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Energy Systems

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NSD-NRC-97-5201
DCP/NRC0927
Docket No.: STN-52-003

July 2, 1997

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: T. R. QUAY

SUBJECT: AP600 DESIGN CERTIFICATION, ADDITIONAL LEVEL OF DETAIL FOR SSAR SUBSECTION 9.4 AND SYSTEM DIAGRAMS, KEY ISSUE #1.

References:

1. Westinghouse letter DCP/NRC0829, "AP600 Design Certification; Formal Notification of Resolution of Items Associated with Section 9.4," dated April 25, 1997.

2. NRC letter, "Staff Update to Open Items (OIs) and Request for Reinstatement of Deleted Information Regarding Section 9.4 of the Westinghouse AP600 Standard Safety Analysis Report (SSAR)," dated October 17, 1996.

Dear Mr. Quay:

This is in response to a telephone conference held on June 6, 1997, between NRC (Jackson, et al) and Westinghouse (Winters, et al). Specifically this letter addresses each of the responses provided by Reference 1 for the NRC items in Reference 2 as discussed in the telephone conference. In addition, this letter provides SSAR system figure markups to resolve the SSAR level of detail issue identified for both Subsection 9.4 and Chapter 11.

Attachment 1 provides a roadmap to additional SSAR revisions required to support NRC review of Subsection 9.4. Attachment 2 provides the SSAR markups associated with Attachment 1 and the resolution of key issue #1. Attachment 2 has been incorporated into Revision 14 of the SSAR.

If you have any questions, please contact me on 412-374-4334 or J. W. Winters on 412-374-5290.

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

E004

jml

Attachments
1. Additional SSAR Revisions to Support NRC Review of Section 9.4
2. SSAR Markup Pages

cc: D. T. Jackson, NRC (w/Attachments)
N. J. Liparulo, Westinghouse (w/o Attachments)

ATTACHMENT 1 TO DCP/NRC0927

ADDITIONAL SSAR REVISIONS TO SUPPORT
NRC REVIEW OF SECTION 9.4

ITEM NUMBER IN NRC LETTER	ATTACHED SSAR MARKUP PAGES	COMMENT
1.a	v, 1.1-3, 1.1-8, 1.1-9, 1.1-10, 1.7-3, 3E-9, 3E-11, 3E-13, 3E-15, 5.1-19, 5.1-21, 5.1-23, 5.4-100, 5.4-103, 6.2-233, 6.3-75, 6.3-77, 6.3-78, 6.4-15, 8.3-53, 8.3-55, 8.3-57, 8.3-59, 9.1-59, 9.1-61, 9.2-59, 9.2-61, 9.2-65, 9.2-67, 9.2-69, 9.2-71, 9.2-73, 9.3-65, 9.3-67, 9.3-69, 9.3-71, 9.4-93, 9.4-99, 9.4-103, 9.4-104, 9.4-105, 9.4-107, 9.4-109, 9.4-110, 9.4-111, 9.4-113, 9.4-115, 9.4-116, 9.5-67, 9.5-69, 9.5-71, 10.3-41, 10.4-65, 10.4-67, 10.4-69, 10.4-71, 10.4-73, 10.4-77, 11.2-43, 11.2-45, 11.2-47, 11.2-49, 11.2-51, 11.2-53, 11.2-55, 11.3-20, 11.3-21	"TABLE 9.4-1" in this item in Attachment 1 to DCP/NRC0829 (NSD-NRC-97-5087) should be: "FIGURE 9.4.1-1". In addition, to respond to this concern, as well as, open items 3424 and 5004 from Chapter 11, system diagram markups are included to better describe system intra- and inter-connections.
1.b	9.4-18, 9.4-24	See response to item 1.a.
1.c		See response to item 1.a. "TABLE 9.4.3-1" in this item in Attachment 1 to DCP/NRC0829 (NSD-NRC-97-5087) should be: "FIGURE 9.4.3-1".
1.d		See response to item 1.a.
1.e		See response to item 1.a.
2.a	9.4-30, 9.4-31	Exhaust air fan capacities are already specified for the subsystems described in subsections 9.4.8, 9.4.9 and 9.4.11.
2.b		Previous response acceptable to NRC.
3.a		Previous response acceptable to NRC.
3.b		Previous response acceptable to NRC.

4		Previous response acceptable to NRC.
5.a		Previous response acceptable to NRC.
5.b		Previous response acceptable to NRC.
5.c		Previous response acceptable to NRC.
5.d		Previous response acceptable to NRC.
5.e		Previous response acceptable to NRC.
5.f		Previous response acceptable to NRC.
5.g		Previous response acceptable to NRC.
5.h		Previous response acceptable to NRC.
6.a.(1)		Previous response acceptable to NRC.
6.a.(2)	6.4-1, 6.4-7, 6.4-8, 6.4-9	
6.a.(3)		Previous response acceptable to NRC.
6.a.(4)	9.4-11	
6.a.(5)	9.4-11	
6.a.(6)		Previous response acceptable to NRC.
6.a.(7)		Previous response acceptable to NRC.
6.a.(8)	9.4-15, 9.4-49	
6.a.(9)		Previous response acceptable to NRC.
6.b.(1)		Previous response acceptable to NRC.
6.b.(2)		Previous response acceptable to NRC.
6.b.(3)		See response to item 1.a.
6.b.(4)		Previous response acceptable to NRC.
6.c.(1)		Previous response acceptable to NRC.
6.c.(2)		Previous response acceptable to NRC.
6.c.(3)		Previous response acceptable to NRC.
6.d.(1)		Previous response acceptable to NRC.
6.d.(2)		Previous response acceptable to NRC.
6.d.(3)		See response to item 6.a.(8).
6.e.(1)		See response to item 1.a.
6.e.(2)		Previous response acceptable to NRC.
6.e.(3)		Previous response acceptable to NRC.

6.f.(1)		See response to item 1.a.
7.a.(1)		The response provided for part c. of RAI 410.245 (on VZS) is also applicable to the defense-in-depth portions of the VBS as described in subsection 9.4.1 of the SSAR.
7.a.(2)		Previous response acceptable to NRC.
7.a.(3)		Previous response acceptable to NRC.
7.a.(4)	1.8-12, 9.4-2, 9.4-72	
7.a.(5)	3.9-168	
7.a.(6)		Westinghouse knows of no requirements to isolate MCR ventilation on a containment isolation high radiation signal. Analysis indicates that isolation on high radiation in the MCR supply air ducts is sufficient for operator protection.
7.a.(7)	9.4-15	
7.b.(1)		Previous response acceptable to NRC.
7.b.(2)		Previous response acceptable to NRC.
7.b.(3)		Previous response acceptable to NRC.
7.b.(4)		Previous response acceptable to NRC.
7.b.(5)		See response to item 1.a.
7.b.(6)		See response to item 1.a.
7.b.(7)		See response to item 1.a.
7.b.(8)		See response to item 1.a.
7.c.(1)		Previous response acceptable to NRC.
7.c.(2)	3.2-70	
7.c.(3)		See response to item 7.c.(2).
7.c.(4)		See response to item 7.c.(2).
7.c.(5)		See response to item 1.a.
7.c.(6)		See response to item 7.c.(2).
7.d.(1)	3.2-71	
7.d.(2)		See response to item 1.a.
7.e.(1)	9.4-18, 9.4-19, 9.4-29, 9.4-31, 9.4-43, 9.4-68	
7.e.(2)	3.2-75	
7.f.(1)	3.2-76	

7.f.(2)		See response to item 1.a. See response to item 7.f.(1).
7.g.(1)	3.2-76	Also see response to item 1.a.
7.h.(1)	8.3-7	
7.h.(2)		Previous response acceptable to NRC.
7.i.(1)		See response to item 1.a.
7.i.(2)	3.2-75	

Attachment 2 to DCP/NRC0927

SSAR Markups

1.1.6.6 SSAR Acronyms

Table 1.1-1 provides a list of acronyms used in the AP600 SSAR. Acronyms for systems are defined in the section in which they are used. Other acronyms may be defined in the section in which they are used. Table 1.1-2 provides a list of AP600 system designators.

1.7-2

1.1.7 Combined License Information

Combined License applicants referencing the AP600 certified design will provide the construction and startup schedule information.

DELETE TABLE 1.1-2 AND REPLACE TABLE 1.7-2 WITH THIS MARKUP

Table 1.~~1~~7-2 (Sheet 1 of 3)

AP600 SYSTEM DESIGNATORS AND SYSTEM DIAGRAMS

DESIGNATOR	SYSTEM	SSAR SECTION	SSAR FIGURE
ASS	Auxiliary Steam Supply System	10.4.10	N/A
BDS	Steam Generator Blowdown System	10.4.8	10.4.8-1
CAS	Compressed and Instrument Air Systems	9.3.1	9.3.1-1
CCS	Component Cooling Water System	9.2.2	9.2.2-2
CDS	Condensate System	10.4.7	10.4.7-1
CES	Condenser Tube Cleaning System	10.4.1	N/A
CFS	Turbine Island Chemical Feed System	10.4.11	N/A
CMS	Condenser Air Removal System	10.4.2	N/A
CNS	Containment System	6.2.3	N/A
CPS	Condensate Polishing System	10.4.6	10.4.6-1
CVS	Chemical and Volume Control System	9.3.6	9.3.6-1
CWS	Circulating Water System	10.4.5	N/A
DAS	Diverse Actuation System	~~7.2~~ ~~2.1~~ 7.7	7.2-1 (Sh. 10 & 20)
DDS	Data Display and Processing System	7.1 & 7.7	7.1-1
DOS	Standby Diesel and Auxiliary Boiler Fuel Oil System	9.5.4	9.5.4-1
DRS	Storm Drain System	N/A	N/A
DTS	Demineralized Water Treatment System	9.2.3	N/A
DWS	Demineralized Water Transfer and Storage System	9.2.4	9.2.4-1
ECS	Main AC Power System	8.3.1	8.3.1-1
EDS	Non Class 1E dc and UPS System	8.3.2	8.3.2-3
EFS	Communication Systems	9.5.2	N/A
EGS	Grounding and Lightning Protection System	8.3.1.1 ~~8.3.1.1.7 & 8.3.1.1.8~~	N/A
EHS	Special Process Heat Tracing System	8.3.1.1	N/A
ELS	Plant Lighting System	9.5.3	N/A
EQS	Cathodic Protection System	N/A	N/A
FHS	Fuel Handling and Refueling System	9.1.1, 9.1.2, 9.1.4	9.1 - various
FPS	Fire Protection System	9.5.1	9.5.1-1
FWS	Main and Startup Feedwater System	10.4.7	10.4.7-1
GSS	Gland Seal System	10.4.3	10.4.3-1
HCS	Generator Hydrogen and CO_2 Systems	N/A	N/A
HDS	Heater Drain System	N/A	N/A
HSS	Hydrogen Seal Oil System	N/A	N/A
IDS	Class 1E dc and UPS System	8.3.2	8.3.2-1
IIS	In-core Instrumentation System	4.4.6	N/A
LOS	Main Turbine and Generator Lube Oil System	N/A	N/A

Table 1.1-2 (Sheet 2 of 3)

AP600 SYSTEM DESIGNATORS

MES	Meteorological and Environmental Monitoring System	2.3.3	N/A
MHS	Mechanical Handling System	9.1	N/A
MSS	Main Steam System	10.3	10.3.2-2
MTS	Main Turbine System	10.2	10.2-1
OCS	Operation and Control Centers System	7.1	7.1-1
PCS	Passive Containment Cooling System	6.2	6.2.2-1
PGS	Plant Gas Systems	9.3.2	MA
PLS	Plant Control System	7.1 & 7.7	7.1-1
PMS	Protection and Safety Monitoring System	Ch. 7	7.2-1
PSS	Primary Sampling System	9.3.3	9.3.3-1
PWS	Potable Water System	9.2.5	N/A
PXS	Passive Core Cooling System	6.3	6.3-1
RCS	Reactor Coolant System	5.1	5.1-5
RDS	Gravity and Roof Drain Collection System	N/A	N/A
RMS	Radiation Monitoring System	11.5	N/A
RNS	Normal Residual Heat Removal System	5.4.7	5.4-7
RWS	Raw Water System	N/A	N/A
RXS	Reactor System	5.3	5.3-1
SDS	Sanitary Drainage System	9.2.6	N/A
SES	Plant Security System	13.6	N/A
SFS	Spent Fuel Pit Cooling System	9.1.3	9.1-6
SGS	Steam Generator System	10.3	10.3.2-1
SJS	Seismic Monitoring System	3.7.4	N/A
SMS	Special Monitoring System	N/A	N/A
SSS	Secondary Sampling System	9.3.4	N/A
SWS	Service Water System	9.2.1	9.2.1-1
TCS	Turbine Building Closed Cooling Water System	9.2.8	N/A
TDS	Turbine Island Vents, Drains and Relief System	N/A	N/A
TOS	Main Turbine Control and Diagnostics System	10.2	N/A
TVS	Closed Circuit TV System	13.6	N/A
VAS	Radiologically Controlled Area Ventilation System	9.4.3	9.4.3-1
VBS	Nuclear Island Nonradioactive Ventilation System	9.4.1	9.4.1-1
VCS	Containment Recirculation Cooling System	9.4.6	9.4.6-1
VES	Main Control Room Emergency Habitability System	6.4	6.4-2
VFS	Containment Air Filtration System	9.4.7	9.4.7-1
VHS	Health Physics and Hot Machine Shop HVAC System	9.4.11	N/A
VLS	Containment Hydrogen Control System	6.2.4	6.2.4-[illegible]

Table 1.1-2 (Sheet 3 of 3)

AP600 SYSTEM DESIGNATORS

VRS	Radwaste Building HVAC System	9.4.8	N/A
VTS	Turbine Building Ventilation System	9.4.9	N/A
VUS	Containment Leak Rate Test System	6.2.5	6.2.5-1
VWS	Central Chilled Water System	9.2.7	9.2.7-1
VXS	Annex/Auxiliary Non-Radioactive Ventilation System	9.4.2	9.4.2-1
VYS	Hot Water Heating System	9.2.10	N/A
VZS	Diesel Generator Building Ventilation System	9.4.10	9.4.10-1
WGS	Gaseous Radwaste System	11.3	11.3-2
WLS	Liquid Radwaste System	11.2	11.2-2
WRS	Radioactive Waste Drain System	9.3.5	9.3.5-1
WSS	Solid Radwaste System	11.4	11.4-1
WWS	Waste Water System	9.2.9	N/A
ZAS	Main Generation System	8.1	N/A
ZBS	Transmission Switchyard and Offsite Power System	8.2	N/A
ZOS	Onsite Standby Power System	8.3.1	8.3.1-4, 8.3.1-5
ZVS	Excitation and Voltage Regulation System	N/A	N/A

NOTE: In the AP600 design documentation system, Piping and Instrumentation Diagrams are numbered XXX-M6-YYY, where XXX is the system designator and YYY is the sheet number. Electrical One-Line Diagrams are numbered XXX-E3-YYY, where XXX is the system designator and YYY is the sheet number. I&C Functional Logic Diagrams are numbered XXX-J1-YYY where XXX is the I&C system designator and YYY is the sheet number.

Table 1.7-2

PIPING AND INSTRUMENTATION DIAGRAMS

REPLACE WITH MARKUP OF TABLE 1.1-2

SSAR Section Number	Title	System Designator	SSAR Figure
5.1	Reactor Coolant System	RCS	5.1-5
5.4.7	Normal Residual Heat Removal System	RNS	5.4.7-2
6.2.2	Passive Containment Cooling System	PCS	6.2.2-1
6.2.5	Containment Leak Rate Test System	VUS	6.2.5-1
6.3.2	Passive Core Cooling System	PXS	6.3-1 & 6.3-2
6.4	Main Control Room Habitability System	VES	6.4-2
8.3.1	Diesel Generator System	ZOS	8.3.1-4
8.3.1	Diesel Engine Skid Mounted System	ZOS	8.3.1-5
9.1	Spent Fuel Pool Cooling System	SFS	9.1-6
9.2.1	Service Water System	SWS	9.2.1-1
9.2.2	Component Cooling Water System	CCS	9.2.2-2
9.2.7	Central Chilled Water System	VWS	9.2.7-1
9.3.6	Chemical and Volume Control System	CVS	9.3.6-2
9.4.1	Nuclear Island Non-Radioactive Ventilation System	VBS	9.4.1-1
9.4.2	Annex/Aux Non-Radioactive Ventilation System	VXS	9.4.2-1, 2, and 3
9.4.6	Containment Recirculation Cooling System	VCS	9.4.6-1
9.4.7	Containment Air Filtration System	VFS	9.4.7-1
9.4.10	Diesel Generator Building Heating and Ventilation System	VZS	9.4.10-1
9..5.1	Fire Protection System	FPS	9.5.1-1
9.5.4	Standby Diesel and Auxiliary Boiler Fuel Oil System	DOS	9.5.4-1
10.3	Main Steam System	SGS	10.3.2-1
10.4.3	Gland Seal System	GSS	10.4.3-1
10.4.7	Condensate System	CDS FWS	10.4.7-1

Table 1.8-2 (Sheet 3 of 4)

SUMMARY OF AP600 STANDARD PLANT COMBINED LICENSE INFORMATION ITEMS

Item No.	Subject	Subsection
6.4-2	Local Toxic Gas Services and Monitoring	6.4.7
6.4-3	Procedures for Training for Control Room Habitability	6.4.7
6.6-1	Inspection Programs	6.6.9.1
6.6-2	Construction Activities	6.6.9.2
7.1-1	Setpoint Calculations for Protective Functions	7.1.6
8.2-1	Offsite Electrical Power	8.2.4
8.3-1	Onsite Electrical Power	8.3.3
9.1-1	Fuel Storage and Handling	9.1.6
9.4-1	Ventilation Systems Operations	9.4.12
9.5-1	Offsite Communications Interfaces	9.5.2.5.1
9.5-2	Emergency Response Facility Communications	9.5.2.5.2
9.5-3	Security Communications	9.5.2.5.3
9.5-4	Cathodic and Environmental Protection for Fuel Oil Tanks	9.5.4.7
10.1-1	Erosion-Corrosion Monitoring	10.1.3
10.2-1	Turbine Maintenance and Inspection	10.2.6
10.4-1	Circulating Water Supply	10.4.12.1
10.4-2	Condensate, Feedwater and Auxiliary Steam System Chemistry Control	10.4.12.2
10.4-3	Potable Water	10.4.12.3
11.2-1	Liquid Radwaste Processing by Mobile Equipment	11.2.4.1
11.2-2	Cost Benefit Analysis of Population Doses from Liquid Effluents	11.2.4.2
11.2-3	Identification of Ion Exchange and Adsorbent Media for Liquid Radwaste	11.2.4.3
11.2-4	Dilution and Control of Boric Acid Discharge	11.2.4.4
11.3-1	Cost Benefit Analysis of Population Doses from Gaseous Effluents	11.3.4.1
11.3-2	Identification of Adsorbent Media for Gaseous Radwaste	11.3.4.2
11.4-1	Solid Waste Management System Process Control Program	11.4.6
11.5-1	Plant Offsite Dose Calculation Manual (ODCM)	11.5.7
12.1-1	ALARA and Operational Policies	12.1.3
12.2-1	Additional Contained Radiation Sources	12.2.3
12.3-1	Administrative Controls, Criteria and Methods for Radiological Protection	12.3.5

INSERTS FOR TABLE 3.2-3

INSERT A

n/a	Air Handling Units w/ Filters	L	NS	ASME N509
n/a	Fans, Ductwork	L	NS	ASME N509

INSERT B

n/a	Other Air Handling Units w/ Filters	Note 2	NS	ASME N509
n/a	Fans, Ductwork	Note 2, L or R	NS	ASME N509

INSERT C

n/a	Fan Coil Units	L	NS	ASME N509
n/a	Fans, Ductwork	L	NS	ASME N509

INSERT D

n/a	Air Supply Filtration Units	L	NS	ASME N509
n/a	Air Exhaust Filtration Units	R	NS	ASME N509
n/a	Fans, Ductwork	L or R	NS	ASME N509

Table 3.2-3 (Sheet 50 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Turbine Island Vents, Drains and Relief System (TDS)				Location:	Turbine Building
n/a	Piping and components that provide the path from the GSS and CMS to atmosphere and rad monitor	D	NS	ANSI B31.1	
Balance of system components are Class E					
Main Turbine Control and Diagnostic System (TOS)				Location:	Turbine Building
System components are Class E					
Radiologically Controlled Area Ventilation System (VAS)			Location:	Auxiliary Building and Annex Building	
n/a	CVS and RNS Pump Room Coolers	Note 2	NS	Manufacturer Std.	
n/a	Valves Providing VAS AP600 Equipment Class D Function	D	NS	ANSI 16.34	
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
n/a	Fire Dampers	Note 3	NS	UL-555	
Balance of system components are Class L ~~or Class R~~ or Class E (INSERT A)					
Nuclear Island Nonradioactive Ventilation System (VBS)			Location:	Auxiliary Building and Annex Building	
n/a	Battery Rooms Exhaust Fans	Note 2	NS	AMCA	
n/a	PCS Room Heaters	Note 2	NS	Manufacturer Std.	
n/a	Fire Dampers	Note 3	NS	NFPA	
n/a	Dampers Providing AP600 Equipment Class D Function	Note 2	NS	ANSI/AMCA-500	
n/a	Dampers in lines isolating radioactive contamination	R	NS	ASME-509	
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
VBS-MP-01A	Sample Pump A	C	I	Manufacturer Std.	
VBS-MP-01B	Sample Pump B	C	I	Manufacturer Std.	
n/a	MCR/TSC Supplemental Air Filtration Units	Note 2	NS	ASME N509	

Table 3.2-3 (Sheet 51 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Nuclear Island Nonradioactive Ventilation System (VBS) (Continued)					
n/a	MCR/TSC Supply Air Handling Units	Note 2	NS	ASME N509	
n/a	Class 1E Electrical Room Air Handling Units	Note 2	NS	ASME N509	
VBS-PL-V160	MCR Penetration Test Valve	C	I	ASME III-3	
VBS-PL-V161	MCR Penetration Test Valve	C	I	ASME III-3	
VBS-PL-V162	MCR Penetration Test Valve	C	I	ASME III-3	
VBS-PL-V164	MCR Penetration Test Valve	C	I	ASME III-3	
VBS-PL-V165	MCR Penetration Test Valve	C	I	ASME III-3	
VBS-PL-V166	MCR Isolation Test Valve	C	I	ASME III-3	
VBS-PL-V167	MCR Isolation Test Valve	C	I	ASME III-3	
VBS-PL-V168	MCR Isolation Test Valve	C	I	ASME III-3	
VBS-PL-V169	MCR Isolation Test Valve	C	I	ASME III-3	
VBS-MD-D214	MCR Isolation Dampers	Note 1	I	ASME N509	
VBS-MD-D215	MCR Isolation Dampers	Note 1	I	ASME N509	
VBS-MD-D216	MCR Isolation Dampers	Note 1	I	ASME N509	
VBS-MD-D217	MCR Isolation Dampers	Note 1	I	ASME N509	
VBS-MD-D220	MCR Isolation Dampers	Note 1	I	ASME N509	
VBS-MD-D221	MCR Isolation Dampers	Note 1	I	ASME N509	
n/a	Valves Providing VBS AP600 Equipment Class D Function	D	NS	ANSI 16.34	
→ INSERT B					
Balance of system components are Class L					
Containment Recirculation Cooling System (VCS)					Location: Containment
n/a	Dampers	L	NS	ANSI/AMCA-500	
→ INSERT C					
Balance of system components are Class D-L					
Main Control Room Emergency Habitability System (VES)					Location: Auxiliary Building
VES-MD-D001A	Relief Damper	Note 1	I	ASME 509/510	
VES-MD-D001B	Relief Damper	Note 1	I	ASME 509/510	
VES-MT-01A	Emergency Air Storage Tank 01A	C	I	ASME VIII, Appendix 22	
VES-MT-01B	Emergency Air Storage Tank 01B	C	I	ASME VIII, Appendix 22	

Table 3.2-3 (Sheet 54 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND
FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Main Control Room Emergency Habitability System (Continued)					
VES-PL-V022B	Pressure Relief Isolation Valve B	C	I	ASME III-3	
VES-PL-V024A	Air Tank Isolation Valve A	C	I	ASME III-3	
VES-PL-V024B	Air Tank Isolation Valve B	C	I	ASME III-3	
VES-PL-V025A	Air Tank Isolation Valve A	C	I	ASME III-3	
VES-PL-V025B	Air Tank Isolation Valve B	C	I	ASME III-3	
VES-PL-V038A	Makeup Air Stop Valve A	C	I	ASME III-3	
VES-PL-V038B	Makeup Air Stop Valve B	C	I	ASME III-3	
VES-PL-V040A	Air Tank Safety Relief Valve A	C	I	ASME III-3	
VES-PL-V040B	Air Tank Safety Relief Valve B	C	I	ASME III-3	
VES-PL-V041A	Air Tank Safety Relief Valve A	C	I	ASME III-3	
VES-PL-V041B	Air Tank Safety Relief Valve B	C	I	ASME III-3	
VES-PL-V042	Refill Line Vent Isolation Valve	C	I	ASME III-3	
VES-PL-V043A	Differential Pressure Instrument Line Isolation Valve A	C	I	ASME III-3	
VES-PL-V043B	Differential Pressure Instrument Line Isolation Valve B	C	I	ASME III-3	
VES-PL-V043C	Differential Pressure Instrument Line Isolation Valve C	C	I	ASME III-3	
Balance of system components are Class ~~D~~ C					
Containment Air Filtration System (VFS)		Location: Auxiliary Building and Annex Building			
VFS-PY-C01	Containment Supply Duct Penetration	B	I	ASME III, MC	
VFS-PY-C02	Containment Exhaust Duct Penetration	B	I	ASME III, MC	
VFS-PY-S01	Containment Air Supply Strainer	C	I	ASME Sec. III Class 3	

Table 3.2-3 (Sheet 55 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Containment Air Filtration System (Continued)					
VFS-PY-S02	Containment Air Exhaust Strainer	C	I	ASME Sec. III Class 3	
VFS-PL-V001	Containment Isolation Test Connection	B	I	ASME III-2	
VFS-PL-V002	Containment Isolation Test Connection	B	I	ASME III-2	
VFS-PL-V007	Containment Isolation Test Connection	B	I	ASME III-2	
VFS-PL-V008	Containment Isolation Test Connection	B	I	ASME III-2	
VFS-PL-V009	Containment Purge Discharge Containment Isolation Valve	B	I	ASME III-2	
VFS-PL-V010	Containment Purge Discharge Containment Isolation Valve	B	I	ASME III-2	
VFS-PL-V012	Containment Isolation Test Connection	B	I	ASME III-2	
VFS-PL-V015	Containment Isolation Test Connection	B	I	ASME III-2	
n/a	Valves Providing VFS AP600 Equipment Class D Function	D	NS	ANSI 16.34	
n/a	Dampers in lines isolating radioactive contamination	R	NS	ASME-509	
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
n/a	Fire Dampers	Note 3	NS	UL-555	
INSERT D					
Balance of system components are Class L and Class R					
Health Physics and Hot Machine Shop HVAC System (VHS)					Location: Annex Building
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
n/a	Fire Dampers	Note 3	NS	UL-555	
INSERT A					
Balance of system components are Class E or Class L					

Table 3.2-3 (Sheet 56 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Containment Hydrogen Control System (VLS)					Location: Containment
n/a	Hydrogen Igniters	D	NS	Manufacturer Std.	Provides Hydrogen Control Following Severe Accidents
VLS-MY-E01A	Catalytic Hydrogen Recombiner A	C	I	Manufacturer Std.	
VLS-MY-E01B	Catalytic Hydrogen Recombiner B	C	I	Manufacturer Std.	
n/a	Fire Dampers	Note 3	NS	UL-555	
Balance of system components are Class E or Class L					
Radwaste Building Ventilation System (VRS)					Location: Radwaste Building
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
n/a → INSERT A	Fire Damper	Note 3	NS	UL-555	
Balance of system components are Class E or Class L					
Turbine Building Ventilation System (VTS)					Location: Turbine Building
n/a	Shutoff, Isolation, and Balancing Dampers	L	NS	ANSI/AMCA-500	
n/a → INSERT A	Fire Dampers	Note 3	NS	UL-555	
Balance of system components are Class L					
Containment Leak Rate Test System (VUS)					Location: Auxiliary Building
VUS-PL-V015	Main Equipment Hatch Test Connection	B	I	ASME III-2	
VUS-PL-V016	Maintenance Equipment Hatch Test Connection	B	I	ASME III-2	
VUS-PL-V017	Personnel Hatch Test Connection	B	I	ASME III-2	
VUS-PL-V018	Personnel Hatch Test Connection	B	I	ASME III-2	
VUS-PL-V019	Personnel Hatch Test Connection	B	I	ASME III-2	
VUS-PL-V020	Personnel Hatch Test Connection	B	I	ASME III-2	

Table 3.2-3 (Sheet 59 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Central Chilled Water System (Continued)					
VWS-PL-V082	Fan Coolers Return Containment Isolation	B	I	ASME III-2	
VWS-PL-V086	Fan Coolers Return Containment Isolation	B	I	ASME III-2	
VWS-PL-V424	Containment Penetration Test Connection	B	I	ASME III-2	
VWS-PL-V425	Containment Penetration Test Connection	B	I	ASME III-2	
Balance of system components are Class E					
Annex/Auxiliary Nonradioactive Ventilation System (VXS) Location: Auxiliary Building and Annex Building					
n/a	Air Handling Unit Fans Providing AP600 Equipment Class D Function	Note 2	NS	AMCA	
n/a	Dampers Providing VXS AP600 Equipment Class D Function	Note 2	NS	ANSI/AMCA-500	
n/a	Fire Dampers	Note 3	NS	UL-555	
→ INSERT A					
Balance of system components are Class E or Class L					
Hot Water Heating System (VYS)				Location: Various	
System components are Class E					
Diesel Generator Building Ventilation System (VZS)				Location: Diesel Generator Building	
n/a	Unit Heaters Providing AP600 Equipment Class D Function	Note 2	NS	AMCA	
n/a	Fans Providing AP600 Equipment Class D Function	Note 2	NS	AMCA	

Table 3.2-3 (Sheet 60 of 62)

AP600 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP600 Class	Seismic Category	Principal Construction Code	Comments
Diesel Generator Building Ventilation System (Continued)					
n/a	Dampers Providing VZS AP600 Equipment Class D Function	Note 2	NS	AMCA	
n/a	Fire Dampers	Note 3	NS	UL-555	
→ Insert A					
Balance of system components are Class E					
Gaseous Radwaste System (WGS)				Location:	Auxiliary Building
n/a	Gas Cooler	D	NS	ASME VIII/ TEMA	
n/a	Sample Pumps	D	NS	Manufacturer Std.	
n/a	Guard and Delay Beds	D	NS	ASME VIII	Design for 1/2 SSE
n/a	Moisture Separator	D	NS	ASME VIII	
n/a	Valves Providing WGS AP600 Equipment Class D Function	D	NS	ANSI 16.34	
Liquid Radwaste System (WLS)			Location:	Containment and Auxiliary Building	
n/a	Heat Exchangers, WLS and CCS Side	D	NS	ASME VIII/ TEMA	
n/a	Pumps	D	NS	Manufacturer Std.	
n/a	Tanks	D	NS	ASME III without Code Stamp	
n/a	Degasifier	D	NS	ASME VIII	
n/a	Ion Exchangers	D	NS	ASME VIII	
n/a	Filters	D	NS	ASME VIII	
n/a	Valves Providing WLS AP600 Equipment Class D Function (local drain valves in Radwaste Building)	D	NS	ANSI 16.34	

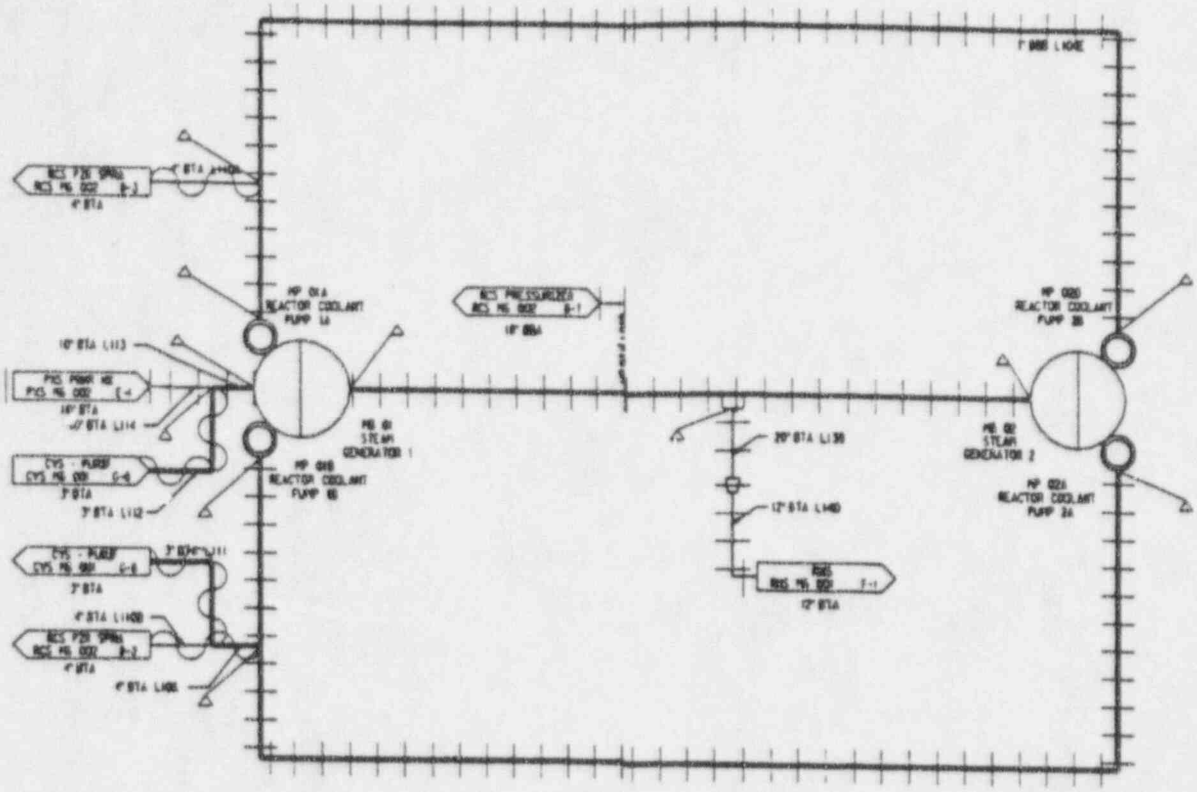
5. The flow capability of each IRWST injection line is demonstrated every 10 years. This demonstration is accomplished by conducting flow tests and inspections. A flow test is conducted to demonstrate the flow capability of the injection line from the IRWST through the IRWST injection check valves. Water flow from the IRWST through the IRWST injection check valve demonstrates the flow capability of this portion of the line. The test is terminated when the flow measurement is obtained. The portion of the line from the IRWST squib valve to the DVI line is demonstrated by an inspection of the inside of the line. The inspection will show that the lines are not obstructed. It is not necessary to operate the IRWST injection squib valves for this inspection.

6. The flow capability of each containment recirculation line is demonstrated every 10 years. This demonstration is accomplished by conducting an inspection. The line from the containment to the containment recirculation squib valve is inspected from the containment side. The line from the squib valve to the IRWST injection line is inspected from the IRWST side. The inspection will show that the lines are not obstructed. It is not necessary to operate the containment recirculation squib valves for this inspection.

7. The heat transfer capability of the passive residual heat exchanger is demonstrated every 10 years. This demonstration is accomplished by conducting a test during cold shutdown conditions. The test is conducted with the RCPs in operation and the RCS at a reduced temperature. Flow through the heat exchanger is initiated by opening one outlet isolation valve. The test is terminated when the flow and temperature measurements are obtained.

8. The MCR pressurization capability is demonstrated during each refueling cycle. The test is conducted with the normal HVAC lines connected to the MCR isolated. Pressurization of the MCR is initiated by opening one of the emergency MCR habitability air supply lines. The test is a limited duration test and is terminated when the MCR pressurization is measured.
using the dampers in VBS designated for this purpose in subsection 9.4.1.

9. The hydrogen recombination capability is demonstrated by performing a surveillance bench test of samples removed from each passive autocatalytic recombiner during each refueling outage. In addition, each passive autocatalytic recombiner device is visually inspected to verify that there is no obstruction of blockage of the inlets or outlets.



Inside Reactor Containment

(REF RCS-001)

Figure 3E-3 (Sheet 1 of 2)

High Energy Piping - Reactor Coolant System

Inside Reactor Containment

(REF RCS-002)

Figure 3E-3 (Sheet 2 of 2)

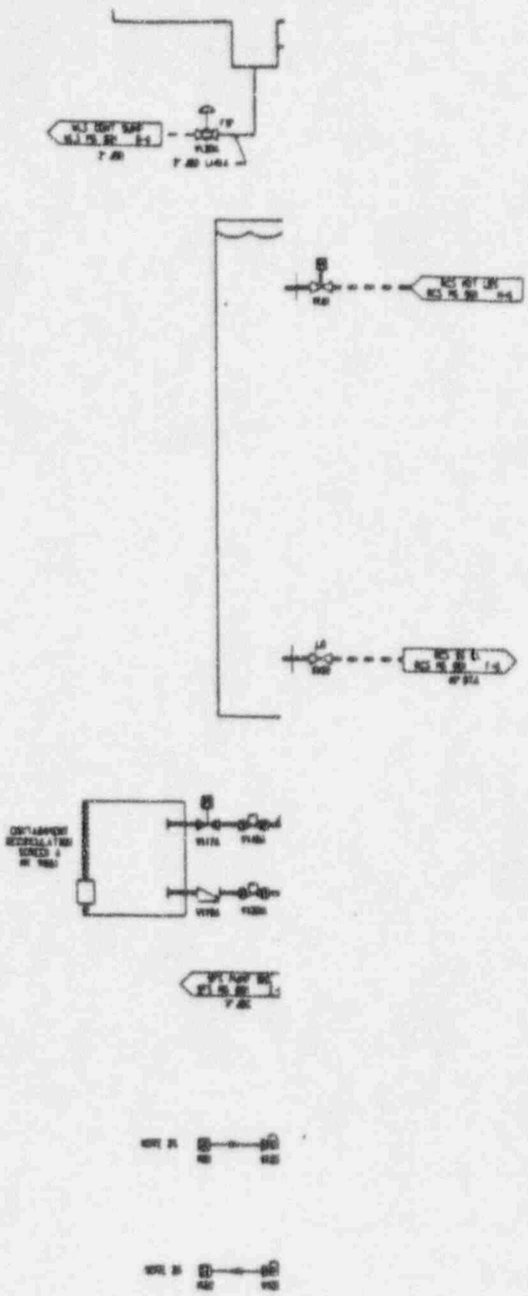
High Energy Piping - Reactor Coolant System

Inside Reactor Containment

(REF PXS-001)

Figure 3E-4 (Sheet 1 of 2)

High Energy Piping - Passive Core Cooling System

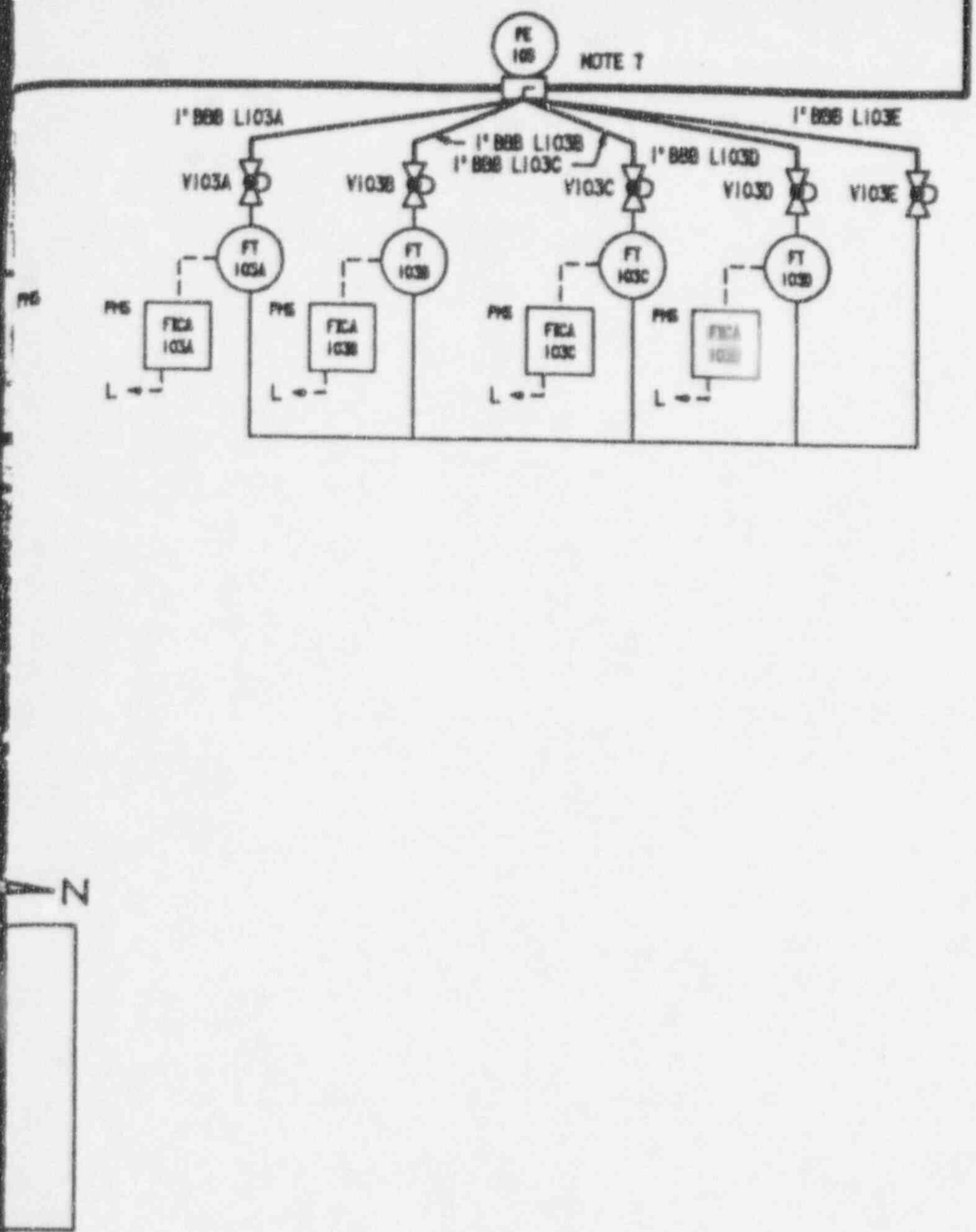


Inside Reactor Containment

(REF PXS-002)

Figure 3E-4 (Sheet 2 of 2)

ligh Energy Piping - Passive Core Cooling System



Inside Reactor Containment

Figure 5.1-5 (Sheet 1 of 3)

Reactor Coolant System
Piping and Instrumentation Diagram

(REF) RCS-001

24. CONNECT AUXILIARY SPRAY LINE TO THE BOTTOM OF THE MAIN SPRAY LINE AT OR BELOW THE PRESSURIZER LOWER LEVEL TAP. THIS LINE SHOULD BE ROUTED TO FORMA VERTICAL COLD TRAP APPROXIMENTLY 10 FEET LONG BETWEEN THE MAIN SPRAY LINE AND THE AUXILIARY SPRAY CONNECTION AND THE PRESSURIZER SHALL EMPLOY ELBOWS WITH RADIUS OF CURVATURE NOT LESS THAN 5 TIMES THE PIPE DIAMETER (5D BENDS).

Inside Reactor Containment

Figure 5.1-5 (Sheet 2 of 3)

Reactor Coolant System
Piping and Instrumentation Diagram

(REF) RCS-002

Inside Reactor Containment.

(REF RCS-003)

Figure 5.1-5 (Sheet 3 of 3)

Reactor Coolant System
Piping and Instrumentation Diagram

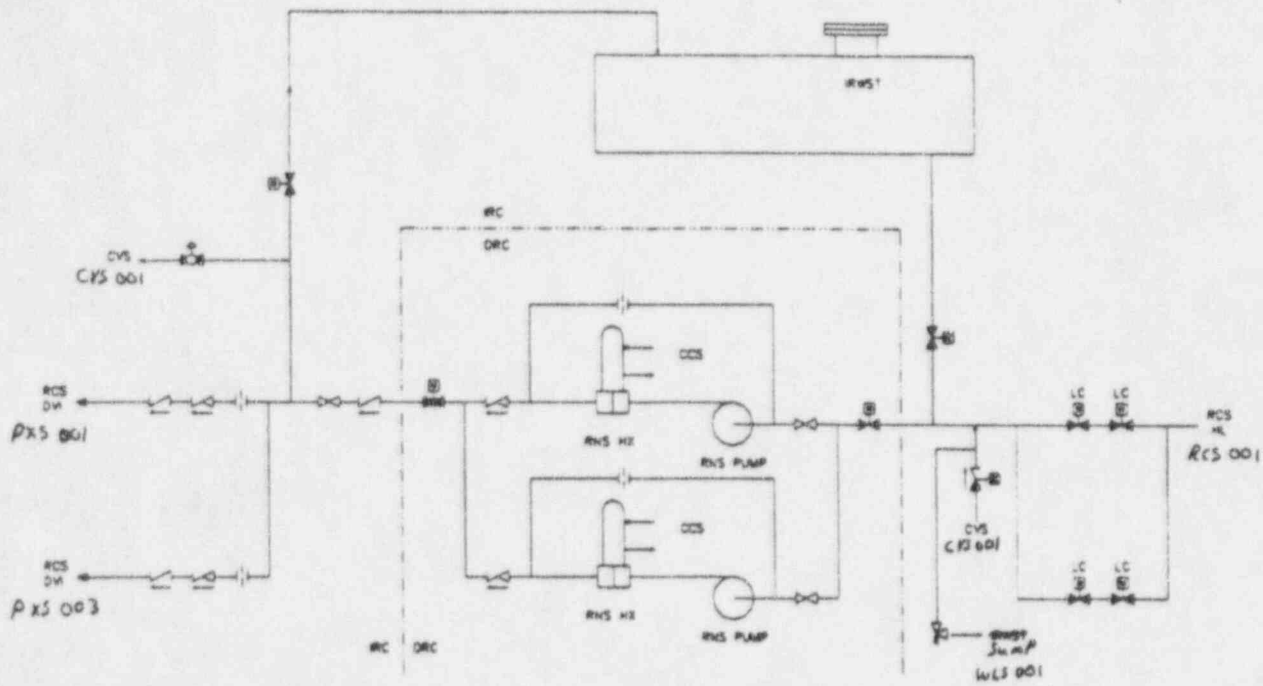
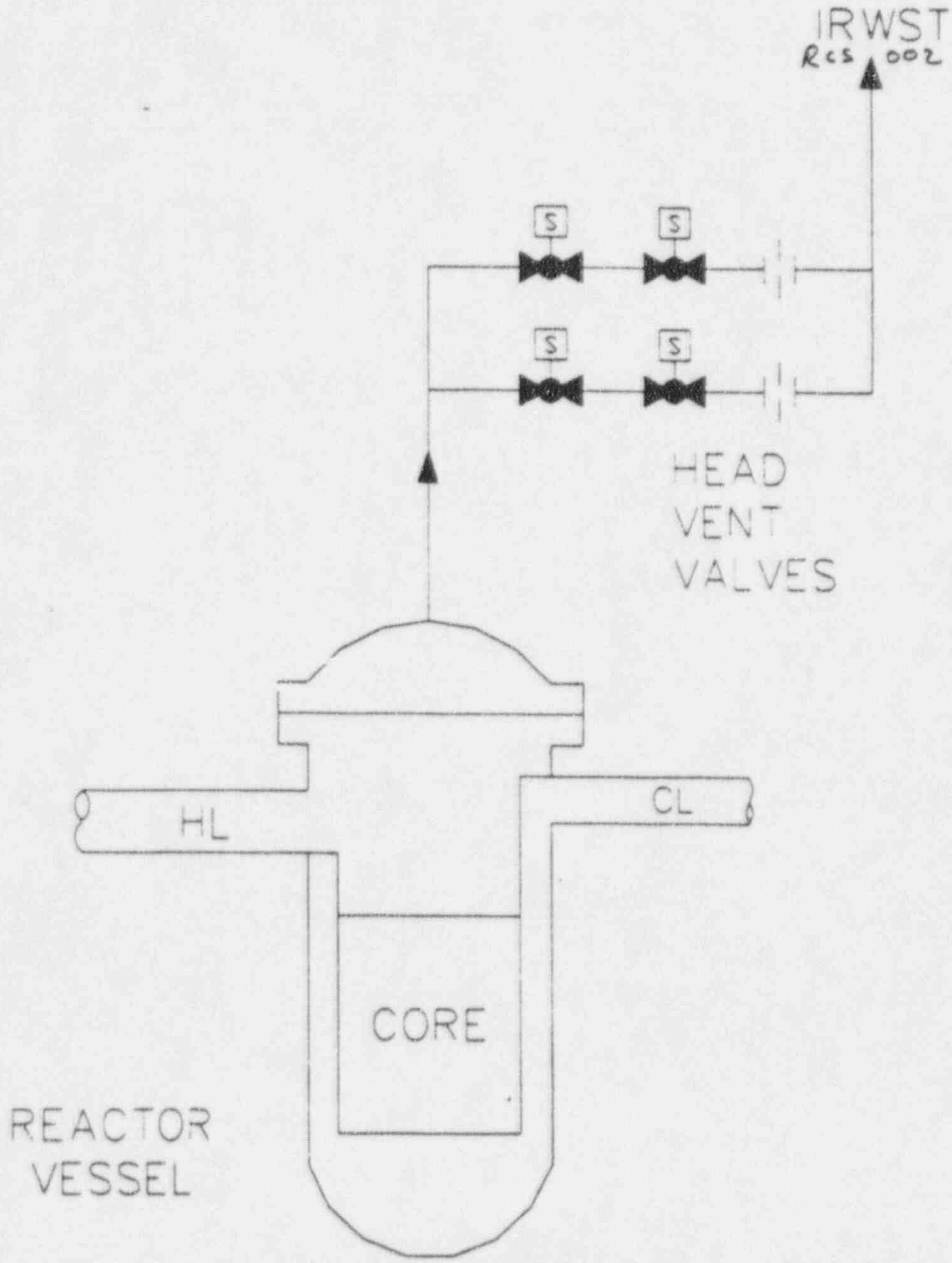


Figure 5.4-6

Normal Residual Heat Removal System

(REF) RNS 001



Inside Reactor Containment

Figure 5.4-8

Reactor Vessel Head Vent
(REF) RCS 001

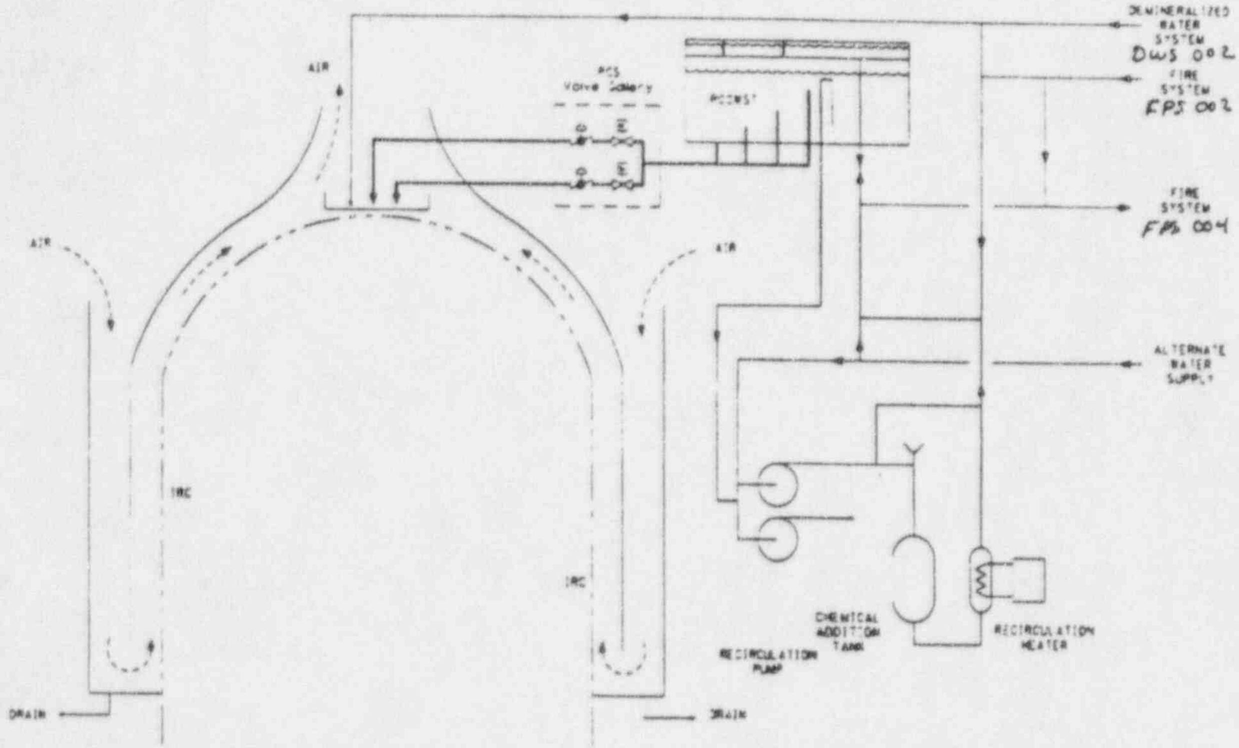
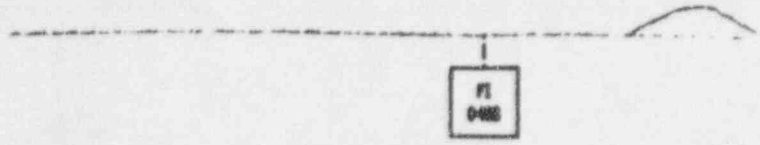


Figure 6.2.2-2

Simplified Sketch of Passive Containment Cooling System
(REF) PCS 001



ALL COMPONENT NUMBERS.
NENTS EXCEPT EQUIPMENT.
003 FOR ADDITIONAL

18. FLOW LIMITING ORIFICE WILL BE ADJUSTED DURING PRE-OPERATIONAL TESTING.

19. IRWST HAS H, L, L-2, L-3 ALARMS. L-3 SETPOINT OPENS CONTAINMENT RECIRCULATION VALVES.

20. ADS STAGE 4 ACTUATION SIGNAL ON A LOW HL LEVEL SIGNAL OPENS IRWST INJECTION VALVES.

HAT ACTUATES A SEPARATE

21. THIS MANUAL VALVE HAS LIMIT SWITCHES CONNECTED TO POSITION ALARMS ON MCB.

AIRTIGHT

22. PROVIDE ACCESSIBILITY TO A SHORT SECTION OF PIPE FOR FREEZE SEAL INSTALLATION. SEE SSD FOR FREEZE SEAL PIPING REQUIREMENTS.

TIONS

M

26. ROUTE 2" TEST CONNECTION LINE TO CONVENIENT LOCATION FOR HOOKUP TO A TEST CART. NORMALLY CAPPED.

USE P&ID

N/SIZE
HAT OPENS

29. VALVES V120A/B, V123A/B, V125A/B ALSO OPEN ON A DAS SIGNAL.

ELEV. TO COLLECT CONDENSATE
RMALLY OPEN DRAIN TO WLS.
). OVERFLOW LINE TERMINATES

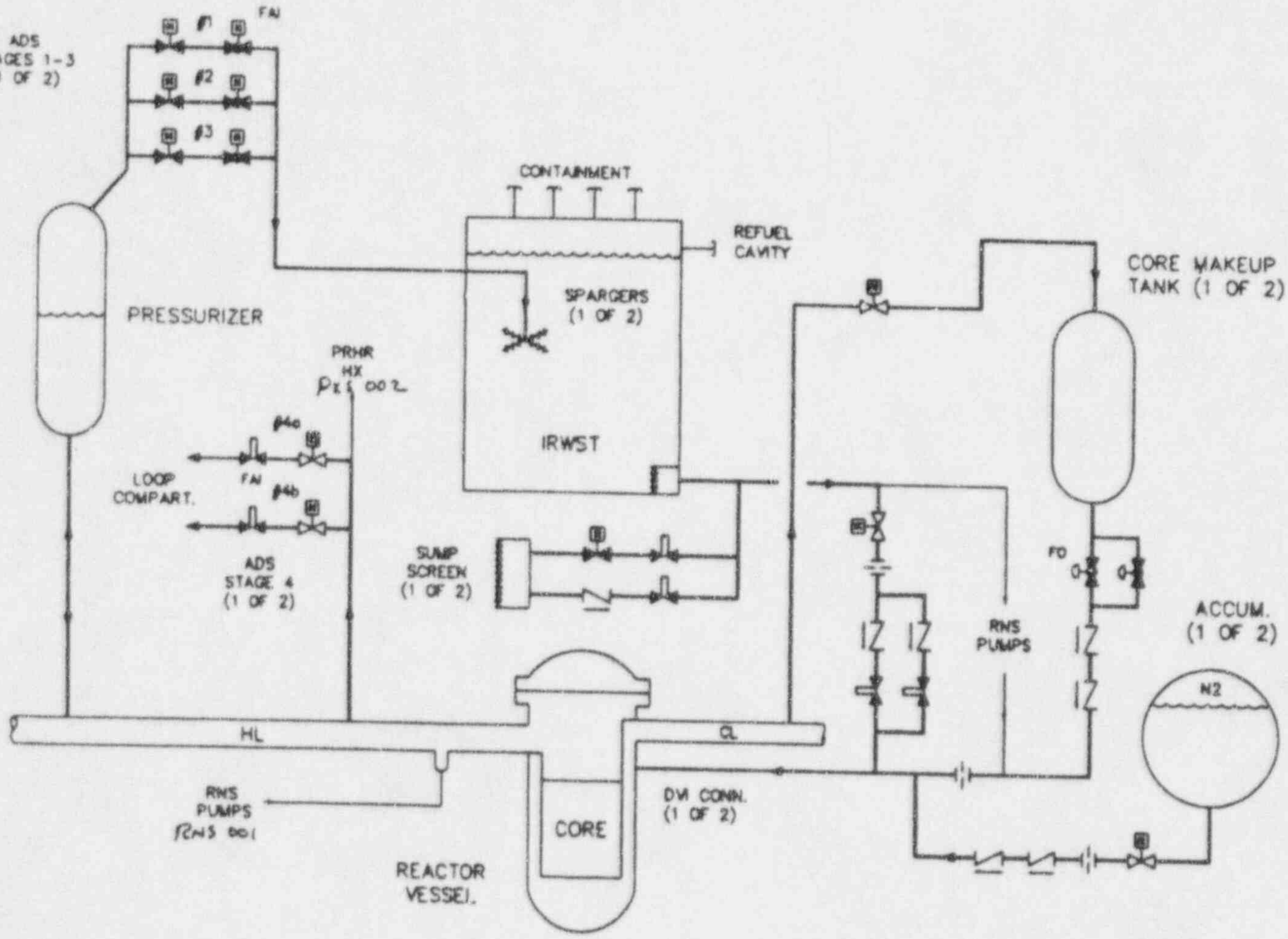
RUMENTS ARE PROVIDED
EACTOR VESSEL CAVITY

Inside Reactor Containment

Figure 6.3-2

Passive Core Cooling System
Piping and Instrumentation Diagram (Sheet 2)

(REF) PXS 002

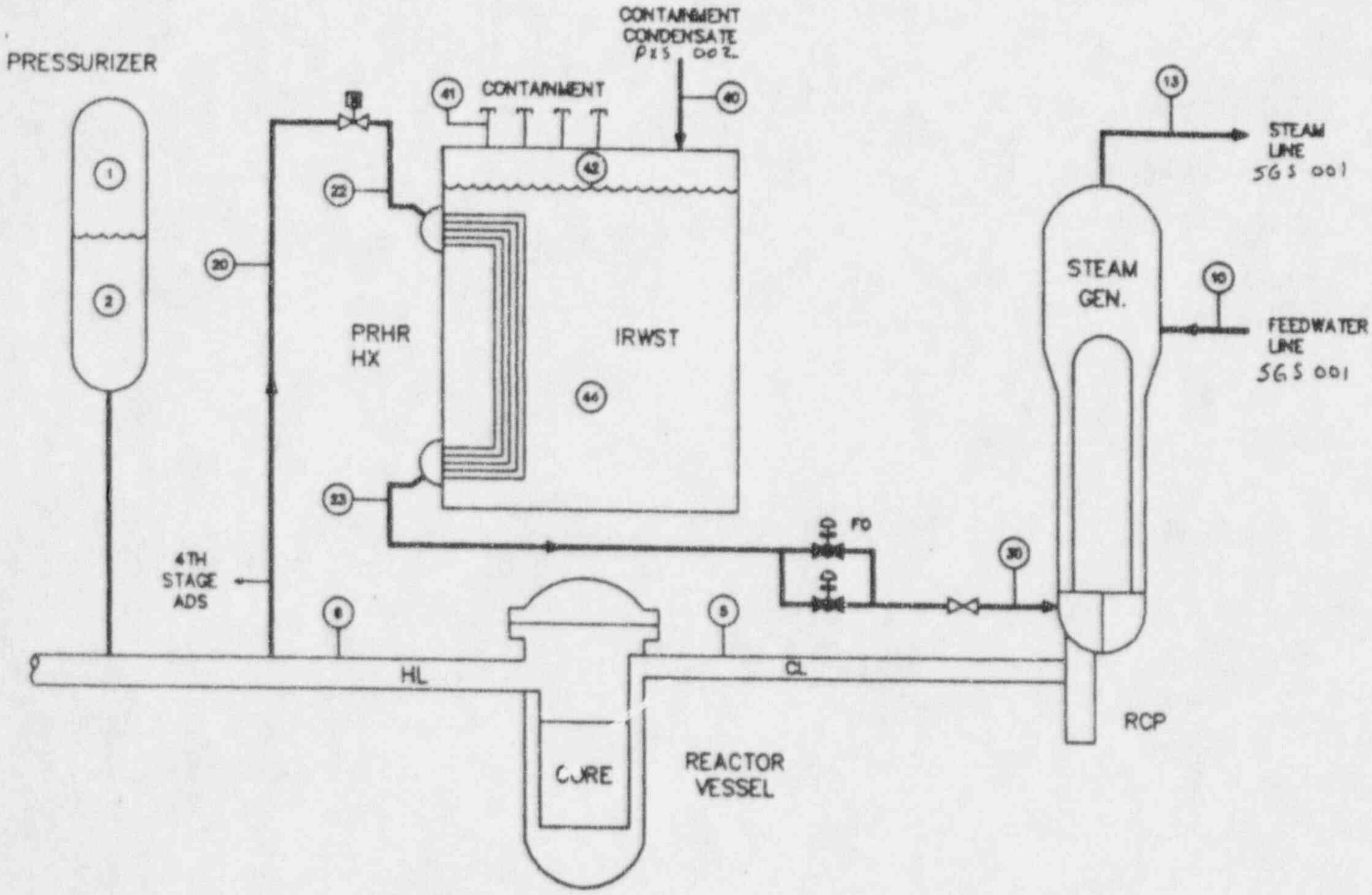


Inside Reactor Containment

Figure 6.3-3

Passive Safety Injection

(REF) RCS & PXS



Inside Reactor Containment

Figure 6.3-4

Passive Decay Heat Removal

(REF): RCS & PXS

6.4 Habitability Systems

The habitability systems are a set of individual systems that collectively provide the habitability functions for the plant. The systems that make up the habitability systems are the:

- Nuclear island nonradioactive ventilation system (VBS)
- Main control room emergency habitability system (VES)
- Radiation monitoring system (RMS)
- Plant lighting system (ELS)

When a source of ac power is available, the nuclear island nonradioactive ventilation system (VBS) provides normal and abnormal HVAC service to the main control room (MCR), technical support center (TSC), instrumentation and control rooms, dc equipment rooms, battery rooms, and the nuclear island nonradioactive ventilation system equipment rooms.

When a source of ac power is not available to operate the nuclear island nonradioactive ventilation system, the main control room emergency habitability system (VES) is capable of providing emergency ventilation and pressurization for the main control room. The main control room emergency habitability system also provides emergency passive heat sinks for the main control room, instrumentation and control rooms, and dc equipment rooms.

Radiation monitoring of the main control room environment is provided by the radiation monitoring system. Smoke detection is provided in the VBS system. Emergency lighting is provided by the plant lighting system. Storage capacity is provided in the main control room for personnel support equipment.

6.4.1 Safety Design Basis

The safety design bases discussed here apply only to the portion of the individual system providing the specified function. The range of applicability is discussed in subsection 6.4.4.

6.4.1.1 Main Control Room Design Basis

The habitability systems provide coverage for the main control room pressure boundary as defined in subsection 6.4.2.1. The following discussion summarizes the safety design bases with respect to the main control room:

- The habitability systems are capable of maintaining the main control room environment suitable for prolonged occupancy throughout the duration of the postulated accidents discussed in Chapter 15 that require protection from the release of radioactivity. Refer to Section 3.1 and subsections 6.4.4 and 15.6.5.3 for a discussion on conformance with General Design Criterion 19 and to Section 1.9 for a discussion on conformance with Generic Issue B-66.

- The main control room is designed to withstand the effects of an SSE and a design-basis tornado.

6.4.3.2 Emergency Mode

Operation of the main control room emergency habitability system is automatically initiated by the following safety-related signals:

- Hi-Hi main control room radiation
- Loss of ac power

Operation can also be initiated by manual actuation.

If radiation levels in the main control room exceed the Hi-Hi setpoint, the nuclear island nonradioactive ventilation system is isolated from the main control room pressure boundary by automatic closure of the isolation devices located in the nuclear island nonradioactive ventilation system ductwork. At the same time, the main control room emergency habitability system begins to deliver air from the emergency air storage bottles to the main control room by automatically opening the isolation valves located in the supply lines. After a slight time delay, in which the main control room pressure increases slightly due to the addition of air, the isolation valves open, allowing the pressure relief dampers to function.

After the main control room emergency habitability system isolation valves are opened, the air supply pressure is regulated by a self-contained regulating valve. This valve maintains a constant downstream pressure regardless of the upstream pressure. A constant air flow rate is maintained by the flow metering orifice downstream of the pressure regulating valve. This flow rate is sufficient to maintain the main control room pressure boundary at 1/8-inch water gauge positive differential pressure with respect to the surroundings. The main control room emergency habitability system air flow rate is also sufficient to maintain the carbon dioxide levels below 0.5 percent concentration for 11 occupants assuming both trains are delivering. With one train delivering, the system maintains the carbon dioxide concentration below 0.5 percent for 5 occupants, or below 1 percent for 11 occupants.

Carbon dioxide is produced in the control room as a byproduct of respiration, and is currently limited by OSHA regulations (Reference 1) to concentrations of 5000 ppm, or 0.5 percent. However, industry studies (References 2, 3, and 4) performed to determine the physiological effects of carbon dioxide demonstrate that exposure to a carbon dioxide concentration of 1.0 percent can be endured without suffering any harmful side effects.

The emergency air storage tanks are sized to provide the required air flow to the main control room pressure boundary for 72 hours. After 72 hours, the main control room may be operated in a natural circulation mode, as discussed in subsection 6.4.2.2.

The temperature rise in the main control room pressure boundary following a loss of the nuclear island nonradioactive ventilation system is less than 15°F over a 72-hour period. Sufficient thermal mass is provided in the walls and ceiling of the main control room to absorb the heat generated by the equipment, lights, and occupants. The temperature in the instrumentation and control rooms and dc equipment rooms following a loss of the nuclear island nonradioactive ventilation system remains below 120°F over a 72-hour period. As in

the main control room, sufficient thermal mass is provided surrounding these rooms to absorb the heat generated by the equipment. After 72 hours, the instrumentation and control rooms and dc equipment rooms may be operated in a natural circulation mode, as discussed in subsection 6.4.2.2.

In the event of a loss of ac power, the nuclear island nonradioactive ventilation system isolation devices automatically close and the main control room emergency habitability system isolation valves automatically open. These actions protect the main control room occupants from a potential radiation release. In instances in which there is no radiological source term present, the compressed air storage tanks are refilled via a connection to the breathable quality air compressor in the compressed and instrument air system (CAS).

6.4.4 System Safety Evaluation

Doses to main control room personnel resulting from a postulated LOCA are presented in subsection 15.6.5.3. Since no radioactive materials are stored or transported near the main control room pressure boundary, only doses to the control room operators due to a LOCA are postulated. A discussion of the calculational models is provided in subsection 15.6.5.3.

As discussed and evaluated in subsection 9.5.1, the use of noncombustible construction and heat and flame resistant materials throughout the plant reduces the likelihood of fire and consequential impact on the main control room atmosphere. Operation of the nuclear island nonradioactive ventilation system in the event of a fire is discussed in subsection 9.4.1.

The exhaust stacks of the onsite standby power diesel generators are located in excess of 150 feet away from the fresh air intakes of the main control room. The onsite standby power system fuel oil storage tanks are located in excess of 300 feet from the main control room fresh air intakes. These separation distances reduce the possibility that combustion fumes or smoke from an oil fire would be drawn into the main control room.

The protection of the operators in the main control room from offsite toxic gas releases is discussed in Section 2.2. The sources of onsite chemicals are described in Table 6.4-1 and their locations are shown on Figure 1.2-2. Analysis of these sources are in accordance with Regulatory Guide 1.78.

A supply of protective clothing, respirators, and self-contained breathing apparatus adequate for 11 persons is stored within the main control room pressure boundary.

The main control room emergency habitability system components discussed in subsection 6.4.2.3 are arranged in redundant, safety-related trains as shown in Figure 6.4-2. The location of components and piping within the main control room pressure boundary provides the required supply of compressed air to the main control room pressure boundary, as shown in Figure 6.4-1.

During emergency operation, the main control room emergency habitability system passive heat sinks are designed to limit the temperature rise inside the main control room to 15°F, and to limit the air temperature inside the instrumentation and control rooms and dc equipment

rooms to 120°F. The walls and ceilings that act as the passive heat sinks contain sufficient thermal mass to accommodate the heat sources from equipment, personnel, and lighting for 72 hours.

The main control room emergency habitability system nominally provides 25 scfm of ventilation air to the main control room from the compressed air storage tanks if one train is delivering, or 50 scfm if both trains are delivering. Twenty-five scfm of ventilation flow is sufficient to pressurize the control room to 1/8-inch water gauge differential pressure in addition to limiting the carbon dioxide concentration below one-half percent by volume for five person occupancy or, alternatively, below one percent concentration for a maximum occupancy of eleven persons. Fifty scfm of ventilation flow is sufficient to both pressurize the control room to 1/8-inch water gauge differential pressure as well as maintaining the carbon dioxide concentration below 0.5 percent by volume for all 11 persons.

Automatic transfer of habitability system functions from the nuclear island nonradioactive ventilation system to the main control room emergency habitability system is accomplished by the receipt of one of two signals:

"High-High" particulate or iodine radioactivity in MCR air supply

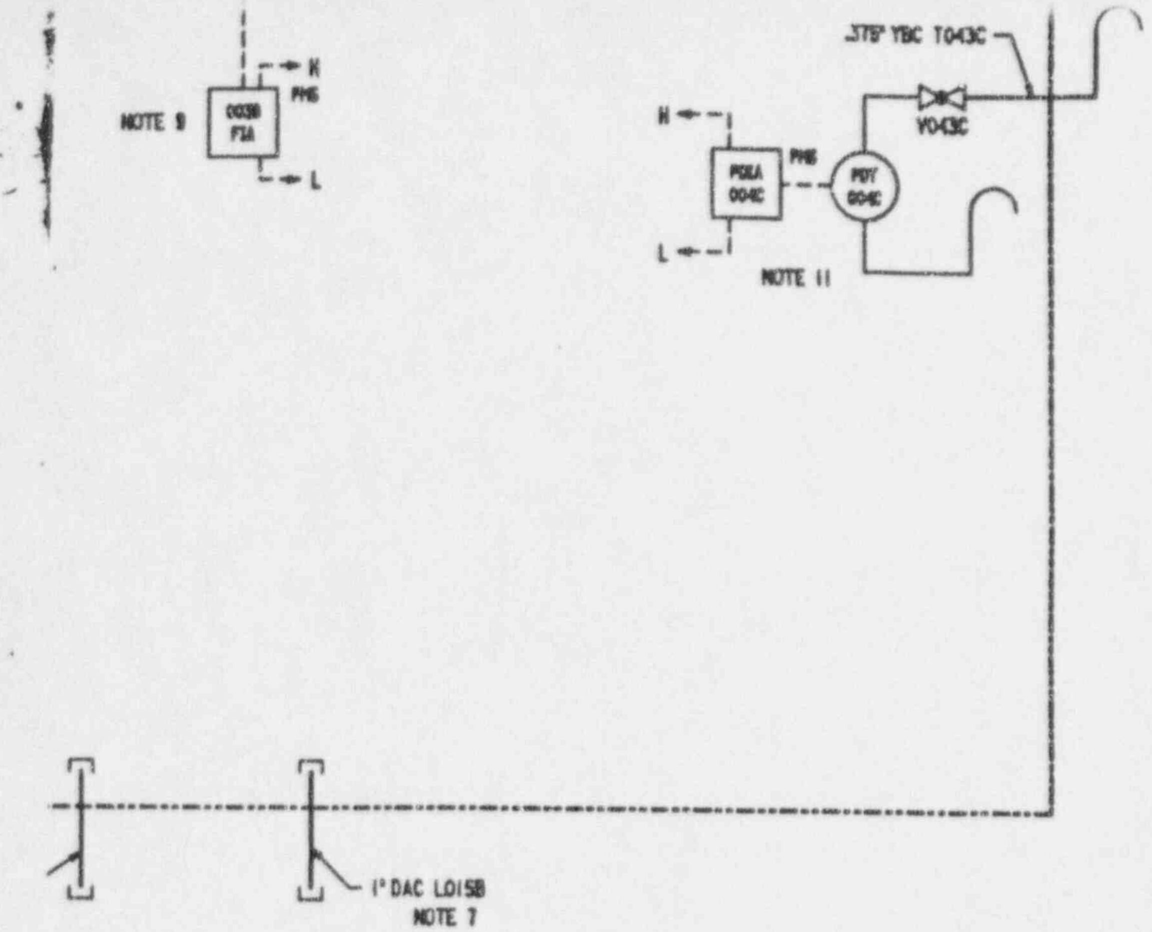
- ~~Hi-Hi main control room radiation~~ ^
- Loss of ac power sources

The airborne fission product source term in the reactor containment following the postulated LOCA is assumed to leak from the containment. The concentration of radioactivity, which is assumed to surround the main control room, after the postulated accident, is evaluated as a function of the fission product decay constants, the containment leak rate, and the meteorological conditions assumed. The assessment of the amount of radioactivity within the main control room takes into consideration the radiological decay of fission products and the infiltration/exfiltration rates to and from the main control room pressure boundary.

A single active failure of a component of the main control room emergency habitability system or nuclear island nonradioactive ventilation system does not impair the capability of the systems to accomplish their intended functions. Each train of the main control room emergency habitability system is connected to an independent Class 1E power supply. Both the main control room emergency habitability system and the portions of the nuclear island nonradioactive ventilation system which isolates the main control room are designed to remain functional during an SSE or design-basis tornado.

6.4.5 Inservice Inspection/Inservice Testing

A program of preoperational and postoperational testing requirements is implemented to confirm initial and continued system capability. The VES system is tested and inspected at appropriate intervals, as defined by the technical specifications. Emphasis is placed on tests and inspections of the safety-related portions of the habitability systems.



ME/ANSI N509 AND N510 AND
E MCR PRESSURE BOUNDARY

NDICATION AND ALARM

TO PRECLUDE PROBLEMS

CTUATED ON TIME DELAY

ON.

Inside Auxiliary Building

Figure 6.4-2

Main Control Room Habitability System
Piping and Instrumentation Diagram

(REF) VES 001

and alarmed in the main control room via the plant data display and processing system as described in Chapter 7.

The design of the onsite standby diesel generators does not ensure functional operability or maintenance access or support plant recovery following design basis events. Maintenance accessibility is provided consistent with the system nonsafety-related functions and plant availability goals.

The piping and instrumentation diagrams for the onsite standby diesel generator units and the associated subsystems are shown on Figures 8.3.1-4 and 8.3.1-5.

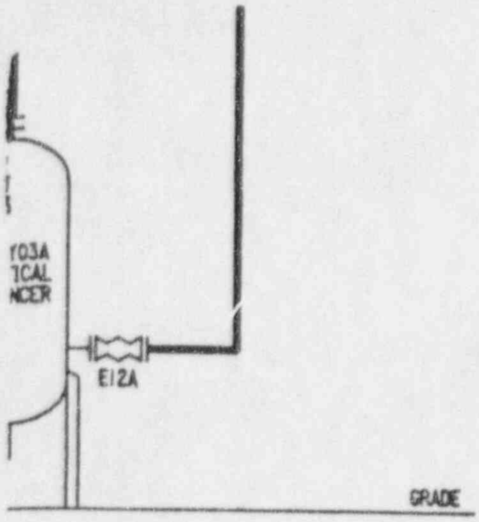
The onsite standby power supply system is shown schematically on one line diagram, Figure 8.3.1-1.

The onsite diesel generators will be procured in accordance with an equipment specification which will include requirements based upon the manufacturer's standards and applicable recommendations from documents such as NUREG/CR-0660 (Reference 15). Control of moisture in the starting air system by the equipment described above will be based upon manufacturer's recommendations. Dust and dirt in the diesel generator room is controlled by the diesel generator building ventilation system described in subsection 9.4.10. Personnel training is addressed as part of overall plant training in subsection 13.2.1. Automatic engine prelube by the equipment described above will be based upon manufacturer's recommendations. Testing, test loading and preventive maintenance is addressed as part of overall plant testing and maintenance in Chapter 13. Instrumentation to support diagnostics during operation are shown on Figure 8.3.1-4. The overall diesel building ventilation design is described in subsection 9.4.10 and the combustion air systems are described above. The fuel oil storage and handling system is described in subsection 9.5.4. High temperature insulation will be based upon manufacturer's recommendations. Response to the effects of engine vibration will be based upon manufacturer's recommendations. Diesel building floor coatings are described in subsections 6.1.2.1.4 and 6.1.3.2. The diesel generators will be procured to be consistent with the diesel generator building HVAC system described in subsection 9.4.10

8.3.1.1.2.2 Generator

Each generator is a direct-shaft driven, air-cooled self ventilated machine. The generator enclosure is open drip-proof type that facilitates free movement of ventilation air. The generator component design is in compliance with the NEMA MG-1 (Reference 1) requirements.

Each generator produces its rated power at 4160 V, 60 Hz. Each generator continuous rating is based on supplying the electrical ac loads listed in Tables 8.3.1-1 or 8.3.1-2. The loads shown on Tables 8.3.1-1 and 8.3.1-2 represent a set of nonsafety-related loads which provide shutdown capability using nonsafety-related systems. The generators can also provide power for additional investment protection ac loads. The plant operator would normally provide power to these loads by deenergizing one of those system components that are redundantly supplied by both the diesel generators. The diesel generator design is compatible with the

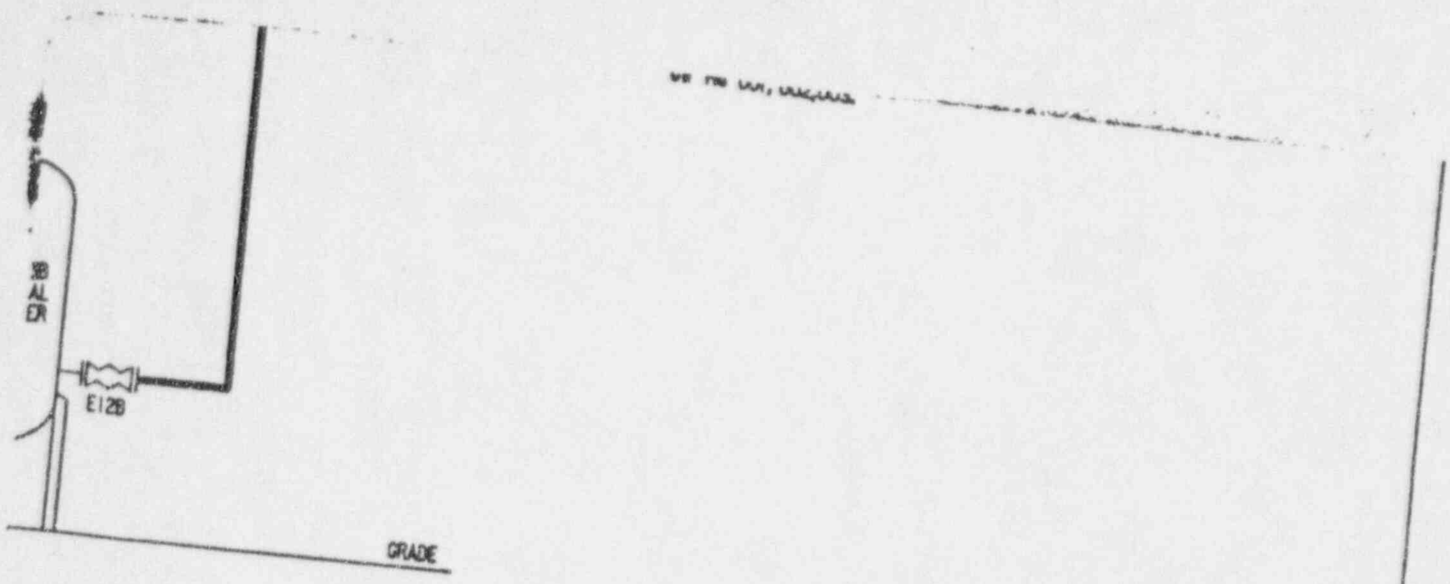


Inside Diesel Generator Building

Figure 8.3.1-4 (Sheet 1 of 2)

Diesel Generator System
Piping and Instrumentation Diagram

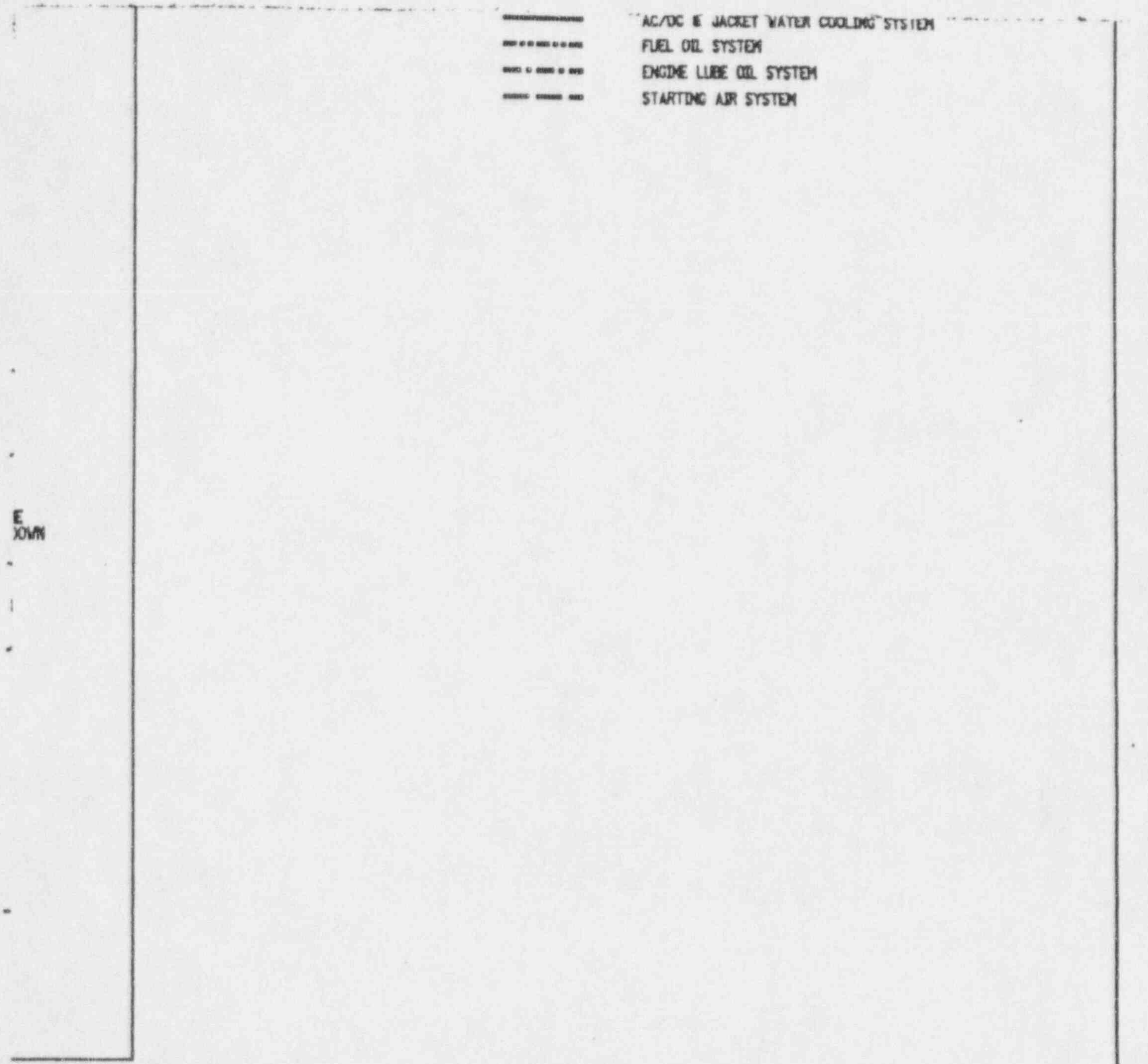
(REF) ZOS 001



Inside Diesel Generator Building

Figure 8.3.1-4 (Sheet 2 of 2)

Diesel Generator System
Piping and Instrumentation Diagram



Inside Diesel Generator Building

Figure 8.3.1-5 (Sheet 1 of 2)

Diesel Engine Skid Mounted System

FUEL OIL SYSTEM
ENGINE LUBE OIL SYSTEM
STARTING AIR SYSTEM

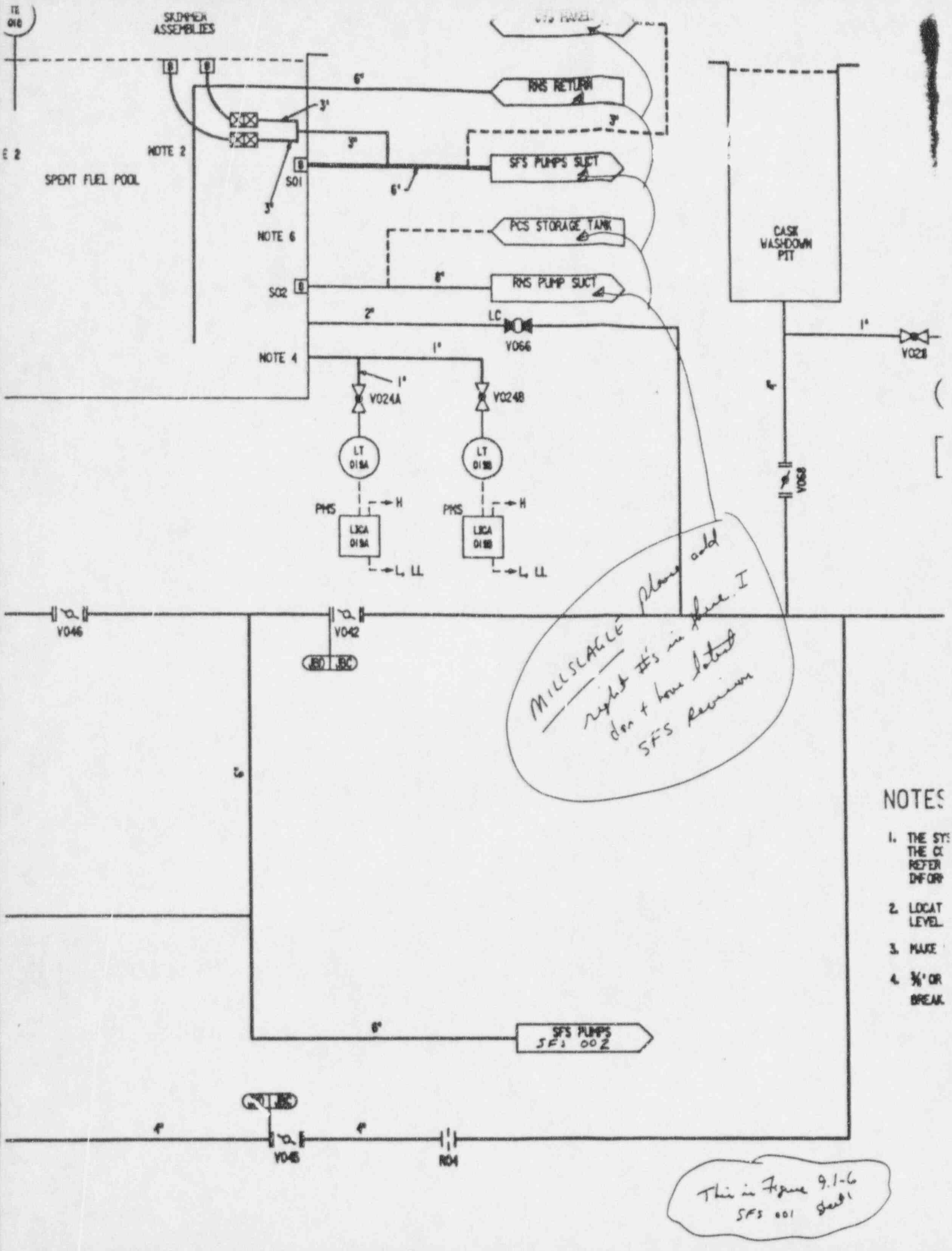
Inside Diesel Generator Building

Figure 8.3.1-5 (Sheet 2 of 2)

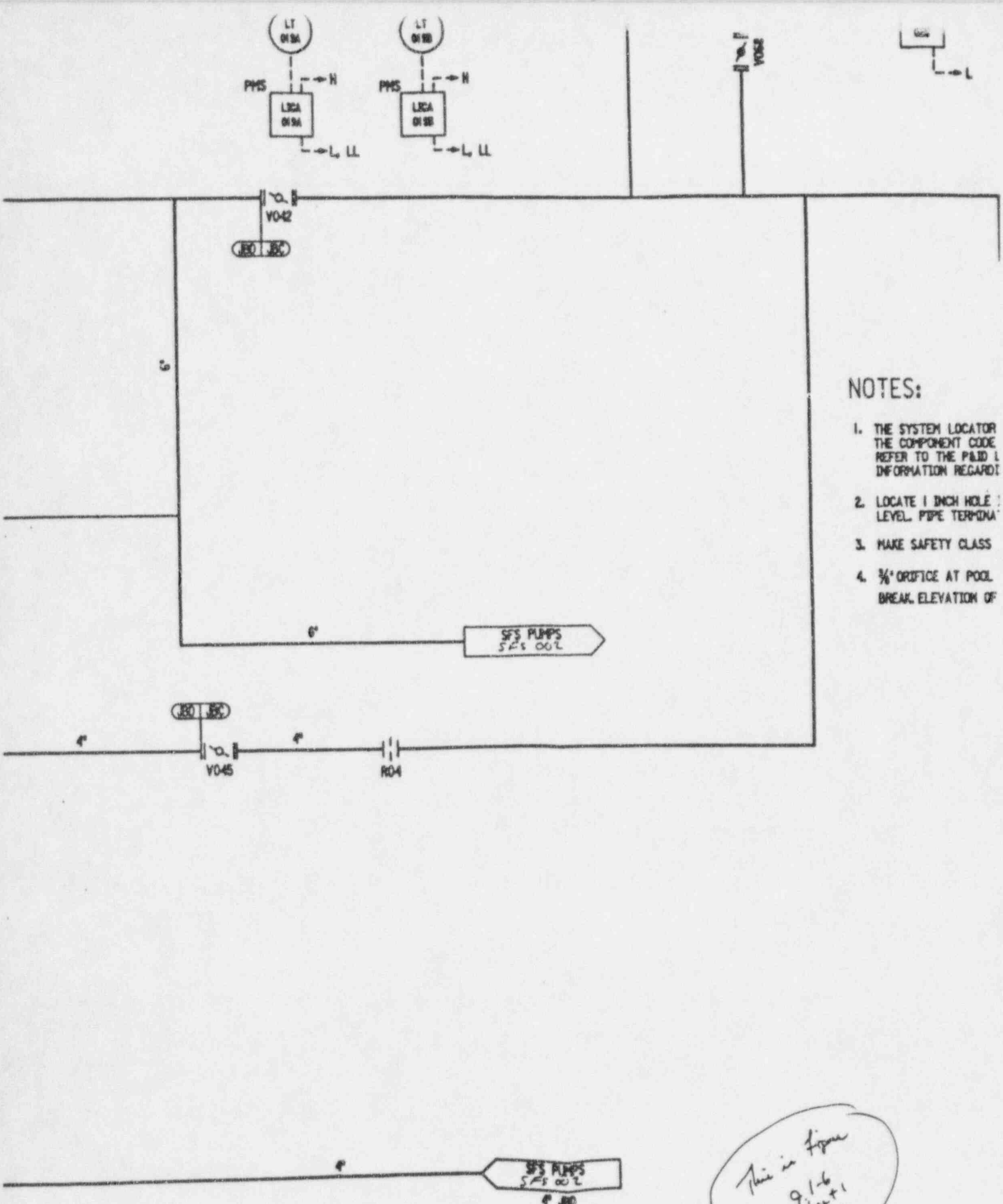
Diesel Engine Skid Mounted System

LIST OF TABLES

AP600 System Designators and System



SKIMMER ASSEMBLIES
SPENT FUEL POOL
NOTE 2
NOTE 6
NOTE 4
S01
S02
RNS RETURN
SFS PUMPS SUCT
PCS STORAGE TANK
RNS PUMP SUCT
CASK WASHDOWN PIT
LC
V066
V028
V024A
V024B
LT 019A
LT 019B
PMS
LICA 019A
LICA 019B
H
L, LL
V046
V042
V058
V045
R04
SFS PUMPS
SFS 002
MILLSLAGLE please add right #'s in line. I don't have latest SFS Revision
This is Figure 9.1-6 SFS 001 Sheet 1
NOTES
1. THE SYS
THE C
REFER
INFOR
2. LOCAT
LEVEL
3. MAKE
4. ¾" OR
BREAK



NOTES:

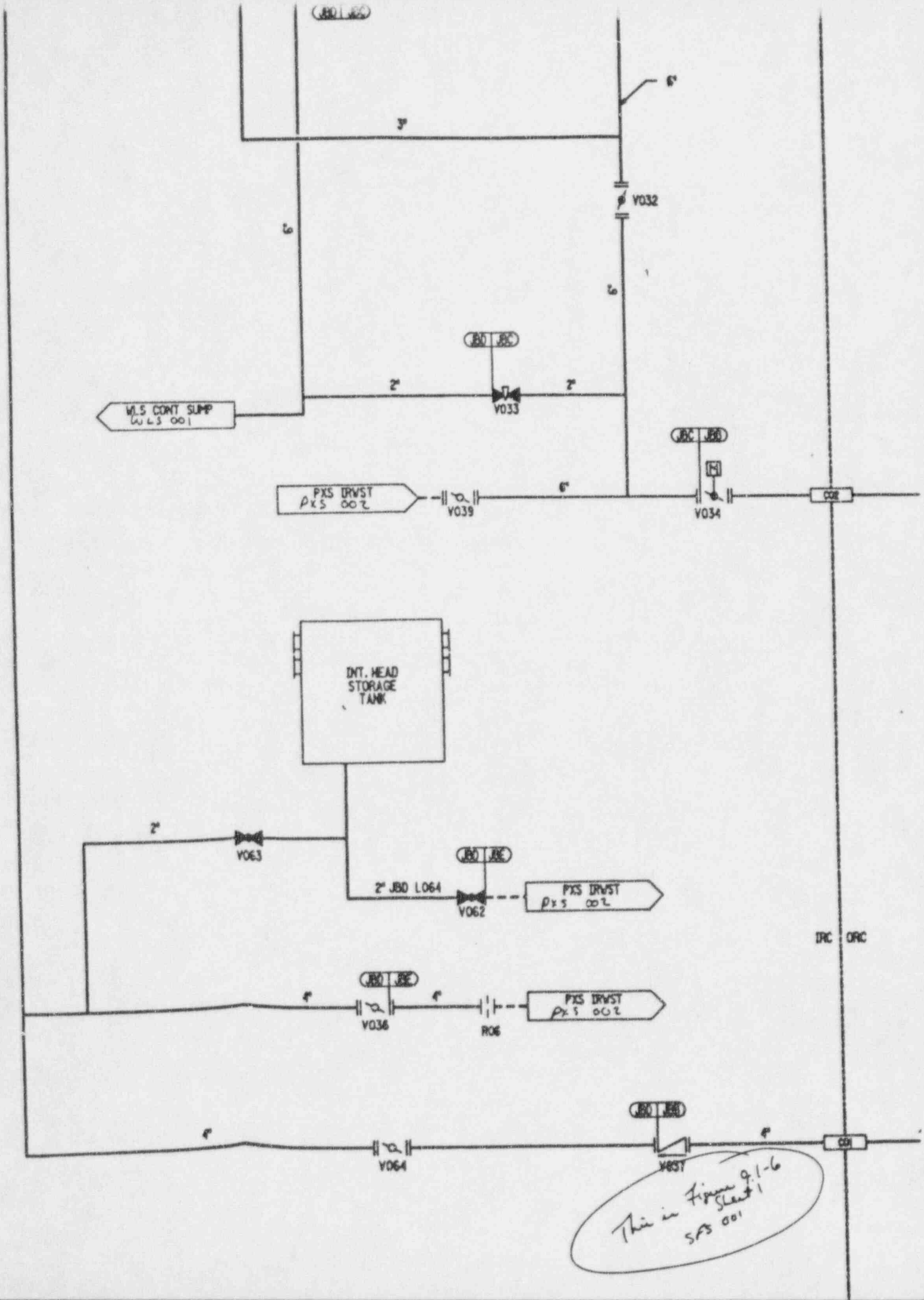
1. THE SYSTEM LOCATOR
THE COMPONENT CODE
REFER TO THE P&ID L
INFORMATION REGARDI

2. LOCATE 1 INCH HOLE
LEVEL. PIPE TERMINA

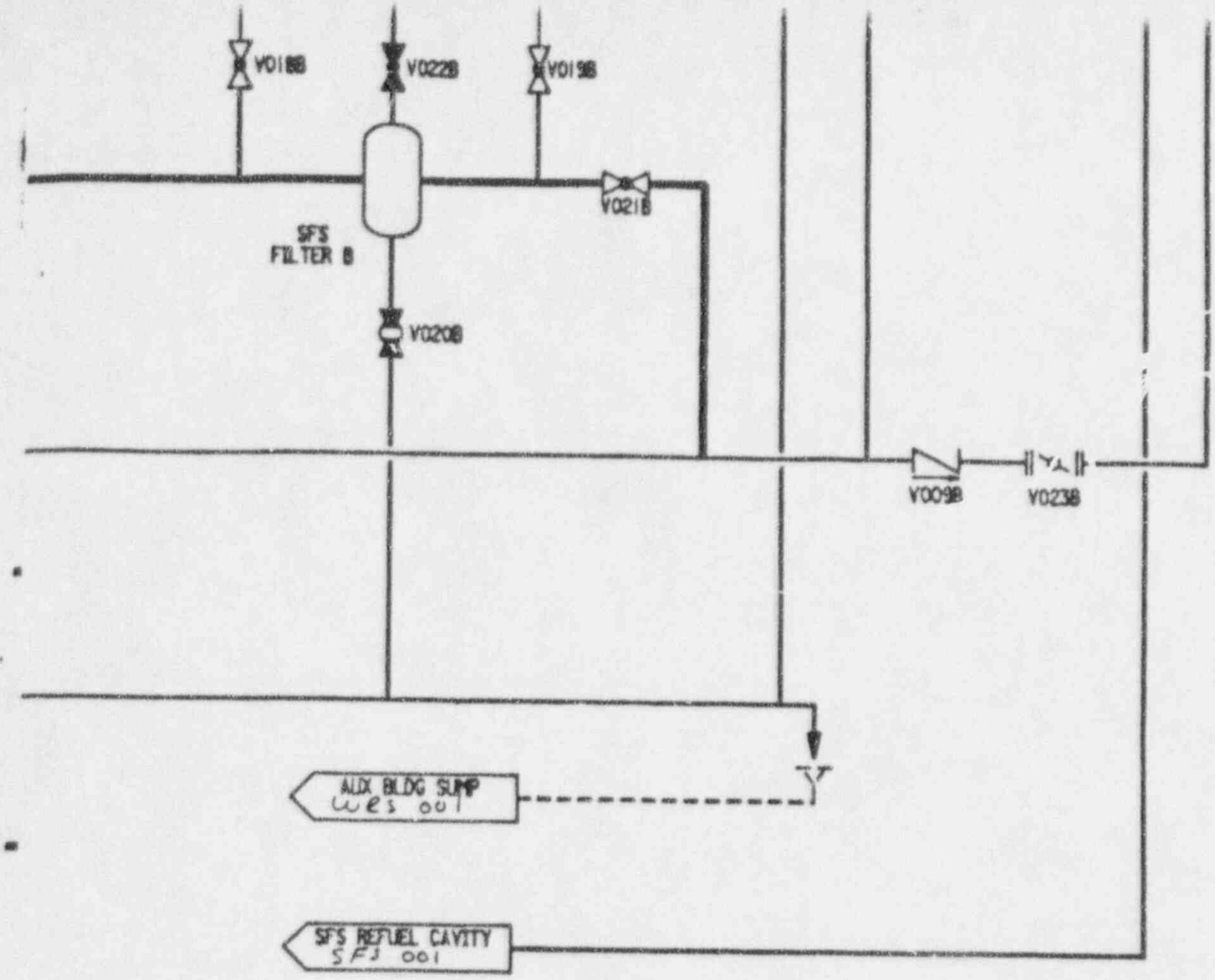
3. MAKE SAFETY CLASS

4. 3/16" ORIFICE AT POOL
BREAK. ELEVATION OF

This is Figure 9.1-6 Sheet 1 SFS 001



JBD | JBD
6"
3"
V032
6
6
JBD | JBC
2"
2"
V033
WLS CONT SUMP
WLS 001
JBC | JBD
M
PXS IRWST
PXS 002
V039
6"
V034
C02
INT. HEAD
STORAGE
TANK
2"
V063
JBD | JBE
2" JBD L064
V062
PXS IRWST
PXS 002
IRC
ORC
JBD | JBE
4"
4"
V036
R06
PXS IRWST
PXS 002
JBD | JBD
4"
V064
4"
C01
This is Figure 9.1-6
Sheet 1
SFS 001



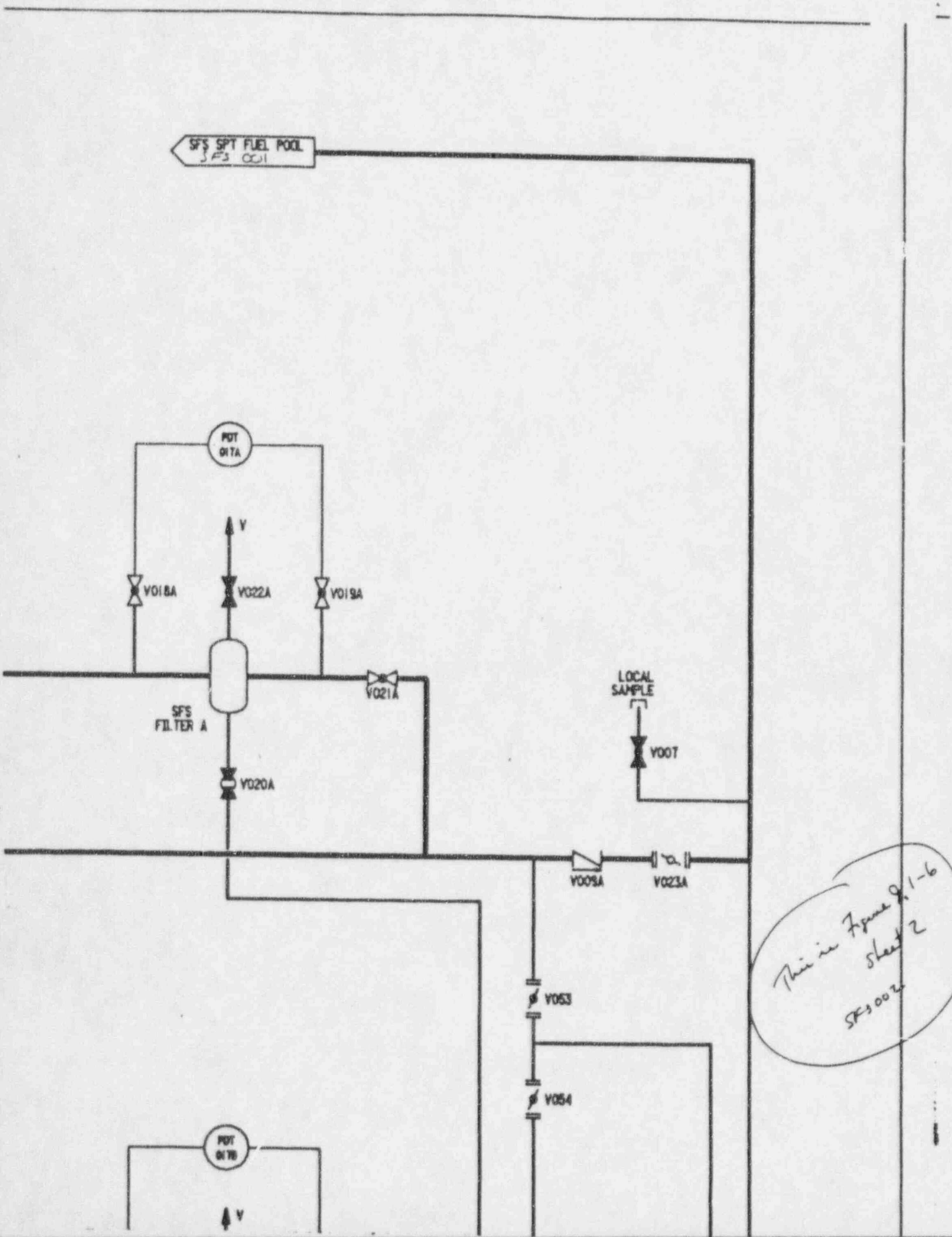
S BEEN OMITTED FROM ALL COMPONENT NUMBERS.
TTED FROM ALL COMPONENTS EXCEPT EQUIPMENT.
G GW M6 001, 002 AND 003 FOR ADDITIONAL
NUMBERING.

ON DOCUMENT FOR
NTATION, CONTROLS

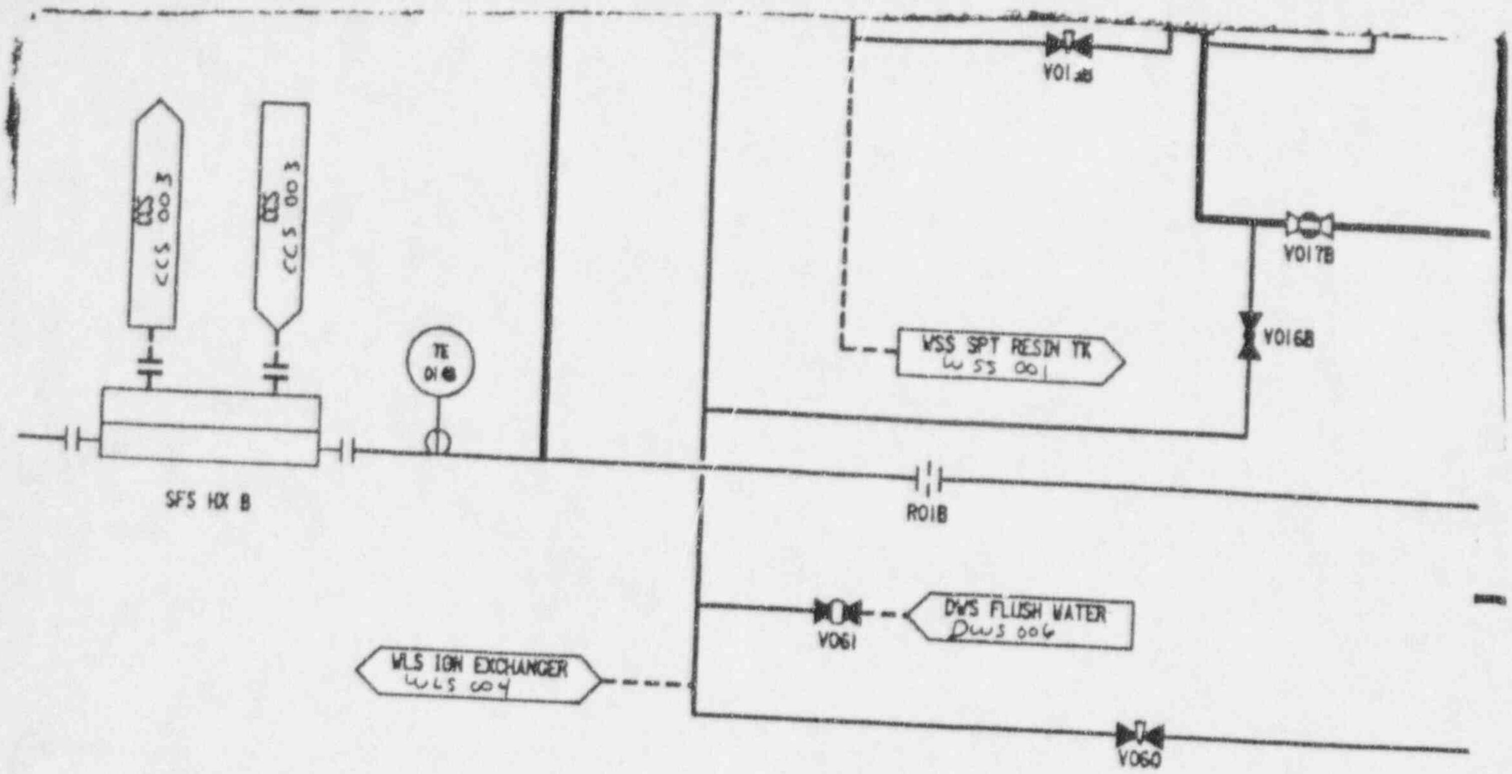
OOL PIECE FOR
AND SPOOL PIECE
E IS CONNECTED
NG OPERATIONS.

Figure 9.1-6 (Sheet 2 of 2)

Spent Fuel Pool Cooling System
Piping and Instrumentation Diagram



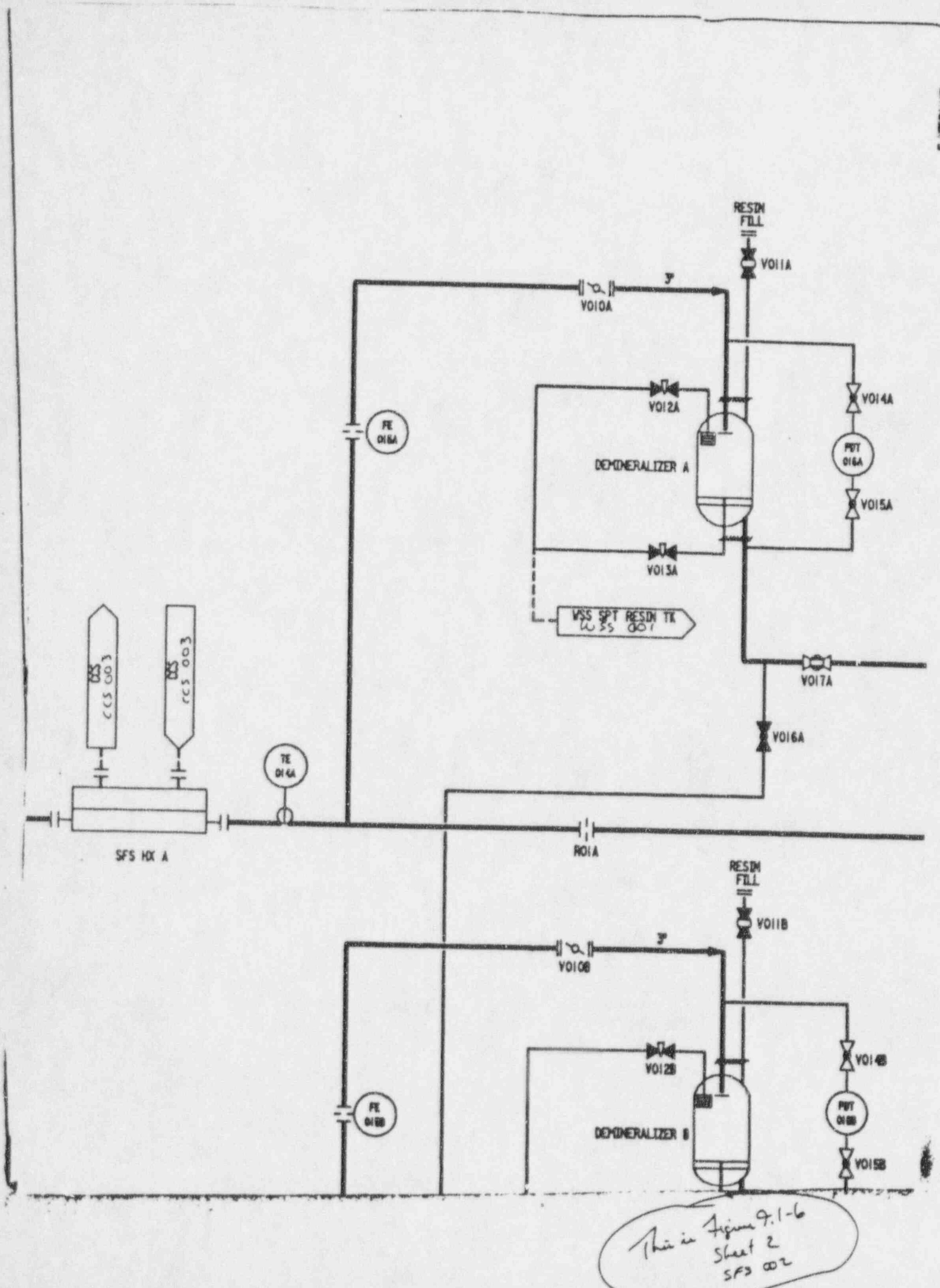
SFS SPT FUEL POOL
SFS 001
PDT 017A
V
V018A
V022A
V019A
V021A
SFS
FILTER A
V020A
LOCAL
SAMPLE
V007
V009A
V023A
V053
V054
PDT 017B
V
This is Figure 9.1-6 sheet 2
SFS002

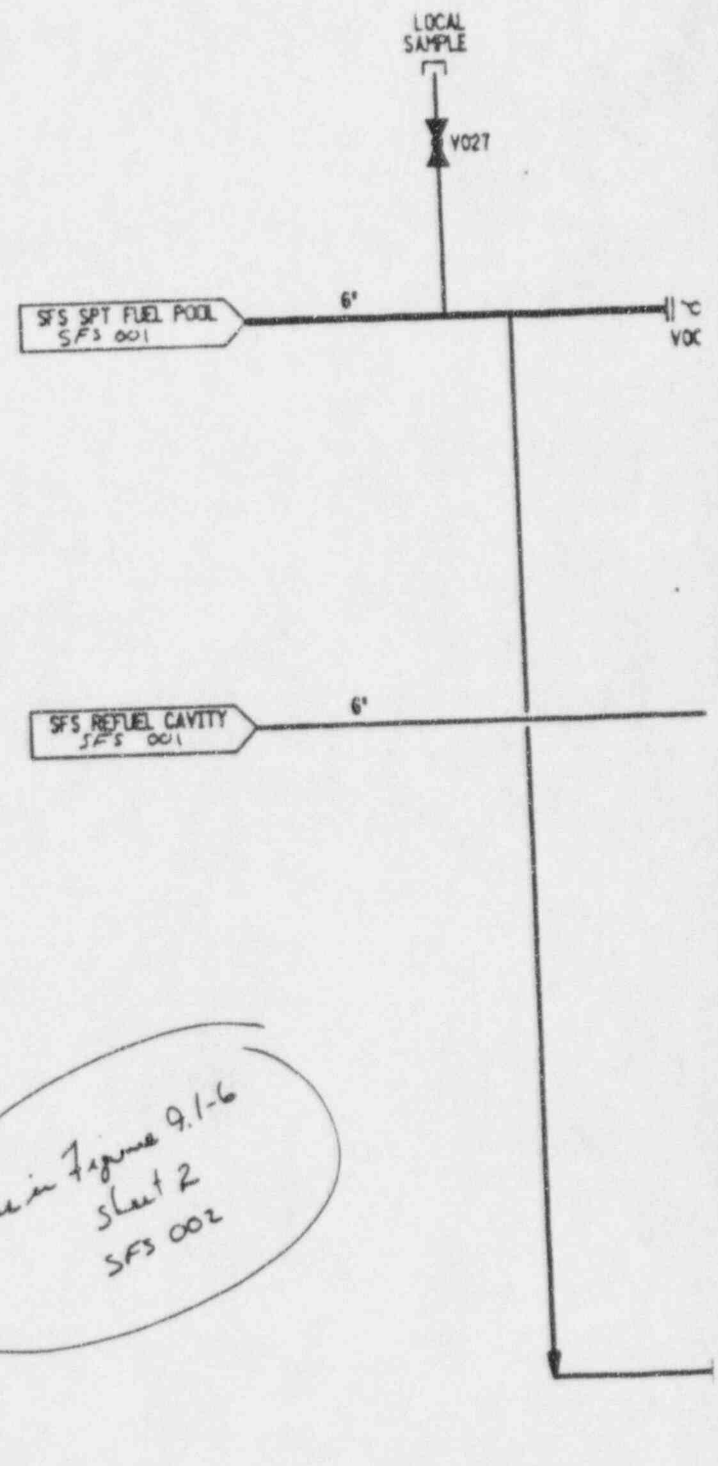


NOTES:

1. THE SYSTEM LOCATOR CODE "SFS" HA
THE COMPONENT CODE HAS BEEN OMI
REFER TO THE P&ID LEGEND DRAWIN
INFORMATION REGARDING COMPONENT
2. REFER TO SFS SYSTEM SPECIFICATI
DETAILED DESCRIPTION OF INSTRUME
AND INTERLOCKS.
3. TEMPORARY STRAINER PLACED IN SP
PRE-OPERATION FLUSHING. STRAINER
FURNISHED BY OTHERS. CAPPED LIN
TO PRESSURE GAUGE DURING FLUSHI

This is Figure 9.1-6
Sheet 2
SFB 002


RESIN FILL
V011A
V010A
3"
V012A
FE 016A
DEMINERALIZER A
V014A
PDT 016A
V015A
V013A
WSS SPT RESIN TK
WSS 001
CCS 003
CCS 003
V017A
V016A
TE 014A
SFS HX A
RO1A
RESIN FILL
V011B
V010B
3"
V012B
V014B
FE 016B
PDT 016B
DEMINERALIZER B
V015B
This is Figure 9.1-6
Sheet 2
SFS 002



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sheet 2
SFS 002

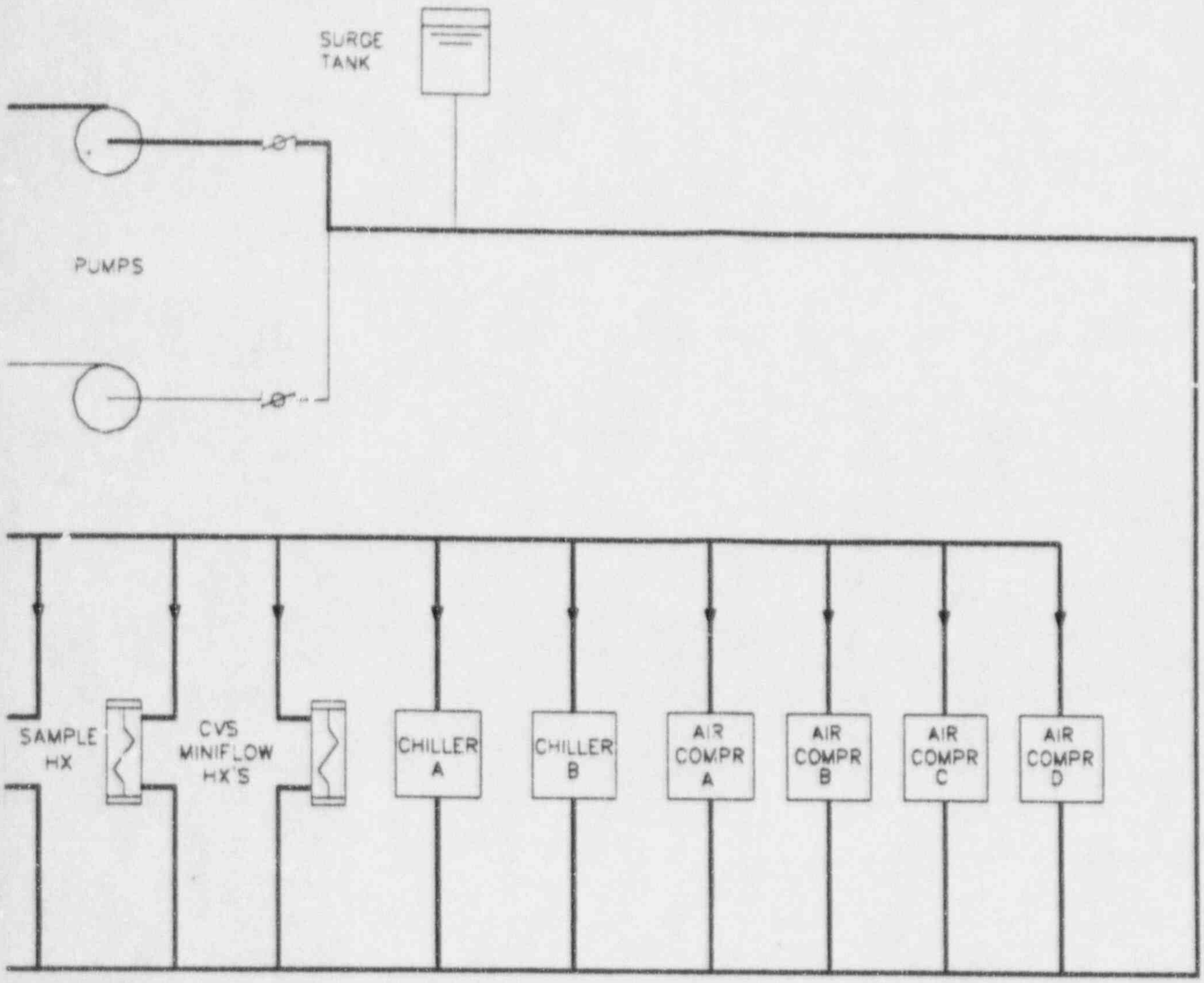
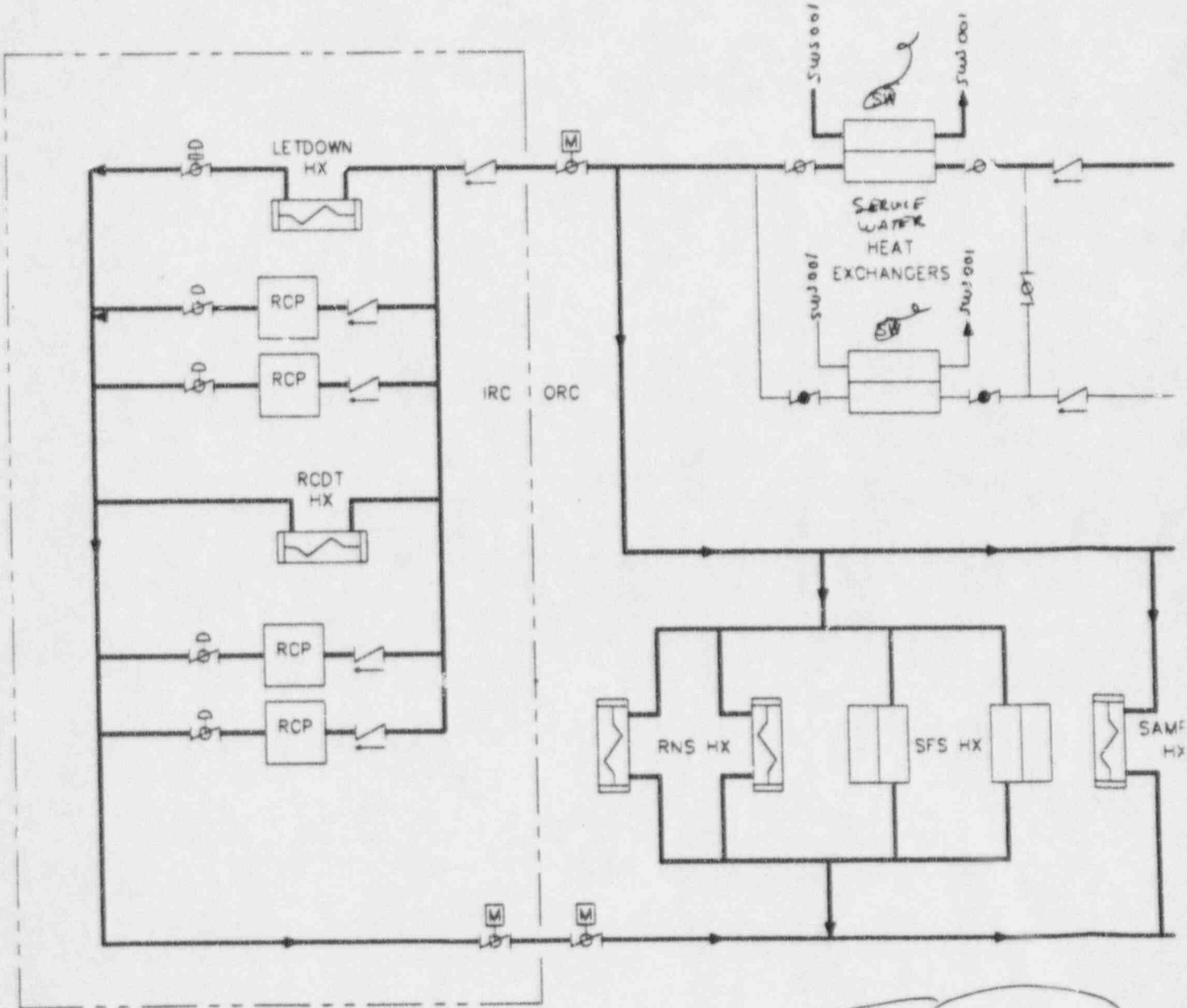


Figure 9.2.2-1

**Component Cooling Water System
Simplified Flow Diagram**

(REF) CCS



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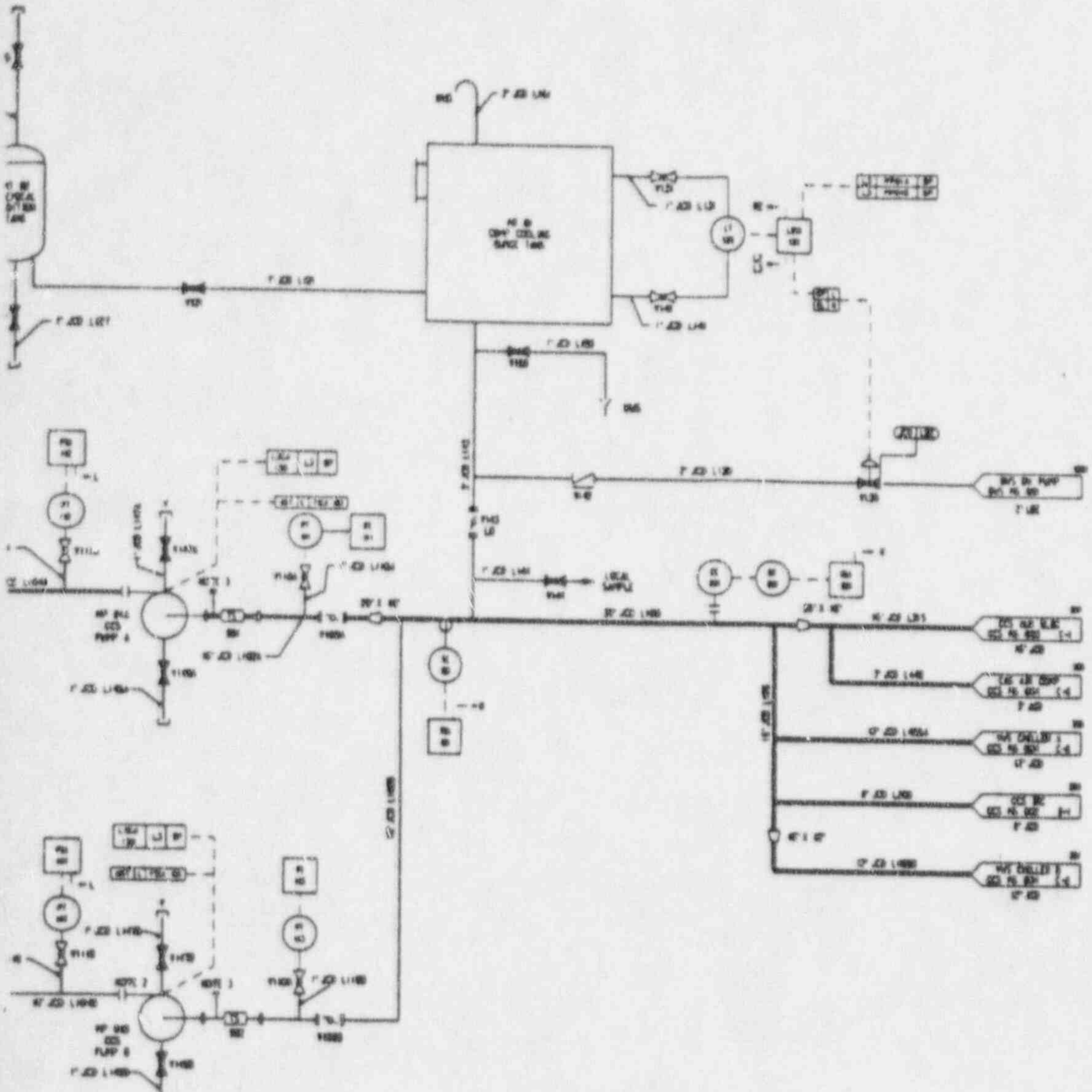


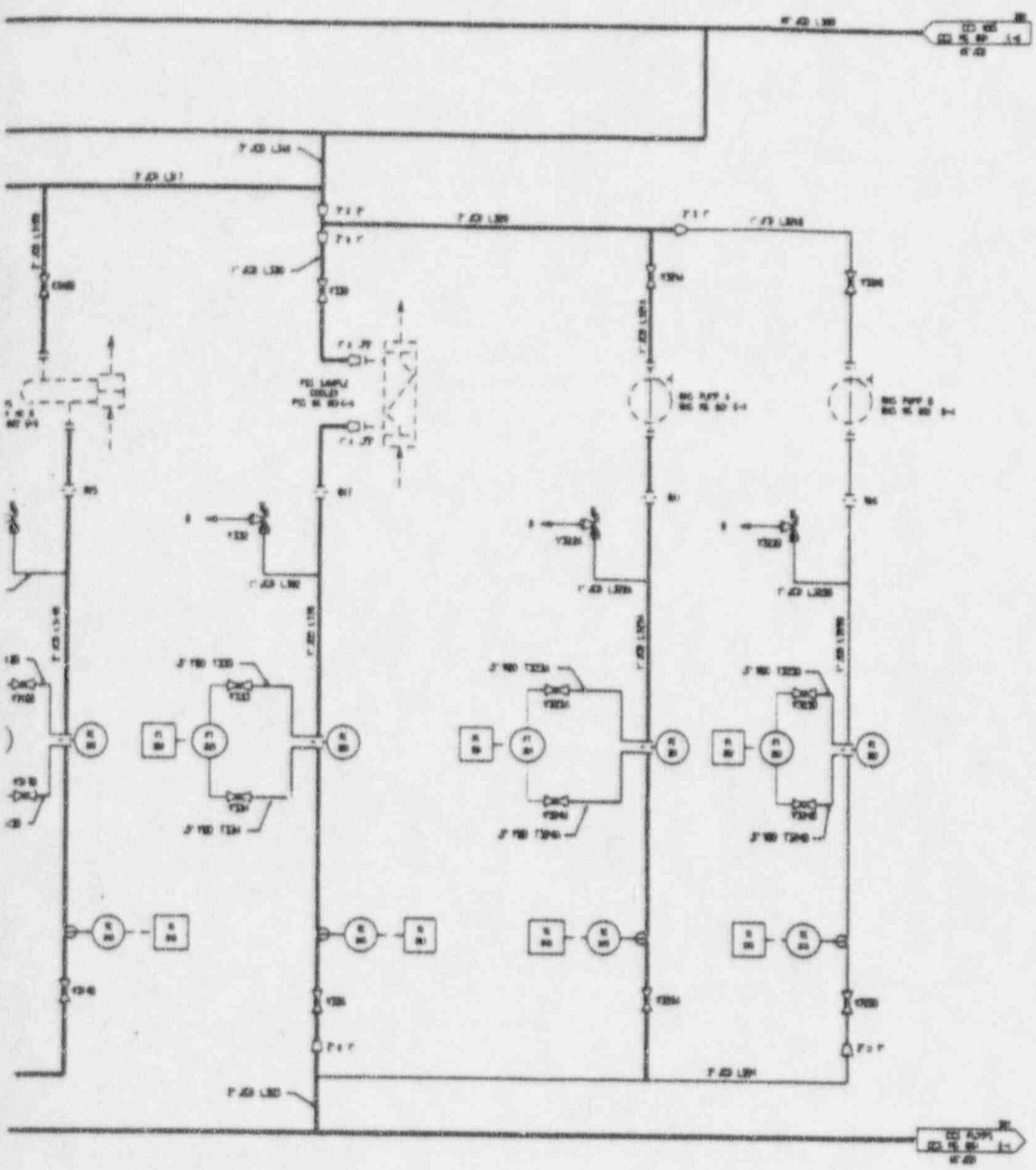
NOTES:

Inside Turbine Building

(REF CCS-001)

Figure 9.2.2-2 (Sheet 1 of 5)

Component Cooling Water System Piping and Instrumentation Diagram



Inside Auxiliary Building

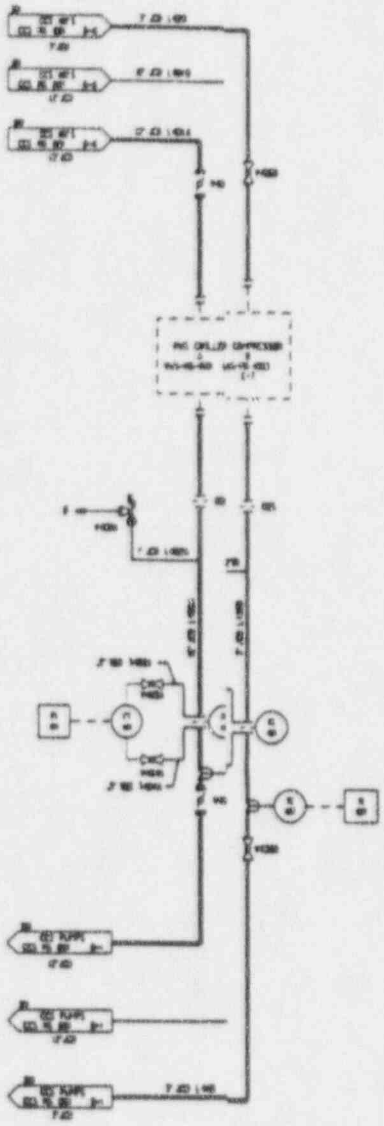
NOTES:

1. [illegible]
2. [illegible]

(REF CCS-003)

Figure 9.2.2-2 (Sheet 3 of 5)

Component Cooling Water System Piping and Instrumentation Diagram



Inside Turbine Building

(REF CCS-004)

Figure 9.2.2-2 (Sheet 4 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram

Inside Turbine Building

(REF CCS-005)

Figure 9.2.2-2 (Sheet 5 of 5)

Component Cooling Water System Piping and Instrumentation Diagram

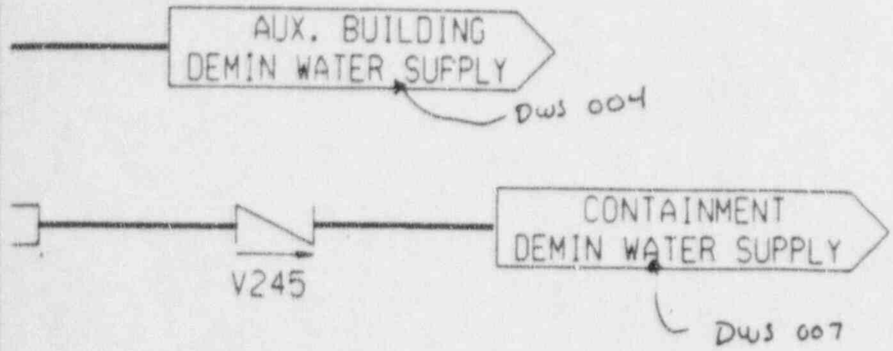
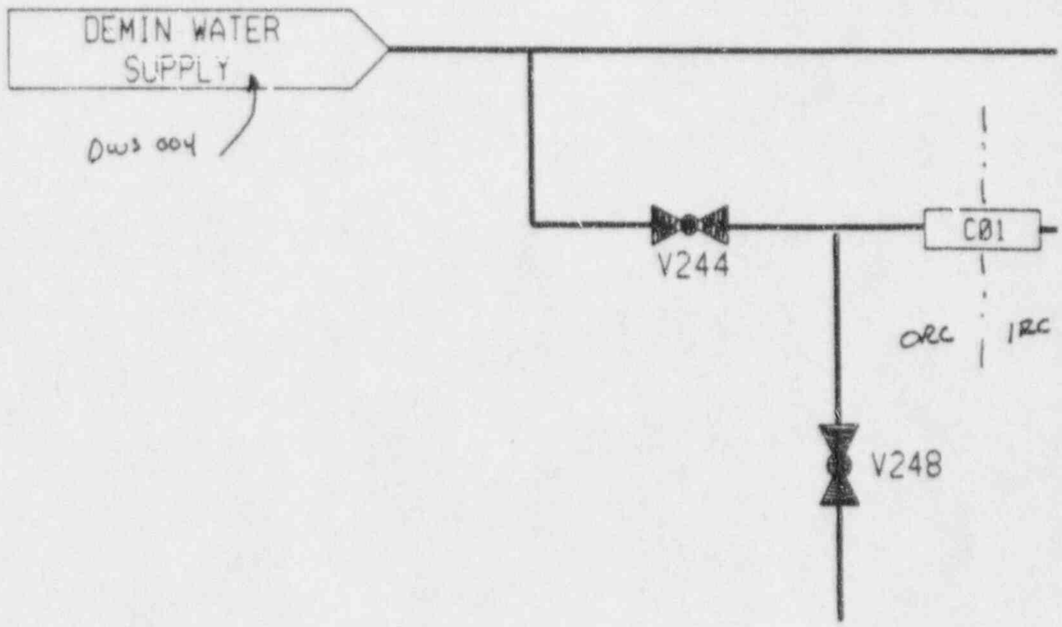
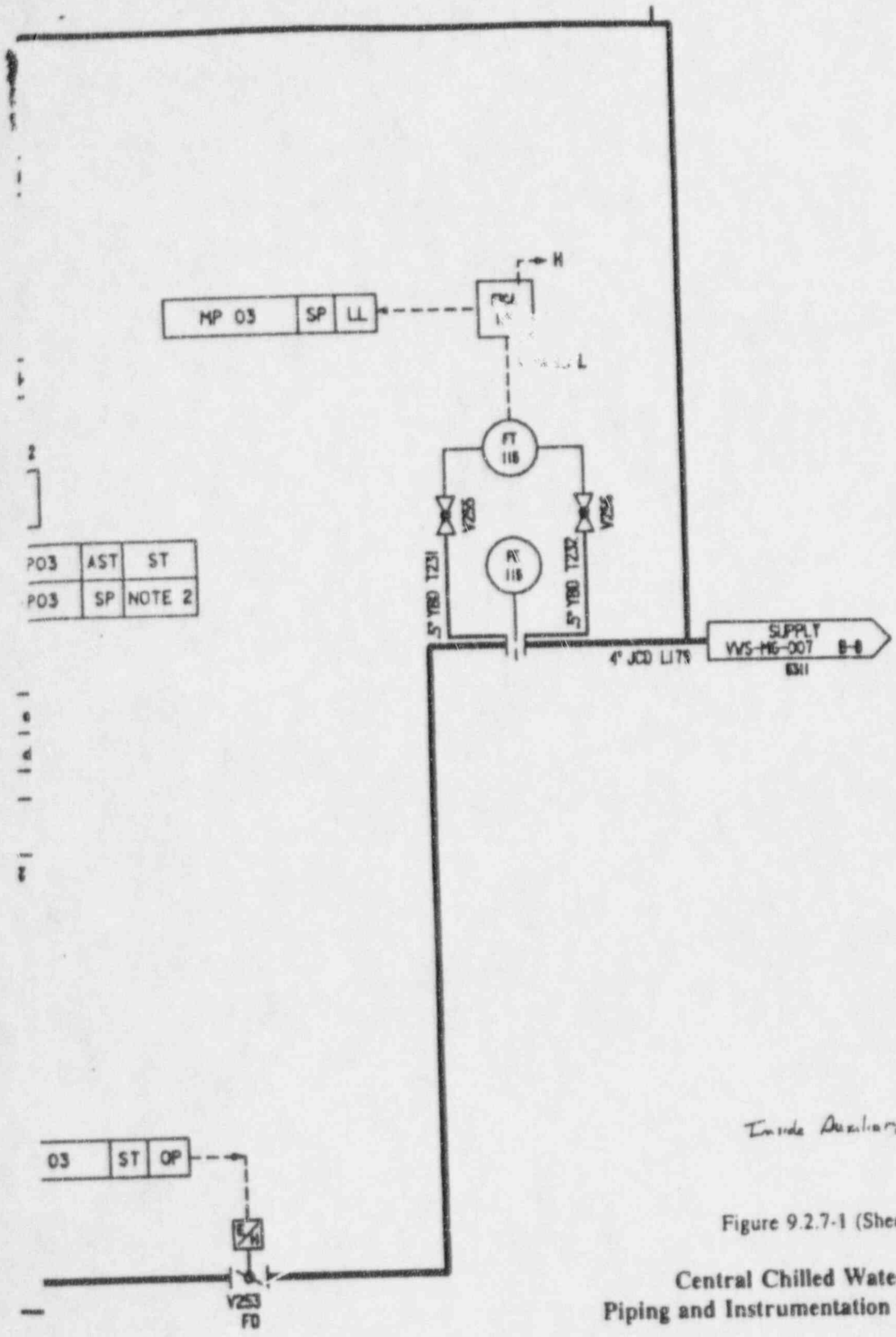


Figure 9.2.4-1

Demineralize Water Transfer and Storage System
Containment Isolation Provisions
(REF) DWS 007



This is Figure 9.2.4-1

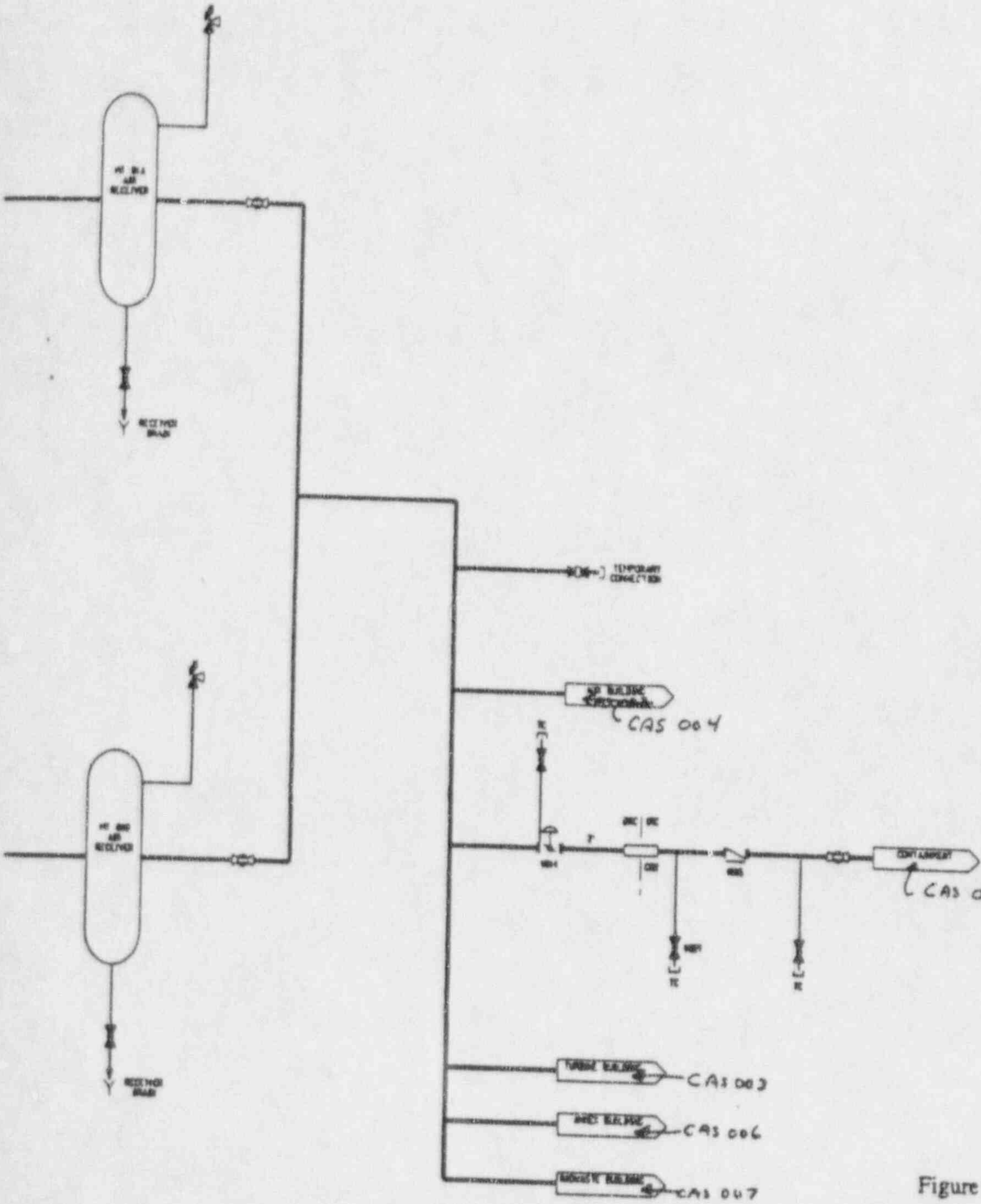


Inside Auxiliary Building

Figure 9.2.7-1 (Sheet 1 of 3)

Central Chilled Water System
Piping and Instrumentation Diagram

(REF) VWS 006

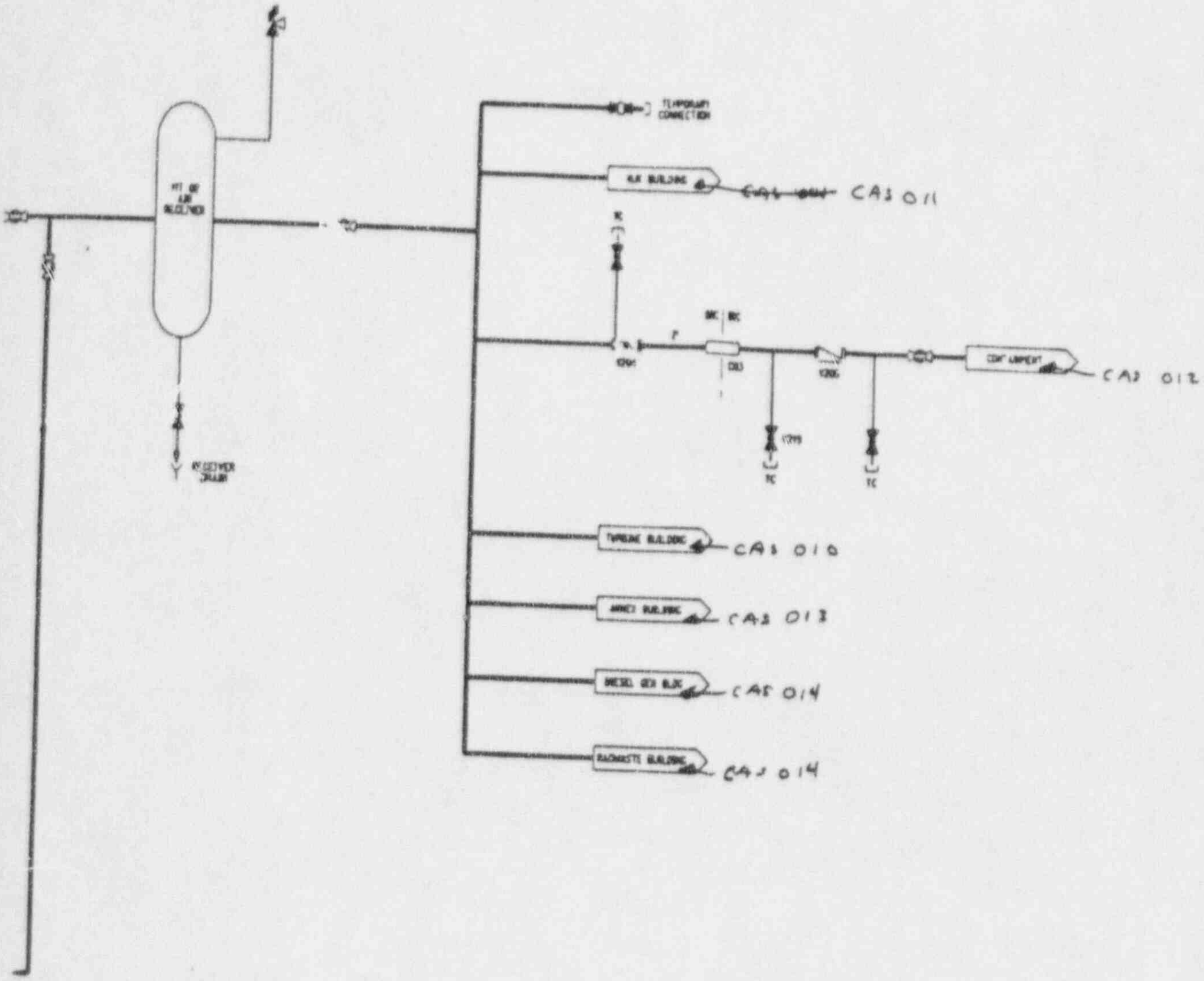


~~(REF CAS-001)~~

Figure 9.3.1-1 (Sheet 1 of 3)

Compressed & Instrument Air System
Piping and Instrumentation Diagram

(REF) CAS 001/002

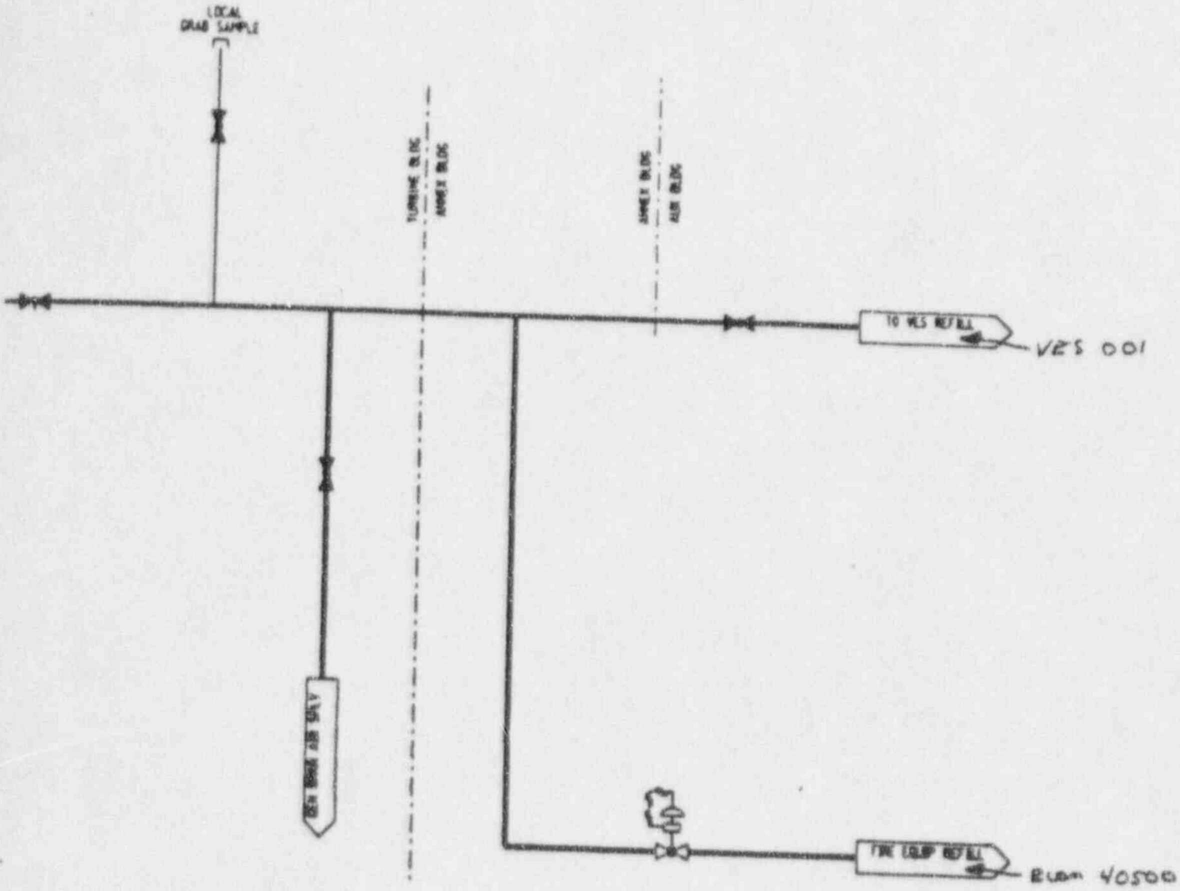


~~(REF CAS 002)~~

Figure 9.3.1-1 (Sheet 2 of 3)

Compressed & Instrument Air System Piping and Instrumentation Diagram

(REF) CAS 008 & 009



~~(REF CAS-003)~~

Figure 9.3.1-1 (Sheet 3 of 3)

Compressed & Instrument Air System
Piping and Instrumentation Diagram

(REF) CAS 015

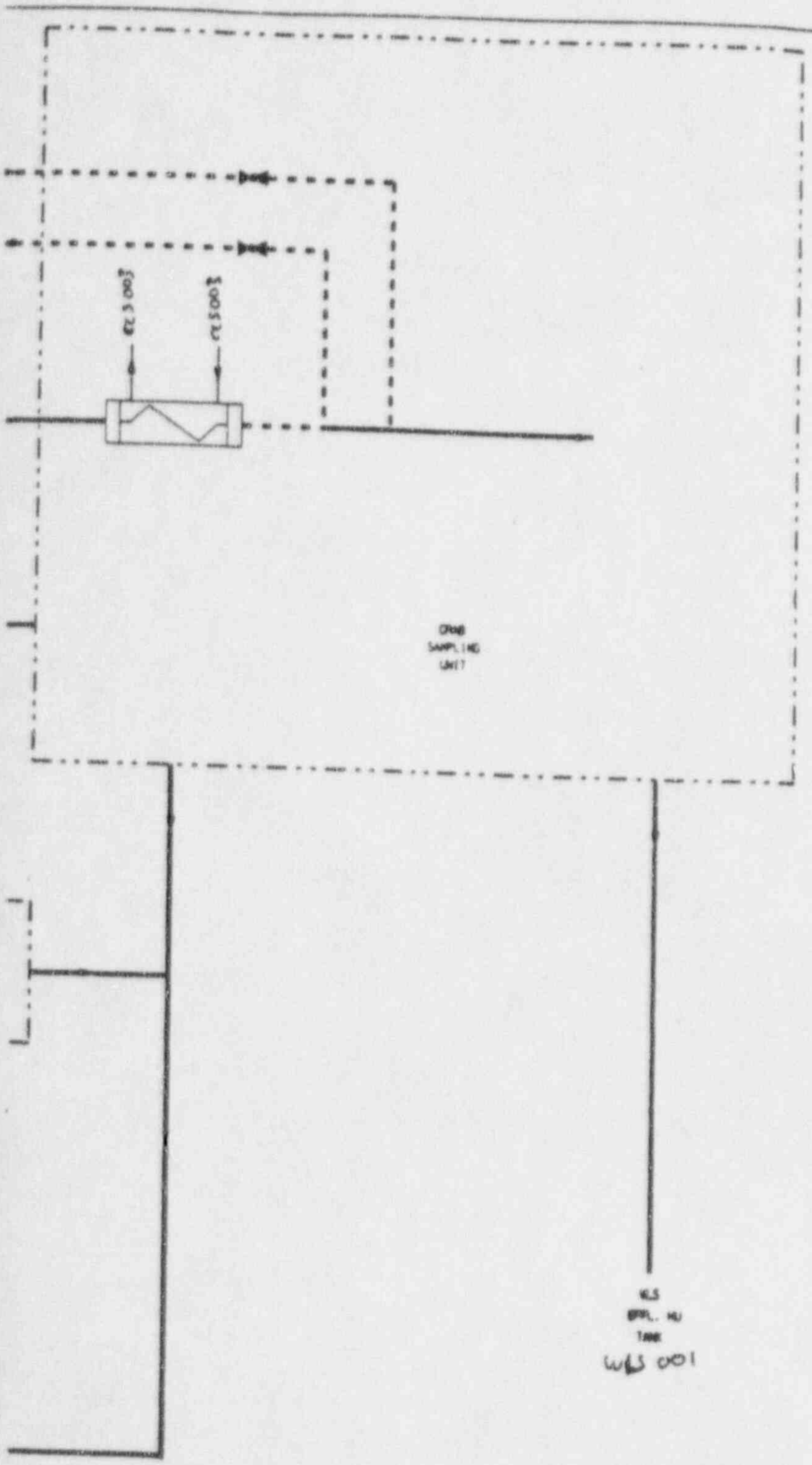
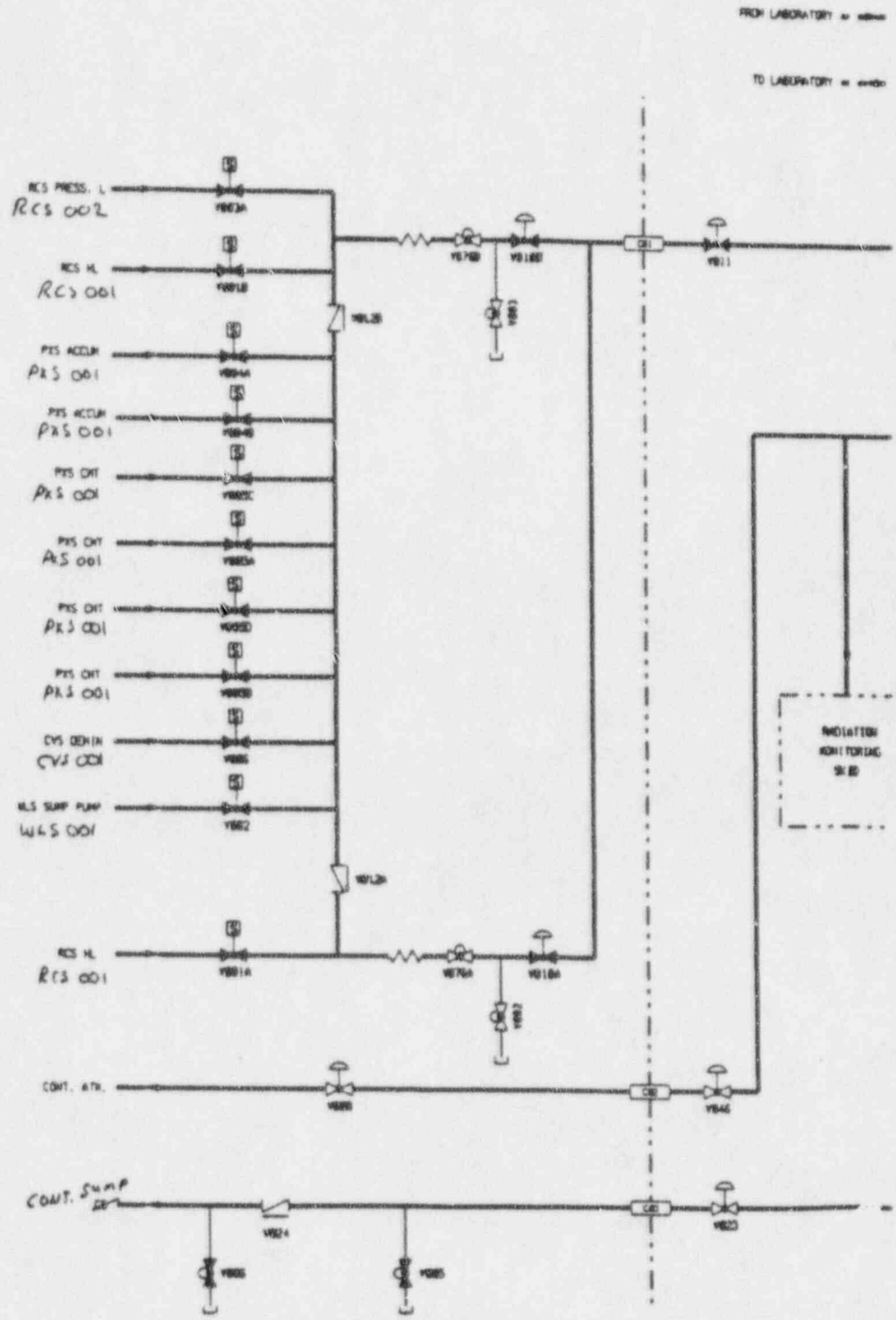


Figure 9.3.3-1

Simplified Sketch of the Primary Sampling System
(REF) PSS 001



This is Figure 9.3.3-1

- Isolates the HVAC ductwork that penetrates the main control room boundary on high particulate or iodine concentrations in the main control room supply air or on extended loss of ac power to support operation of the main control room emergency habitability system as described in Section 6.4

Those portions of the nuclear island nonradioactive ventilation system which penetrate the main control room envelope are safety-related and designed as seismic Category I to provide isolation of the main control room envelope from the surrounding areas and outside environment in the event of a design basis accident. Other functions of the system are nonsafety-related. HVAC equipment and ductwork whose failure could affect the operability of safety-related systems or components are designed to seismic Category II requirements. The remaining portion of the system is nonsafety-related and nonseismic.

The nuclear island nonradioactive ventilation system is designed to control the radiological habitability in the main control room within the guidelines presented in Standard Review Plan (SRP) 6.4 and NUREG 0696 (Reference 1), if the system is operable and ac power is available.

The nuclear island nonradioactive ventilation system is not safety-related. However, the portions of the system that provide filtration of main control room/technical support center air during conditions of abnormal airborne radioactivity are designed, constructed, and tested ~~in accordance~~ to conform with Generic Issue B-36, as described in Section 1.9 and Regulatory Guide 1.140, as described in Appendix 1A, ASME N509 (Reference 2) and ASME N510 (Reference 3).

The nuclear island nonradioactive ventilation system is designed to provide a reliable source of heating, ventilation, and cooling to the areas served when ac power is available. The system equipment and component functional capabilities are to minimize the potential for actuation of the main control room emergency habitability system or the potential reliance on passive equipment cooling. This is achieved through the use of redundant equipment and components that are connected to standby onsite ac power sources.

9.4.1.1.2 Power Generation Design Basis

Main Control Room/Technical Support Center Areas

The nuclear island nonradioactive ventilation system provides the following specific functions:

- Controls the main control room and technical support center relative humidity between 25 to 60 percent

- Maintains the main control room and technical support center areas at a slightly positive pressure with respect to the adjacent rooms and outside environment during normal operations to prevent infiltration of unmonitored air into the main control room and technical support center areas

The smoke/purge exhaust isolation dampers close, if open.

If "high" gaseous radioactivity is detected in the main control room supply air duct and the main control room/technical support center HVAC subsystem is operable, both supplemental air filtration units automatically start to pressurize the main control room and technical support center areas to at least 1/8 inch wg using filtered makeup air. After the room is pressurized, one of the supplemental air filtration units is manually shut down. The normal outside air makeup duct and the main control room and technical support center toilet exhaust duct isolation dampers close. The main control room/technical support center supply air handling unit provides cooling with recirculation air to maintain the main control room passive heat sink below its initial ambient air design temperature and maintains the main control room and technical support center areas within their design temperatures. The supplemental air filtration subsystem pressurizes the combined volume of the main control room and technical support center concurrently with filtered outside air. A portion of the recirculation air from the main control room and technical support center is also filtered for cleanup of airborne radioactivity. The main control room/technical support center HVAC equipment and ductwork that form an extension of the main control room/technical support center pressure boundary limit the overall infiltration (negative operating pressure) and exfiltration (positive operating pressure) rates to those values shown in Table 9.4.1-1. Based on these values, the system is designed to maintain operator doses within allowable General Design Criteria (GDC) 19 limits.

continues to

If ac power is unavailable for more than a short period or if "high-high" particulate or iodine radioactivity is detected in the main control room supply air duct, which would lead to exceeding GDC 19 operator dose limits, the plant safety and monitoring system automatically isolates the main control room from the normal main control room/technical support center HVAC subsystem by closing the supply, return, and toilet exhaust duct isolation dampers. Main control room habitability is maintained by the main control room emergency habitability system which is discussed in Section 6.4.

If a high concentration of smoke is detected in the outside air intake, an alarm is initiated in the main control room and the main control room/technical support center HVAC subsystem is manually realigned to the recirculation mode by closing the outside air and toilet exhaust duct isolation dampers. The main control room and technical support center toilet exhaust fans are tripped upon closure of the isolation dampers. The main control room/technical support center areas are not pressurized when operating in the recirculation mode. The main control room/technical support center HVAC supply air subsystem continues to provide cooling, ventilation, and temperature control to maintain the emergency habitability passive heat sink below its initial ambient air design temperature and maintains the main control room and technical support center areas within their design temperatures. The main control room and technical support center areas ventilation supply and return/exhaust ducts can be remotely or manually isolated from the main control room.

In the event of a fire in the main control room or technical support center, in response to heat from the fire or upon receipt of a smoke signal from an area smoke detector, the combination fire/smoke dampers close automatically to isolate the fire area. The subsystem continues to provide ventilation/cooling to the unaffected area and maintains the unaffected areas at a slightly positive pressure. The main control room/technical support center HVAC subsystem

The supplemental air filtration unit, HEPA filters, and charcoal adsorbers are ~~field~~ tested in place in accordance with ASME N510 to verify that these components do not exceed a maximum allowable bypass leakage rate. Used samples of charcoal adsorbent are periodically tested to verify a minimum charcoal efficiency of 90 percent in accordance with Regulatory Guide 1.140, except that test procedures and test frequency are conducted in accordance with ASME N510.

The ductwork for the supplemental air filtration subsystem and portions of the main control room/technical support center HVAC subsystem that maintain the integrity of the main control room/technical support center pressure boundary during conditions of abnormal airborne radioactivity are tested for leak tightness in accordance with ASME N510, Section 6. The remaining supply and return/exhaust ductwork is ~~field~~ tested in place for leakage in accordance with SMACNA HVAC Duct Leakage Test Manual (Reference 18).

9.4.1.5 Instrumentation Applications

The nuclear island nonradioactive ventilation system is controlled by the plant control system except for the main control room isolation dampers, which are controlled by the protection and safety monitoring system. Refer to subsection 7.1.1 for a description of the plant control and plant safety and monitoring systems. The instruments discussed below satisfy Table 4.2 of ASME N 509 (Reference 2).

Temperature controllers are provided in the return air ducts to control the room air temperatures within the predetermined ranges. Temperature indication and alarms for the main control room return air, Class 1E electrical room return air, air handling unit supply air, supplemental filtration unit prefilter inlet air and charcoal adsorbers are provided to inform plant operators of abnormal temperature conditions.

Pressure differential indication and alarms are provided across each filter bank (except charcoal filters) to inform plant operators when filter changeout is necessary. Pressure differential indication and alarms are provided to control the main control room and monitor the technical support center ambient room pressure differentials with respect to surrounding areas.

Radioactivity indication and alarms are provided to inform the main control room operators of gaseous, particulate, and iodine radioactivity concentrations in the main control room supply air duct. See Section 11.5 for a description of the main control room supply air duct radiation monitors and their actuation functions.

Smoke monitors are provided to detect smoke in the outside air intake duct to the main control room and the main control room and Class 1E electrical room return air ducts.

Airflow indication and alarms are provided to monitor operation of the supply and exhaust fans.

and areas served via registers. An electric heating coil is provided in the branch supply duct to the men's and women's change rooms for tempering the supply air.

A humidifier is provided in the system to provide a minimum space relative humidity of 35 percent.

Air from the men's and women's locker, toilet, and shower facilities in the annex building is exhausted directly to atmosphere by an exhaust fan. Room air from the remaining areas served is recirculated back to the air handling unit via a ceiling return plenum and a return duct system. Outside make-up air is added to the return air stream at the air handling units to replace air exhausted from toilets and showers in the area served.

9.4.2.2.1.2 Switchgear Room HVAC Subsystem

The switchgear room HVAC subsystem serves electrical switchgear Rooms 1 and 2 in the annex building. The switchgear room HVAC system consists of two 100 percent capacity air handling units, a ducted supply and return air system, and automatic controls and accessories.

The air handling units are located in the north air handling equipment room in the annex building at elevation 135'-3". The air handling units discharge into a common duct distribution system that is routed through the building to the rooms served. Air is returned to the air handling units from the rooms served by a return duct system.

They are connected to a common intake plenum located along the east wall adjacent to their air handling equipment room. This plenum also supplies air for the equipment room HVAC subsystem.

9.4.2.2.1.3 Equipment Room HVAC Subsystem

The equipment room HVAC subsystem serves electrical and mechanical equipment rooms in the annex and auxiliary buildings. These rooms include the non-Class 1E battery charger Rooms 1 and 2, the non-Class 1E battery Rooms 1 and 2, the reactor switchgear Rooms I and II and RCC and ICC/non-Class 1E penetration rooms. This subsystem also serves the security area offices and the central alarm station in the annex building. These include two rest rooms, access areas, and corridors. The equipment room HVAC system consists of two 100 percent capacity air handling units, two battery room exhaust fans, a toilet exhaust fan, a ducted supply and return air system, and automatic controls and accessories.

The air handling units are located in the north air handling equipment room in the annex building at elevation 135'-3". The air handling units discharge into a common duct distribution system that is routed through the buildings to the various areas served. Air is returned to the air handling units from the rooms served (except the battery rooms and rest rooms) by a return duct system. Electric reheat coils are provided in the ductwork to areas requiring close temperature control such as the security ~~area offices~~ rooms, rest rooms and the central alarm station. Hot water unit heaters are provided in the north air handling equipment room to maintain the area above 50°F.

They are connected to a common intake plenum located along the east wall adjacent to their air handling equipment room. This plenum also supplies air for the switchgear room HVAC subsystem.

A humidifier is provided in the branch duct to the security areas to provide a minimum space relative humidity of 35 percent.

Each non-Class 1E battery room is provided with an individual exhaust system to prevent the buildup of hydrogen gas in the room. Each exhaust system consists of an exhaust fan, an exhaust air duct and gravity back draft damper located in the fan discharge. Air supplied to the battery rooms by the air handling units is exhausted to atmosphere. Air from the rest rooms is exhausted to atmosphere by a separate exhaust fan.

9.4.2.2.1.4 MSIV Compartment HVAC Subsystem

The main steam isolation valve compartment HVAC subsystem serves the two main steam isolation valve compartments in the auxiliary building that contain the main steam and feedwater lines routed between the containment and the turbine building. Each compartment is provided with separate heating and cooling equipment.

The main steam isolation valve compartment HVAC subsystem consists of two 100-percent-capacity supply air handling units per compartment of about 3,300 scfm each with only low efficiency filters, ducted supply air distribution directly to the space served, automatic controls, and accessories for each main steam isolation valve compartment.

The supply air handling units are located directly within the space served. One unit in each compartment normally operates to maintain the temperature of the compartment. The air handling units can be connected to the standby power system, for investment protection, in the event of loss of the plant ac electrical system.

9.4.2.2.1.5 Mechanical Equipment Areas HVAC Subsystem

The mechanical equipment areas HVAC subsystem serves the ancillary diesel generator room, demineralized water deoxygenating room, boric acid batching room, upper south air handling equipment room, and lower south air handling equipment room in the annex building.

The mechanical equipment areas HVAC subsystem consists of two 50 percent capacity air handling units with supply fans and return/exhaust fans of about 2,200 scfm each, a ducted supply and return air system, automatic controls, and accessories.

The air handling units are located in the lower south air handling unit equipment room on elevation 135'-3" of the annex building. They are supplied from the air intake plenum #2 located at the extreme south end of the annex building between elevation 135'-3" and 158'. This plenum also supplies air for the radiologically controlled area ventilation system, the health physics and hot machine shop HVAC system and the containment air filtration system. The intake is not protected from tornado missiles.

The ancillary diesel generator room is supplied air from the air handling units to maintain normal design temperatures. Air supplied to the room is exhausted direct to outdoors by means of a separate exhaust fan. Ventilation and cooling for the room when the ancillary diesel generators operate is provided by means of manually operated dampers and opening doors to allow radiator discharge air to be exhausted direct to outdoors.

The temperature of the air supplied by the air handling unit is maintained at 62°F by a temperature controller based on outside ambient temperature conditions. When the outdoor air temperature is below 62°F, the temperature controller modulates the outside air, return air and exhaust air dampers of the air handling unit to mix return air and outside air in the proper proportion, and modulates the face and bypass dampers of the hot water heating coils to maintain a mixed air temperature of 62°F. A minimum amount of outside air is always provided for ventilation requirements. When the outdoor air temperature is above 62°F, the outside air, return air and exhaust air dampers automatically reposition for minimum outside air and the temperature controller modulates the chilled water control valves to maintain the supply air at 62°F. The switchover between cooling and heating modes is automatically controlled by the supply air temperature controllers.

Electric reheat coils serving the security ~~access areas~~ room #2 and the central alarm station are controlled by temperature controllers with sensors located in the areas served. The temperature sensor sends a signal to a temperature controller which modulates the electric heating elements to maintain the security access areas at their design temperatures. Hot water unit heaters operate intermittently to provide supplemental heating for the north air handling equipment room to maintain the area temperature above 50°F.

A humidistat located in the security access area intermittently operates the humidifier to maintain the security office area at a minimum space relative humidity of 35 percent.

The differential pressure drop across each air handling unit filter bank is monitored, and individual alarms are actuated when the pressure drop rises to a predetermined level indicative of the need for filter replacement. To replace the filters of an air handling unit, the unit is stopped and isolated from the duct system by means of isolation dampers. During filter replacement, the second air handling unit operates at full system capacity.

A temperature controller opens the outside air intake and starts and stops the elevator machine room exhaust fan as required to maintain room design temperature conditions. A local thermostat controls the electric unit heater.

Abnormal Plant Operation

In the event of a loss of the plant ac electrical system, the air handling unit supply and return/exhaust fans are connected to the standby power system to provide ventilation cooling to the dc switchgear and inverters. This cooling permits that equipment to perform its defense in depth functions. In this mode of operation, the rooms are cooled utilizing once-through ventilation using outdoor air. When in the once-through ventilation mode, the dc switchgear and inverter areas will be maintained at or below 122°F. Equipment in those areas that operate following a loss of the plant ac electrical system are designed for continuous operation at this temperature. To maintain the areas above freezing, the mixing dampers will modulate to maintain a supply air temperature of 62°F for outdoor temperatures below 62°F. For outdoor temperature above 62°F, the outside air, return air, and exhaust air dampers are positioned for a once-through flow.

Occupied Areas	Temperatures (°F)
Fuel Handling Area Ventilation Subsystem	
Fuel handling area	50-96
Radiation Chemistry Laboratory Ventilation Subsystem	
Radiation chemistry laboratory	73-78
Primary sample room	50-104
Security rooms	73-78

9.4.3.2 System Description

The radiologically controlled area ventilation system consists of the following subsystems:

- Auxiliary/annex building ventilation subsystem
- Fuel handling area ventilation subsystem

The defense in depth portion of the system is shown in Figure 9.4.3-1.

9.4.3.2.1 General Description

9.4.3.2.1.1 Auxiliary/Annex Building Ventilation Subsystem

They are connected to the air intake plenum #3 located in the extreme south end of the annex building. This common intake plenum is described in subsection 9.4.7

STET

The auxiliary/annex building ventilation subsystem serves radiologically controlled equipment, piping and valve rooms and adjacent access and staging areas. See Figure 9.4.3-1, sheet 2 of 3, for a complete listing of rooms and corridors serviced by this subsystem. The auxiliary/annex building ventilation subsystem consists of two 50 percent capacity supply air handling units of about ~~21,000~~ scfm each, a ducted supply and exhaust air system, isolation dampers, diffusers and registers, exhaust fans, automatic controls and accessories. The supply air handling units are located in the south air handling equipment room of the annex building at elevation 158'-0". The units discharge into a ducted supply distribution system which is routed through the radiologically controlled areas of the auxiliary and annex buildings. The supply and exhaust ducts have isolation dampers that close to isolate the auxiliary and annex buildings from the outside environment when high airborne radioactivity is detected in the exhaust air duct. The supply and exhaust ducts are configured so that two building zones may be independently isolated. The annex building staging and storage area, containment purge exhaust filter rooms, containment access corridor, and adjacent auxiliary building staging, equipment areas, and security rooms are aligned to one zone. The other zone includes the radiation chemistry laboratory, primary sample room, spent fuel pool cooling water pump and heat exchanger rooms, normal residual heat removal pump and heat exchanger rooms, CVS makeup pump room, lower annulus, ~~middle annulus~~ and various radwaste equipment rooms, pipe chases, and access corridors. A radiation monitor is located in the exhaust air duct from each zone.

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two 50% capacity

The exhaust air fans are located in the upper radiologically controlled area ventilation system equipment room at elevation 145'-9" of the auxiliary building. The exhaust air ductwork is routed to minimize the spread of airborne contamination by directing the supply airflow from the low radiation access areas into the radioactive equipment and piping rooms with a greater potential for airborne radioactivity. Additionally, the exhaust air ductwork is connected to the radioactive waste drain system (WRS) sump to maintain the sump atmosphere at a negative air pressure to prevent the exfiltration of potentially contaminated air into the surrounding area. The exhaust air ductwork is connected to the radwaste effluent holdup tanks to prevent the potential buildup of airborne radioactivity or hydrogen gas within these tanks. The exhaust fans discharge the exhaust air into the plant vent for monitoring of offsite airborne radiological releases.

The ventilation airflow dilutes potential airborne contamination to maintain the concentration at the site boundary within 10 CFR 20 (Reference 21) allowable effluent concentration limits and the internal room airborne concentrations within 10 CFR 20 occupational derived air concentration (DAC) limits during normal plant operation.

Unit coolers are located in the normal residual heat removal system (RNS) and chemical and volume control system (CVS) pump rooms because they have significant cooling loads on an intermittent basis when large equipment is operating. Each unit cooler is sized to accommodate 100 percent of its corresponding pump cooling load. The unit coolers are provided with chilled water from redundant trains of the central chilled water system (VWS) low capacity subsystem. The normal residual heat removal pump room unit coolers have two cooling coils per unit cooler so that chilled water supplied by either train A or train B alone can support concurrent operation of both normal residual heat removal system pumps. The two chemical and volume control makeup pump room unit coolers are connected to redundant trains of the chilled water system; however, operation of either the train A or train B unit cooler alone maintains the common makeup pump room temperature conditions and supports operation of either makeup pump.

Heating coils are located in the supply air ducts serving plant areas that require supplemental heating during periods of cold outside air temperature conditions. The radiation chemistry laboratory and security room supply air ducts are provided with local electric coils and humidifiers to maintain the environmental conditions within the areas suitable for personnel comfort. Electric unit heaters provide supplemental heating in the middle annulus.

The upper annulus is separated from the middle annulus area of the auxiliary building by a concrete floor section and flexible seals that connects the containment steel shell to the shield building. The annulus seal provides a passive barrier during normal plant operation or when the auxiliary building is isolated, preventing the exfiltration of unmonitored releases from the middle annulus to the environment.

9.4.3.2.1.2 Fuel Handling Area Ventilation Subsystem

The fuel handling area ventilation subsystem serves the fuel handling area, rail car bay/filter storage area, resin transfer pump/valve room, spent resin tank room, waste disposal container

area, and WSS valve/piping area. The fuel handling area ventilation subsystem consists of two 50 percent capacity supply air handing units of about 9,500 scfm each, a ducted supply and exhaust air system, isolation dampers, diffusers, registers, exhaust fans, automatic controls and accessories. The ventilation airflow capacity is designed to maintain environmental conditions that support worker efficiency during fuel handling operations based on a maximum wetbulb globe temperature of 80°F (96°F drybulb) as defined by EPRI NP-4453 (Reference 22). The supply air handling units are located in the south air handling equipment room of the annex building at elevation 135'-3". The units discharge into a ducted supply distribution system which is routed to the fuel handling and rail car bay/filter storage areas of the auxiliary building. The supply and exhaust ducts are provided with isolation dampers that close when high airborne radioactivity in the exhaust air or high pressure differential with respect to the outside atmosphere is detected.

The exhaust air fans are located in the upper radiologically controlled area ventilation system equipment room at elevation 145'-9" of the auxiliary building. The supply and exhaust ductwork is arranged to exhaust the spent fuel pool plume and to provide directional airflow from the rail car bay/filter storage area into the spent resin equipment rooms. The exhaust fans discharge the normally unfiltered exhaust air into the plant vent for monitoring of offsite airborne gaseous and other radiological releases.

The ventilation airflow dilutes potential airborne contamination to maintain the concentration at the site boundary within 10 CFR 20 (Reference 21) allowable effluent concentration limits and the internal room airborne concentrations within 10 CFR 20 occupational derived air concentration (DAC) limits during normal plant operation.

9.4.3.2.2 Component Description

The radiologically controlled area ventilation system is comprised of the following major components. These components are located in buildings on the Seismic Category I Nuclear Island and the Seismic Category II portion of the annex building. The seismic design classification, safety classification and principal construction code for Class A, B, C, or D components are listed in Section 3.2. Table 9.4.3-1 provides design parameters for major defense in depth components in the system.

Supply Air Handling Units

Each supply air handling unit consists of a low efficiency filter bank, a high efficiency filter bank, a hot water heating coil bank, a chilled water cooling coil bank, and a supply fan.

high airborne radioactivity or high pressure differential. Refer to subsection 9.4.3 for a description of the radiologically controlled area ventilation system.

9.4.7.2 System Description

The containment air filtration system is shown in Figure 9.4.7-1.

9.4.7.2.1 General Description

The containment air filtration system consists of two 100 percent capacity supply air handling units, a ducted supply and exhaust air system with containment isolation valves and piping, registers, exhaust fans, filtration units, automatic controls and accessories. The supply air handling units are located in the south air handling equipment room of the annex building at elevation 158′-0″. The supply air handling units are connected to a common air intake plenum, located at the south end of the fan room. The common air intake plenum is located at the extreme south end of the annex building between elevation ~~135′-0″~~ and ~~152′-0″~~. This plenum supplies air for the radiologically control area ventilation system, the containment air filtration system, ~~the nuclear island non-radioactive ventilation system, the annex/auxiliary building non-radioactive HVAC system and the health physics and hot machine shop HVAC system~~. The intake is not protected from tornado missiles. The containment air filtration system supply air handling units discharge the supply air towards the east containment recirculation cooling system (VCS) recirculation unit to distribute the purge air within the containment. Refer to subsection 9.4.6 for a description of the containment recirculation cooling system.

The exhaust air filtration units are located within the radiologically controlled area of the annex building at elevation 135′-3″ and 146′-3″. The filtration units are connected to a ducted system with isolation dampers to provide HEPA filtration and charcoal adsorption of exhaust air from the containment, fuel handling area, auxiliary and annex buildings. A gaseous radiation monitor is located downstream of the exhaust air filtration units in the common ductwork to provide an alarm if abnormal gaseous releases are detected. The plant vent exhaust flow is monitored for gaseous, particulate and iodine releases to the environment. During containment purge, the exhaust air filtration units satisfy 10 CFR 50 Appendix I guidelines (Reference 20) for offsite releases and meets 10 CFR 20 (Reference 21) allowable effluent concentration limits when combined with gaseous releases from other sources. During conditions of abnormal airborne radioactivity in the fuel handling area, auxiliary and/or annex buildings, the filtration units provide filtered exhaust to minimize unfiltered offsite releases.

The size of the containment air filtration system supply and exhaust air lines that penetrate the containment pressure boundary is 36 inches in diameter. Each penetration includes an inboard and outboard branch connection with 16 inch diameter containment isolation valves that are opened when the containment air filtration system is connected to the containment. The ends of the 36 inch containment penetrations are capped for possible future addition of a high volume purge system. In the event of a loss-of-coolant accident (LOCA) while the

The containment air filtration system is not required to mitigate the consequences of a design basis fuel handling accident or a loss of coolant accident. If the exhaust air filtration units are operational and ac power is available, they may be used to support post-event recovery operations. The plant vent high range radiation detectors monitor effuents discharged into the plant vent.

If smoke is detected in the common supply air duct, an alarm is initiated. The system remains in operation unless plant operators determine that there is a need to manually shut down the supply air handling units. Fire dampers are provided for HVAC ductwork that passes through a fire barrier in order to isolate each fire zone in the event of a fire.

9.4.7.3 Safety Evaluation

The containment air filtration system has no safety-related function, other than containment isolation, and therefore requires no nuclear safety evaluation. The containment isolation function is evaluated in subsection 6.2.3.

The failure of equipment and ductwork will not reduce the functioning of safety-related systems, structures or components that are required to close to maintain containment isolation integrity after a design basis accident. Ductwork that is located inside containment whose failure may affect any safety-related equipment is designed to seismic Category II requirements.

9.4.7.4 Tests and Inspections

The radiologically controlled area ventilation system is designed to permit periodic inspection of system components. Each component is inspected prior to installation. Components of each system are accessible for periodic inspection during normal plant operation. The exhaust subsystem is balanced to provide airflow in accordance with the guidelines of ASME N510 (Reference 3). The supply air subsystem airflow rate is measured and balanced in accordance with the guidelines of SMACNA HVAC Systems - Testing, Adjusting and Balancing (Reference 19). Instruments are calibrated during testing. Automatic controls are tested for actuation at the proper setpoints. Alarm functions are checked for operability.

The tests and inspections of the containment isolation valves associated with the containment air filtration system are discussed in subsections 6.2.3 and 6.2.5.

HEPA filters and charcoal adsorbers are ~~field~~ tested in place in accordance with ASME N510 to verify that these components do not exceed a maximum allowable bypass leakage. Samples of charcoal adsorbent are periodically tested to verify a minimum charcoal efficiency of 90 percent in accordance with Regulatory Guide 1.140 except that test procedures and test frequency are conducted in accordance with ASME N510.

The exhaust ductwork and filter plenums are ~~field~~ tested in place for leak tightness in accordance with ASME N510, Section 6.

9.4.11.1.2 Power Generation Design Basis

The health physics and hot machine shop HVAC system provides the following functions:

- Provides conditioned air to work areas to maintain acceptable temperatures for equipment and personnel working in the areas
- Provides air movement from clean to potentially contaminated areas to minimize the spread of airborne contaminants
- Collects the vented discharges from potentially contaminated equipment in the area
- Provides for exhaust from welding booths, grinders and other miscellaneous equipment located in the hot machine shop
- Provides for radiation monitoring of exhaust air prior to release to the environment
- Maintains the access control area and hot machine shop at a slight negative pressure with respect to outdoors and the clean areas of the annex building to prevent unmonitored releases of radioactive contaminants
- Provides humidification to maintain a minimum of 35 percent relative humidity

The system maintains the following temperatures based on maximum and minimum normal outside air temperature conditions shown in Chapter 2, Table 2-1:

Room or Area	Temperatures (°F)
Health physics area	73-78
Hot machine shop	65-85

9.4.11.2 System Description

9.4.11.2.1 General Description

The health physics and hot machine shop HVAC system is a once-through ventilation system consisting of two integrated subsystems: a supply air system and an exhaust air system. The systems operate in conjunction with each other to satisfy the functional requirements of maintaining temperatures in the areas served while controlling air flow paths and area negative pressure.

The supply air system consists of two 100 percent capacity air handling units of about 14,000 scfm each with a ducted air distribution system and automatic controls. The air handling units are located in the lower south air handling equipment room on elevation 135'-3" of the annex building. The units draw 100 percent outdoor air through a louvered outdoor air intake plenum and discharge into a duct distribution system which is routed to the health physics and

[handwritten annotations: "- the common," ; "#2 as described in subsection 9.4.2. They"]

Temperature is indicated for each air handling unit supply air discharge duct.

Operational status of fans is indicated in the main control room. The fans and air handling units can be placed into operation or shutdown from the main control room.

Differential pressure indication is provided for each of the filters in the air handling units and an alarm for high pressure drop is provided for each air handling unit.

Airflow is indicated for the air handling unit and exhaust fan discharge ducts. Alarms are provided for low air flow rates in the fan discharge ducts.

An alarm is provided for high radiation in the main exhaust duct to the vent stack.

An alarm is provided for smoke in the common discharge duct from the supply air handling units.

Position indicating lights are provided for automatic dampers.

9.4.12 Combined License Information

The Combined License applicants referencing the AP600 Certified design will implement a program to maintain compliance with ASME N509 (Reference 2), ASME N510 (Reference 3) and Regulatory Guide 1.140 for portions of the nuclear island nonradioactive ventilation system and containment air filtration system identified in subsections 9.4.1 and 9.4.7.

~~This section has no requirement for information to be provided in support of the Combined License application.~~

9.4.13 References

1. "Functional Criteria For Emergency Response Facilities," USNRC NUREG 0696.

2. "Nuclear Power Plant Air-Cleaning Units and Components," ASME N509-1989.

3. "Testing of Nuclear Air-Cleaning Systems," ASME N510-1989.

4. "Laboratory Method of Testing Fans for Rating Purposes," ANSI/AMCA 210-85.

5. "Certified Ratings Program Air Performance," ANSI/AMCA 211-85.

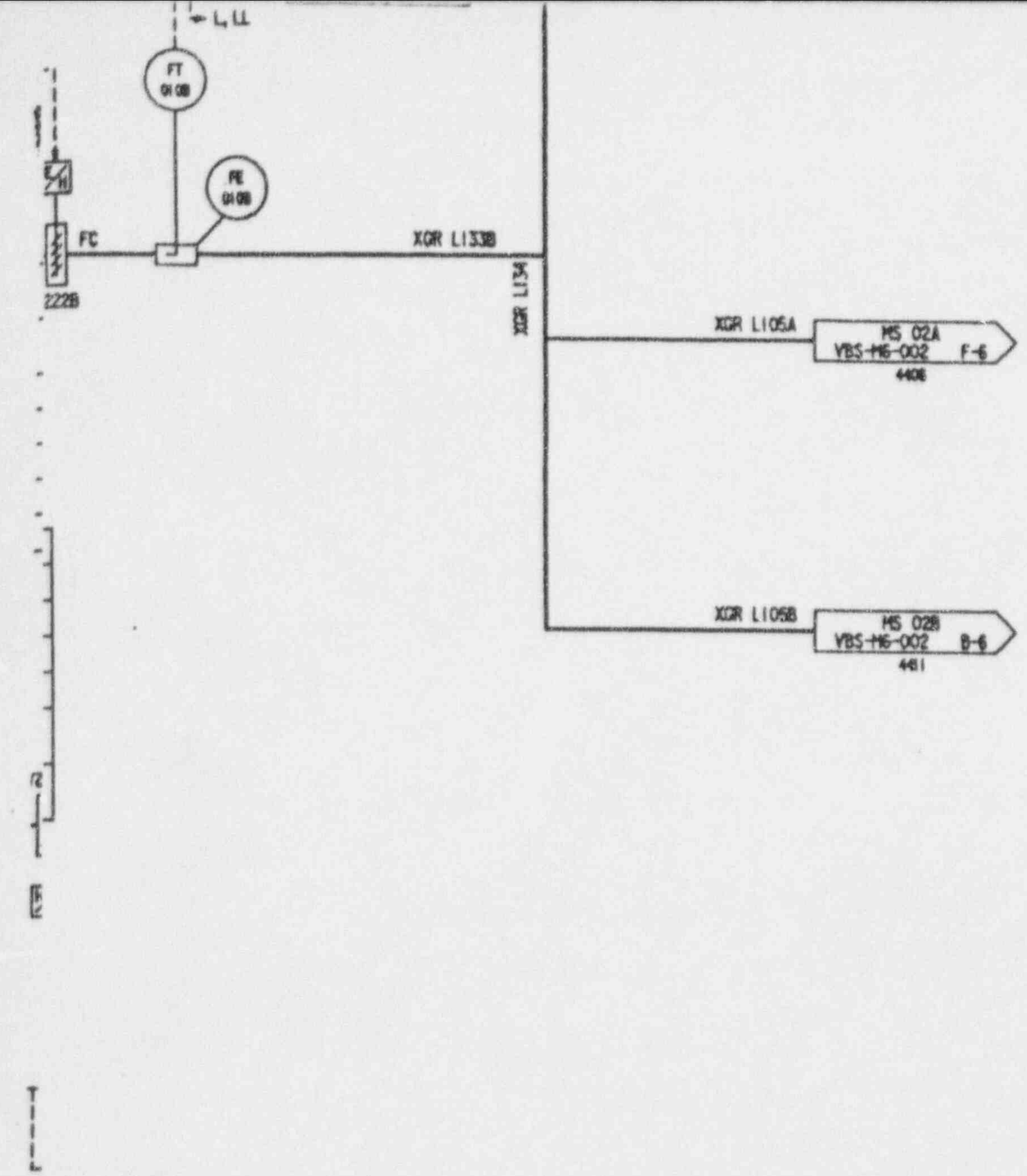
6. "Reverberant Room Method of Testing Fans For Rating Purposes," ANSI/AMCA 300-85.

7. "Methods of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter," ASHRAE 52-76.

8. "Test Performance of Air-Filter Units," UL-900, 1986.

9. "High-Efficiency, Particular, Air-Filter Units," UL-586, 1985.

10. "Electric Central Air Heating Equipment," UL-1096, 1986.

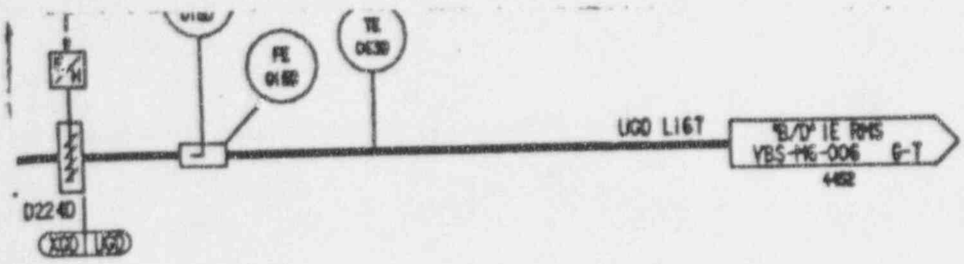


Inside Auxiliary Building

Figure 9.4.1-1 (Sheet 1 of 7)

Nuclear Island Non-Radioactive Ventilation System Piping and Instrumentation Diagram

(REF) VBS 001



Inside Auxiliary Building

Figure 9.4.1-1 (Sheet 4 of 7)

Nuclear Island Non-Radioactive Ventilation System Piping and Instrumentation Diagram

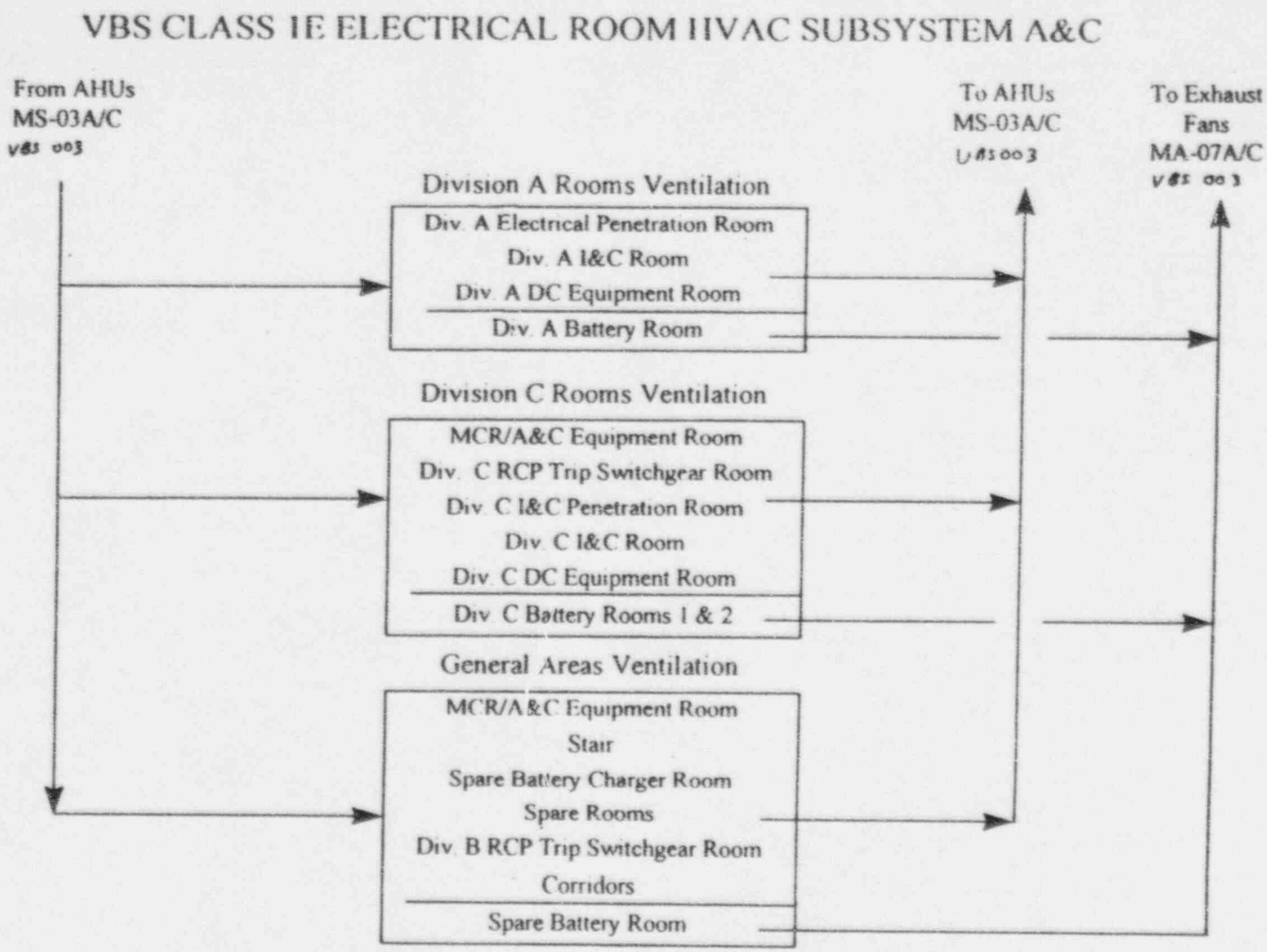


Figure 9.4.1-1 (Sheet 6 of 7)
Nuclear Island Non-Radioactive Ventilation System
Piping and Instrumentation Diagram
(REF) VBS 005

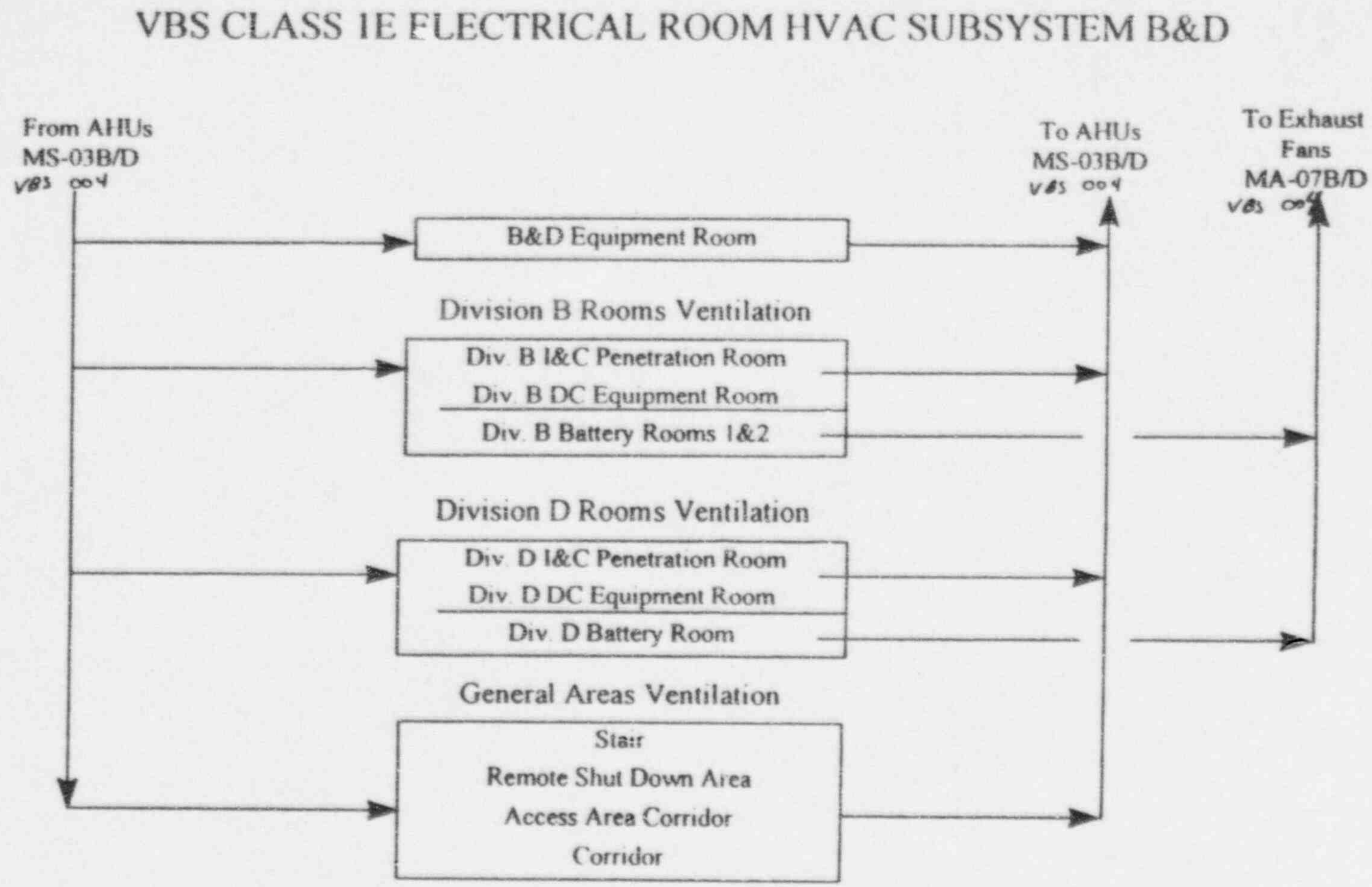
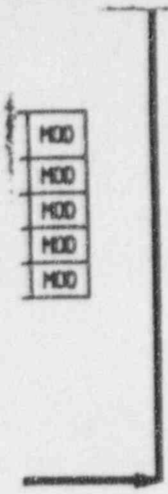


Figure 9.4.1-1 (Sheet 7 of 7)

Nuclear Island Non-Radioactive Ventilation System
Piping and Instrumentation Diagram

(REF) VBS 006



REFERENCES

A. AP600 COMPONENT NUMBERING PROCEDURE GW GMP 006.

B. PIPING AND INSTRUMENTATION DIAGRAM LEGEND DRAWING GW M6 001, 002 AND 003.

Inside Annex Building

Figure 9.4.2-1 (Sheet 1 of 5)

Annex/Aux Non-Radioactive Ventilation System
Piping and Instrumentation Diagram

(REF) VXS 003

REFERENCES

A. AP600 COMPONENT NUMBERING PROCEDURE GW GMP 006.

B. PIPING AND INSTRUMENTATION DIAGRAM LEGEND DRAWING GW M6 001, 002 AND 003.

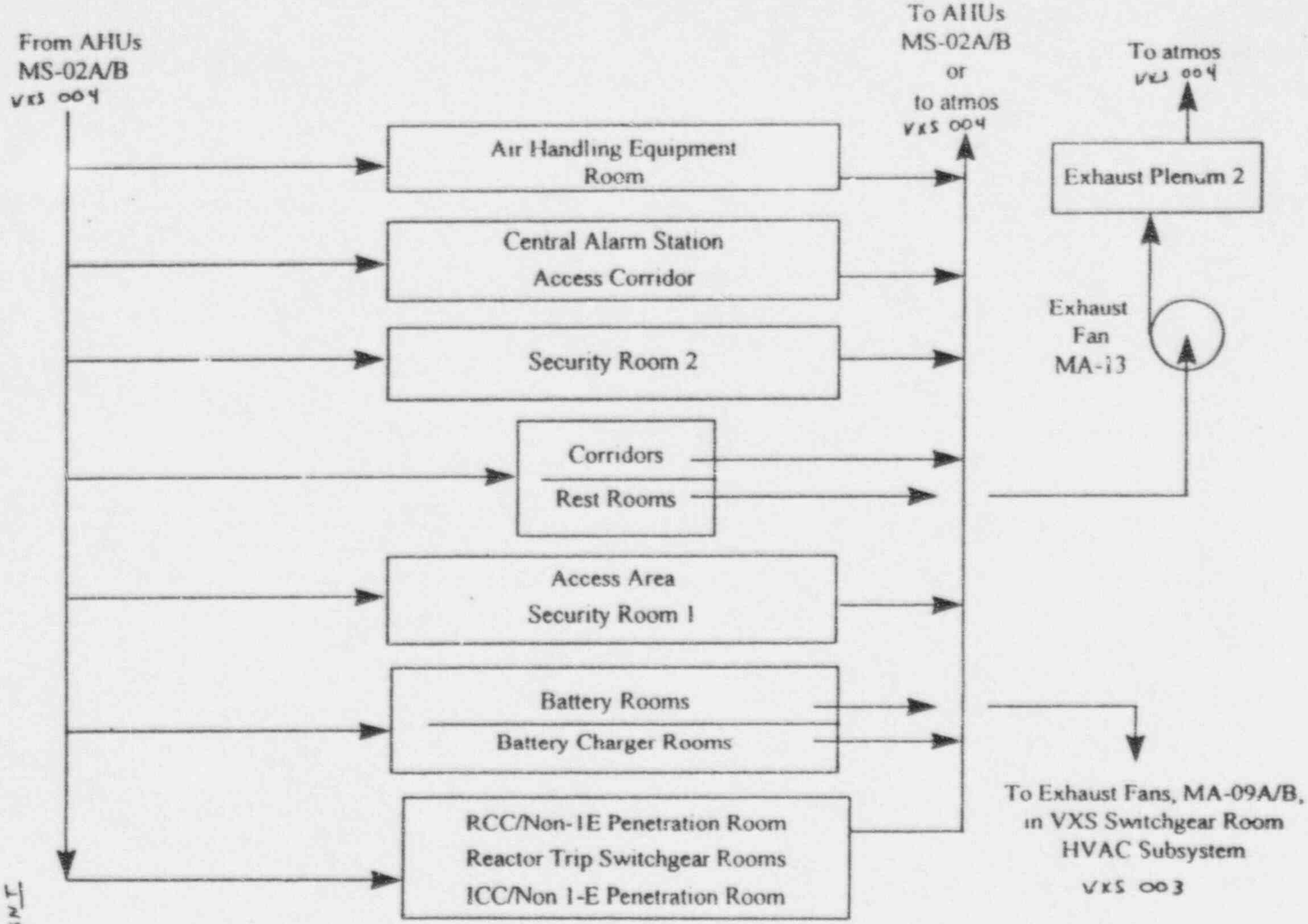
Inside Annex Building

Figure 9.4.2-1 (Sheet 2 of 5)

Annex/Aux Non-Radioactive Ventilation System Piping and Instrumentation Diagram

(REF) VXS 004

VXS EQUIPMENT ROOM HVAC SUBSYSTEM



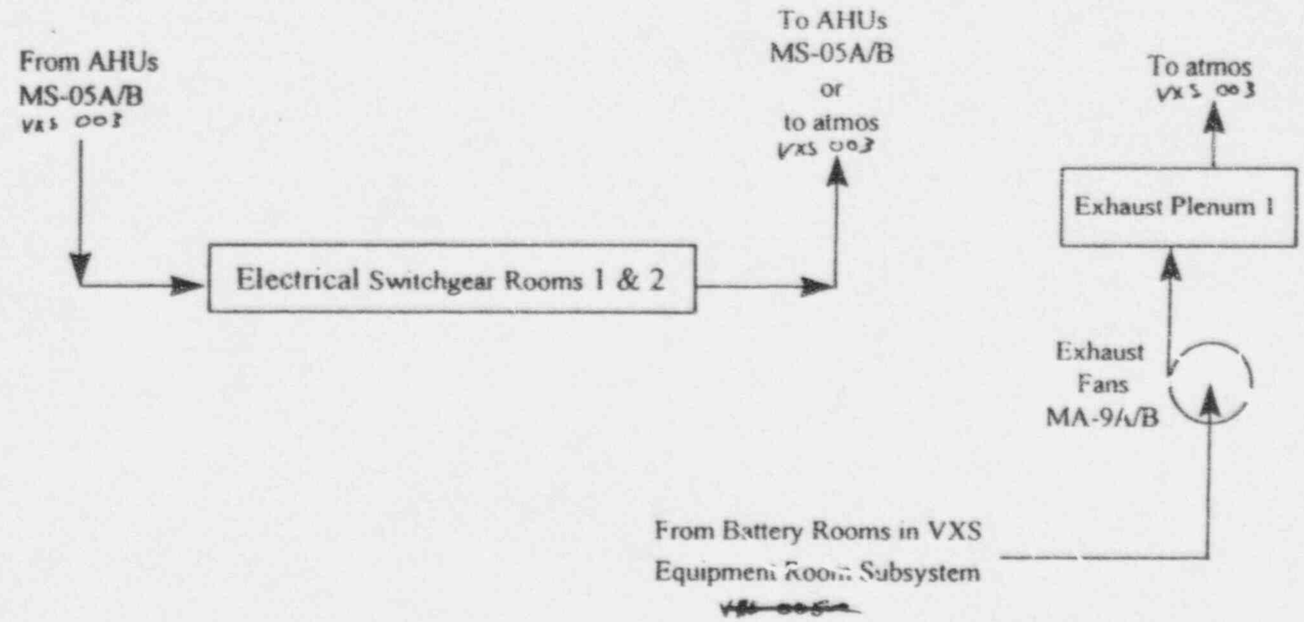
INSIDE Annex Building

Figure 9.4.2-1 (Sheet 3 of 5)

Annex/Aux Non-Radioactive Ventilation System
Piping and Instrumentation Diagram

(REF) VXS 005 & 006

VXS SWITCHGEAR ROOM HVAC SUBSYSTEM

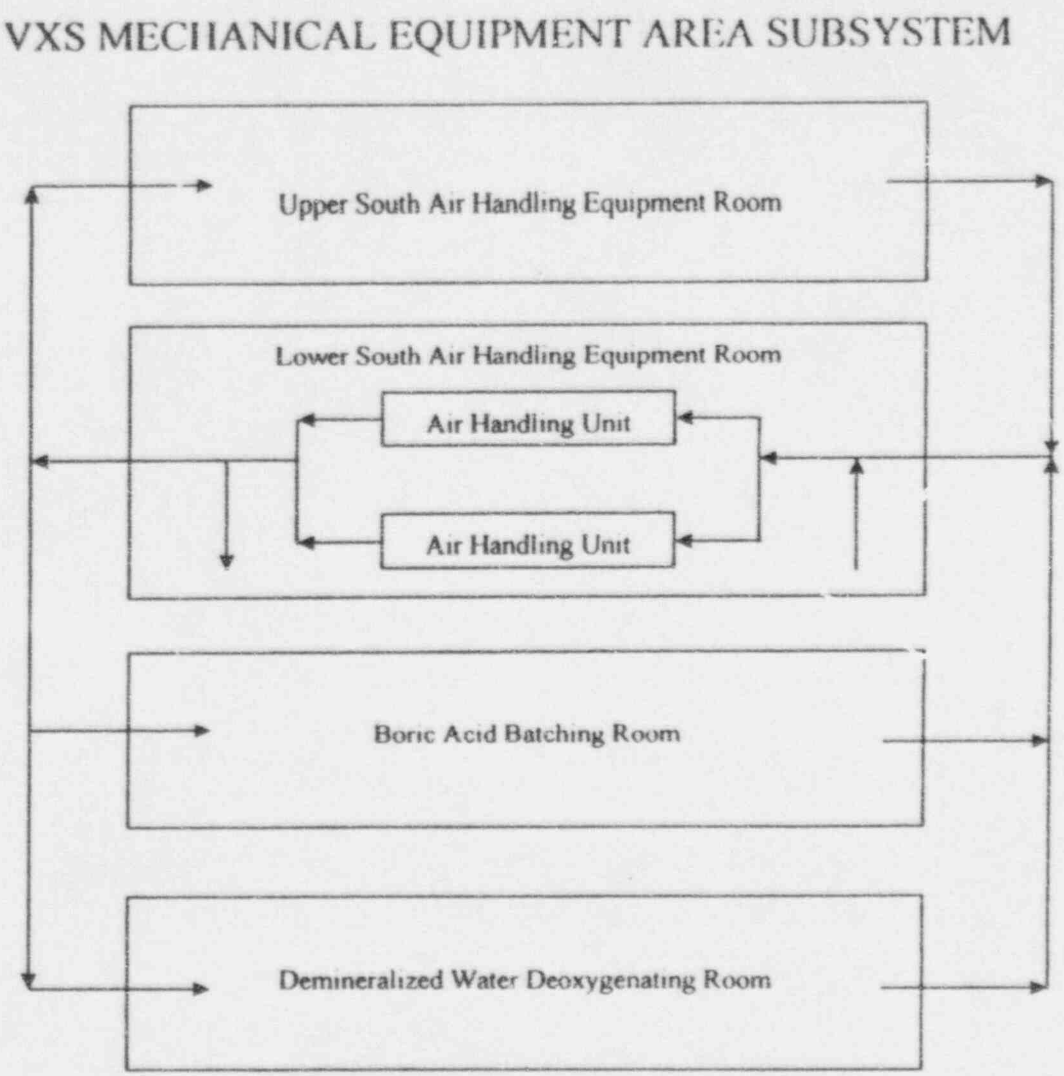


Inside Annex Building

Figure 9.4.2-1 (Sheet 4 of 5)

Annex/Aux Non-Radioactive Ventilation System
Piping and Instrumentation Diagram

(REF) VXS 005



Inside Annex Building

Figure 9.4.2-1 (Sheet 5 of 5)

Annex/Aux Non-Radioactive Ventilation System Piping and Instrumentation Diagram

(REF) VXS 010

Inside Auxiliary Building

Figure 9.4.3-1 (Sheet 1 of 3)

Radiologically Controlled Area Ventilation System
Piping and Instrumentation Diagram

(REF) VAS 008

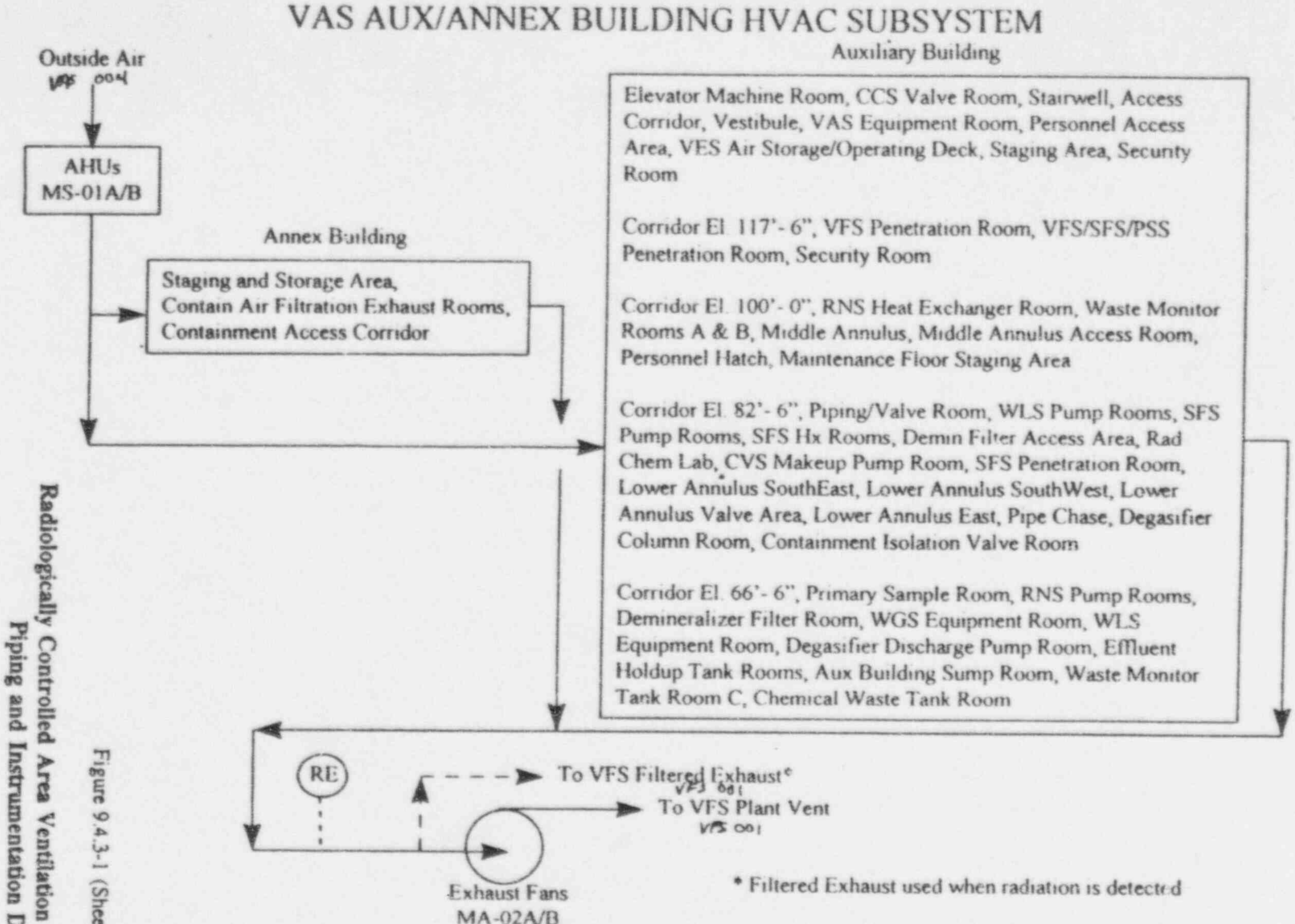


Figure 9.4.3-1 (Sheet 2 of 3)
Radiologically Controlled Area Ventilation System
Piping and Instrumentation Diagram

(REF) VAS 005

VAS FUEL HANDLING AREA HVAC SUBSYSTEM

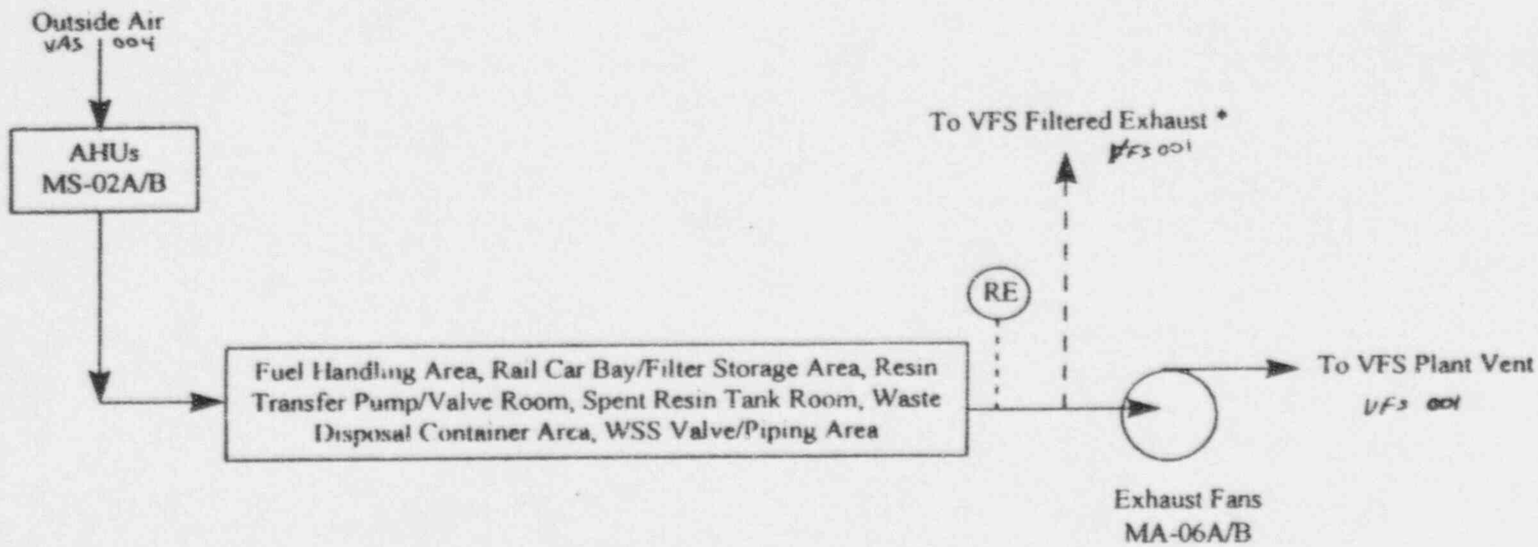
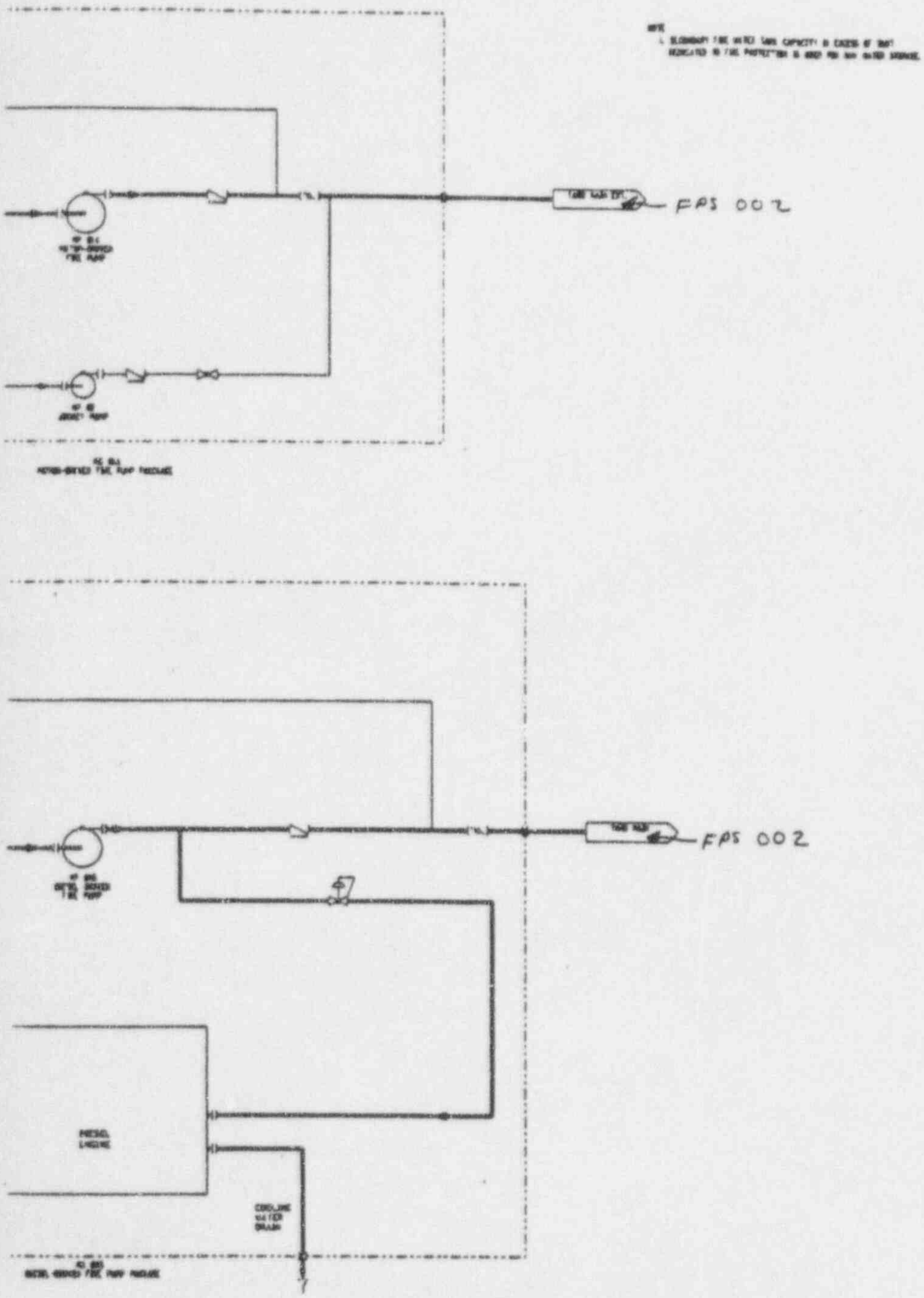


Figure 9.4.3-1 (Sheet 3 of 3)

Radiologically Controlled Area Ventilation System
Piping and Instrumentation Diagram

(REF) VAS 005

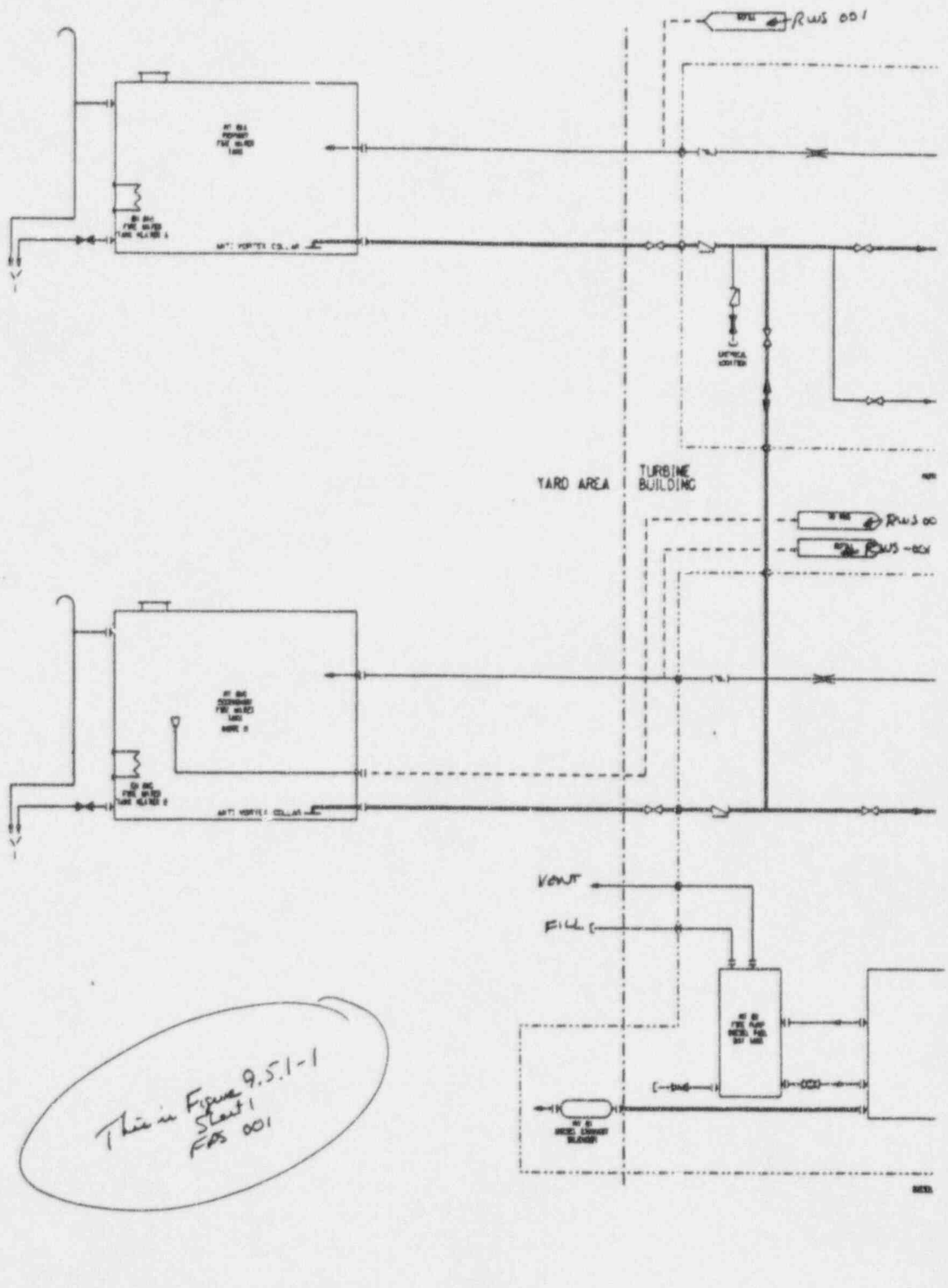


~~(REF FPS-001)~~

Figure 9.5.1-1 (Sheet 1 of 3)

Fire Protection System
Piping and Instrumentation Diagram

(REF) FPS 001


RWS 001
YARD AREA
TURBINE BUILDING
VENT
FILL
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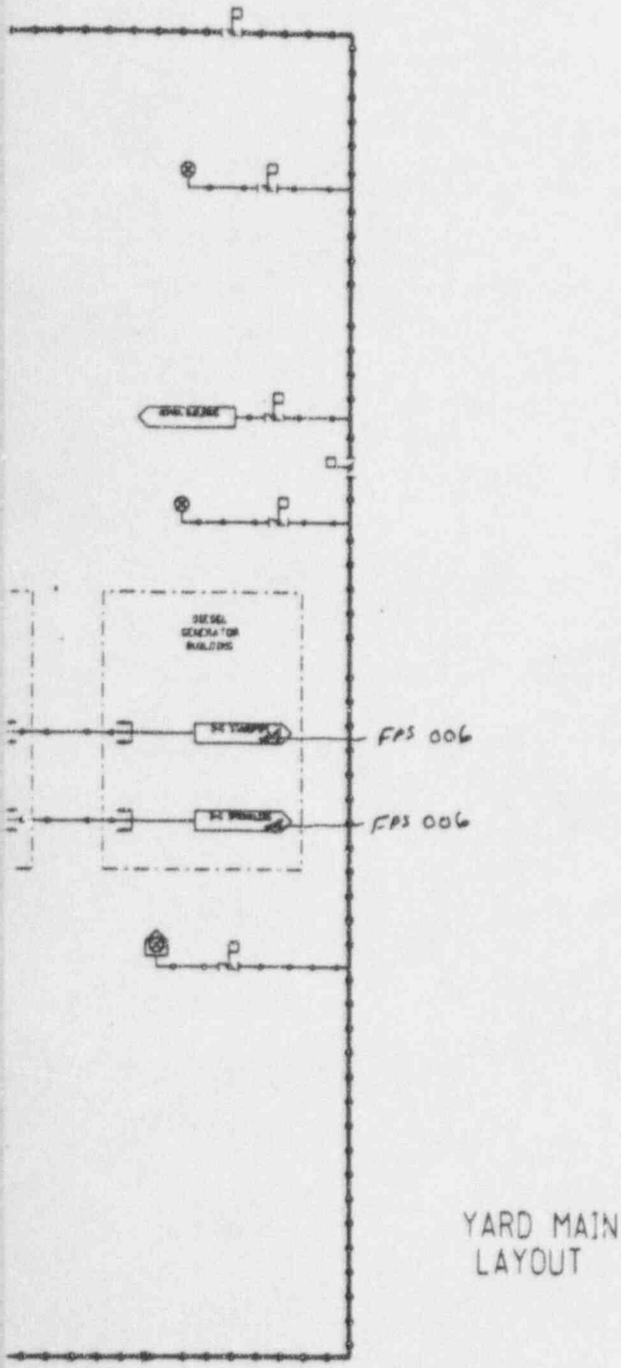
Sheet 1
FPS 001

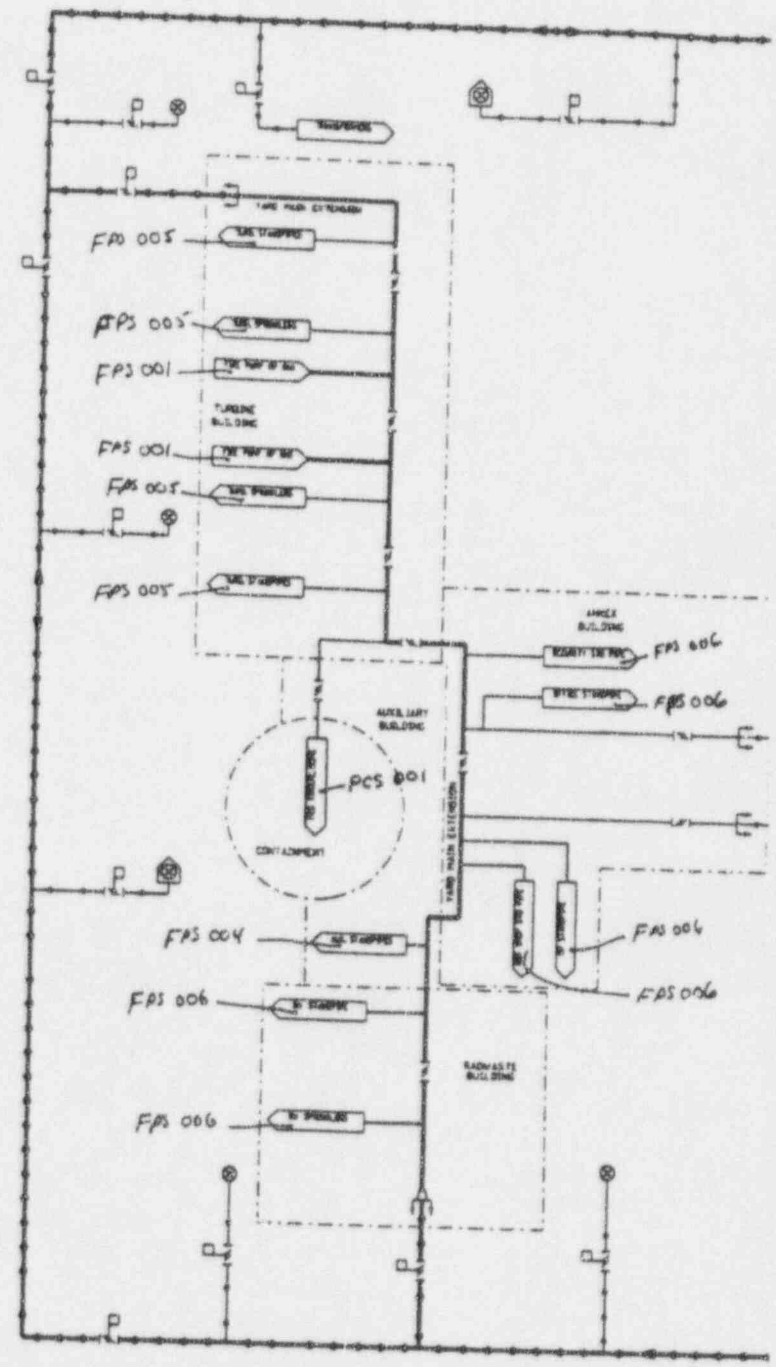


~~(REF FPS-002)~~

Figure 9.5.1-1 (Sheet 2 of 3)

Fire Protection System
Piping and Instrumentation Diagram

(REF) FPS 002



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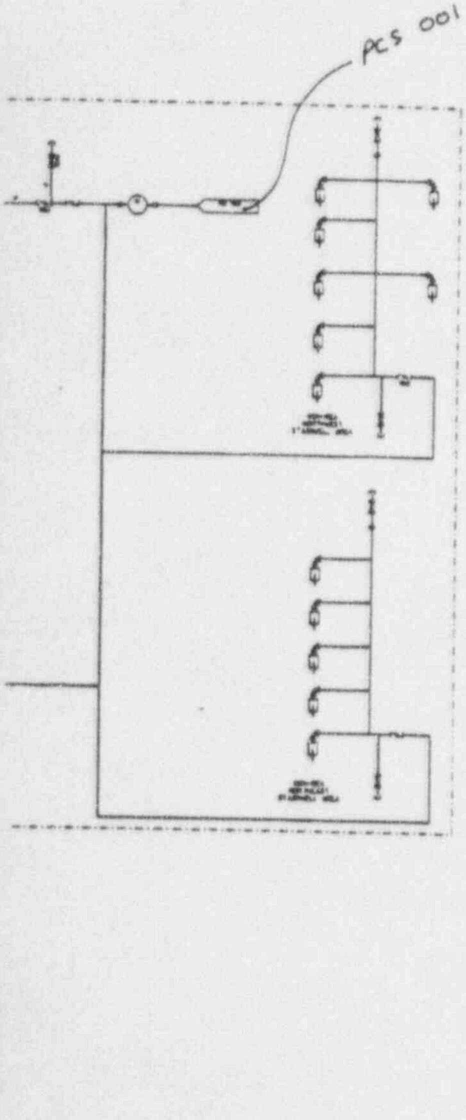
Sheet 2
FPS 002



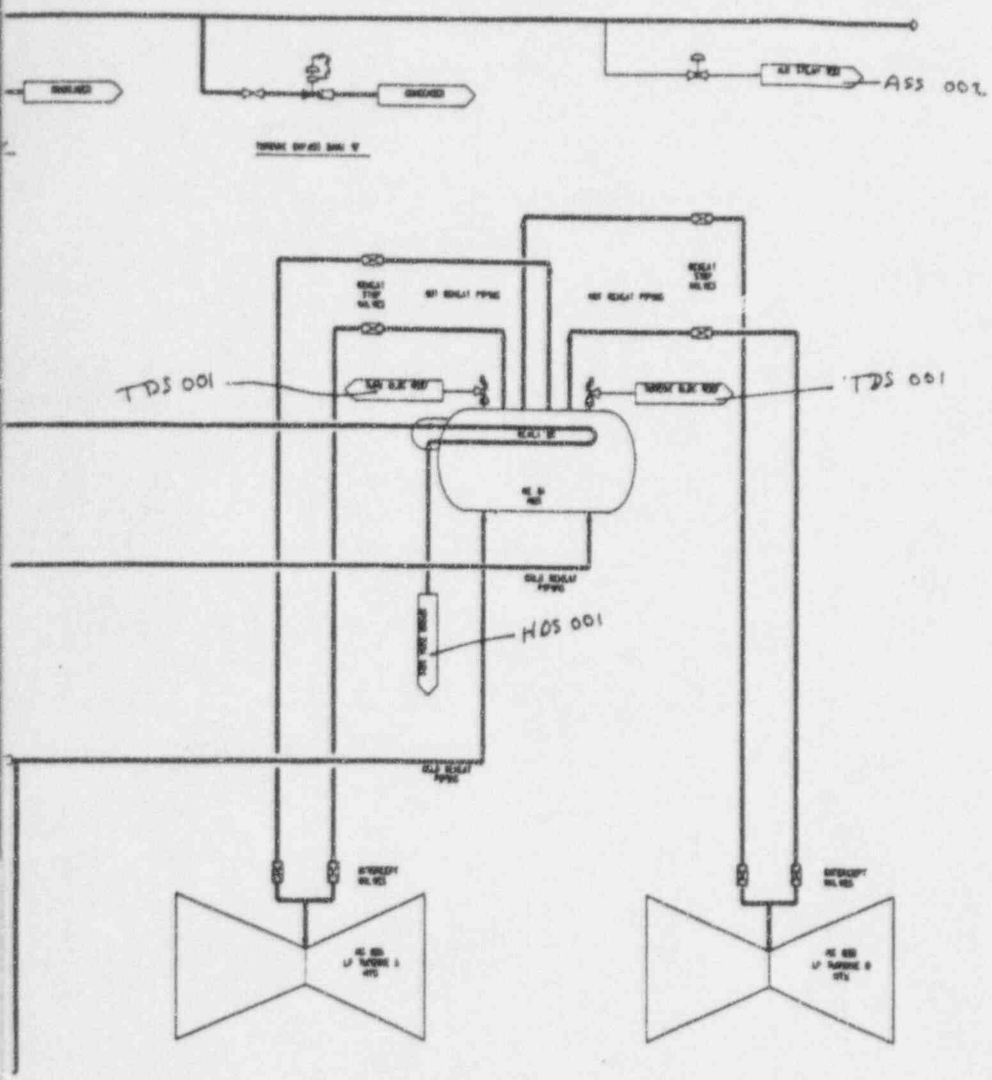
NOTE:

FIRE HOSE STATIONS ARE PROVIDED AT VARIOUS ELEVATIONS AND AREAS TO PROTECT SAFE SHUTDOWN EQUIPMENT

~~(REF FPS-003)~~

Figure 9.5.1-1 (Sheet 3 of 3)

Fire Protection System
Piping and Instrumentation Diagram
(REF) FPS 004

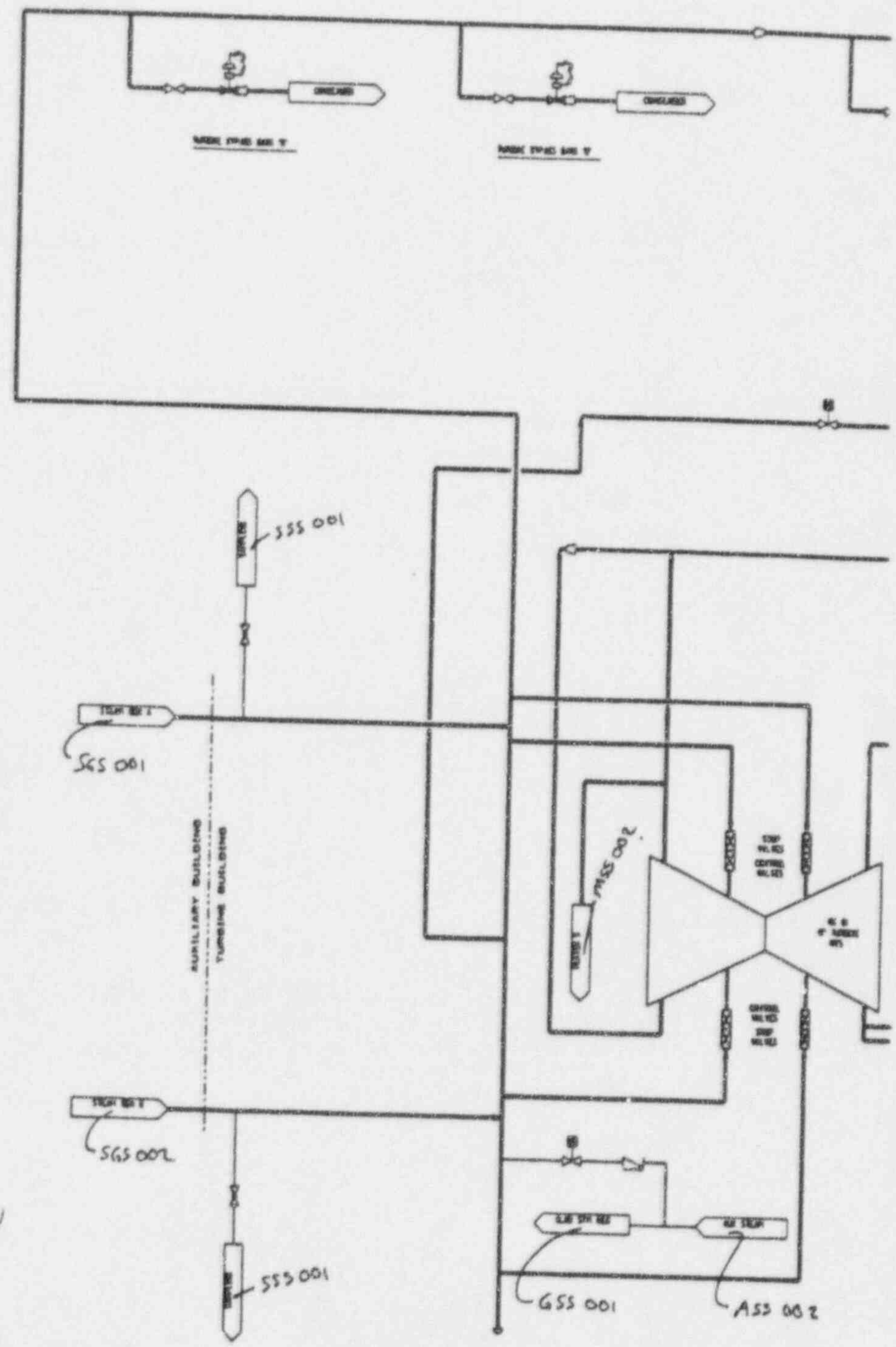


Inside Turbine Building

~~(REF MSS 001)~~

Figure 10.3.2-2

Main Steam System Diagram
(REF) MSS 001



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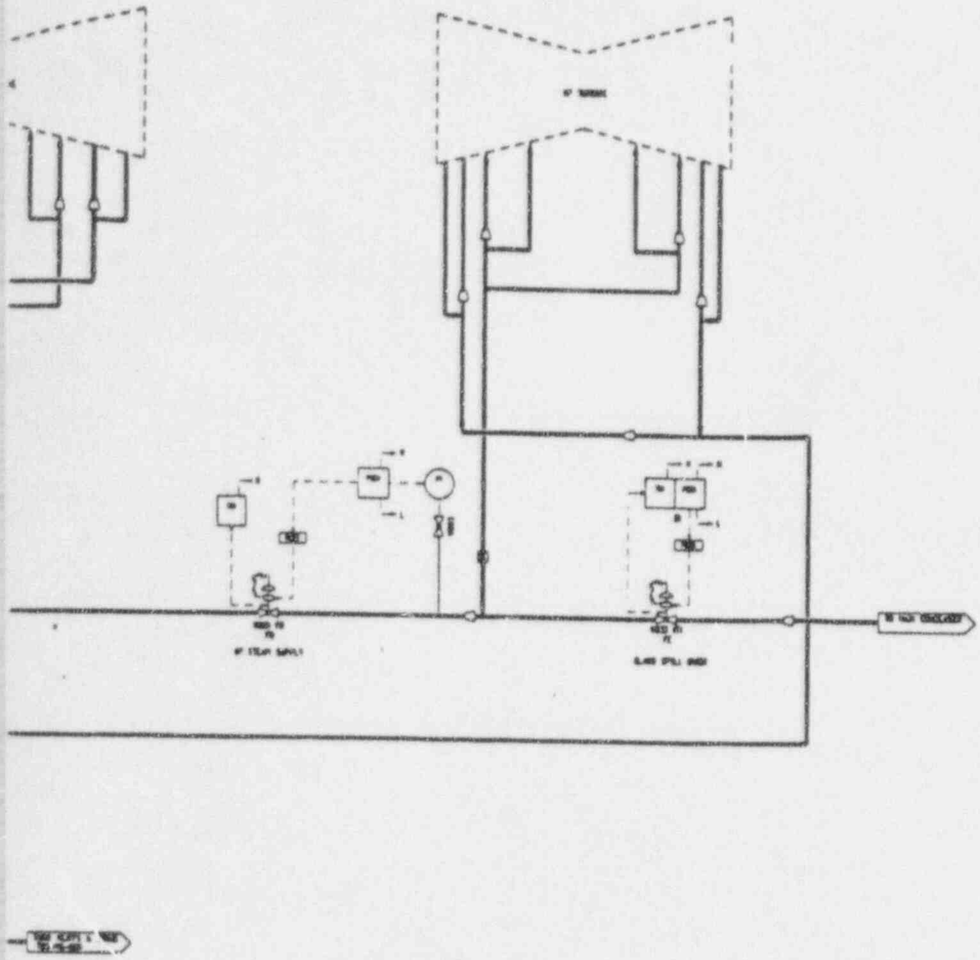
MSS 001

Westinghouse

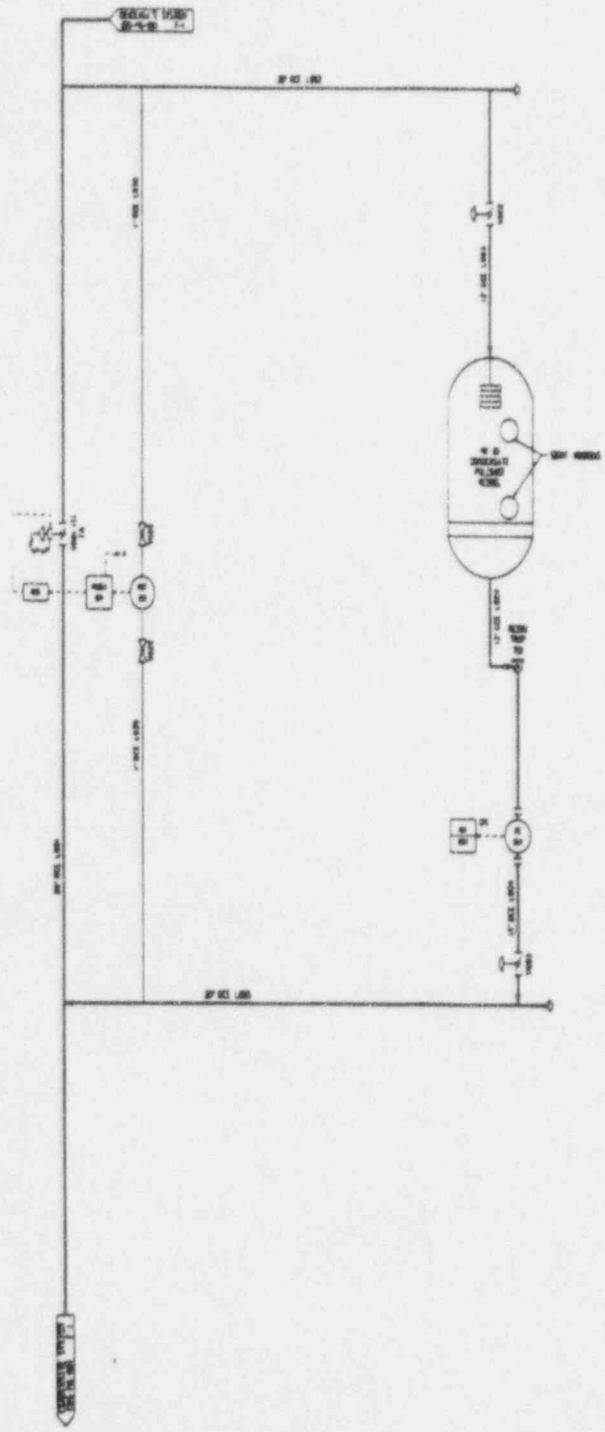


Inside Turbine Building

~~(REF GSS-001)~~

Figure 10.4.3-1

Gland Seal System
Piping and Instrumentation Diagram
(REF) GSS 001



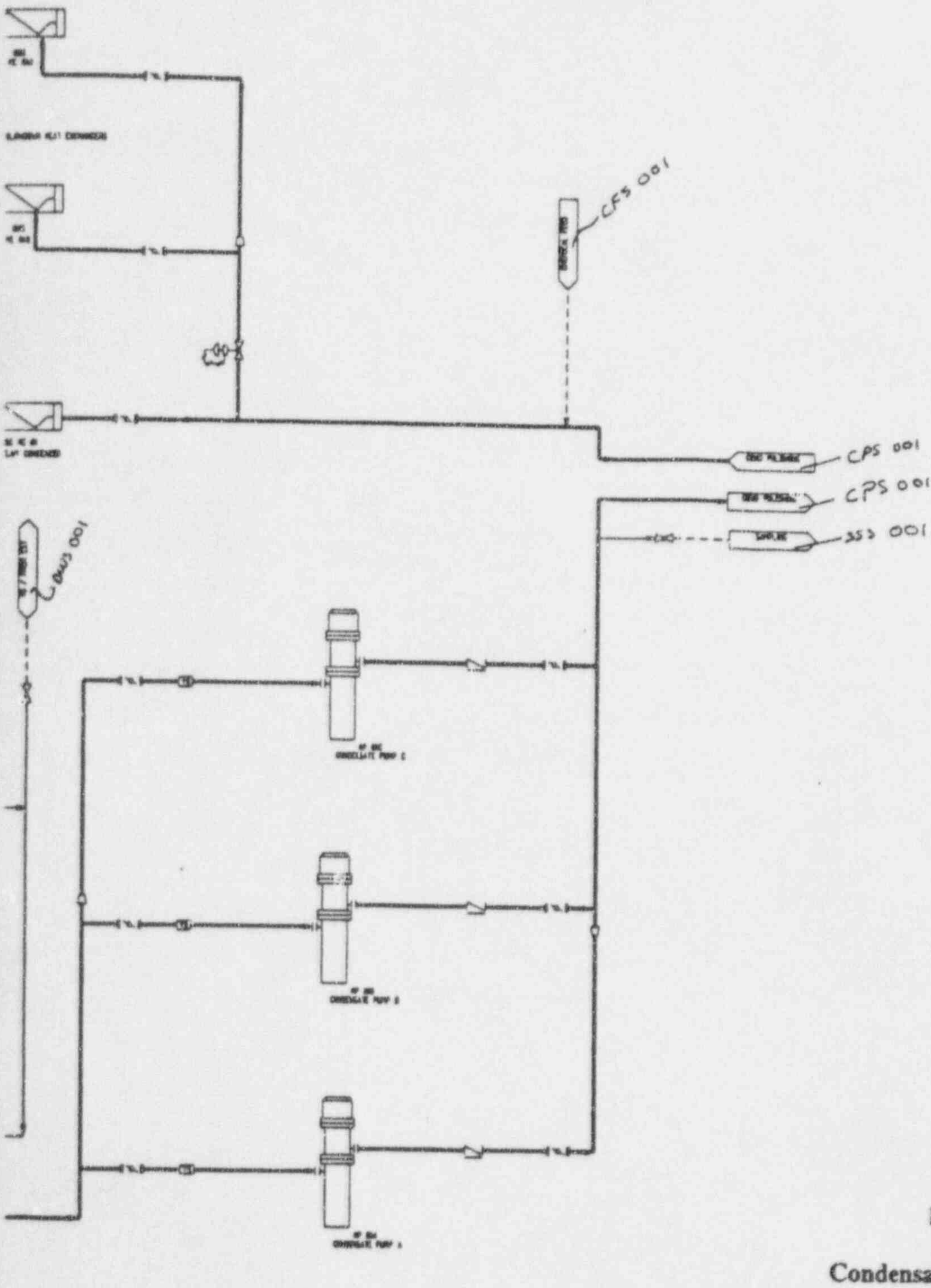
Inside Turbine Building

~~(REF CPS-001)~~

Figure 10.4.6-1

Condensate Polishing System
Piping and Instrumentation Diagram

(Ref) CPS 001



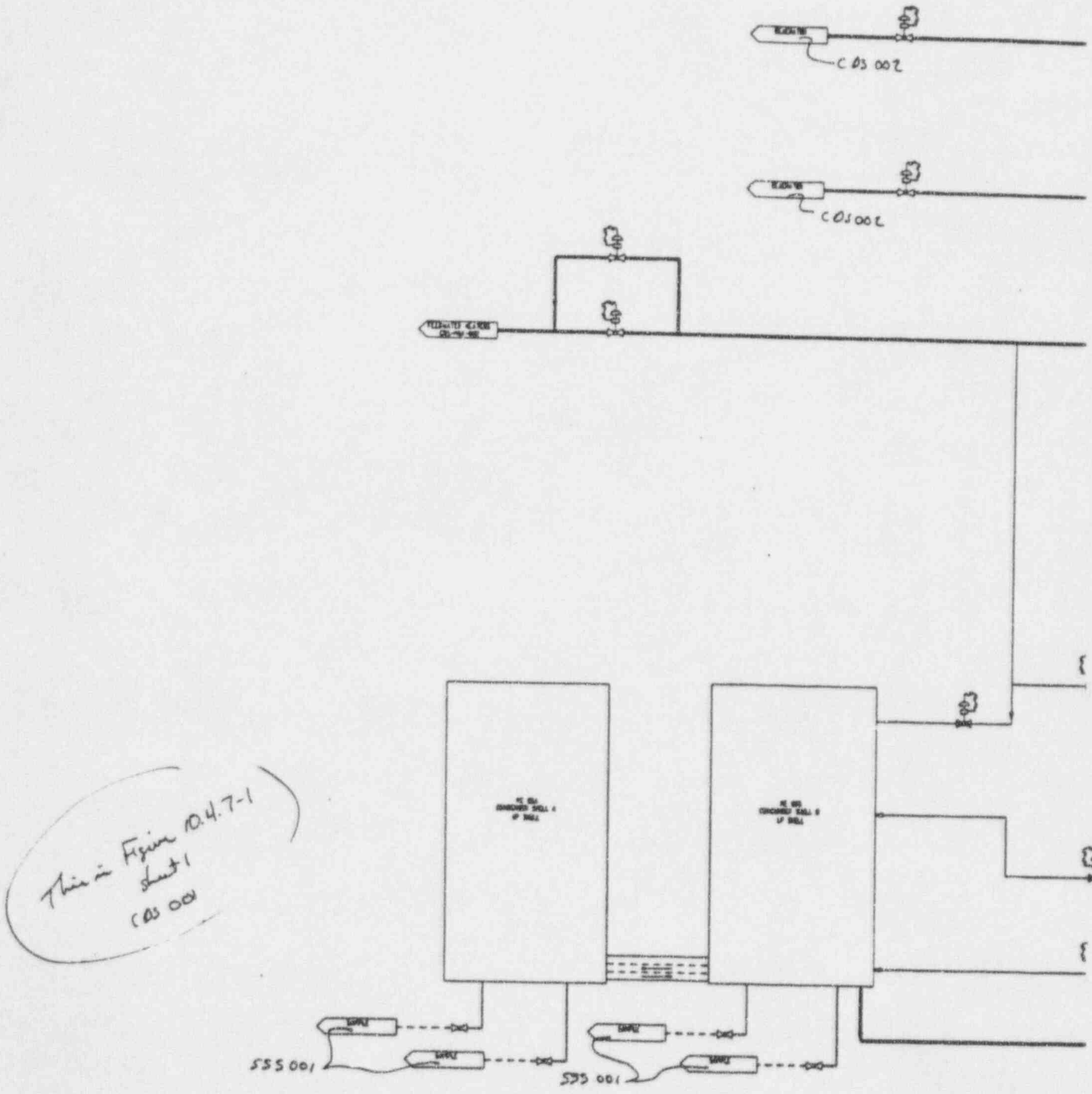
Inside Turbine Building

~~(REF CDS-001)~~

Figure 10.4.7-1 (Sheet 1 of 4)

Condensate and Feedwater System
Piping and Instrumentation Diagram

(REF) CDS 001


CDS 002
CDS002
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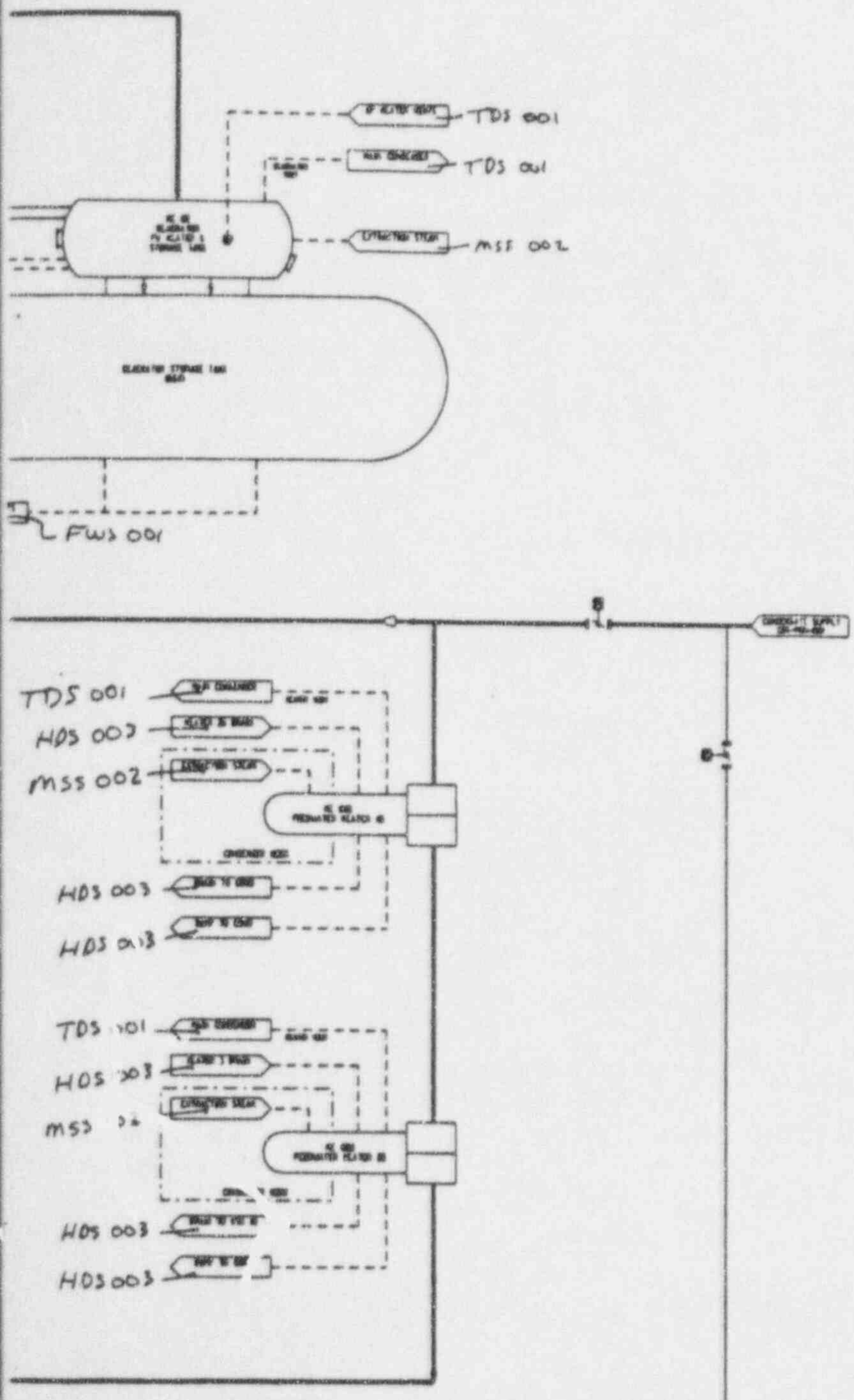
Sheet 1
CDS 001
SSS 001
SSS 001



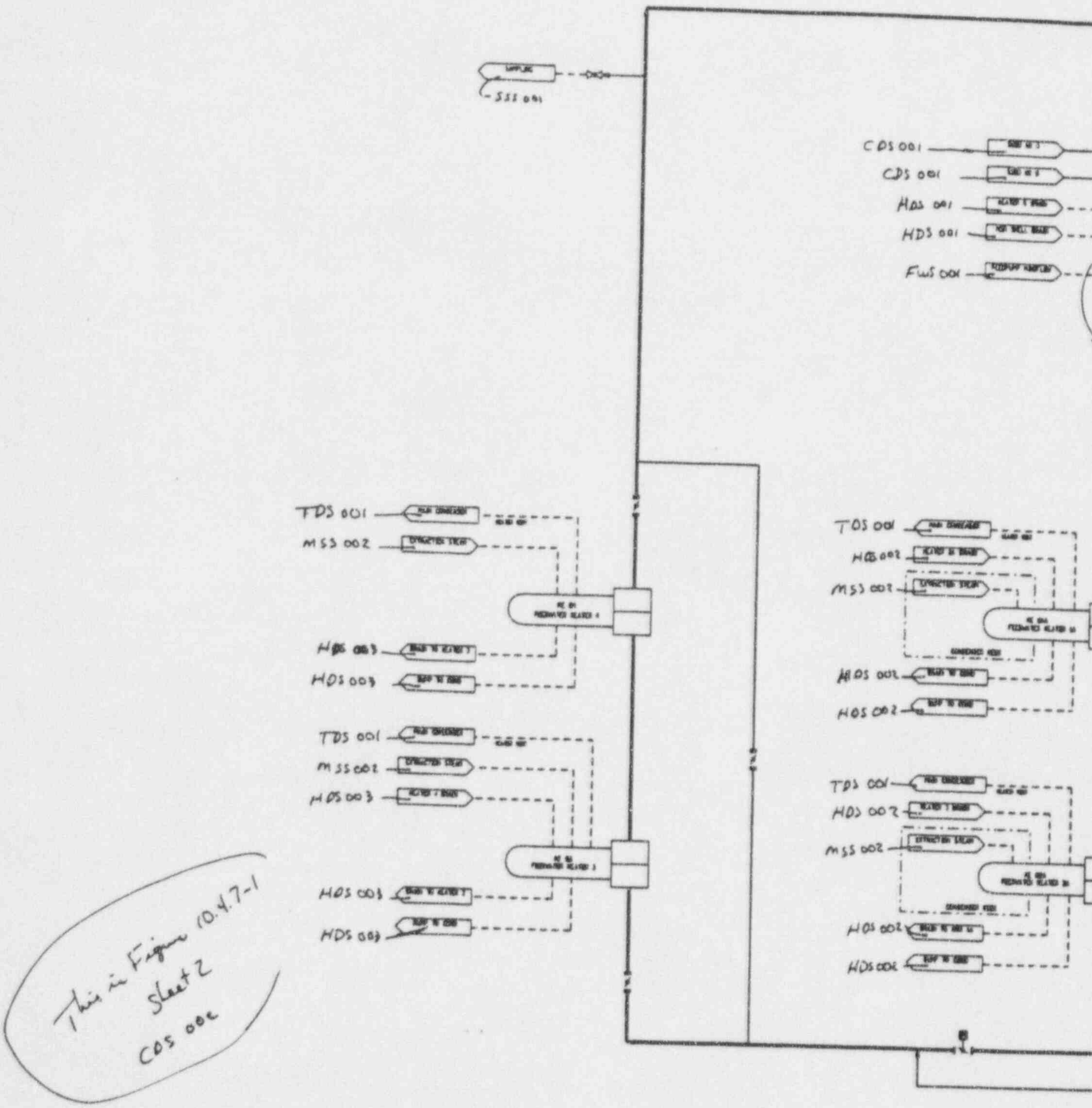
Inside Turbine Building

~~(REF CDS-002)~~

Figure 10.4.7-1 (Sheet 2 of 4)

Condensate and Feedwater System
Piping and Instrumentation Diagram

(REF) CDS 002


SSS 001
CDS 001
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HDS 001
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FWS 001
TDS 001
MSS 002
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MSS 002
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MSS 002
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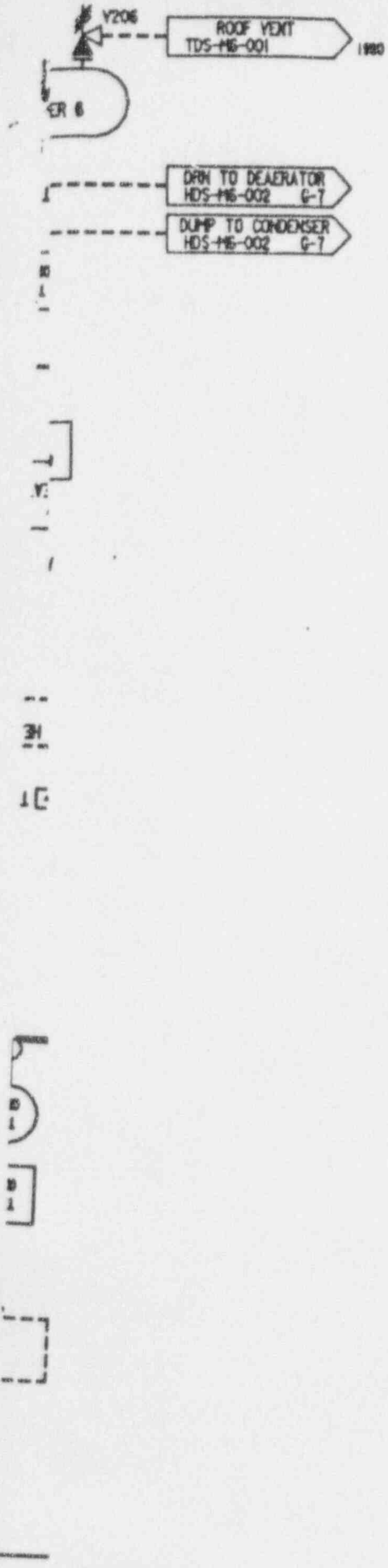
Sheet 2
CDS 002



NOTES:

1. THE SYSTEM LOCATOR CODE "FWS", HAS BEEN OMITTED FROM ALL COMPONENT NUMBERS. EXCEPT FOR EQUIPMENT, THE COMPONENT TYPE CODE HAS ALSO BEEN OMITTED.
2. A TEMPORARY STRAINER CAN BE INSTALLED FOR USE DURING INITIAL PLANT STARTUP OR FOLLOWING EXTENSIVE MAINTENANCE OR MODIFICATION.
3. SEE DRAWING ME01-M8X-001 FOR THE MAIN CONDENSER CONNECTION LIST AND ASSOCIATED DATA.
4. THE MAIN FEEDWATER PUMP IS DRIVEN, THROUGH A SPEED INCREASER, BY THE SAME MOTOR THAT DRIVES THE FEEDWATER BOOSTER PUMP.
5. SEE DRAWING PMS-J1-110 FOR MAIN FEEDWATER PUMP TRIP LOGIC FROM PMS.
6. SEE DRAWING PLS-J1-111 FOR FEEDWATER HEADER PRESSURE AND FEEDWATER TEMPERATURE INPUTS TO FEEDWATER CONTROL.
7. BOOSTER/MAIN FEEDWATER PUMPS TRIP ON TWO OUT OF TWO LOW OIL PRESSURE SIGNALS FROM PICA 546A/B & 547A/B. SEE DRAWING FWS-M6-003.
8. MFW/SFW CROSS CONNECT ISOLATION VALVE V097 AUTOMATICALLY OPENS UPON PLS TRANSFER OF FEEDWATER CONTROL FROM SGS MFCVS TO SFCVS AND AUTOMATICALLY CLOSES FOLLOWING PLS TRANSFER OF FEEDWATER CONTROL FROM SFCVS TO MFCVS. V097 AUTOMATICALLY CLOSES UPON PMS FEEDWATER ISOLATION SIGNAL.
9. BYPASS VALVE V918 FURNISHED WITH AND WELDED TO ISOLATION VALVE V018.

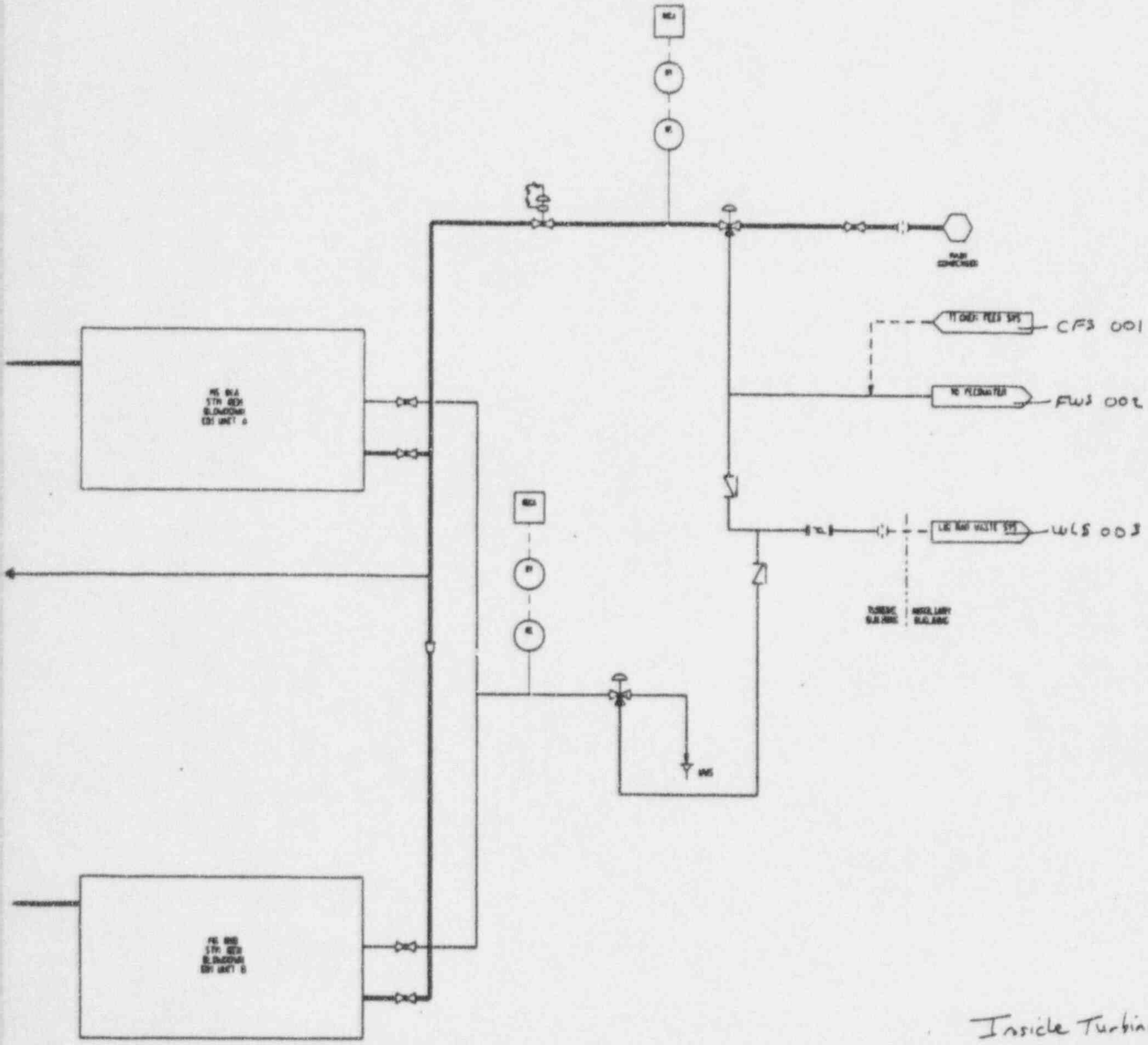
REFERENCES:

A. AP600 COMPONENT NUMBERING PROCEDURE GW-GMP-006.
B. P & ID LEGEND DRAWINGS GW-M6-001, 002 & 003.

Inside Turbine Building

Figure 10.4.7-1 (Sheet 3 of 4)

Condensate and Feedwater System
Piping and Instrumentation Diagram

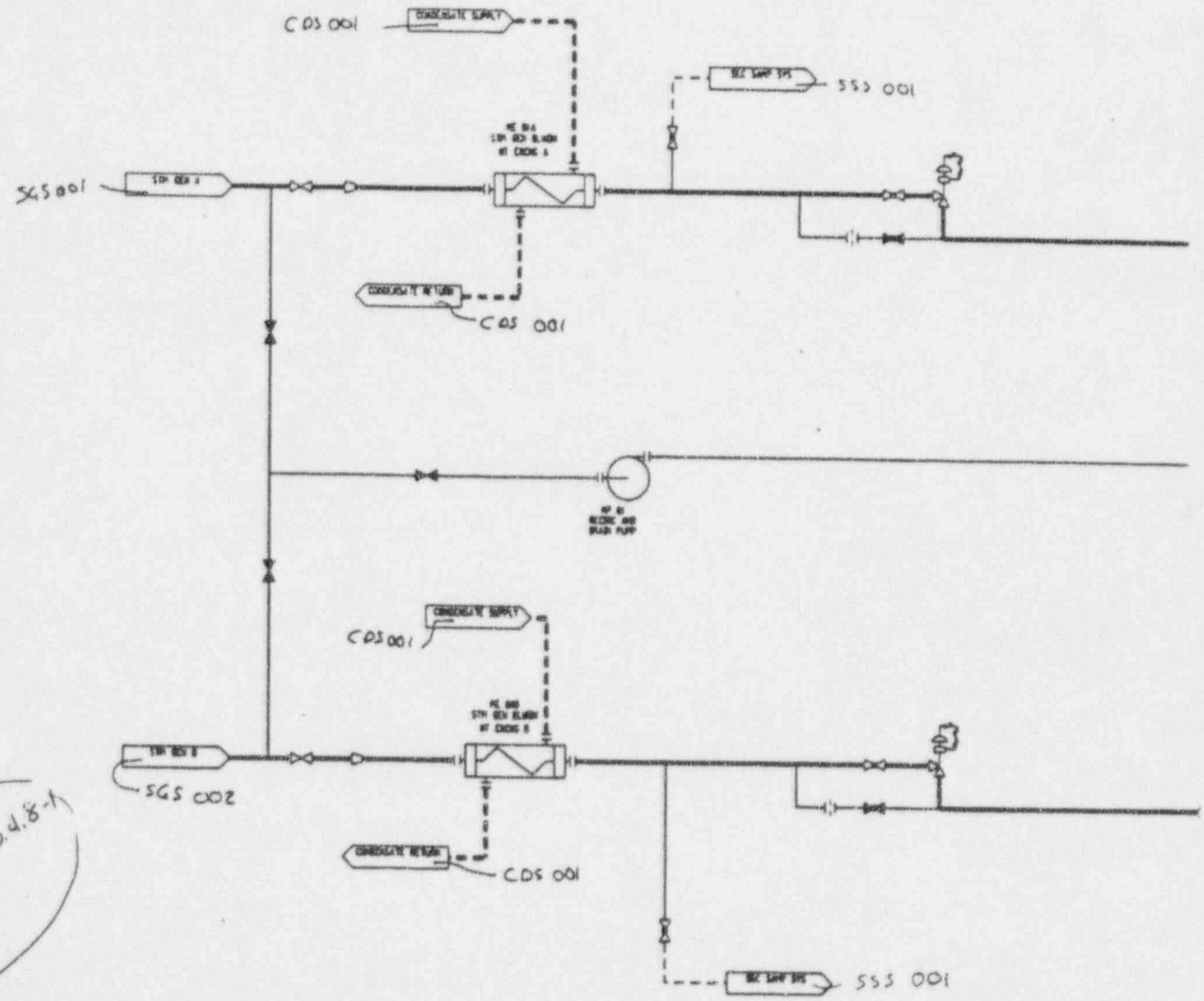


Inside Turbine Building

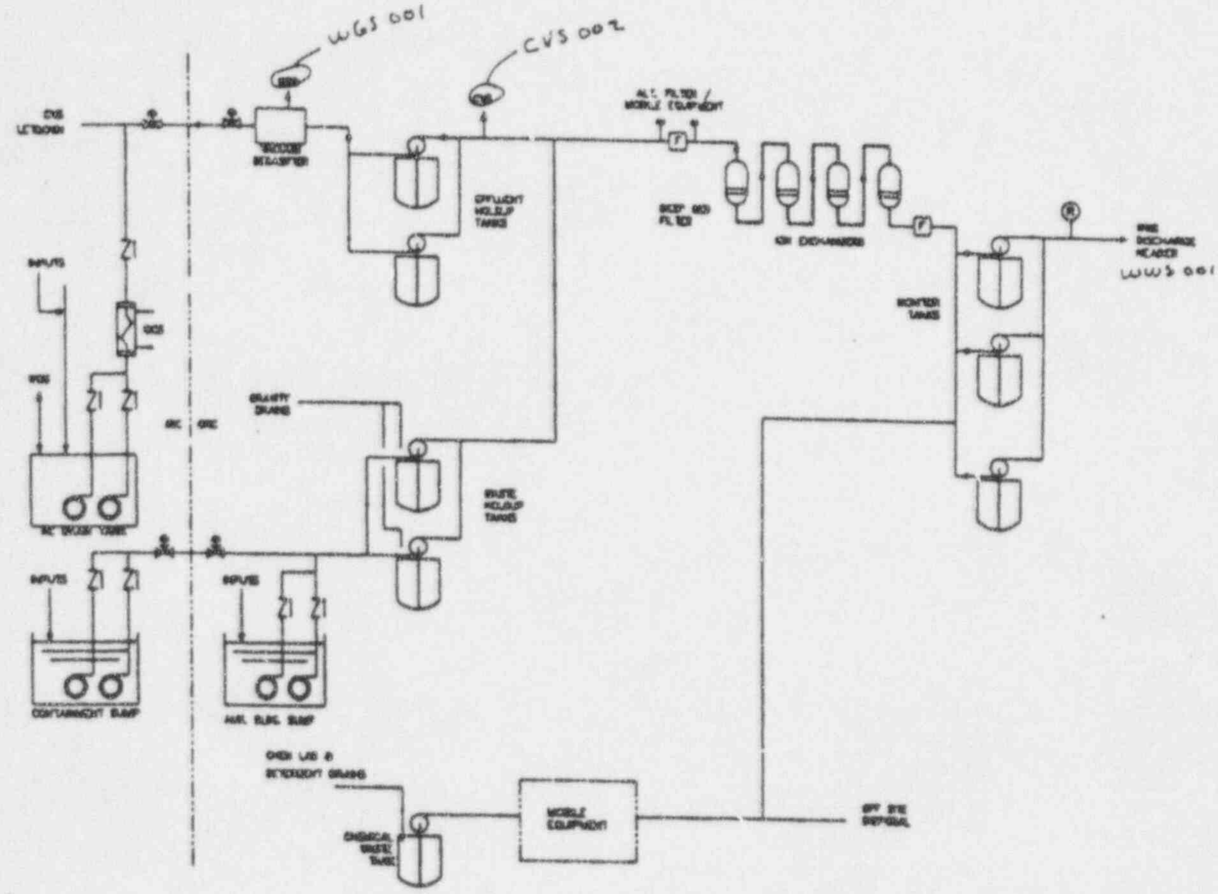
~~(REF BDS-001)~~

Figure 10.4.8-1

Steam Generator Blowdown System
Piping and Instrumentation Diagram
(REF) BDS 001



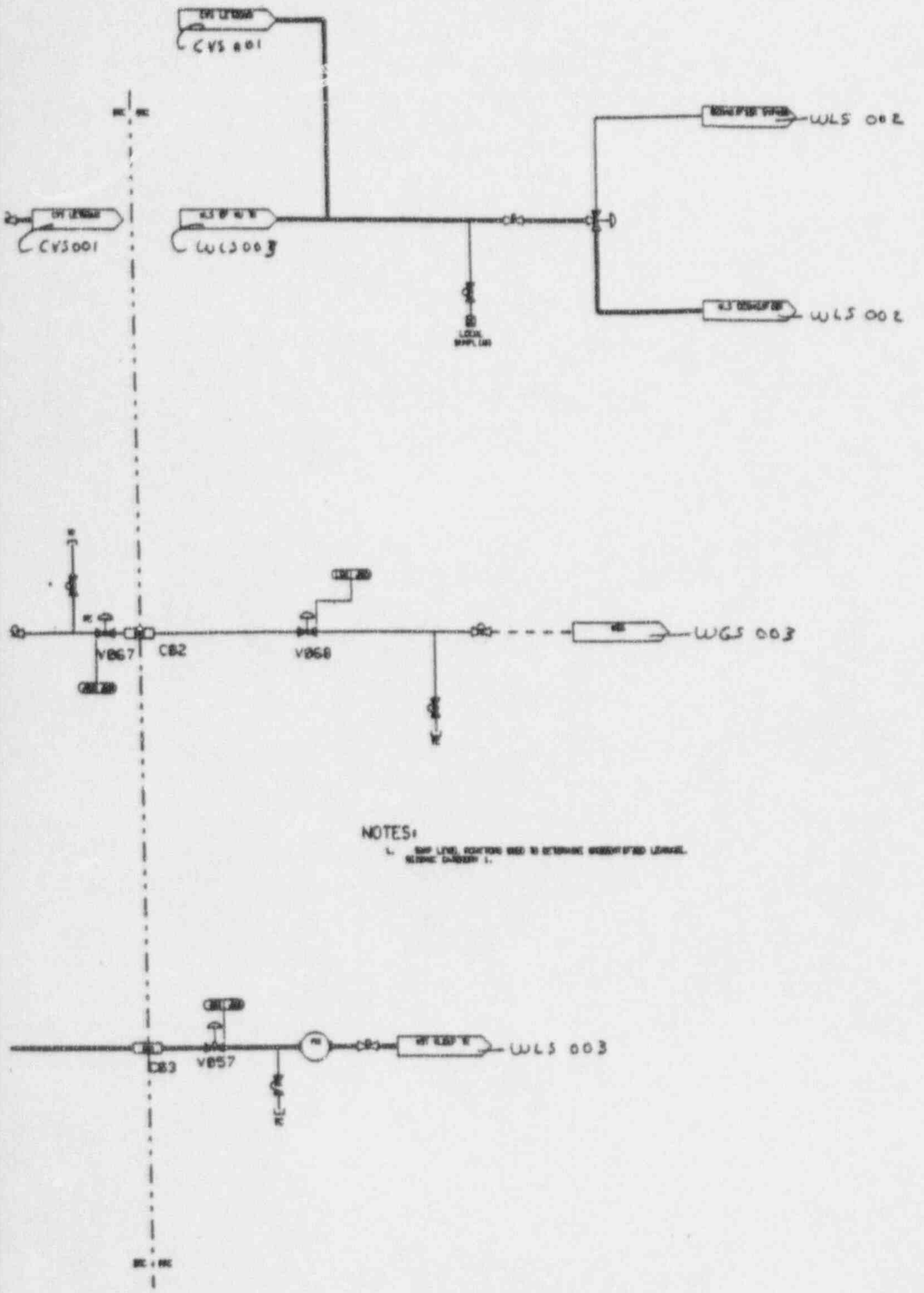
This is Figure 10.4.8-1
BDS 001



~~(REF WLS-001)~~

Figure 11.2-1

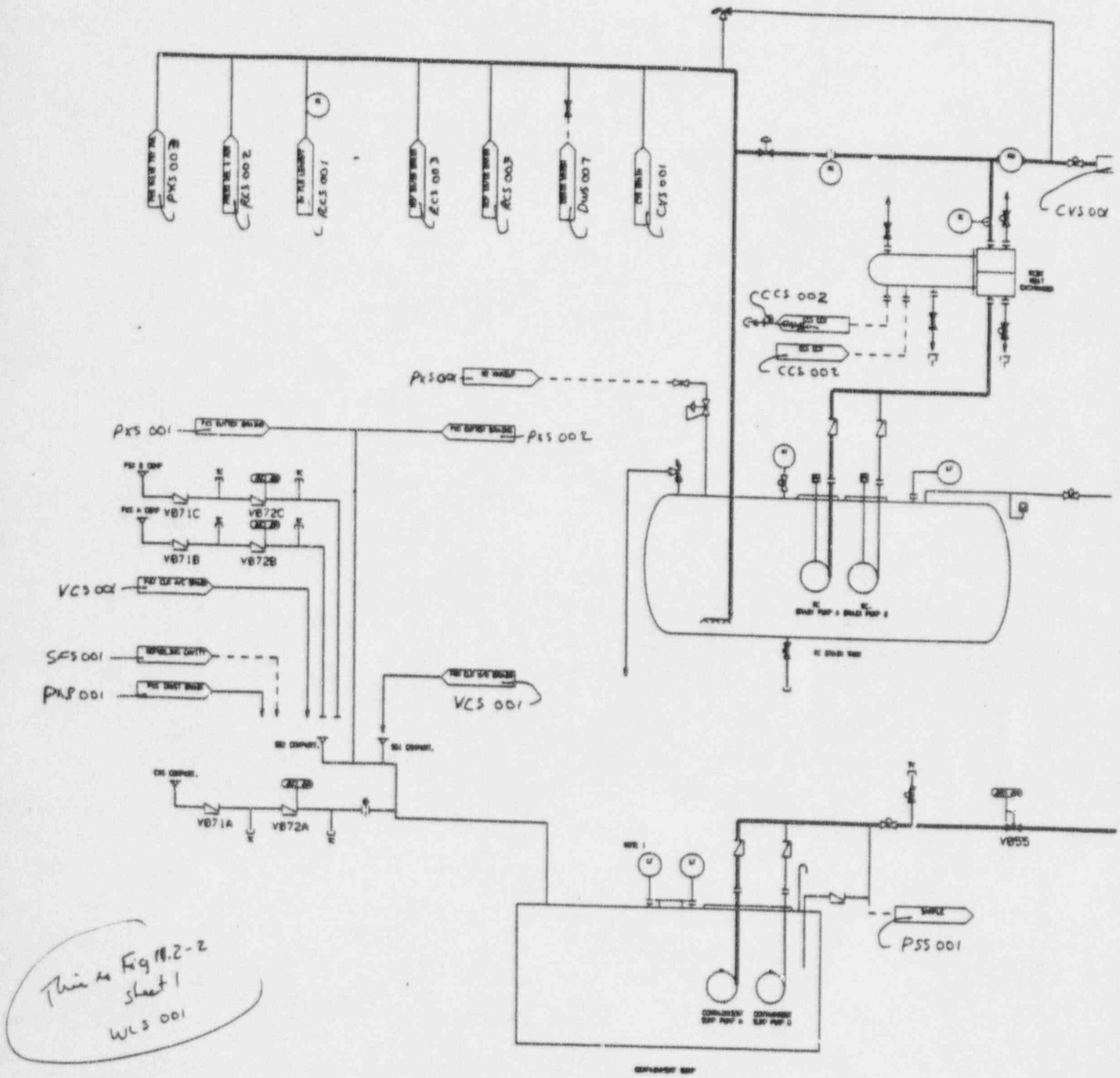
Liquid Radwaste System
Simplified Piping and Instrumentation Diagram
(REF) WLS

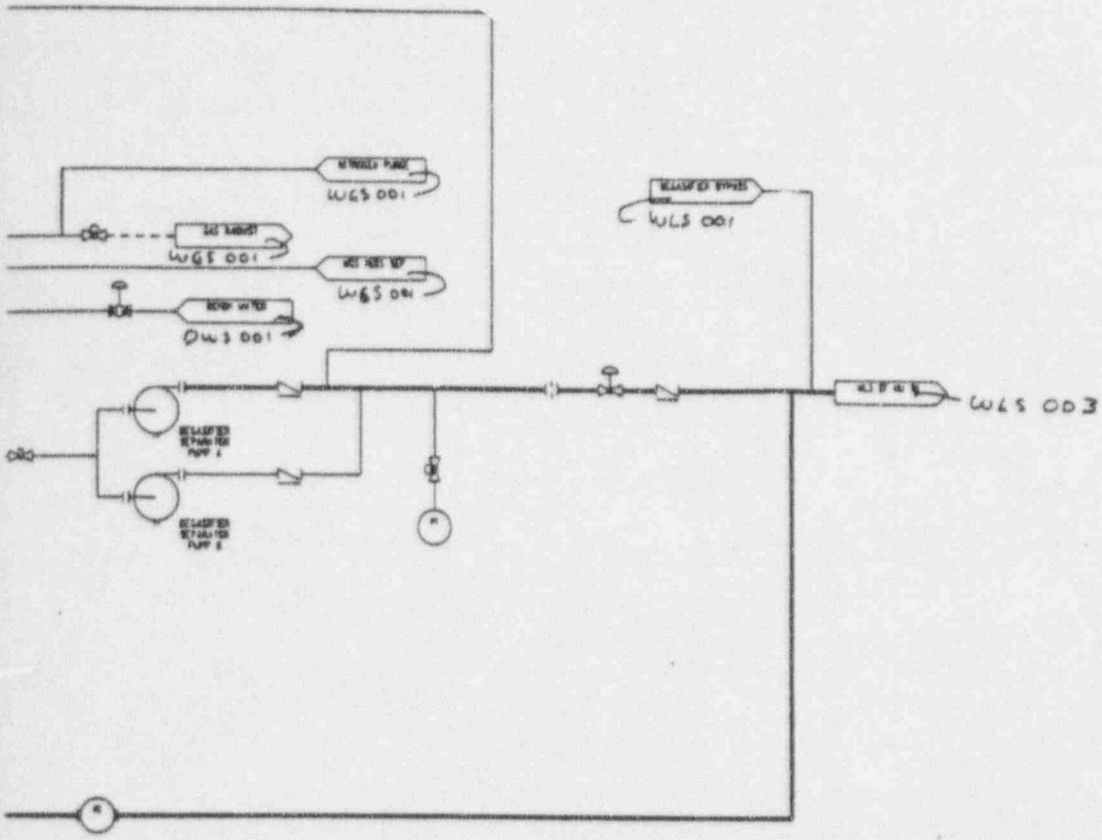


~~(REF WLS 001)~~

Figure 11.2-2 (Sheet 1 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 001


PXS 003
RCS 002
RCS 001
RCS 003
RCS 003
DWS 007
CVS 001
CVS 001
CCS 002
CCS 002
PXS 001
PXS 001
PXS 002
V071C
V072C
V071B
V072B
VCS 001
SFS 001
PSS 001
VCS 001
V071A
V072A
V055
PSS 001
This is Fig 11.2-2 sheet 1 WLS 001



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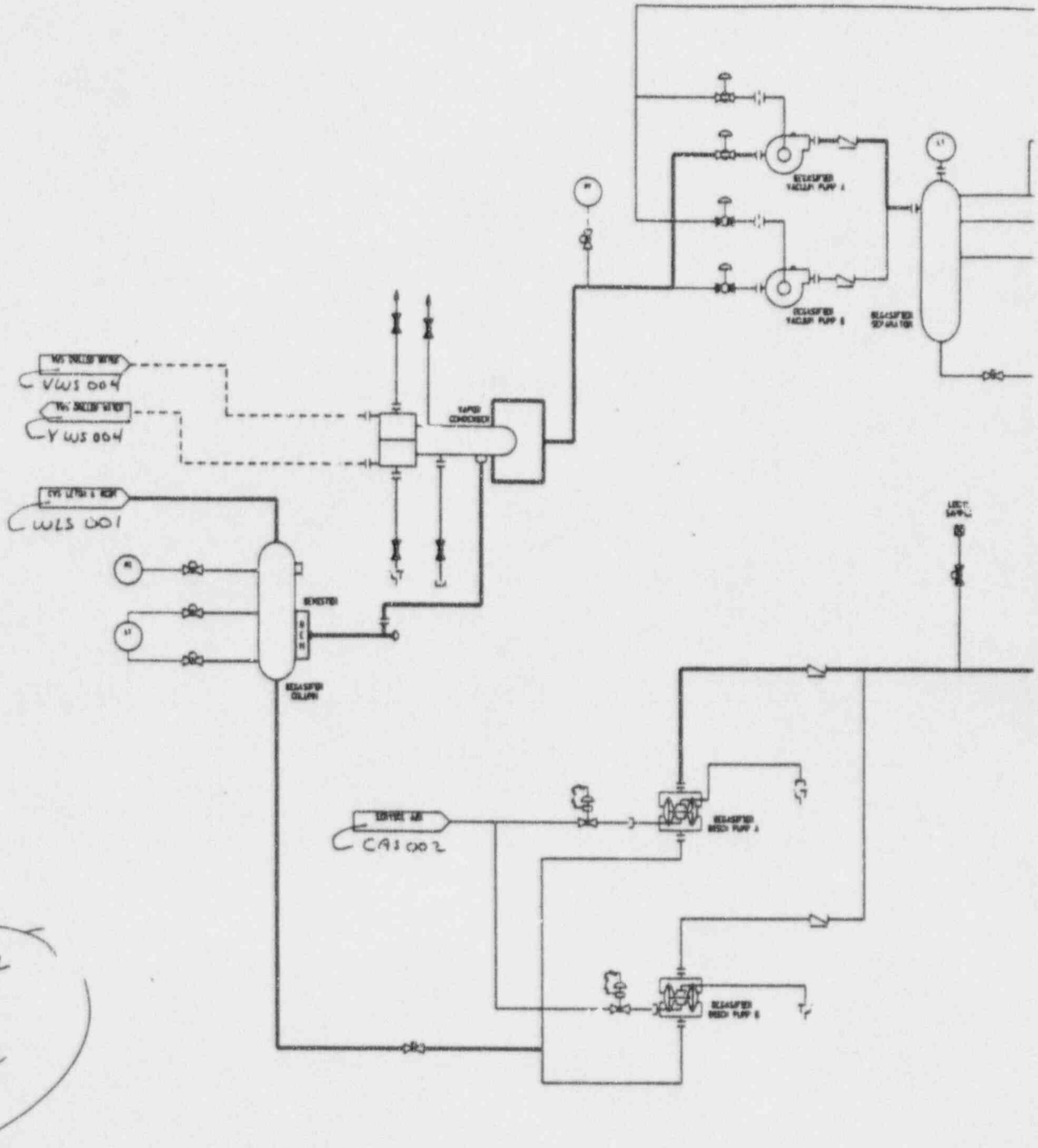
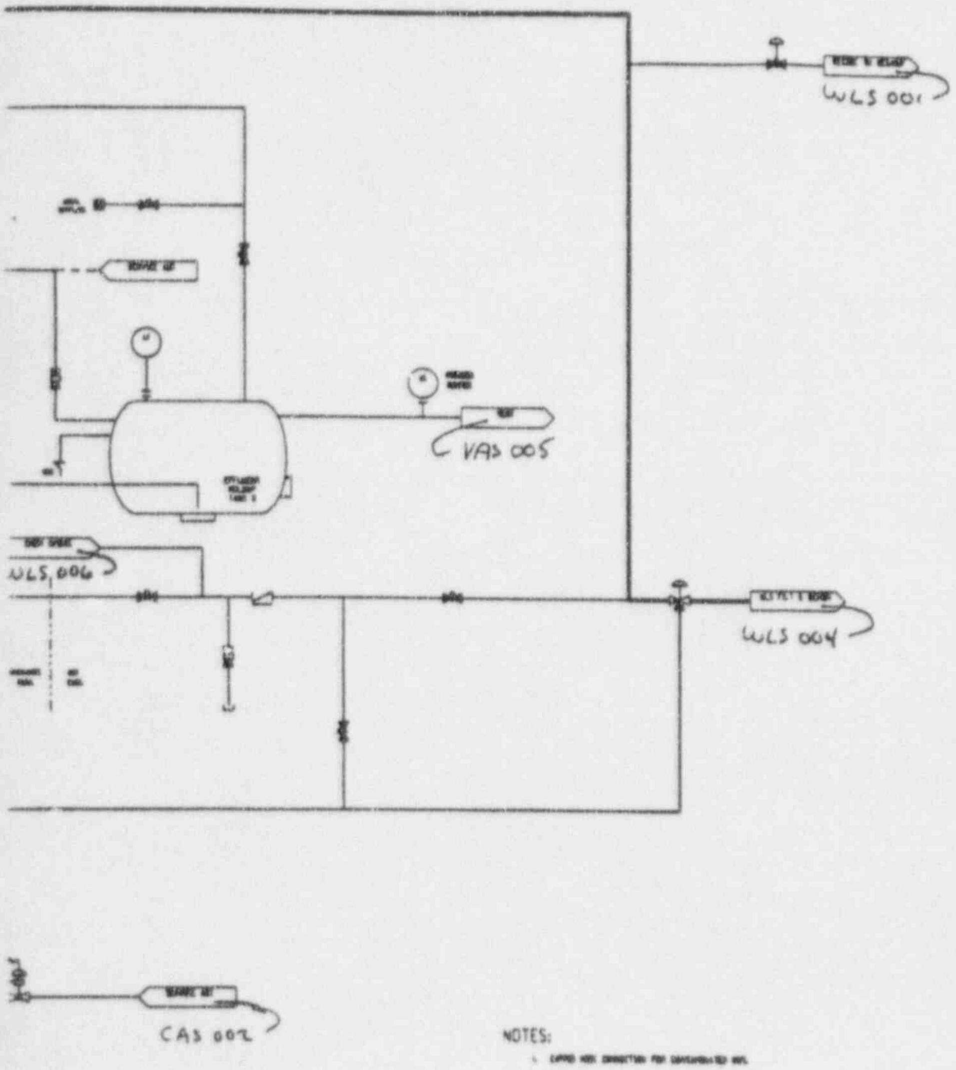
~~(REF WLS 002)~~

Figure 11.2-2 (Sheet 2 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 002


VWS 004
VWS 004
WLS 001
CAS 002
This is Fig 11.2-2
Sheet 2
WLS 002



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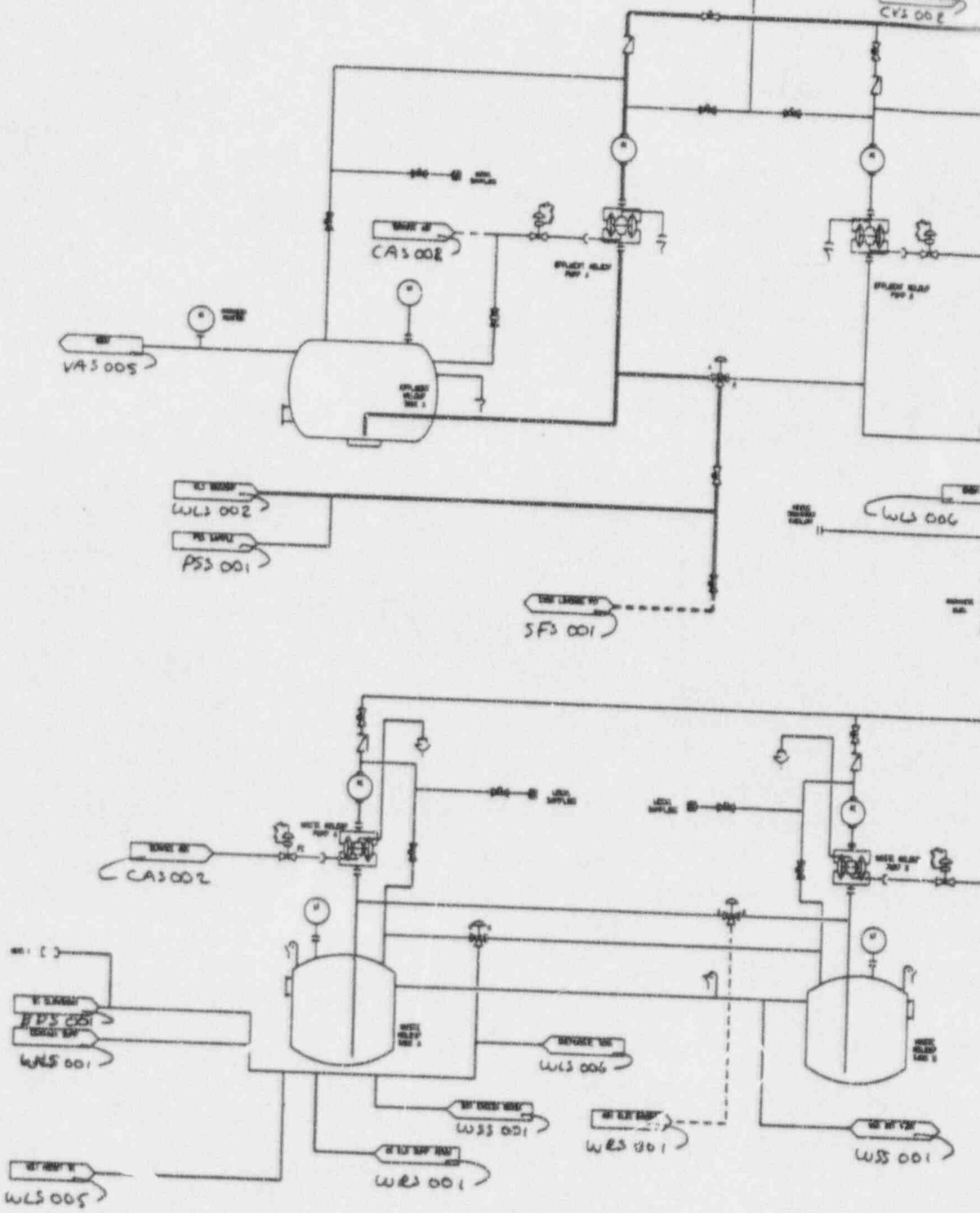
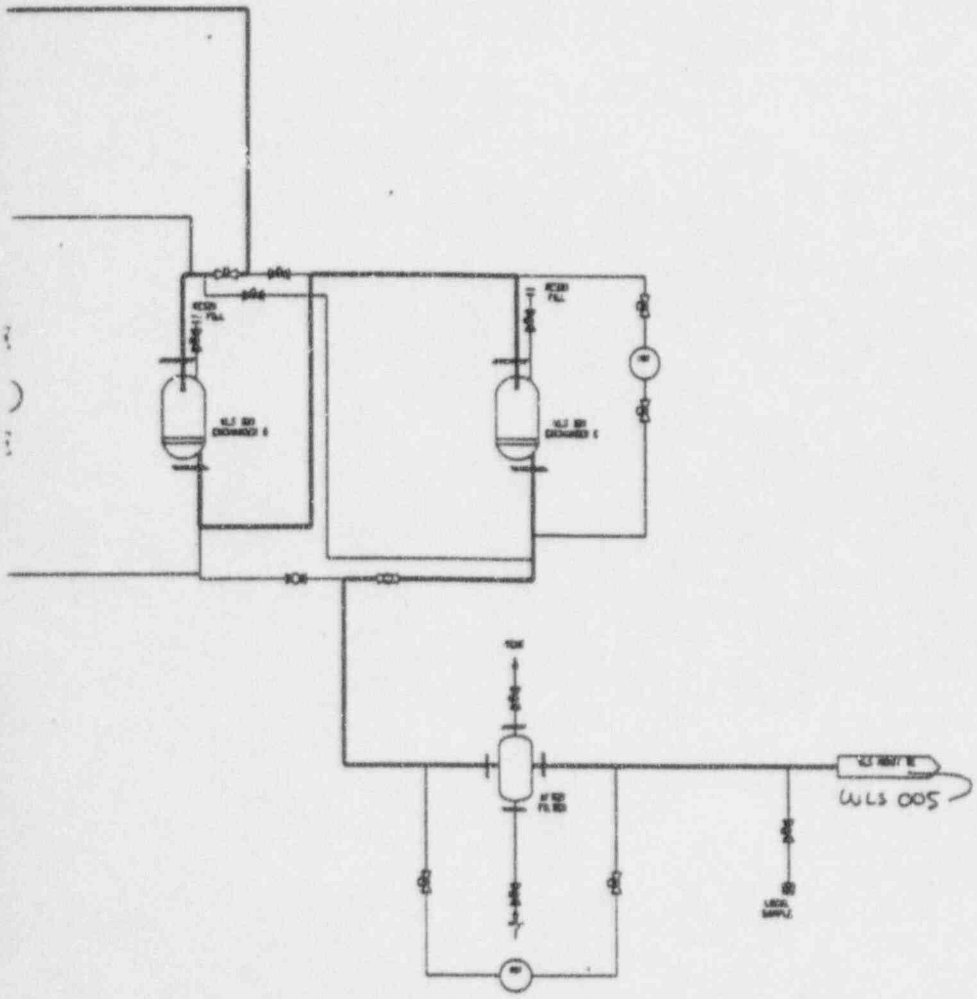
~~(REF WLS 003)~~

Figure 11.2-2 (Sheet 3 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 003

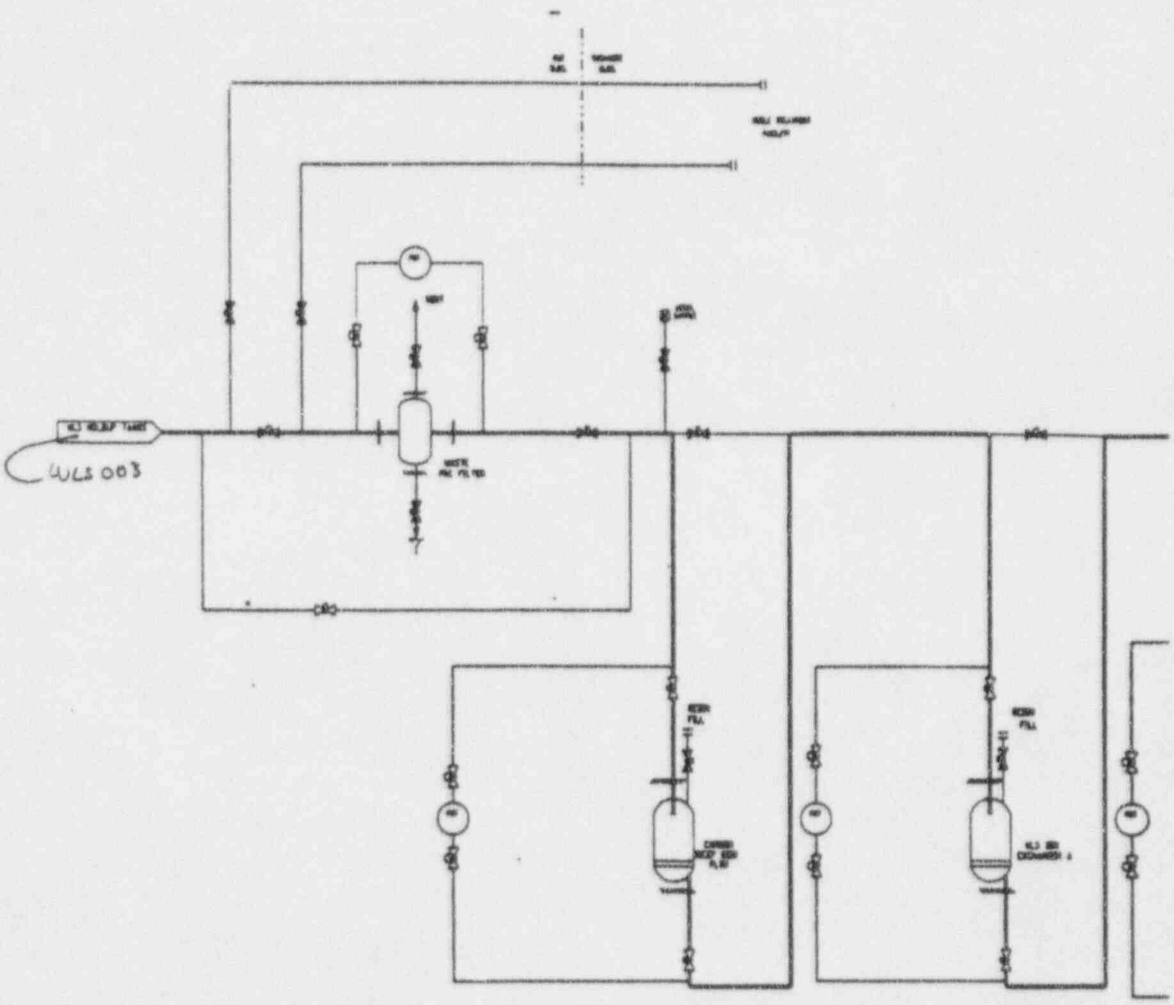

CVS 008
CAS 008
VAS 005
WLS 002
PSS 001
WLS 006
SFS 001
CAS 002
BDS 001
WLS 001
WLS 006
WSS 001
WRS 001
WRS 001
WSS 001
WLS 005
This is Fig 11.2-2
Sheet 3
WLS 003



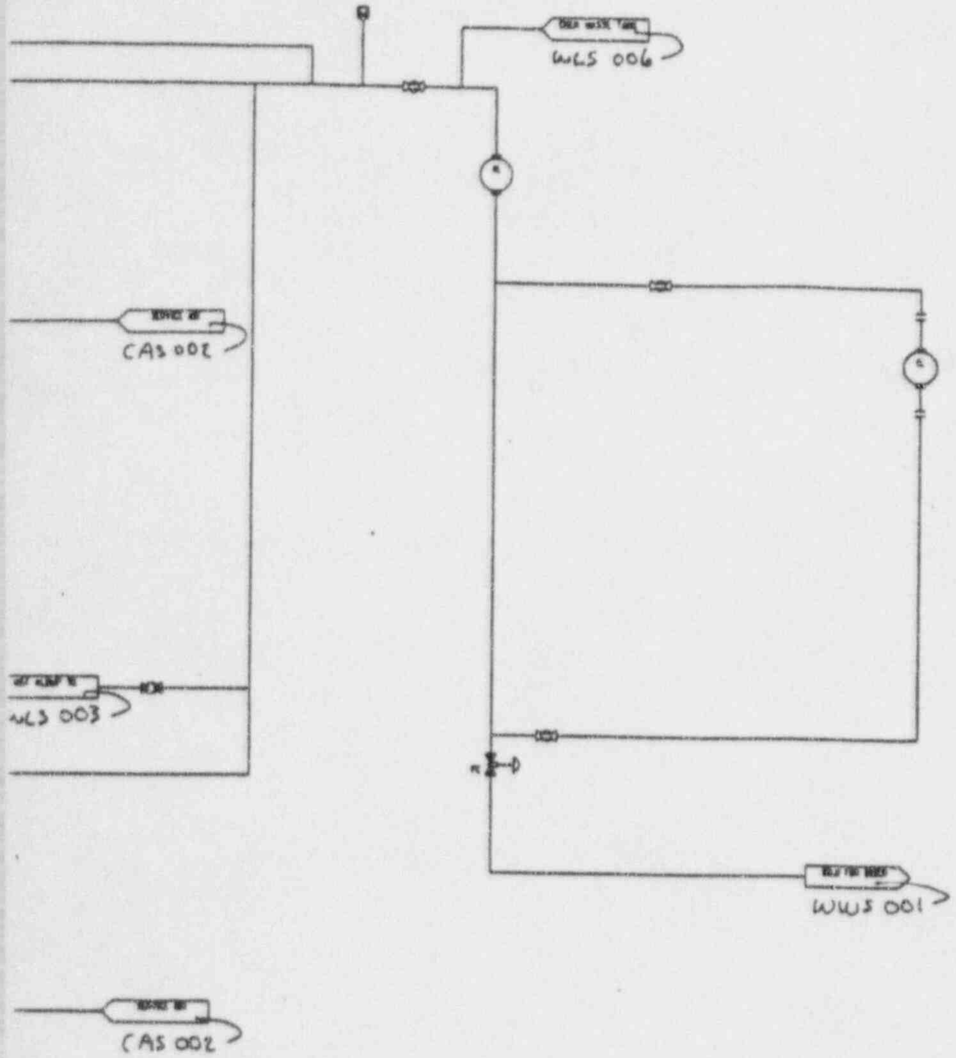
~~(REF WLS 004)~~

Figure 11.2-2 (Sheet 4 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 004



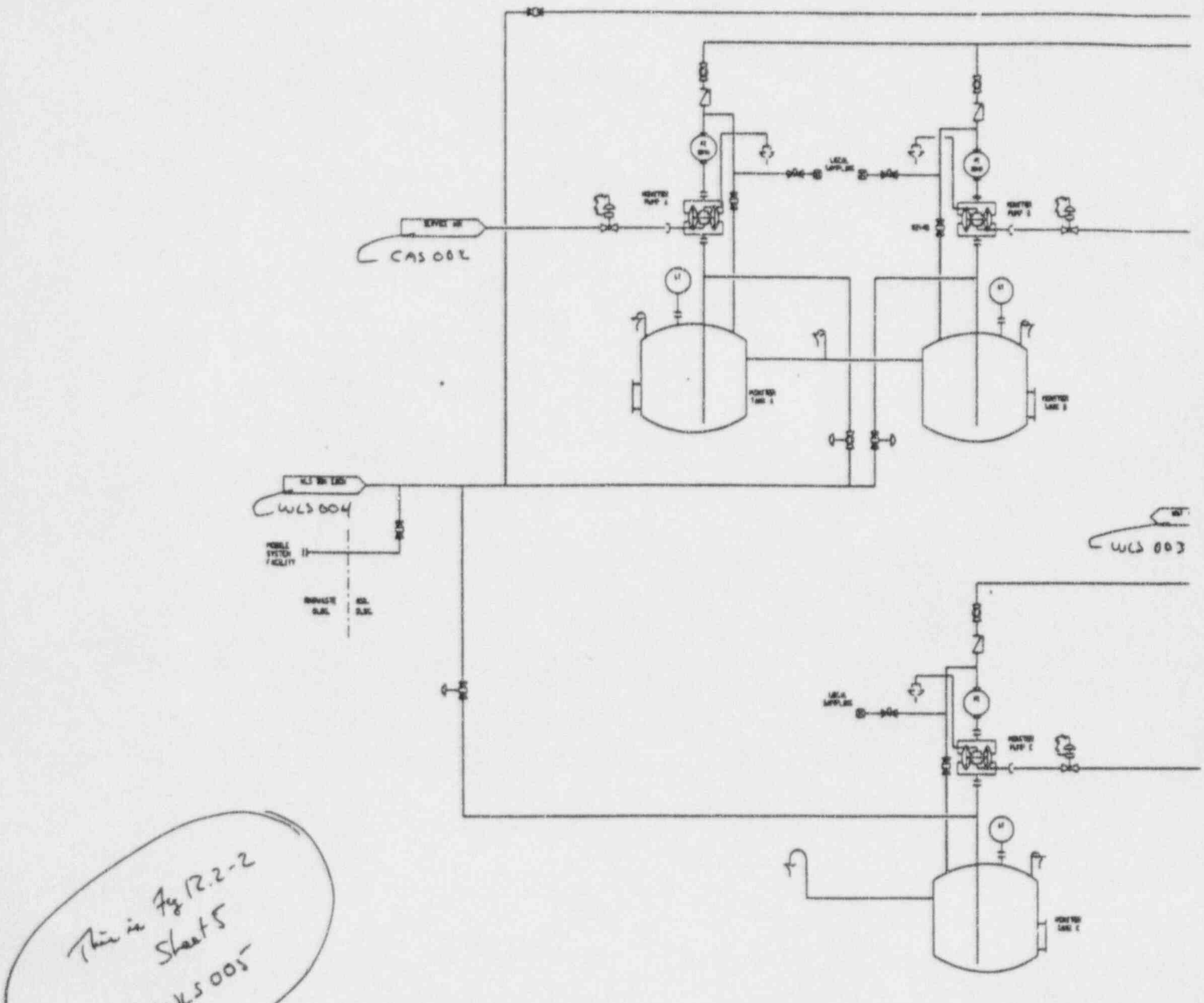
This is Fig 11.2-2
Sheet 4
WLS 004

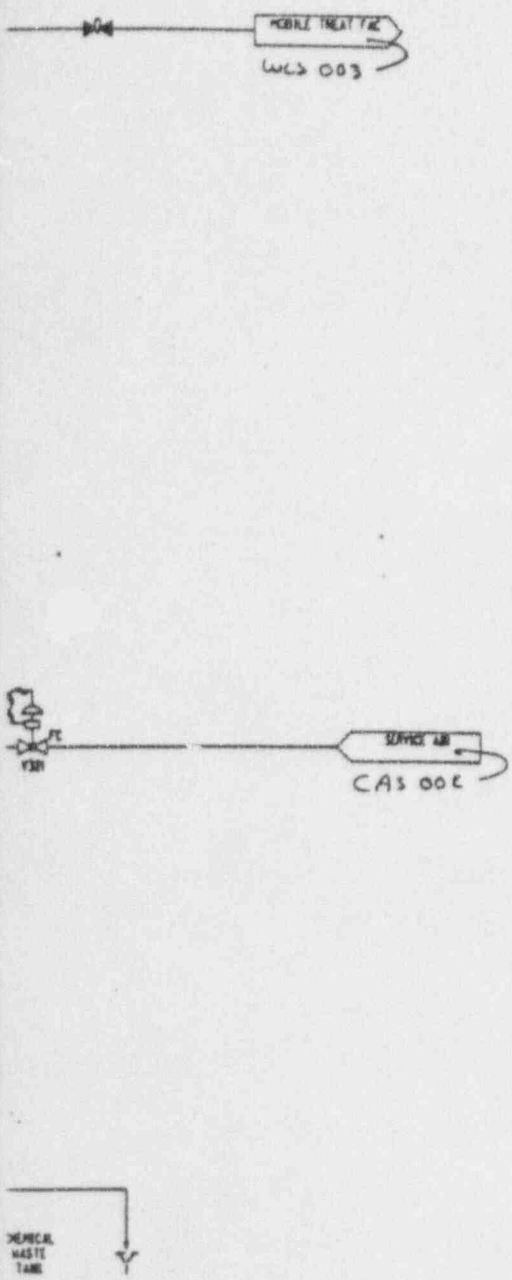


~~(REF WLS 005)~~

Figure 11.2-2 (Sheet 5 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 005


CAS 002
WLS 004
WLS 003
This is Fig 12.2-2
Sheet 5
WLS 005



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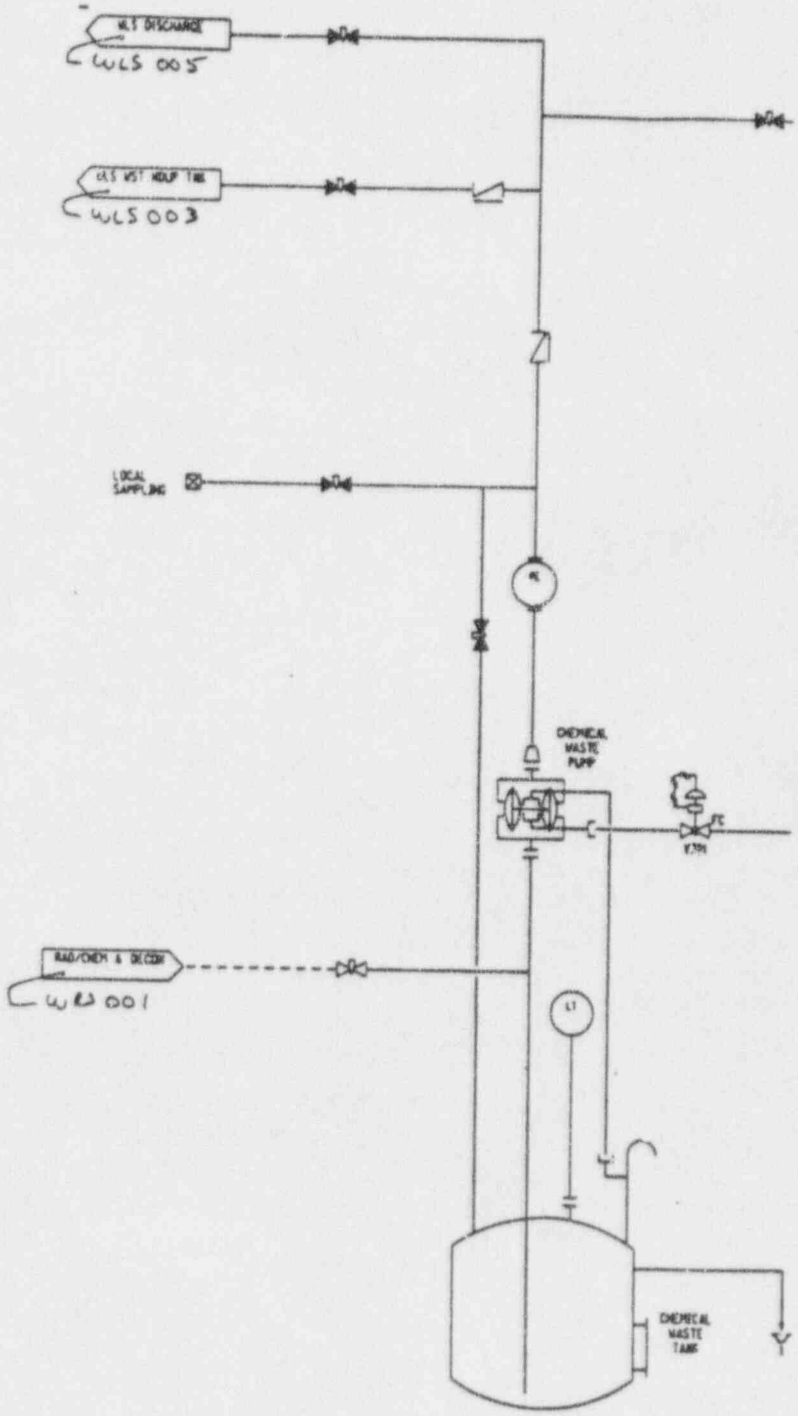
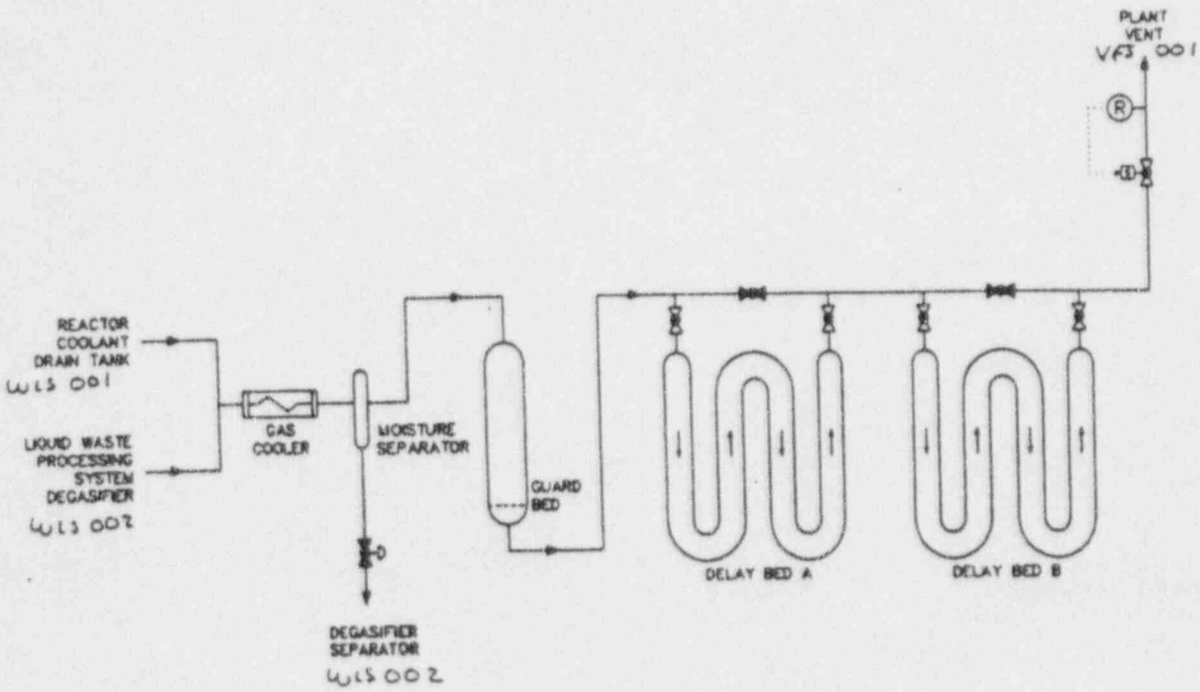
~~(REF WLS 006)~~

Figure 11.2-2 (Sheet 6 of 6)

Liquid Radwaste System
Piping and Instrumentation Diagram
(REF) WLS 006



This is Fig 11.2-2
Sheet 6
WLS 006



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~~(REF WGS 001)~~

Figure 11.3-1

Gaseous Radwaste System
Simplified Piping and Instrumentation Diagram

(REF) WGS 001

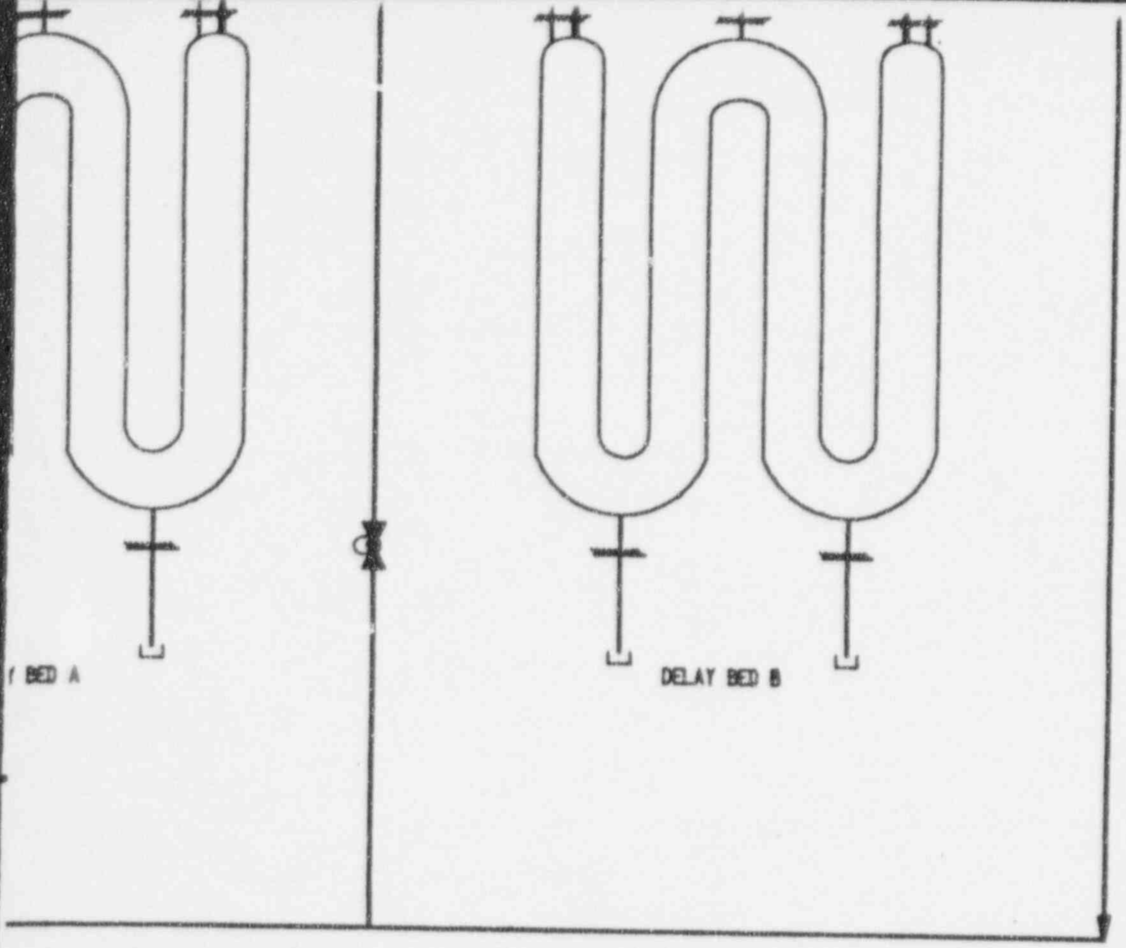

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Figure 11.3-2

Gaseous Radwaste System
Piping and Instrumentation Diagram

(REF) WGS 001

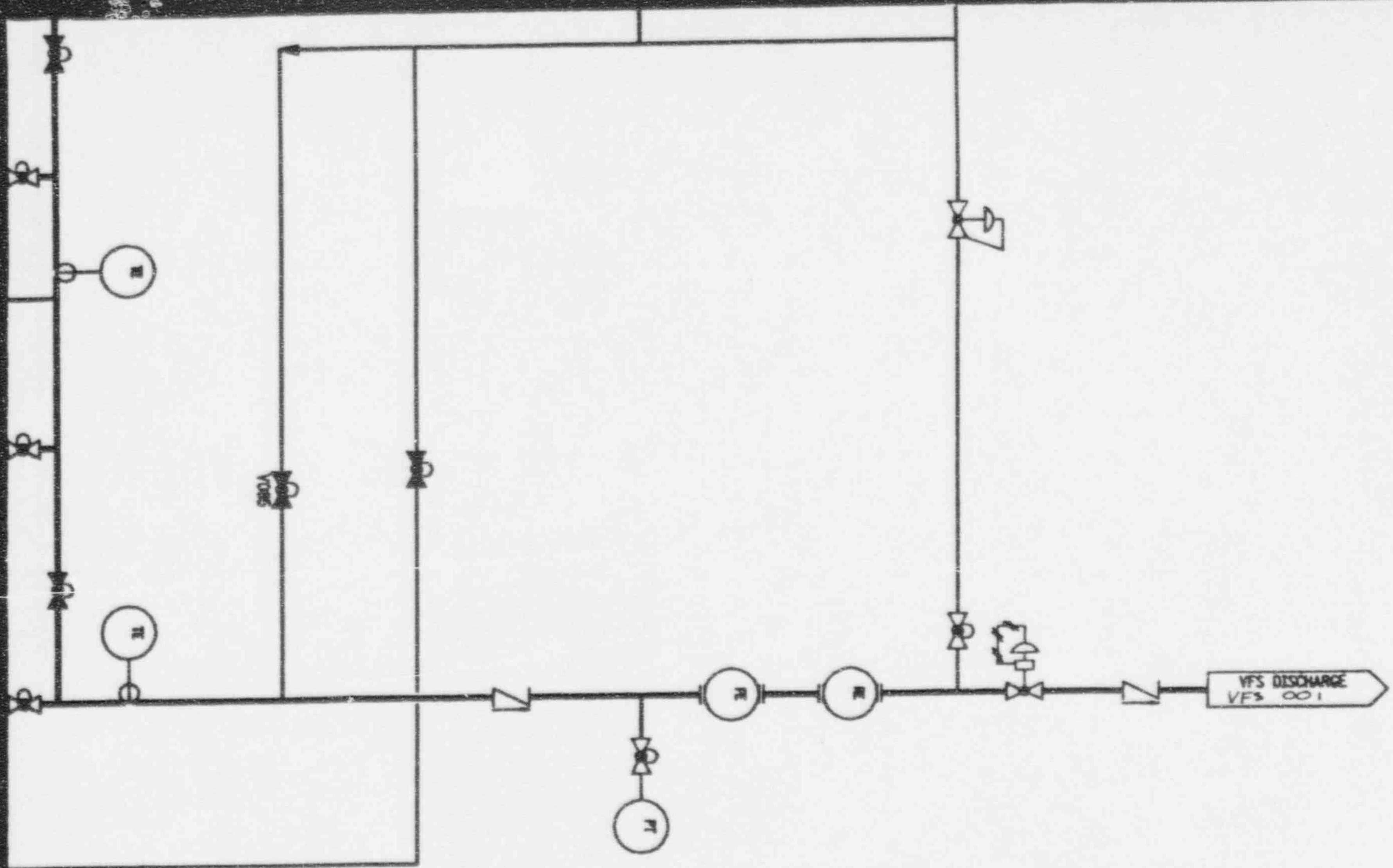


FIG 11.3-2
WGS 001

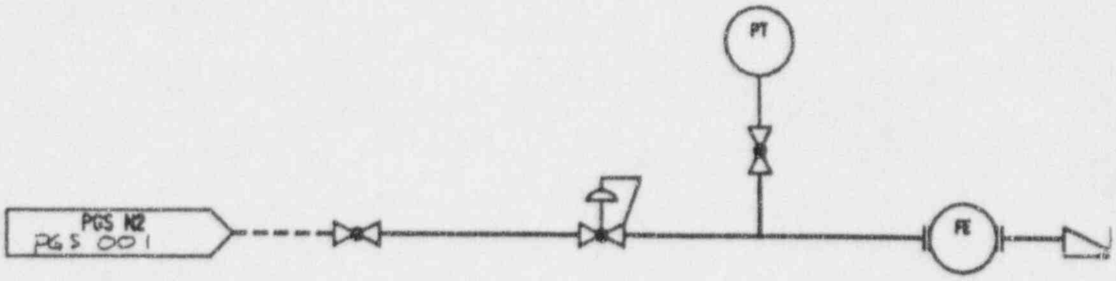
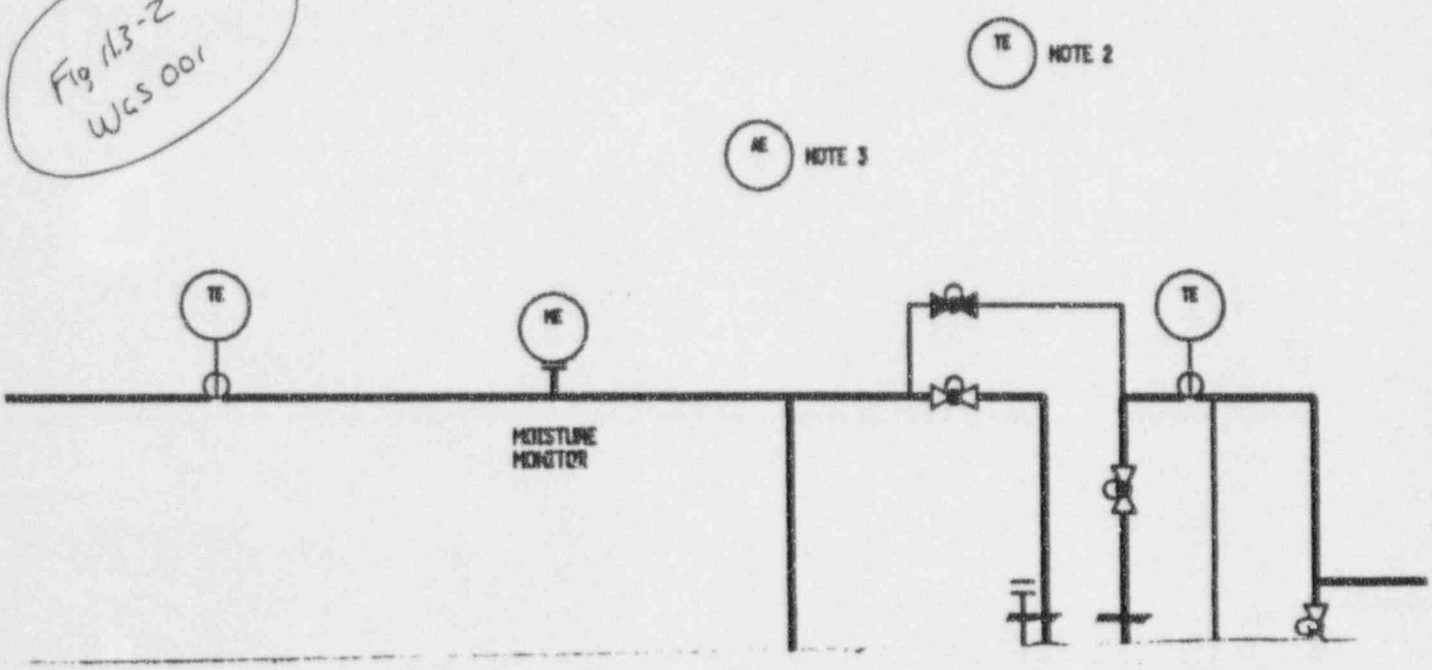


Fig 11.3-2
WGS 001



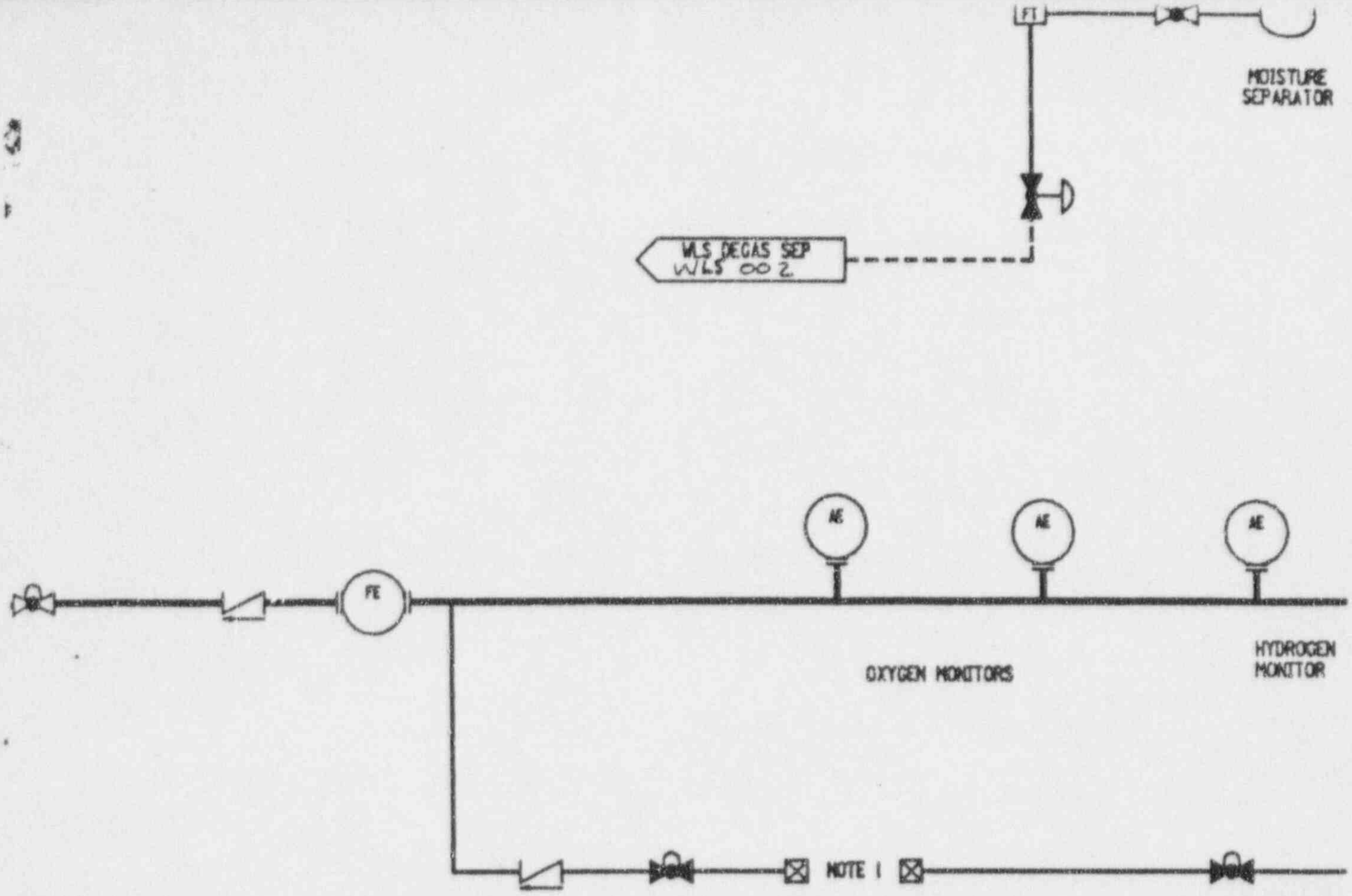


Fig 11.3-2
WGS 001

Fig 11.3-2
WGS 001

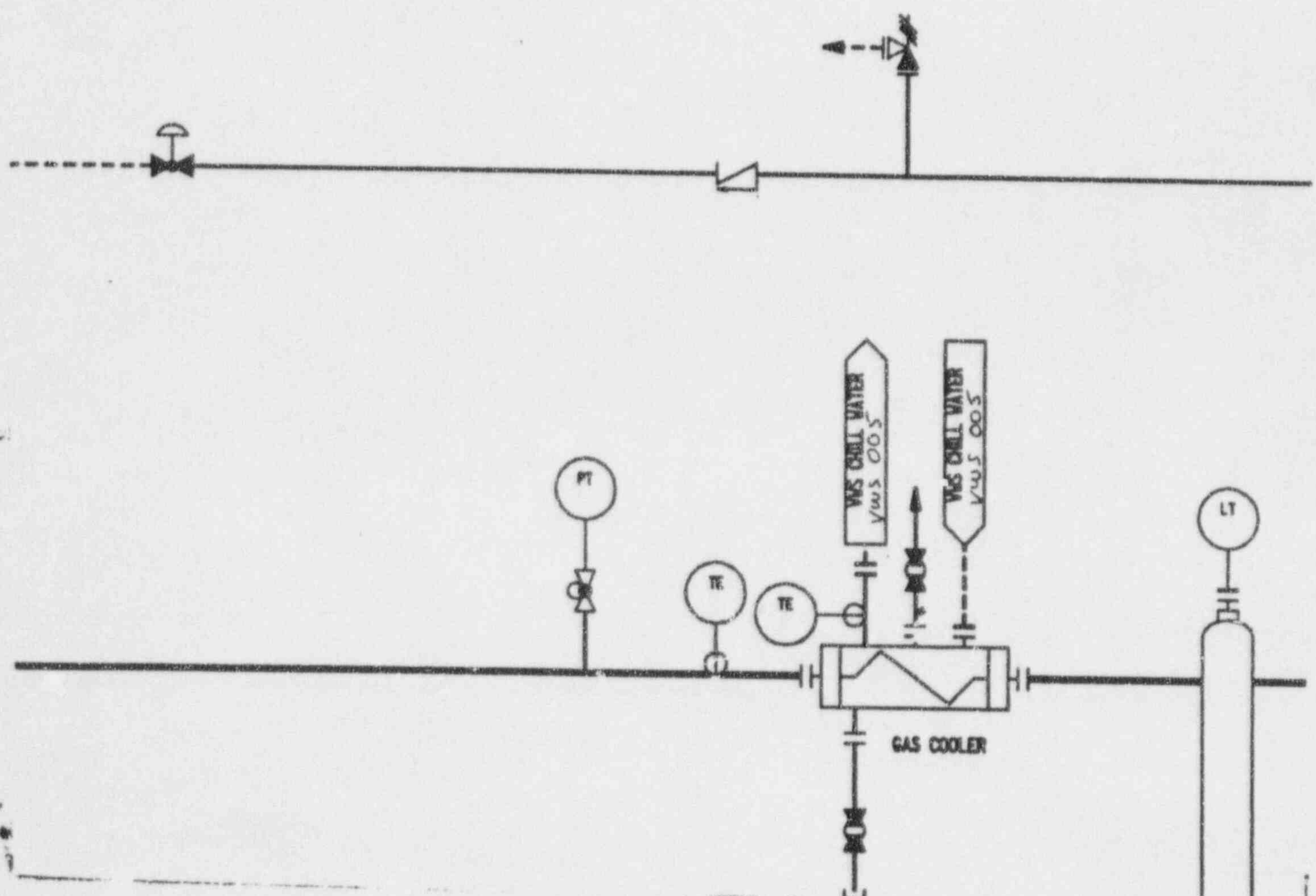


FIG 11.3-2
WGS 001