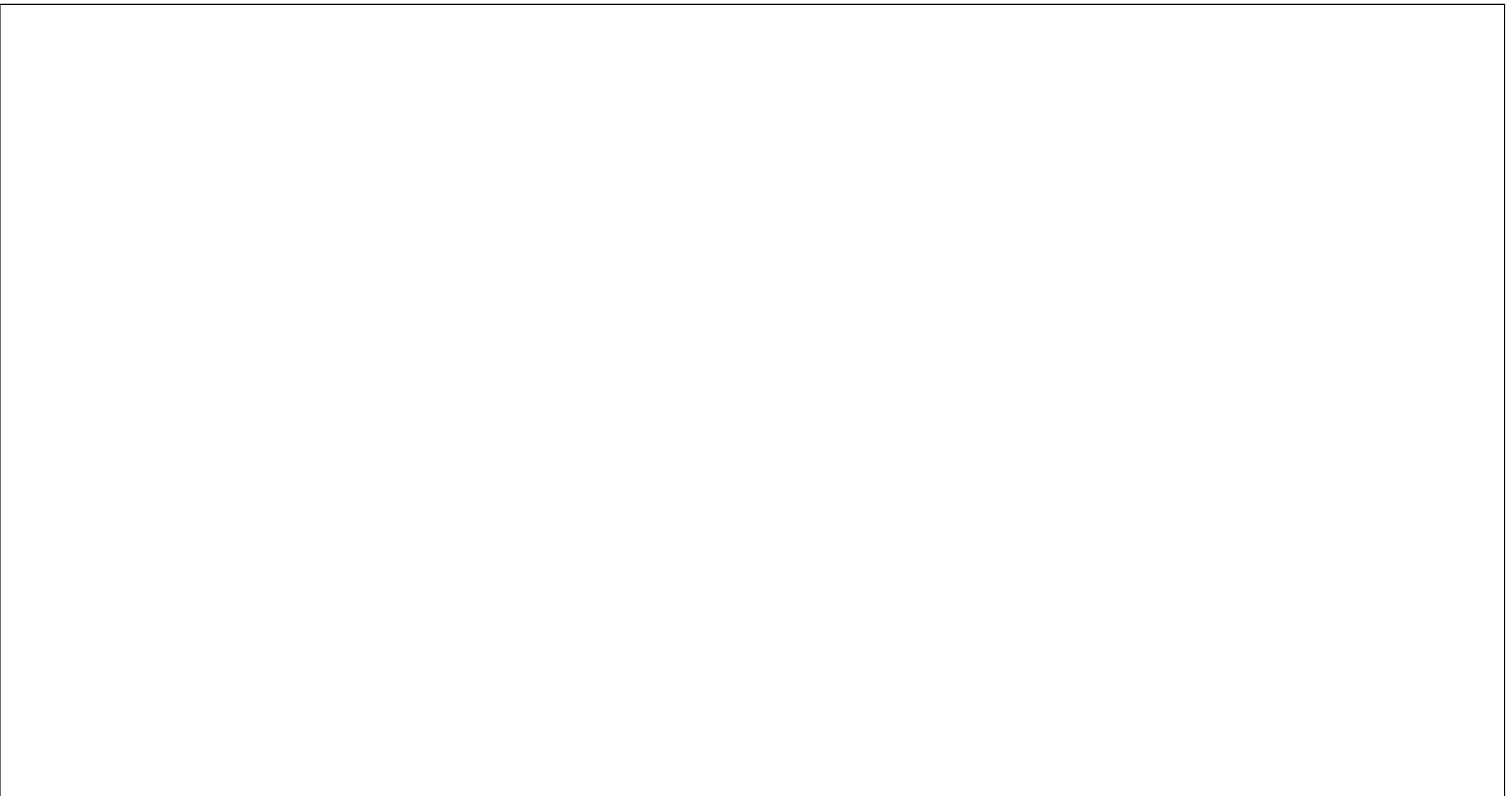


Figure 12.3-47 Control and Service Building, Radiation Zone, Normal Operation at Elevation 17150 mm

Figure 12.3-48 Control and Service Building, Radiation Zone, Normal Operation, Side View, Cross Section B-B

Figure 12.3-49 Turbine Building, Radiation Zone at Elevation 5300 mm

Figure 12.3-50 Turbine Building, Radiation Zone at Elevation 12300 mm

Figure 12.3-51 Turbine Building, Radiation Zone at Elevation 20300 mm

Figure 12.3-52 Turbine Building, Radiation Zone at Elevation 30300 mm

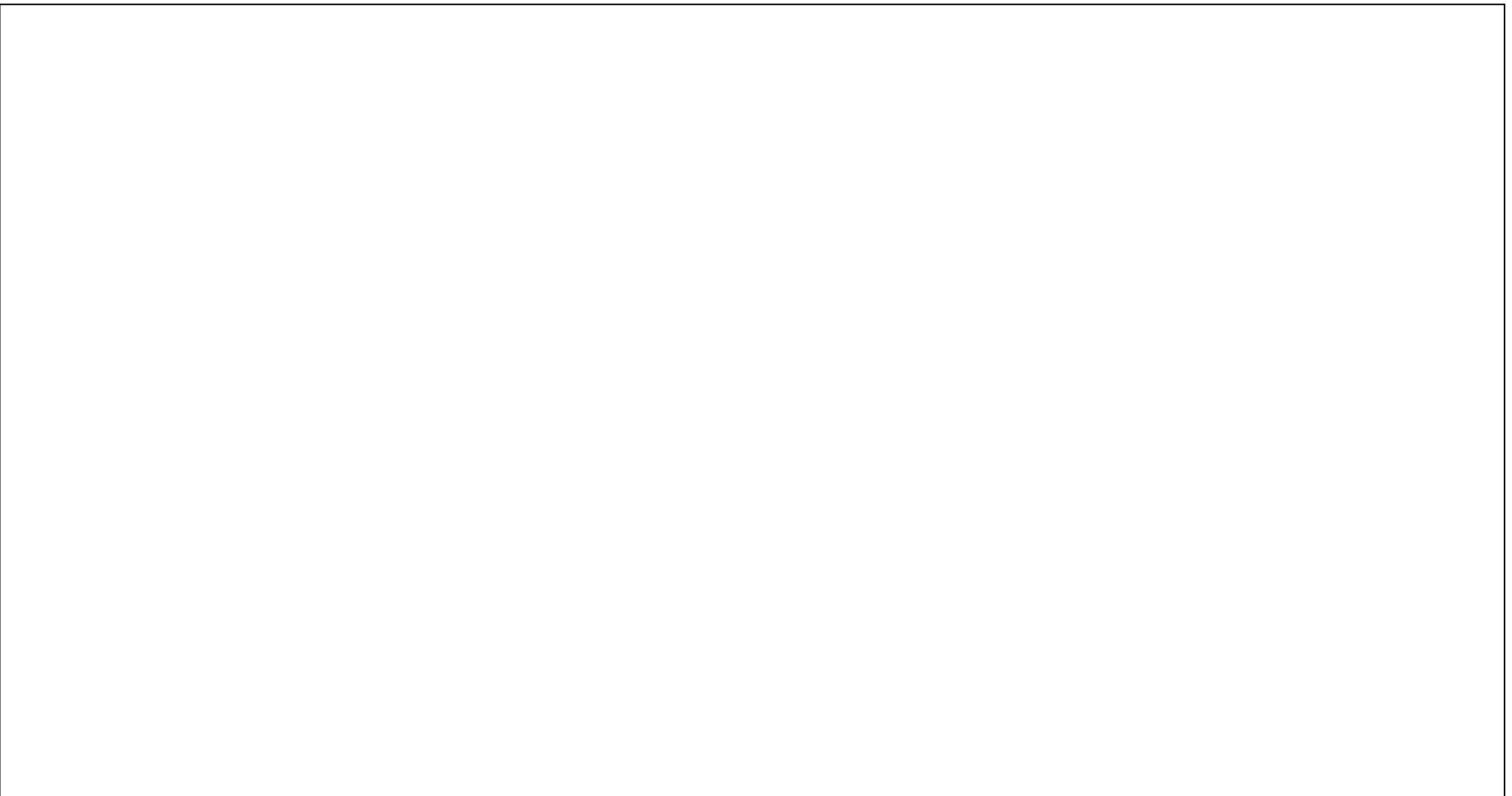


Figure 12.3-53 Turbine Building, Radiation Zone at Normal Operation Longitudinal Section A-A

Figure 12.3-54 Control and Service Building, Radiation Zone, Post LOCA, Section B-B

Figure 12.3-55 Turbine Building, Radiation Zone, Post LOCA, Longitudinal Section A-A

Figure 12.3-56 Reactor Building, Area Radiation Monitors at Elevation -8200 mm

Figure 12.3-57 Reactor Building, Area Radiation Monitors at Elevation -1700 mm

Figure 12.3-58 Reactor Building, Area Radiation Monitors at Elevation 4800/8500 mm

Figure 12.3-59 Reactor Building, Area Radiation Monitors at Elevation 12300 mm

Figure 12.3-60 Reactor Building, Area Radiation Monitors at Elevation 23500 mm

Figure 12.3-61 Reactor Building, Area Radiation Monitors at Elevation 27200 mm

Figure 12.3-62 Reactor Building, Area Radiation Monitors at Elevation 31700/38200 mm

Figure 12.3-63 Reactor Building, Area Radiation Monitors, Section B-B

Figure 12.3-64 Control and Service Buildings, Area Radiation Monitors, Section B-B

Figure 12.3-65 Radwaste Building, Area Radiation Monitors at Elevation -1500 mm

Figure 12.3-66 Radwaste Building, Area Radiation Monitors at Elevation 4800 mm

Figure 12.3-67 Radwaste Building, Area Radiation Monitors at Elevation 12300 mm

Figure 12.3-68 Radwaste Building, Area Radiation Monitors at Elevation 21000 mm

Figure 12.3-70 Turbine Building, Area Radiation Monitors at Elevation 12300 mm

Figure 12.3-71 Turbine Building, Area Radiation Monitors at Elevation 20300 mm

Figure 12.3-72 Turbine Building, Area Radiation Monitors at Elevation 30300 mm

Figure 12.3-73 Turbine Building, Area Radiation Monitors, Longitudinal Section A-A

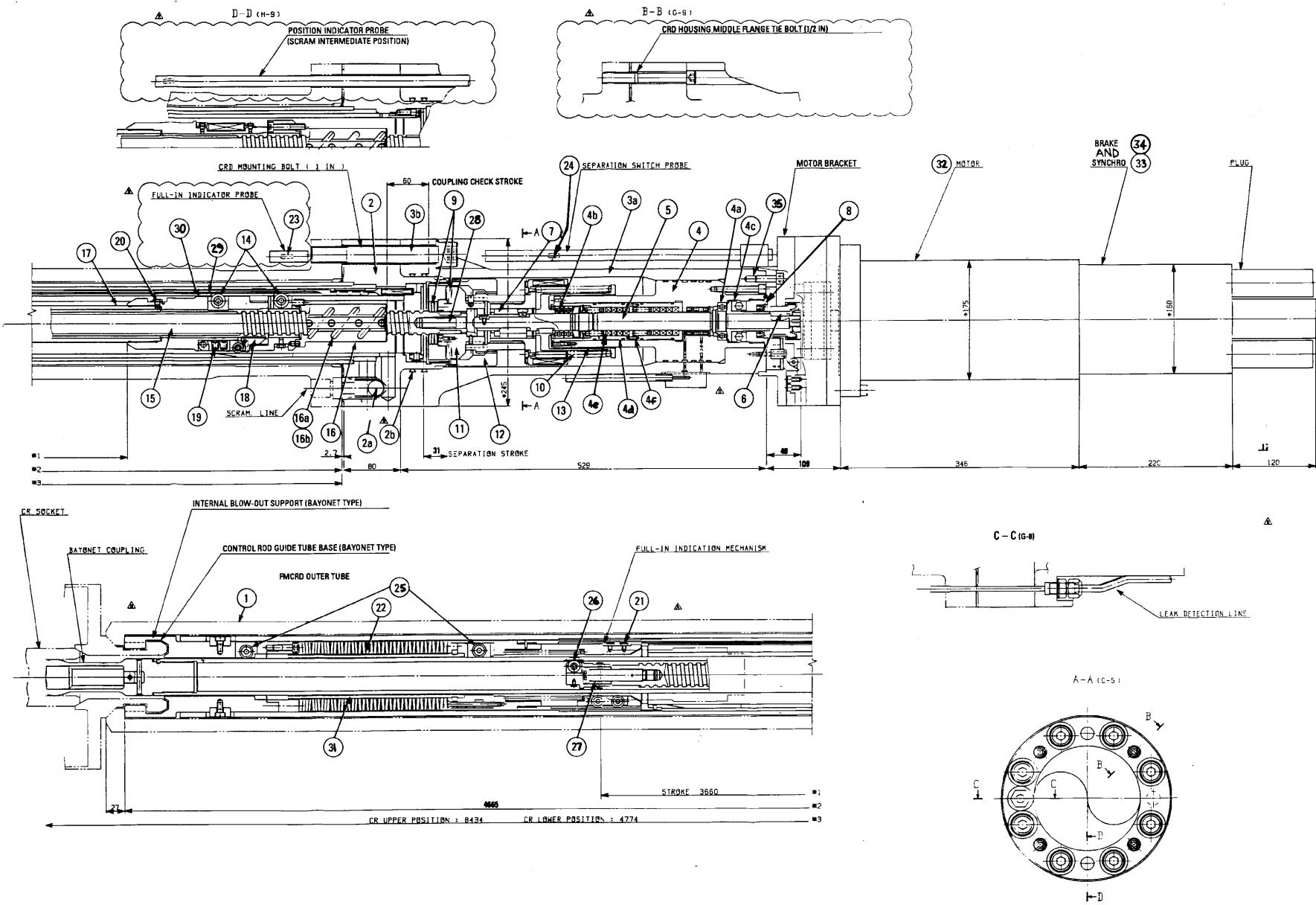


Figure 15B-3 Fine Motion Control Rod Drive

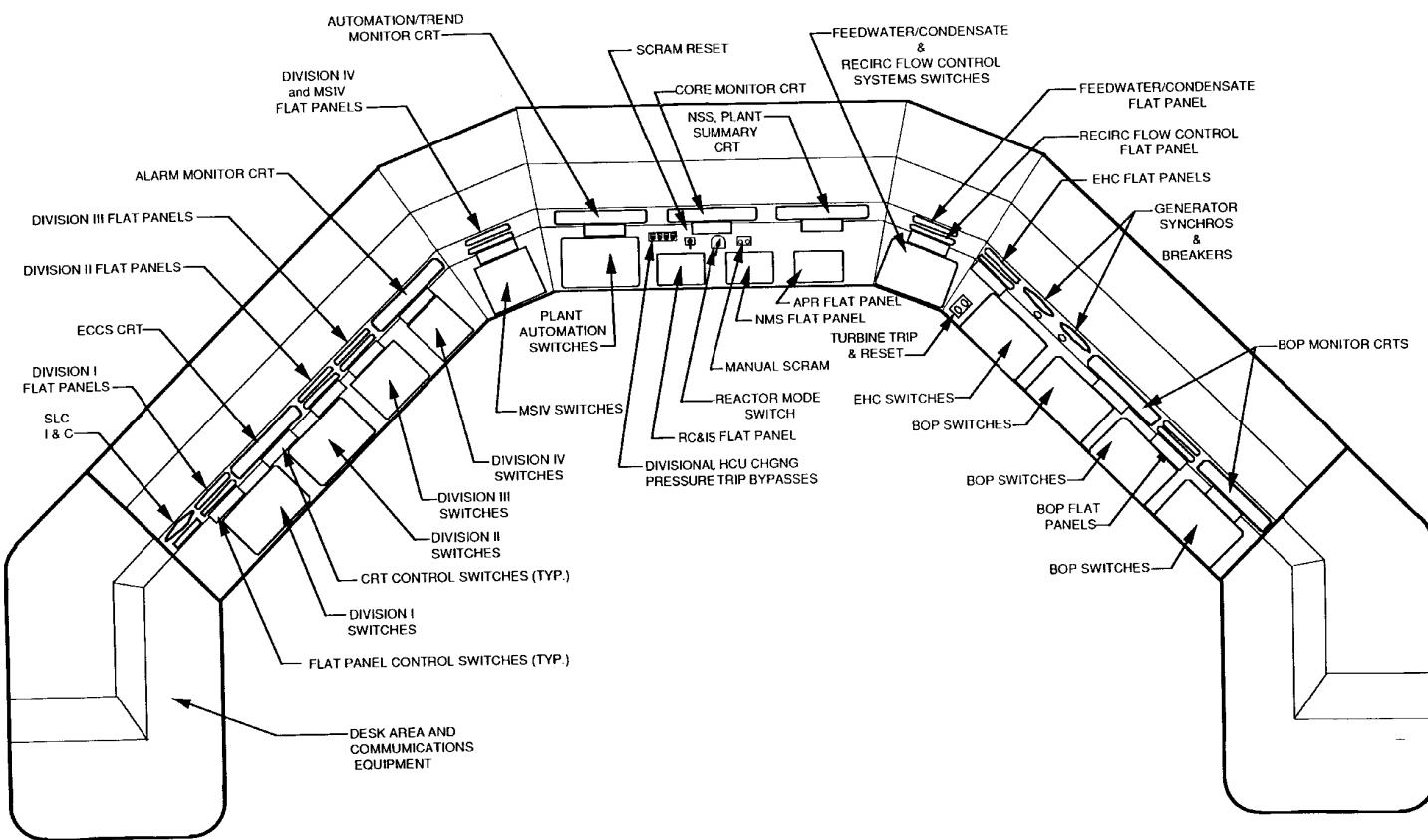


Figure 18C-5 Arrangement of Equipment of Main Control Console

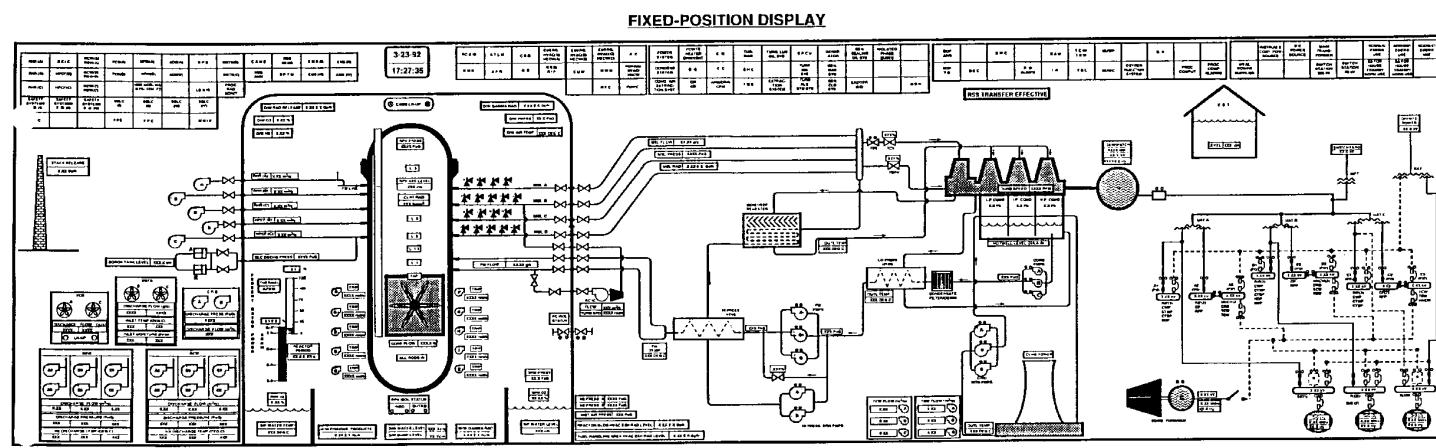


Figure 18C-7 Fixed-Position Display

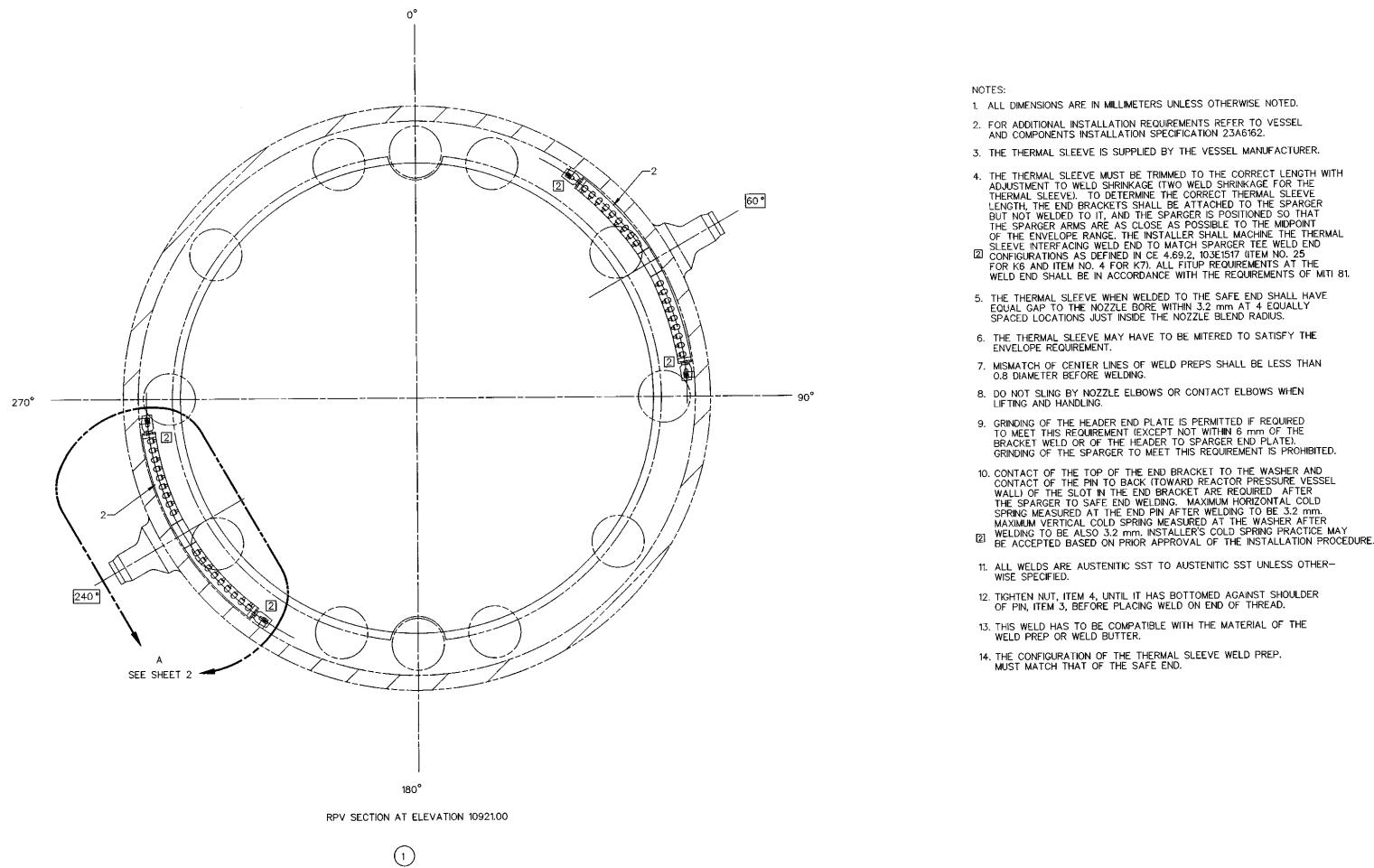


Figure 20.3.4-5a Low Pressure Core Flooder Sparger (Sheet 1)

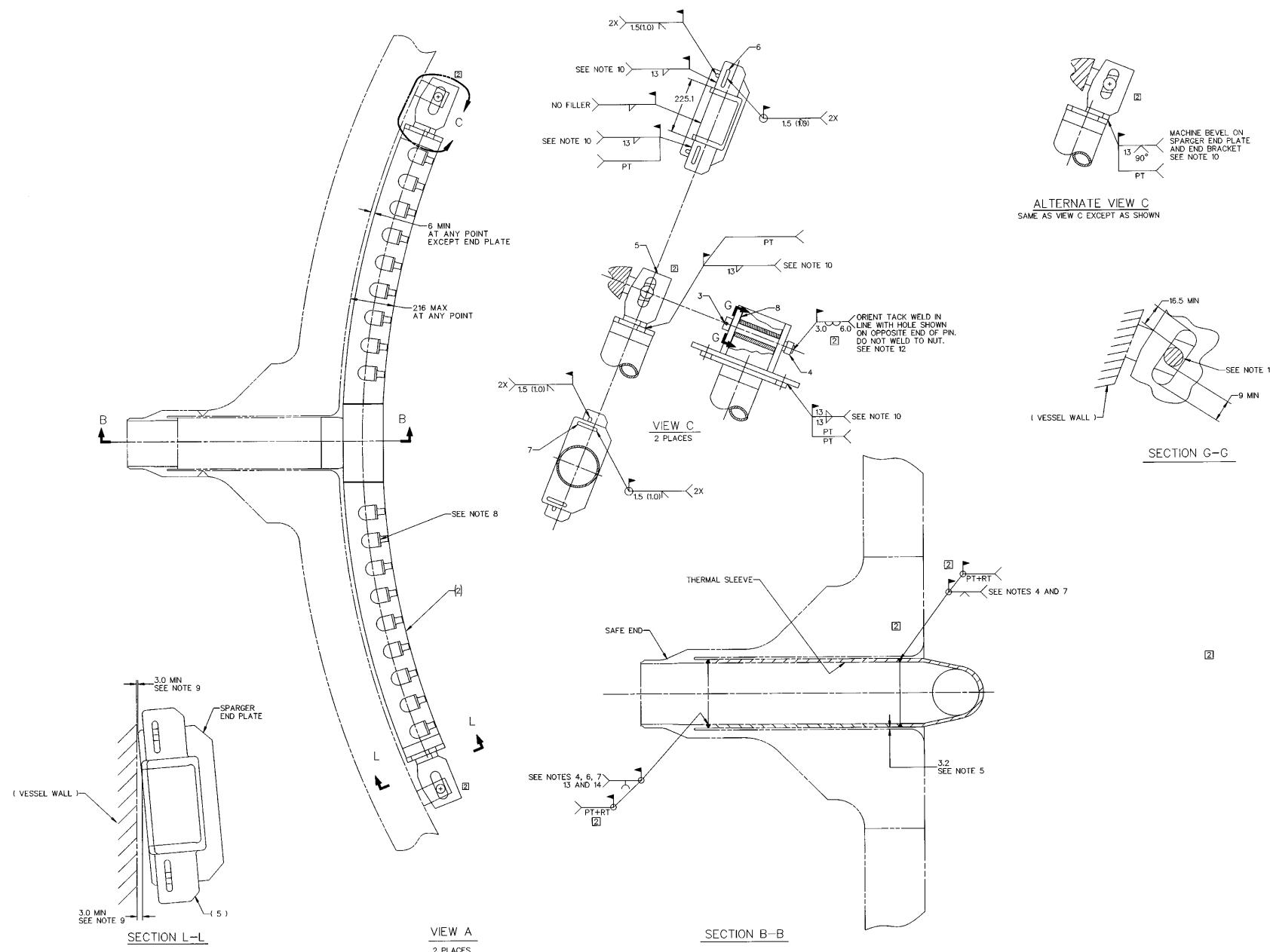


Figure 20.3.4-5b Low Pressure Core Flooder Sparger (Sheet 2)

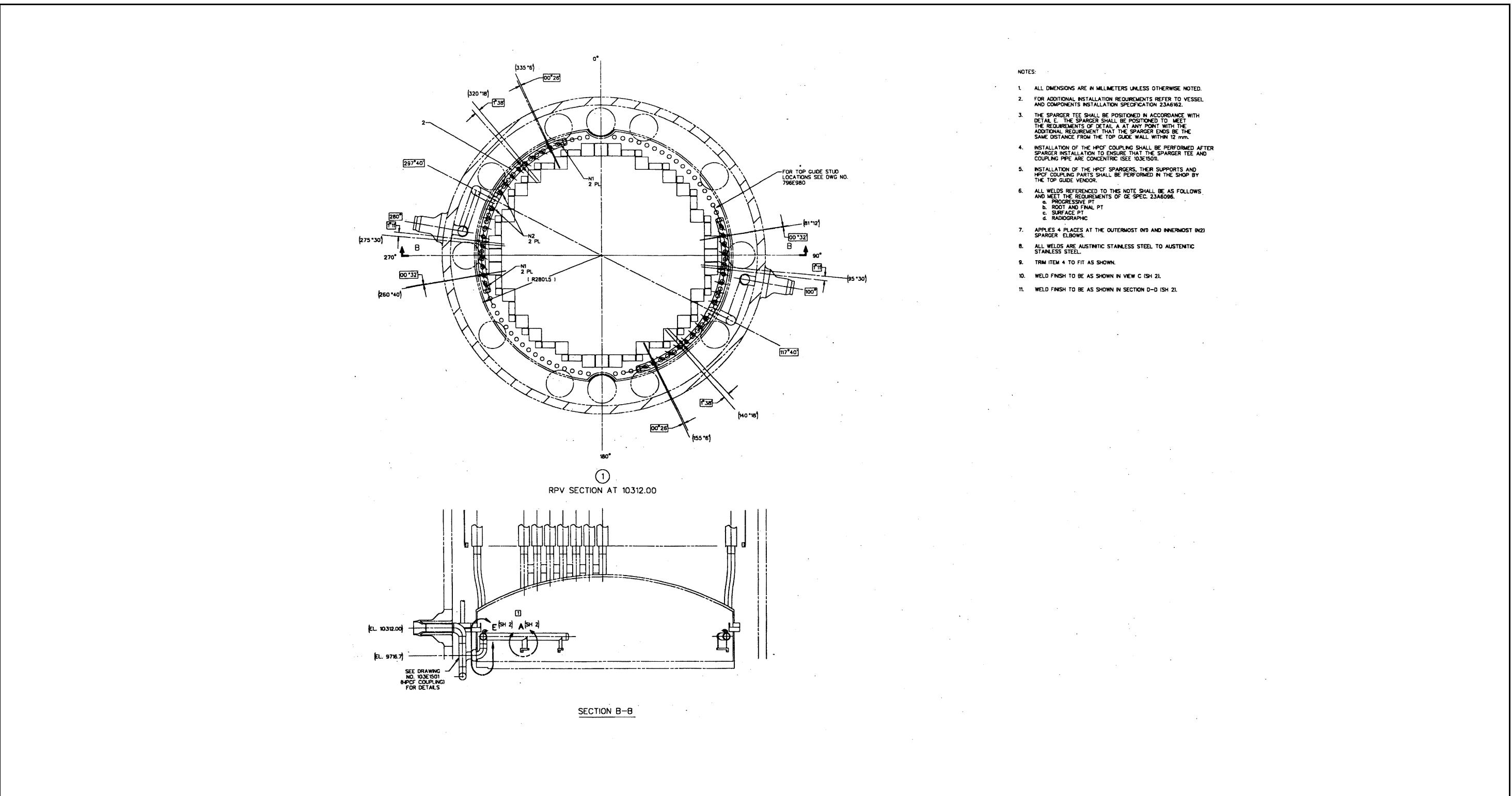


Figure 20.3.4-5c High Pressure Core Flooder Sparger