NUCLEAR POWER PLANT SYSTEM SOURCEBOOK

GINNA

50-244

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CAUTION

The information in this report has been developed over an extended period of time based on a site visit, the Final Safety Analysis Report, system and layout drawings, and other published information. To the best of our knowledge, it accurately reflects the plant configuration at the time the information was obtained, however, the information in this document has not been independently verified by the licensee or the NRC.

NOTICE

This sourcebook will be periodically updated with new and/or replacement pages as appropriate to incorporate additional information on this reactor plant. Technical errors in this report should be brought to the attention of the following:

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Correction and other recommended changes should be submitted in the form of marked up copies of the affected text, tables or figures. Supporting documentation should be included if possible.

GINNA
RECORD OF REVISIONS

REVISION	ISSUE	COMMENTS
0	12/89	Original report

GINNA SYSTEM SOURCEBOOK

This sourcebook contains summary information on the Ginna nuclear power plant. Summary data on this plant are presented in Section 1, and similar nuclear power plants are identified in Section 2. Information on selected reactor plant systems is presented in Section 3, and the site and building layout is illustrated in Section 4. A bibliography of reports that describe features of this plant or site is presented in Section 5. Symbols used in the system and layout drawings are defined in Appendix A. Terms used in data tables are defined in Appendix B.

1. SUMMARY DATA ON PLANT

Basic information on the Ginna nuclear power plant is listed below:

- Docket number	50-244
- Operator	Rochester Gas and Electric Corp.
- Location	15 mi. NE Rochester
- Commercial operation date	7-70
- Reactor type	PWR
- NSSS vendor	Westinghouse
- Number of loops	2
- Power (MWt/MWe)	1520/470
- Architect-engineer	Gilbert
- Containment type	Reinforced concrete cylinder with steel liner

2. IDENTIFICATION OF SIMILAR NUCLEAR POWER PLANTS

Ginna utilizes a Westinghouse PWR two-loop nuclear steam supply system (NSSS). Other two-loop Westinghouse plants in the United States include:

- Kewaunee
- Point Beach 1 and 2
- Prarie Island 1 and 2

3. SYSTEM INFORMATION

This section contains descriptions of selected systems at the Ginna nuclear power plant in terms of general function, operation, system success criteria, major components, and support system requirements. A summary of major systems at the Ginna nuclear power plant is presented in Table 3-1. In the "Report Section" column of this table, a section reference (i.e. 3.1, 3.2, etc.) is provided for all systems that are described in this report. An entry of "X" in this column means that the system is not described in this report. In the "FSAR Section Reference" column, a cross-reference is provided to the section of the Final Safety Analysis Report where additional information on each system can be found. Other sources of information on this plant are identified in the bibliography in Section 5.

Several cooling water systems are identified in Table 3-1. The functional relationships that exist among cooling water systems required for safe shutdown are shown in Figure 3-1. Details on the individual cooling water systems are provided in the report sections identified in Table 3-1.

Table 3-1. Summary of Ginna Systems Covered in this Report

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Reactor Heat Removal Systems			
- Reactor Coolant System (RCS)	Same	3.1	5
- Auxiliary Feedwater (AFW) and Secondary Steam Relief (SSR) Systems	Same	3.2	7.4.1.2, 10.5
- Emergency Core Cooling Systems (ECCS)	Same		
- High-Pressure injection & Recirculation	Safety Injection System, CVCS	3.3	6.3
- Low-pressure Injection & Recirculation	Residual Heat Removal System	3.3	6.3
- Decay Heat Removal (DHR) System (Residual Heat Removal (RHR) System)	Residual Heat Removal (RHR) System	3.3	5.4.5, 6.3
- Main Steam and Power Conversion Systems	Main Steam Supply System Condensate and Feedwater System, Circulating Water System	X	7.4.1.3, 10.3 10.4 10.6
- Other Heat Removal Systems	None identified	X	
Reactor Coolant Inventory Control Systems			
- Chemical and Volume Control System (CVCS) (Charging System)	Same	3.4	7.4.1.5, 9.3.4
- ECCS	See ECCS, above	-	-

Table 3-1. Summary of Ginna Systems Covered in this Report (Continued)

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Containment Systems			
- Containment	Same	X	6.2.1
- Containment Heat Removal Systems	Post Accident Heat Removal Systems	3.9	6.2.2
- Containment Spray System	Same	3.9	6.2.2.2
- Containment Fan Cooler System	Reactor Containment Fan Cooler Subsystem	3.9	6.2.2.1
- Containment Normal Ventilation Systems	Containment Penetration Ventilation Subsystem	X	9.4.1
- Combustible Gas Control Systems	Combustible Gas Control System	X	6.2.5
Reactor and Reactivity Control Systems			
- Reactor Core	Same	X	4.1
- Control Rod System	Control Rod Drive System	X	4.6
- Boration Systems	See CVCS, above	-	-
Instrumentation & Controls (I&C) Systems			
- Reactor Protection System (RPS)	Reactor Trip System	3.5	7.2
- Engineered Safety Feature Actuation System (ESFAS)	Same	3.5	7.3
- Remote Shutdown System	Auxiliary Shutdown Panel	3.5	7.4

Table 3-1. Summary of Ginna Systems Covered in this Report (Continued)

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Instrumentation & Control (I&C) Systems (continued)			
- Other I&C Systems	Various systems	X	7.2, 7.3, 7.4
Support Systems			
- Class 1E Electric Power System	Same	3.6	8.1, 8.3
- Non-Class 1E Electric Power System	Same	X	8.2, 8.3
- Diesel Generator Auxiliary Systems	Same	3.6	9.5.4 thru 9.5.8
- Component Cooling Water (CCW) System	Same	3.7	9.2.2
- Service Water System (SWS)	Essential Water System, Non-essential Service Water System	3.8	7.4.1.4, 9.2.1
- Other Cooling Water Systems	None Identified	-	-
- Fire Protection Systems	Same	X	9.5.1
- Room Heating, Ventilating, and Air-Conditioning (HVAC) Systems	Same	X	9.4.1 thru 9.4.10
- Instrument and Service Air Systems	Compressed Air Systems	X	9.3.1
- Refueling and Spent Fuel Systems	Spent Fuel Pool Cooling and Cleanup System, Fuel Handling System	X	9.1.3, 9.1.4
- Radioactive Waste Systems	Radioactive Waste Management Systems	X	11
- Radiation Protection Systems	Same	X	12

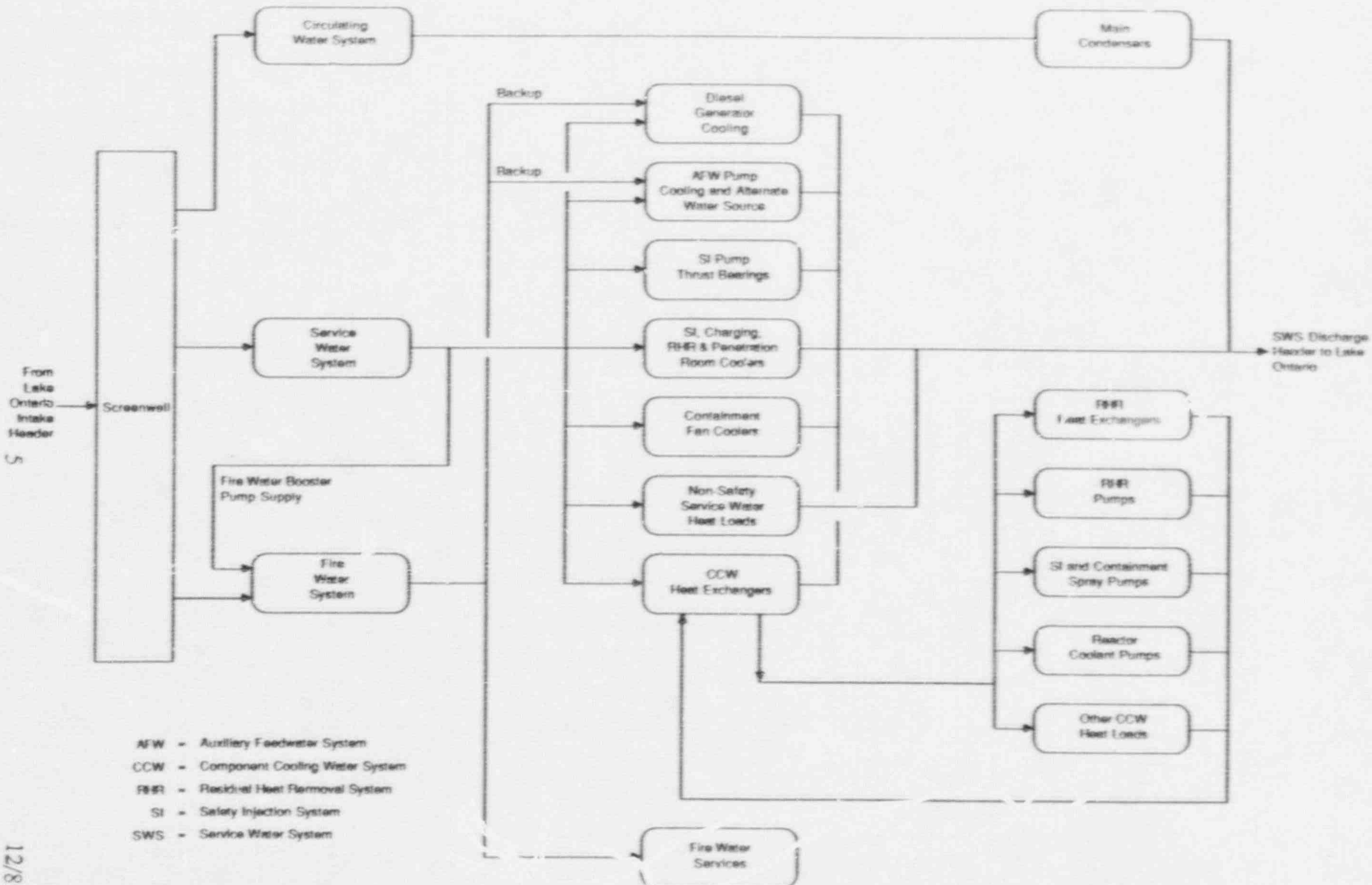


Figure 3-1. Cooling Water Systems Functional Diagram for Ginna

3.1 REACTOR COOLANT SYSTEM (RCS)

3.1.1 System Function

The RCS transfers heat from the reactor core to the secondary coolant system via the steam generators. The RCS pressure boundary also establishes a boundary against the uncontrolled release of radioactive material from the reactor core and primary coolant.

3.1.2 System Definition

The RCS includes: (a) the reactor vessel, (b) two parallel reactor coolant loops, (c) two reactor coolant pumps, (d) the primary side of the steam generators (e) a pressurizer, and connected piping out to a suitable isolation valve boundary. An isometric drawing of a two-loop Westinghouse RCS is shown in Figure 3.1-1. Simplified diagrams of the RCS and important system interfaces are shown in Figures 3.1-2 and 3.1-3. A summary of data on selected RCS components is presented in Table 3.1-1.

3.1.3 System Operation

During power operation, circulation in the RCS is maintained by one reactor coolant pump in each of the two reactor coolant loops. RCS pressure is maintained within a prescribed band by the combined action of pressurizer heaters and pressurizer spray.

At power, core heat is transferred to secondary coolant (feedwater) in the steam generators. The heat transfer path to the ultimate heat sink is completed by the main steam and power conversion system and the circulating water system.

Following a transient or small LOCA (if RCS inventory is maintained), reactor core heat is still transferred to secondary coolant in the steam generators. Flow in the RCS is maintained by the reactor coolant pumps or by natural circulation. The heat transfer path to the ultimate heat sink can be established by using the secondary steam relief system to vent main steam to atmosphere when the power conversion and circulating water systems are not available. If reactor core heat removal by this alternate path is not adequate, the RCS pressure will increase and a heat balance will be established in the RCS by venting steam or reactor coolant to the quench tank through the pressurizer relief valves. There are two power-operated relief valves and two safety valves on the pressurizer. A continued inability to establish adequate heat transfer to the steam generators will result in a LOCA-like condition (i.e., continuing loss of reactor coolant through the pressurizer relief valves). Repeated cycling of these relief valves has resulted in valve failure (i.e., relief valve stuck open).

Following a large LOCA, reactor core heat is dumped to the containment as reactor coolant and ECCS makeup water spills from the break. For a short period, the containment can act as a heat sink; however, the containment cooling systems must operate in order to complete a heat transfer path to the ultimate heat sink.

3.1.4 System Success Criteria

The RCS "success" criteria can be represented in terms of LOCA and transient mitigation, as follows:

- An unmitigatable LOCA is not initiated.
- If a mitigatable LOCA is initiated, then LOCA mitigating systems are successful.

- If a transient is initiated, then either:
  - RCS integrity is maintained and transient mitigating systems are successful, or
  - RCS integrity is not maintained, leading to a LOCA-like condition (i.e. stuck-open safety or relief valve, reactor coolant pump seal failure), and LOCA mitigating systems are successful.

3.1.5 Component Information

A. RCS
   1. Total system volume, including pressurizer: unknown
   2. Normal operating pressure: 2235 psig

B. Pressurizer
   1. Water volume, full power: 480 ft^3
   2. Steam volume, full power: 320 ft^3

C. Reactor Coolant Pumps (2)
   1. Rated flow: 90,000 gpm @ 282 ft. head (122 psid)
   2. Type: In-line pumps

D. Power-Operated Relief Valves (2)
   1. Set pressure: 2335 psig
   2. Relief capacity: 179,000 lb/hr (each)

E. Safety Valves (2)
   1. Set pressure: 2485 psig
   2. Relief capacity: 288,000 lb/hr (each)

F. Steam Generators (2)
   1. Type: Vertical shell and U-tube
   2. Heat Transfer Rate: 5.204×10^9 Btu/hr (total)

3.1.6 Support Systems and interfaces

A. Motive Power
   1. The reactor coolant pumps are supplied from Non-Class 1E switchgear.
   2. There are two banks pressurizer heaters: A and B. These are Class 1E AC loads that can be supplied from the standby diesel generators as described in Section 3.7.

B. Reactor Coolant Pump Seal Injection Water System
   The chemical and volume control system supplies seal water to cool the reactor coolant pump shaft seals and to maintain a controlled in-leakage of seal water into the RCS. Loss of seal water flow may result in RCS leakage through the pump shaft seals which will resemble a small LOCA.

C. Cooling for reactor coolant pumps is provided from the component cooling water system (see Section 3.8).

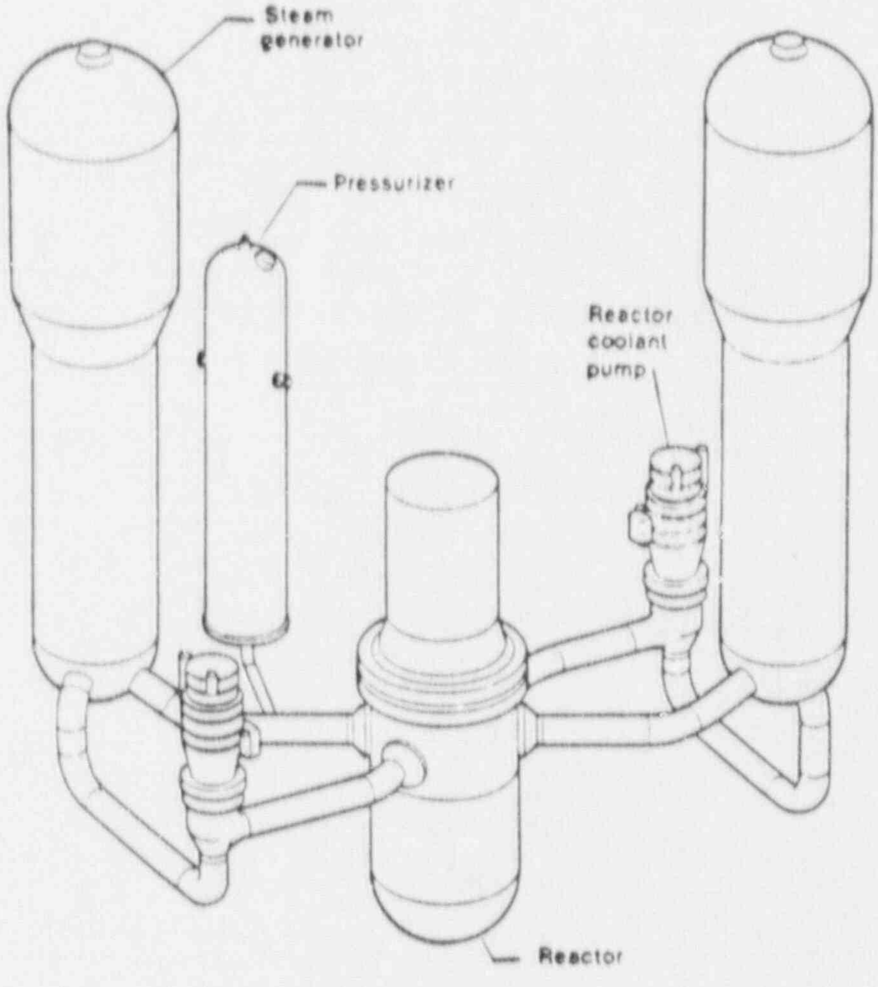


Figure 3.1-1. Isometric View of a 2-Loop Westinghouse RCS.

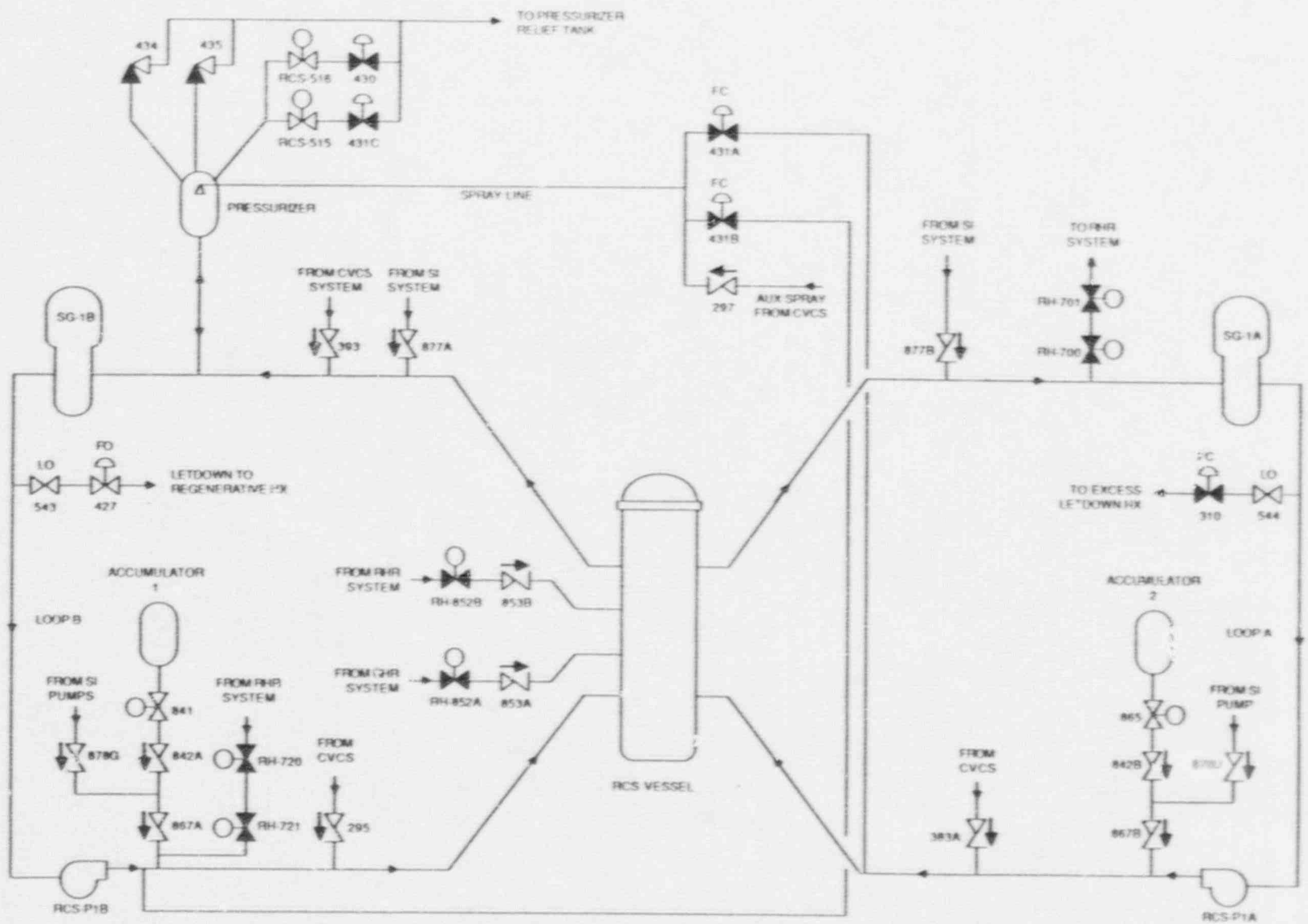


Figure 3.1-2. Ginna Reactor Coolant System (RCS)

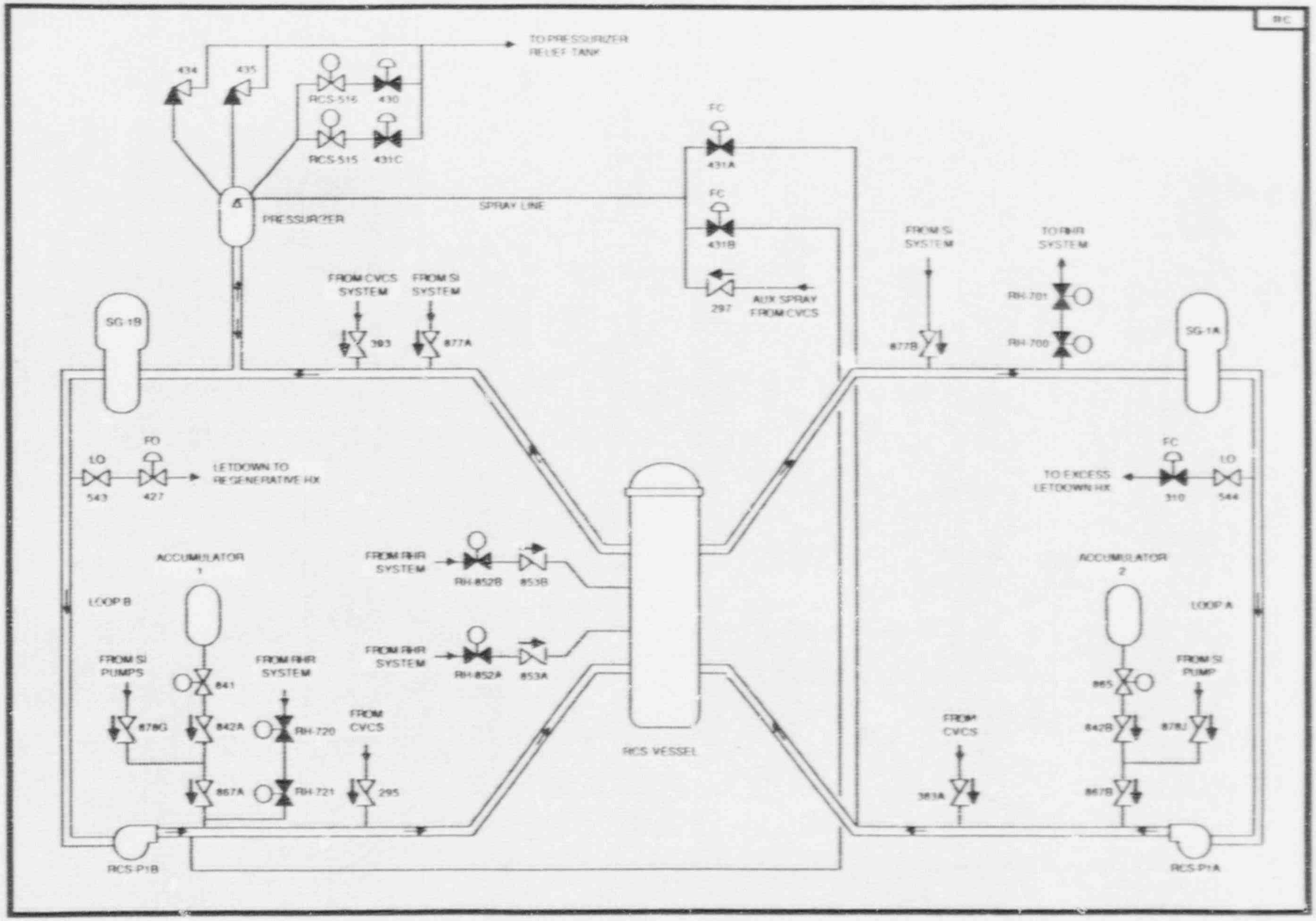


Figure 3.1-3. Ginna Reactor Coolant System (RCS) Showing Component Locations

Table 3.1-1. Ginna Reactor Coolant System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
RCS-430	NV	RC	EP-CBP1A	125	CR	DC/1A
RCS-431C	NV	RC	EP-CBP1B	125	CR	DC/1B
RCS-515	MOV	RC	MCC 1C	480	AB	AC/1A
RCS-516	MOV	RC	MCC 1D	480	AB	AC/1B
RCS-VESSEL	RV	RC				

3.2 AUXILIARY FEEDWATER SYSTEM (AFWS) AND SECONDARY STEAM RELIEF SYSTEM (SSRS)

3.2.1 System Function

The AFWS provides a source of feedwater to the steam generators to remove heat from the reactor coolant system (RCS) when: (a) the main feedwater system is not available, and (b) RCS pressure is too high to permit heat removal by the residual heat removal (RHR) system. The Secondary Steam Relief System (SSRS) provides a steam vent path from the steam generators to the atmosphere, thereby completing the heat transfer path to an ultimate heat sink when the main steam and power conversion systems are not available. Together, the AFWS and SSRS constitute an open-loop fluid system that provides for heat transfer from the RCS following transients and small-break LOCAs.

3.2.2 System Definition

The AFWS consists of a main system and a standby system. The main AFWS consists of two subsystems. One subsystem utilizes a turbine-driven pump, the other utilizes two motor-driven pumps. Both subsystems can deliver feedwater to both steam generators. A normally closed crosstie exists between the two subsystems. The turbine-driven pump can be supplied with steam from either steam line A or B. Each pump is sufficient to deliver adequate flow to the steam generators. The standby AFWS consists of two motor-driven pumps located in a room separate from the main AFWS. Each standby pump is also sufficient to deliver adequate flow to the steam generators.

The primary water supply for the AFWS pumps is the condensate storage tanks (CSTs). As a backup, the service water system can supply water to AFW pump suctions.

The SSRS consists of four safety valves and one pneumatically-operated atmospheric dump valve on each of the two main steam lines.

Simplified drawings of the main AFWS and the SSRS are shown in Figures 3.2-1 and 3.2-2. Simplified drawings of the standby AFWS are shown in Figures 3.2-3 and 3.2-4 A summary of data on selected AFWS components is presented in Table 3.2-1.

3.2.3 System Operation

During normal operation the AFWS is in standby. The motor-driven pumps are started on either a low-low level in any steam generator, a safety injection signal, or a trip of both main feedwater pumps. The turbine-driven pump will start on either a low-low level in any two steam generators or a complete loss of electrical power on both 4.16 kV buses.

Water to the pump suction is provided by two CSTs, with the service water system as a back-up. The capacity of the CSTs are 30,000 gallons each. Makeup to these CSTs can be provided from a 100,000 gallon CST, or the condenser hotwell. An unlimited supply of makeup water is also available from Lake Ontario via the service water system. An alarm is provided on each CST to indicate that the 22,500 gallon level has been reached and that makeup to the tank is required.

All pumps have sufficient head to deliver their rated capacity to the steam generators at the safety valve setpoint. At any pressure condition, steam from either main steam line A or B will be adequate for operation of the turbine-driven pump.

The standby AFWS is also normally in standby and can provide independent auxiliary feedwater capability. The standby AFWS is actuated in the event of a high energy line break in the main AFWS or a 2 out of 3 low-low level in either steam generator. Suction to the AFWS backup pumps is provided from station service water, with a 10,000 gallon auxiliary condensate storage tank also available. In the event the service water is lost, a hose connection for water supply from the fire water system can be established.

There are both AC and DC powered lube oil pumps that provide lube oil for the turbine-driven pump bearings. The lube oil is cooled by pumping it through a heat exchanger which is cooled by the SWS. In the event of a loss of AC power, SWS cooling is lost and the DC lube oil pump will circulate uncooled lube oil to the turbine-driven AFW pump. It has been determined that the turbine-driven pump can operate for at least two hours at full capacity without lube oil cooling.

Auxiliary feedwater control is accomplished manually by means of an air-operated control valve in each line to the steam generators. Should the air supply fail, parallel motor-operated valves can be utilized for flow control.

3.2.4 System Success Criteria

For the decay heat removal function to be successful, both the AFWS and the SSRS must operate successfully. The AFWS success criteria are the following (Refs. 1 and 2).

- Adequate makeup to one of two steam generators is required from any of the following sources.
  - The turbine driven main AFWS pump
  - Either of the two motor-driven main AFWS pumps.
  - Either of the two motor-driven standby AFWS pumps
- Condensate storage tank 1A and 1B, the yard fire hydrant system, or the service water system is an adequate source of water for the AFWS pumps.

3.2.5 Component Information

A. Motor-driven AFWS pumps 1A, 1B
   1. Rated flow: 200 gpm @ 3099 ft. head (1344 psid)
   2. Rated capacity: 100%
   3. Type: 3 Phase horizontal centrifugal

B. Motor-driven standby AFWS pumps 1C, 1D
   1. Rated flow: 200 gpm @ 2500 ft. head (1084 psid)
   2. Rated capacity: 100%
   3. Type: Horizontal centrifugal

C. Turbine-driven AFWS pump 1E
   1. Rated flow: 400 gpm @ 3099 ft. head (1344 psid)
   2. Rated capacity: 200%
   3. Type: Horizontal centrifugal

D. Condensate Storage Tanks 1A, 1B
   1. Capacity: 30,000 gallons each

E. Safety Valves (8)
   1.Capacity 785,000 lb/hr @ 1085 psig

F. Atmospheric Steam Dump Valves (2)
   1. Capacity 313,550 lb/hr @ 1060 psig (normal)

3.2.6 Support Systems and Interfaces

A. Control Signals

1. Automatic
   The main AFW motor-driven pumps are automatically actuated on either a 2-out-of-3 low-low level in any steam generator, a safety injection signal, or a trip of both main feedwater pumps. The AFW turbine-driven pump is automatically actuated on either a low-low level in any two steam generators or a complete loss of electrical power on buses 11A or 11B.
2. Remote manual
   The standby AFWS is started manually from the control room. Both the main and standby AFWS can be operated from the control room.

B. Motive Power

1. The motor driven main and standby AFWS pumps and motor-operated valves are Class 1E loads that can be supplied from the standby diesel generators as described in Section 3.7. (See Table 3.7-2)
2. The turbine-driven pump is supplied with steam from the main steam lines of either steam generator A or B upstream of the main steam line isolation valves. The power and controls for the steam supply valves are assumed to be supplied from the Class 1E DC system.

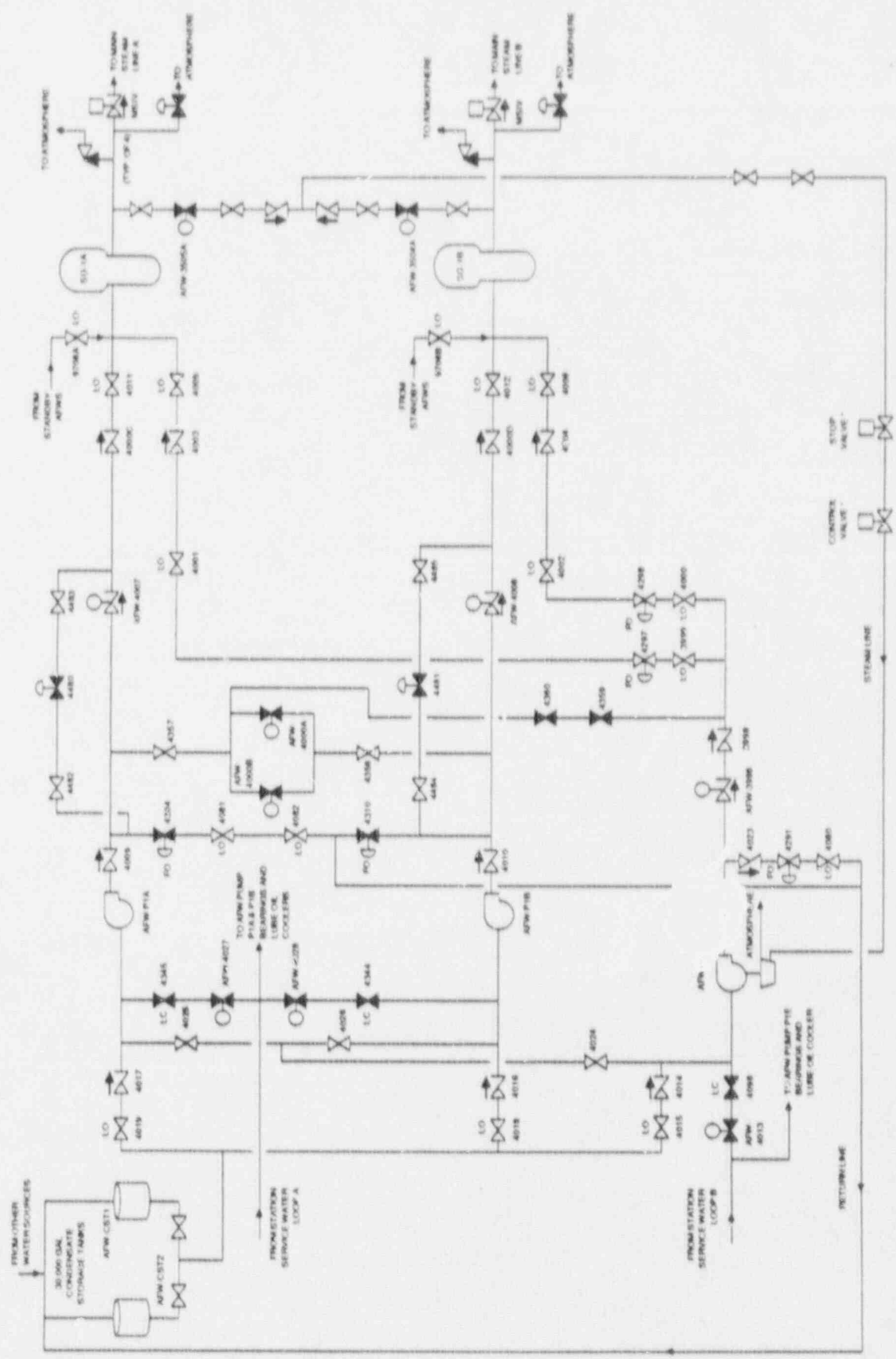
C. Other

1. Cooling for the motor-driven main AFWS pump bearings and lube oil coolers are provided by station service water loop A.
2. Cooling for the turbine-driven main AFWS pump bearings and lube oil cooler is provided by station service water loop B.
3. Lubrication and cooling are provided locally for the standby AFWS pumps.
4. The service water system is the backup water source for the AFWS, and the primary water source for the standby AFWS (see Section 3.9).
5. The fire water system can be aligned as a backup water source for the standby AFWS (see Section 3.10).
6. Systems for AFWS pump room cooling have not been identified.

3.2.7 Section 3.2 References

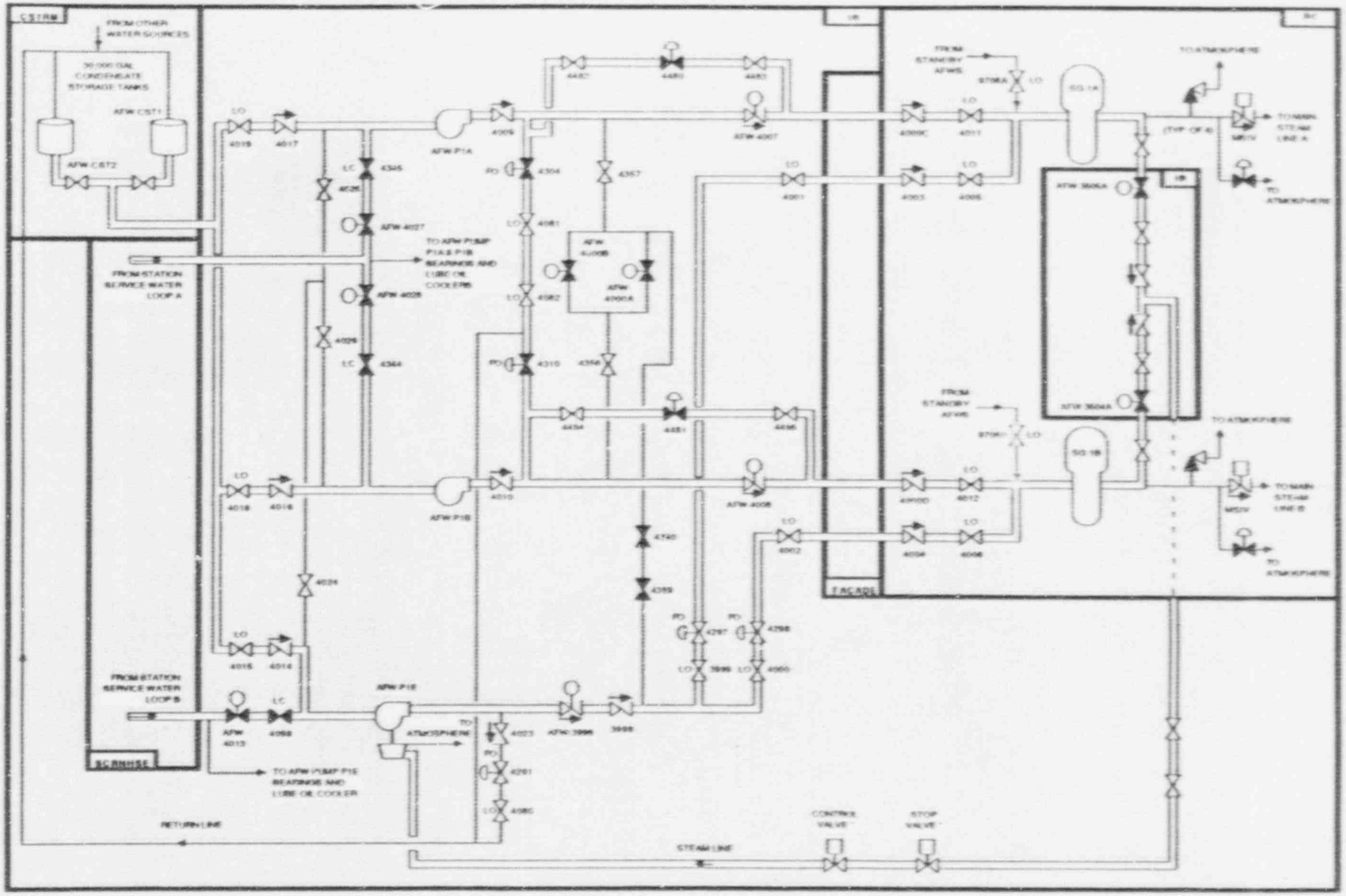
1. R. E. Ginna Safety Analysis Report, Sec. 10.5

2. NUREG-0611, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in Westinghouse-Designed Operating Plants, Appendix X.6, "Ginna Auxiliary Feedwater System", USNRC, January 1980.



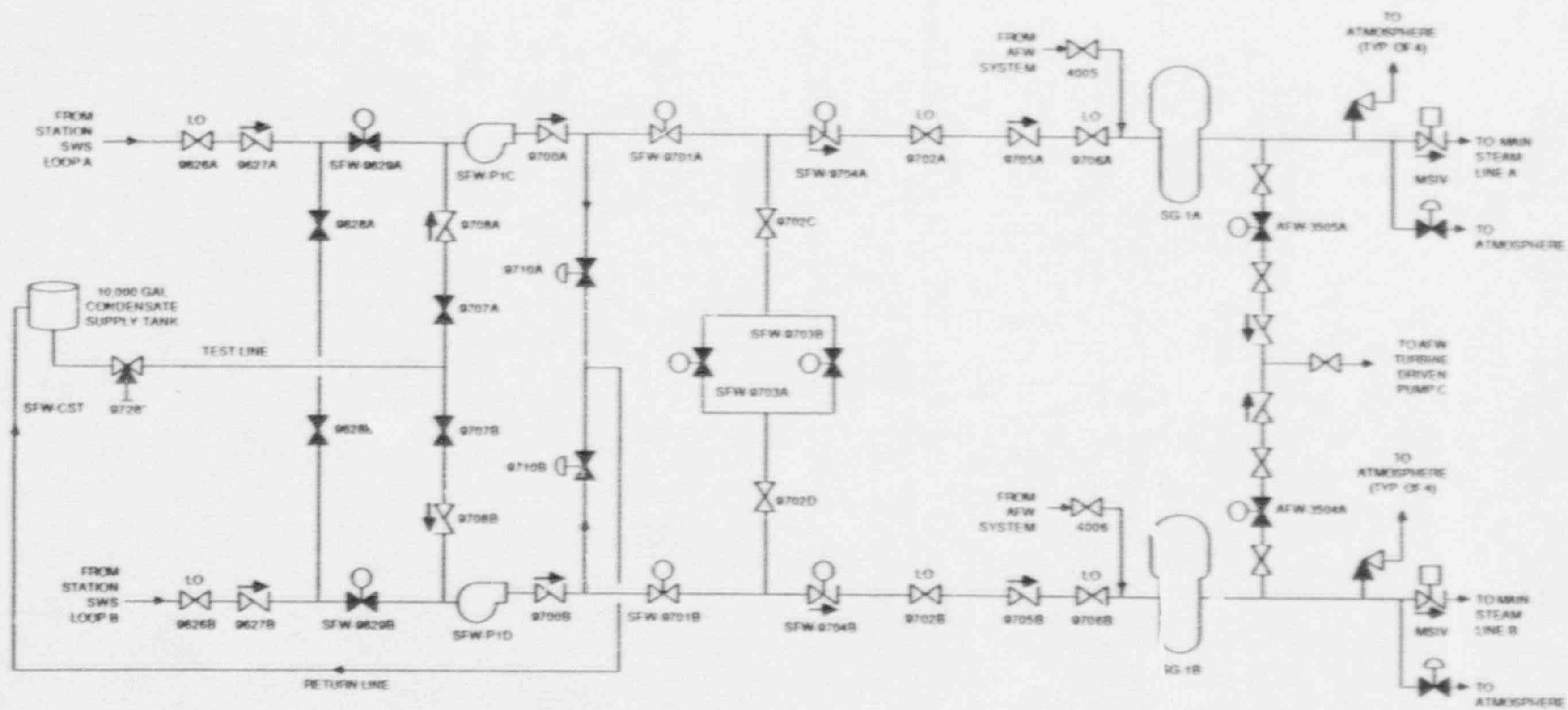
*Valve Type Is Assumed To Be Hydraulic

Figure 3.2-1. Ginna Auxiliary Feedwater System (AFW)



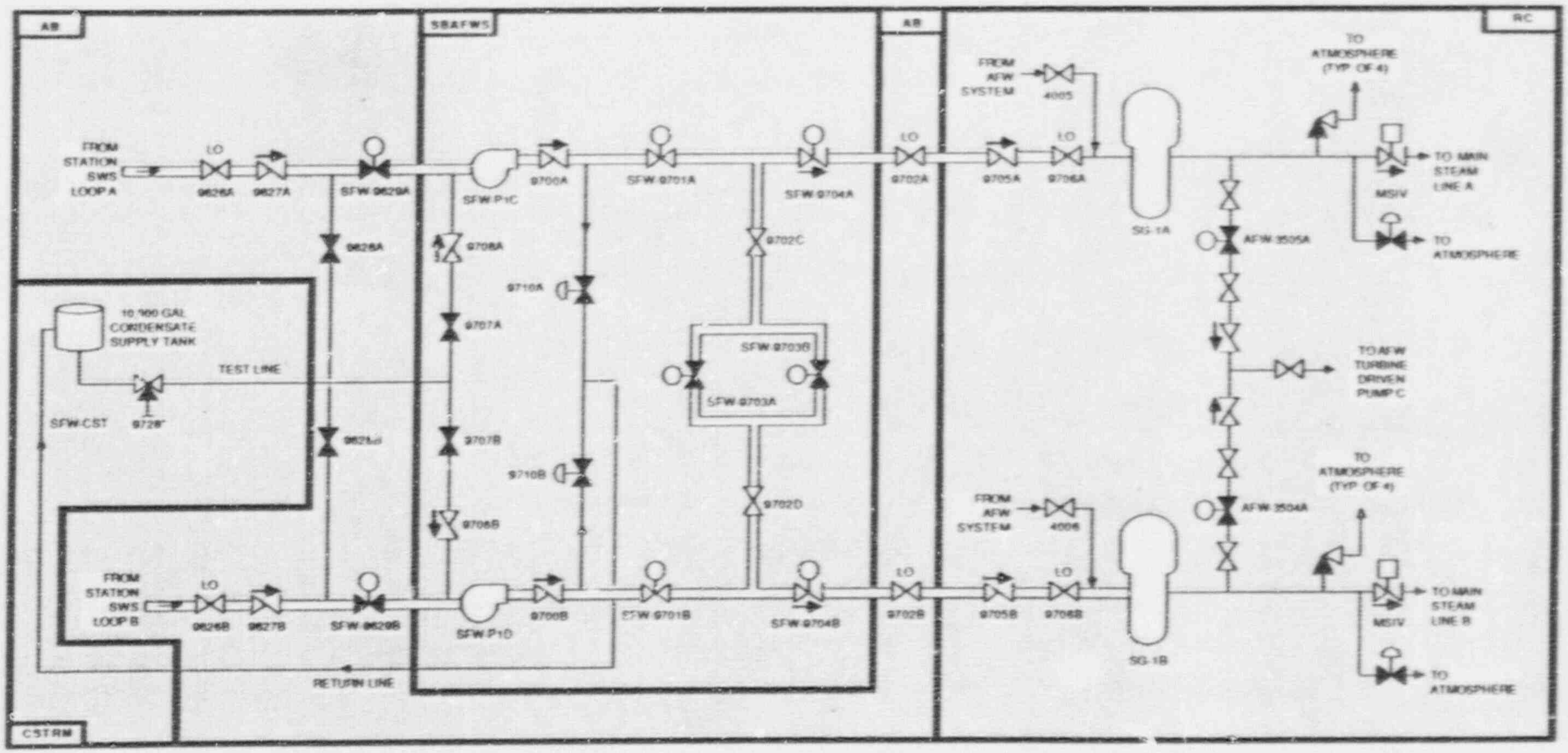
* Valve Type Is Assumed To Be Hydraulic

Figure 3.2-2. Ginna Auxiliary Feedwater System (AFW) Showing Component Locations



* Valve 9728 is capped

Figure 3.2-3. Ginna Standby Auxiliary Feedwater System (SFW)



* Valve 9728 is capped

Figure 3.2-4. Ginna Standby Auxiliary Feedwater System (SFW) Showing Component Locations

Table 3.2-1. Ginna Auxiliary Feedwater System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
AFW-3504A	MOV	IB	DC-MAIN 1B	125	BATRMB	DC/1B
AFW-3505A	MOV	IB	DC-MAIN 1A	125	BATRMA	DC/1A
AFW-3996	MOV	IB	DC-MAIN 1B	125	BATRMB	DC/1B
AFW-4000A	MOV	IB	MCC 1L	480	AB	AC/1A
AFW-4000B	MOV	IB	MCC 1M	480	AB	AC/1B
AFW-4007	MOV	IB	MCC 1C	480	AB	AC/1A
AFW-4008	MOV	IB	MCC 1D	480	AB	AC/1B
AFW-4013	MOV	IB	MCC 1D	480	AB	AC/1B
AFW-4027	MOV	IB	MCC 1C	480	AB	AC/1A
AFW-4028	MOV	IB	MCC 1D	480	AB	AC/1B
AFW-CST1	TANK	CSTRM				
AFW-CST2	TANK	CSTRM				
AFW-P1A	MDP	IB	BUS 14	480	AB	AC/1A
AFW-P1B	MDP	IB	BUS 16	480	AB	AC/1B
AFW-P1E	TDP	IB				
SFW-9629A	MOV	AB	MCC 1L	480	AC	AC/1A
SFW-9629B	MOV	AB	MCC 1M	480	AB	AC/1B
SFW-9701A	MOV	SBAFWS	MCC 1L	480	AB	AC/1A
SFW-9701B	MOV	SBAFWS	MCC 1M	480	AB	AC/1B
SFW-9703A	MOV	SBAFWS	MCC 1L	480	AB	AC/1A
SFW-9703B	MOV	SBAFWS	MCC 1M	480	AB	AC/1B
SFW-9704A	MOV	SBAFWS	MCC 1L	480	AB	AC/1A
SFW-9704B	MOV	SBAFWS	MCC 1M	480	AB	AC/1B
SFW-P1C	MDP	SBAFWS	BUS 14	480	AB	AC/1A
SFW-P1D	MDP	SBAFWS	BUS 16	480	AB	AC/1B
SG-1A	SG	RC				
SG-1B	SG	RC				

3.3 EMERGENCY CORE COOLING SYSTEM (ECCS)

3.3.1 System Function

The ECCS, or Safety Injection System (SIS), is an integrated set of subsystems that perform emergency coolant injection and recirculation functions to maintain reactor core coolant inventory and adequate decay heat removal following a LOCA. The coolant injection function is performed during a relatively short-term period after LOCA initiation, followed by realignment to a recirculation mode of operation to maintain long-term, post-LOCA core cooling. Heat from the reactor core is transferred to the containment. The heat transfer path to the ultimate heat sink is completed by heat exchangers in the residual heat removal system or by the containment heat removal systems (see Section 3.5).

3.3.2 System Definition

The emergency coolant injection (ECI) function is performed by the following subsystems:

- Accumulators
- Safety Injection System (high pressure)
- Residual Heat Removal System (low pressure)

There are two accumulators, one attached to each cold leg, that discharge their contents when RCS pressure drops below the tank pressure. The safety injection system (SIS) consists of three motor-driven pumps that deliver water into two separate injection loops. Each loop directs flow into a separate cold leg of the RCS. The RHR system consists of two motor-driven pumps that deliver water directly to the reactor vessel or to the loop B RCS cold leg. During recirculation, the RHR pumps can also deliver water to the suction of the containment spray and safety injection pumps. The RHR pumps also provide the shutdown cooling function. The Refueling Water Storage Tank (RWST) is the water source for the ECCS pumps during the injection phase. However, the safety injection pumps initially take suction from the boric acid tanks. During recirculation, the RHR pumps take a suction on the containment sump.

Simplified drawings of the safety injection system are shown in Figures 3.3-1 and 3.3-2. The RHR system is shown in Figures 3.3-3 and 3.3-4. The charging system is discussed in Section 3.4. A summary of data on selected ECCS components is given in table 3.3-1.

3.3.3 System Operation

During normal operation, the ECCS is in standby. The ECCS pumps are automatically actuated by any of the following Safety Injection Signals:

- Low pressurizer pressure on two of three detectors
- High containment pressure on two of three detectors
- Two of the three low steam line pressures
- Manual actuation

The accumulators constitute a passive injection system, discharging their contents automatically when RCS pressure drops below the tank pressure. Sufficient borated water is supplied in the two tanks to rapidly fill the volume outside of the core barrel below the nozzles, the bottom plenum, and a portion of the core with the contents of one tank assumed to be lost through the break. During injection, the safety injection pumps take a suction from the two boric acid tanks until a low level of 10% is reached. Suction for the safety injection pumps is then redirected by suction valves to the RWST.

The RHR pumps take a suction on the RWST and deliver borated water directly to the reactor vessel and/or the loop B RCS cold leg. The relative importance of the safety injection pumps is increased for small breaks when the RCS is still at high pressure, while the RHR pumps are important in responding to large breaks.

When the RWST reaches a low level alarm set point, the operator takes action to begin the recirculation phase. The RHR pumps take suction on the containment sump and deliver through the RHR heat exchangers directly to the reactor vessel and to the suctions of the containment spray and safety injection pumps. Interjection directly into the reactor vessel only occurs when RCS pressure is less than RHR pump shutoff head. At higher RCS pressure, the high pressure recirculation lineup, with an RHR pump and an SI pump in tandem, is used.

3.3.4 System Success Criteria

The success criteria for the ECCS is not clearly defined in the Ginna FSAR (Ref. 1). LOCA mitigation requires both the emergency coolant injection (ECI) and emergency coolant recirculation (ECR) functions. The two accumulators, three positive displacement charging pumps, three safety injection pumps, and two residual heat removal pumps are all utilized to respond to both large and small LOCAs, with the accumulators and RHR pumps more important for large LOCAs and the charging and safety injection pumps more important for small LOCAs. The ECCS is designed to be successful with a single active failure and one RCS loop assumed to be out of service due to the break.

The RWST is required for system success during the injection phase. The containment sump and one of two RHR pumps is required for system success during the recirculation phase.

For small LOCAs that do not result in RCS depressurization below the safety injection pump shutoff head the RCS must be depressurized by other means if the safety injection pumps are to provide makeup. Options for depressurizing the RCS may include:

- Opening power-operated relief valves on the pressurizer (two PORVs are available, see Section 3.1)
- PCS cooldown (i.e. using auxiliary feedwater system, see Section 3.2)

3.3.5 Component Information

A. Safety Injection pumps 1A, 1B, 1C (3)
   1. Rated flow: 300 gpm @ 2700 ft. head (1170 psid)
   2. Maximum flow: 600 gpm
   3. Shutoff head: 3500 ft. (1517 psid)
   4. Type: Horizontal centrifugal

B. Residual Heat Removal pumps 1A, 1B (2)
   1. Rated flow: 1560 gpm @ 280 ft. head
   2. Maximum flow: 2500 gpm
   3. Shutoff head: 410 psig
   4. Type: Horizontal centrifugal

C. Accumulators (2)
   1. Volume, Total: 1750 ft^3
   2. Minimum water volume: 1108 ft^3
   3. Normal operating pressure: 760 psig

D. Refueling Water Storage Tank
   1. Capacity: 388,000 gallons
   2. Operating pressure: atmospheric

E. Boric Acid Tanks (2)
   1. Volume: 3600 gallons each
   2. Operating temp: 2250°F

F. RHR Heat Exchangers (2)
   1. Type: Vertical shell and U-tube
   2. Heat transferred 2.415 X 10^7 Btu/hr (total)

3.3.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The ECCS subsystems are automatically actuated on any of the following safety injection signals.

      - Low pressurizer pressure on two of three detectors
      - High containment pressure on two of three detectors
      - Low steam pressure on two of three detectors
      - Manual actuation

      The SIAS automatically initiates the following actions:

      - reactor trip
      - starts the diesel generators
      - starts the safety injection and RHR pumps
      - opens the AFWS steam isolation valves
      - produces a phase A containment isolation signal

   2. Remote manual
      a. A safety injection signal can be initiated by remote manual means from the control room. ECCS operation can be initiated by remote manual means.
      b. The switchover to the recirculation mode requires operator action.

B. Motive Power
   All ECCS motor driven pumps and motor operated valves are Class 1E AC loads that can be supplied from the standby diesel generators as described in Section 3.7.

C. Other
   1. Cooling for the safety injection and RHR pumps is provided by the Component Cooling Water System (see Section 3.8).
   2. Safety injection pump thrust bearings are cooled by the service water system (see Section 3.9).
   3. ECCS pump room cooling is provided by local fan coolers in each pump room, with cooling water provided by the service water system (see Section 3.9).
   4. The RHR heat exchanges are cooled by the Component Cooling Water System (see Section 3.8).
   5. Makeup to the SI accumulators is by the SI pumps.
   6. Nitrogen supply provides SI accumulator pressurization.

3.3.7 Section 3.3 References

1. Ginna Final Safety Analysis Report, Sections 5.4.5, and 6.3.1

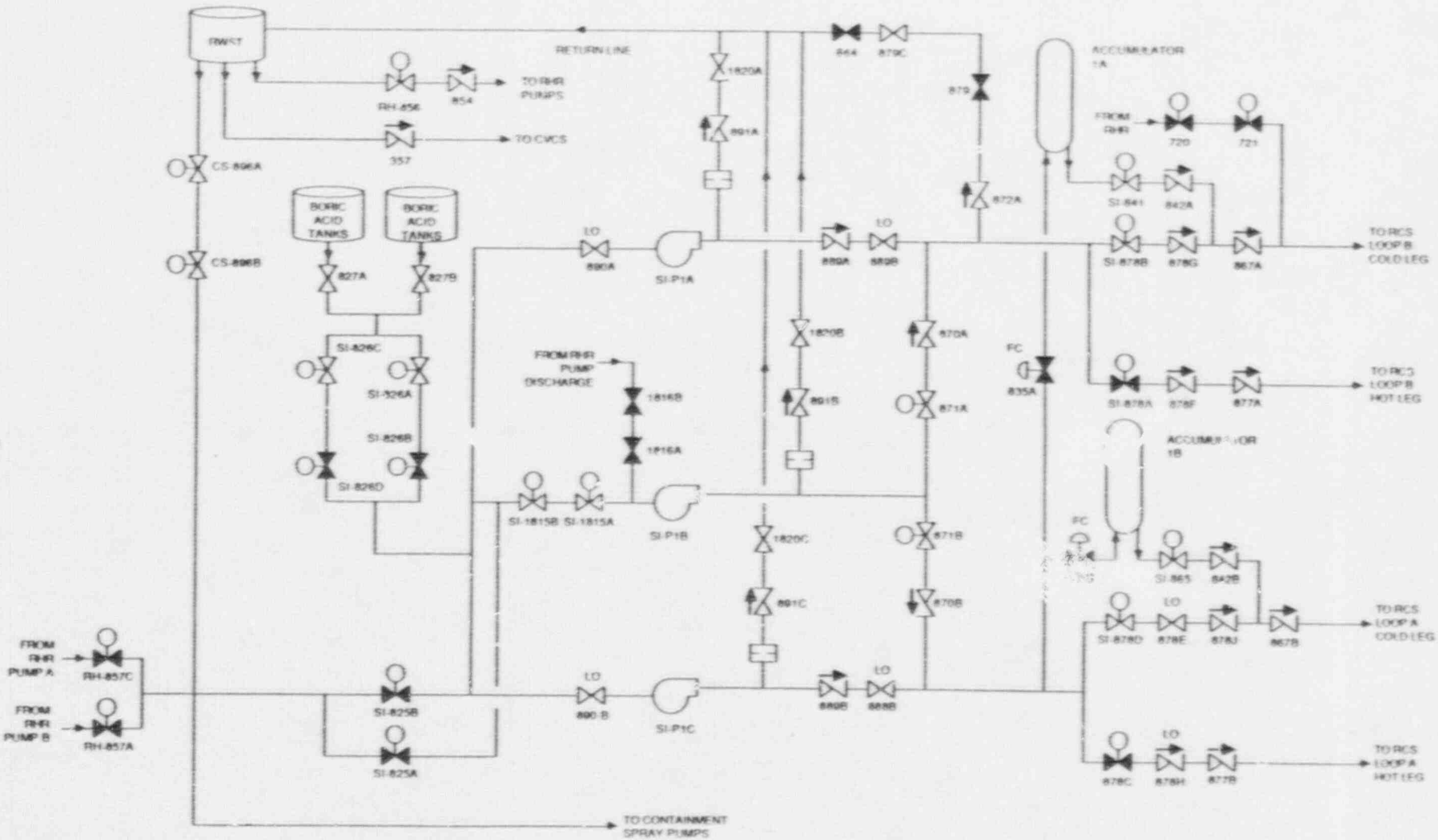


Figure 3.3-1. Ginna Safety Injection (SI) System

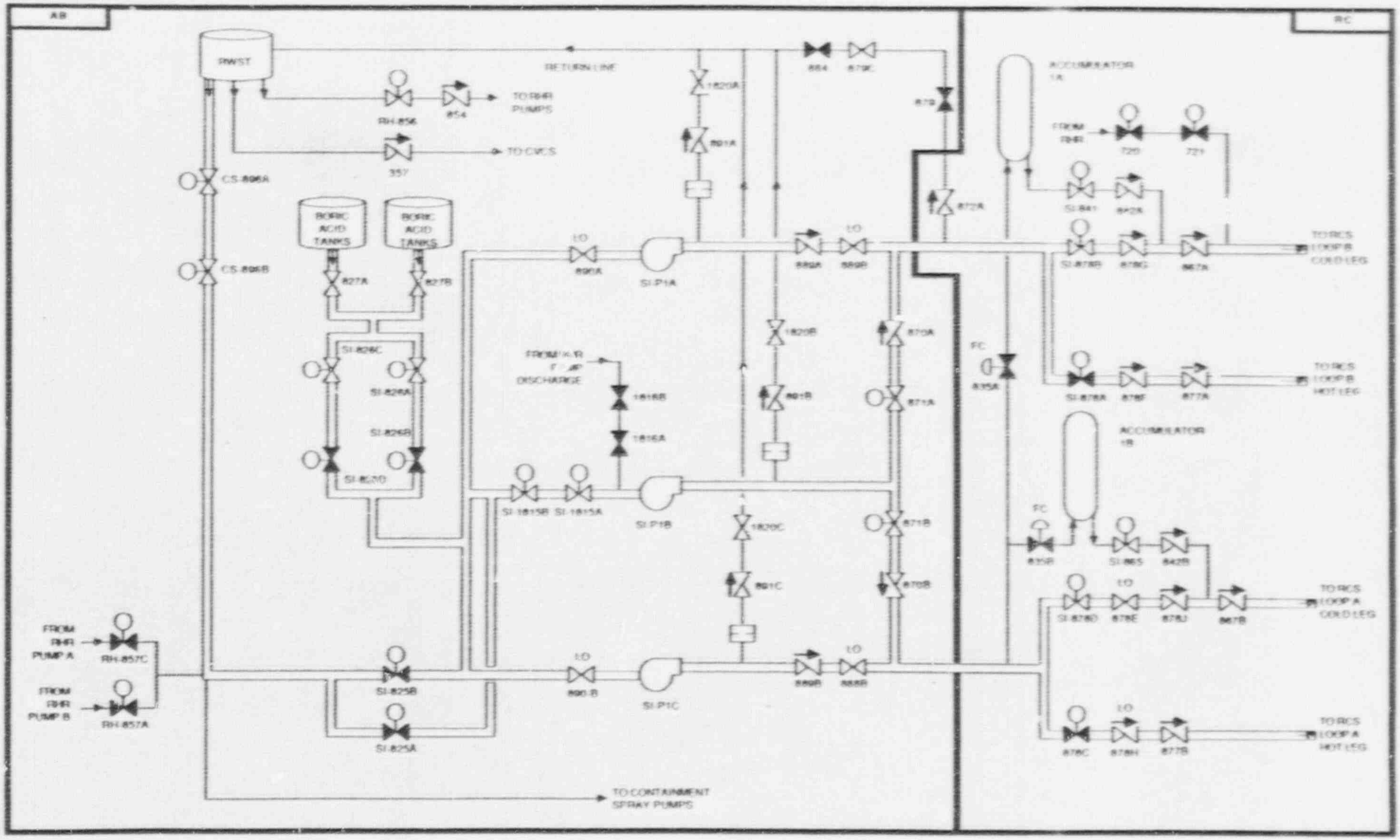


Figure 3.3-2. Ginna Safety Injection (SI) System Showing Component Locations

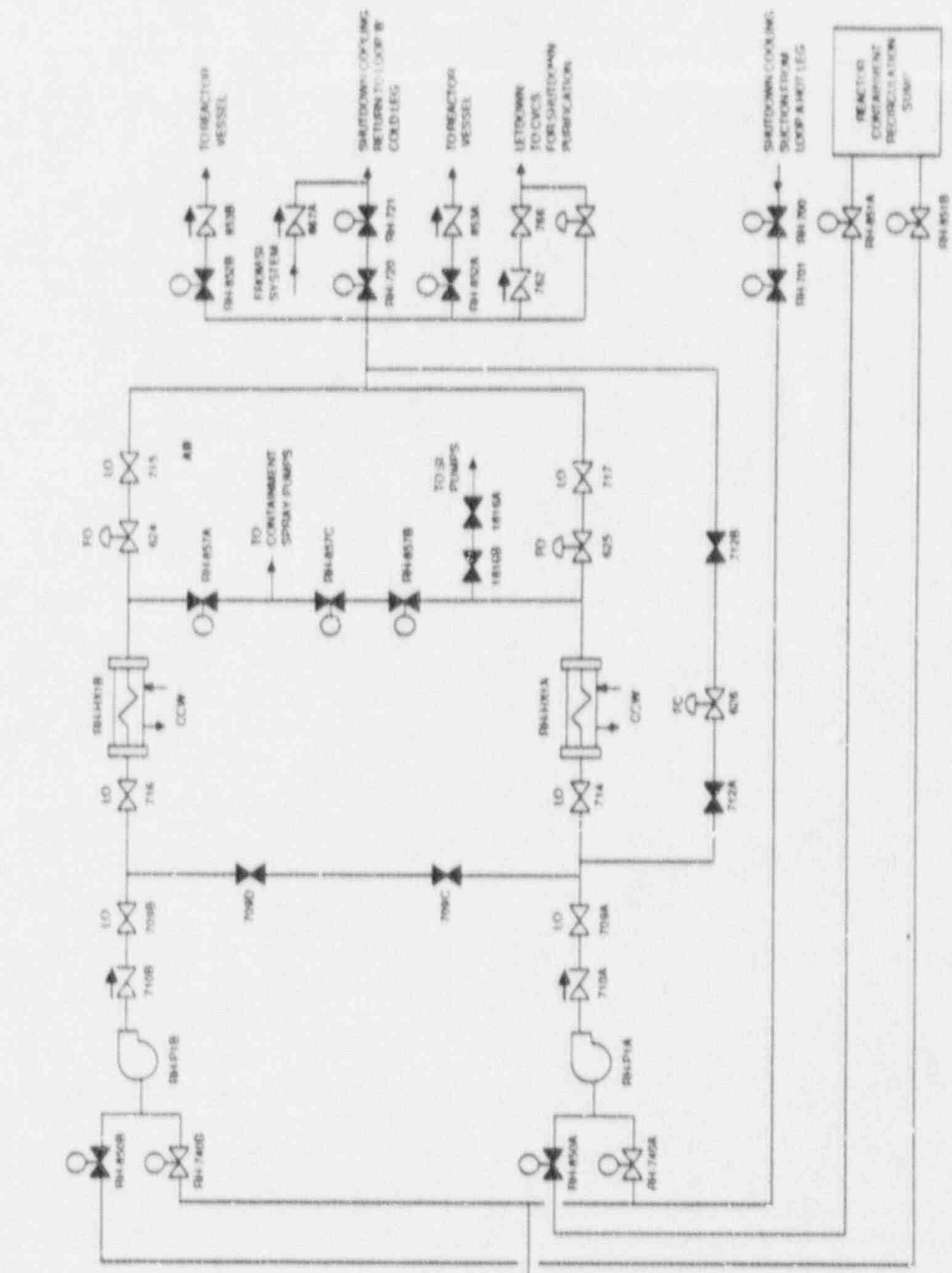


Figure 3.3-3. Ginna Residual Heat Removal (RHR) System

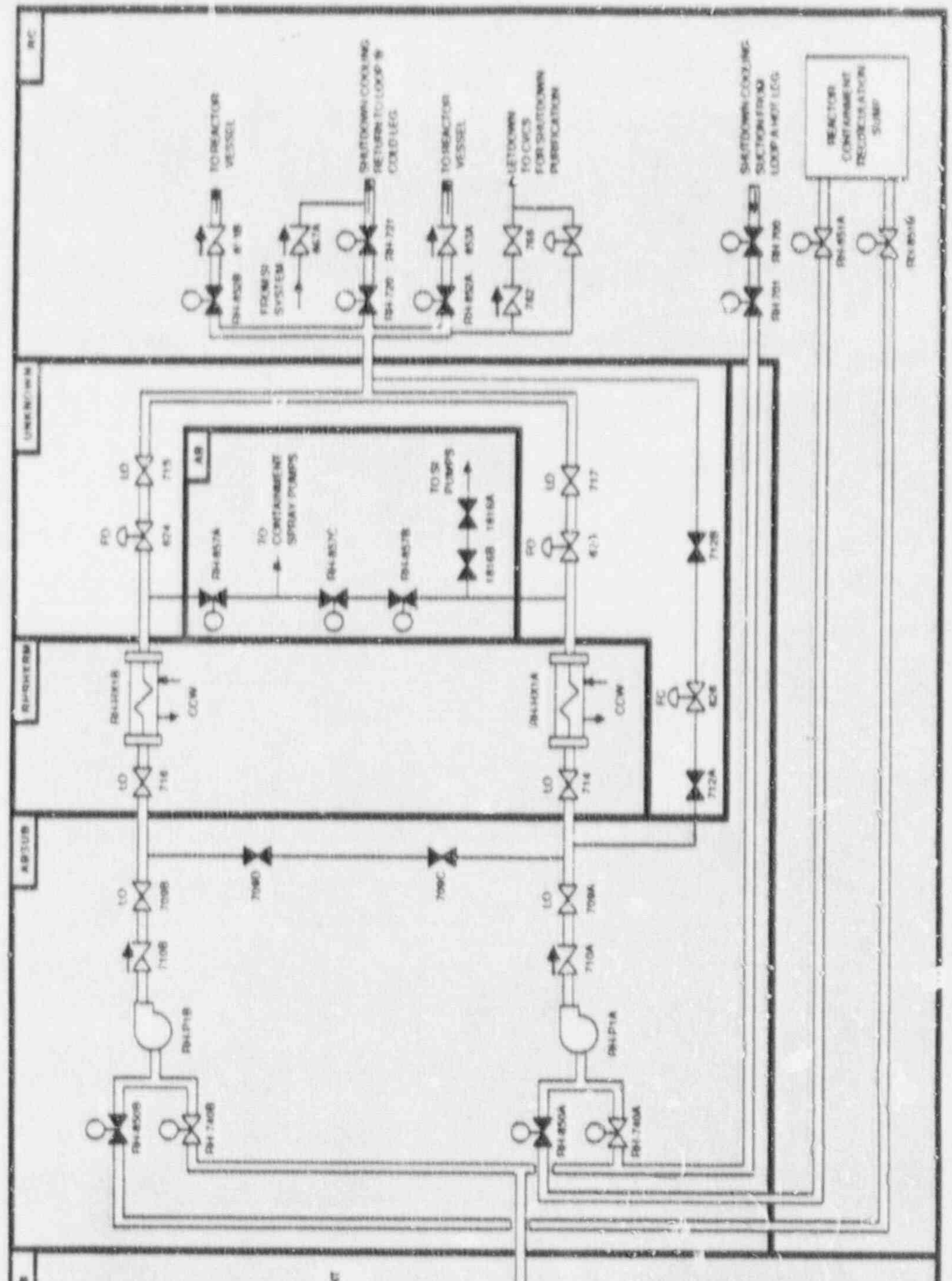


Figure 3.3-4. Ginna Residual Heat Removal (RHR) Syst_m Showing Component Locations

Table 3.3-1. Ginna Emergency Core Cooling System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
CS-896A	MOV	AB	MCC 1C	480	AB	AC/1A
CS-896B	MOV	AB	MCC 1D	480	AB	AC/1B
RH-700	MOV	RC	MCC 1C	480	AB	AC/1A
RH-701	MOV	RC	MCC 1D	480	AB	AC/1B
RH-720	MOV	RC	MCC 1C	480	AB	AC/1A
RH-721	MOV	RC	MCC 1D	480	AB	AC/1B
RH-850A	MOV	ABSUB	MCC 1C	480	AB	AC/1A
RH-850B	MOV	ABSUB	MCC 1D	480	AB	AC/1B
RH-851A	MOV	RC	MCC 1C	480	AB	AC/1A
RH-851B	MOV	RC	MCC 1D	480	AB	AC/1B
RH-857A	MOV	AB	MCC 1C	480	AB	AC/1A
RH-857B	MOV	AB	MCC 1D	480	AB	AC/1B
RH-857C	MOV	AB	MCC 1C	486	AB	AC/1A
RH-HX1B	HX	RHRHX				
RH-HX1B	HX	RHRHX				
RH-P1A	MDP	ABSUB	BUS 14	480	AB	AC/1A
RH-P1B	MDP	ABSUB	BUS 16	480	AB	AC/1B
SI-1815A	MOV	AB	MCC 1C	480	AB	AC/1A
SI-1815B	MOV	AB	MCC 1D	480	AB	AC/1B
SI-871A	MOV	AB	MCC 1D	480	AB	AC/1B
SI-871B	MOV	AB	MCC 1D	480	AB	AC/1B
SI-878A	MOV	RC	MCC 1C	480	AB	AC/1A
SI-878B	MOV	RC	MCC 1D	480	AB	AC/1B
SI-878C	MOV	RC	MCC 1C	480	AB	AC/1A
SI-878D	MOV	RC	MCC 1D	480	AB	AC/1B
SI-P1A	MDP	AB	BUS 14	480	AB	AC/1A
SI-P1B	MDP	AB	BUS 16	480	AB	AC/1B

Table 3.3-1. Ginna Emergency Core Cooling System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
SI-P1C	MDP	AB	BUS 16	480	AB	AC/AB

3.4 CHARGING SYSTEM (CVCS)

3.4.1 System Function

The charging system is part of the Chemical and Volume Control System (CVCS). The CVCS is responsible for maintaining the proper water inventory in the Reactor Coolant System, providing required seal water flow to the reactor coolant pump seals, and maintaining water purity and the proper concentration of neutron absorbing and corrosion inhibiting chemicals in the reactor coolant and to process the reactor coolant effluent for reuse of boric acid and makeup water. The makeup function of the CVCS is required to maintain the plant in an extended hot shutdown condition following a transient. The charging pump also are used in response to LOCAs.

3.4.2 System Definition

The CVCS consists of several subsystems that perform the functions of maintaining RCS coolant inventory control, coolant chemistry and purity control, and reactivity control. The charging system consists of three positive displacement charging pumps that, during normal operation, take a suction from the volume control tank and inject into the RCS. The normal charging path is through the regenerative heat exchanger.

Simplified drawings of the charging system are shown in Figures 3.4-1 and 3.4-2. A summary of data on selected charging system components is presented in Table 3.4-1.

3.4.3 System Operation

During normal operation, reactor coolant flows through the letdown line to the purification system and then is directed to the charging pumps for return to the RCS. Letdown flow from RCS cold leg B passes through the shell side of the regenerative heat exchanger for an initial temperature reduction. The pressure is then reduced by a letdown orifice. The cooled, low pressure water leaves the containment and enters the auxiliary building where it undergoes a second temperature reduction in the tube side of the nonregenerative heat exchanger, followed by a second pressure reduction by the low pressure letdown valve. Flow is then directed through various filters and ion exchangers before being sprayed into the volume control tank (VCT) where it is returned to the RCS by the charging pumps. The charging pumps can also take a suction on the RWST which is an alternate source of borated water.

The charging flow passes through the tube side of the regenerative heat exchanger for recovery of heat from the letdown flow before being returned to the RCS. Charging flow is directed to one of two normal charging lines: to the cold leg B or hot leg B. Should the charging line inside the reactor containment building be inoperative for any reason, the line may be isolated outside the containment, and the charging flow may be injected via the pressurizer auxiliary spray line. Flow may also be redirected to the alternate charging line connected to RCS cold leg A. A portion of the charging flow is filtered and injected into the reactor coolant pump seals.

3.4.4 System Success Criteria

The following success criteria for RCS makeup during normal operation are assumed to also apply for post-transient RCS makeup:

- 1 of 3 charging pumps taking suction on the VCT or the RWST is required for adequate post-transient makeup to the RCS.
- If the VCT is the charging water source, borated makeup must be provided from other sources prior to emptying the VCT.

3.4.5 Component Information

A. Charging pumps 1A, 1B, 1C
   1. Rated flow: 60 gpm @ 2385 psid
   2. Type: positive displacement

B. Refueling Water Storage Tank
   1. Capacity: 338,000 gallons
   2. Operating pressure: atmospheric

C. Boric Acid Tanks
   1. Volume: 3600 gallons each
   2. Operating pressure: atmospheric
   3. Operating temperature: 250°F

D. Volume control tank
   1. Volume: 1500 gallons
   2. Operating pressure: 75 psig internal/ 15 psig external
   3. Operating temperature: 250°F

3.4.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      A safety injection signal automatically starts all three charging pumps and causes pump suction to change from the VCT to the RWST.
   2. Remote manual
      The charging pumps and associated motor-operated valves can be actuated by remote means from the control room.

B. Motive Power
   The charging pumps and motor-operated valves of the CVCS are Class 1E AC loads that can be supplied from the standby diesel generators as described in Section 3.7.

C. Other
   1. Charging pump lubrication and cooling is assumed to be provided locally.
   2. Charging pump room cooling systems is provided by local room coolers that are cooled by the service water system (see Section 3.9).
   3. Charging pump seal leakoff tank holds charging pump leakage.

3.4.7 References

1. Ginna Final Safety Analysis Report, Section 9.3.4

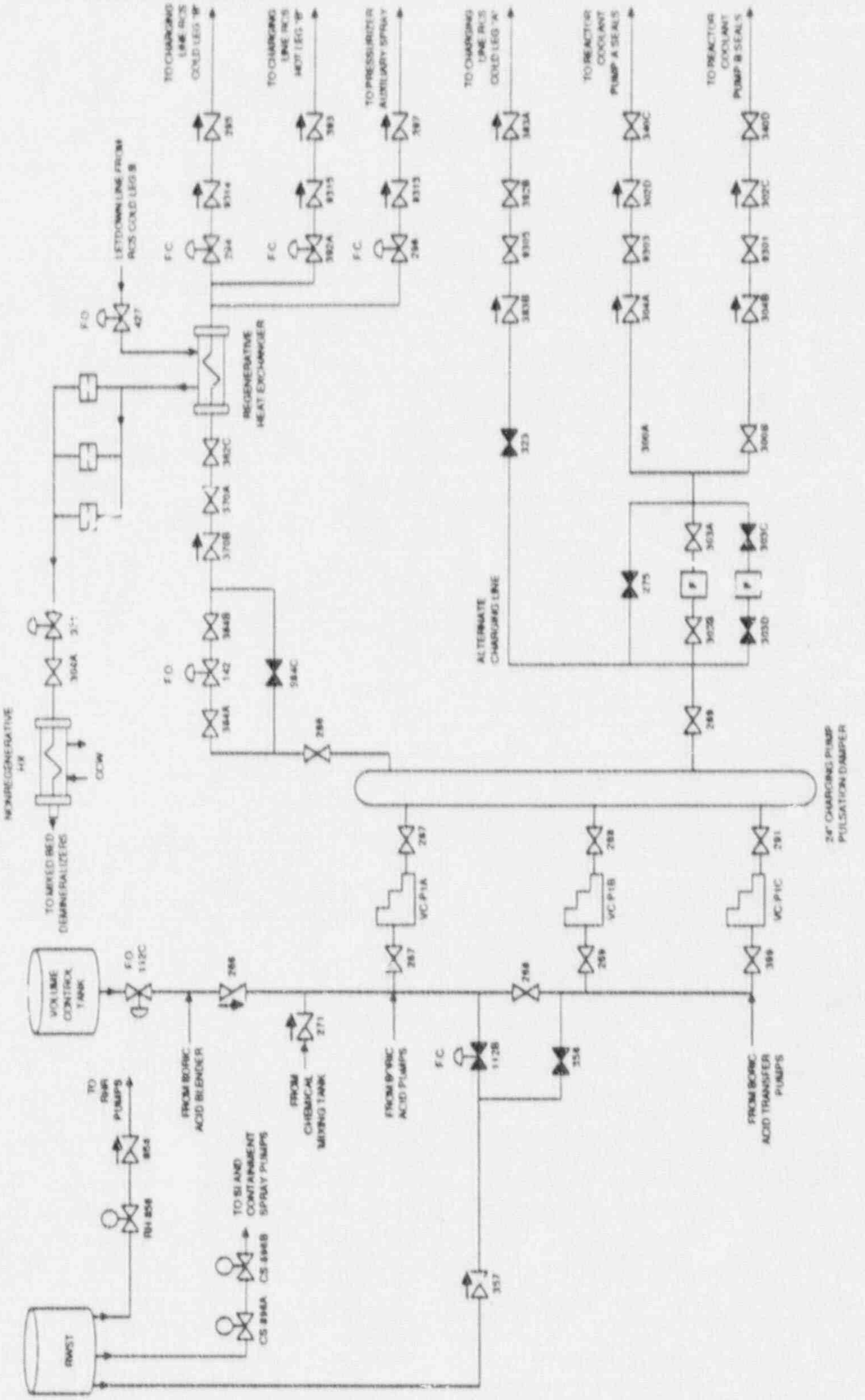


Figure 3.4-1. Ginna Charging System (CVCS)

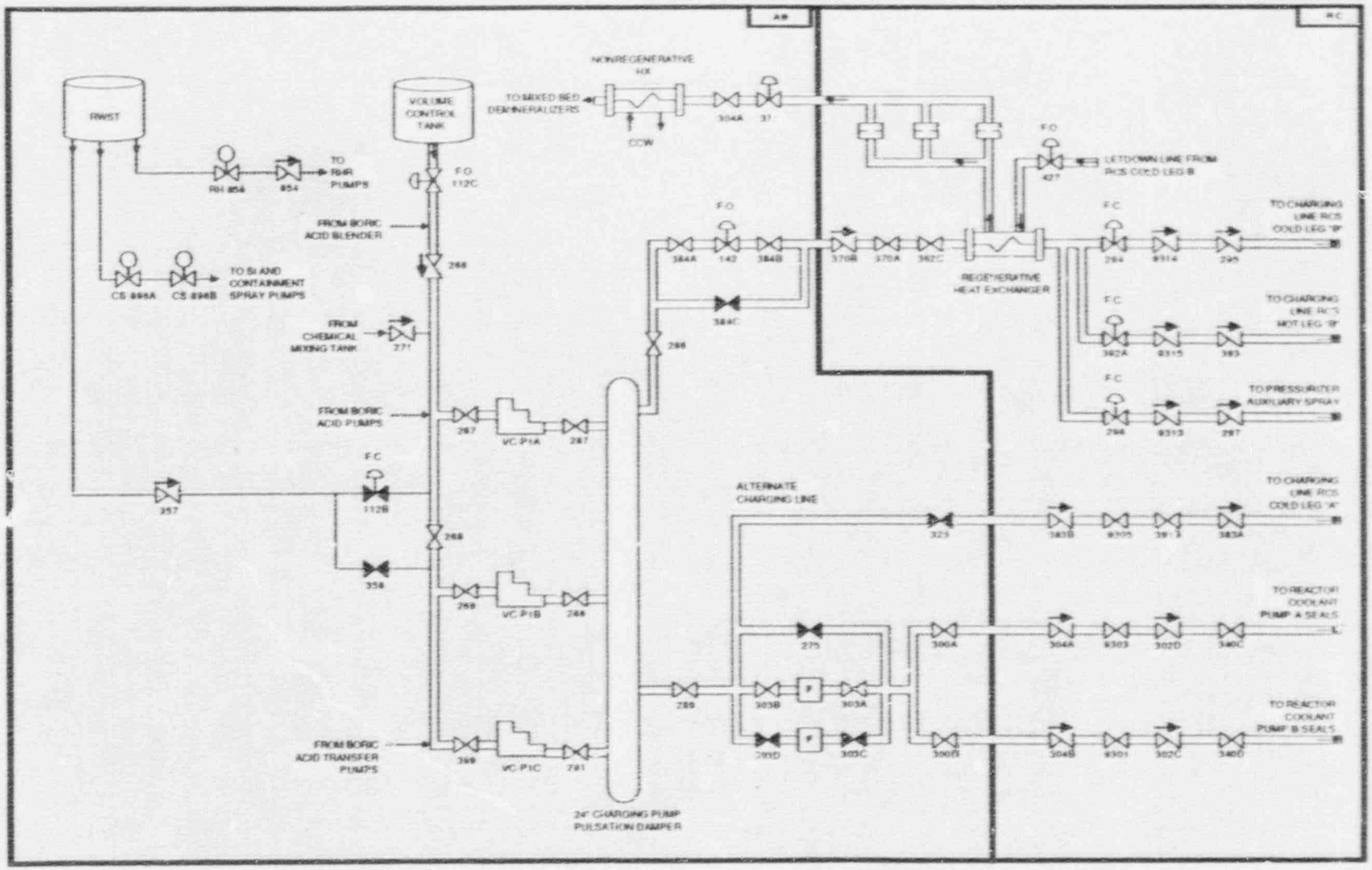


Figure 3.4-2. Ginna Charging System (CVCS) Showing Component Locations

Table 3.4-1. Ginna Charging System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
RGN-HX	HX	RC				
VC-P1A	MDP	AB	BUS 14	480	AB	AC/1A
VC-P1B	MDP	AB	BUS 16	480	AB	AC/1B
VC-P1C	MDP	AB	BUS 16	480	AB	AC/1B

3.5 CONTAINMENT HEAT REMOVAL SYSTEMS

3.5.1 System Function

The containment heat removal systems consist of an integrated set of subsystems that provide the functions of containment heat removal and containment pressure control following a loss of coolant accident. In conjunction with the ECCS, the containment heat removal systems complete the post-LOCA heat transfer path from the reactor core to the ultimate heat sink.

3.5.2 System Definition

The containment heat removal systems consists of two separate subsystems:

- Containment Spray System (CSS)
- Containment Air Recirculation Cooling (ACU) System

The CSS consists of two parallel redundant subsystems, each feeding one 360 degree spray ring header in the containment dome. Each CSS subsystem consists of one horizontal centrifugal pump drawing a suction from the Refueling Water Storage Tank (RWST) during the injection phase of a LOCA and from the RHR pumps discharge during recirculation. The Containment ACU system consists of four air cooling units, each including air operated inlet louvers, roughing filters, cooling coils, fan and drive motor, duct distribution system, and instrumentation, and controls. The cooling coils are supplied by the Service Water System.

Simplified drawings of the Containment Spray System are shown in Figures 3.5-1 and 3.5-2. The interface between the Containment ACUs and the service water system is shown on the SW system drawings in Section 3.9. A summary of data on selected containment heat removal system components is presented in Table 3.5-1.

3.5.3 System Operation

Normally the CSS is in standby. The CSS is actuated on Hi-Hi containment pressure whereupon the CSS pumps start and spray water from the RWST into the containment atmosphere. The contents of the spray additive tank (sodium hydroxide) are mixed with the spray stream to provide iodine removal from the containment atmosphere. After a low level in the RWST is reached the RWST is isolated and recirculation of water from the containment sump is accomplished by diversion of a portion of the flow from the discharge of the RHR pumps to the suction of the CSS pumps .

The containment ACUs are normally in use during plant operation. The ACU system removes heat from the containment atmosphere by continuous recirculation through cooling coils to transfer heat to the service water system. Each of the four fan cooler units is capable of transferring heat at a rate of 4280 Btu/sec at design basis accident conditions. A gravity operated damper in the fan discharge opens automatically when the fan is started. The four ACU units discharge into a common ring header, so that no space in the containment is dependent on a single ACU for cooling and ventilation.

3.5.4 System Success Criteria

The containment heat removal function is satisfied by any of the following combinations of equipment (Ref. 1):

- all four containment cooling units
- both containment spray pumps providing spray
- 2 of 4 containment cooling units and 1 of 2 containment spray pumps operating

3.5.5 Component Information

A. Containment Spray Pumps A and B
1. Rated flow: 1200 gpm @ unknown head
2. Rated capacity: 50%
3. Type: horizontal centrifugal

B. Containment Air Recirculation Cooler Units
1. Design duty: 4280 Btu/sec each
2. Rated capacity = 25%
3. Fan type: centrifugal
4. Coil type: plate fin-tube

C. Spray Additive Tank
1. Minimum volume: 4500 gal
2. Design pressure: 300 psig

3.5.6 Support Systems and Interfaces

A. Control Signals
1. Automatic
   a. The CSS pumps are automatically actuated on coincidence of two sets of two out of three Hi-Hi containment pressure signals.
   b. An SI signal automatically starts any stopped fan cooler unit.
2. Remote manual
   The CSS and ACU units can be actuated by remote manual means from the control room.

B. Motive Power
The CSS pumps, ACU units, and related motor-operated valves are Class 1E AC loads that can be supplied from the standby diesel generators, as described in Section 3.7. Redundant loads are supplied from separate load groups.

C. Cooling Water
1. The CSS pumps are cooled by the Component Cooling Water System (see Section 3.8).
2. The ACU units are cooled by the Service Water System (see Section 3.9).

D. Other
Lubrication and cooling are assumed to be provided locally for the CSS pumps.

3.5.7 Section 3.5 References

1. Ginna Final Safety Analysis Report, Sec. 6.2.2

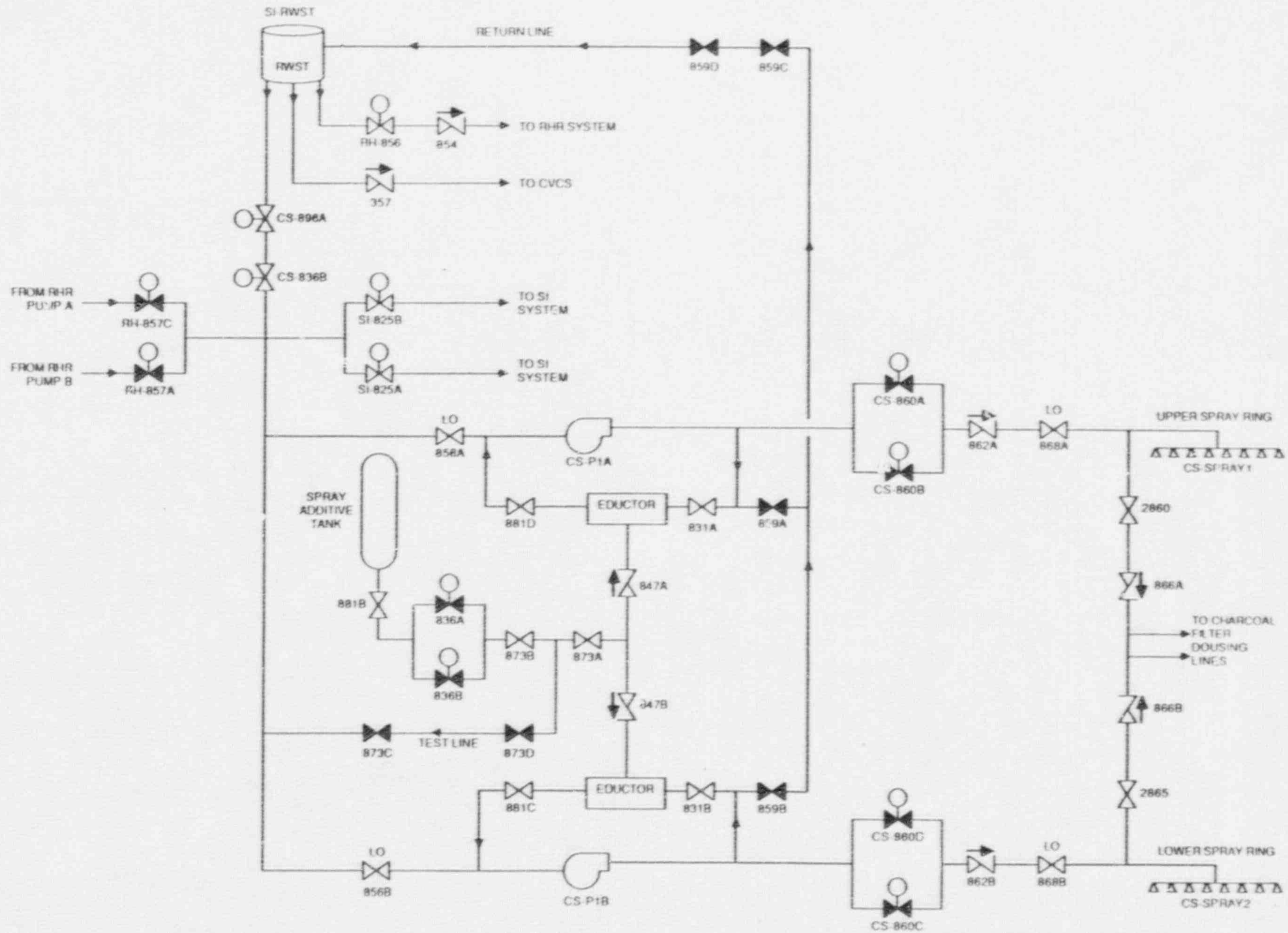


Figure 3.5-1. Ginna Containment Spray System (CSS)

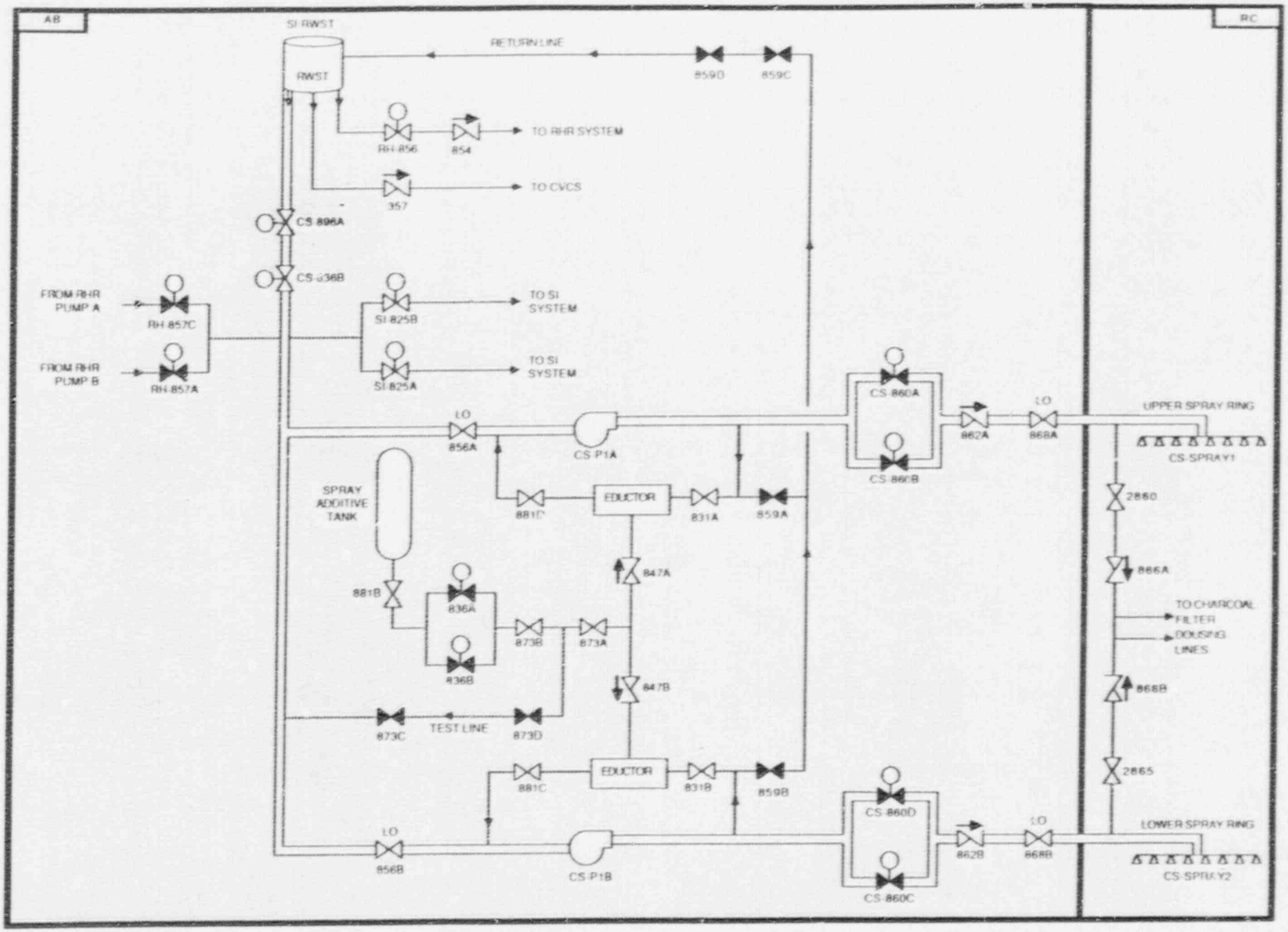


Figure 3.5-2. Ginna Containment Spray System (CSS) Showing Component Locations

Table 3.5-1. Ginna Containment Heat Removal Systems Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
ACU-1A	FAN	RC	BUS 14	480	AB	AC/1A
ACU-1B	FAN	RC	BUS 16	480	AB	AC/1B
ACU-1C	FAN	RC	BUS 16	480	AB	AC/1B
ACU-1D	FAN	RC	BUS 14	480	AB	AC/1A
CS-860A	MOV	AB	MCC 1C	480	AB	AC/1A
CS-860B	MOV	AB	MCC 1D	480	AB	AC/1B
CS-860C	MOV	AB	MCC 1C	480	AB	AC/1A
CS-860D	MOV	AB	MCC 1D	480	AB	AC/1B
CS-P1A	MDP	AB	BUS 14	480	AB	AC/1A
CS-P1B	MDP	AB	BUS 16	480	AB	AC/1B
CS-SPRAY 1	SN	RC				
CS-SPRAY 2	SN	RC				

3.6 INSTRUMENTATION AND CONTROL (I & C) SYSTEMS

3.6.1 System Function

The instrumentation and control systems consist of the Reactor Protection System (RPS), the Engineered Safety Features (ESF) Instrumentation System, and systems for the display of plant information to the operators. The RPS and ESF systems monitor the reactor plant, and alert the operator to take corrective action before specified limits are exceeded. The RPS will initiate an automatic reactor trip (scram) to rapidly shutdown the reactor when plant conditions exceed one or more specified limits. The ESF system will automatically actuate selected safety systems based on the specific limits or combinations of limits that are exceeded. A remote shutdown capability is provided to ensure that the reactor can be placed in a safe condition in the event that the main control room must be evacuated.

3.6.2 System Definition

The RPS includes sensor and transmitter units, logic units, and output trip relays that generate a reactor trip signal. The ESF system includes independent sensor and transmitter units, logic units and relays that interface with the control circuits for the many different sets of engineered safety features components that can be actuated. Operator instrumentation display systems consist of display panels in the control room that are powered by the 120 VAC electric power system (see Section 3.7). The remote shutdown capability is provided by remote panels and local equipment controls in conjunction with normal automatic systems.

3.6.3 System Operation

A. RPS

The RPS has four redundant input instrument channels for each sensed parameter. Two reactor trip breakers are actuated by two separate RPS logic matrices when prescribed parameters are outside the safe operating range. The reactor trip breakers interrupt power to the rod cluster control assembly drive mechanisms. Certain reactor trip channels are automatically bypassed at power levels where they are not required for safety. The following conditions result in a reactor trip:

- High neutron flux
- High neutron flux rate
- Negative neutron flux rate
- Overtemperature delta T
- Overpower delta T
- Low pressurizer pressure
- High pressurizer pressure
- Low reactor coolant flow
- Safety injection system actuation
- Turbine trip
- Steam/feedwater flow mismatch
- Low-low steam generator water level

In addition, the RPS can be manually tripped.

B. ESF Actuation System

The ESF systems are actuated by redundant logic and coincidence networks similar to those used by the RPS. Each network actuates a device that operates the associated ESF equipment, motor starters, and valve operators. Up to four independent measurements channels are used for each sensed parameter. The following protective actions are initiated by ESF actuation systems:

- Safety injection system actuation
- Containment isolation
- Containment cooling system actuation
- Main steam line isolation
- Feedwater isolation
- Auxiliary feedwater actuation
- Diesel generator start

The actuation systems provide an actuation signal to each individual component in the required engineered safety features system.

C. Remote Shutdown

Equipment is provided in appropriate locations outside the control room to allow the plant to maintain a hot shutdown condition (Ref. 1, Section 7.4.3). To maintain a hot shutdown capability, local controls are provided for the following systems, in addition to those controls in the main control room:

1. Auxiliary Feedwater Systems
   A local start/stop switch with a selector switch and instrumentation is provided for the turbine driven AFW pump and the turbine DC-lube-oil pump. Local start/stop switches and instrumentation is also provided for the intermediate building emergency local instrumentation panel. Similar local panels exist for the motor driven AFW pumps and for the standby AFW pumps. Feedwater flow and steam generator level control can be accomplished from the local panels. An alarm is sounded in the control room when pump controls are transferred to local.
2. Service Water
   Local stop/start switches with selector switches are provided for the service water pumps.
3. Atmospheric Steam Dump
   The valves of the SSRS can be operated locally.
4. Component Cooling Water
   Local controls are available for the CCWS pump and valves.
5. Instrument Air
   Instrument air is supplied by the service air system through filters and dryers. The service air compressors can be started and stopped locally at compressor control panels. The air filter and dryer controls can be operated locally.
6. Chemical and Volume Control System
   A local stop/start switch with a selector switch to operate charging pump 1A is provided, along with manual speed control for all charging pumps.

In addition, local stop/start and motor control is provided for diesel generator 1A, the boric acid transfer pumps, and the pressurizer heaters. Valve control is provided locally for all other valves requiring operation during hot shutdown.

3.6.4 System Success Criteria

A. RPS

The RPS uses hindrance logic (normal = 1, trip = 0) in both the input and output logic. Therefore, a channel will be in a trip state when input signals are lost, when control power is lost, or when the channel is temporarily removed from service for testing or maintenance (i.e. the channel has a fail-safe failure mode). A reactor scram will occur upon loss of control power to the RPS. A reactor scram usually is implemented by the scram circuit breakers which must open in response to a scram signal. Typically there are two series scram circuit breakers in the power path to the scram rods. In this case, one of two circuit breakers must open. Details of the scram system for Ginna have not been determined.

B. ESF Systems

In general, the loss of instrument power to the sensor, instruments, or logic devices places that channel in the trip mode. The one exception is the containment spray initiating channels, which require instrument power for actuation. Details of the ESF actuation systems for Ginna have not been determined.

C. Manually-Initiated Protective Actions

When reasonable time is available, certain protective actions may be performed manually by plant personnel. The control room operators are capable of operating individual components using normal control circuitry, or operating groups of components by manually tripping the RPS or an ESF subsystem. The control room operators also may send qualified persons into the plant to operate components locally or from some other remote control location (i.e., a remote shutdown panel or a motor control center). To make these judgments, data on key plant parameters must be available to the operators.

3.6.5 Support Systems and Interfaces

A. Control Power

1. RPS

   The RPS input instrument channels are powered from the Class 1E 125 VDC main distribution panels.

2. ESF

   The ESF system input instrument channels are powered from the 120 VAC instrument buses.

3. Operator Instrumentation

   Operator instrumentation displays are powered from the 120 VAC instrument buses.

3.6.6 Section 3.6 References

1. Ginna Final Safety Analysis Report.

3.7 ELECTRIC POWER SYSTEM

3.7.1 System Function

The electric power system supplies power to various equipment and systems needed for normal operation and/or response to accidents. The onsite Class 1E electric power system supports the operation of safety class systems and instrumentation needed to establish and maintain a safe shutdown plant condition following an accident, when the normal electric power sources are not available.

3.7.2 System Definition

All of the engineered safety features receive power from four 480 volt buses, designated 14, 16, 17, and 18. The emergency source of power for these buses are two diesel generators. Diesel generator 1A is connected to 480 VAC buses 14 and 18, diesel 1B is connected to buses 16 and 17.

The 125 VDC system provides power for control and instrumentation and other loads. The system consists of batteries, battery chargers, panels, fuse boxes, and main buses 1A and 1B. Each 125 VDC bus is powered by a dedicated battery, with battery chargers that are supplied by 480 VAC buses.

The 120 VAC system consists of four instrument power buses. Two buses can be supplied from an inverter/rectifier, and two buses are supplied or from a 480 VAC MCC through a transformer. Each inverter/rectifier can convert both 125 VDC and 480 VAC to 120 VAC. The backup power supply for the 120 VAC system is from non-Class 1E source.

Simplified one-line diagrams of the 480 VAC electric power system are shown in Figures 3.7-1 and 3.7-2. The 125 VDC system is shown in Figures 3.7-3 through 3.7-6. The 120 VAC System is shown in figure 3.7-7 and 3.7-8. A summary of data on selected electric power system components is presented in Table 3.7-1. A partial listing loads and components supplied by the Class 1E electric power system is presented in Table 3.7-2.

3.7.3 System Operation

During normal operation, the Class 1E electric power system is supplied from the switchyard through the main transformer or the station auxiliary transformer. The emergency sources of AC power are the diesel generators. The transfer from the preferred power source to the diesel generators is accomplished automatically by opening the normal source circuit breakers and then reenergizing the Class 1E portion of the electric power system from the diesel generators.

The DC power system normally is supplied through the battery chargers, with the batteries "floating" on the system, maintaining a full charge. Upon loss of AC power, the entire DC load draws from the batteries. The batteries are rated for approximately 8 hours of operation without assistance from the battery chargers.

120 VAC instrumentation busses 1A and 1C normally receive their power from an inverter connected to both a class 1E 480 VAC MCC and a Class 1E DC bus. Bus 1B is supplied from Class 1E 480 VAC MCC 1C via a 480/120 volt transformer. Bus 1D is supplied in a similar way, except that the power source is non-Class 1E. All 120 VAC busses can be supplied from a non-Class 1E backup 480/120 volt transformer.

Redundant safeguards equipment such as motor-driven pumps and motor-operated valves are supplied by different AC buses and motor control centers. For the purpose of discussion, this equipment has been grouped into "load group". Load group AC/1A contains components powered either directly or indirectly from diesel generator 1A. Load group AC/1B contains components powered by diesel generator 1B. Components receiving DC power are assigned to load groups DC/1A or DC/1B, based on the battery power source.

3.7.4 System Success Criteria

Basic system success criteria for mitigating transients and loss-of-coolant accidents are defined by front-line systems, which then create demands on support systems. Electric power system success criteria are defined as follows, without taking credit for cross-ties that may exist between independent load groups:

- Each Class 1E DC load group is supplied from its respective battery (also needed for diesel starting)
- Each Class 1E AC load group is isolated from the non-Class 1E system and is supplied from its respective emergency power source (i.e. diesel generator)
- Power distribution paths to e ential loads are intact
- Power to the battery charg... is restored before the batteries are exhausted

3.7.5 Component Information

A. Standby diesel generators 1A, 1B
   1. Rated load: 1950 kW continuous
   2. Rated voltage: 480 VAC
   3. Manufacturer: Alco

B. Batteries 1A, 1B
   1. Rated voltage: 125 VDC
   2. Rated capacity: approximately 8 hours with design loads (Ref. 1)

3.7.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The standby diesel generators are automatically started based on undervoltage of safeguard buses 14 and 16, a loss of offsite power, or a safety injection signal.
   2. Remote manual
      The diesel generators can be started, and many distribution circuit breakers can be operated, from the control room.

B. Diesel Generator Auxiliary Systems
   1. Diesel Cooling Water System
      Each diesel generator is cooled by the service water system (see Section 3.9). The fire water system is an alternate source of cooling water for the diesel generators (see Section 3.10).
   2. Diesel Starting System
      Each diesel has an independent air starting system.
   3. Diesel Fuel Storage System
      The diesels are supplied from independent 10,000 gallon fuel oil storage tanks that have sufficient capacity for 40 hours of continuous operation. No "day tanks" were identified.
   4. Diesel Lubrication System
      Each diesel generator has its own lubrication system.
   5. Diesel Room Ventilation System
      This system consists of exhaust fans which maintain the environmental conditions in the diesel room within limits for which the diesel generator and switchgear have been qualified. This system may be needed for long-term operation of the diesel generator.

C. Switchgear and Battery Room Ventilation Systems
These systems maintain acceptable environmental conditions in the switchgear and battery rooms, and may be needed for long-term operation of the electric power systems. Details of these systems have not been determined.

3.7.7 Section 3.7 References

1. Ginna Final Safety Analysis Report, Section 8

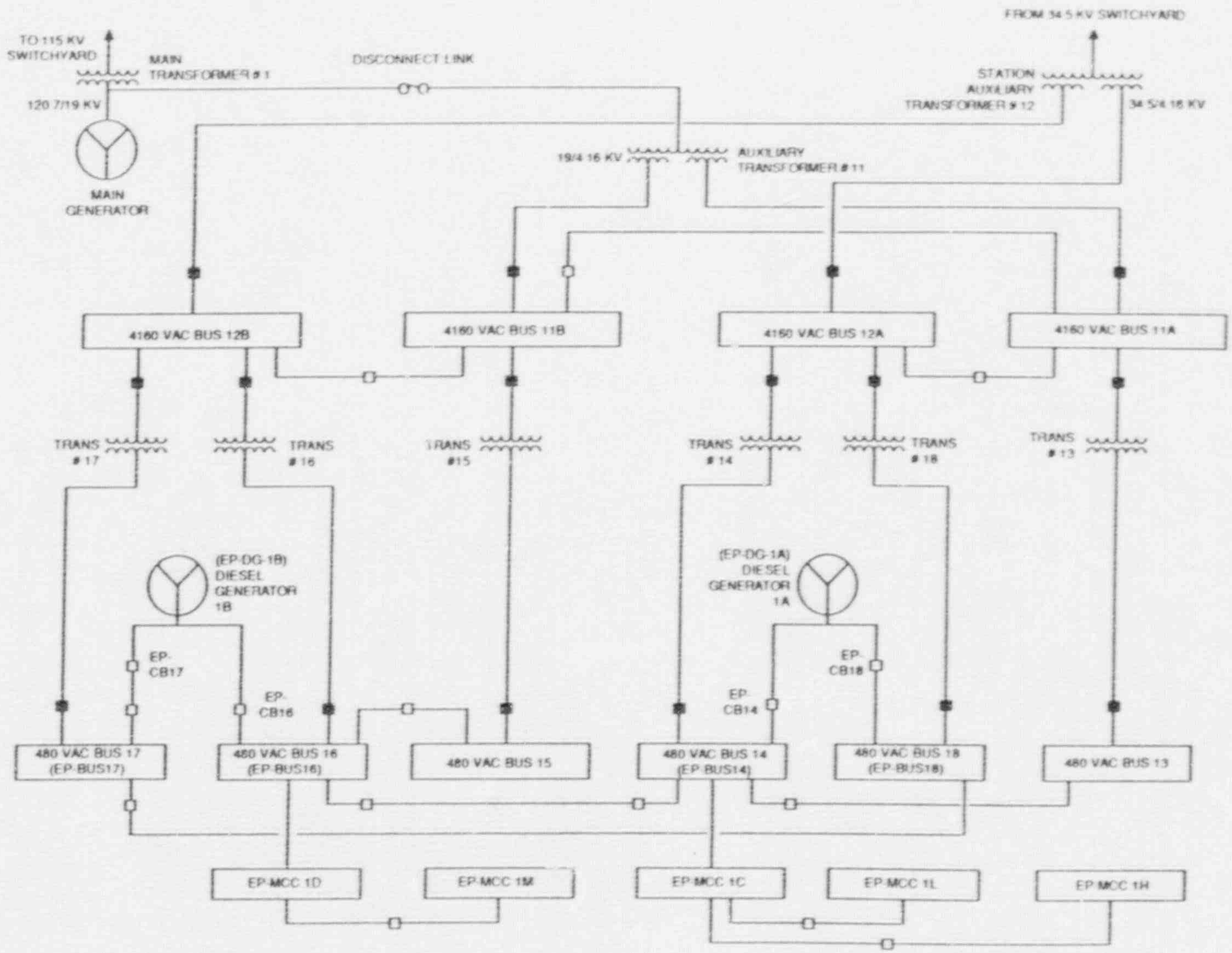
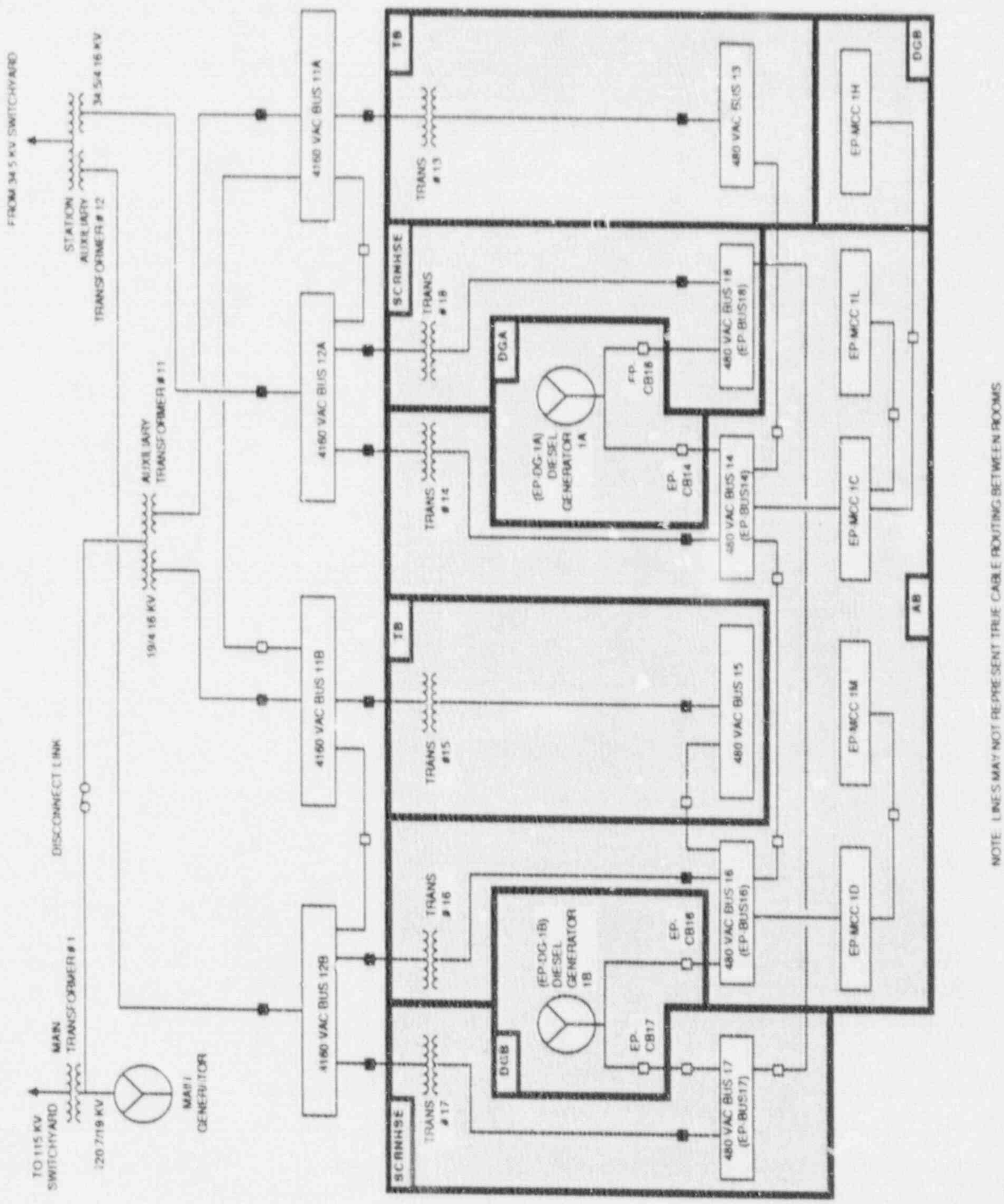


Figure 3.7-1. Ginna Station 4160 and 480 VAC Electric Power System



NOTE: LINES MAY NOT REPRESENT TRUE CABLE ROUTING BETWEEN ROOMS

Figure 3.7-2. Ginna Station 4160 and 480 VAC Electric Power System Showing Component Locations

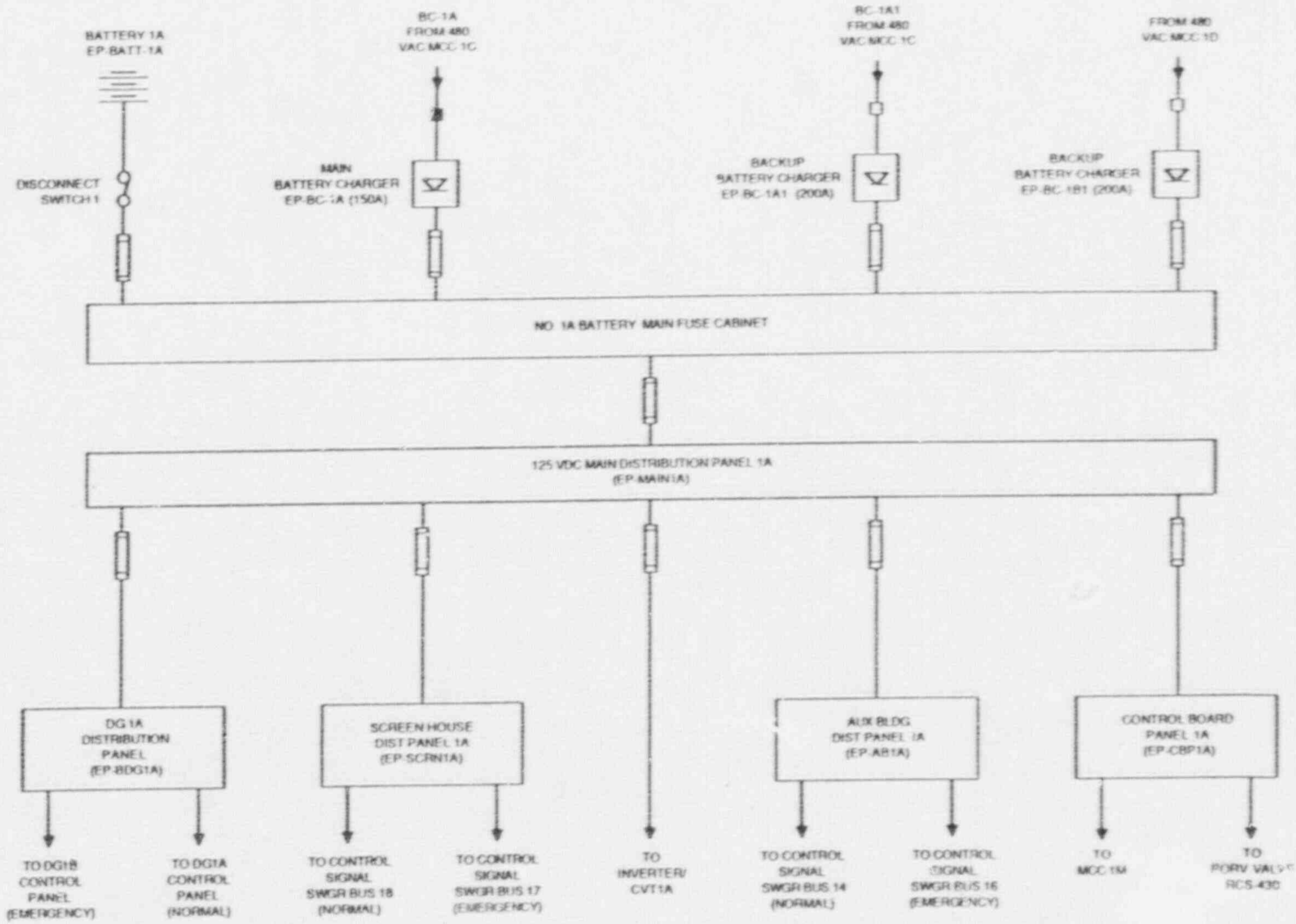


Figure 3.7-3. Ginna 125 VDC Train A Electric Power System

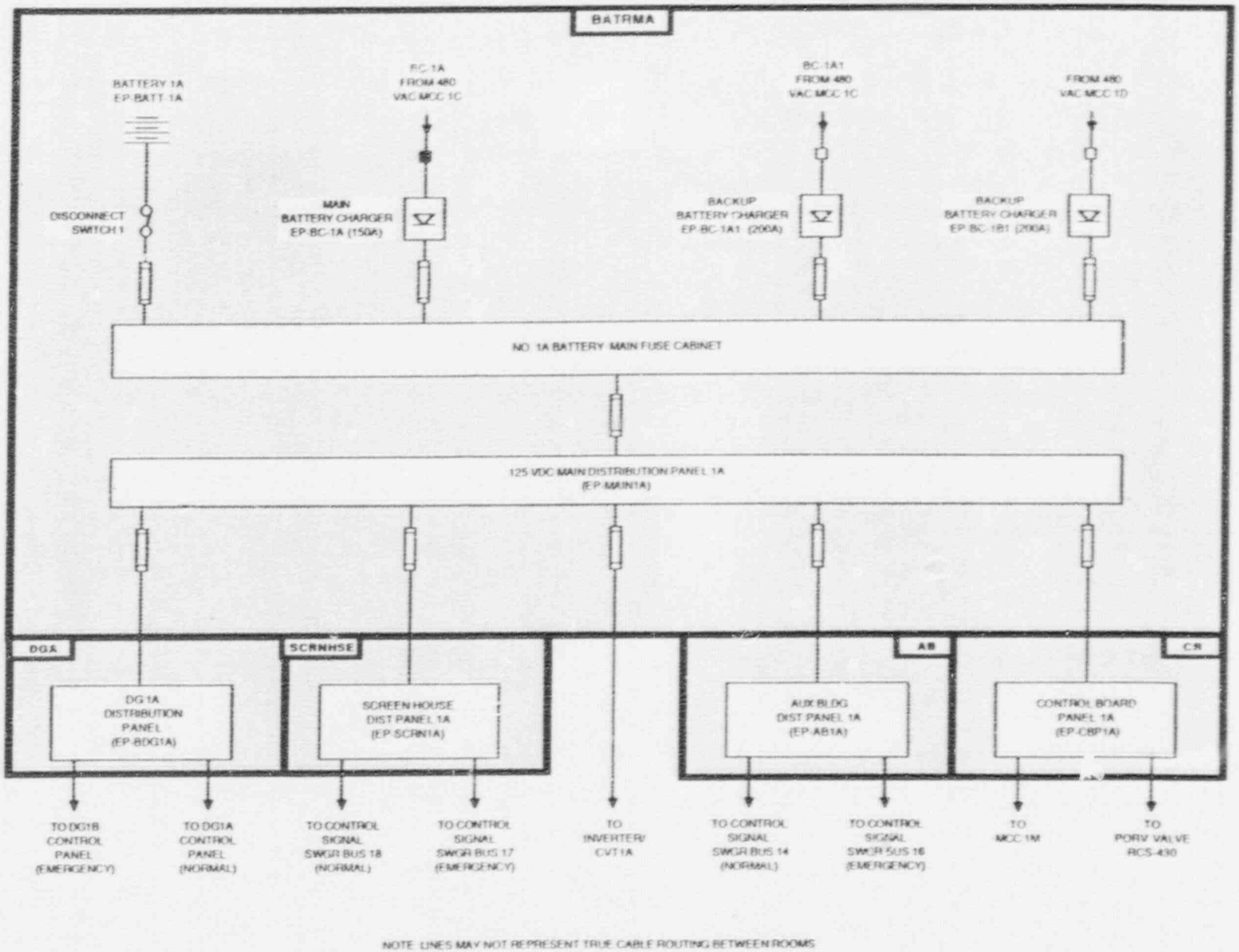


Figure 3.7-4. Ginna 125 VDC Train A Electric Power System Showing Component Locations

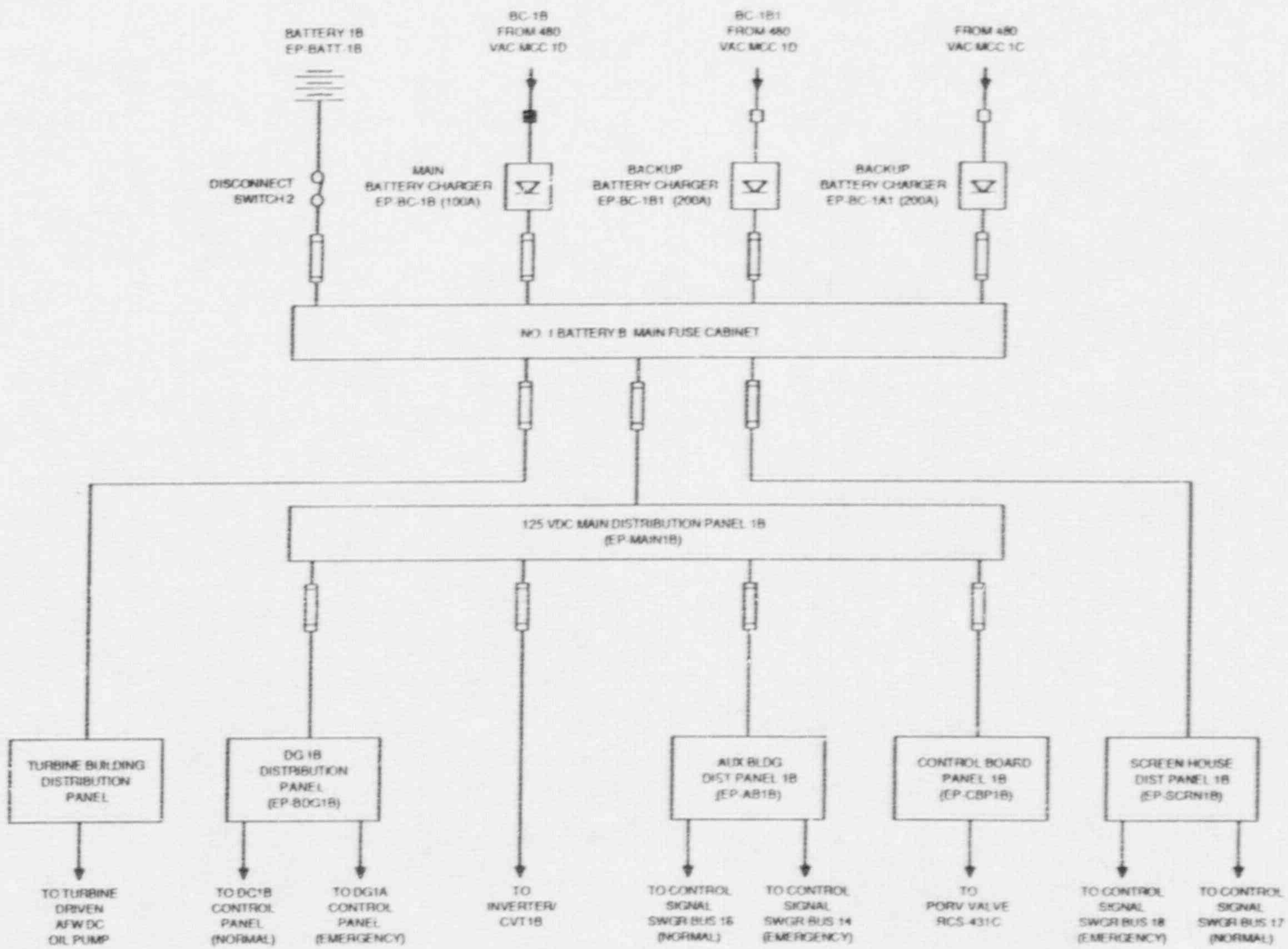


Figure 3.7-5. Ginna 125 VDC Train B Electric Power System

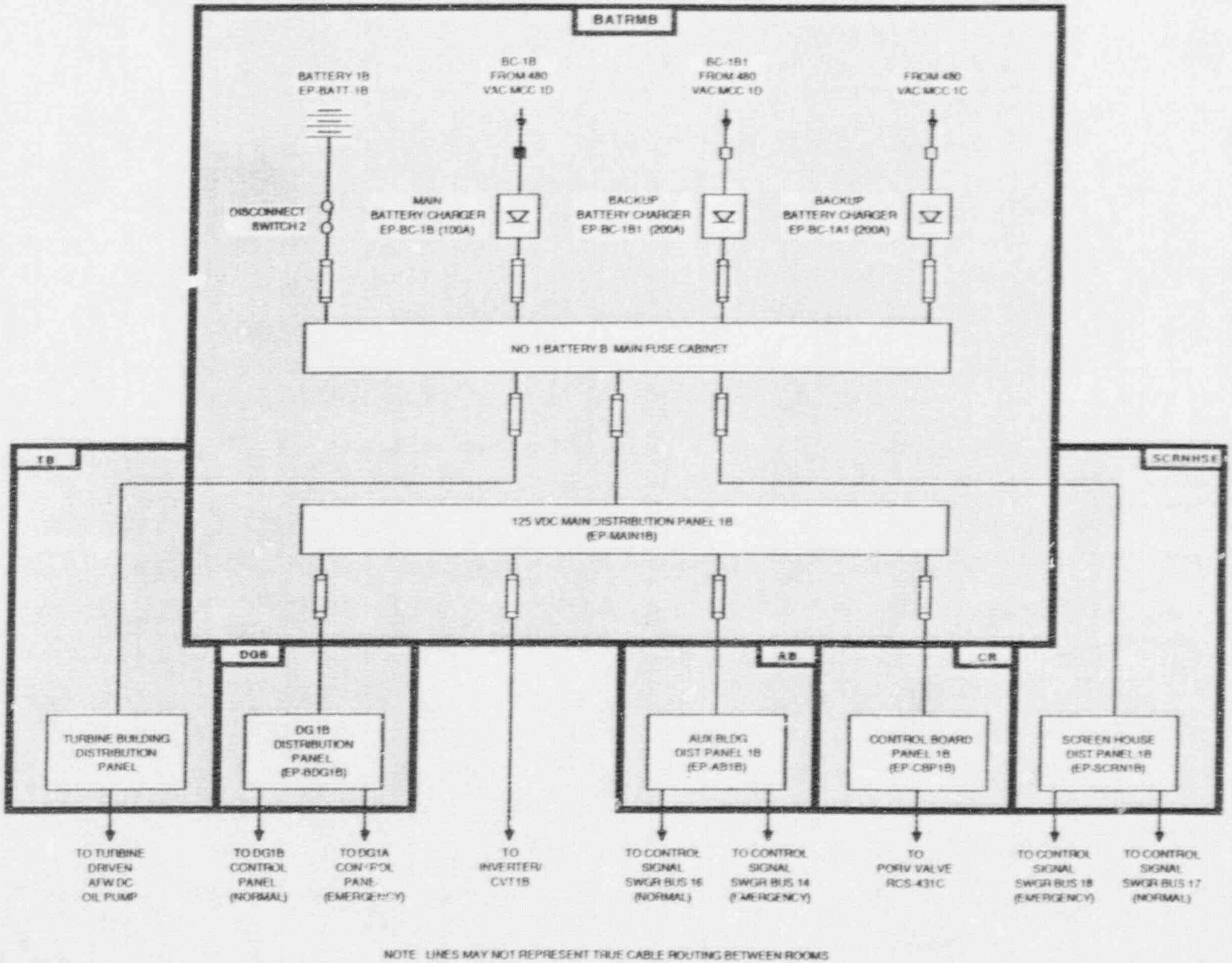


Figure 3.7-6. Ginna 125 VDC Train B Electric Power System Showing Component Locations

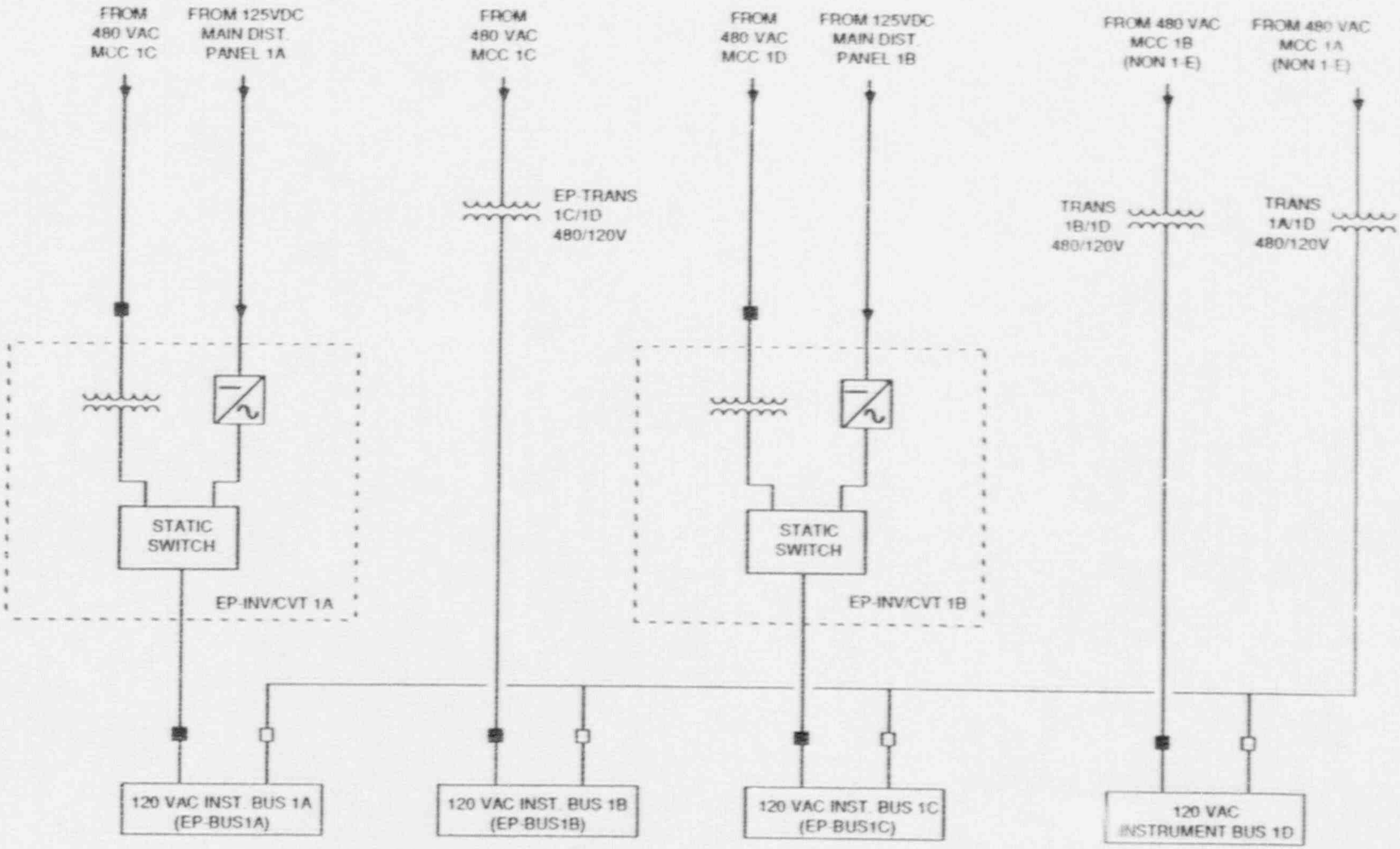


Figure 3.7-7. Ginna 120 VAC Instrument Bus Supply

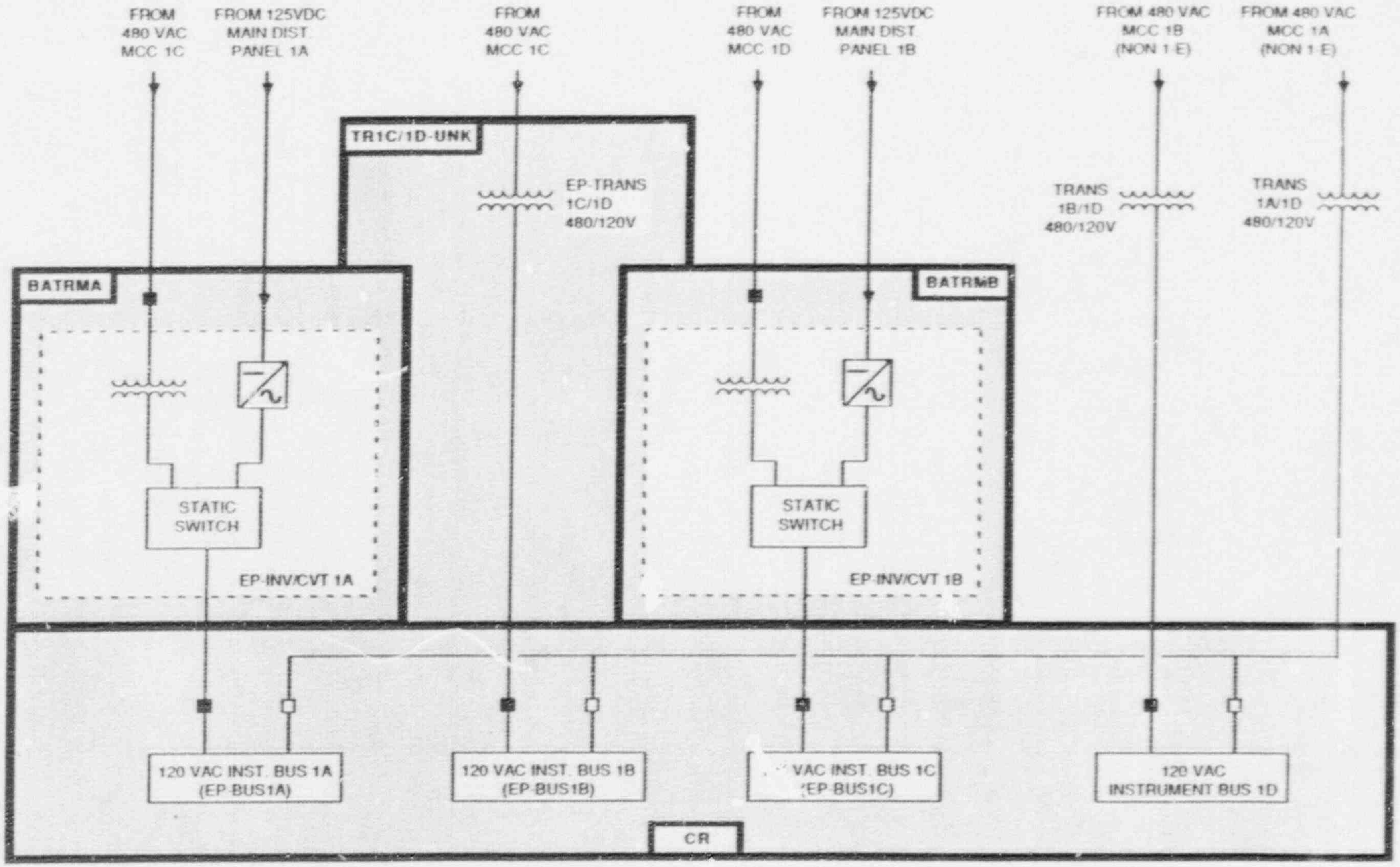


Figure 3.7-8. Ginna 120 VAC Instrument Bus Supply Showing Component Locations

Table 3.7-1. Ginna Electric Power System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
EP-AB1A	PNL	AB	DC-MAIN 1A	125	BATRMA	DC/1A
EP-AB1B	PNL	AB	DC-MAIN 1B	125	BATRMB	DC/1B
EP-BATT-1A	BATT	BATRMA		125		DC-1A
EP-BATT-1B	BATT	BATRMB		125		DC/1B
EP-BC-1A	BC	BATRMA	MCC 1C	480	AB	AC/1A
EP-BC-1A1	BC	BATRMA	MCC 1C	480	AB	AC/1A
EP-BC-1B	BC	BATRMB	MCC 1D	480	AB	AC/1B
EP-BC-1B1	BC	BATRMB	MCC 1D	480	AB	AC/1B
EP-BDG1A	PNL	DGA	DC-MAIN 1A	125	BATRMA	DC/1A
EP-BDG1B	PNL	DGB	DC-MAIN 1B	125	BATRMB	DC/1B
EP-BUS 14	BUS	AB	DG 1A	480	DGA	AC/1A
EP-BUS 16	BUS	AB	DG 1B	480	DGB	AC/1B
EP-BUS 17	BUS	SCRNHSE	DG 1B	480	DGB	AC/1B
EP-BUS 18	BUS	SCRNHSE	DG 1A	480	DGA	AC/1A
EP-BUS 1A	BUS	CR	INV/CVT 1A	120	CR	DC/1A
EP-BUS 1B	BUS	CR	TRANS 1C/1D	120	TR1C/1D-UNK	AC/1A
EP-BUS 1C	BUS	CR	INV/CVT 1B	120	CR	DC/1B
EP-CB-14	CB	DGA	DG 1A	480	DGA	AC/1A
EP-CB-16	CB	DGB	DG 1B	480	DGB	AC/1B
EP-CB-17	CB	DGB	DG 1B	480	DGB	AC/1B
EP-CB-18	CB	DGA	DG 1A	480	DGA	AC/1A
EP-CBP1A	PNL	CR	DC-MAIN 1A	125	BATRMA	DC/1A
EP-CBP1B	PNL	CR	DC-MAIN 1B	125	BATRMB	DC/1B
EP-DG-1B	DG	DGB		480		AC/1B
EP-DG1A	DG	DGA		480		AC/1A
EP-INV/CVT 1A	INV	BATRMA	DC-MAIN 1A	125	BATRMA	DC/1A
EP-INV/CVT 1B	INV	BATRMB	DC-MAIN 1B	125	BATRMB	DC/1B

Table 3.7-1. Ginna Electric Power System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
EP-MAIN 1A	PNL	BATRMA	BATT A	125	BATRMA	DC/1A
EP-MAIN 1B	PNL	BATRMB	BATT B	125	BATRMB	DC/1B
EP-MCC 1C	MCC	AB	BUS 14	480	AB	AC/1A
EP-MCC 1D	MCC	AB	BUS 16	480	AB	AC/1B
EP-MCC1H	MCC	DGB	MCC 1C	480	AB	AC/1A
EP-MCC1L	MCC	AB	MCC 1C	480	AB	AC/1A
EP-MCC1M	MCC	AB	MCC 1D	480	AB	AC/1B
EP-SCRN1A	PNL	SCRNHSE	DC-MAIN 1A	125	BATRMA	DC/1A
EP-SCRN1B	PNL	SCRNHSE	DC-MAIN 1B	125	BATRMB	DC/1B
EP-TRANS1C/1D	TRAN	TR1C-1D-UNK	MCC 1C	480	AB	AC/1A

Table 3.7-2. Partial Listing of Electrical Sources and Loads at Ginna

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
BATT A	125	DC/1A	BATRMA	EP	EP-MAIN 1A	PNL	BATRMA
BATT B	125	DC/1B	BATRMB	EP	EP-MAIN 1B	PNL	BATRMB
BUS 14	480	AC/1A	AB	AFW	AFW-P1A	MDP	IB
BUS 14	480	AC/1A	AB	AFW	SFW-P1C	MDP	SBAFWS
BUS 14	480	AC/1A	AB	CCS	ACU-1A	FAN	RC
BUS 14	480	AC/1A	AB	CCS	ACU-1D	FAN	RC
BUS 14	480	AC/1A	AB	CCS	CS-P1A	MDP	AB
BUS 14	480	AC/1A	AB	CCW	CCW-P1A	MDP	AB
BUS 14	480	AC/1A	AB	CVCS	VC-P1A	MDP	AB
BUS 14	480	AC/1A	AB	ECCS	RH-P1A	MDP	ABSUB
BUS 14	480	AC/1A	AB	ECCS	SI-P1A	MDP	AB
BUS 14	480	AC/1A	AB	EP	EP-MCC 1C	MCC	AB
BUS 16	480	AC/1B	AB	AFW	AFW-P1B	MDP	IB
BUS 16	480	AC/1B	AB	AFW	SFW-P1D	MDP	SBAFWS
BUS 16	480	AC/1B	AB	CCS	ACU-1B	FAN	RC
BUS 16	480	AC/1B	AB	CCS	ACU-1C	FAN	RC
BUS 16	480	AC/1B	AB	CCS	CS-P1B	MDP	AB
BUS 16	480	AC/1B	AB	CCW	CCW-P1B	MDP	AB
BUS 16	480	AC/1B	AB	CVCS	VC-P1B	MDP	AB
BUS 16	480	AC/1B	AB	CVCS	VC-P1C	MDP	AB
BUS 16	480	AC/1B	AB	ECCS	RH-P1B	MDP	ABSUB
BUS 16	480	AC/1B	AB	ECCS	SI-P1B	MDP	AB
BUS 16	480	AC/1B	AB	ECCS	SI-P1C	MDP	AB
BUS 16	480	AC/1B	AB	EP	EP-MCC 1D	MCC	AB
BUS 17	480	AC/1B	SCRNHSE	SWS	SWS-P1B	MDP	SCRNHSE
BUS 17	480	AC/1B	SCRNHSE	SWS	SWS-P1D	MDP	SCRNHSE
BUS 18	480	AC/1A	SCRNHSE	SWS	SWS-P1A	MDP	SCRNHSE
BUS 18	480	AC/1A	SCRNHSE	SWS	SWS-P1C	MDP	SCRNHSE
DC-MAIN 1A	125	DC/1A	BATRMA	AFW	AFW-3505A	MOV	IB
DC-MAIN 1A	125	DC/1A	BATRMA	EP	EP-AB1A	PNL	AB
DC-MAIN 1A	125	DC/1A	BATRMA	EP	EP-BDG1A	PNL	DGA

Table 3.7-2. Partial Listing of Electrical Sources and Loads at Ginna (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
DC-MAIN 1A	125	DC/1A	BATRMA	EP	EP-CBP1A	PNL	CR
DC-MAIN 1A	125	DC/1A	BATRMA	EP	EP-INV/CVT 1A	INV	BATRMA
DC-MAIN 1A	125	DC/1A	BATRMA	EP	EP-SCRN1A	PNL	SCRNHSE
DC-MAIN 1B	125	DC/1B	BATRMB	AFW	AFW-3504A	MOV	IB
DC-MAIN 1B	125	DC/1B	BATRMB	AFW	AFW-3996	MOV	IB
DC-MAIN 1B	125	DC/1B	BATRMB	EP	EP-AB1B	PNL	AB
DC-MAIN 1B	125	DC/1B	BATRMB	EP	EP-BDG1B	PNL	DGB
DC-MAIN 1B	125	DC/1B	BATRMB	EP	EP-CBP1B	PNL	CR
DC-MAIN 1B	125	DC/1B	BATRMB	EP	EP-INV/CVT 1B	INV	BATRMB
DC-MAIN 1B	125	DC/1B	BATRMB	EP	EP-SCRN1B	PNL	SCRNHSE
DG 1A	480	AC/1A	DGA	EP	EP-BUS 14	BUS	AB
DG 1A	480	AC/1A	DGA	EP	EP-BUS 18	BUS	SCRNHSE
DG 1A	480	AC/1A	DGA	EP	EP-CB-14	CB	DGA
DG 1A	480	AC/1A	DGA	EP	EP-CB-18	CB	DGA
DG 1B	480	AC/1B	DGB	EP	EP-BUS 16	BUS	AB
DG 1B	480	AC/1B	DGB	EP	EP-BUS 17	BUS	SCRNHSE
DG 1B	480	AC/1B	DGB	EP	EP-CB-16	CB	DGB
DG 1B	480	AC/1B	DGB	EP	EP-CB-17	CB	DGB
EP-CBP1A	125	DC/1A	CR	RCS	RCS-430	NV	RC
EP-CBP1B	125	DC/1B	CR	RCS	RCS-431C	NV	RC
INV/CVT 1A	120	DC/1A	CR	EP	EP-BUS 1A	BUS	CR
INV/CVT 1B	120	DC/1B	CR	EP	EP-BUS 1C	BUS	CR
MCC 1C	480	AC/1A	AB	AFW	AFW-4007	MOV	IB
MCC 1C	480	AC/1A	AB	AFW	AFW-4027	MOV	IB
MCC 1C	480	AC/1A	AB	CCS	CS-860A	MOV	AB
MCC 1C	480	AC/1A	AB	CCS	CS-860C	MOV	AB
MCC 1C	480	AC/1A	AB	CCW	CCW-738A	MOV	AB
MCC 1C	480	AC/1A	AB	ECCS	CS-896A	MOV	AB
MCC 1C	480	AC/1A	AB	ECCS	RH-700	MOV	RC
MCC 1C	480	AC/1A	AB	ECCS	RH-720	MOV	RC
MCC 1C	480	AC/1A	AB	ECCS	RH-850A	MOV	ABSUB

Table 3.7-2. Partial Listing of Electrical Sources and Loads at Ginna (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
MCC 1C	480	AC/1A	AB	ECCS	RH-8[illegible]1A	MOV	RC
MCC 1C	480	AC/1A	AB	ECCS	RH-857A	MOV	AB
MCC 1C	480	AC/1A	AB	ECCS	RH-857C	MOV	AB
MCC 1C	480	AC/1A	AB	ECCS	SI-1815A	MOV	AB
MCC 1C	480	AC/1A	AB	ECCS	SI-878A	MOV	RC
MCC 1C	480	AC/1A	AB	ECCS	SI-878C	MOV	RC
MCC 1C	480	AC/1A	AB	EP	EP-BC-1A	BC	BATRMA
MCC 1C	480	AC/1A	AB	EP	EP-BC-1A1	BC	BATRMA
MCC 1C	480	AC/1A	AB	EP	EP-MCC1H	MCC	DGB
MCC 1C	480	AC/1A	AB	EP	EP-MCC1L	MCC	AB
MCC 1C	480	AC/1A	AB	EP	EP-TRANS1C/1D	TRAN	TR1C-1D-UNK
MCC 1C	480	AC/1A	AB	RCS	RCS-515	MOV	RC
MCC 1C	4[illegible]	AC/1A	AB	RHR	RH-856	MOV	AB
MCC 1C	4[illegible]	AC/1A	AB	SWS	SWS-4614	MOV	IB
MCC 1C	480	AC/1A	AB	SWS	SWS-4615	MOV	AB
MCC 1C	480	AC/1A	AB	SWS	SWS-4616	MOV	AB
MCC 1D	480	AC/1B	AB	AFW	AFW-4008	MOV	IB
MCC 1D	480	AC/1B	AB	AFW	AFW-4013	MOV	IB
MCC 1D	480	AC/1B	AB	[illegible]	AFW-4028	MOV	IB
MCC 1D	480	AC/1B	AB	CCS	CS-860B	MOV	AB
MCC 1D	480	AC/1B	AB	CCS	CS-860D	MOV	AB
MCC 1D	480	AC/1B	AB	CCW	CCW-738B	MOV	AB
MCC 1D	480	AC/1B	AB	ECCS	CS-896B	MOV	AB
MCC 1D	480	AC/1B	AB	ECCS	RH-701	MOV	RC
MCC 1D	480	AC/1B	AB	ECCS	RH-721	MOV	RC
MCC 1D	480	AC/1B	AB	ECCS	RH-850B	MOV	ABSUB
MCC 1D	480	AC/1B	AB	ECCS	RH-851B	MOV	RC
MCC [illegible]	480	AC/1B	AB	ECCS	RH-857B	MOV	AB
MCC 1D	480	AC/1B	AB	ECCS	SI-1815B	MOV	AB
MCC 1D	480	AC/1B	AB	ECCS	SI-871A	MOV	AB
MCC 1D	480	AC/1B	AB	ECCS	SI-871B	MOV	AB

Table 3.7-2. Partial Listing of Electrical Sources and Loads at Ginna (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
MCC 1D	480	AC/1B	AB	ECCS	SI-878B	MOV	RC
MCC 1D	480	AC/1B	AB	ECCS	SI-878D	MOV	RC
MCC 1D	480	AC/1B	AB	EP	EP-BC-1B	BC	BATRMB
MCC 1D	480	AC/1B	AB	EP	EP-BC-1B1	BC	BATRMB
MCC 1D	480	AC/1B	AB	EP	EP-MCC1M	MCC	AB
MCC 1D	480	AC/1B	AB	RCS	RCS-516	MOV	RC
MCC 1D	480	AC/1B	AB	SWS	SWS-4664	MOV	IB
MCC 1D	480	AC/1B	AB	SWS	SWS-4734	MOV	AB
MCC 1D	480	AC/1B	AB	SWS	SWS-4735	MOV	AB
MCC 1H	480	AC/1A	DGA	SWS	SWS-4670	MOV	DGB
MCC 1L	480	AC/1A	AB	AFW	AFW-4000A	MOV	IB
MCC 1L	480	AC/1A	AB	AFW	SFW-9629A	MOV	AB
MCC 1L	480	AC/1A	AB	AFW	SFW-9701A	MOV	SBAFWS
MCC 1L	480	AC/1A	AB	AFW	SFW-9703A	MOV	SBAFWS
MCC 1L	480	AC/1A	AB	AFW	SFW-9704A	MOV	SBAFWS
MCC 1M	480	AC/1B	AB	AFW	AFW-4000B	MOV	IB
MCC 1M	480	AC/1B	AB	AFW	SFW-9629B	MOV	AB
MCC 1M	480	AC/1B	AB	AFW	SFW-9701B	MOV	SBAFWS
MCC 1M	480	AC/1B	AB	AFW	SFW-9703B	MOV	SBAFWS
MCC 1M	480	AC/1B	AB	AFW	SFW-9704B	MOV	SBAFWS
TRANS 1C/1D	120	AC/1A	TR1C/1D-UNK	EP	EP-BUS 1B	BUS	CR

3.8 COMPONENT COOLING WATER SYSTEM (CCWS)

3.8.1 System Function

The CCWS serves to remove heat from the reactor auxiliaries and RHR heat exchangers and to transfer it to the Service Water System for rejection to the ultimate heat sink. The CCWS operates during all normal modes of operation and folowing accidents. The CCWS serves as an intermediate system between the RCS and SWS, thereby reducing the probability of leakage of potentially radioactive coolant.

3.8.2 System Definition

The CCWS is a closed loop cooling water system designed to remove heat from residual, spent fuel pit, seal water, letdown, excess letdown, and sample heat exchangers, and various other components (e.g., ECCS and reactor coolant pumps and motors). The system consists of two pumps, two heat exchangers, a surge tank, and distribution piping serving the various heat loads. Flow to the cooled components is arranged in parallel flow circuits. There is one main loop for the entire unit. Heat is rejected in the CCWS heat exchangers to the Service Water System.

Simplified drawings of the CCWS are shown in Figures 3.8-1 and 3.8-2. A summary of data on selected CCWS components is presented in Table 3.8-1.

3.8.3 System Operation

During normal operation one pump and one heat exchanger is capable of serving all operating components. The standby pump and heat exchanger provide 100% backup during normal operation. Both pumps and heat exchangers are used to remove residual and sensible heat during shutdown, however only one pump and heat exchanger are required in such a situation.

Both pumps supply a common header to the heat exchangers, which in turn supply a common header to the cooling loops, so any pump and heat exchanger combination can cool the components served by the system.

The CCW heat exchangers transfer heat to the Service Water System. The CCW surge tank is connected to the suction side of the pumps, and accommodates fluid expansion and contraction in the system.

3.8.4 System Success Criteria

Following a LOCA, one CCW pump and one heat exchanger are capable of fulfilling system requirements (Ref.1, Sec 9.3.2). The Service Water System is required to remove heat from the CCWS (see Section 3.8).

3.8.5 Component Information

A. Component Cooling Water pumps 1A, 1B
   1. Rated flow: 2980 gpm @ 180 ft head (78 psid)
   2. Rated capacity: 100%
   3. Type: Horizontal centrifugal

B. Component Cooling Water heat exchangers 1, 2
   1. Heat transferred: 25.15×10^6 Btu/hr
   2. Type: Shell and straight tube

C. Surge tank
   1. Total Volume: 2000 gallons
   2. Normal water volume: 1000 gallons

3.8.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      a. CCWS lines into containment are automatically isolated following a LOCA.
      b. The CCWS pumps are not automatically actuated.
   2. Remote manual
      The CCWS can be operated from the control room.

B. Motive Power
   The motor driven CCWS pumps and motor operated valves are Class 1E loads that can be supplied from the standby diesel generators as described in Section 3.6.

C. Other
   1. Lubrication and cooling are assumed to be provided locally for the CCWS pumps.
   2. Systems providing ventilation for the CCWS pump room have not been determined

3.8.7 Section 3.8 References

1. Ginna Final Safety Analysis Report.

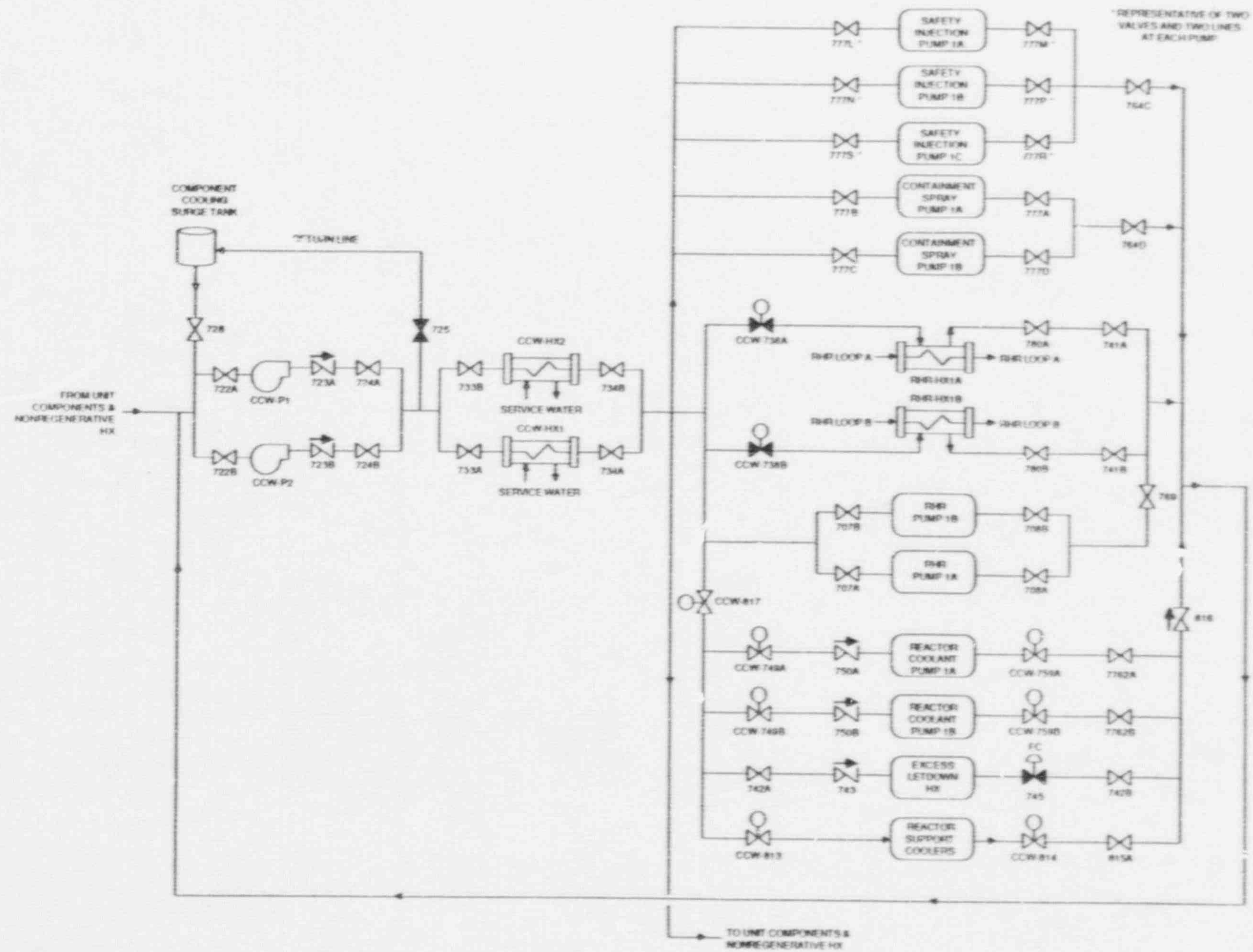


Figure 3.8-1. Ginna Component Cooling Water System (CCWS)

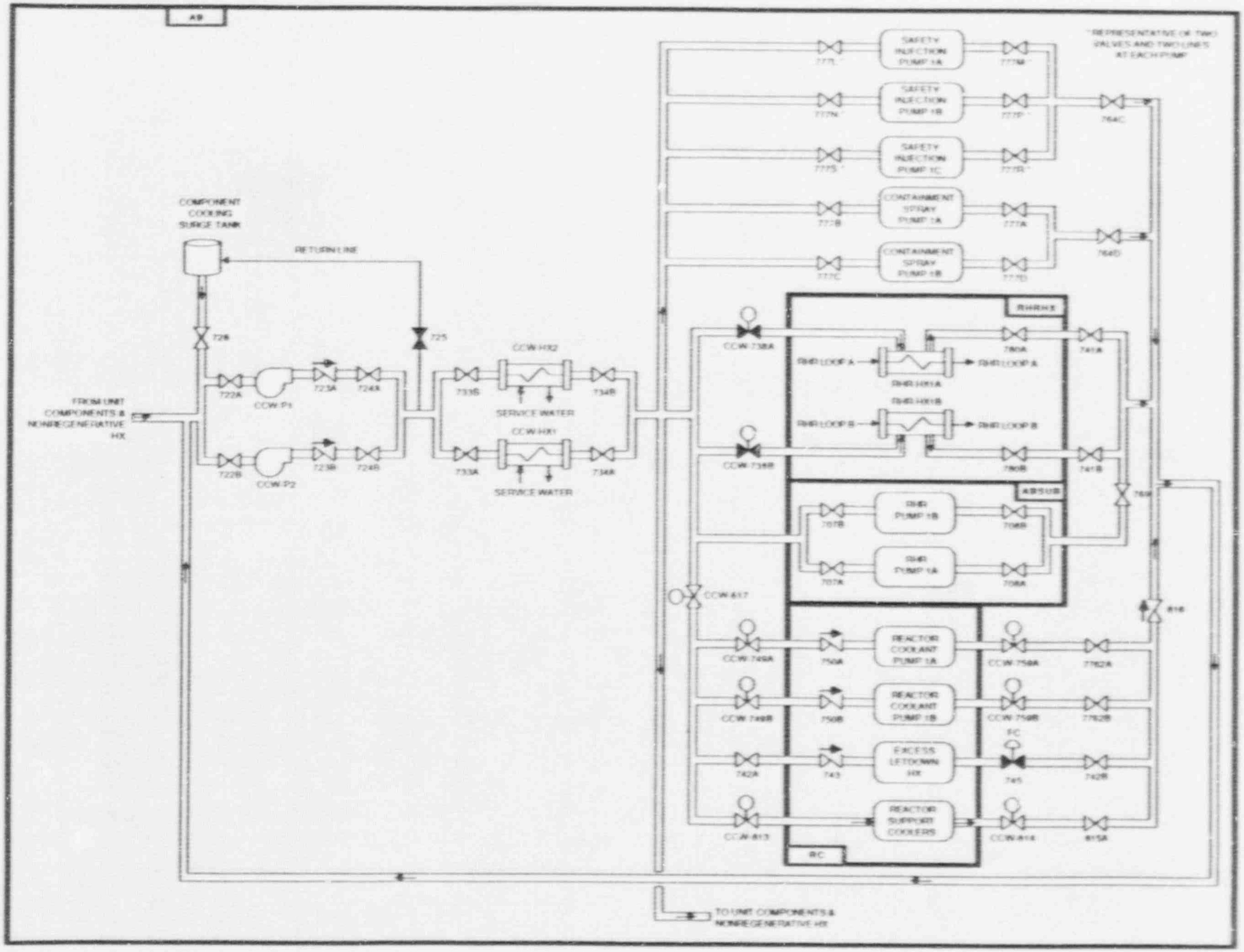


Figure 3.8-2. Ginna Component Cooling Water System (CCWS) Showing Component Locations

Table 3.8-1. Ginna Component Cooling Water System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
CCW-738A	MOV	AB	MCC 1C	480	AB	AC/1A
CCW-738B	MOV	AB	MCC 1D	480	AB	AC/1B
CCW-HX1	HX	AB				
CCW-HX2	HX	AB				
CCW-P1A	MDP	AB	BUS 14	480	AB	AC/1A
CCW-P1B	MDP	AB	BUS 16	480	AB	AC/1B

3.9 SERVICE WATER SYSTEM (SWS)

3.9.1 System Function

The SWS supplies all the equipment cooling water for the plant, including the emergency shutdown requirements. Equipment cooled by the SWS includes the diesel generators, the component cooling water heat exchangers, containment coolers, safety injection pump thrust bearings, and various air conditioning and ventilation coolers and condensers. The SWS can also deliver water to the suction of the auxiliary feedwater pumps and provide makeup to the 100,000 gallon condensate storage tank. The SWS is the normal source of water for the standby AFWS pumps (see Section 3.2).

3.9.2 System Definition

The SWS is an open loop system. The system consists of four pumps that feed two separate main supply headers. The headers are cross-tied by manual valves 4611 and 4612 so that any combination of pumps can serve both headers during normal operating conditions. The pumps take suction from the screenwell. Cooling water to the diesel generators and CCW heat exchangers can be provided by both either header.

Simplified drawings of the SWS are shown in Figures 3.9-1 and 3.9-2. A summary of data on selected SWS components is presented in Table 3.9-1.

3.9.3 System Operation

During normal operation three SWS pumps are running with the fourth pump serving as a standby. The fourth pump will automatically start if header pressure decreases to 50 psig. Under emergency shutdown and accident conditions, one pump is used during the injection phase, and two pumps during the recirculation phase. Minimum flow is provided by one pump and one header. Non-safety loads serviced by the SWS can be isolated to reduce the load on the system. Although two pumps are used during recirculation, one pump can supply all needed emergency loads required for safe plant shutdown.

The service water pumps are powered by 480 VAC buses 17 and 18. The diesel generators are sized to accommodate one service water pump each in addition to the other engineered safeguards loads.

3.9.4 System Success Criteria

Under emergency shutdown and accident conditions, system success can be achieved by one service water pump (Ref. 1).

3.9.5 Component Information

A. Service Water pumps 1A, 1B, 1C, 1D
   1. Rated flow: 5300 gpm @ 198 ft head (86 psid)
   2. Rated capacity: 100%
   3. Type: vertical, 2-stage centrifugal

3.9.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      During normal operation with two SWS pumps running, the third pump will be automatically started if system pressure decreases to 50 psig.
   2. Remote Manual
      The SWS pumps can be operated from the control room.

B. Motive Power
The motor driven SWS pumps and motor-operated valves are Class 1E loads that can be supplied from the standby diesel generators as described in Section 3.7.

C. Other
1. Lubrication and cooling are assumed to be provided locally for the SWS pumps.
2. Systems providing ventilation for the SWS pump room have not been determined.

3.9.7 Section 3.9 References

1. Ginna Final Safety Analysis Report, Section 9.2.1

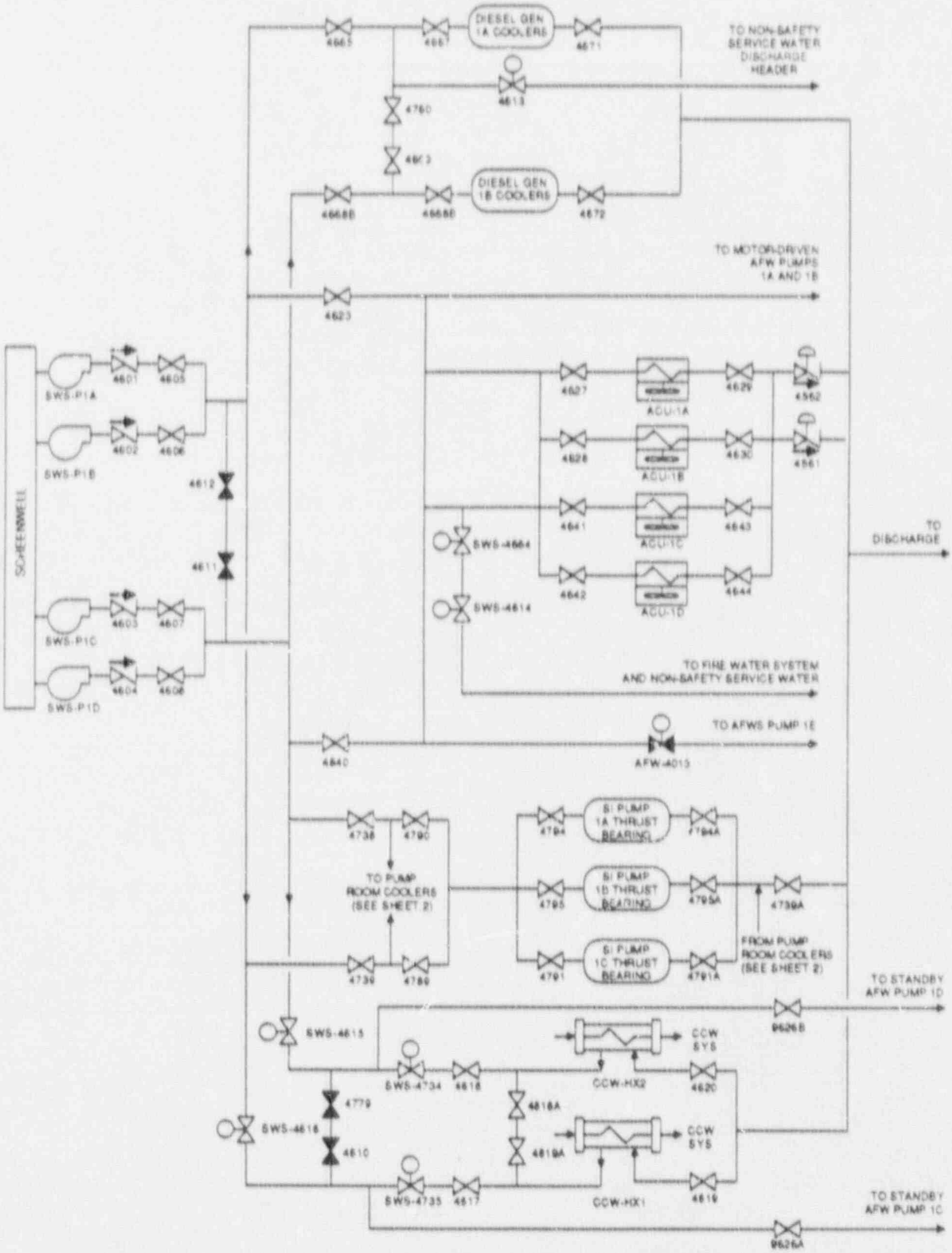


Figure 3.9-1. Ginna Service Water System (Sheet 1 of 2)

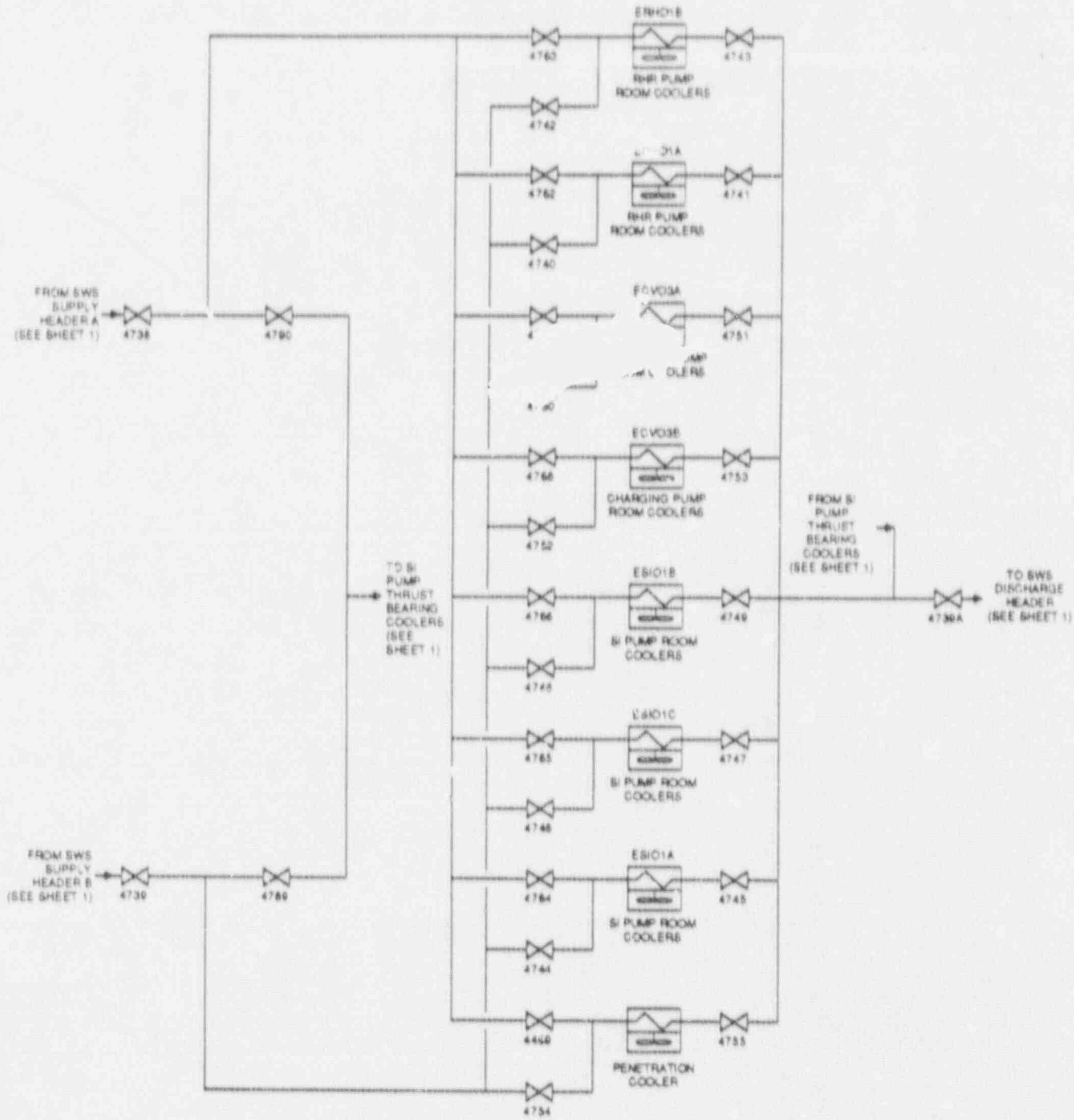


Figure 3.9-1. Ginna Service Water System
(Sheet 2 of 2)

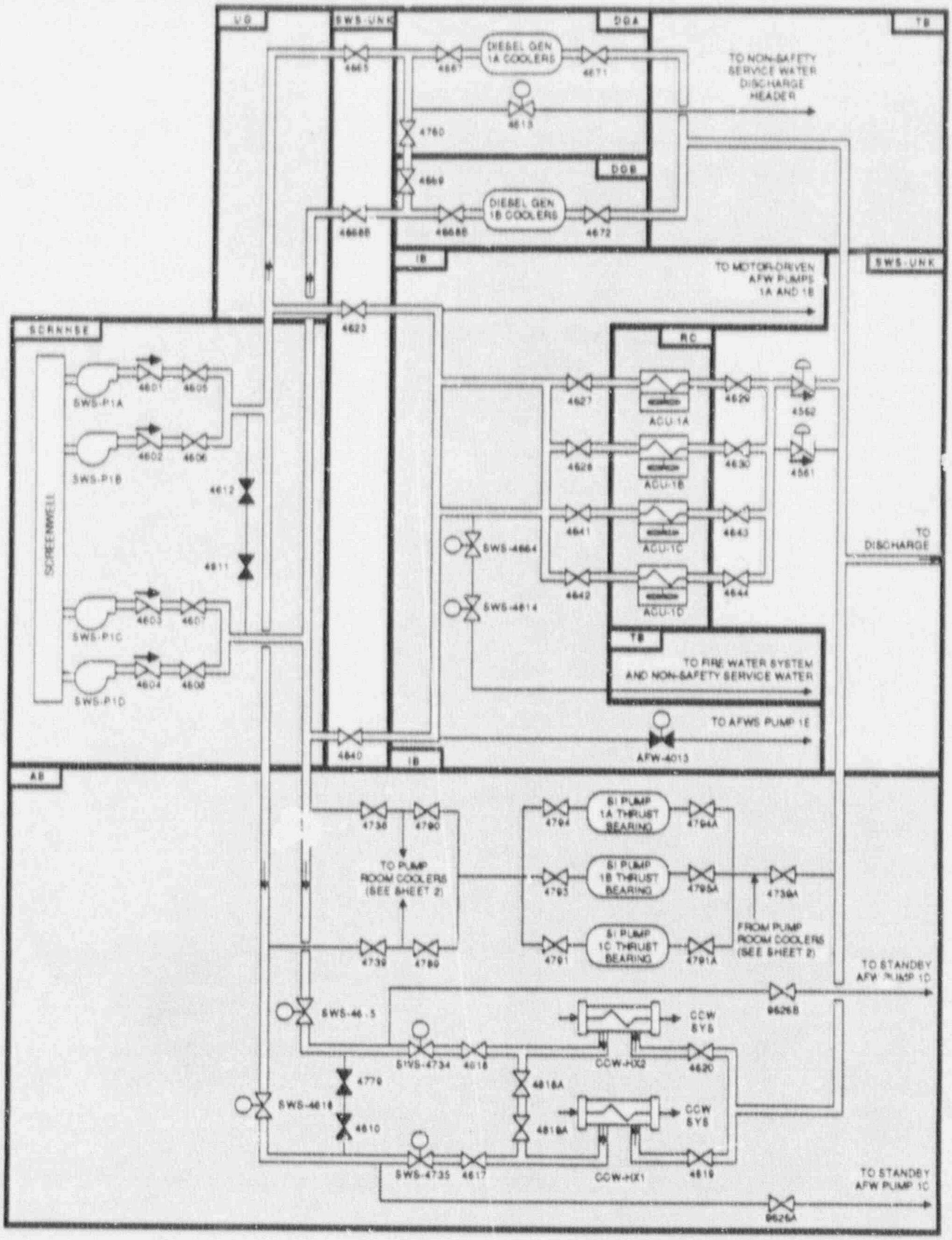
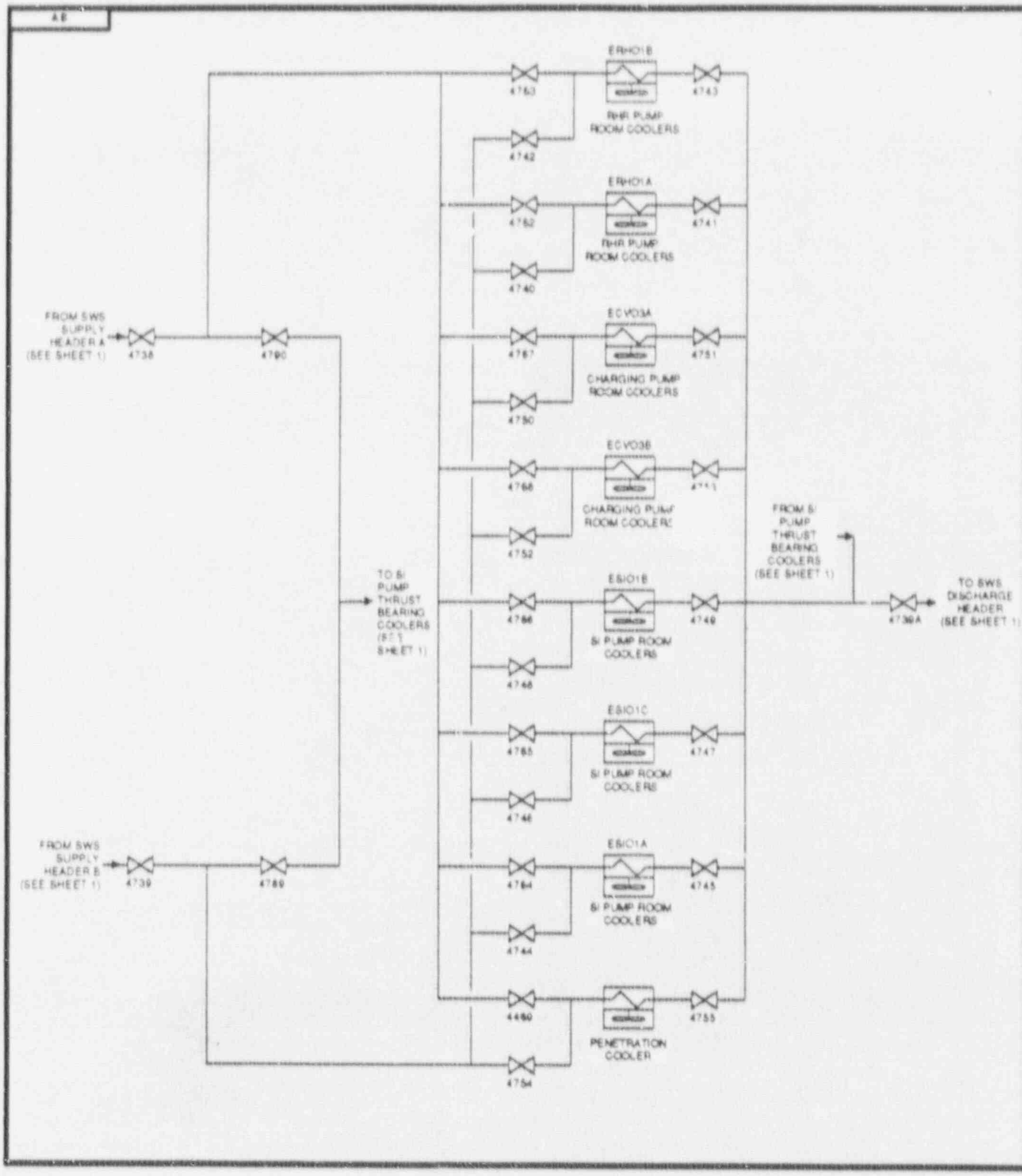


Figure 3.9-2. Ginna Service Water System Showing Component Locations (Sheet 1 of 2)



NOTE: SUBDIVISION OF AUXILIARY BUILDING (AREA AB) INTO VARIOUS PUMP ROOMS IS NOT SHOWN IN THIS DRAWING

Figure 3.9-2. Ginna Service Water System Showing Component Lc :ations (Sheet 2 of 2)

Table 3.9-1. Ginna Service Water System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
SWS-4614	MOV	IB	MCC 1C	480	AB	AC/1A
SWS-4615	MOV	AB	MCC 1C	480	AB	AC/1A
SWS-4616	MOV	AB	MCC 1C	480	AB	AC/1A
SWS-4664	MOV	IB	MCC 1D	480	AB	AC/1B
SWS-4670	MOV	DGB	MCC 1H	480	DGA	AC/1A
SWS-4734	MOV	AB	MCC 1D	480	AB	AC/1B
SWS-4735	MOV	AB	MCC 1D	480	AB	AC/1B
SWS-P1A	MDP	SCRNHSE	BUS 18	480	SCRNHSE	AC/1A
SWS-P1B	MDP	SCRNHSE	BUS 17	480	SCRNHSE	AC/1B
SWS-P1C	MDP	SCRNHSE	BUS 18	480	SCRNHSE	AC/1A
SWS-P1D	MDP	SCRNHSE	BUS 17	480	SCRNHSE	AC/1B

3.10 FIRE WATER SYSTEM (FWS)

3.10.1 System Function

The fire water system provides fire protection throughout the plant. Plant fire protection is provided by a loop fire header distribution system utilizing fire hydrants, fire hose reels, fixed water sprinkler spray systems, and water deluge systems. This system also can serve as a backup water source for the Standby Auxiliary Feedwater System (see Section 3.2) and also as an alternate meas of cooling the diesel generators.

3.10.2 System Definition

The fire system consists of one-diesel-driven pump, one motor-driven pump and a jockey pump. The pumps supply water to the plant fire header distribution loop. Pressure in the fire protection system is maintained by the jockey pump, which takes its suction from the service water system. Simplified drawings of the fire water system are shown in Figures 3.10-1 and 3.10-2.

3.10.3 System Operation

A looped 10 inch yard main encircles the entire plant with fire hydrants spaced at approximately 250 foot intervals. The various buildings are supplied from headers off of the main sprinklers and deluge systems are actuated by heat detecting devices. Alarms and interlocks are provided to indicate operation of the system.

The fire system is normally supplied with water from Lake Ontario and maintained at a minimum pressure of 100 psig by a 15,000 gallon pressure tank and a 120 gpm centrifugal jockey pump. Under LOCA conditions the suction lines to these pumps are isolated from the service water header by motor-operated valves.

Whenever the fire protection system header falls to 95 psig, the motor-driven fire pump will automatically start. If this pump fails to start or is unable to satisfy the demands of the fire system the diesel-driven fire pump will automatically start at a header pressure of 85 psig. The diesel-driven pump is battery started and does not require any external electrical power for operation. Both pumps take their suction from the circulating water intake.

3.10.4 System Success Criteria

The Ginna FSAR (Ref. 1, Section 9.5.1.2.3.2) implies that either the motor-driven or the diesel-driven fire water pump can successfully supply the needs of the fire system, including providing cooling water to the diesel generators.

3.10.5 Component Information

A. Fire water pumps 1A, 1B
   1. Rated flow: 2000 gpm @ 125 psig
   2. Rated capacity: 100%

B. Jockey Pump 1C
   1. Rated flow: 120 gpm @ 100 psig

C. Pressure tank
   1. Water volume: 10,000 gal

3.10.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      a. The motor-driven fire pump is automatically started when system pressure decreases to 95 psig.
      b. The diesel-driven fire pump is automatically started when system pressure decreases to 85 psig.
   2. Remote Manual
      The fire pumps can be operated from the control room.

B. Motive Power
   1. The motor-driven fire pump is a Class 1E load that can be supplied from the standby diesel generators as described in Section 3.7.
   2. The diesel-driven fire pump is powered by its own diesel engine.

C. Other
   1. Lubrication, cooling, and ventilation are assumed to be provided locally for the fire pumps.
   2. An alternate method for cooling the diesel generators exists by using a hose connection from the fire water system hydrant outside the turbine building to valves in the service water system lines to the diesel generators.
   3. An alternate method for providing makeup water for the standby auxiliary feedwater pumps exists via a connection with the fire water system. Details on this capability have not been determined.

3.10.7 Section 3.10 References

1. Ginna Final Safety Analysis Report.

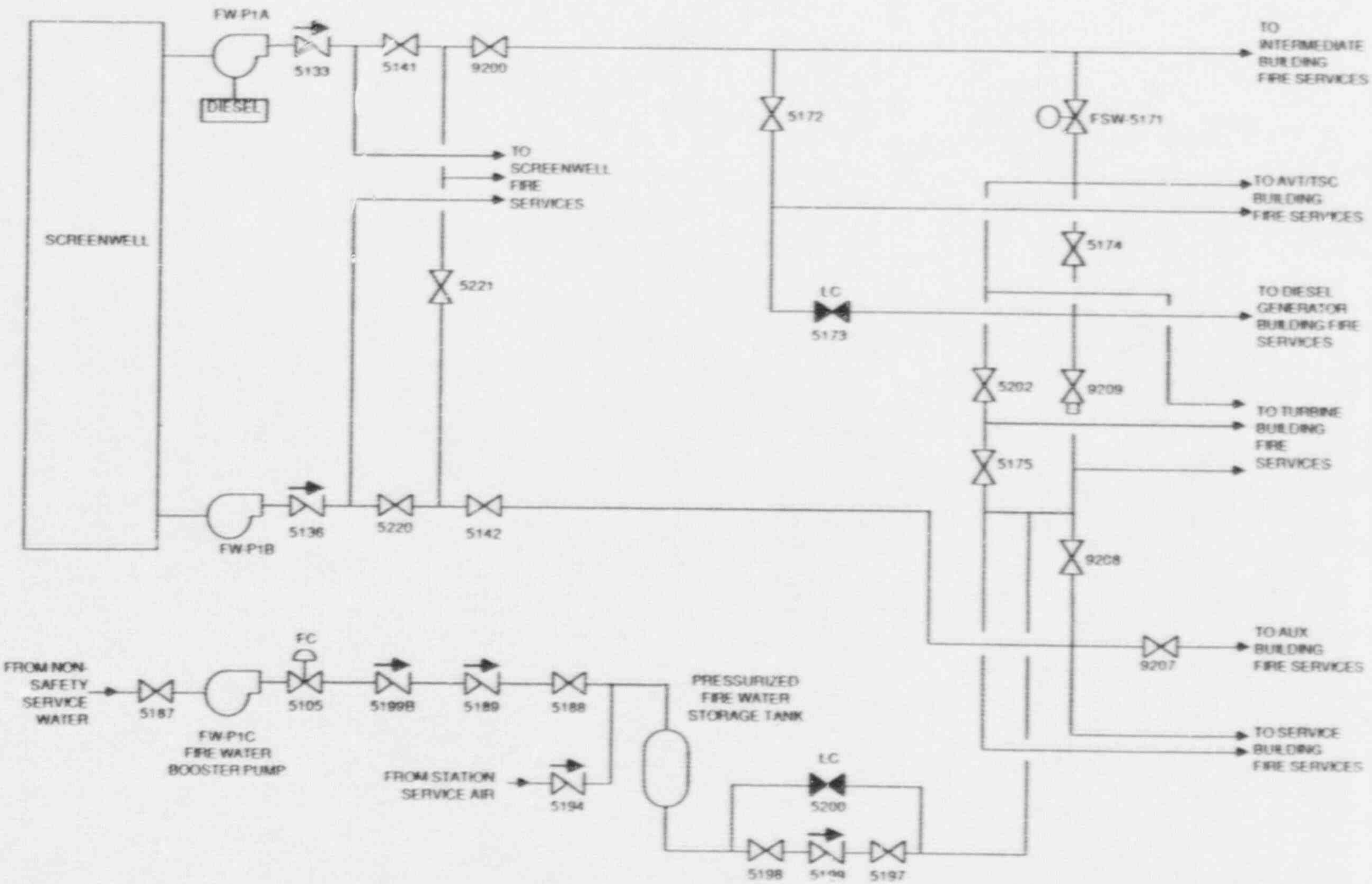


Figure 3.10-1. Ginna Fire Water System

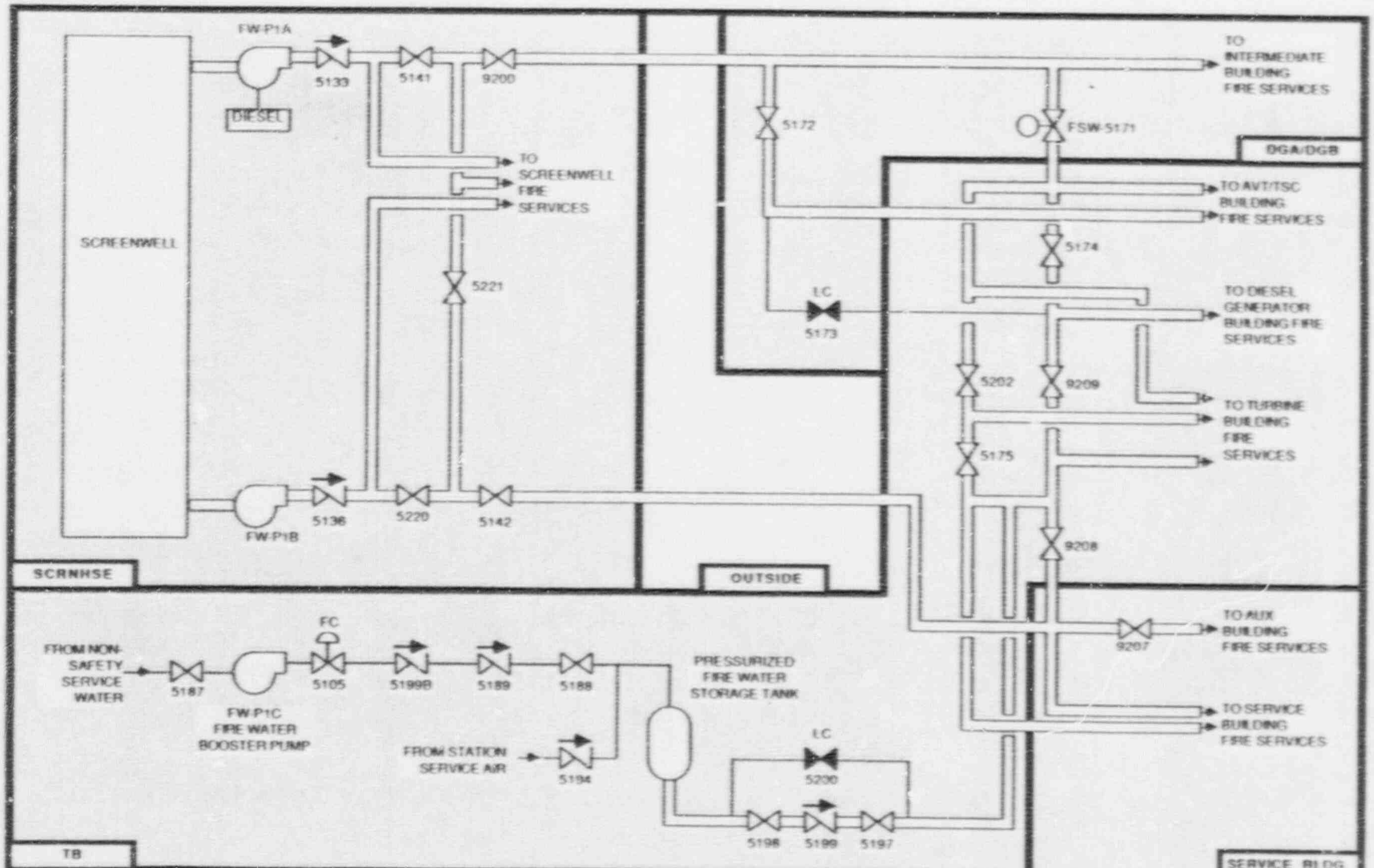


Figure 3.10-2. Ginna Fire Water System Showing Component Locations

4. PLANT INFORMATION

4.1 SITE AND BUILDING SUMMARY

The R.E. Ginna site is located in the Township of Ontario, in the northwest corner of Wayne County, New York, on the south shore of Lake Ontario about 16 miles east of the center of the city of Rochester and 40 miles west-southwest of Oswego. Figure 4-1 (from Ref. 1) shows a general view of the site, while Figure 4-2 shows a simplified plot plan. The major structures include the reactor containment, the Auxiliary Building, the Intermediate Building, the Turbine Building, and the Service Building.

The reactor containment contains the RCS and portions of the AFWS, ECCS, CVCS, and RHR systems.

The Auxiliary Building located to the immediate south of the containment, contains most of the major engineered safety features components. Components of the ECCS, CVCS, CCWS, RHR, and electric power system are located in the Auxiliary Building. The standby AFWS is located in a separate building attached to the south side of the Auxiliary Building.

The Intermediate Building, attached to the west side of the containment, contains the AFWS. There is a Facade, which runs between the Intermediate Building and the reactor containment 30 feet above ground, which contains a portion of the AFWS piping and the main steam lines.

The Turbine Building is located north of the Intermediate Building and contains components of the power conversion system. The diesel generators are located in separate rooms attached to the northeast corner of the turbine building.

The Screenhouse is located on Lake Ontario and contains the service water pumps, as well as the fire water pumps.

4.2 FACILITY LAYOUT DRAWINGS

Figure 4-3 shows various section views of the Ginna station. Figures 4-4 through 4-11 show simplified layout drawings for Ginna. Major rooms, stairways, elevators, and doorways are shown in the simplified layout drawings, however, many interior walls have been omitted for clarity. Labels printed in uppercase correspond to the location codes listed in Table 4-1 and used in the component data listings and system drawings in Section 3. Some additional labels are included for information and are printed in lowercase type.

A listing of components by location is presented in Table 4-2. Components included in Table 4-2 are those found in the system data tables in Section 3, therefore this table is only a partial listing of the components and equipment that are located in a particular room or area of the plant.

4.3 SECTION 4 REFERENCES

1. Heddleson, F.A. "Design Data and Safety Features of Commercial Nuclear Power Plants", ORNL-NSIC-55, Vol. I, Oak Ridge National Laboratory December 1973.

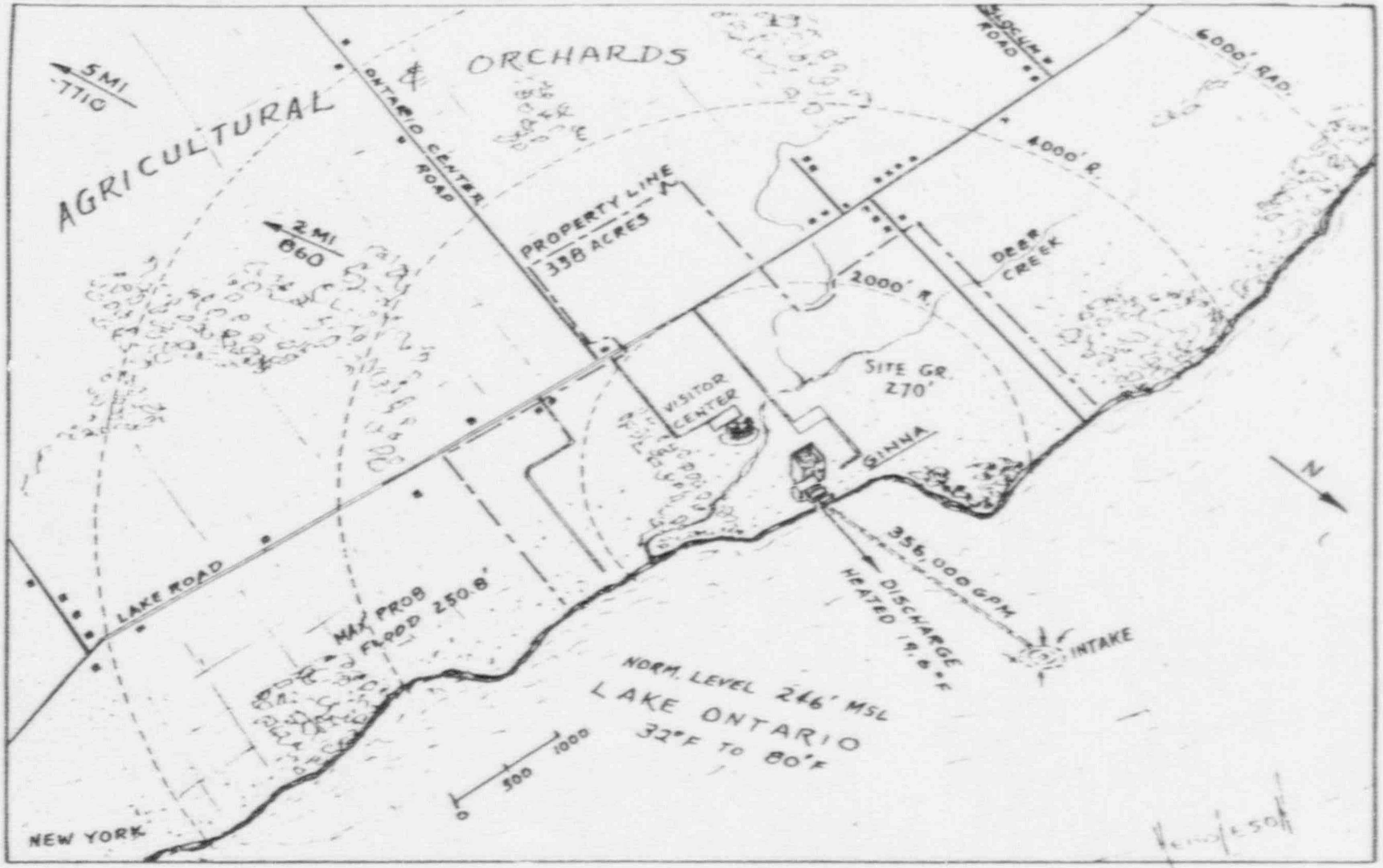


Figure 4-1. General View of Ginna Site and Vicinity

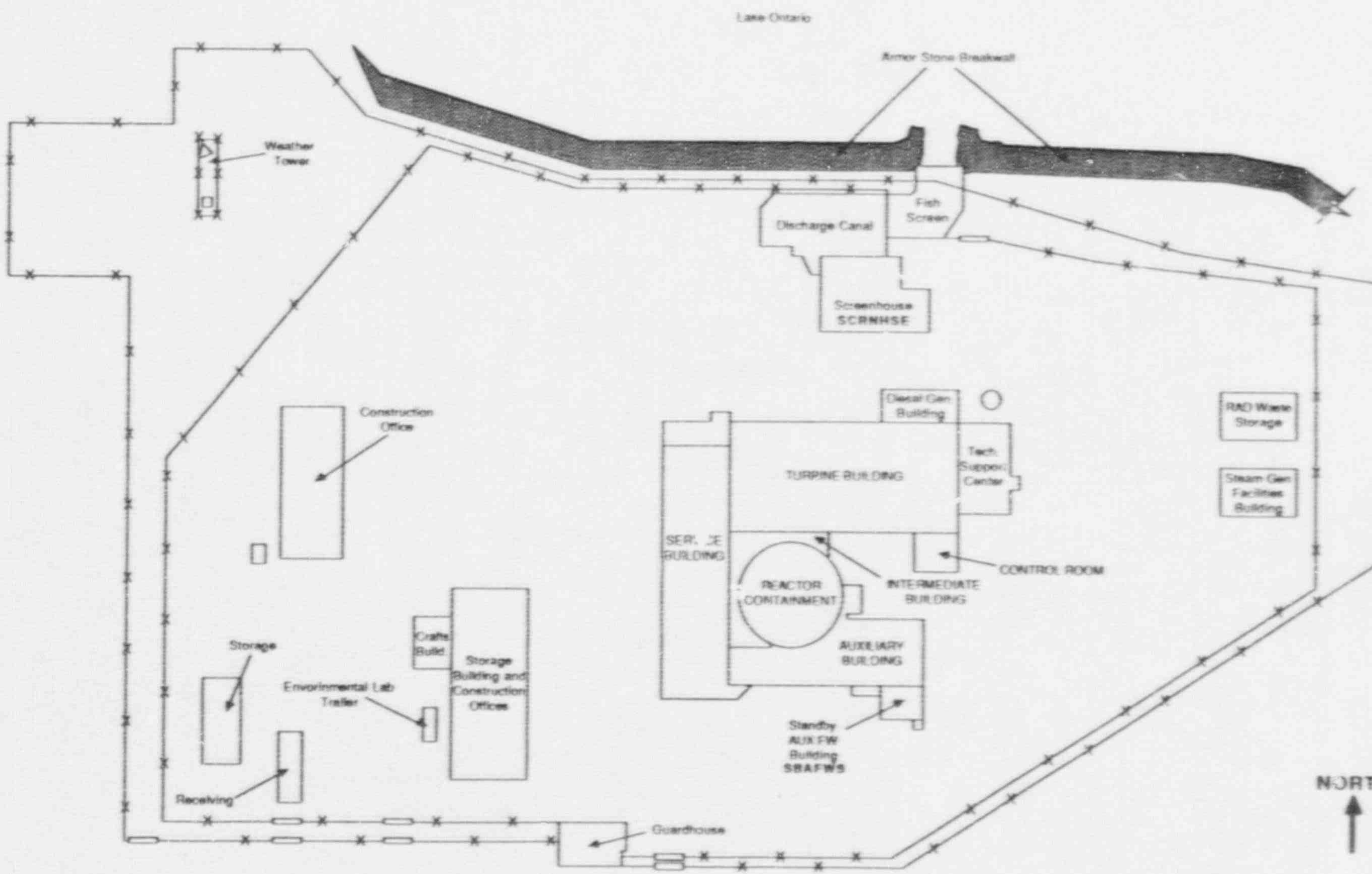


Figure 4-2. Ginna Site Plot Plan

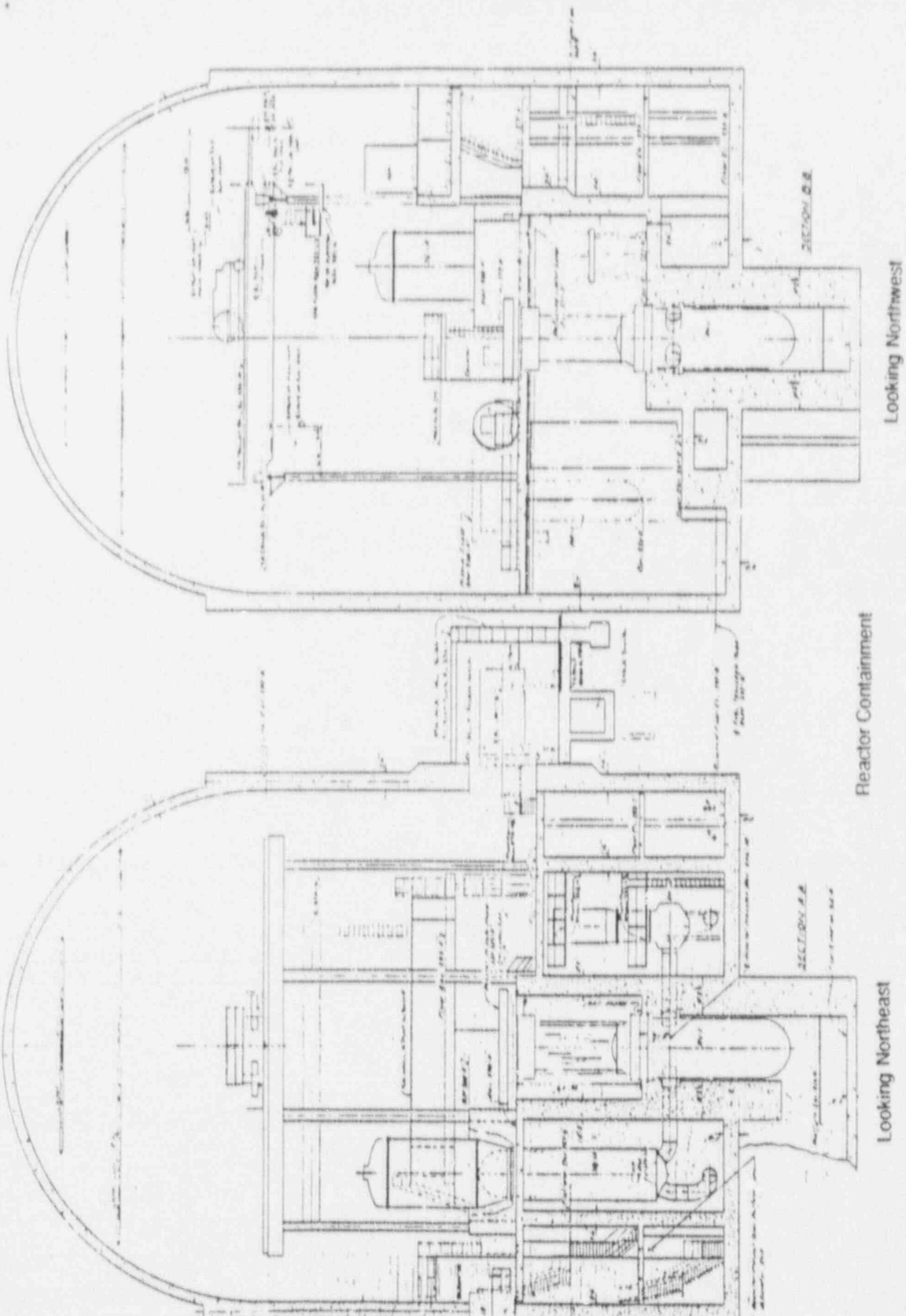
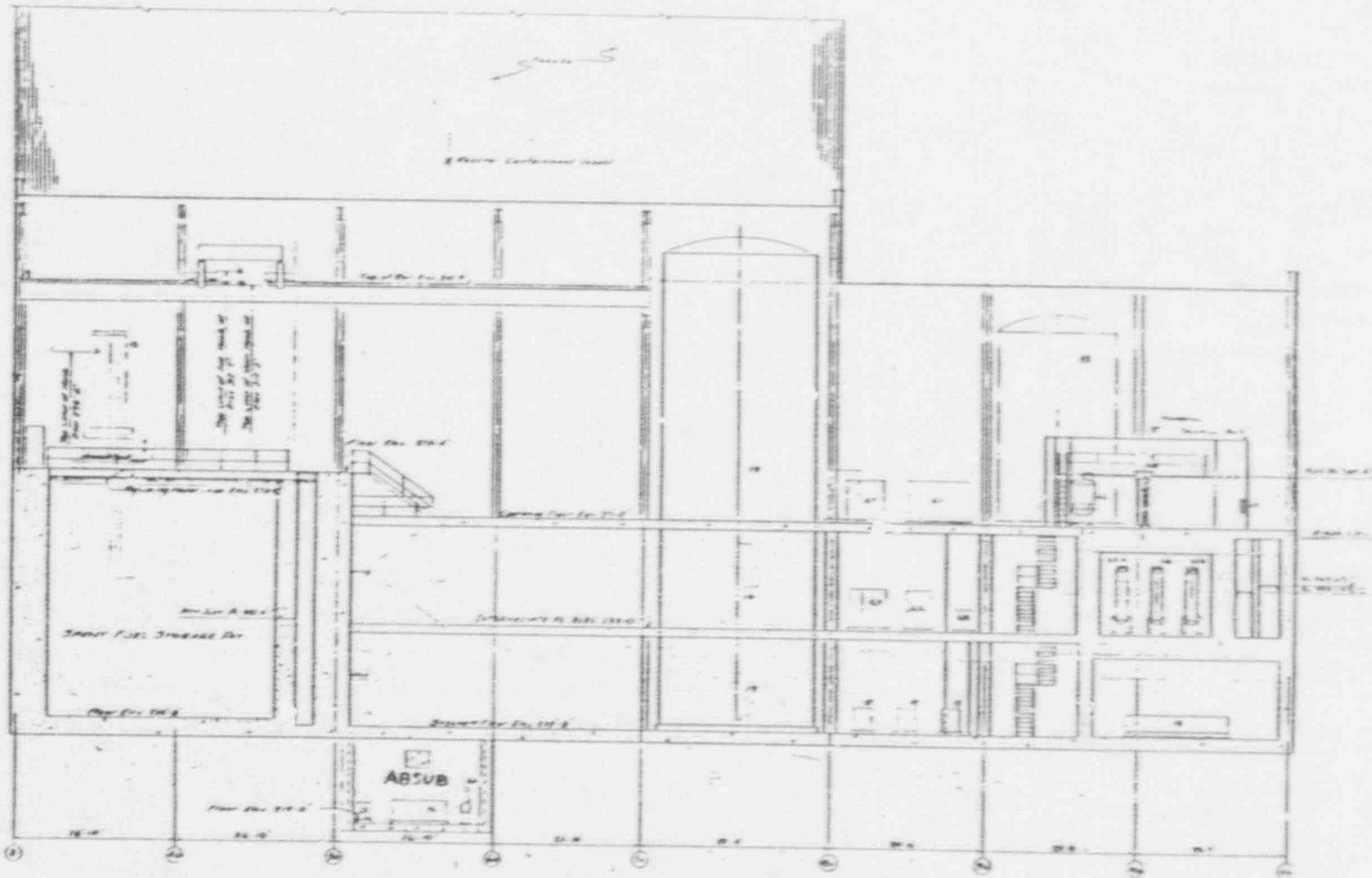
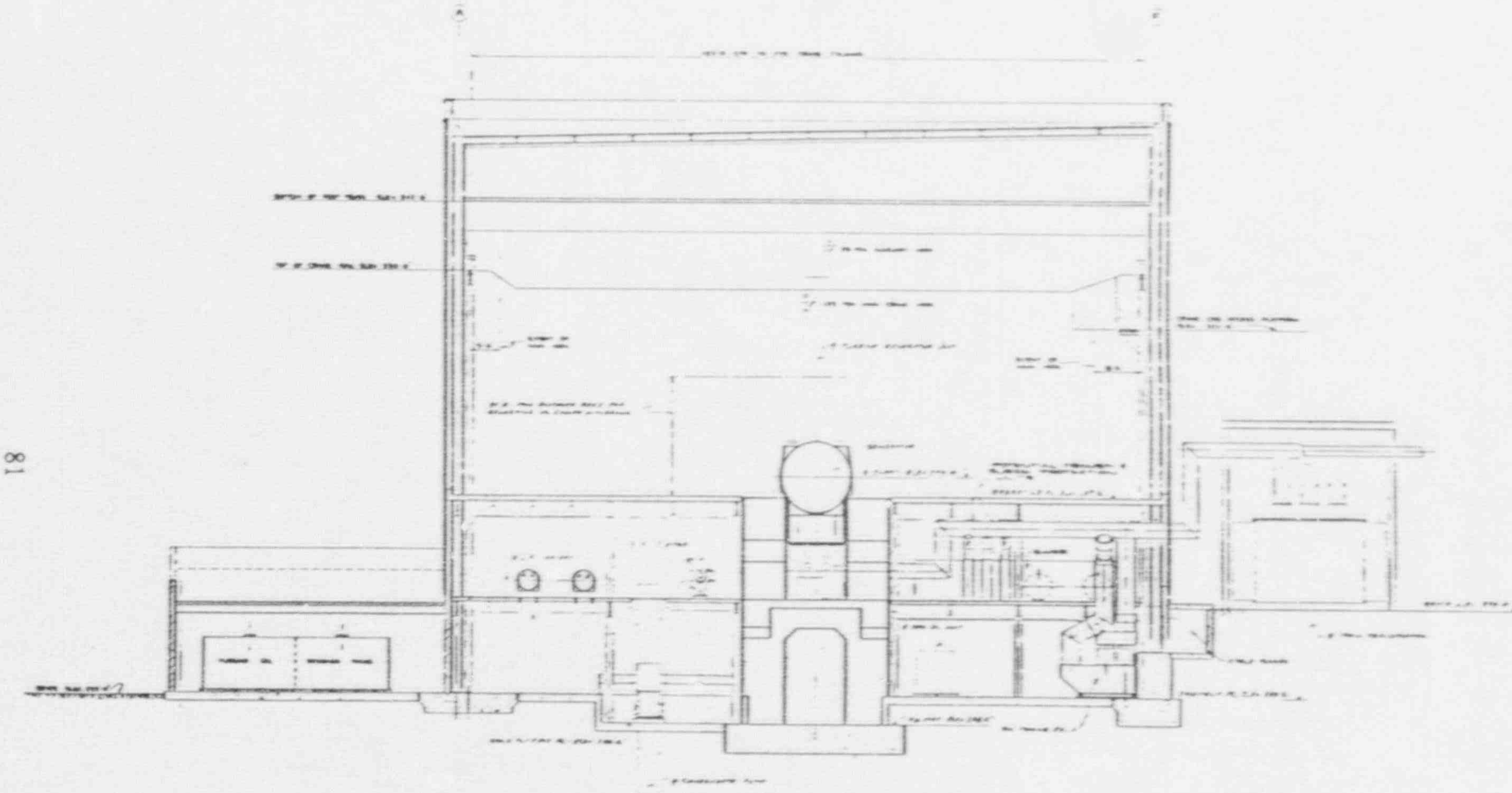


Figure 4-3. Ginna Section Drawings (Page 1 of 3)



Auxiliary Building (Including ABSUB)

Figure 4-3. Ginna Section Drawings (Page 2 of 3)



Turbine Building

Figure 4-3. Ginna Section Drawings (Page 3 of 3)

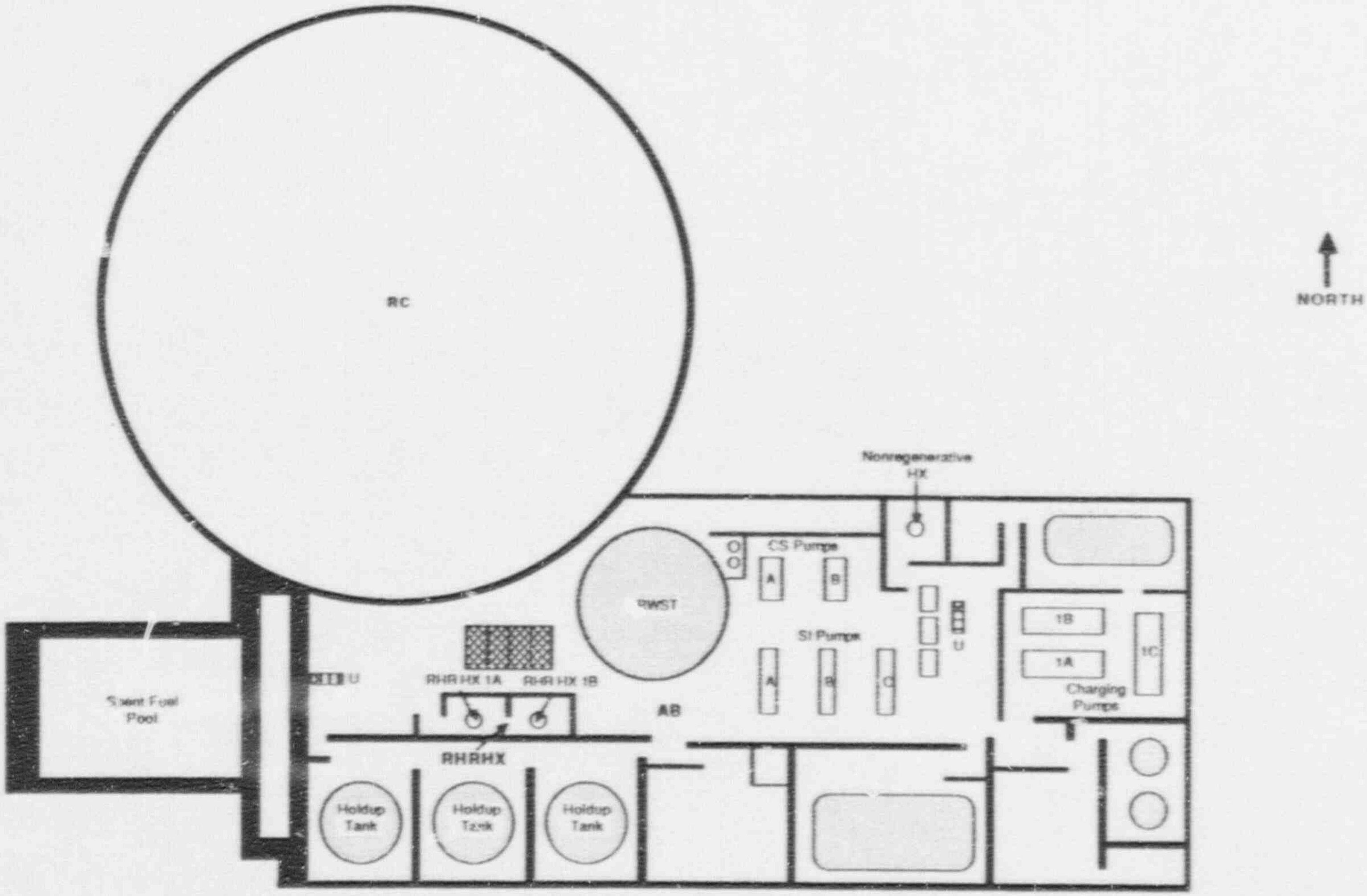


Figure 4-4. C .ua Reactor Building, Elevation 235'-8"

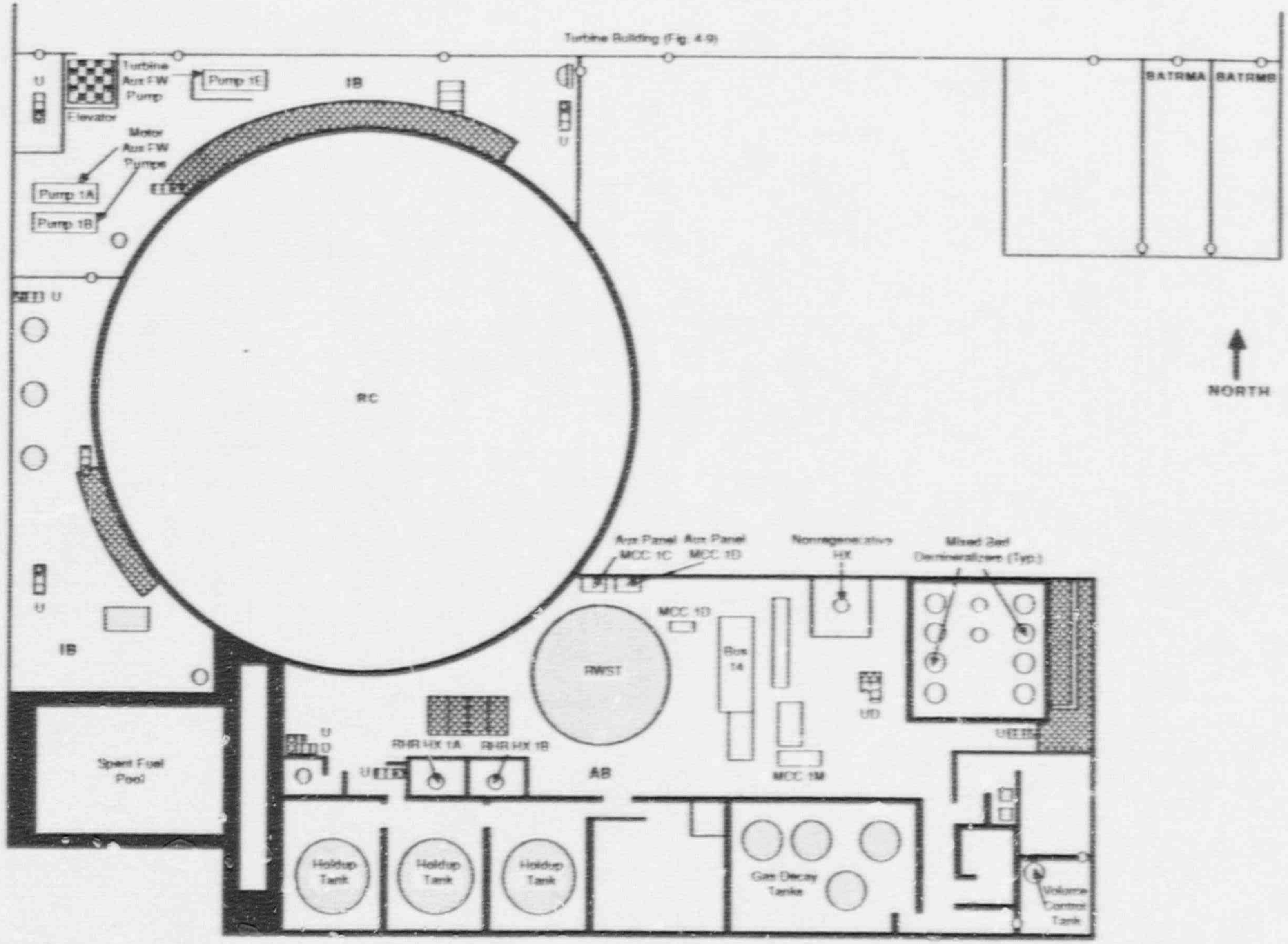


Figure 4-5. Ginna Reactor Building, Elevation 253'-6"

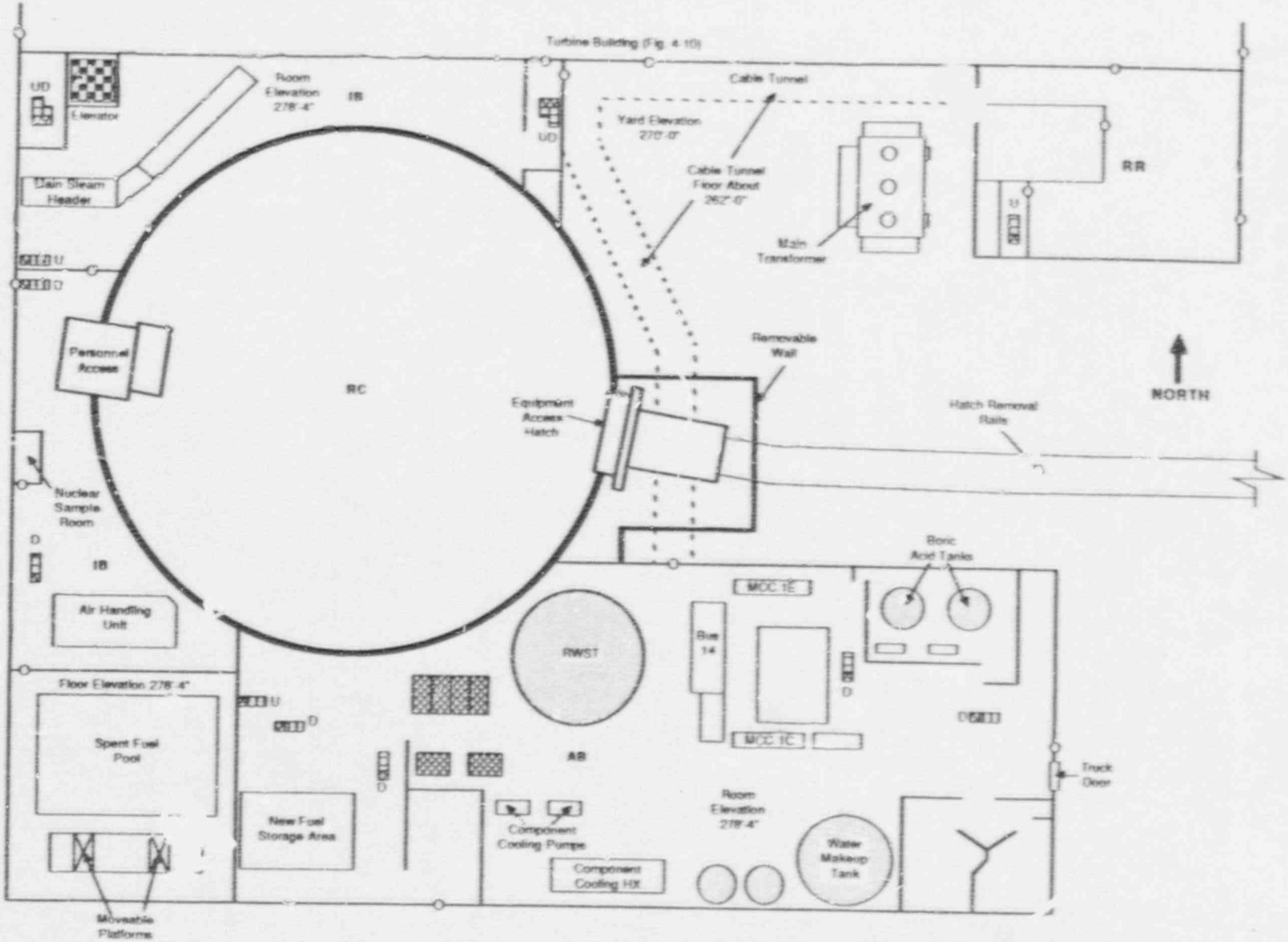


Figure 4-6. Ginna Reactor Building, Elevation 271'-0"

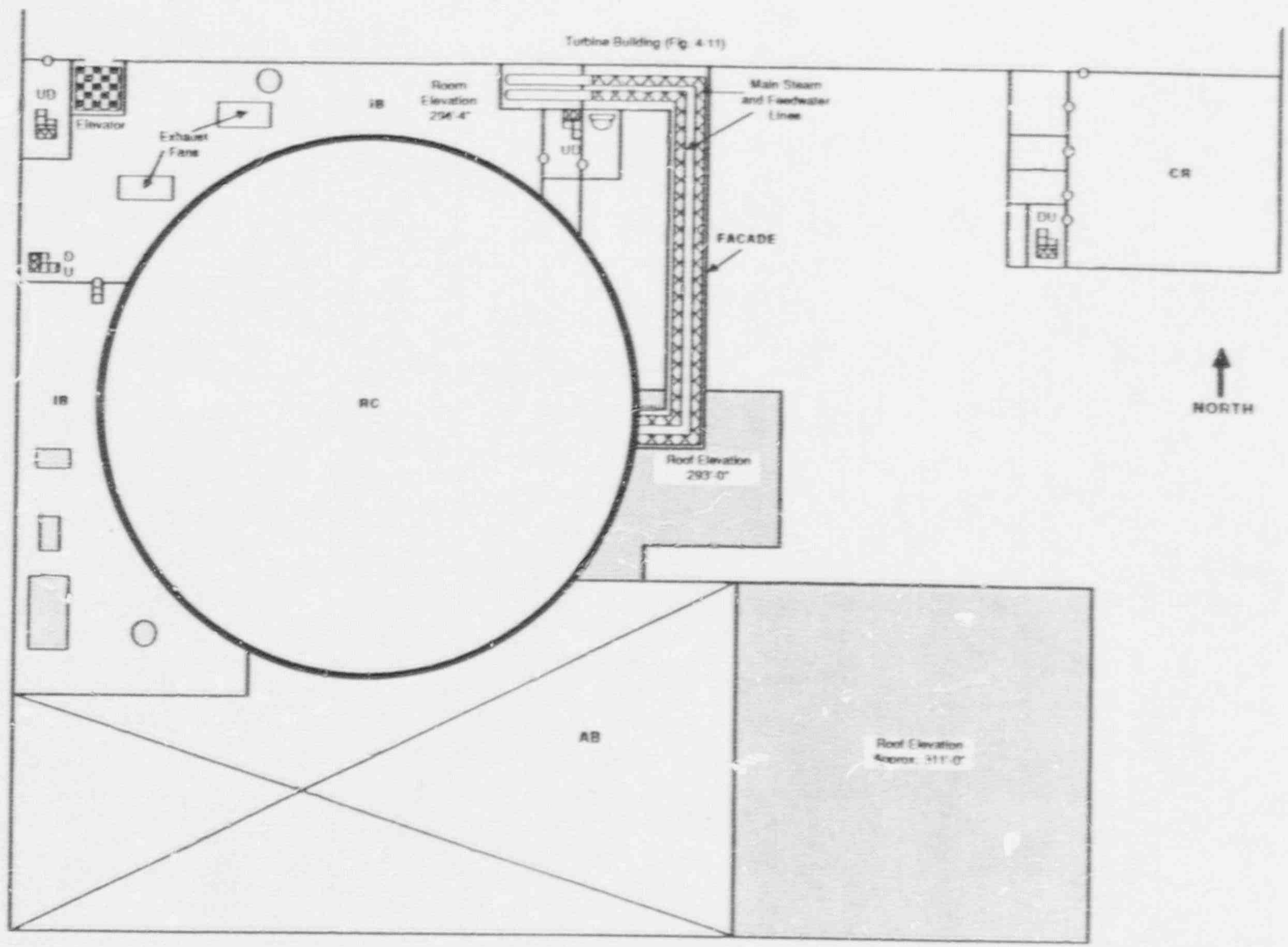


Figure 4-7. Ginna Reactor Building, Elevation 293'-0"

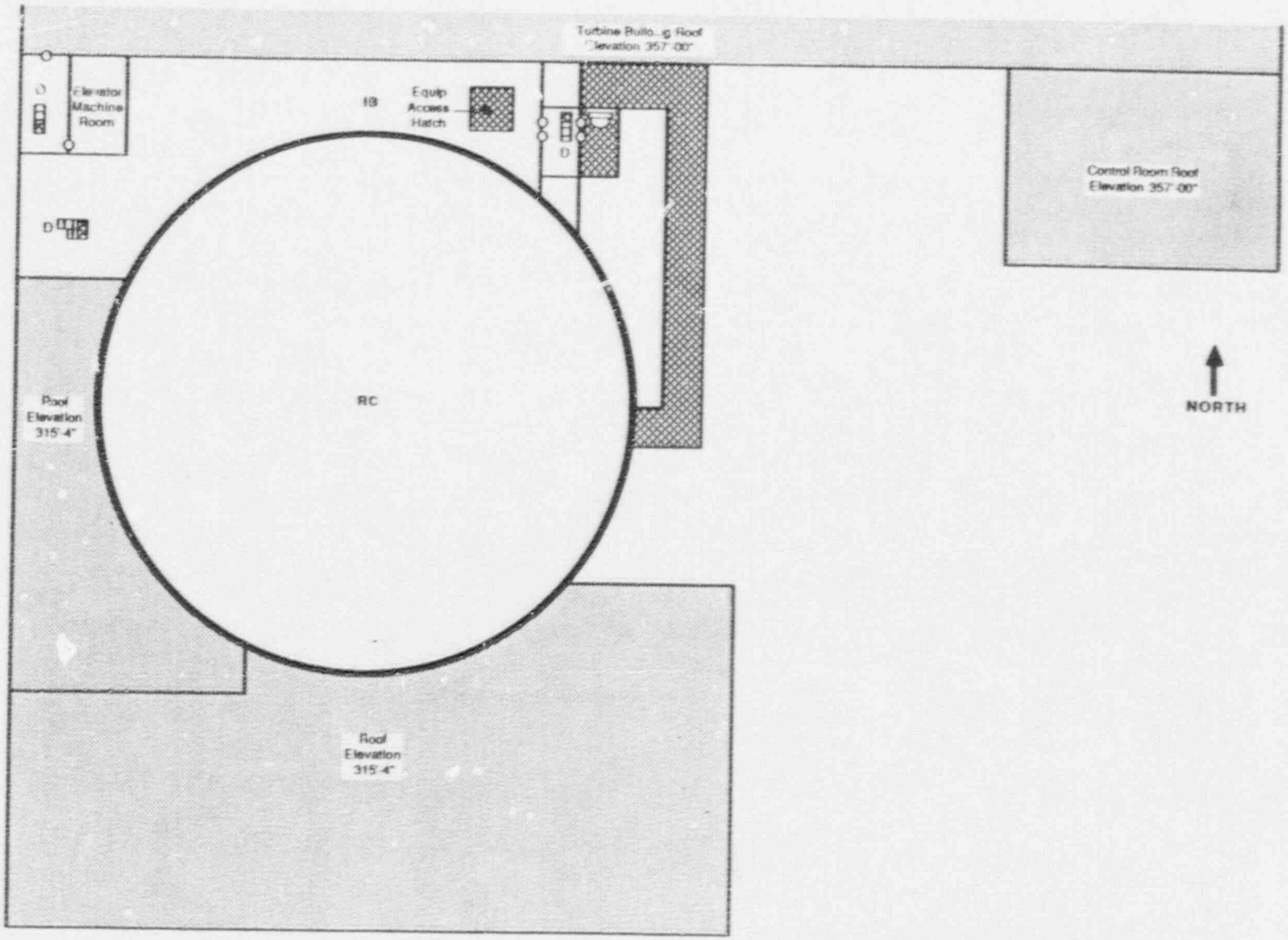


Figure 4-8. Ginna Reactor Building, Elevation 315'-4"

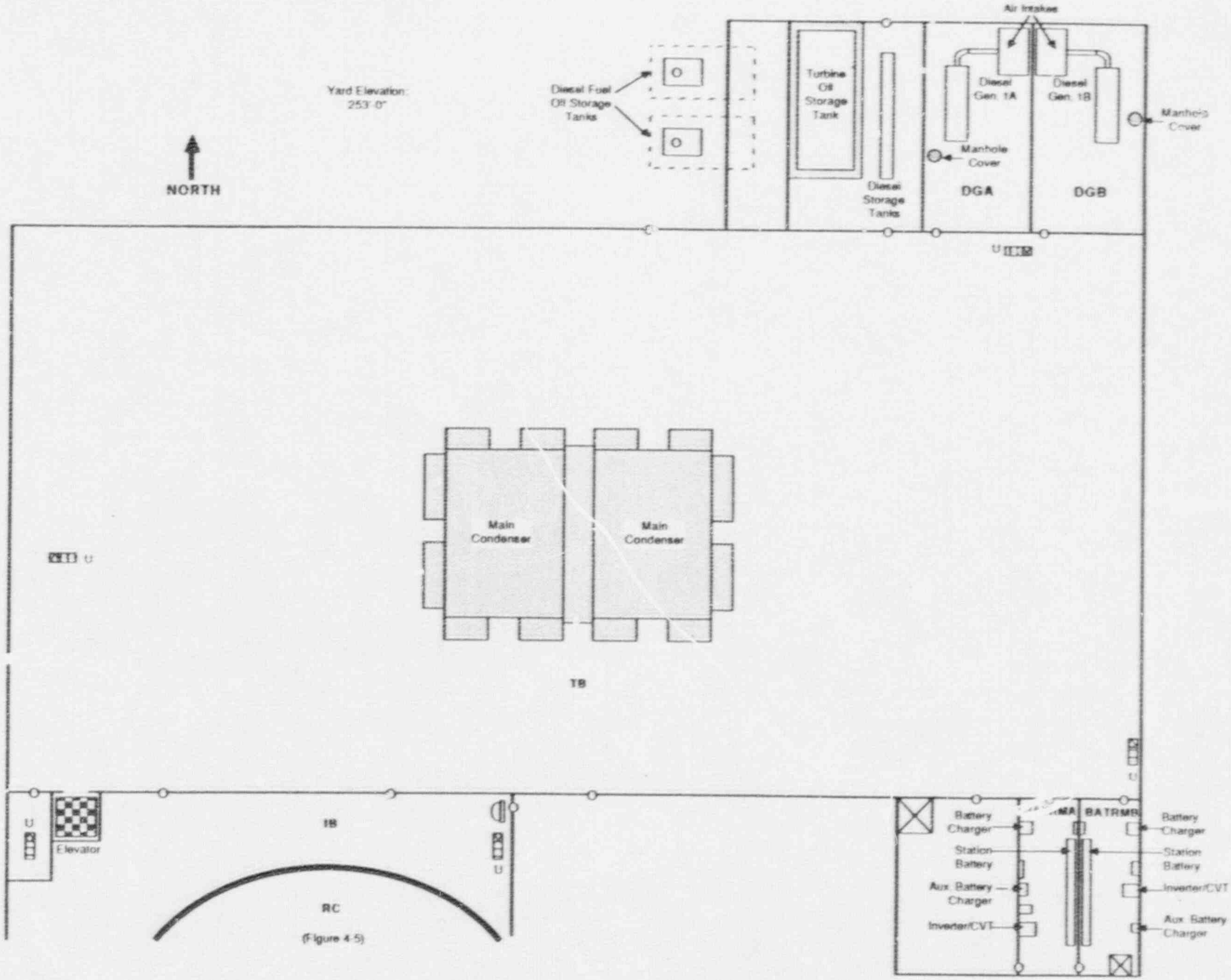


Figure 4-9. Ginna Turbine Building, Elevation 253'-6"

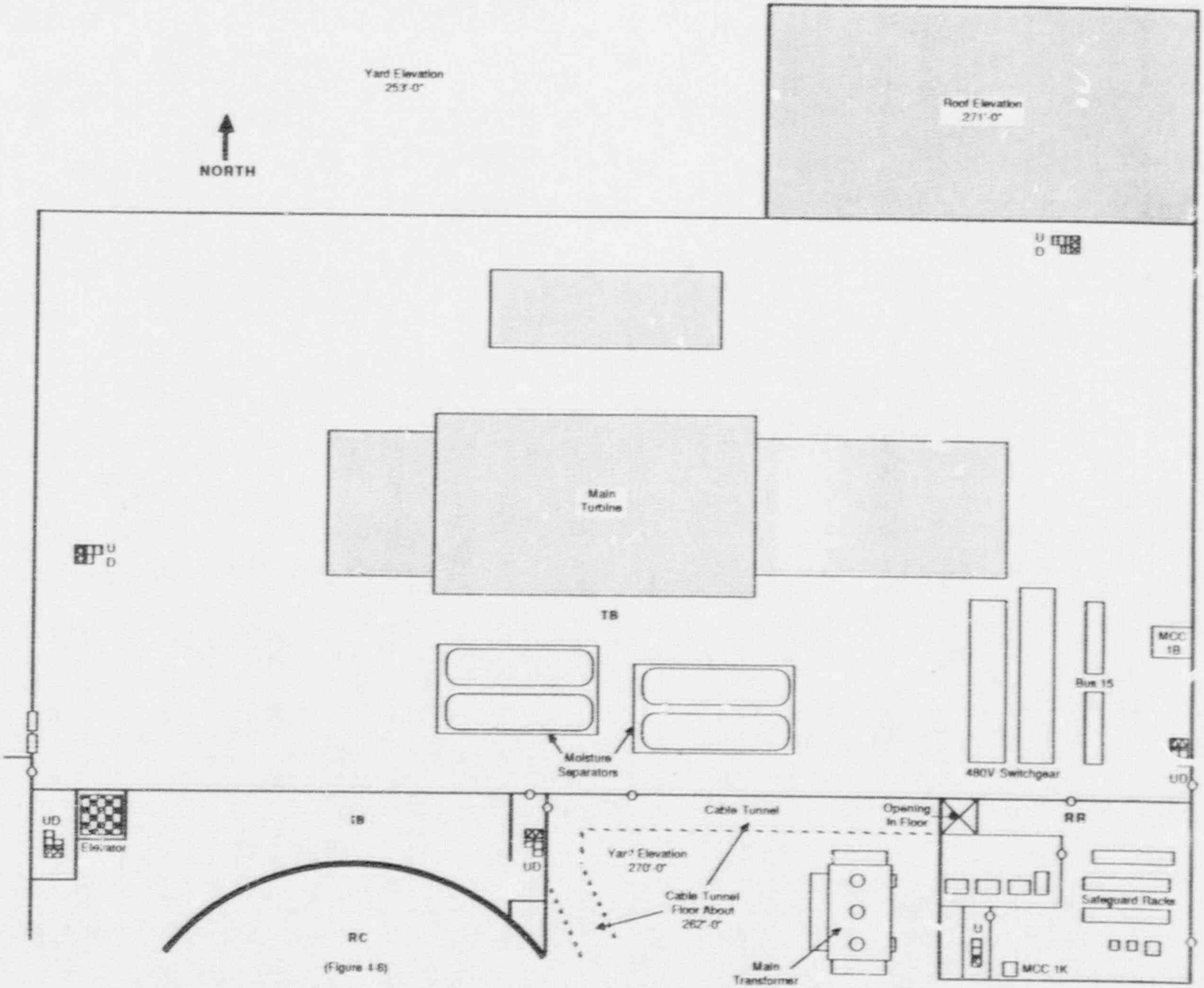


Figure 4-10. Ginna Turbine Building, Elevation 271'-0"

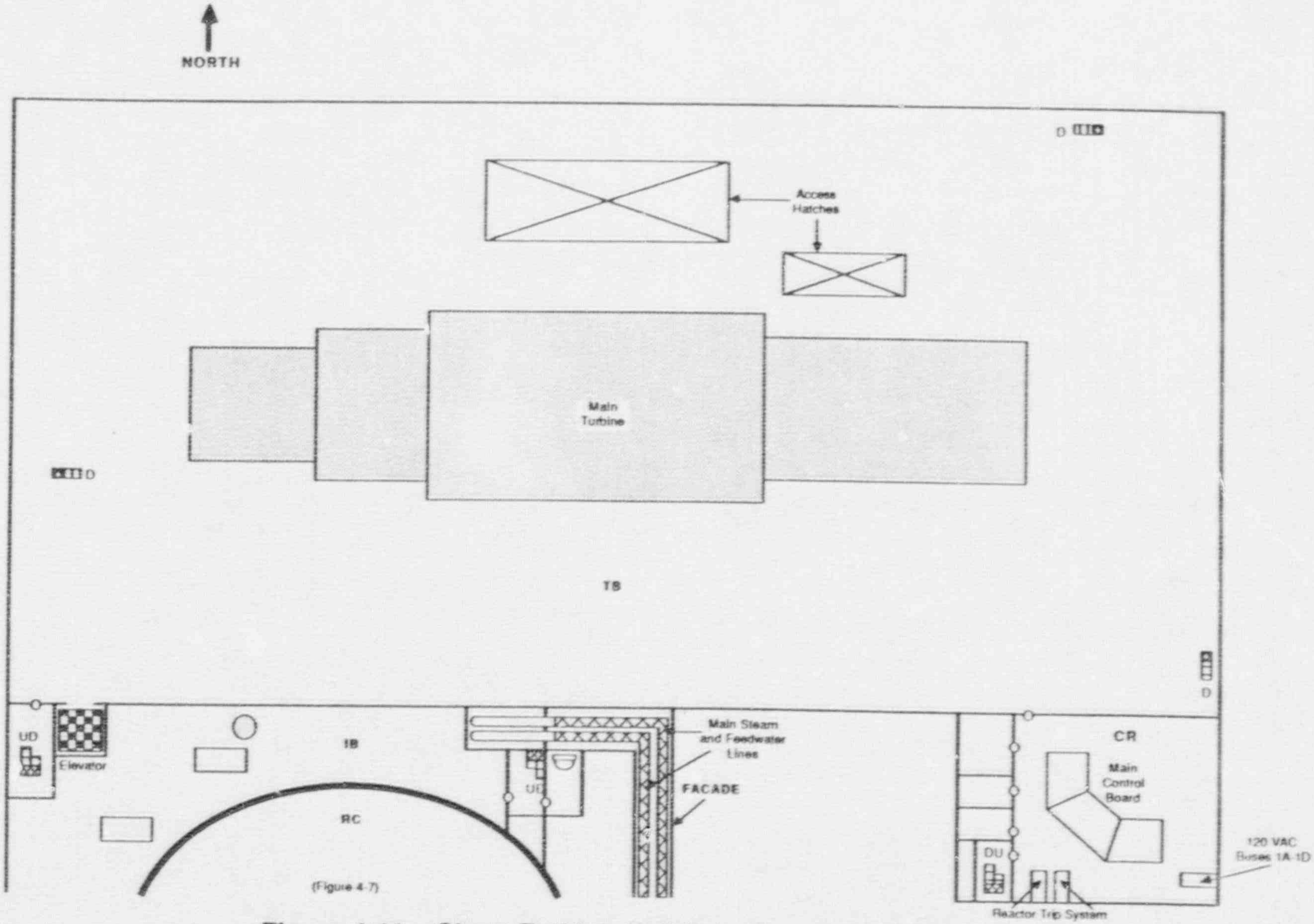


Figure 4-11. Ginna Turbine Building, Elevation 289'-0"

Table 4-1. Definition of Ginna Building and Location Codes

	Codes	Descriptions
1.	AB	The entire Auxiliary Building at elevation 235' and above.
2.	ABSUB	The Auxiliary building sub-basement at elevation 219'.
3.	BATRMA	Battery Room 1A, located off the south side of the Turbine Building at elevation 253'.
4.	BATRMB	Battery Room 1B, located off the south side of the Turbine Building at elevation 253'.
5.	CR	Control Room, located off the south side of the Turbine Building at elevation 289'.
6.	CSTRM	Room in Service Building containing the condensate storage tanks.
7.	DGA	Diesel Generator Room A, located off the north side of the Turbine Building at elevation 253'. Contains Diesel Generator 1A.
8.	DGB	Diesel Generator Room B, located off the north side of the Turbine Building at elevation 253'. Contains Diesel Generator 1B.
9.	FACADE	Area behind facade where the B loop FW line and main AFW lines run outside from the Intermediate Building and enters the Reactor Containment 30 feet above the yard at elevation 301'.
10.	IB	The entire Intermediate Building at elevation 253' and above.
11.	RC	Reactor Containment.
12.	RHRHX	RHR Heat Exchanger rooms, located in the Auxiliary Building at elevation 235'-8".
13.	RR	Relay Room, located below the control room off the south side of the Turbine Building at elevation 271'.
14.	SBAFWS	Standby Auxiliary Feedwater System Building, located off the south side of the Auxiliary Building. Contains the Standby AFWS.
15.	SCRNHSE	Screenhouse. Contains the service water pumps and 480V switchgear Busses 17 and 18.

Table 4-1. Definition of Ginna Building and Location Codes (Continued)

	Codes	Descriptions
16.	TB	The entire Turbine Building.
17.	SWS-UNK	Undefined area which contains SWS piping from the containment ACUs to the discharge tunnel, and at the locations of valves 4665, 4668B, 4623, and 4840.

Table 4-2. Partial Listing of Components by Location at Ginna

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
AB	AFW	SFW-9629A	MOV
AB	AFW	SFW-9629B	MOV
AB	CCS	CS-P1A	MDP
AB	CCS	CS-860A	MOV
AB	CCS	CS-860B	MOV
AB	CCS	CS-P1B	MDP
AB	CCS	CS-860C	MOV
AB	CCS	CS-860D	MOV
AB	CCW	CCW-P1A	MDP
AB	CCW	CCW-P1B	MDP
AB	CCW	CCW-HX2	HX
AB	CCW	CCW-738A	MOV
AB	CCW	CCW-738B	MOV
AB	CCW	CCW-HX1	HX
AB	CVCS	VC-P1A	MDP
AB	CVCS	SI-RWST	TANK
AB	CVCS	VC-P1B	MDP
AB	CVCS	VC-P1C	MDP
AB	ECCS	CS-896A	MOV
AB	ECCS	CS-896B	MOV
AB	ECCS	SI-P1A	MDP
AB	ECCS	SI-P1B	MDP
AB	ECCS	SI-P1C	MDP
AB	ECCS	SI-1815A	MOV
AB	ECCS	SI-1815B	MOV
AB	ECCS	RH-857A	MOV
AB	ECCS	RH-857B	MOV
AB	ECCS	RH-857C	MOV
AB	ECCS	SI-871A	MOV
AB	ECCS	SI-871B	MOV

Table 4-2. Partial Listing of Components by Location at Ginna (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
AB	EP	EP-BUS 14	BUS
AB	EP	EP-BUS 16	BUS
AB	EP	EP-MCC 1C	MCC
AB	EP	EP-MCC 1D	MCC
AB	EP	EP-AB1B	PNL
AB	EP	EP-AB1A	PNL
AB	EP	EP-MCC1L	MCC
AB	EP	EP-MCC1M	MCC
AB	RHR	RH-856	MOV
AB	SI	SI-RWST	TANK
AB	SWS	SWS-4615	MOV
AB	SWS	SWS-4616	MOV
AB	SWS	SWS-4734	MOV
AB	SWS	SWS-4735	MOV
ABSUB	ECCS	RH-P1A	MDP
ABSUB	ECCS	RH-850A	MOV
ABSUB	ECCS	RH-P1B	MDP
ABSUB	ECCS	RH-850B	MOV
BATRMA	EP	EP-MAIN 1A	PNL
BATRMA	EP	EP-BC-1A	BC
BATRMA	EP	EP-BC-1A1	BC
BATRMA	EP	EP-BATT-1A	BATT
BATRMA	EP	EP-INV/CVT 1A	INV
BATRMB	EP	EP-MAIN 1B	PNL
BATRMB	EP	EP-BC-1B	BC
BATRMB	EP	EP-BC-1B1	BC
BATRMB	EP	EP-BATT-1B	BATT
BATRMB	EP	EP-INV/CVT 1B	INV
CR	EP	EP-BUS 1A	BUS
CR	EP	EP-BUS 1C	BUS

Table 4-2. Partial Listing of Components by Location at Ginna (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
CR	EP	EP-BUS 1B	BUS
CR	EP	EP-CBP1A	PNL
CR	EP	EP-CBP1B	PNL
CSTRM	AFW	AFW-CST1	TANK
CSTRM	AFW	AFW-CST2	TANK
DGA	EP	EP-BDG1A	PNL
DGA	EP	EP-DG1A	DG
DGA	EP	EP-CB-14	CB
DGA	EP	EP-CB-18	CB
DGB	EP	EP-BDG1B	PNL
DGB	EP	EP-DG-1B	DG
DGB	EP	EP-CB-16	CB
DGB	EP	EP-CB-17	CB
DGB	EP	EP-MCC1H	MCC
DGB	SWS	SWS-4670	MOV
IB	AFW	AFW-4000A	MOV
IB	AFW	AFW-4000B	MOV
IB	AFW	AFW-4007	MOV
IB	AFW	AFW-4008	MOV
IB	AFW	AFW-P1A	MDP
IB	AFW	AFW-4027	MOV
IB	AFW	AFW-P1B	MDP
IB	AFW	AFW-4028	MOV
IB	AFW	AFW-P1E	TDP
IB	AFW	AFW-3504A	MOV
IB	AFW	AFW-3505A	MOV
IB	AFW	AFW-3996	MOV
IB	AFW	AFW-4013	MOV
IB	SWS	SWS-4614	MOV
IB	SWS	SWS-4664	MOV

Table 4-2. Partial Listing of Components by Location at Ginna (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
RC	AFW	SG-1A	SG
RC	AFW	SG-1B	SG
RC	CCS	CS-SPRAY 1	SN
RC	CCS	CS-SPRAY 2	SN
RC	CCS	ACU-1A	FAN
RC	CCS	ACU-1B	FAN
RC	CCS	ACU-1C	FAN
RC	CCS	ACU-1D	FAN
RC	CVCS	RGN-HX	HX
RC	ECCS	RH-700	MOV
RC	ECCS	RH-701	MOV
RC	ECCS	RH-720	MOV
RC	ECCS	RH-721	MOV
RC	ECCS	RH-851A	MOV
RC	ECCS	RH-851B	MOV
RC	ECCS	SI-878A	MOV
RC	ECCS	SI-878B	MOV
RC	ECCS	SI-878C	MOV
RC	ECCS	SI-878D	MOV
RC	RCS	RCS-VESSEL	RV
RC	RCS	RCS-430	NV
RC	RCS	RCS-431C	NV
RC	RCS	RCS-515	MOV
RC	RCS	RCS-516	MOV
RHRHX	ECCS	RH-HX1B	HX
RHRHX	ECCS	RH-HX1B	HX
SBAFWS	AFW	SFW-9704A	MOV
SBAFWS	AFW	SFW-9701A	MOV
SBAFWS	AFW	SFW-9701B	MOV
SBAFWS	AFW	SFW-9703A	MOV

Table 4-2. Partial Listing of Components by Location at Ginna (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
SBAFWS	AFW	SFW-9703B	MOV
SBAFWS	AFW	SFW-9704B	MOV
SBAFWS	AFW	SFW-P1C	MDP
SBAFWS	AFW	SFW-P1D	MDP
SCRNHSE	EP	EP-BUS 17	BUS
SCRNHSE	EP	EP-BUS 18	BUS
SCRNHSE	EP	EP-SCRN1A	PNL
SCRNHSE	EP	EP-SCRN1B	PNL
SCRNHSE	SWS	SWS-P1A	MDP
SCRNHSE	SWS	SWS-P1B	MDP
SCRNHSE	SWS	SWS-P1C	MDP
SCRNHSE	SWS	SWS-P1D	MDP
TR1C-1D-UNK	EP	EP-TRANS1C/1D	TRAN

5. BIBLIOGRAPHY FOR GINNA

1. NUREG-0611, "Generic Evaluation of Feedwater Transients and Small Break Loss of Coolant Accidents in Westinghouse-Designed Operating Plants," Appendix X.6, "Ginna Auxiliary Feedwater System," USNRC, January 1980.

2. NUREG-0821, "Integrated Plant Safety Assessment, Systematic Evaluation Program, R.E. Ginna Nuclear Power Plant," USNRC Office of Nuclear Reactor Regulation, December 1982.

3. NUREG-0909, "NRC Report on the January 25, 1982, Steam Generator Tube Rupture at R.E. Ginna Nuclear Power Plant," USNRC, April 1982.

4. NUREG-0916, "Safety Evaluation Report Related to Restart of R.E. Ginna Nuclear Power Plant," USNRC, May 1982.

5. NUREG/CR-1821, "Seismic Review of the Robert E. Ginna Nuclear Power Plant as Part of the Systematic Evaluation Program," Lawrence Livermore National Laboratory, December 1980.

APPENDIX A
DEFINITION OF SYMBOLS USED IN THE SYSTEM AND LAYOUT DRAWINGS

A1. SYSTEM DRAWINGS

A1.1 Fluid System Drawings

The simplified system drawings are accurate representations of the major flow paths in a system and the important interfaces with other fluid systems. As a general rule, small fluid lines that are not essential to the basic operation of the system are not shown in these drawings. Lines of this type include instrumentation lines, vent lines, drain lines, and other lines that are less than 1/3 the diameter of the connecting major flow path. There usually are two versions of each fluid system drawing; a simplified system drawing, and a comparable drawing showing component locations. The drawing conventions used in the fluid system drawings are the following:

- Flow generally is left to right.
  - Water sources are located on the left and water "users" (i.e., heat loads) or discharge paths are located on the right.
  - One exception is the return flow path in closed loop systems which is right to left.
  - Another exception is the Reactor Coolant System (RCS) drawing which is "vessel-centered", with the primary loops on both sides of the vessel.
  - Horizontal lines always dominate and break vertical lines.

- Component symbols used in the fluid system drawings are defined in Figure A-1.
  - Most valve and pump symbols are designed to allow the reader to distinguish among similar components based on their support system requirements (i.e., electric power for a motor or solenoid, steam to drive a turbine, pneumatic or hydraulic source for valve operation, etc.)
  - Valve symbols allow the reader to distinguish among valves that allow flow in either direction, check (non-return) valves, and valves that perform an overpressure protection function. No attempt has been made to define the specific type of valve (i.e., as a globe, gate, butterfly, or other specific type of valve).
  - Pump symbols distinguish between centrifugal and positive displacement pumps and between types of pump drives (i.e., motor, turbine, or engine).

- Locations are identified in terms of plant location codes defined in Section 4 of this Sourcebook.
  - Location is indicated by shaded "zones" that are not intended to represent the actual room geometry.
  - Locations of discrete components represent the actual physical location of the component.
  - Piping locations between discrete components represent the plant areas through which the piping passes (i.e. including pipe tunnels and underground pipe runs).
  - Component locations that are not known are indicated by placing the components in an unshaded (white) zone.
  - The primary flow path in the system is highlighted (i.e., bold white line) in the location version of the fluid system drawings.

A1.2 Electrical System Drawings

The electric power system drawings focus on the Class 1E portions of the plant's electric power system. Separate drawings are provided for the AC and DC portions of the Class 1E system. There often are two versions of each electrical system drawing; a simplified system drawing, and a comparable drawing showing component locations. The drawing conventions used in the electrical system drawings are the following:

- Flow generally is top to bottom
  - In the AC power drawings, the interface with the switchyard and/or offsite grid is shown at the top of the drawing.
  - In the DC power drawings, the batteries and the interface with the AC power system are shown at the top of the drawing.
  - Vertical lines dominate and break horizontal lines.

- Component symbols used in the electrical system drawings are defined in Figure A-2.

- Locations are identified in terms of plant location codes defined in Section 4 of this Sourcebook.
  - Locations are indicated by shaded "zones" that are not intended to represent the actual room geometry.
  - Locations of discrete components represent the actual physical location of the component.
  - The electrical connections (i.e., cable runs) between discrete components, as shown on the electrical system drawings, DO NOT represent the actual cable routing in the plant.
  - Component locations that are not known are indicated by placing the discrete components in an unshaded (white) zone.

A2. SITE AND LAYOUT DRAWINGS

A2.1 Site Drawings

A general view of each reactor site and vicinity is presented along with a simplified site plan showing the arrangement of the major buildings, tanks, and other features of the site. The general view of the reactor site is obtained from ORNL-NSIC-55 (Ref. 1). The site drawings are approximately to scale, but should not be used to estimate distances on the site. As-built scale drawings should be consulted for this purpose.

Labels printed in bold uppercase correspond to the location codes defined in Section 4 and used in the component data listings and system drawings in Section 3. Some additional labels are included for information and are printed in lowercase type.

A2.2 Layout Drawings

Simplified building layout drawings are developed for the portions of the plant that contain components and systems that are described in Section 3 of this Sourcebook. Generally, the following buildings are included: reactor building, auxiliary building, fuel building, diesel building, and the intake structure or pumphouse. Layout drawings generally are not developed for other buildings.

Symbols used in the simplified layout drawings are defined in Figure A-3. Major rooms, stairways, elevators, and doorways are shown in the simplified layout drawings however, many interior walls have been omitted for clarity. The building layout drawings, are approximately to scale, should not be used to estimate room size or distances. As-built scale drawings for should be consulted his purpose.

Labels printed in uppercase bolded also correspond to the location codes defined in Section 4 and used in the component data listings and system drawings in Section 3. Some additional labels are included for information and are printed in lowercase type.

A3. APPENDIX A REFERENCES

1. Heddleson, F.A., "Design Data and Safety Features of Commercial Nuclear Power Plants.", ORNL-NSIC-55, Volumes 1 to 4. Oak Ridge National Laboratory, Nuclear Safety Information Center, December 1973 (Vol.1), January 1972 (Vol. 2), April 1974 (Vol. 3), and March 1975 (Vol. 4)

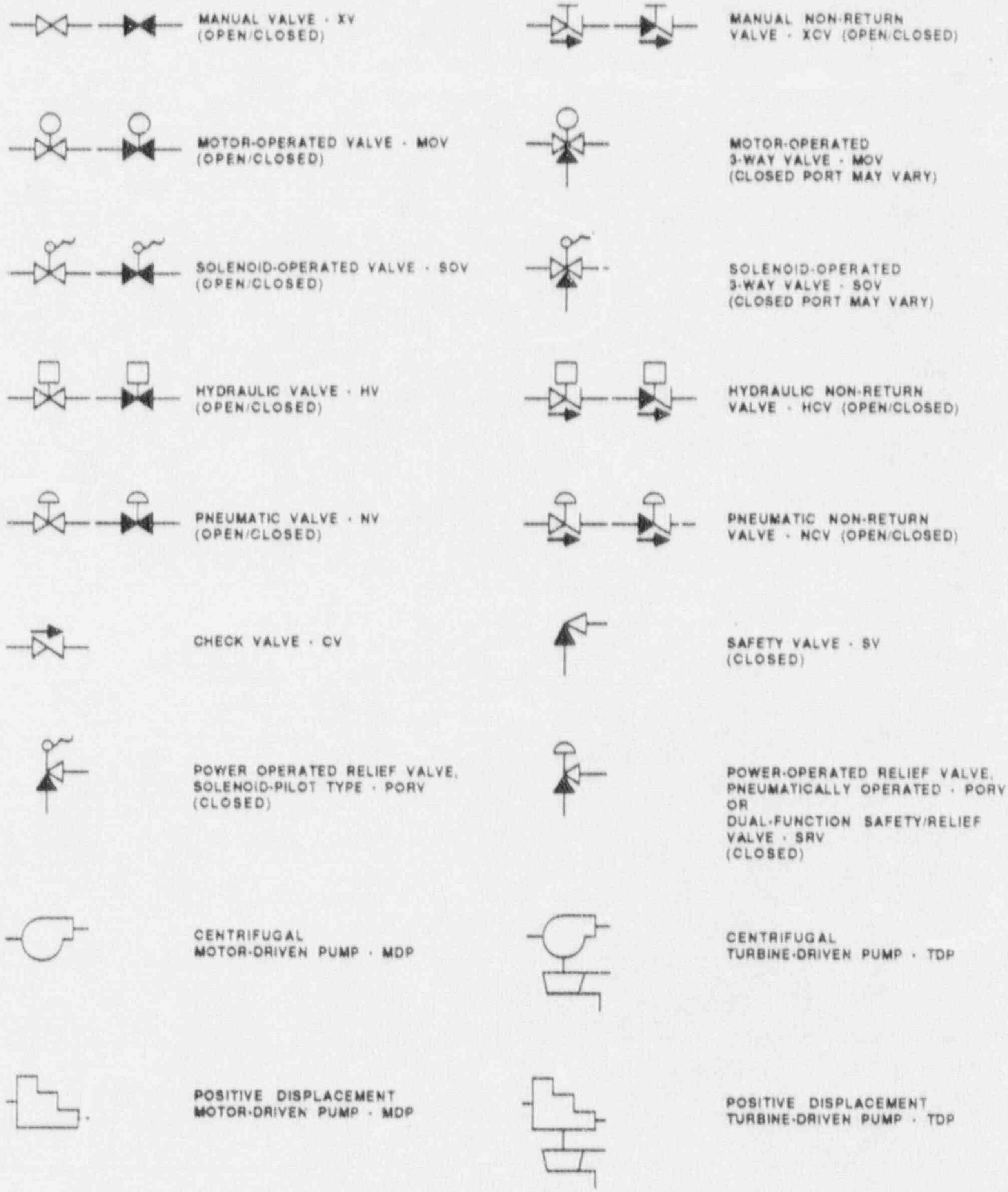


Figure A-1. Key To Symbols In Fluid System Drawings

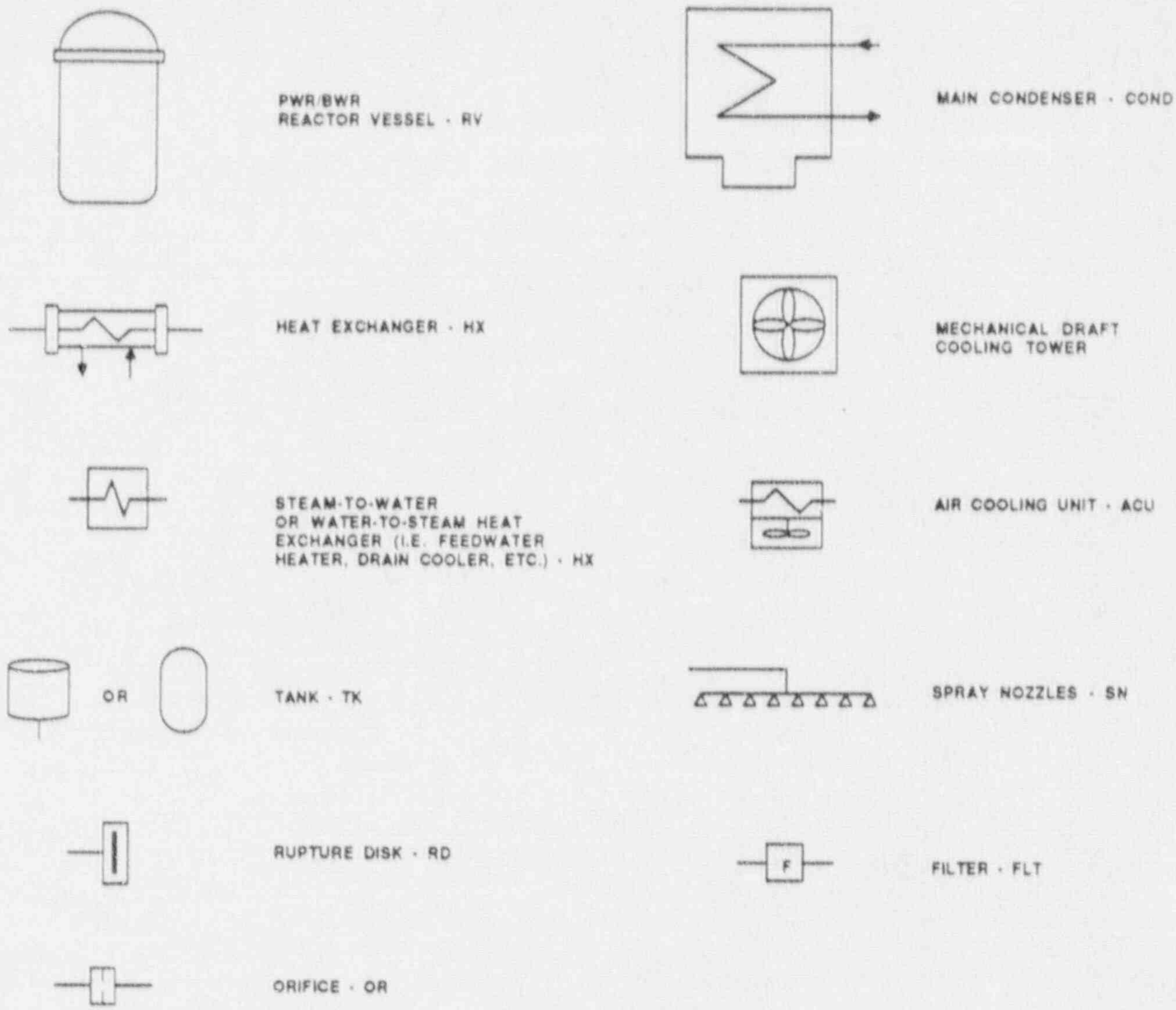


Figure A-1. Key To Symbols In Fluid System Drawings (Continued)

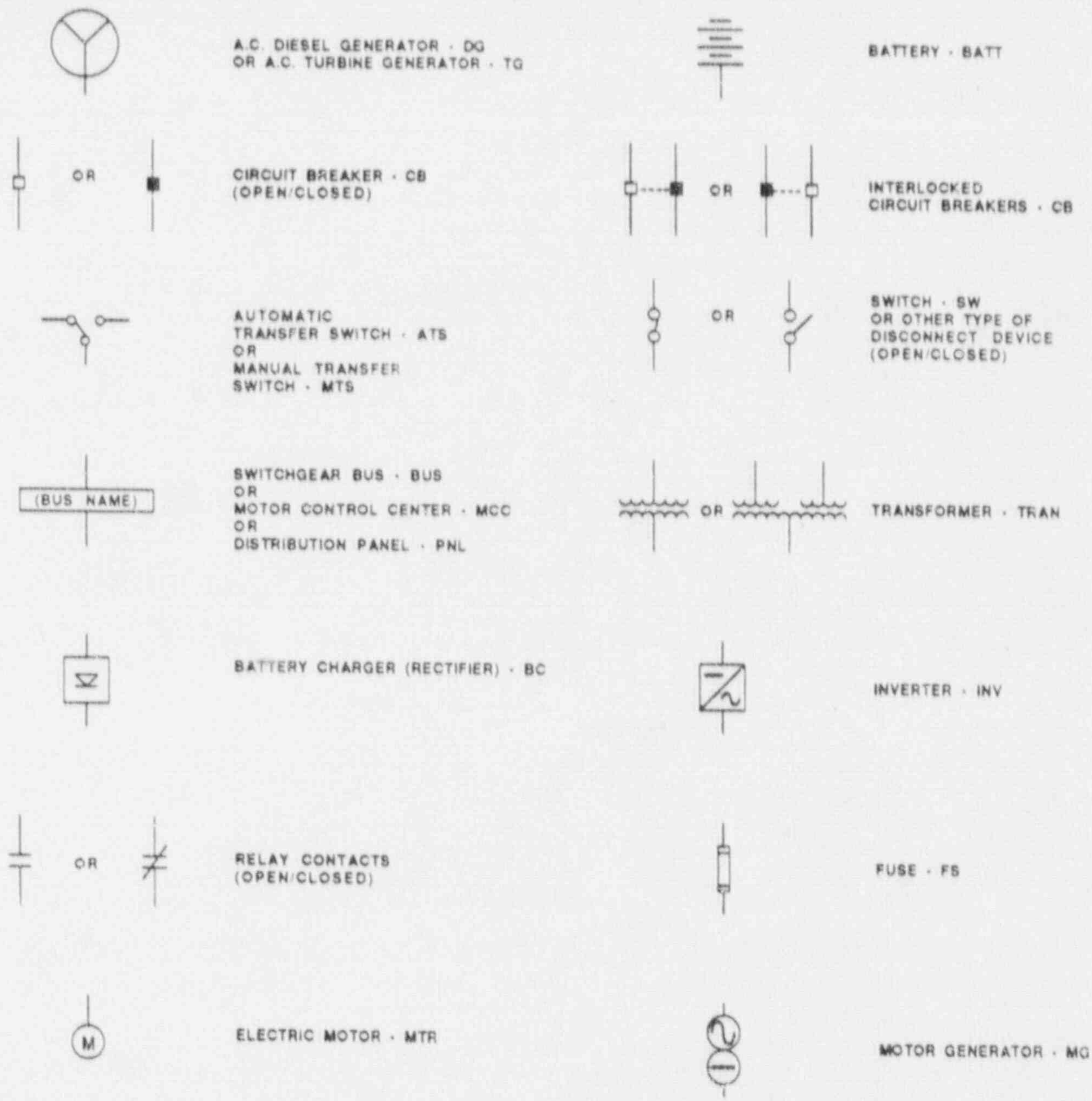


Figure A-2. Key To Symbols In Electrical System Drawings

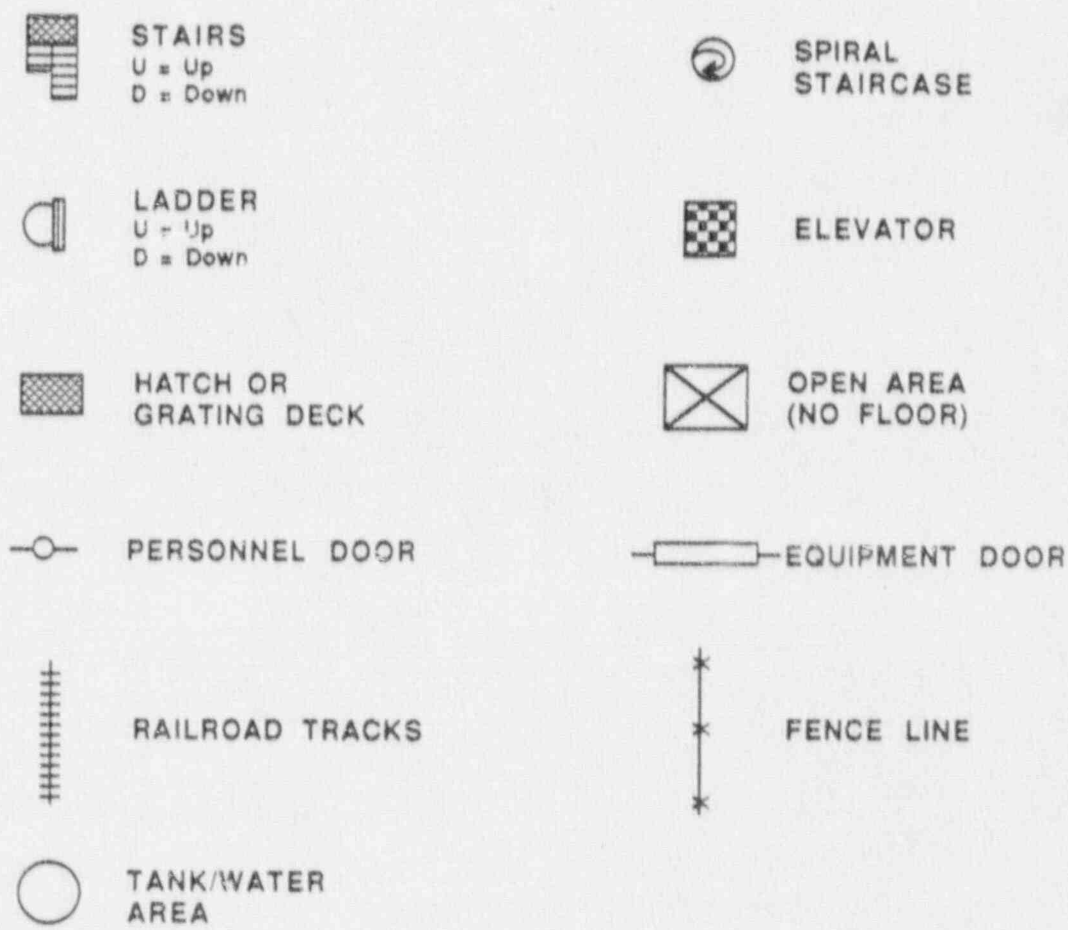


Figure A-3. Key To Symbols In Facility Layout Drawings

APPENDIX B
DEFINITION OF TERMS USED IN THE DATA TABLES

Terms appearing in the data tables in Sections 3 and 4 of this Sourcebook are defined as follows:

SYSTEM (also LOAD SYSTEM) - All components associated with a particular system description in the Sourcebook have the same system code in the data base. System codes used in this Sourcebook are the following:

Code	Definition
RCS	Reactor Coolant System
AFW	Auxiliary Feedwater System
ECCS	Emergency Core Cooling System (including HPSI and LPSI)
CCS	Containment Cooling System (including containment spray and fan coolers)
CVCS	Chemical and Volume Control System (charging system)
EP	Electric Power System
CCW	Component Cooling Water System
SWS	Service Water System

COMPONENT ID (also LOAD COMPONENT ID) - The component identification (ID) code in a data table matches the component ID that appears in the corresponding system drawing. The component ID generally begins with a system preface followed by a component number. The system preface is not necessarily the same as the system code described above. For component IDs, the system preface corresponds to what the plant calls the component (e.g. HPI, RHR). An example is HPI-730, denoting valve number 730 in the high pressure injection system, which is part of the ECCS. The component number is a contraction of the component number appearing in the plant piping and instrumentation drawings (P&IDs) and electrical one-line system drawings.

LOCATION (also COMPONENT LOCATION and POWER SOURCE LOCATION) - Refer to the location codes defined in Section 4.

COMPONENT TYPE (COMP TYPE) - Refer to Table B-1 for a list of component type codes.

POWER SOURCE - The component ID of the power source is listed in this field (see COMPONENT ID, above). In this data base, a "power source" for a particular component (i.e. a load or a distribution component) is the next higher electrical distribution or generating component in a distribution system. A single component may have more than one power source (i.e. a DC bus powered from a battery and a battery charger).

POWER SOURCE VOLTAGE (also VOLTAGE) - The voltage "seen" by a load of a power source is entered in this field. The downstream (output) voltage of a transformer, inverter, or battery charger is used.

EMERGENCY LOAD GROUP (EMERG LOAD GROUP) - AC and DC load groups (or electrical divisions) are defined as appropriate to the plant. Generally, AC load groups are identified as AC/A, AC/B, etc. The emergency load group for a third-of-a-kind load (i.e. a "swing" load) that can be powered from either of two AC load groups would be identified as AC/AB. DC load group follows similar naming conventions.

TABLE B-1. COMPONENT TYPE CODES

COMPONENT	COMP TYPE
VALVES:	
Motor-operated valve	MOV
Pneumatic (air-operated) valve	NV or AOV
Hydraulic valve	HV
Solenoid-operated valve	SOV
Manual valve	XV
Check valve	CV
Pneumatic non-return valve	NCV
Hydraulic non-return valve	HCV
Safety valve	SV
Dual function safety/relief valve	SRV
Power-operated relief valve (pneumatic or solenoid-operated)	PORV
PUMPS:	
Motor-driven pump (centrifugal or PD)	MDP
Turbine-driven pump (centrifugal of PD)	TDP
Diesel-driven pump (centrifugal of PD)	DDP
OTHER FLUID SYSTEM COMPONENTS:	
Reactor vessel	RV
Steam generator (U-tube or once-through)	SG
Heat exchanger (water-to-water HX, or water-to-air HX)	HX
Cooling tower	CT
Tank	TANK or TK
Sump	SUMP
Rupture disk	RD
Orifice	ORIF
Filter or strainer	FLT
Spray nozzle	SN
Heaters (i.e. pressurizer heaters)	HTR
VENTILATION SYSTEM COMPONENTS:	
Fan (motor-driven, any type)	FAN
Air cooling unit (air-to-water HX, usually including a fan)	ACU or FCU
Condensing (air-conditioning) unit	COND
EMERGENCY POWER SOURCES:	
Diesel generator	DG
Gas turbine generator	GT
Battery	BATT

TABLE B-1. COMPONENT TYPE CODES (Continued)

COMPONENT	COMP TYPE
ELECTRIC POWER DISTRIBUTION EQUIPMENT:	
Bus or switchgear	BUS
Motor control center	MCC
Distribution panel or cabinet	PNL or CAB
Transformer	TRAN or XFMR
Battery charger (rectifier)	BC or RECT
Inverter	INV
Uninterruptible power supply (a unit that may include battery, battery charger, and inverter)	UPS
Motor generator	MG
Circuit breaker	CB
Switch	SW
Automatic transfer switch	ATS
Manual transfer switch	MTS