SAIC 89/1527

NUCLEAR POWER PLANT SYSTEM SOURCEBOOK

ST. LUCIE 1 and 2

50-335 and 50-389

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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.

ST. LUCIE 1 and 2
RECORD OF REVISIONS

REVISION	ISSUE	COMMENTS
0	10/89	Original report

ST. LUCIE SYSTEM SOURCEBOOK

This sourcebook contains summary information on the St. Lucie 1 and 2 nuclear power plants. 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 St. Lucie 1 and 2 nuclear power plants is listed below:

- Docket number	50-335 and 50-389
- Operator	Florida Power and Light Company
- Location	Ft. Pierce, Florida
- Commercial operation date	12-76 (Unit 1), 8-83 (Unit 2)
- Reactor type	PWR
- NSSS vendor	Combustion Engineering, Inc.
- Number of loops	2
- Power (MWt/MWe)	2700/890
- Architect-engineer	Ebasco
- Containment type	Steel cylinder with reinforced concrete shield building

2. IDENTIFICATION OF SIMILAR NUCLEAR POWER PLANTS

St. Lucie 1 and 2 utilize a Combustion Engineering nuclear steam supply system and a steel containment vessel surrounded by a concrete shield building. Other Combustion Engineering PWR plants in the United States include:

- Fort Calhoun
- Maine Yankee
- Palisades
- Millstone 2
- Calvert Cliffs 1 & 2
- Waterford 3
- ANO-2
- San Onofre 2 & 3
- Palo Verde 1, 2, & 3
- WNP 3

3. SYSTEM INFORMATION

This section contains descriptions of selected systems at St. Lucie in terms of general function, operation, system success criteria, major components, and support system requirements. A summary of major systems at St. Lucie 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.

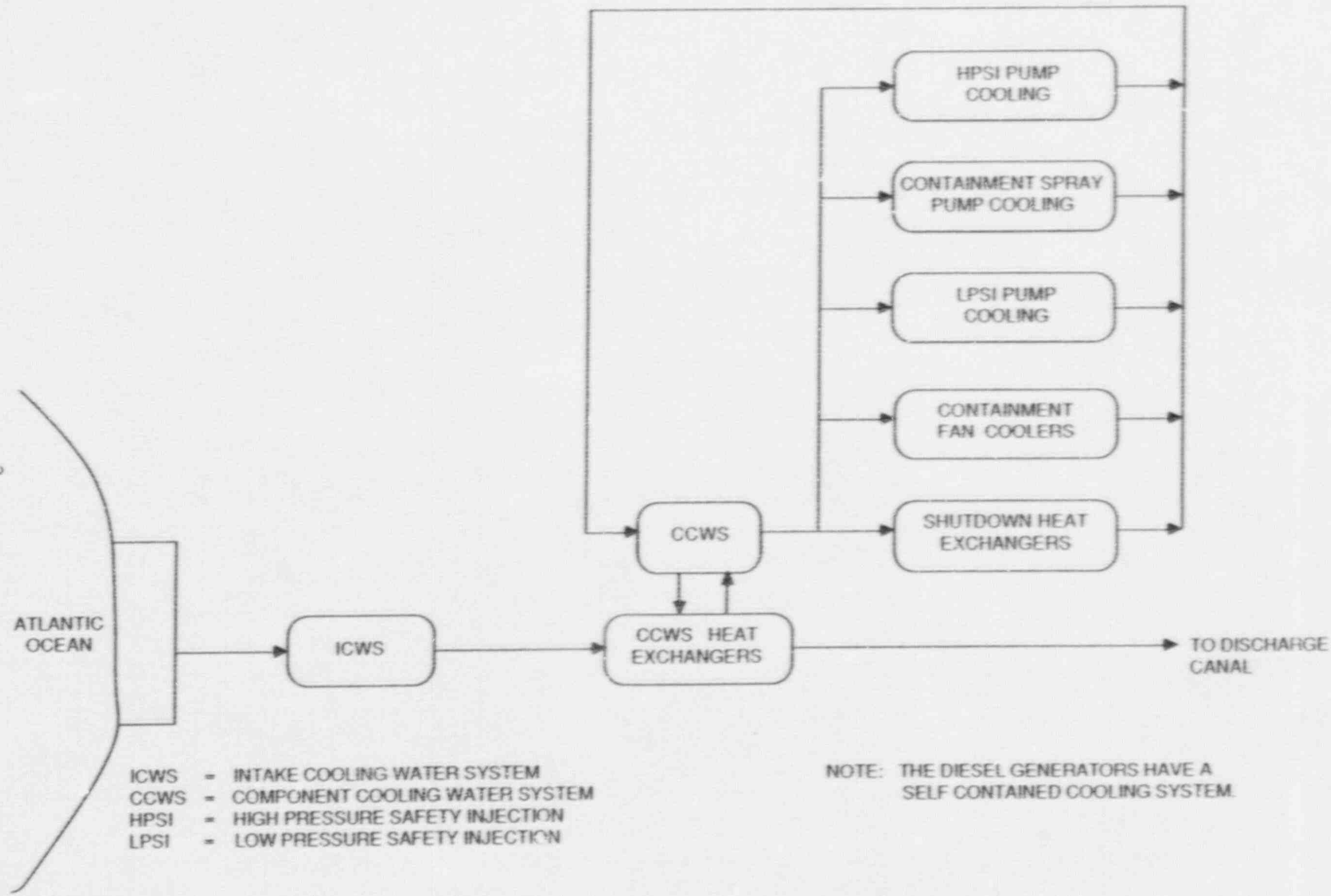


Figure 3-1. Cooling Water Systems Functional Diagram for St. Lucie 1

Table 3-1. Summary of St. Lucie 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	10.4.9
- Emergency Core Cooling Systems (ECCS)	Safety Injection System		
- High-Pressure Injection & Recirculation	High Pressure Safety Injection System	3.3	6.3
- Low-pressure Injection & Recirculation	Low Pressure Safety Injection System	3.3	6.3
- Decay Heat Removal (DHR) System (Residual Heat Removal (RHR) System)	Shutdown Cooling System	X	6.3, 9.3.5
- Main Steam and Power Conversion Systems	Main Steam Supply System, Condensate and Feedwater System, Circulating Water System	X X X	10.3, 10.4 10.4 10.4.5
- Other Heat Removal Systems	None identified	X	-
Reactor Coolant Inventory Control Systems			
- Chemical and Volume Control System (CVCS) (Charging System)	Same	3.4	9.3.4
- ECCS	See ECCS, above	-	-

Table 3-1. Summary of St. Lucie 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
- Containment Heat Removal Systems			
- Containment Spray System	Same	X	6.2.2
- Containment Fan Cooler System	Containment Cooling System	X	6.2
- Containment Normal Ventilation Systems	Shield Building Ventilation System	X	6.2.3
- Combustible Gas Control Systems	Containment Hydrogen Control System	X	6.2.5
Reactor and Reactivity Control Systems			
- Reactor Core	Same	X	4
- Control Rod System	Reactor Control System	X	4.2.3, 7.7.1
- Boration Systems	See CVCS, above	-	-
Instrumentation & Control (I&C) Systems			
- Reactor Protection System (RPS)	Same	3.5	7.2
- Engineered Safety Feature Actuation System (ESFAS)	Same	3.5	7.3
- Remote Shutdown System	Emergency Control Stations	3.5	7.4.1
- Other I&C Systems	Various Systems, Post-Accident Sampling System	X X	7.5, 7.6, 7.7 9.3.6

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

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Support Systems			
- Class 1E Electric Power System	Same	3.6	8.2, 8.3
- Non-Class 1E Electric Power System	Same	X	8.2, 8.3
- Diesel Generator Auxiliary Systems	Same	3.6	8.3, 9
- Component Cooling Water (CCW) System	Component Cooling System	3.7	9.2.2
- Service Water System (SWS)	Intake Cooling Water System	3.8	9.2.1
- Other Cooling Water Systems	Turbine Cooling Water System	X	9.2.7
- Fire Protection Systems	Same	X	9.5.1
- Other Water Systems	Primary Makeup and Demineralized Water Systems	X	9.2.3
	Service and PotableWater System	X	9.2.5
	Condensate StorageTank	X	9.2.6
	Equipment and Floor Drainage Systems	X	9.3.3
- Room Heating, Ventilating, and Air-Conditioning (HVAC) Systems	Air Conditioning, Heating, Cooling and Ventilation Systems	X	9.4
- Instrument and Service Air Systems	Compressed Air System	X	9.3.1

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

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
- Refueling and Spent Fuel Systems	Same	X	9.1
- Radioactive Waste Systems	Same	X	11
- Radiation Protection Systems	Same	X	12

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, each containing one steam generator and two reactor coolant pumps, (c) a pressurizer connected to one of the reactor vessel outlet pipes (hot legs), and (d) associated piping out to a suitable isolation valve boundary. An elevation view of a two-loop Combustion Engineering 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 two reactor coolant pumps 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. RCS coolant inventory is measured by pressurizer water level which is maintained within a prescribed band by the chemical and volume control system (CVCS).

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 three simple spring loaded safety valves on the pressurizer.

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 described in terms of LOCA and transient mitigation, as follows:

- An unmitigatible LOCA is not initiated.
- If a mitigatible 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. Volume: unknown
   2. Normal operating pressure: 2485 psig

B. Pressurizer
   1. Volume: 1500 ft^3

C. Reactor Coolant Pumps (4)
   1. Rated flow: unknown
   2. Type: Vertical Centrifugal

D. Power-Operated Relief Valves (2)
   1. Set pressure: 2385 psig
   2. Relief capacity: 153,000 lb/hr (each)

E. Safety Valves (3)
   1. Set pressure: 2485 psig
   2. Relief capacity: 200,000 lb/hr (each)

F. Steam Generators (2)
   1. Type: Vertical shell and U-Tube
   2. Heat Transfer Rate: 4.386×10^9 Btu/hr

G. Pressurizer Heaters
   1. Capacity: unknown

3.1.6 Support Systems and Interfaces

A. Motive Power
   1. The reactor coolant pumps are supplied from Non-Class 1E switchgear.
   2. The pressurizer heaters are Class 1E AC loads that can be supplied from the standby diesel generators as described in Section 3.6.

B. Reactor Coolant Pump Seal Injection Water System
   The component cooling system supplies seal water to cool the reactor coolant pump shaft seals and to maintain a controlled inleakage 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.

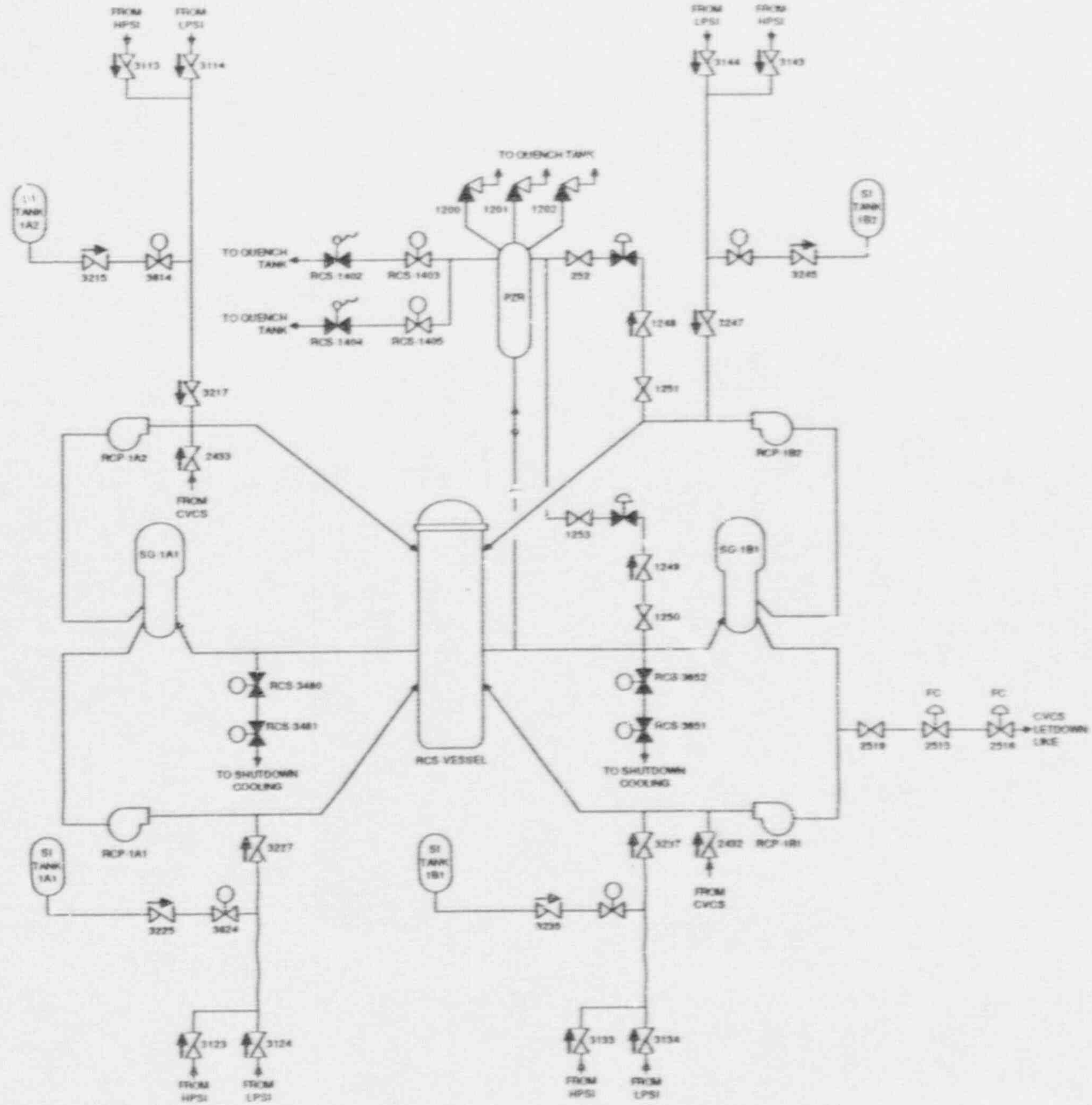


Figure 3.1-2. St. Lucie 1 Reactor Coolant System

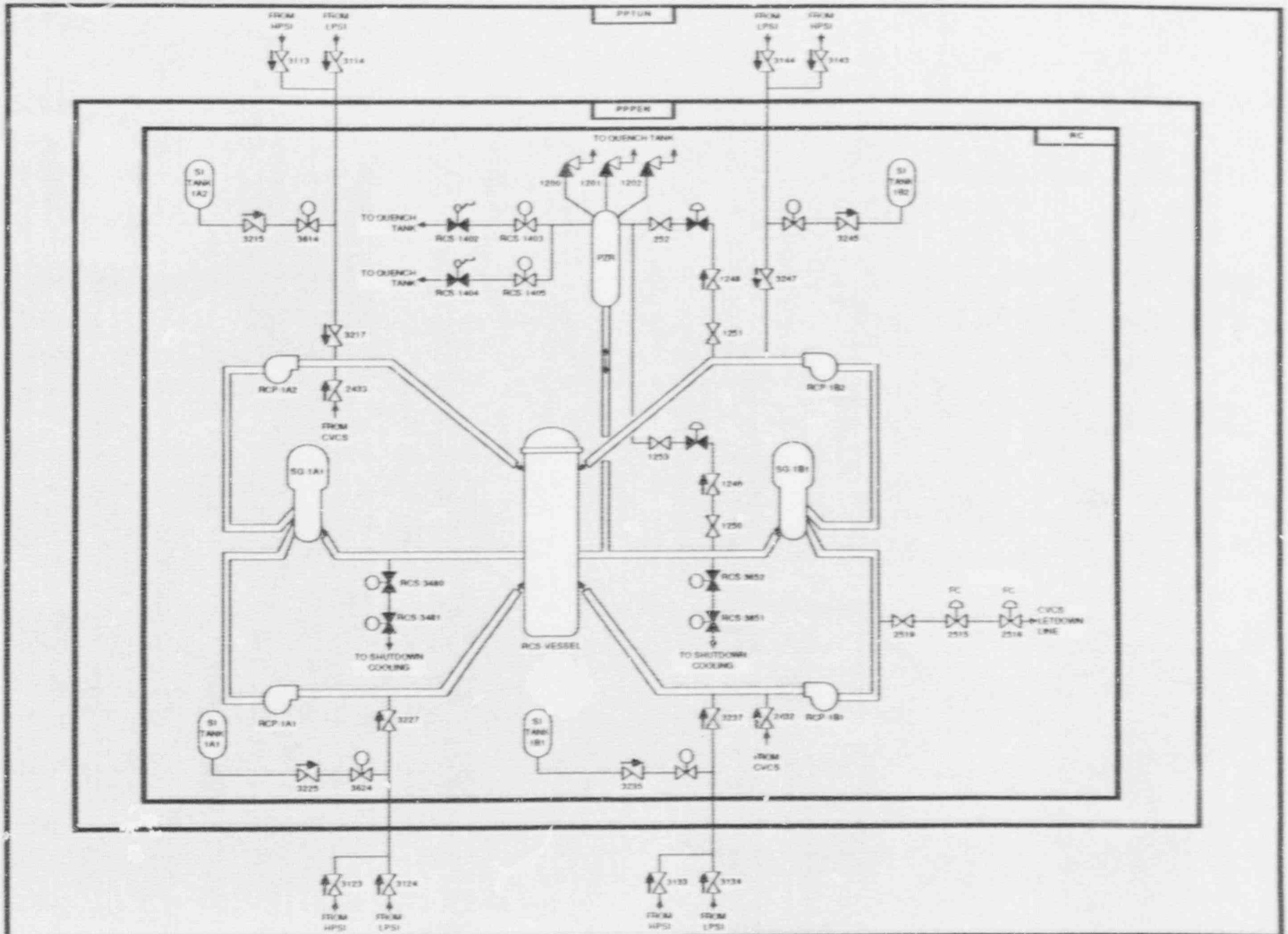


Figure 3.1-3. St. Lucie 1 Reactor Coolant System Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
RCS-1402	MOV	RC				
RCS-1403	MOV	RC	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
RCS-1404	MOV	RC				
RCS-1405	MOV	RC	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
RCS-3480	MOV	RC	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
RCS-3481	MOV	RC	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
RCS-3651	MOV	RC	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
RCS-3652	MOV	RC	EP-MCC-1B-6	480	ELECT-EQUIP-RM	AC/B

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

3.2.1 System Function

The AFWS provides an independent means of supplying feedwater to the steam generators in addition to the main feedwater system. The AFWS is intended to provide a sufficient supply of feedwater to permit the plant to operate at hot standby after a transient or small break LOCA for eight hours followed by an orderly plant cooldown to the point where the shutdown cooling system may be initiated. 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. 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 two full-capacity motor-driven pumps, one greater than full capacity steam turbine-driven pump, associated piping, controls and instrumentation. All pumps can supply both steam generators. The source of auxiliary feedwater is the condensate storage tank (CST). A cross-tie with the Unit 2 CST also exists.

Each motor driven pump normally supplies one steam generator but a cross-tie allows a motor driven pump to supply the opposite steam generator. The turbine driven pump supplies both steam generators and can be supplied with steam from either steam generator.

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

Simplified drawings of the AFWS and the SSRS are shown in Figures 3.2-1 and 3.2-2. 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. When the steam generator level decreases to the low level trip point, an AFW Actuation Signal (AFAS) time delay is actuated. If, after the set time delay, steam generator level is still low, the AFWS will be actuated. The AFAS starts the turbine driven pump and the motor driven pump associated with the steam generator with the low level and opens the associated discharge valves. When the level in the steam generator increases to the second AFAS reset set point, the AFW discharge valves close and water is diverted back to the CST. Steam generator level is maintained automatically after initiation of the AFWS. Manual control of the AFWS pumps and valves is also possible from the control room . The AFWS is shutdown manually.

3.2.4 System Success Criteria

For the decay heat removal function to be successful, both the AFW system and the SSR system must operate successfully. The AFW success criteria are the following (Ref. 1):

- AFW pump can provide adequate flow.
- Water must be provided from at least one source to the AFW pump suctions. Alternative water sources include (insert actual sources)
- Makeup to any one of two steam generator provides adequate decay heat removal from the reactor coolant system.

The SSR system must operate to complete the heat transfer path to the environment. The number of safety valves that must open for the decay heat removal function is not known.

3.2.5 Component Information

A. Motor-driven AFWS pumps 1A, 1B
   1. Rated flow: 250 gpm @ 1200 psi
   2. Rated capacity: 100%
   3. Type: centrifugal

B. Turbine-driven AFWS pump 1C
   1. Rated flow: 500 gpm @ 1200 psi
   2. Rated capacity: greater than 100%
   3. Type: centrifugal

C. Condensate Storage Tank
   1. Capacity: 250,000 gallons

3.2.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The AFWS pumps are automatically actuated upon receipt of an Auxiliary Feedwater Actuation Signal (AFAS) after a set time delay.
   2. Remote manual
      The AFWS can be operated from the control room.

B. Motive Power
   1. The motor driven AFWS pumps and motor operated valves are Class 1E loads that can be supplied from the standby diesel generators as described in Section 3.6.
   2. The turbine-driven pump is supplied with steam from the main steam lines of either steam generator upstream of the main steam line isolation valves. The power and controls for the valves associated with this pump receive power from the Class 1E DC system.

C. Other
   1. Lubrication, cooling, and ventilation are provided locally for the AFWS pumps.
   2. Systems for AFWS pump room cooling have not been identified.

3.2.7 Section 3.2 References

1. NUREG/CR-4710, "Shutdown Decay Heat Removal Analysis of a Combustion Engineering 2-Loop Pressurized Water Reactor", Appendix A, Section 2.0, Sandia National Laboratories, August 1987.

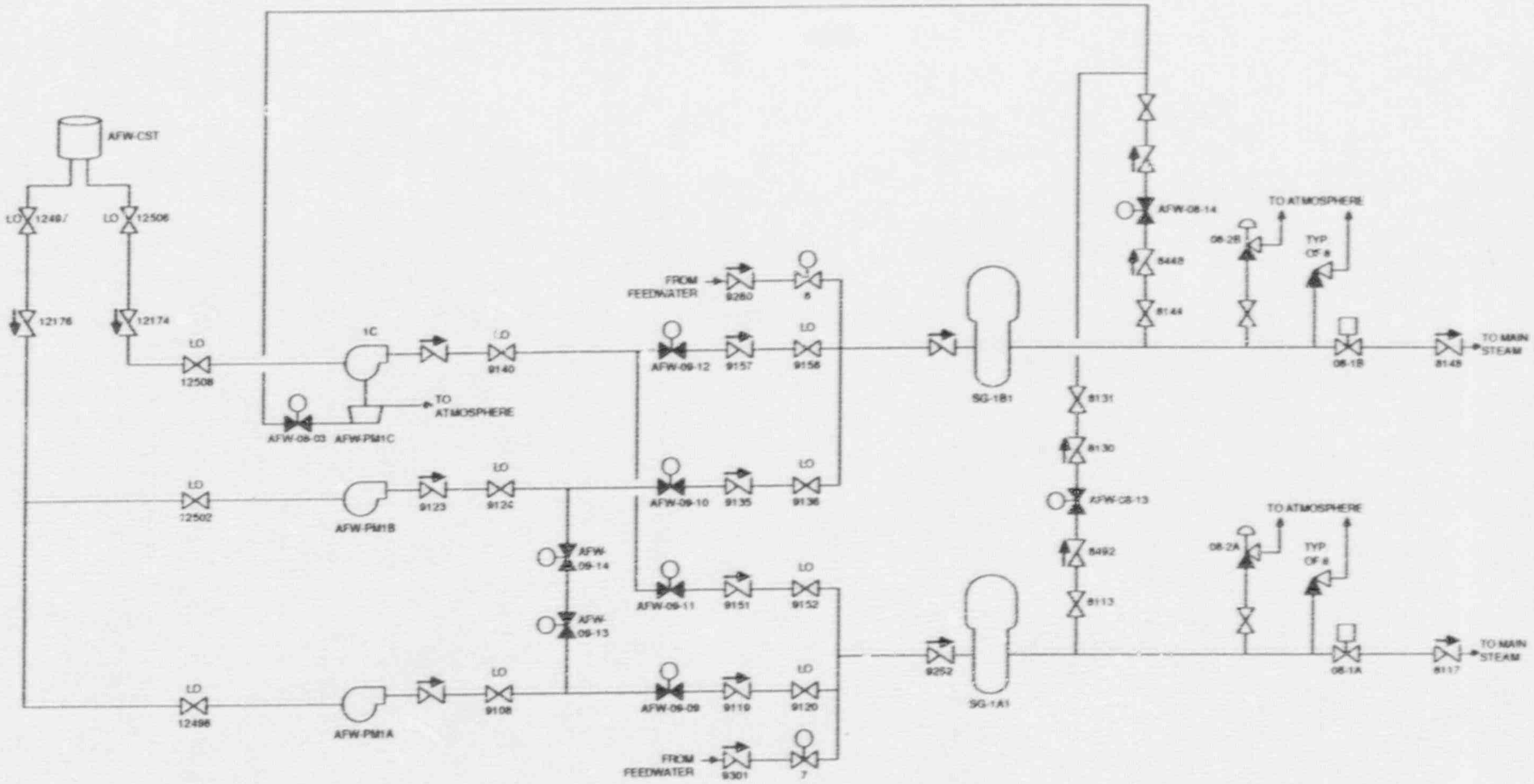


Figure 3.2-1. St. Lucie 1 Auxiliary Feedwater System

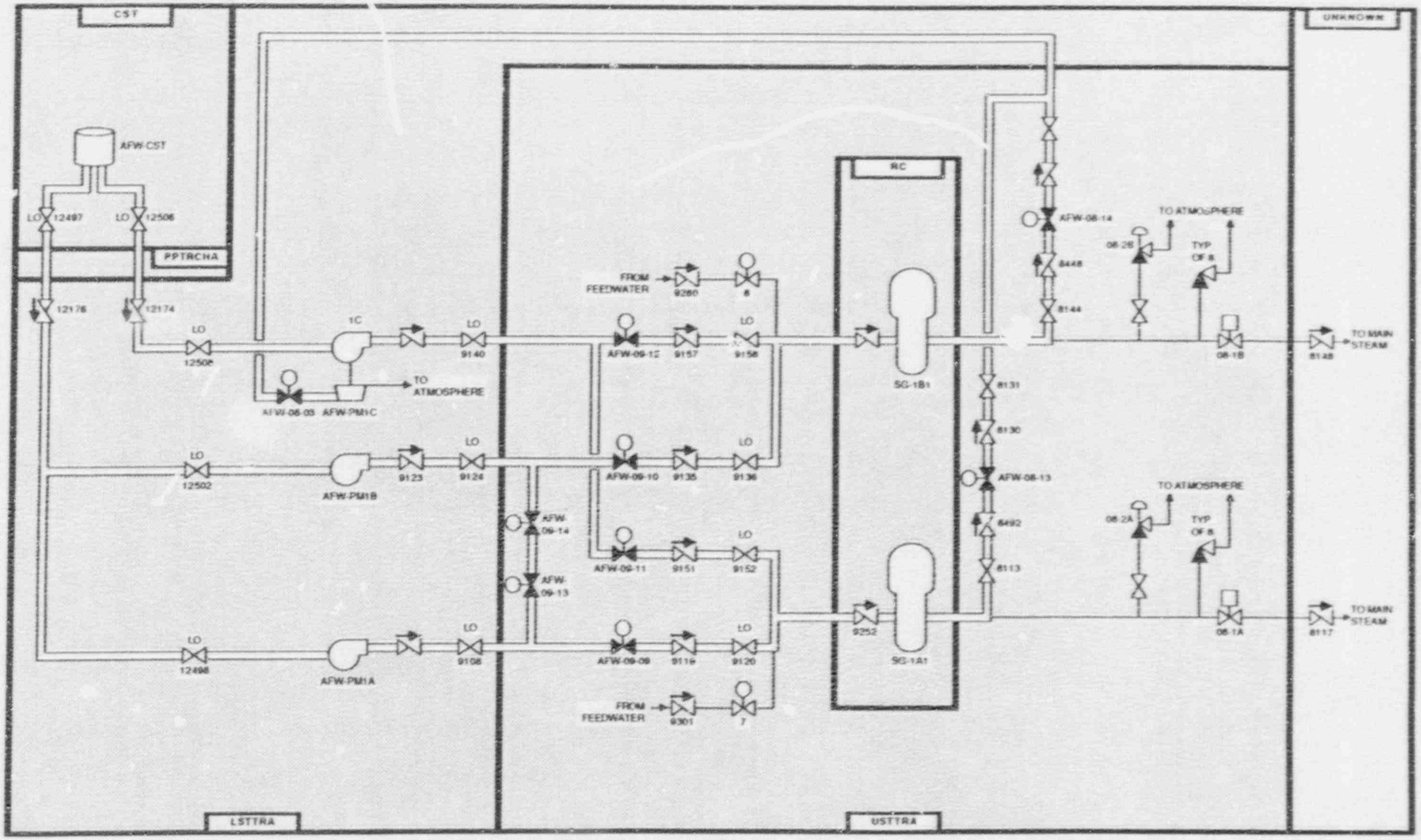


Figure 3.2-2. St. Lucie 1 Auxiliary Feedwater System Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
AFW-08-03	MOV	LSTTRA	EP-DCMCC-1AB	125	ELECT-EQUIP-RM	DC/AB
AFW-08-13	MOV	LSTTRA	EP-DCMCC-1AB	125	ELECT-EQUIP-RM	DC/AB
AFW-08-14	MOV	LSTTRA	EP-DCMCC-1AB	125	ELECT-EQUIP-RM	DC/AB
AFW-09-09	MOV	USTTRA	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
AFW-09-10	MOV	USTTRA	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
AFW-09-11	MOV	USTTRA	EP-DCMCC-1AB	125	ELECT-EQUIP-RM	DC/AB
AFW-09-12	MOV	USTTRA	EP-DCMCC-1AB	125	ELECT-EQUIP-RM	DC/AB
AFW-09-13	MOV	USTTRA	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
AFW-09-14	MOV	USTTRA	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
AFW-CST	TANK	CST				
AFW-PM1A	MDP	LSTTRA	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/A
AFW-PM1B	MDP	LSTTRA	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/B
AFW-PM1C	TDP	LSTTRA				
AFW-PM1C	TDP	LSTTRA				

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 the containment heat removal systems.

3.3.2 System Definition

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

- Safety Injection Tanks (SITs)
- High Pressure Safety Injection (HPSI) system
- Low Pressure Safety Injection (LPSI) system

There are four safety injection tanks, one attached to each cold leg, that discharge their contents when RCS pressure drops below the tank pressure. The HPSI system consists of three motor driven pumps that deliver water to an injection header. The header directs flow to the four cold legs. The LPSI system consists of two motor driven pumps that deliver water to the four cold legs. The LPSI pumps also provide the shutdown cooling function. The Refueling Water Storage Tank (RWT) is the water source for the HPSI and LPSI pumps. The Containment Spray system is not part of the ECCS but can be used as a HPSI water source during the recirculation phase of operation.

Simplified drawings of the HPSI system are shown in Figures 3.3-1 and 3.3-2. The LPSI system is shown in Figures 3.3-3 and 3.3-4, and the Containment Spray (CS) system is shown in Figures 3.3-5 and 3.3-6. A summary of data on selected ECCS components is presented in Table 3.3-1.

3.3.3 System Operation

During normal operation, the ECCS is in standby. The ECCS automatically goes into operation upon indication that a significant breach in the RCS boundary has occurred. The injection mode of operation is initiated upon a Safety Injection Actuation Signal (SIAS). An SIAS is produced upon any two coincident low pressurizer pressure or two coincident high containment pressure signals, or produced manually from the control room. An SIAS starts the HPSI and LPSI pumps and opens their cold leg isolation valves.

The SITs constitute a passive injection system, discharging their contents automatically when RCS pressure drops below the tank pressure. Adequate borated water is supplied in the four tanks to rapidly cover the core, with the contents of one tank assumed to be lost through the break. During injection the HPSI and LPSI pumps take suction on the RWT and deliver borated water to the four cold legs. The HPSI pumps are designed for small breaks when the RCS is still at high pressure, while the LPSI pumps are designed to respond to large breaks.

When RWT inventory is down to 10%, the recirculation phase begins. The LPSI pumps are secured and the HPSI pumps are realigned to take suction from the containment sump. At the discretion of the operator, a portion of the cooled water from the containment spray system may be directed to the HPSI pump suction. This is not necessary to meet core cooling requirements but is a preferred mode of operation. When shutdown cooling entry conditions are met, the LPSI pumps are aligned to take a suction from the hot legs through the shutdown cooling line, discharge through the shutdown cooling heat exchangers, and return flow to the RCS througn the cold leg injection lines. Heat is transferred in the shutdown cooling heat exchangers to the Component Cooling Water system (see Section 3.7).

3.3.4 System Success Criteria

LOCA mitigation requires that both the emergency coolant injection and emergency coolant recirculation functions be accomplished. The ECI success criteria for a large LOCA is the following (Ref. 1):

- 3 of 4 safety injection tanks provide makeup as RCS pressure drops below tank pressure, and
- One high pressure safety injection pump injects into the RCS, and
- One low pressure safety injection pump injects into the RCS

If the ECI success criteria is met, then the following large LOCA ECR success criteria will apply (Ref. 1):

- At least one high pressure safety injection pump is realigned for recirculation and takes a suction on the containment sump and injects into the RCS cold legs.

ECI and ECR success criteria for a small LOCA are not clearly defined in the FSAR, however, it should be noted that:

- The HPSI pump shutoff head is less than RCS normal operating pressure, therefore, a small LOCA must be of sufficient size to cause some RCS depressurization, or the RCS must be depressurized by other means if the HPSI 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)
    - RCS cooldown (i.e. using the auxiliary feedwater system, see Section 3.2)
    - The combined capacity of the three positive displacement charging pumps (not part of the SIS) is 120 gpm (i.e. 40 gpm each).

3.3.5 Component Information

A. High Pressure Safety Injection pumps A, B, C
   1. Rated flow: [illegible] gpm @ 2500 ft. head (1,138 psid)
   2. Maximum flow: 650 gpm @ 1250 ft. head (542 psid)
   3. Shutoff head: 3000 ft. head (1300 psid)
   4. Rated capacity: 100%
   5. Type: multistage centrifugal

B. Low Pressure Safety Injection pumps A, B
   1. Rated flow: 3000 gpm @ 350 ft. head (159 psid)
   2. Rated capacity: 100%
   3. Type: Single stage centrifugal

C. Safety Injection Tanks (4)
   1. Volume, Total: 1980 ft^3
   2. Volume, Liquid: 1138 ft^3
   3. Normal operating pressure: 250 psig

D. Refueling Water Storage Tank
   1. Capacity: 500,000 gallons

3.3.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The ECCS subsystems are automatically actuated by a safety injection actuation signal (SIAS). Conditions initiating an SIAS trip are:

      - Low pressurizer pressure
      - High containment pressure
      - Manual actuation

      The SIAS automatically initiates the following actions:

      - starts the HPSI and LPSI pumps
      - aligns the pumps for injection
      - aligns the pump suction to the RWT

      Switchover to the recirculation mode occurs automatically on low level in the RWT.

   2. Remote manual
      An SIAS signal can be initiated by remote manual means from the main control room. ECCS operation can be initiated by remote manual means.

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 3.6.

C. Other
   1. The HPSI pumps, LPSI pumps and shutdown cooling heat exchangers are cooled by the Component Cooling Water System (see Section 3.7).
   2. Lubrication is provided locally for the ECCS pumps and motors.
   3. Systems for ECCS pump room cooling have not been identified.

3.3.7 Section 3.3 References

1. NUREG/CR-3713, BNL-NUREG-51752, "Grouping of Light Water Reactors for Evaluation of Decay Heat Removal Capability", Brookhaven National Laboratory, June 1984.
2. Final Safety Analysis Report, St. Lucie Nuclear Power Station, Unit 1. Docket # 335.

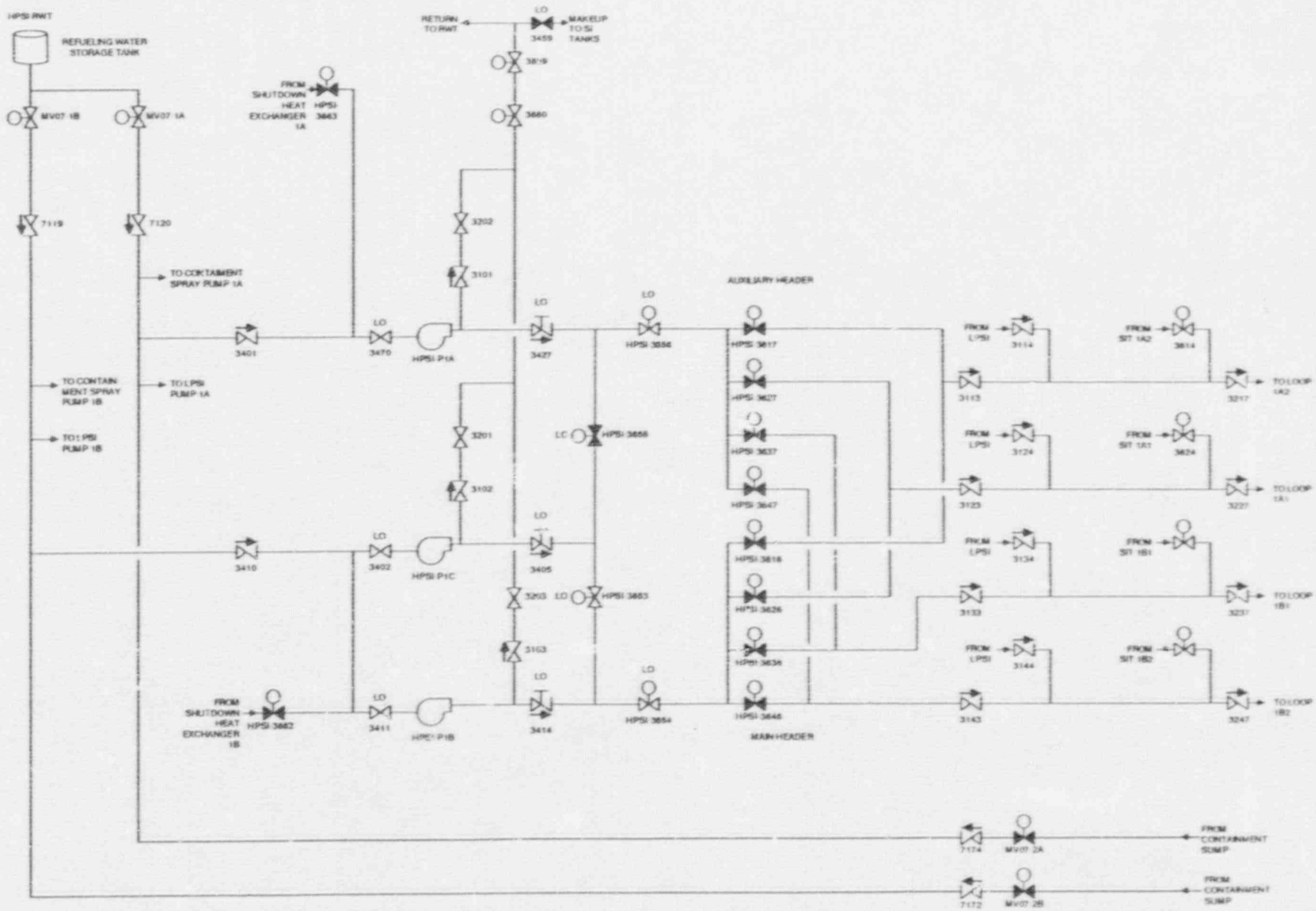


Figure 3.3-1. St. Lucie 1 High Pressure Safety Injection System

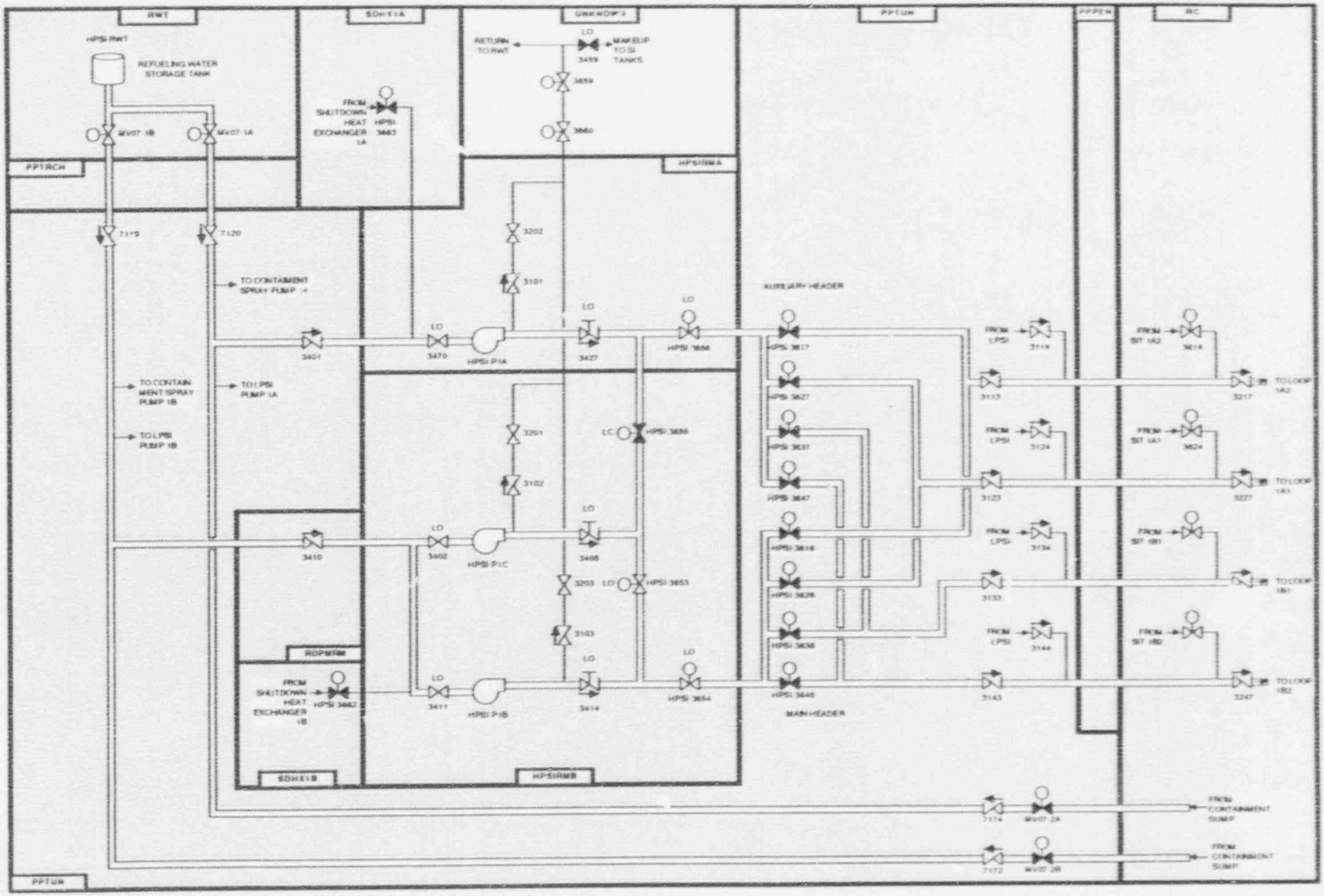


Figure 3.3-2. St. Lucie 1 High Pressure Safety Injection System Showing Component Locations

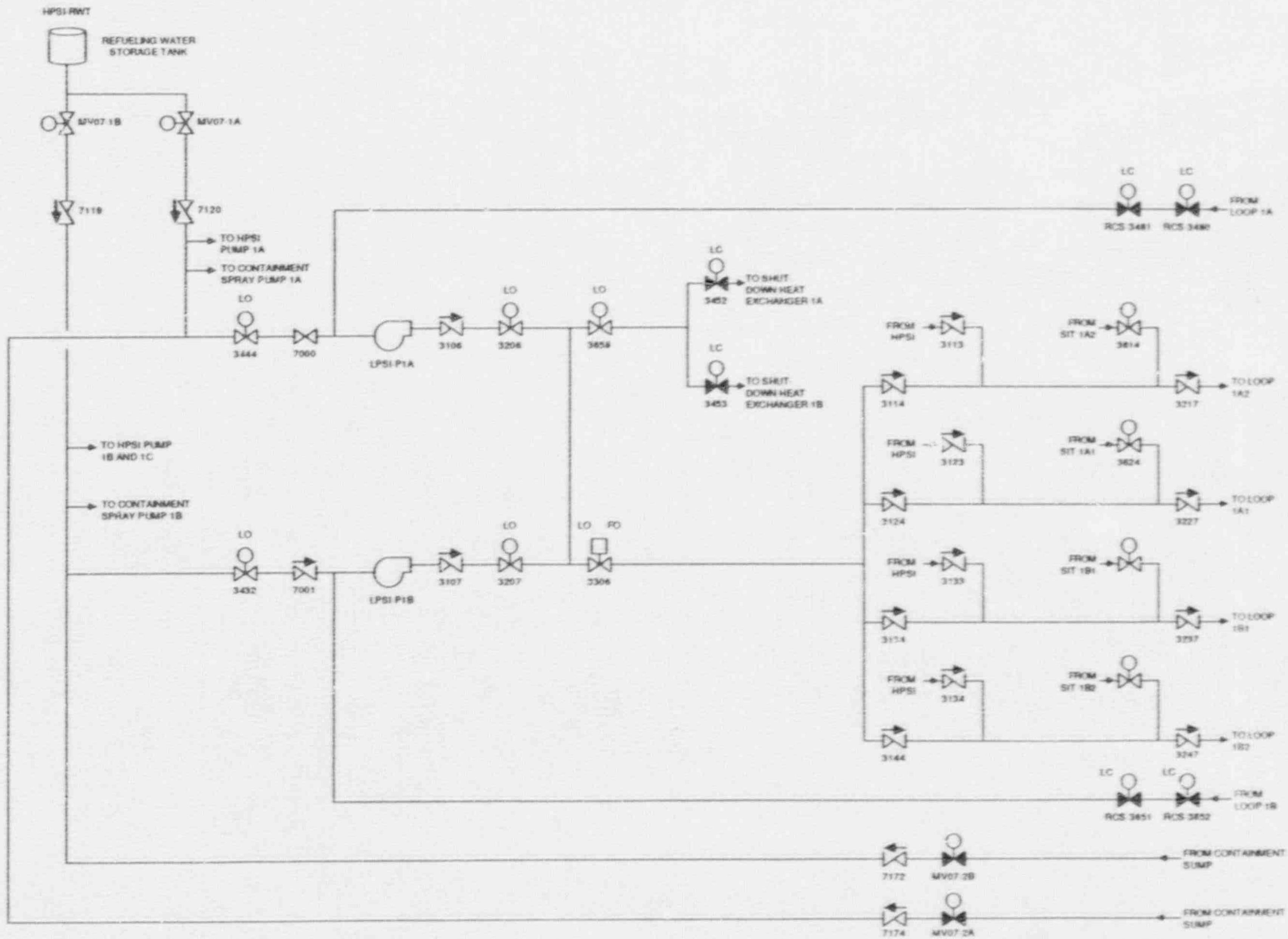


Figure 3.3-3. St. Lucie 1 Low Pressure Safety Injection System

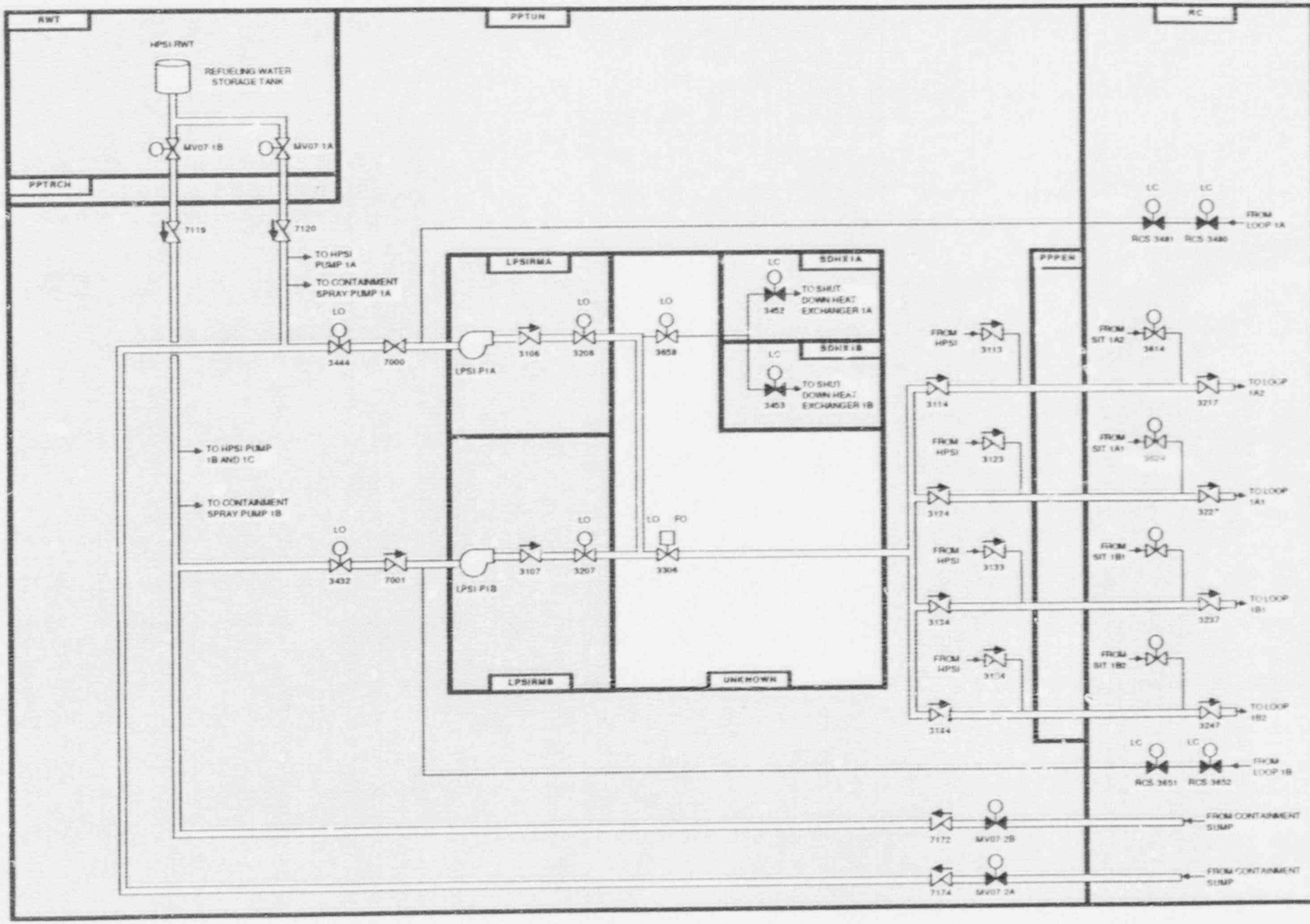


Figure 3.3-4. St. Lucie 1 Low Pressure Safety Injection System Showing Component Locations

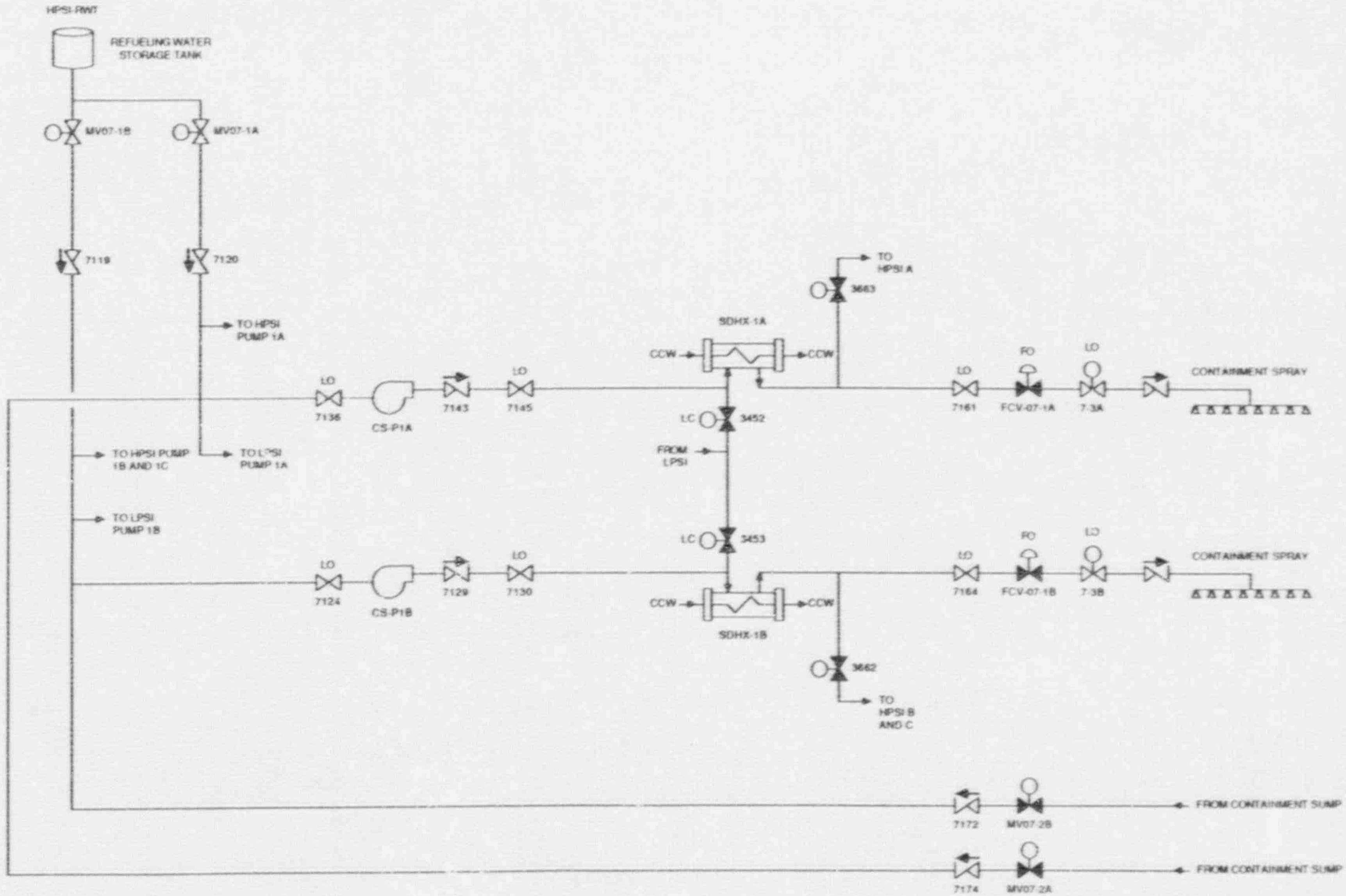


Figure 3.3-5. St. Lucie 1 Containment Spray System

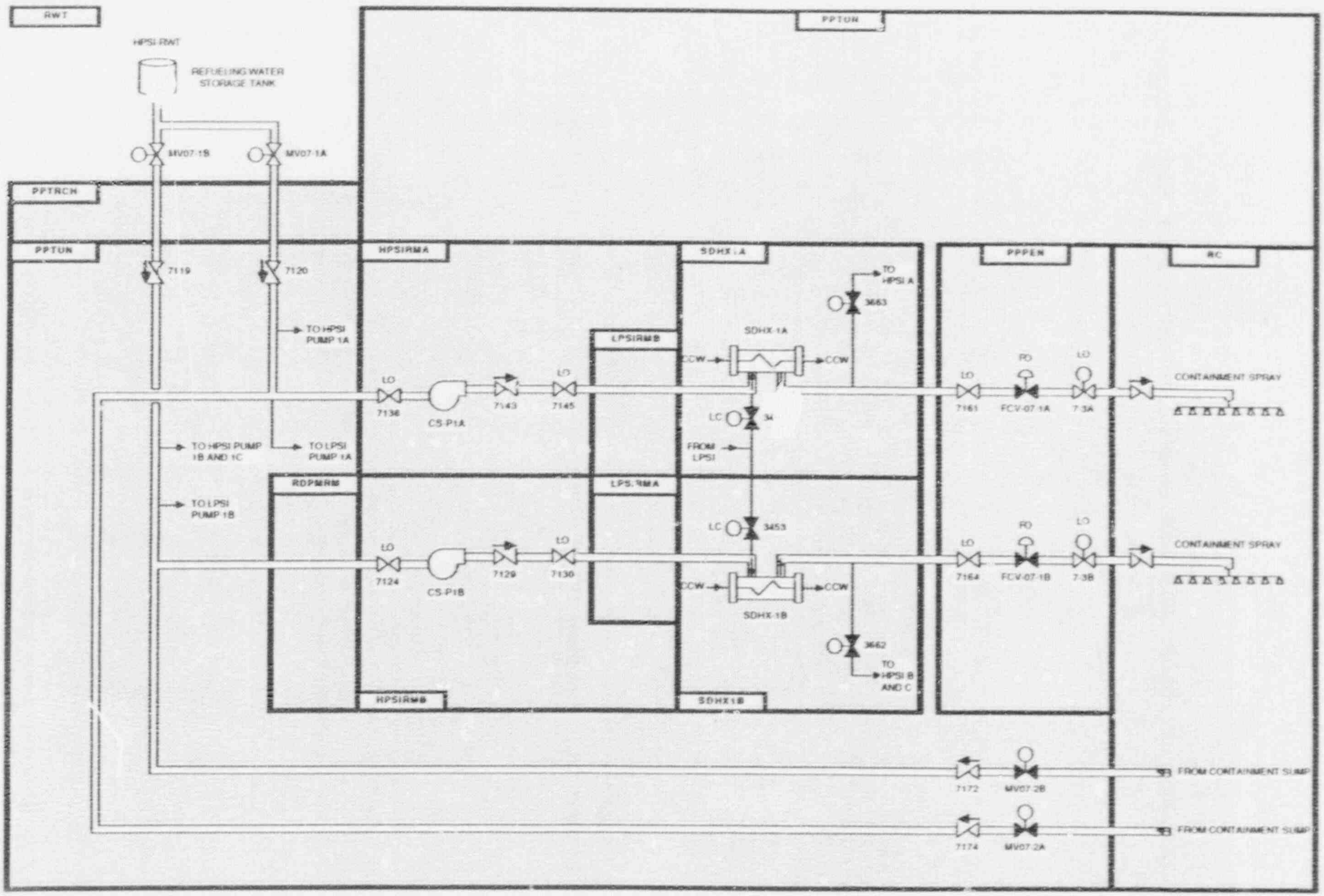


Figure 3.3-6. St. Lucie 1 Containment Spray System Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
CS-P1A	MDP	HPSIRMA	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/A
CS-P1B	MDP	HPSIRMB	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/B
HPSI-3616	MOV	PPTUN	EP-BS-1B-5	480	ELECT-EQUIP-RM	AC/B
HPSI-3617	MOV	PPTUN	EP-BS-1A-5	480	ELECT-EQUIP-RM	AC/A
HPSI-3626	MOV	PPTUN	EP-BS-1B-6	480	ELECT-EQUIP-RM	AC/B
HPSI-3627	MOV	PPTUN	EP-BS-1A-6	480	ELECT-EQUIP-RM	AC/A
HPSI-3636	MOV	PPTUN	EP-BS-1B-6	480	ELECT-EQUIP-RM	AC/B
HPSI-3637	MOV	PPTUN	EP-BS-1A-6	480	ELECT-EQUIP-RM	AC/A
HPSI-3646	MOV	PPTUN	EP-BS-1B-5	480	ELECT-EQUIP-RM	AC/B
HPSI-3647	MOV	PPTUN	EP-BS-1A-5	480	ELECT-EQUIP-RM	AC/A
HPSI-3653	MOV	HPSIRMB				
HPSI-3653	MOV	HPSIRMB				
HPSI-3654	MOV	HPSIRMB	EP-BS-1B-5	480	ELECT-EQUIP-RM	AC/B
HPSI-3654	MOV	HPSIRMB	EP-BS-1B-5	480	ELECT-EQUIP-RM	AC/B
HPSI-3655	MOV	HPSIRMB				
HPSI-3655	MOV	HPSIRMB				
HPSI-3656	MOV	HPSIRMA	EP-BS-1A-5	480	ELECT-EQUIP-RM	AC/A
HPSI-3656	MOV	HPSIRMA	EP-BS-1A-5	480	ELECT-EQUIP-RM	AC/A
HPSI-3662	MOV	SDHX1B	EP-BS-1B5	480	ELECT-EQUIP-RM	AC/B
HPSI-3663	MOV	SDHX1A	EP-BS-1A-5	480	ELECT-EQUIP-RM	AC/A
HPSI-P1A	MDP	HPSIRMA	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/A
HPSI-P1B	MDP	HPSIRMB	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/B
HPSI-P1C	MDP	HPSIRMB	EP-BS-B1AB	4160	SWGR1AB	AC/AB
HPSI-RWT	TANK	RWT				
MV07-1A	MOV	PPPEN				
MV07-1A	MOV	RWT				
MV07-1B	MOV	PPPEN				
MV07-2A	MOV	PPTUN				

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
MV07-2A	MOV	PPTUN				
MV07-2B	MOV	PPTUN				
MV07-2B	MOV	PPTUN				

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 and maintaining water purity and the proper concentration of neutron absorbing and corrosion inhibiting chemicals in the reactor coolant. The makeup function of the CVCS is required to maintain the plant in an extended hot shutdown condition following a transient. The ECCS (see Section 3.3) provides makeup after a LOCA.

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 take suction from the volume control tank and inject into the RCS. The boric acid makeup system, consisting of two pumps, two storage tanks, and a boric acid batching tank, controls changes in reactor coolant boron concentration. Either storage tank is sufficient to bring the plant to a subcritical cold shutdown condition (Ref. 1, Section 9.3.4.3.1). Purification is accomplished by directing letdown flow from one cold leg through a series of heat exchangers, filters, and ion exchangers.

Simplified drawings of the CVCS, focusing on the charging portion of the system, are shown in Figures 3.4-1 and 3.4-2. The boric acid makeup portion of the CVCS is shown in Figures 3.4-3 and 3.4-4. A summary of data on selected CVCS components is presented in Table 3.4-1.

3.4.3 System Operation

During normal operation, including hot standby and power generation when the RCS is at normal operating pressure and temperature, one charging pump is in operation with suction on the volume control tank (VCT). The other charging pumps are automatically started by the pressurizer level control of the Safety Injection Actuation Signal (SIAS). The SIAS also causes pump suction to change from the Volume Control Tank (VCT) to the boric acid pump discharge.

Letdown flow from RCS cold leg 1B2 passes through the tube side of the regenerative heat exchanger for an initial temperature reduction. The pressure is then reduced by a letdown control valve to the letdown heat exchanger operating pressure. The final reduction to the operating temperature and pressure of the Purification System is made by the letdown heat exchanger and one of the two letdown back pressure control valves. Flow is then directed through the various filters and ion exchangers in the purification system before being sprayed into the VCT where it is returned to the RCS by the charging pumps. Reactor coolant pump bleedoff is also directed to the VCT.

The charging flow passes through the shell side of the regenerative heat exchanger for recovery of heat from the letdown flow before being returned to the RCS. Charging flow is split into two charging lines, to cold legs 1B1 and 1A2. 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.

Concentrated boric acid solution, prepared in the boric acid batching tank, is stored in the two boric acid makeup tanks. Two boric acid pumps supply boric acid to the volume control tank or directly to the charging pumps suction. A gravity feed line directly from the boric acid tanks to the charging pumps is also provided.

3.4.4 System Success Criteria

The following success criteria is assumed for CVCS makeup following a transient:

- 1 of 3 positive displacement charging pumps is required for adequate post-transient makeup to the RCS.
- 1 of 2 boric acid tanks are required as a source of water for the charging pumps, supplied by either the associated boric acid pump or the gravity feed line (Ref 1, Section 9.3.4).

3.4.5 Component Information

A. Charging pumps 1A, 1B, 1C
   1. Rated capacity: 44 gpm
   2. Normal discharge pressure: 2300 psig
   3. Type: Positive displacement

B. Boric acid pumps A, B
   1. Rated capacity: unknown
   2. Type: Single stage centrifugal

C. Boric acid makeup tanks A, B
   1. Volume: unknown

D. Volume control tank
   1. Volume: 4200 gal.

3.4.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The SIAS or pressurizer level control signal automatically starts all 3 charging pumps. The SIAS also causes pump suction to change from the VCT to the boric acid pump discharge
   2. Remote manual
      The charging pumps, boric acid pumps, and associated motor operated valves can be actuated by remote means from the control room.

B. Motive Power
   The positive displacement charging pumps, boric acid 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 3.6.

C. Other
   1. Cooling water and lubrication for the charging and boric acid pumps are assumed to be provided locally.
   2. Pump room cooling systems have not been identified.

3.4.7 Section 3.4 References

1. Final Safety Analysis Report, St. Lucie Nuclear Power Station, Unit 1. Docket # 335.

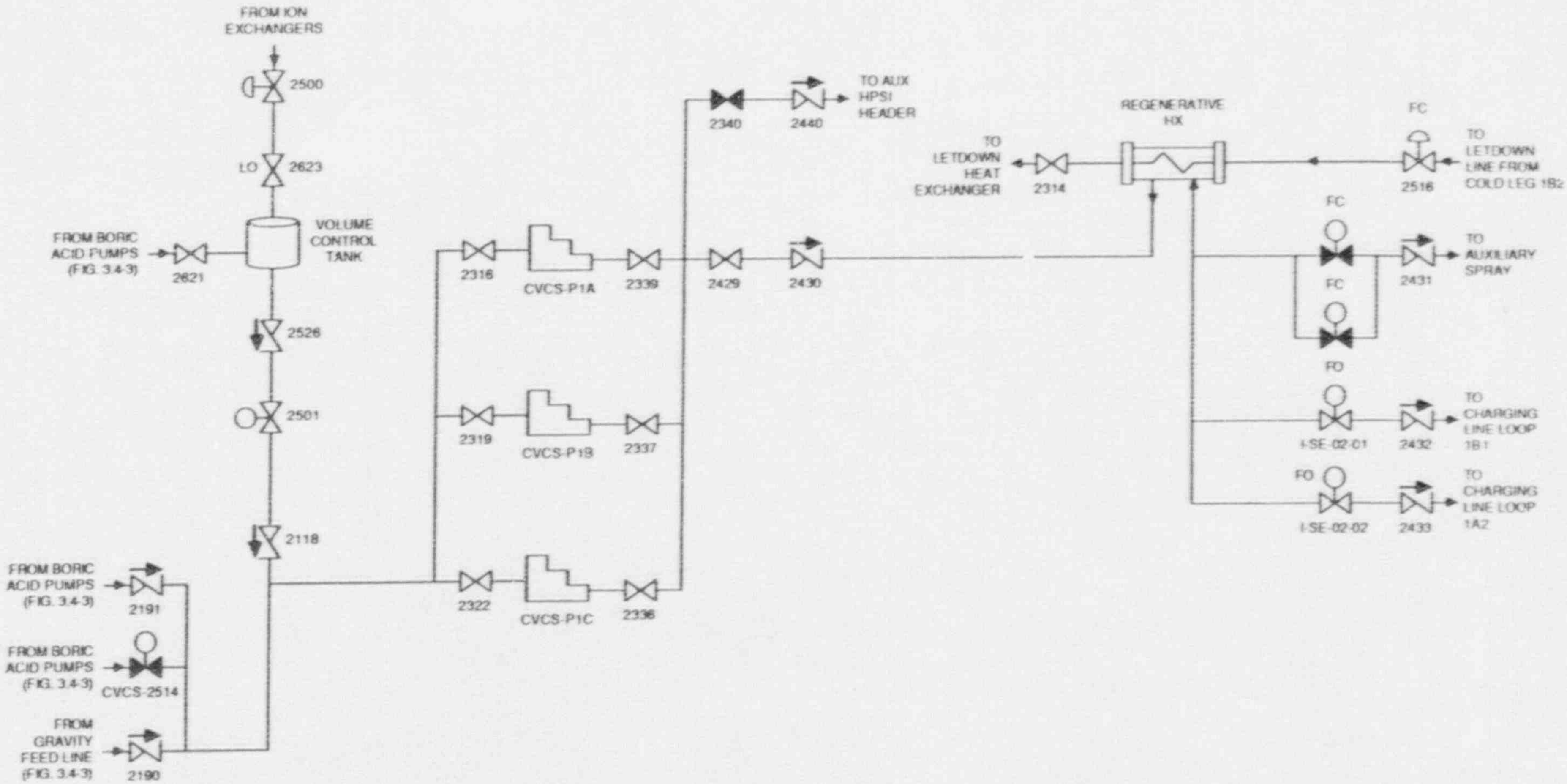


Figure 3.4-1. St. Lucie 1 Charging System (CVCS)

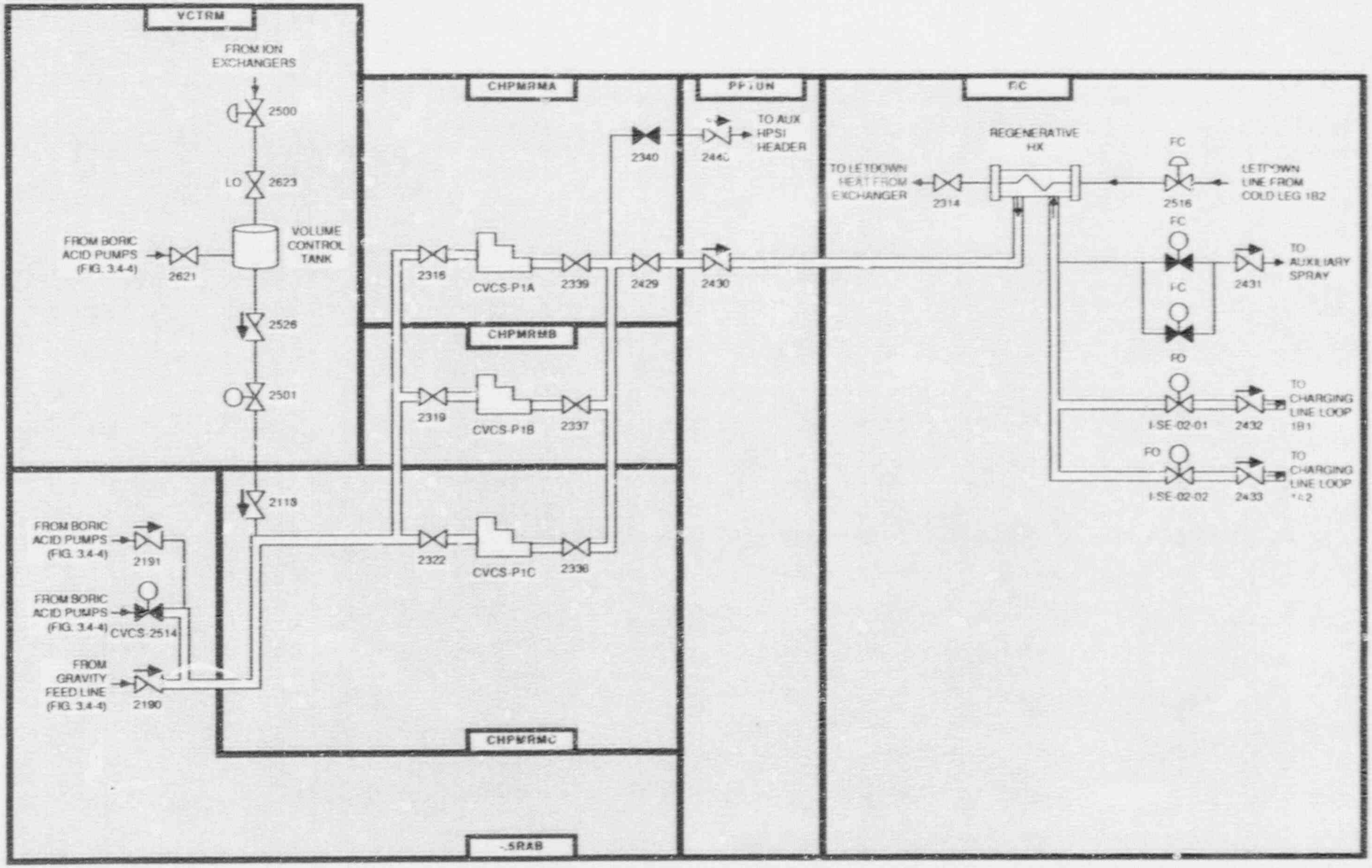


Figure 3.4-2. St. Lucie 1 Charging System (CVCS) Showing Component Locations

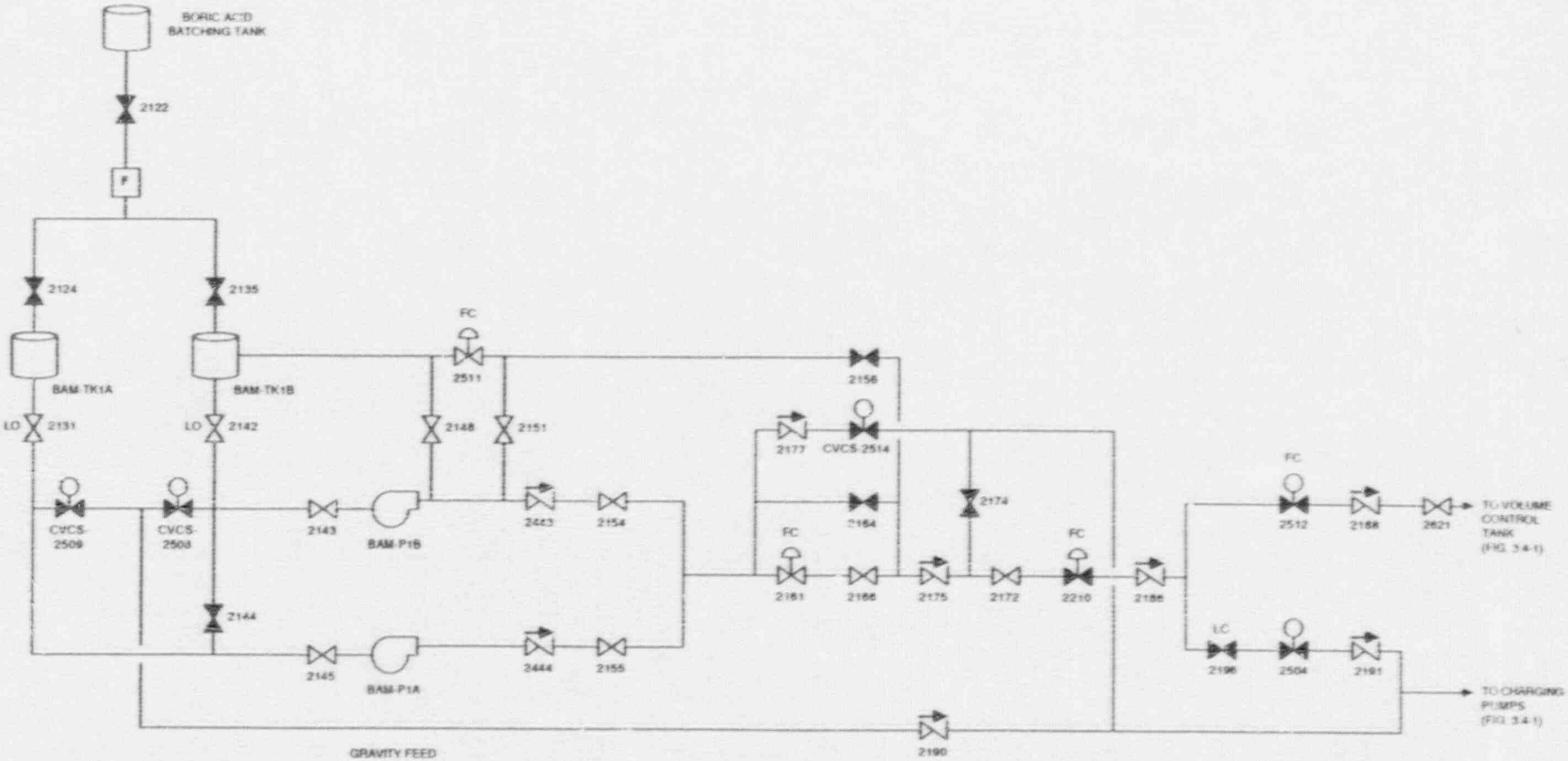


Figure 3.4-3. St. Lucie 1 Boric Acid Makeup System

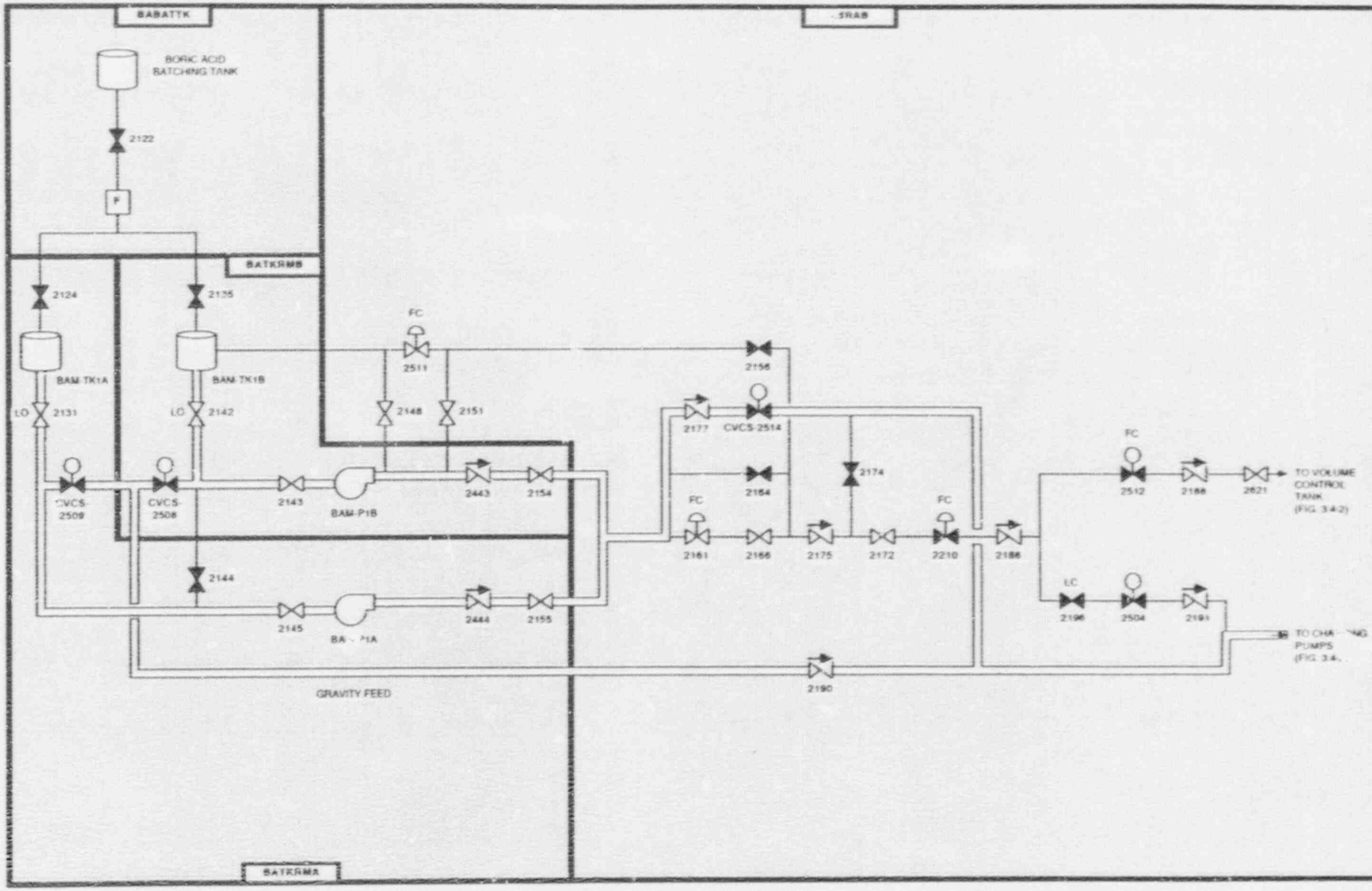


Figure 3.4-4. St. Lucie 1 Boric Acid Makeup System Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
BAM-P1A	MDP	BATKRMA	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
BAM-TK1A	TANK	BATKRMA				
BAM-TK1B	TANK	BATKRMB				
CVCS-2508	MOV	BATKRMB	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
CVCS-2508	MOV	BATKRMB	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
CVCS-2509	MOV	BATKRMA	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
CVCS-2509	MOV	BATKRMA	EP-MCC-1B-5	480	ELECT-EQUIP-RM	AC/B
CVCS-2514	MOV	-.5RAB	EP-MCC-1A-5	480	ELECT-EQUIP-RM	AC/A
CVCS-P1A	MDP	CHPMRMA	EP-BS-1A2	480	ELECT-EQUIP-RM	AC/A
CVCS-P1B	MDP	CHPMRMB	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/B
CVCS-P1B	MDP	BATKRMB	EP-MCC-1A-6	480	ELECT-EQUIP-RM	AC/A
CVCS-P1C	MDP	CHPMRMC	EP-BS-480V-1AB	480	SWGR1AB	AC/AB

3.5 INSTRUMENTATION AND CONTROL (I & C) SYSTEMS

3.5.1 System Function

The instrumentation and control systems consist of the Reactor Protective System (RPS), the Engineered Safety Features Actuation System (ESFAS), and systems for the display of plant information to the operators. The RPS and the Engineered Safety Features Actuation System 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 Engineered Safety Features Actuation System will automatically actuate selected safety systems based on the specific limits or combinations of limits that are exceeded.

3.5.2 System Definition

The RPS includes sensor and transmitter units, logic units, and output trip relays that generate a reactor trip signal. The reactor trip signal deenergizes the control element drive mechanisms (CEDM), allowing all control element assemblies (CEAs) to drop into the core. The Engineered Safety Features Actuation System includes independent sensor and transmitter units, logic units and relays that interface with the control circuits for the many different sets of components that can be actuated by this system. Operator instrumentation display systems consist of display panels in the control room and at the auxiliary control panel that are powered by the 120 VAC electric power system (see Section 3.6). A summary of data on selected I & C system components is presented in Table 3.5-1.

3.5.3 System Operation

A. RPS

The RPS has four redundant input instrument channels for each sensed parameter. A two-out-of-four coincidence of like trip signals is required to generate a reactor trip signal. The fourth instrument channel is provided as an installed spare and allows bypassing one channel while maintaining a two-out-of-three system. Manual reactor trip is also provided.
The following conditions result in reactor trip:

- High power level
- High rate change of power
- High local power density
- High pressurizer pressure
- Thermal margin/low pressure
- Low steam generator water level
- Low steam generator pressure
- High containment pressure
- Asymmetric steam generator transient
- Low reactor coolant flow
- Turbine trip
- Manual

B. ESFAS

The ESFAS also utilizes a two-out-of-four coincidence of like initiating trip signals from four independent measurement channels, with two output actuation trains. The ESFAS logic is similar to that of the RPS. The ESFAS generates the following actuation signals:

- Safety Injection Actuation Signal (SIAS)
- Containment Isolation Actuation Signal (CIAS)
- Containment Spray Actuation Signal (CSAS)
- Main Steam Isolation Signal (MSIS)
- Auxiliary Feedwater Actuation Signal-1 (AFAS-1)
- Auxiliary Feedwater Actuation Signal-2 (AFAS-2)
- Recirculation Actuation Signal (RAS)

The actuation systems provide an actuation signal to each individual component in the required engineered safety features system. An individual component usually receives an actuation signal from only one output train.

C. Remote Shutdown
Operator instrumentation is provided in the control room. Instrumentation display panels are powered by 120 VAC as described in Section 3.5. Equipment is provided in appropriate locations outside the control room to bring the plant to a hot standby condition with the potential capability for subsequent cold shutdown (Ref. 1, Section 7.4.1).

3.5.4 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 St. Lucie have not been determined.

B. ESFAS
A single component usually receives a signal from only one ESFAS output train. ESFAS Trains A and B must be available in order to automatically actuate their respective components. ESFAS typically uses hindrance input logic (normal = 1, trip = 0) and transmission output logic (normal = 0, trip = 1). In this case, an input 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). Control power is needed for the ESFAS output channels to send an actuation signal. Note that there may be some ESFAS actuation subsystems that utilize hindrance output logic. For these subsystems, loss of control power will cause system or component actuation, as is the case with the RPS. Details of the ESFAS system for St. Lucie 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 ESFAS 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., the

remote shutdown panel or a motor control center). To make these judgments, data on key plant parameters must be available to the operators.

3.5.5 Support Systems and Interfaces

A. Control Power
Operator instrumentation displays are powered from the 120 VAC vital instrument buses.

3.5.6 Section 3.5 References

1. Final Safety Analysis Report, St. Lucie Nuclear Power Station, Unit 1.

3.6 ELECTRIC POWER SYSTEM

3.6.1 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.

3.6.2 System Definition

The onsite Class 1E electric power system consists of three AC load groups. Diesel generator 1A is connected to 4160 VAC bus 1A3, and diesel generator 1B is connected to 4160 VAC bus 1B3. A third 4160 VAC bus, 1AB, can receive power from either bus 1A3 or 1B3, but not from both simultaneously. This bus supplies power to equipment which are backup to equipment powered from the other buses. There are three 480 VAC power centers. These include bus 1A2, which is connected to 4160 bus 1A3 through transformer 1A2, bus 1B2, which is connected to 4160 bus 1B3 through transformer 1B2, and bus 1AB, which can receive power from either power center 1A2 or 1B2, but not from both simultaneously. Various motor control centers receive their power from the 480 VAC buses. In some cases, there are non-emergency loads connected to emergency MCCs. Whenever this occurs, the MCC bus is split into a vital and non-vital section connected through a bus isolating device that automatically opens during an emergency, thus isolating the non-emergency loads from those MCCs. The 480 VAC system also includes pressurizer heater buses 1A3 and 1B3 that supply power to the pressurizer heaters.

The 125 VDC system is designed to provide a source of reliable continuous power for control and instrumentation and other loads. The 125 VDC system consists of two batteries, each with its own battery chargers, load center, and distribution panels. The batteries, designated 1A and 1B are connected to load center buses 1A and 1B, respectively. A third 125 VDC bus, 1AB, is normally served by bus 1A or 1B, but never both simultaneously. The battery chargers for the 125 VDC system are supplied from 480 VAC motor control centers.

The 120/208 VAC system includes distribution panels supplied via transformers from 480 VAC MCCs. These panels feed safety related loads such as ESF process monitoring instrumentation. These panels also feed four redundant 120 VAC single phase instrument power buses (1MA, 1MB, 1MC, and 1MD) which provide power to essential instrumentation and control loads under all operating conditions. Each instrumentation bus is normally supplied from an AC inverter connected to one of the 125 VDC panels.

Simplified one-line diagrams of the 4160 VAC and 480 VAC electric power system are shown in Figures 3.6-1 and 3.6-2. The 125 VDC and 120 VAC systems are shown in Figures 3.6-3 and 3.6-4. A summary of data on selected electric power system components is presented in Table 3.6-1. Selected loads and components supplied by the Class 1E electric power system are listed in Table 3.6-2.

3.6.3 System Operation

During normal operation, the Class 1E electric power system is supplied from the switchyard through two unit auxiliary transformers. 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 8 hours of operation without assistance from the battery chargers when non-emergency loads are disconnected (Ref. 1, Sec. 8.3.2.1).

Four redundant 120 VAC single phase instrumentation buses provide power to essential instrumentation and control loads under all operating conditions. Each bus is supplied separately from an inverter connected to one of the Class 1E DC buses. The 120 VAC buses can also be supplied by 120 VAC distribution panels to permit maintenance on the DC buses without interrupting instrumentation power.

Redundant safeguards equipment such as motor driven pumps and motor operated valves are supplied by different VAC buses. For the purpose of discussion, this equipment has been grouped into "load groups". Load group AC/A contains components powered either directly or indirectly from 4160 bus 1A3. Load group AC/B contains components powered either directly or indirectly by bus 1B3. Load group AC/AB contains components powered by 4160 VAC bus 1AB, 480 VAC bus 1AB, or associated MCCs. Components receiving DC power are assigned to load groups DC/A, DC/B, or DC/AB, based on the battery power source.

3.6.4 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 initially 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 essential loads are intact
- Power to the battery chargers is restored before the batteries are exhausted

3.6.5 Component Information

A. Standby diesel generators 1A, 1B
   1. Maximum continuous rating: 3500 kW
   2. Rated voltage: 4160 VAC
   3. Manufacturer: General Motors

B. Batteries 1A, 1B
   1. Rated voltage: 125 VDC
   2. Type: Lead-calcium
   3. Capacity: 8 hours with non-emergency loads disconnected

3.6.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The standby diesel generators are automatically started based on:
      - loss of voltage in the emergency 4160 VAC and/or 480 VAC buses
      - actuation of any ESF signal which include the Safety Injection Actuation Signal (SIAS), Containment Isolation Signal (CIS), or Containment Spray Actuation Signal (CSAS).
   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 has a self-contained cooling system which consists of a forced circulation cooling water system which cools the engine directly and an air cooled radiator system which removes heat from the cooling water. The cooling water pump and radiator fan are driven directly from the engine crankshaft.

2. Diesel Starting System
Each diesel has an independent air starting system.

3. Diesel Fuel Oil Transfer and Storage System
A "day tank" supplies short-term (approximately 1.25 hours) fuel needs of each diesel. Each day tank can be replenished from a separate diesel oil storage tank during engine operation. The long-term storage tanks are located to the north-east of the diesel generator building.

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 are not known.

3.6.7 Section 3.6 References

1. Final Safety Analysis Report, St. Lucie Nuclear Power Station, Unit 1.

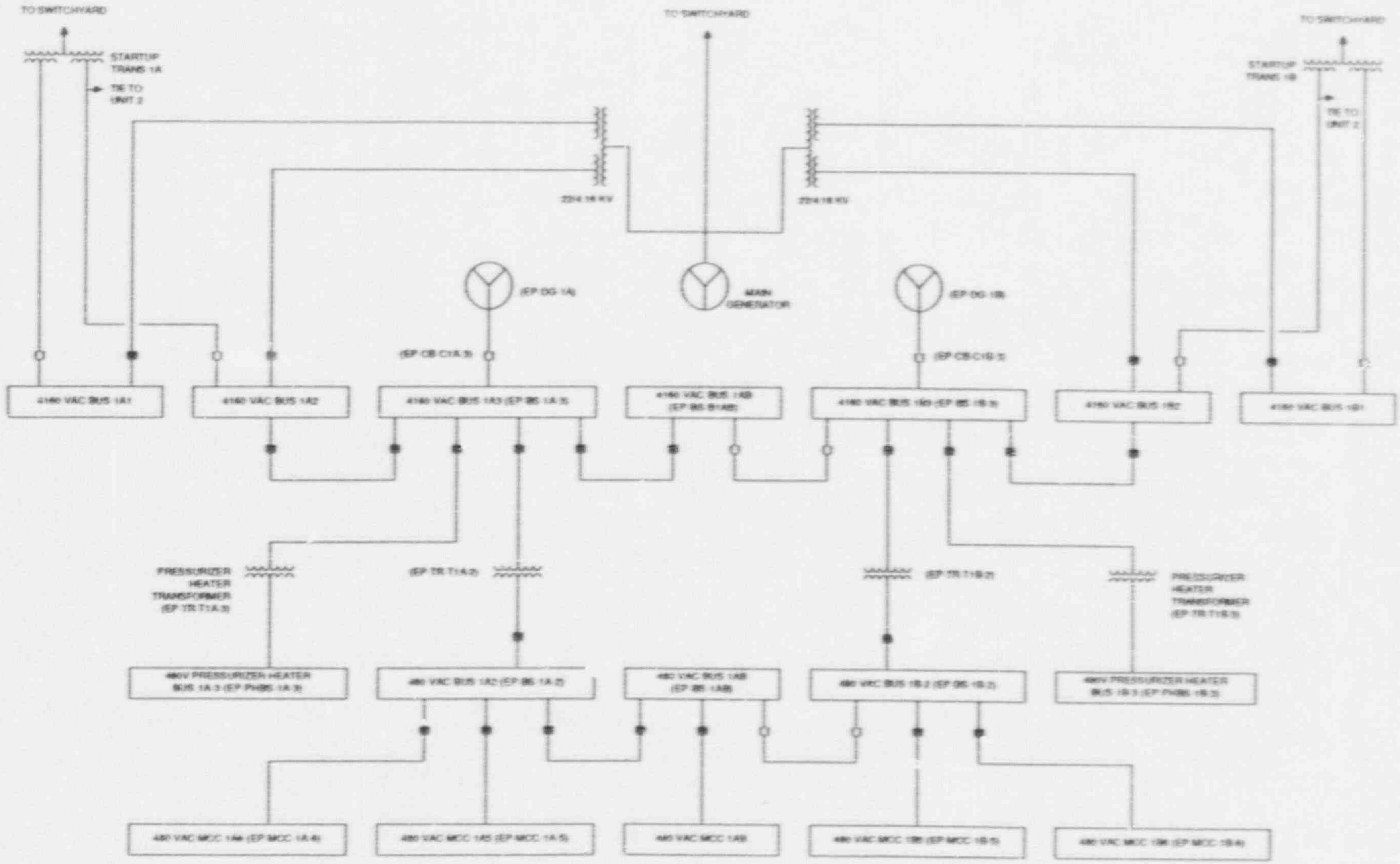


Figure 3.6-1. St. Lucie 1 4160 VAC and 480 VAC Electric Power Distribution Systems

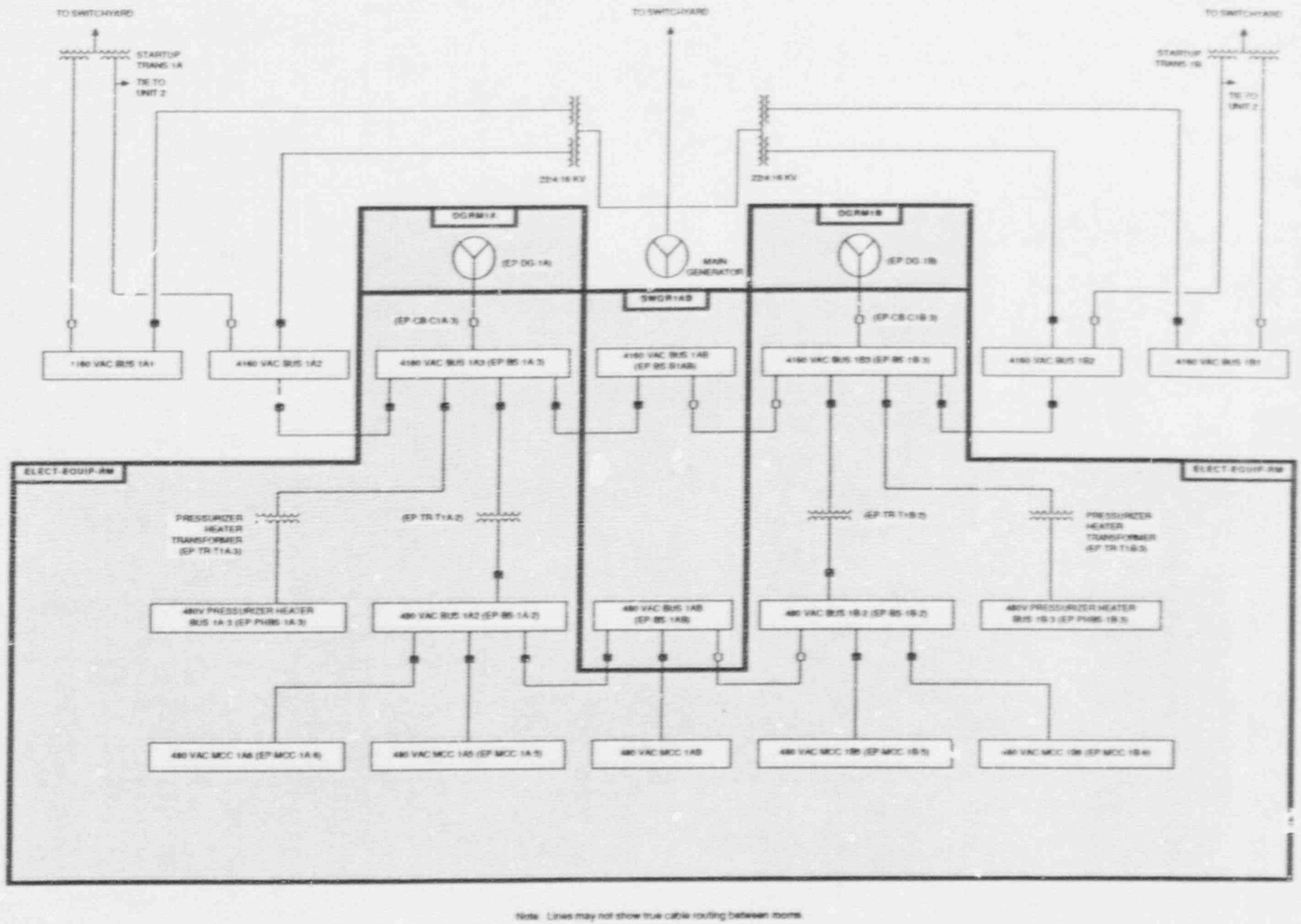


Figure 3.6-2. St. Lucie 1 4160 VAC and 480 VAC Electric Power Distribution Systems Showing Component Locations

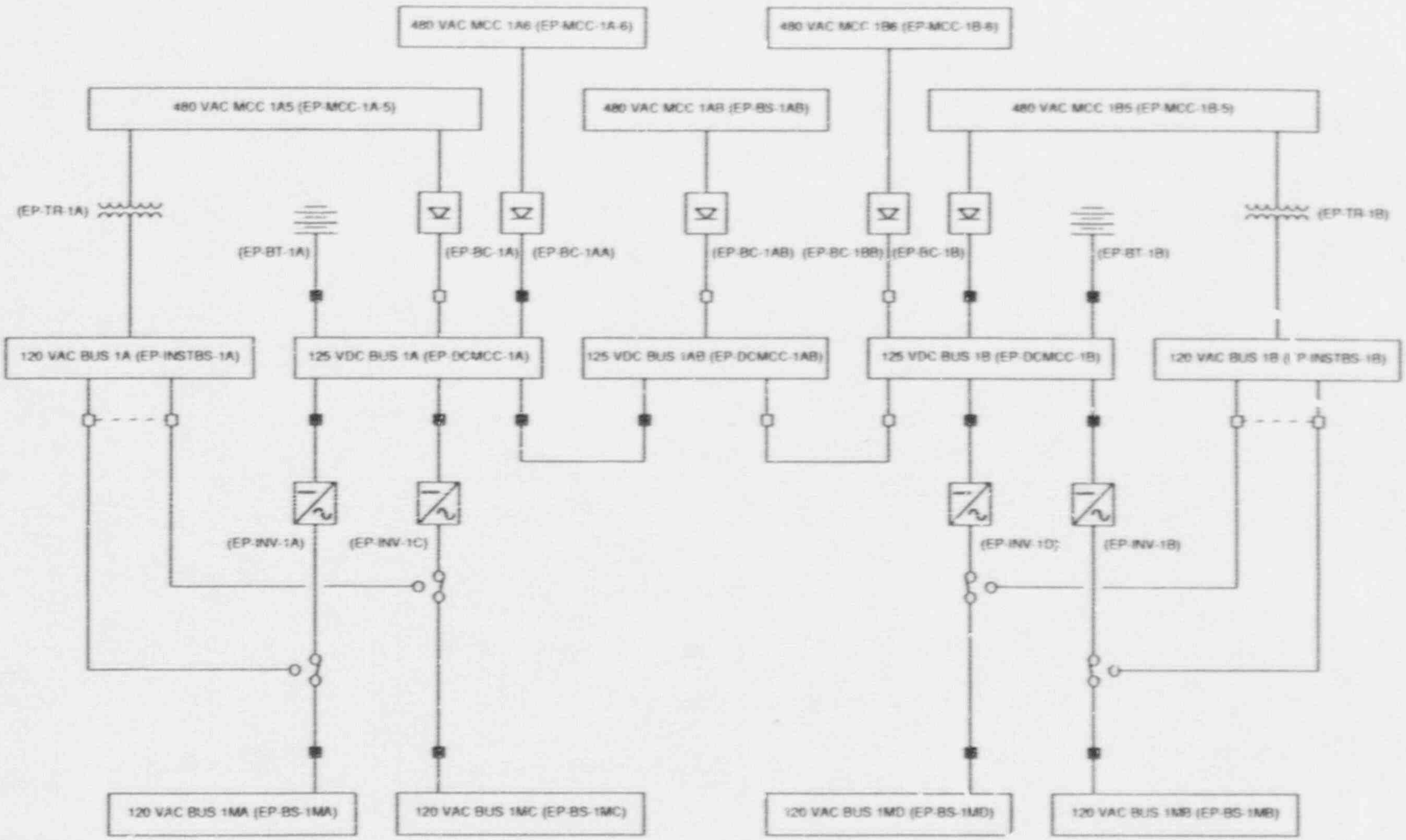
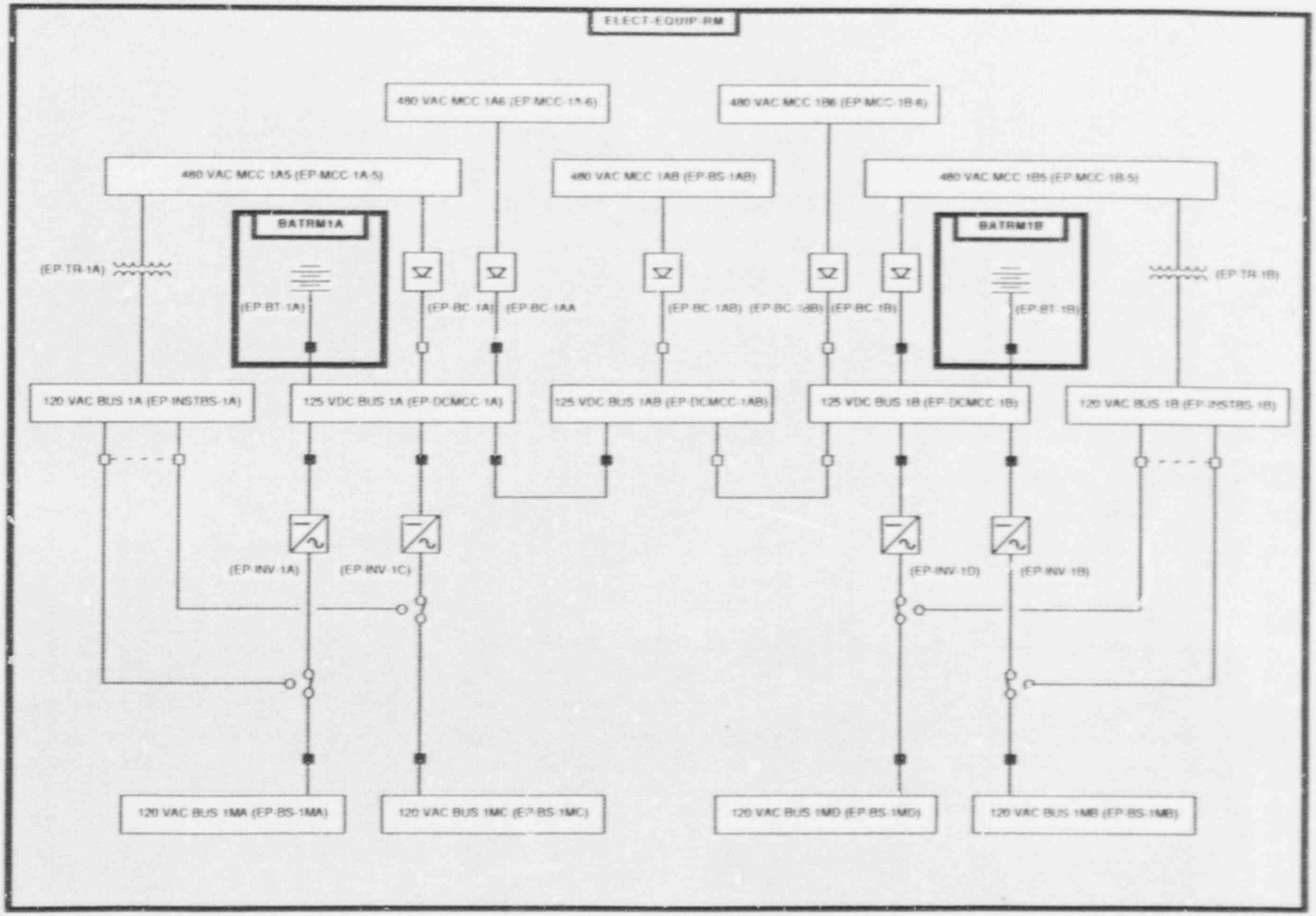


Figure 3.6-3. St. Lucie 1 120 VAC and 125 VDC Electric Power Distribution Systems



Note: Lines may not show true cable routing between rooms.

Figure 3.6-4. St. Lucie 1 120 VAC and 125 VDC Electric Power Distribution Systems Showing Component Locations

Table 3.6-1. St. Lucie 1 Electric Power System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
CB-C1A-3	CB	ELECT-EQUIP-R	EP-DG-1A	4160	DGRM1A	AC/A
CB-C1B-3	CB	ELECT-EQUIP-R	EP-DG-1B	4160	DGRM1B	AC/B
EP-BC-1A	BC	ELECT-EQUIP-R	EP-MCC-1A-5	125	ELECT-EQUIP-RM	DC/A
EP-BC-1B	BC	ELECT-EQUIP-R	EP-MCC-1B-5	125	ELECT-EQUIP-RM	DC/B
EP-BC-1BB	BC	ELECT-EQUIP-R	EP-MCC-1B-6	125	ELECT-EQUIP-RM	DC/B
EP-BS-1A-2	BUS	ELECT-EQUIP-R	EP-TR-T1A-2	480	ELECT-EQUIP-RM	AC/A
EP-BS-1A-3	BUS	ELECT-EQUIP-R	EP-DG-1A	4160	DGRM1A	AC/A
EP-BS-1AB	BUS	SWGR1AB	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/AB
EP-BS-1AB	BUS	SWGR1AB	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/AB
EP-BS-1AB	MCC	ELECT-EQUIP-R	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/A
EP-BS-1AB	MCC	ELECT-EQUIP-R	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/B
EP-BS-1B	BUS	ELECT-EQUIP-R	EP-TR-T1B-2	480	ELECT-EQUIP-RM	AC/B
EP-BS-1B-3	BUS	ELECT-EQUIP-R	EP-DG-1B	4160	DGRM1B	AC/B
EP-BS-1MA	BUS	ELECT-EQUIP-R	EP-INV-1A	120	ELECT-EQUIP-RM	AC/A
EP-BS-1MA	BUS	ELECT-EQUIP-R	EP-INSTBS-1A	120	ELECT-EQUIP-RM	AC/A
EP-BS-1MB	BUS	ELECT-EQUIP-R	EP-INV-1B	120	ELECT-EQUIP-RM	AC/B
EP-BS-1MB	BUS	ELECT-EQUIP-R	EP-INSTBS-1B	120	ELECT-EQUIP-RM	AC/B
EP-BS-1MC	BUS	ELECT-EQUIP-R	EP-INV-1C	120	ELECT-EQUIP-RM	AC/A
EP-BS-1MC	BUS	ELECT-EQUIP-R	EP-INSTBS-1A	120	ELECT-EQUIP-RM	AC/A
EP-BS-1MD	BUS	ELECT-EQUIP-R	EP-INV-1D	120	ELECT-EQUIP-RM	AC/B
EP-BS-1MD	BUS	ELECT-EQUIP-R	EP-INSTBS-1B	120	ELECT-EQUIP-RM	AC/B
EP-BS-B1AB	BUS	SWGR1AB	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/AB
EP-BS-B1AB	BUS	SWGR1AB	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/AB
EP-BT-1A	BATT	BATRM1A	EP-DCMCC-1A	125	ELECT-EQUIP-RM	DC/A
EP-BT-1B	BATT	BATRM1B	EP-DCMCC-1B	125	ELECT-EQUIP-RM	DC/B
EP-DC-1AA	BC	ELECT-EQUIP-R	EP-MCC-1A-6	125	ELECT-EQUIP-RM	DC/A
EP-DCMCC-1A	MCC	ELECT-EQUIP-R	EP-BC-1A	125	ELECT-EQUIP-RM	DC/A
EP-DCMCC-1A	MCC	ELECT-EQUIP-R	EP-BT-1A	125	BATRM1A	DC/A

Table 3.6-1. St. Lucie 1 Electric Power System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
EP-DCMCC-1A	MCC	ELECT-EQUIP-R	EP-BC-1AA	125	ELECT-EQUIP-RM	DC/A
EP-DCMCC-1AB	MCC	ELECT-EQUIP-R	EP-DCMCC-1A	125	ELECT-EQUIP-RM	DC/AB
EP-DCMCC-1AB	MCC	ELECT-EQUIP-R	EP-DCMCC-1B	125	ELECT-EQUIP-RM	DC/AB
EP-DCMCC-1B	MCC	ELECT-EQUIP-R	EP-BC-1B	125	ELECT-EQUIP-RM	DC/B
EP-DCMCC-1B	MCC	ELECT-EQUIP-R	EP-BT-1B	125	BATRM1B	DC/B
EP-DCMCC-1B	MCC	ELECT-EQUIP-R	EP-BC-1BB	125	ELECT-EQUIP-RM	DC/B
EP-DG-1A	DG	DGRM1A		4160		AC/A
EP-DG-1B	DG	DGRM1B		4160		AC/B
EP-INSTBS-1A	BUS	ELECT-EQUIP-R	EP-TR-1A	120	ELECT-EQUIP-RM	AC/A
EP-INSTBS-1B	BUS	ELECT-EQUIP-R	EP-TR-1B	120	ELECT-EQUIP-RM	AC/B
EP-INV-1A	INV	ELECT-EQUIP-R	EP-DCMCC-1A	120	ELECT-EQUIP-RM	DC/A
EP-INV-1B	INV	ELECT-EQUIP-R	EP-DCMCC-1B	120	ELECT-EQUIP-RM	DC/B
EP-INV-1C	INV	ELECT-EQUIP-R	EP-DCMCC-1A	120	ELECT-EQUIP-RM	DC/A
EP-INV-1D	INV	ELECT-EQUIP-R	EP-DCMCC-1B	120	ELECT-EQUIP-RM	DC/B
EP-MCC-1A-5	MCC	ELECT-EQUIP-R	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/A
EP-MCC-1A-6	MCC	ELECT-EQUIP-R	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/A
EP-MCC-1B-5	MCC	ELECT-EQUIP-R	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/B
EP-MCC-1B-6	MCC	ELECT-EQUIP-R	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/B
EP-PHBS-1A-3	BUS	ELECT-EQUIP-R	EP-TR-T1A-3	480	ELECT-EQUIP-RM	AC/A
EP-PHBS-1B-3	BUS	ELECT-EQUIP-R	EP-TR-T1B-3	480	ELECT-EQUIP-RM	AC/B
EP-TR-1A	TRAN	ELECT-EQUIP-R	EP-MCC-1A-5	120	ELECT-EQUIP-RM	AC/A
EP-TR-1B	TRAN	ELECT-EQUIP-R	EP-MCC-1B-5	120	ELECT-EQUIP-RM	AC/B
EP-TR-T1A-2	TRAN	ELECT-EQUIP-R	EP-BS-1A-3	480	ELECT-EQUIP-RM	AC/A
EP-TR-T1A-3	TRAN	ELECT-EQUIP-R	EP-BS-1A-3	480	ELECT-EQUIP-RM	AC/A
EP-TR-T1B-2	TRAN	ELECT-EQUIP-R	EP-BS-1B-3	480	ELECT-EQUIP-RM	AC/B
EP-TR-T1B-3	TRAN	ELECT-EQUIP-R	EP-BS-1B-3	480	ELECT-EQUIP-RM	AC/B

Table 3.6-2. Partial Listing of Electrical Sources and Loads at St. Lucie 1

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
EP-BC-1A	125	DC/A	ELECT-EQUIP-RM	EP	EP-DCMCC-1A	MCC	ELECT-EQUIP-RM
EP-BC-1AA	125	DC/A	ELECT-EQUIP-RM	EP	EP-DCMCC-1A	MCC	ELECT-EQUIP-RM
EP-BC-1B	125	DC/B	ELECT-EQUIP-RM	EP	EP-DCMCC-1B	MCC	ELECT-EQUIP-RM
EP-BC-1BB	125	DC/B	ELECT-EQUIP-RM	EP	EP-DCMCC-1B	MCC	ELECT-EQUIP-RM
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	CCW		MOV	YARD
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	CCW	CCW-14-1	MOV	YARD
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	CCW	CCW-14-3	MOV	YARD
EP-BS-1A-2	480	AC/AB	ELECT-EQUIP-RM	EP	EP-BS-1AB	BUS	SWGR1AB
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1AB	MCC	ELECT-EQUIP-RM
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	EP	EP-MCC-1A-5	MCC	ELECT-EQUIP-RM
EP-BS-1A-2	480	AC/A	ELECT-EQUIP-RM	EP	EP-MCC-1A-6	MCC	ELECT-EQUIP-RM
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	AFWS	AFW-PM1A	MDP	LSTTRA
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	CCW	CCW-14-6	MOV	PPPEN
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	CCW	CCW-14-6	MOV	PPPEN
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	CCW	CCW-P1A	MDP	YARD
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ECCS	CS-P1A	MDP	HPSIRMA
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ECCS	CS-P1A	MDP	HPSIRMA
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	ECCS	EP-BS-1A-2	BUS	ELECT-EQUIP-RM
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	ECCS	EP-BS-1A-2	BUS	ELECT-EQUIP-RM
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-P1A	MDP	HPSIRMA
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-P1A	MDP	HPSIRMA
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ECCS	HPSIA-P1A	MDP	HPSIRMB
EP-BS-1A-3	4160	AC/AB	ELECT-EQUIP-RM	EP	EP-BS-B1AB	BUS	SWGR1AB
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	EP	EP-TR-T1A-2	TRAN	ELECT-EQUIP-RM
EP-BS-1A-3	480	AC/A	ELECT-EQUIP-RM	EP	EP-TR-T1A-3	TRAN	ELECT-EQUIP-RM
EP-BS-1A-3	4160	AC/A	ELECT-EQUIP-RM	ICW	ICWO-P1A	MDP	INTSTR
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3617	MOV	PPTUN
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3617	MOV	PPTUN
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3647	MOV	PPTUN
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3647	MOV	PPTUN
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3656	MOV	HPSIRMA
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3656	MOV	HPSIRMA
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3656	MOV	HPSIRMA

Table 3.6-2. Partial Listing of Electrical Sources and Loads at St. Lucie 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3656	MOV	HPSIRMA
EP-BS-1A-5	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3663	MOV	SDHX1A
EP-BS-1A-6	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3627	MOV	PPTUN
EP-BS-1A-6	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3627	MOV	PPTUN
EP-BS-1A-6	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3637	MOV	PPTUN
EP-BS-1A-6	480	AC/A	ELECT-EQUIP-RM	ECCS	HPSI-3637	MOV	PPTUN
EP-BS-1A2	480	AC/A	ELECT-EQUIP-RM	CVCS	CVCS-P1A	MDP	CHPMRMA
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	CCW		MOV	YARD
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	CCW	CCW-14-2	MOV	YARD
EP-BS-1B-2				CCW	CCW-14-4	MOV	YARD
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	CVCS	CVCS-P1B	MDP	CHPMRMB
EP-BS-1B-2	480	AC/AB	ELECT-EQUIP-RM	EP	EP-BS-1AB	BUS	SWGR1AB
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1AB	MCC	ELECT-EQUIP-RM
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	EP	EP-MCC-1B-5	MCC	ELECT-EQUIP-RM
EP-BS-1B-2	480	AC/B	ELECT-EQUIP-RM	EP	EP-MCC-1B-6	MCC	ELECT-EQUIP-RM
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	AFWS	AFW-PM1B	MDP	LSTTRA
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	CCW	CCW-14-5	MOV	PPPEN
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	CCW	CCW-14-5	MOV	PPPEN
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	CCW	CCW-P1B	MDP	YARD
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	ECCS	CS-P1B	MDP	HPSIRMB
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	ECCS	CS-P1B	MDP	HPSIRMB
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	ECCS	EP-BS-1B-2	BUS	ELECT-EQUIP-RM
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	ECCS	EP-BS-1B-2	BUS	ELECT-EQUIP-RM
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-P1B	MDP	HPSIRMB
EP-BS-1B-3	4160	AC/AB	ELECT-EQUIP-RM	EP	EP-BS-B1AB	BUS	SWGR1AB
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	EP	EP-TR-T1B-2	TRAN	ELECT-EQUIP-RM
EP-BS-1B-3	480	AC/B	ELECT-EQUIP-RM	EP	EP-TR-T1B-3	TRAN	ELECT-EQUIP-RM
EP-BS-1B-3	4160	AC/B	ELECT-EQUIP-RM	ICW	ICWO-P1B	MDP	INTSTR
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3616	MOV	PPTUN
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3616	MOV	PPTUN
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3646	MOV	PPTUN
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3646	MOV	PPTUN
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3654	MOV	HPSIRMB

Table 3.6-2. Partial Listing of Electrical Sources and Loads at St. Lucie 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3654	MOV	HPSIRMB
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3654	MOV	HPSIRMB
EP-BS-1B-5	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3654	MOV	HPSIRMB
EP-BS-1B-6	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3626	MOV	PPTUN
EP-BS-1B-6	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3626	MOV	PPTUN
EP-BS-1B-6	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3636	MOV	PPTUN
EP-BS-1B-6	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3636	MOV	PPTUN
EP-BS-1B6	480	AC/B	ELECT-EQUIP-RM	ECCS	HPSI-3662	MOV	SDHX1B
EP-BS-480V-1AB	480	AC/AB	SWGR1AB	CVCS	CVCS-P1C	MDP	CHPMPMC
EP-BS-B1AB	4160	AC/AB	SWGR1AB	CCW	CCW-P1C	MDP	YARD
EP-BS-B1AB	4160	AC/AB	SWGR1AB	ECCS	HPSI-P1C	MDP	HPSIRMB
EP-BS-B1AB	4160	AC/AB	SWGR1AB	ICW	ICWO-P1C	MDP	INTSTR
EP-BT-1A	125	DC/A	BATRM1A	EP	EP-DCMCC-1A	MCC	ELECT-EQUIP-RM
EP-BT-1B	125	DC/B	BATRM1B	EP	EP-DCMCC-1B	MCC	ELECT-EQUIP-RM
EP-DCMCC-1A	125	DC/A	ELECT-EQUIP-RM	EP	EP-BT-1A	BATT	BATRM1A
EP-DCMCC-1A	125	DC/AB	ELECT-EQUIP-RM	EP	EP-DCMCC-1AB	MCC	ELECT-EQUIP-RM
EP-DCMCC-1A	120	DC/A	ELECT-EQUIP-RM	EP	EP-INV-1A	INV	ELECT-EQUIP-RM
EP-DCMCC-1A	120	DC/A	ELECT-EQUIP-RM	EP	EP-INV-1C	INV	ELECT-EQUIP-RM
EP-DCMCC-1AB	125	DC/AB	ELECT-EQUIP-RM	AFWS	AFW-08-03	MOV	LSTTRA
EP-DCMCC-1AB	125	DC/AB	ELECT-EQUIP-RM	AFWS	AFW-08-13	MOV	LSTTRA
EP-DCMCC-1AB	125	DC/AB	ELECT-EQUIP-RM	AFWS	AFW-08-14	MOV	LSTTRA
EP-DCMCC-1AB	125	DC/AB	ELECT-EQUIP-RM	AFWS	AFW-09-11	MOV	USTTRA
EP-DCMCC-1AB	125	DC/AB	ELECT-EQUIP-RM	AFWS	AFW-09-12	MOV	USTTRA
EP-DCMCC-1B	125	DC/B	ELECT-EQUIP-RM	EP	EP-BT-1B	BATT	BATRM1B
EP-DCMCC-1B	125	DC/AB	ELECT-EQUIP-RM	EP	EP-DCMCC-1AB	MCC	ELECT-EQUIP-RM
EP-DCMCC-1B	120	DC/B	ELECT-EQUIP-RM	EP	EP-INV-1B	INV	ELECT-EQUIP-RM
EP-DCMCC-1B	120	DC/B	ELECT-EQUIP-RM	EP	EP-INV-1D	INV	ELECT-EQUIP-RM
EP-DG-1A	4160	AC/A	DGRM1A	EP	CB-C1A-3	CB	ELECT-EQUIP-RM
EP-DG-1A	4160	AC/A	DGRM1A	EP	EP-BS-1A-3	BUS	ELECT-EQUIP-RM
EP-DG-1B	4160	AC/B	DGRM1B	EP	CB-C1B-3	CB	ELECT-EQUIP-RM
EP-DG-1B	4160	AC/B	DGRM1B	EP	EP-BS-1B-3	BUS	ELECT-EQUIP-RM
EP-INSTBS-1A	120	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1MA	BUS	ELECT-EQUIP-RM
EP-INSTBS-1A	120	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1MC	BUS	ELECT-EQUIP-RM

Table 3.6-2. Partial Listing of Electrical Sources and Loads at St. Lucie 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
EP-INSTBS-1B	120	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1MB	BUS	ELECT-EQUIP-RM
EP-INSTBS-1B	120	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1MD	BUS	ELECT-EQUIP-RM
EP-INV-1A	120	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1MA	BUS	ELECT-EQUIP-RM
EP-INV-1B	120	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1MB	BUS	ELECT-EQUIP-RM
EP-INV-1C	120	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1MC	BUS	ELECT-EQUIP-RM
EP-INV-1D	120	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1MD	BUS	ELECT-EQUIP-RM
EP-MCC-[illegible]A	120	AC/A	ELECT-EQUIP-RM	I&C		PNL	CR
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	AFWS	AFW-09-09	MOV	USTTRA
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	AFWS	AFW-09-13	MOV	USTTRA
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	CVCS	BAM-P1A	MDP	BATKRMA
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	CVCS	CVCS-2514	MOV	[illegible]5RAB
EP-MCC-1A-5	[illegible]	DC/A	ELECT-EQUIP-RM	EP	EP-BC-1A	BC	ELECT-EQUIP-RM
EP-MCC-1A-5	120	AC/A	ELECT-EQUIP-RM	EP	EP-TR-1A	TRAN	ELECT-EQUIP-RM
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	RCS	RCS-1403	MOV	RC
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	RCS	RCS-3481	MOV	RC
EP-MCC-1A-5	480	AC/A	ELECT-EQUIP-RM	RCS	RCS-3651	MOV	RC
EP-MCC-1A-6	480	AC/A	ELECT-EQUIP-RM	CVCS	CVCS-P1B	MDP	BATKRMB
EP-MCC-1A-6	125	DC/A	ELECT-EQUIP-RM	EP	EP-DC-1AA	BC	ELECT-EQUIP-RM
EP-MCC-1B	120	AC/B	ELECT-EQUIP-RM	I&C		PNL	CR
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	AFWS	AFW-09-10	MOV	USTTRA
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	AFWS	AFW-09-14	MOV	USTTRA
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	CVCS	CVCS-2508	MOV	BATKRMB
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	CVCS	CVCS-2508	MOV	BATKRMB
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	CVCS	CVCS-2509	MOV	BATKRMA
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	CVCS	CVCS-2509	MOV	BATKRMA
EP-MCC-1B-5	125	DC/B	ELECT-EQUIP-RM	EP	EP-BC-1B	BC	ELECT-EQUIP-RM
EP-MCC-1B-5	120	AC/B	ELECT-EQUIP-RM	EP	EP-TR-1B	TRAN	ELECT-EQUIP-RM
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	RCS	RCS-1405	MOV	RC
EP-MCC-1B-5	480	AC/B	ELECT-EQUIP-RM	RCS	RCS-3480	MOV	RC
EP-MCC-1B-6	125	DC/B	ELECT-EQUIP-RM	EP	EP-BC-1BB	BC	ELECT-EQUIP-RM
EP-MCC-1B-[illegible]	480	AC/B	ELECT-EQUIP-RM	RCS	RCS-3652	MOV	RC
EP-MCC-1C	120	AC/A	ELECT-EQUIP-RM	I&C		PNL	CR
EP-MCC-1D	120	AC/B	ELECT-EQUIP-RM	I&C		PNL	CR

Table 3.6-2. Partial Listing of Electrical Sources and Loads at St. Lucie 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
EP-TR-1A	120	AC/A	ELECT-EQUIP-RM	EP	EP-INSTBS-1A	BUS	ELECT-EQUIP-RM
EP-TR-1B	120	AC/B	ELECT-EQUIP-RM	EP	EP-INSTBS-1B	BUS	ELECT-EQUIP-RM
EP-TR-T1A-2	480	AC/A	ELECT-EQUIP-RM	EP	EP-BS-1A-2	BUS	ELECT-EQUIP-RM
EP-TR-T1A-3	480	AC/A	ELECT-EQUIP-RM	EP	EP-PHBS-1A-3	BUS	ELECT-EQUIP-RM
EP-TR-T1B-2	480	AC/B	ELECT-EQUIP-RM	EP	EP-BS-1B	BUS	ELECT-EQUIP-RM
EP-TR-T1B-3	480	AC/B	ELECT-EQUIP-RM	EP	EP-PHBS-1B-3	BUS	ELECT-EQUIP-RM

3.7 COMPONENT COOLING WATER SYSTEM (CCWS)

3.7.1 System Function

The CCWS serves to remove heat from the reactor auxiliaries and shutdown heat exchangers and to transfer it to the Intake Cooling Water System for rejection to the ultimate heat sink. The CCWS ensures continuous operation or safe shutdown of the plant under all modes of operation.

3.7.2 System Definition

The CCWS is a closed loop cooling water system that uses demineralized water buffered with a corrosion inhibitor to cool the shutdown heat exchangers and various components throughout the plant. The system includes three pumps, two heat exchangers, one surge tank, and one chemical addition tank.

The CCWS is arranged in two essential loops, A and B, which serve safety-related equipment. A non-essential loop can be supplied from either loop A or B.

Simplified drawings of the CCWS are shown in Figures 3.7-1 and 3.7-2. A summary of data on selected CCWS components is presented in Table 3.7-1.

3.7.3 System Operation

During normal, shutdown, or refueling operating conditions, the CCW pumps supply cooling water to the essential loops A and B and to the non-essential loop. Upon receipt of an SIAS, the two redundant essential loops are automatically isolated from each other and the non-essential loop is isolated from the essential loops. Following isolation, separate CCWS loops are formed, each providing 100% of the heat removal capability necessary to shutdown the reactor.

Each essential CCWS loop supplies two containment fan coolers, one HPSI pump (A or B), one LPSI pump, one containment spray pump, and one shutdown cooling heat exchanger. The standby HPSI pump C is supplied from CCWS loop B.

The CCW heat exchanger, transfers heat to the Intake Cooling Water System (see Section 3.8).

The CCW surge tank is connected to the suction side of the pumps, and accommodates fluid expansion and contraction in the system. The chemical addition tank permits manual on-line addition of proper corrosion inhibitor. Makeup to the CCWS is provided by the fire protection system.

3.7.4 System Success Criteria

Success criteria is given on a per loop basis. A given component must be cooled by its respective CCWS loop. The success criteria for each loop are:

- 1 of 2 CCW pumps per loop must operate (i.e. 1A or 1C in loop A, 1B or 1C in loop B).
- The CCW heat exchanger must be available as a heat sink.

Note that pump 1C can be aligned to only one CCW loop, A or B.

3.7.5 Component Information

A. Component Cooling Water pumps 1A, 1B, 1C
   1. Rated flow: 8500 gpm @ 177 to 182 ft head (77 to 79 psid)
   2. Rated capacity: 100%
   3. Type: Centrifugal, horizontal split, double suction

B. Component Cooling Water heat exchangers 1A, 1B
   1. Design duty: 55×10^6 Btu/hr (normal)
      165×10^6 Btu/hr (accident)
   2. Type: Horizontal, counter flow, straight tube

3.7.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      A SIAS sends a start signal to the CCWS pumps and closes appropriate valves to isolate the two CCWS loops.
   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
   Lubrication, cooling, and ventilation are assumed to be provided locally for the CCWS pumps.

3.7.7 Section 3.7 References

1. Final Safety Analysis Report, St. Lucie Nuclear Power Station, Unit 1.

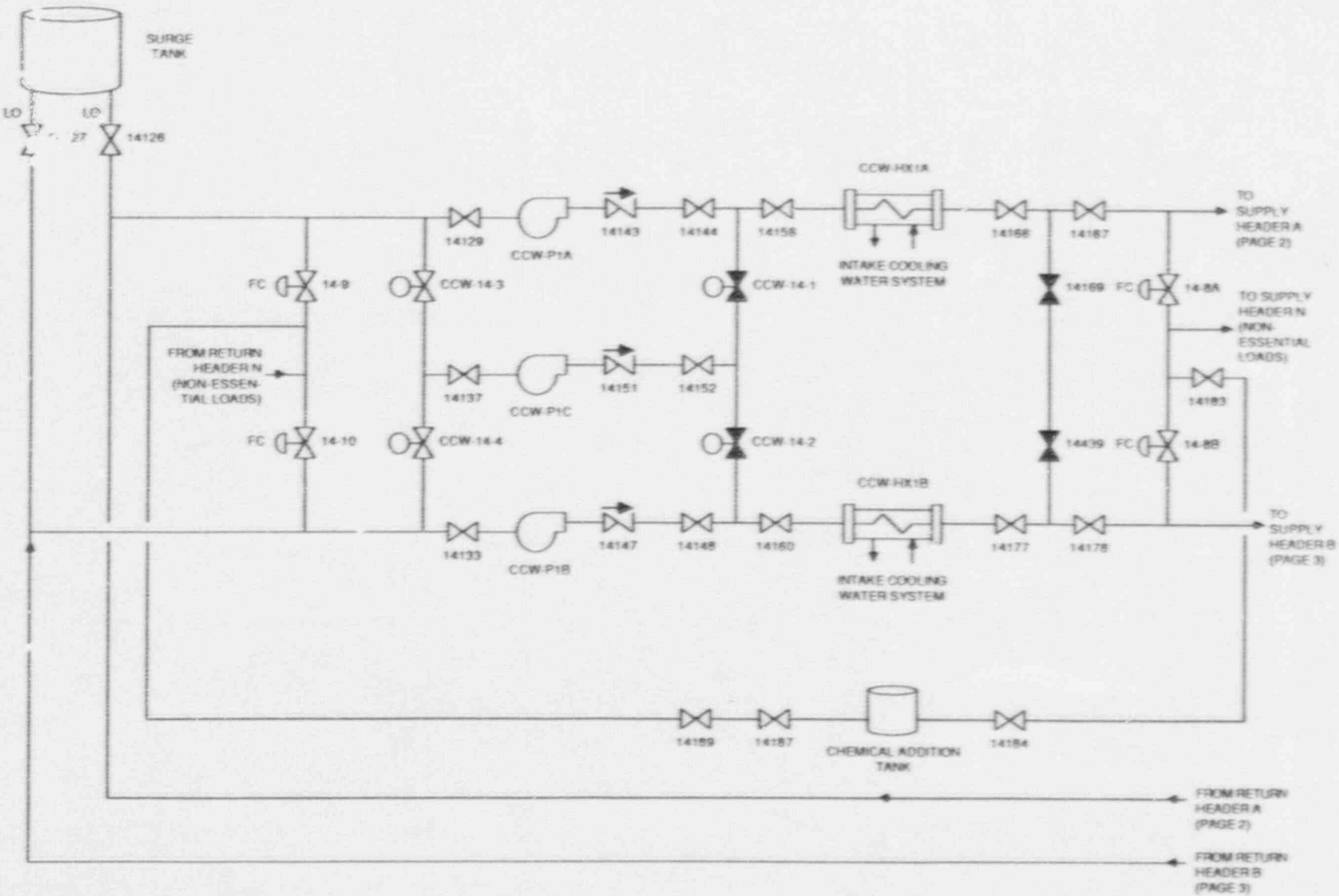


Figure 3.7-1. St. Lucie 1 Component Cooling Water System (Page 1 of 3)

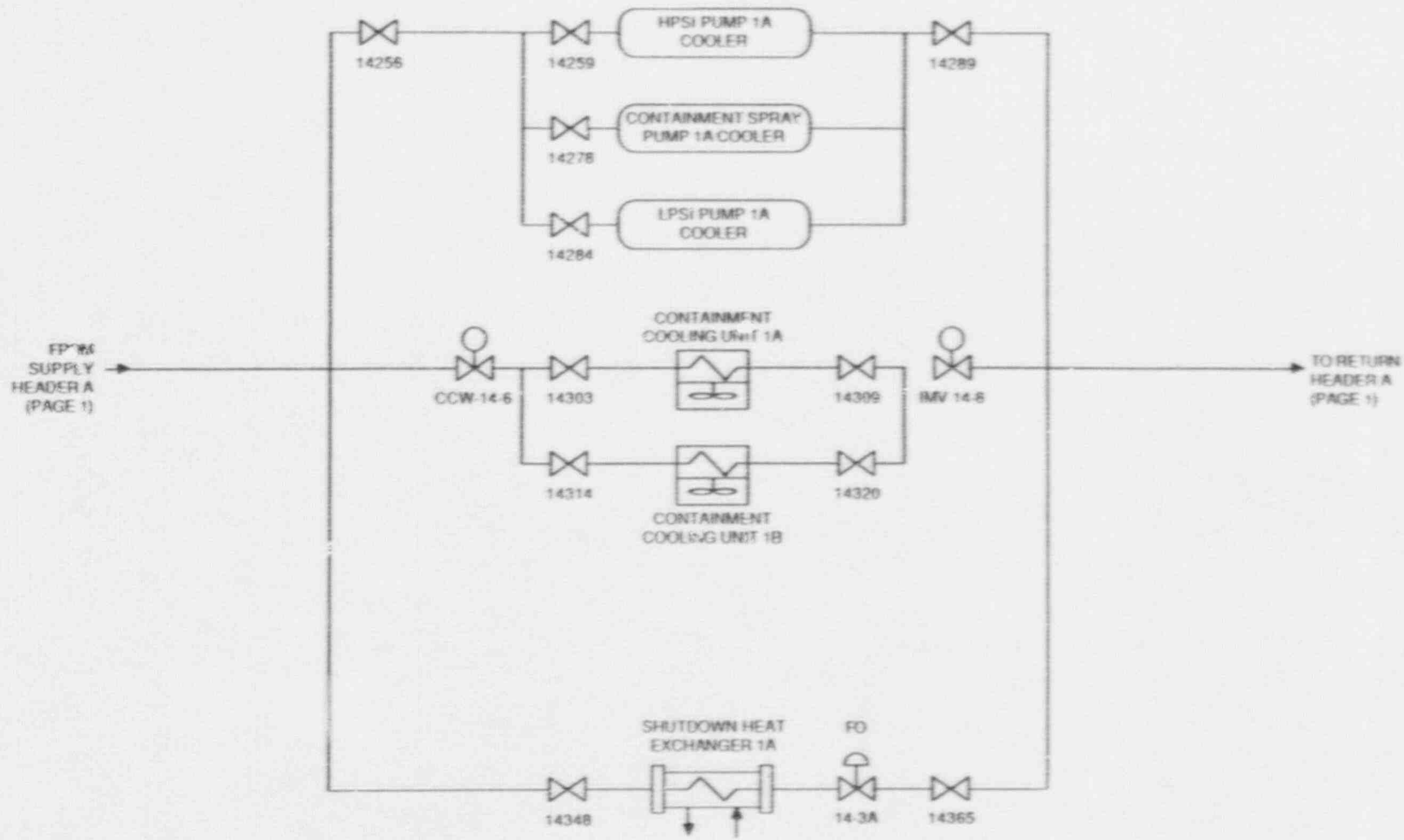


Figure 3.7-1. St. Lucie 1 Component Cooling Water System (Page 2 of 3)

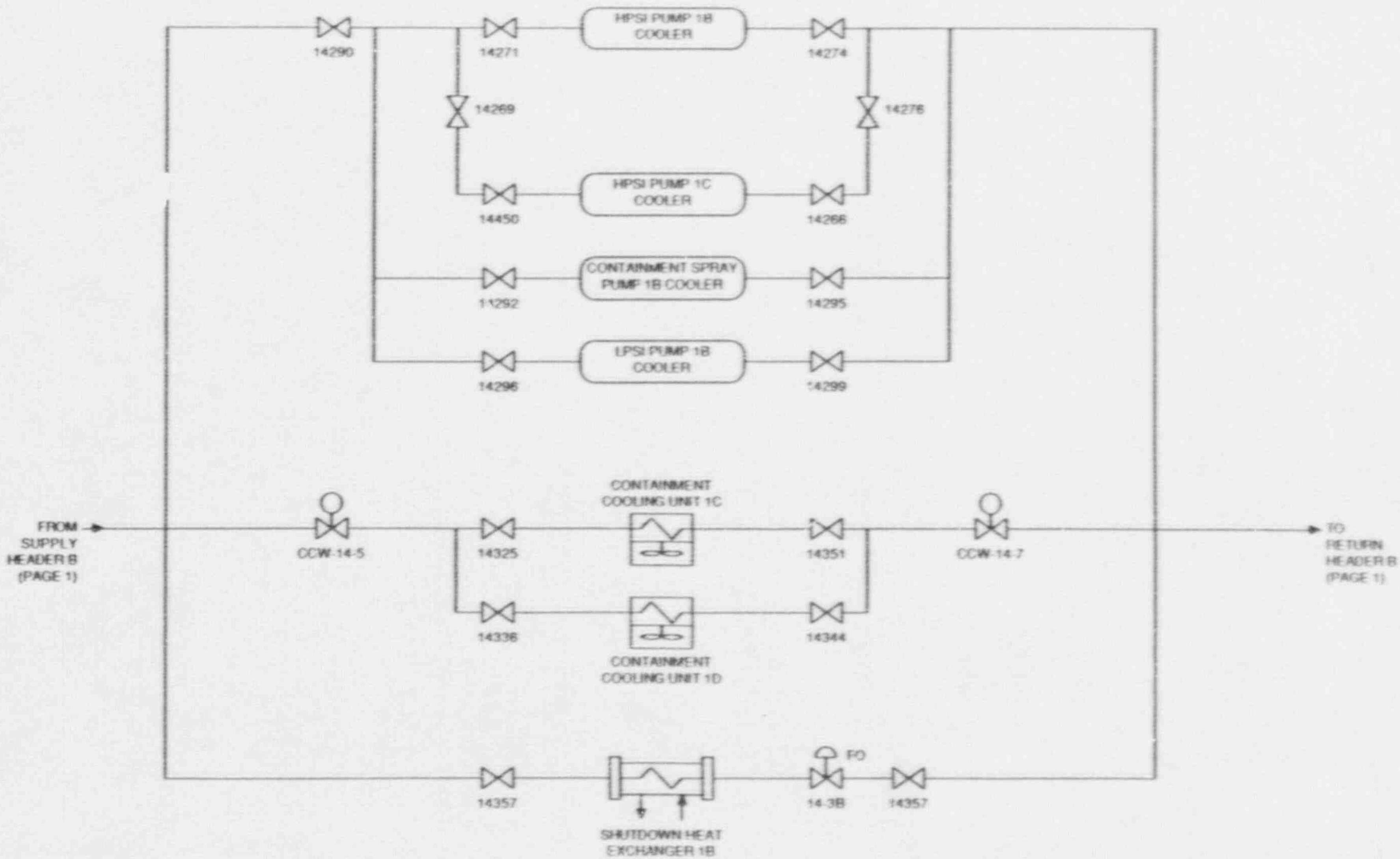


Figure 3.7-1. St. Lucie 1 Component Cooling Water System (Page 3 of 3)

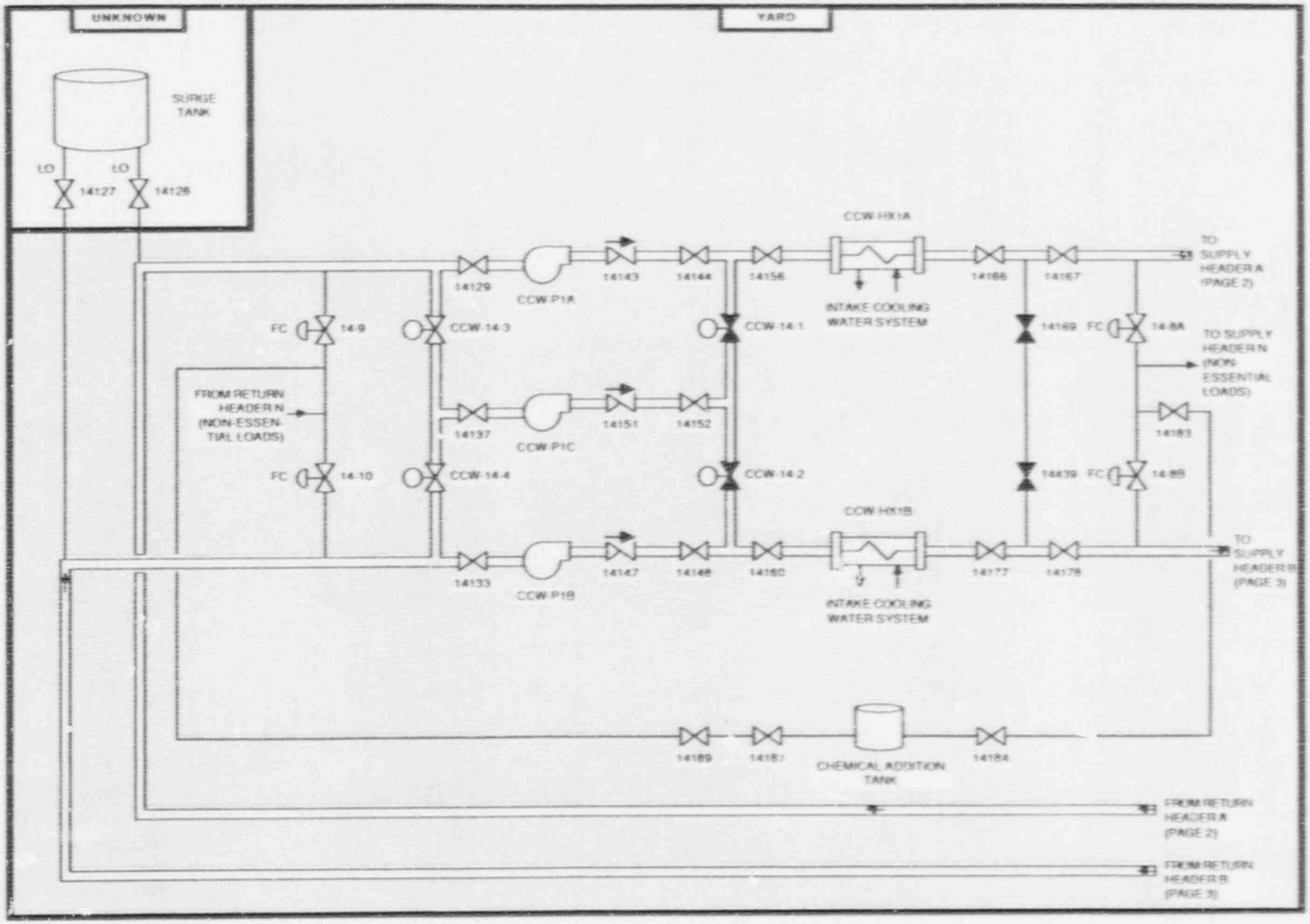


Figure 3.7-2. St. Lucie 1 Component Cooling Water System Showing Component Locations (Page 1 of 3)

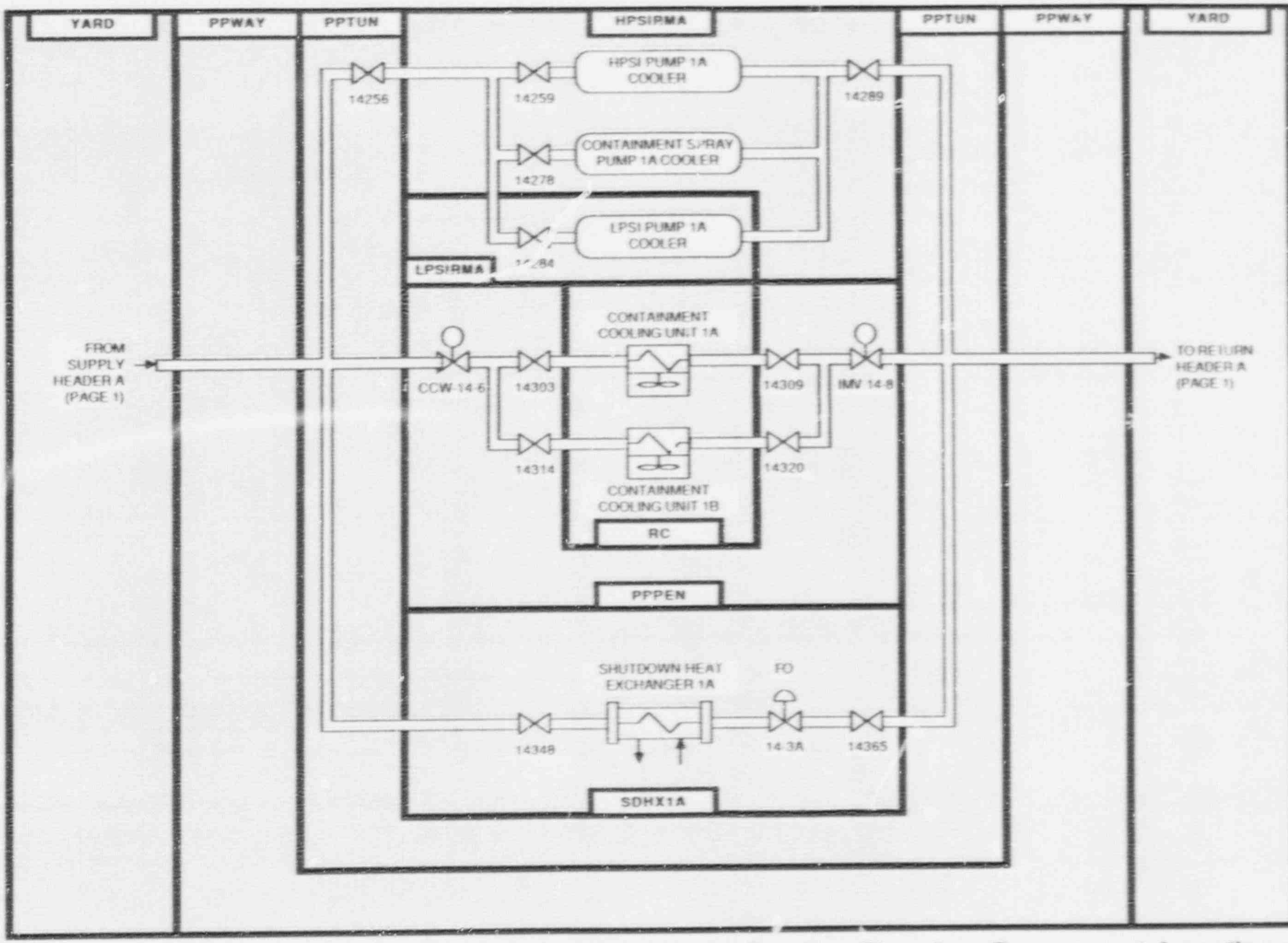


Figure 3.7-2. St. Lucie 1 Component Cooling Water System Showing Component Locations (Page 2 of 3)

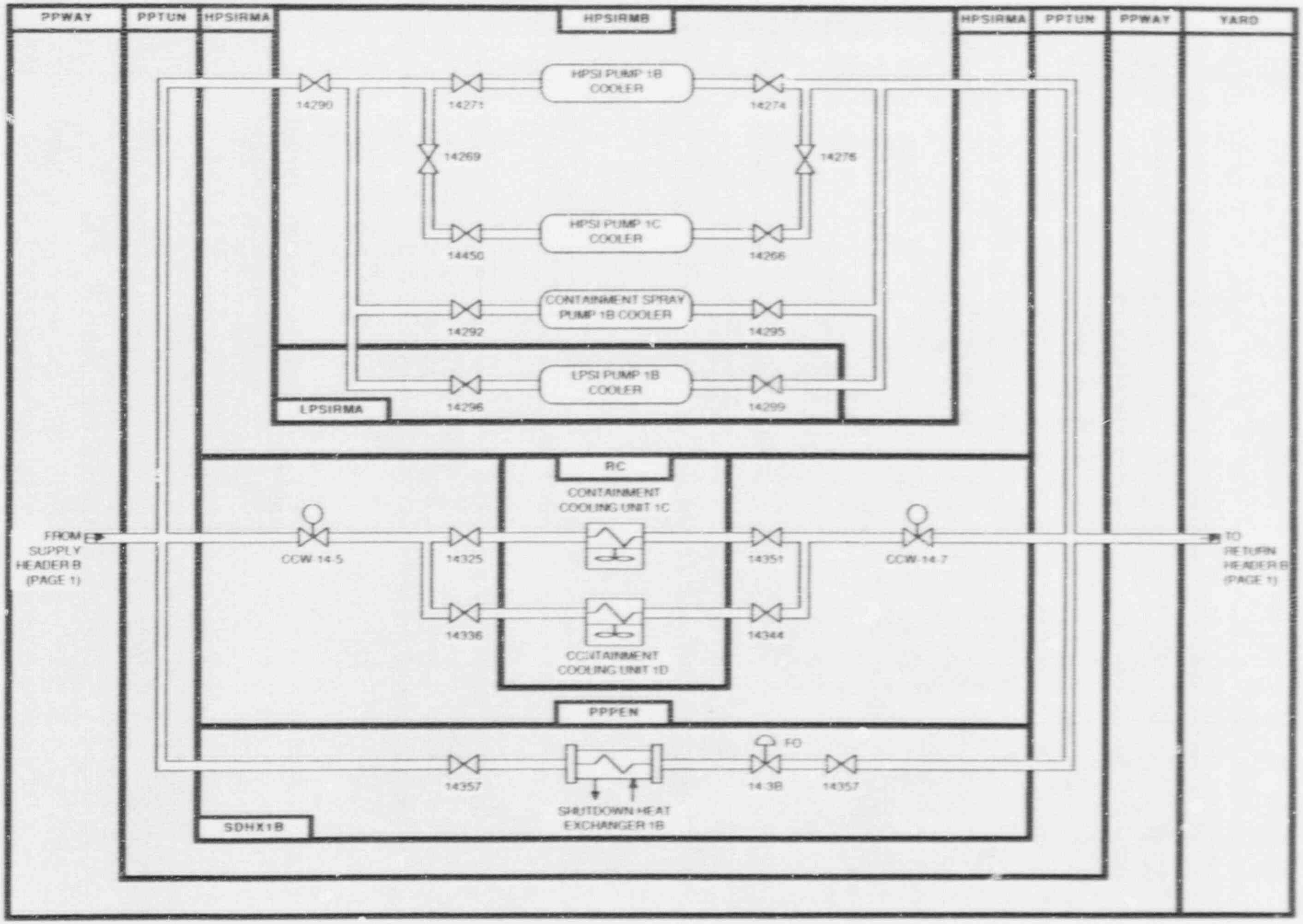


Figure 3.7-2. St. Lucie 1 Component Cooling Water System Showing Component Locations (Page 3 of 3)

Table 3.7-1. St. Lucie 1 Component Cooling Water System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
CCW-14-1	MOV	YARD	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/A
CCW-14-2	MOV	YARD	EP-BS-1B-2	480	ELECT-EQUIP-RM	AC/B
CCW-14-3	MOV	YARD	EP-BS-1A-2	480	ELECT-EQUIP-RM	AC/A
CCW-14-4	MOV	YARD	EP-BS-1B-2			
CCW-14-5	MOV	PPPEN	EP-BS-1B-3	480	ELECT-EQUIP-RM	AC/B
CCW-14-6	MOV	PPPEN	EP-BS-1A-3	480	ELECT-EQUIP-RM	AC/A
CCW-HX1A	HX	YARD				
CCW-HX1B	HX	YARD				
CCW-P1A	MDP	YARD	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/A
CCW-P1B	MDP	YARD	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/B
CCW-P1C	MDP	YARD	EP-BS-B1AB	4160	SWGR1AB	AC/AB

3.8 INTAKE COOLING WATER SYSTEM (ICWS)

3.8.1 System Function

The ICWS removes heat, from the CCWS, turbine cooling, and steam generator open blowdown heat exchangers during normal operation and normal shutdown conditions. The ICWS also transfers heat from the CCWS heat exchangers to the ultimate heat sink during accident conditions.

3.8.2 System Definition

The ICWS is an open loop system that draws a suction from the Atlantic Ocean and discharges back to the Atlantic Ocean via the discharge canal. It is divided into two redundant supply header systems designated A and B. Both header systems, each aligned with an intake cooling water pump, supply normal plant operating and shutdown requirements. In the event that either pump 1A or 1B fails, ICW pump 1C may be aligned with either header A or B by positioning of the pump discharge header cross connect valve. A summary of the data on selected ICWS system components is presented in Table 3.8-1.

3.8.3 System Operation

The ICWS is required to operate during normal conditions to remove heat from the CCW, turbine cooling, and steam generator open blowdown systems. During accident conditions the SIAS signal automatically isolates the turbine cooling water and open blowdown heat exchangers by closing valves IMV-21-2 and IMV-21-3. One pump header is adequate to supply the required cooling water to one component cooling heat exchanger.

3.8.4 System Success Criteria

System success criteria is defined on a per loop basis. One of two pumps per loop must operate, (i.e. 1A or 1C in loop A, 1B or 1C in loop B) non-essential heat loads should be isolated, and the downstream piping must remain intact. Note that pump 1C can be aligned to only one ICWS loop, A or B.

3.8.5 Component Information

A. Intake Cooling Water pumps A, B, C
  1. Rated flow: 14,500 gpm @ 130 ft head (56 psid)
  2. Rated capacity: 100%
  3. Type: Single stage vertical

3.8.6 Support Systems and Interfaces

A. Control Signals
  1. Automatic
     The ICWS pumps are automatically started and valve IMV-21-2 and IMV-21-3 are automatically closed by a SIAS.
  2. Remote Manual
     The ICWS pumps can be operated from the control room.

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

C. Other
   Lubrication, cooling, and ventilation are assumed to be provided locally for the ICWS pumps.

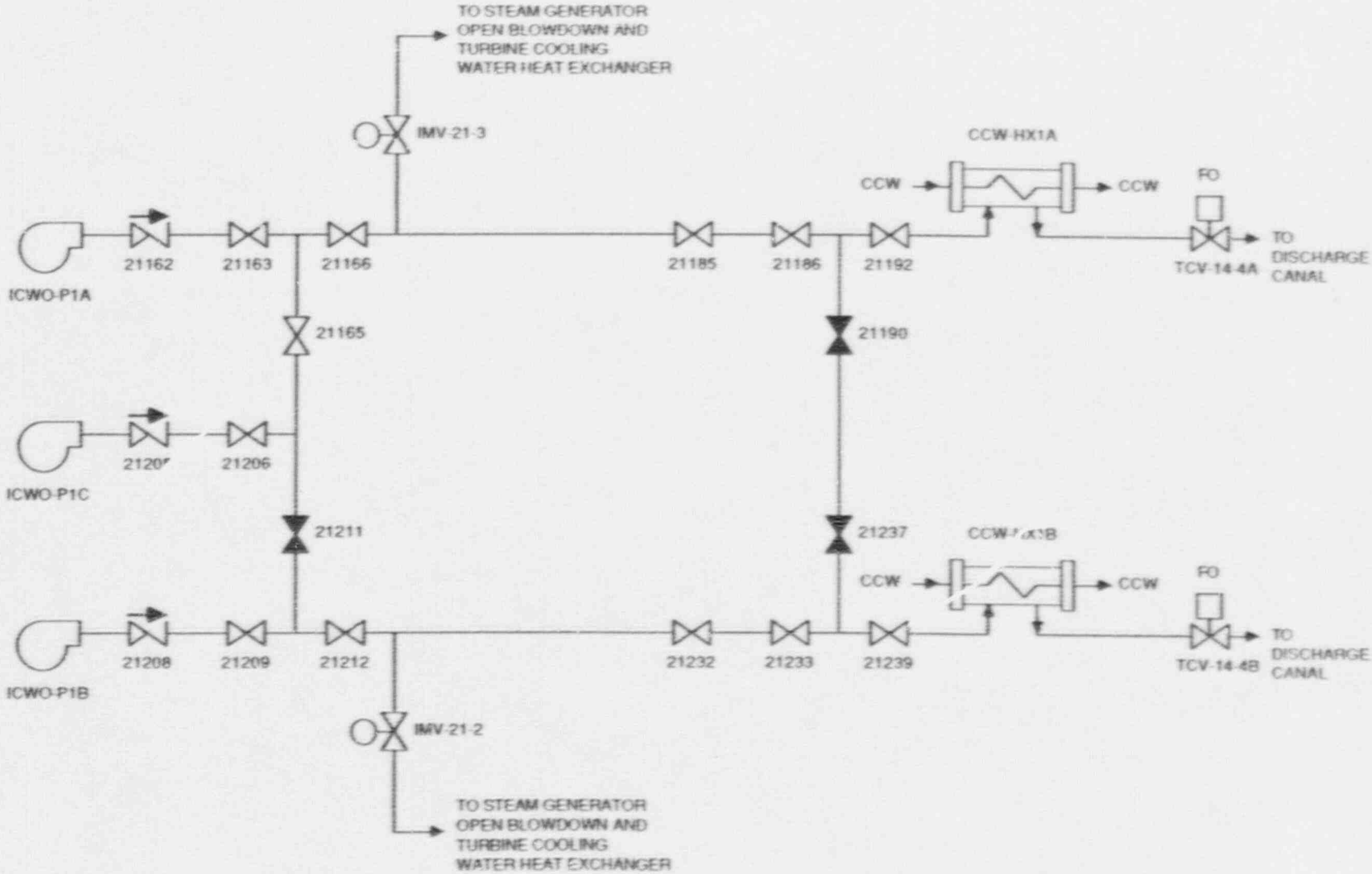


Figure 3.8-1. St. Lucie 1 Intake Cooling Water System

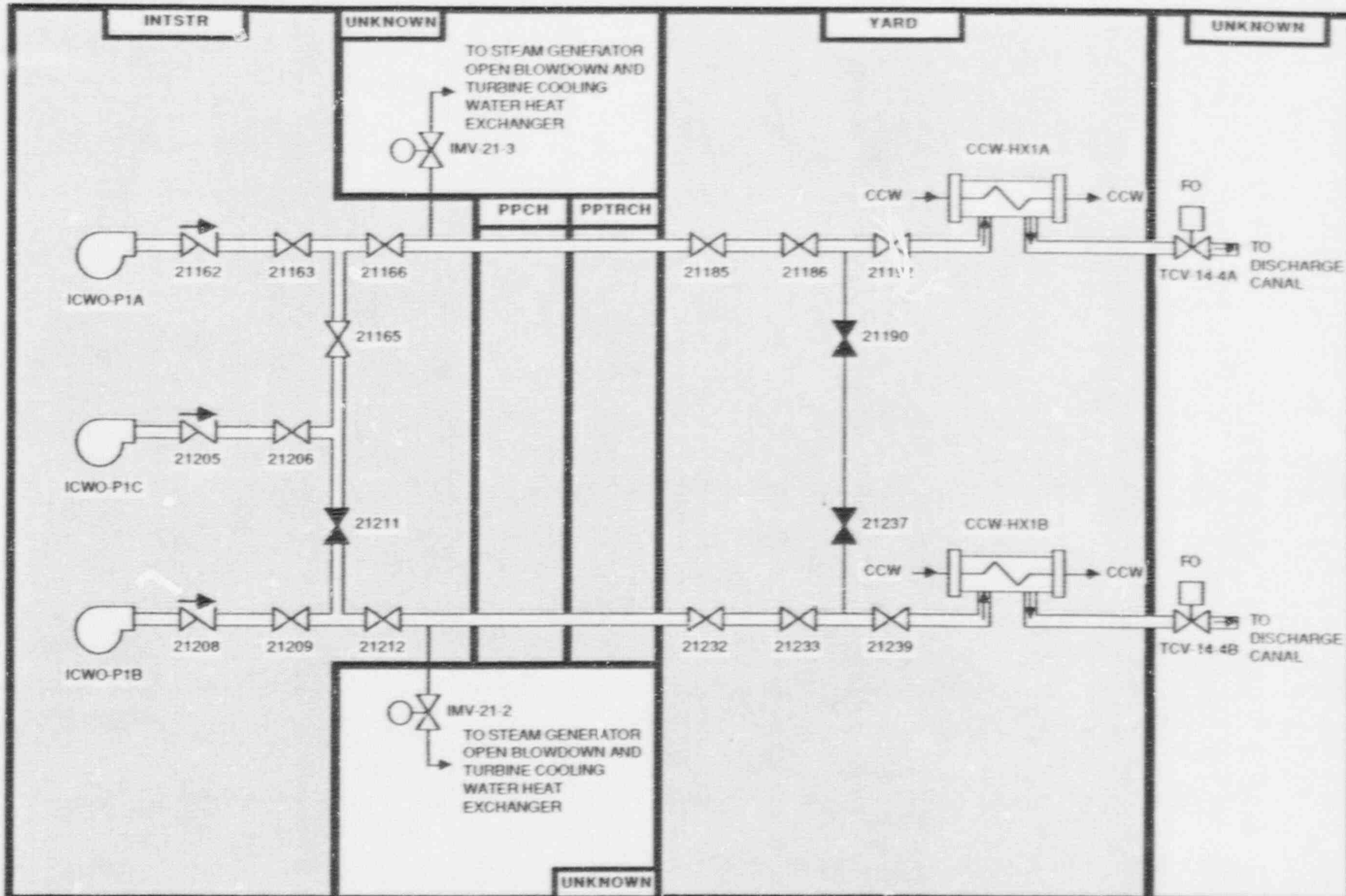


Figure 3.8-2. St. Lucie 1 Intake Cooling Water System Showing Component Locations

Table 3.8-1. St. Lucie 1 Intake Cooling Water System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP
CCW-HX1A	HX	YARD				
CCW-HX1B	HX	YARD				
ICWO-P1A	MDP	INTSTR	EP-BS-1A-3	4160	ELECT-EQUIP-RM	AC/A
ICWO-P1B	MDP	INTSTR	EP-BS-1B-3	4160	ELECT-EQUIP-RM	AC/B
ICWO-P1C	MDP	INTSTR	EP-BS-B1AB	4160	SWGR1AB	AC/AB

4. PLANT INFORMATION

4.1 SITE AND BUILDING SUMMARY

The St. Lucie 1 and 2 site is located on Hutchinson Island in St. Lucie County on the east coast of Florida. The site is located about halfway between Ft. Pierce and Stuart. Figure 4-1 shows a general view of the site, while Figure 4-2 shows a simplified plot plan.

The reactor building contains the RCS and portions of the AFWS, ECCS, and CVCS. Figure 4-3 shows two section views of the reactor building.

The reactor auxiliary building, located south of the reactor building, contains the major engineered safety features components. Components of the AFWS, ECCS, CVCS, CCWS, ICWS, and electric power system are located in the reactor auxiliary building. The control room and electrical equipment room are also located in the reactor auxiliary building. Figure 4-4 shows five section views of the reactor auxiliary building.

The fuel handling building is located east of the reactor building and contains the spent fuel pool. Figure 4-5 shows a section view of the fuel handling building.

The turbine building is located west of the reactor auxiliary building and contains components of the power conversion system.

The intake cooling water pumps are located in the intake structure located west of the turbine building. The Atlantic Ocean is the normal heat sink during power operation and is also the ultimate heat sink for safety-related heat loads.

4.2 FACILITY LAYOUT DRAWINGS

Figures 4-6 through 4-13 show simplified layout drawings for St. Lucie 1 and 2. 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, Volume 2, Oak Ridge National Laboratory, Nuclear Safety Information Center, January 1972.

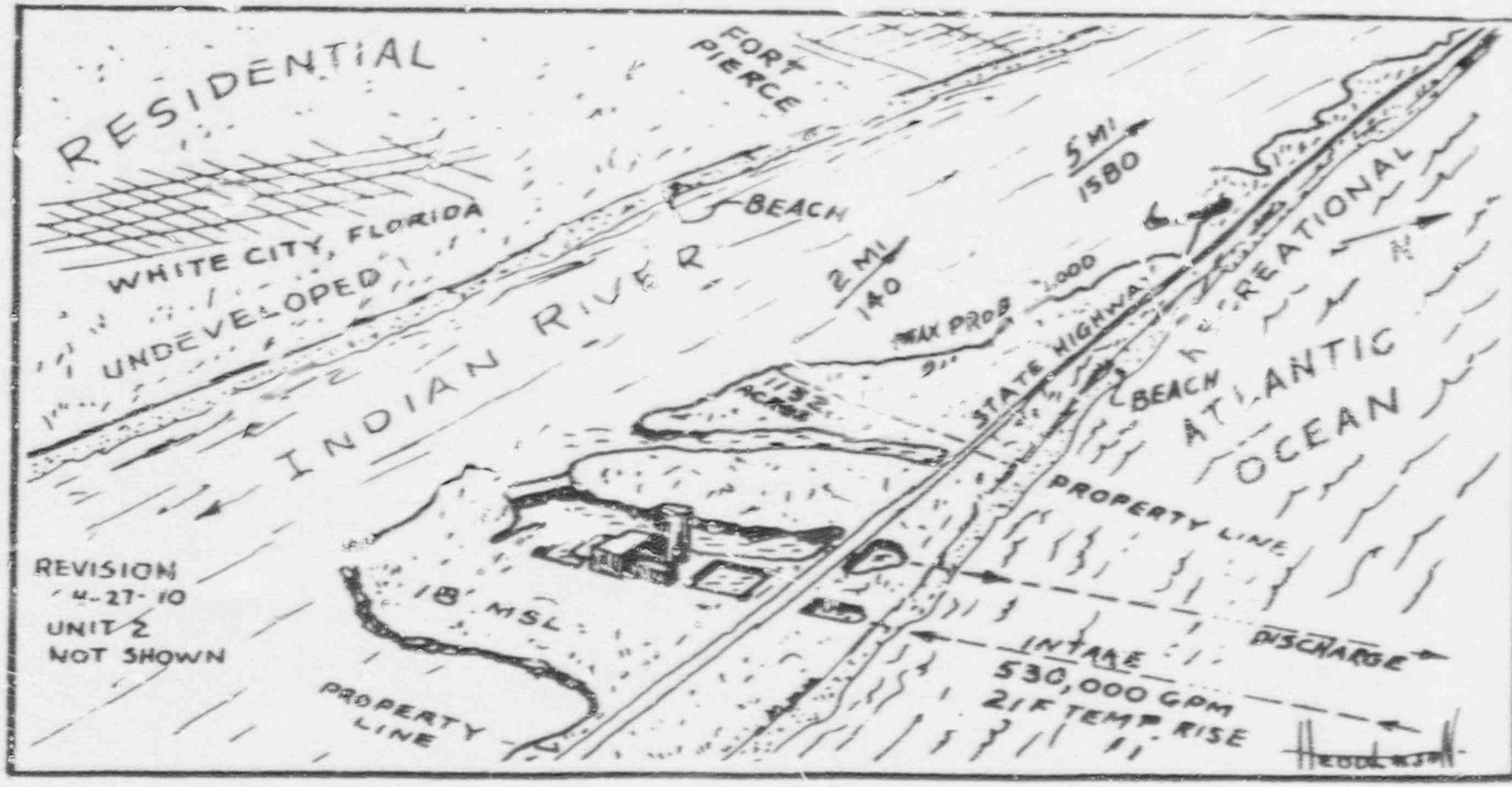


Figure 4-1. General View of St. Lucie Site and Vicinity

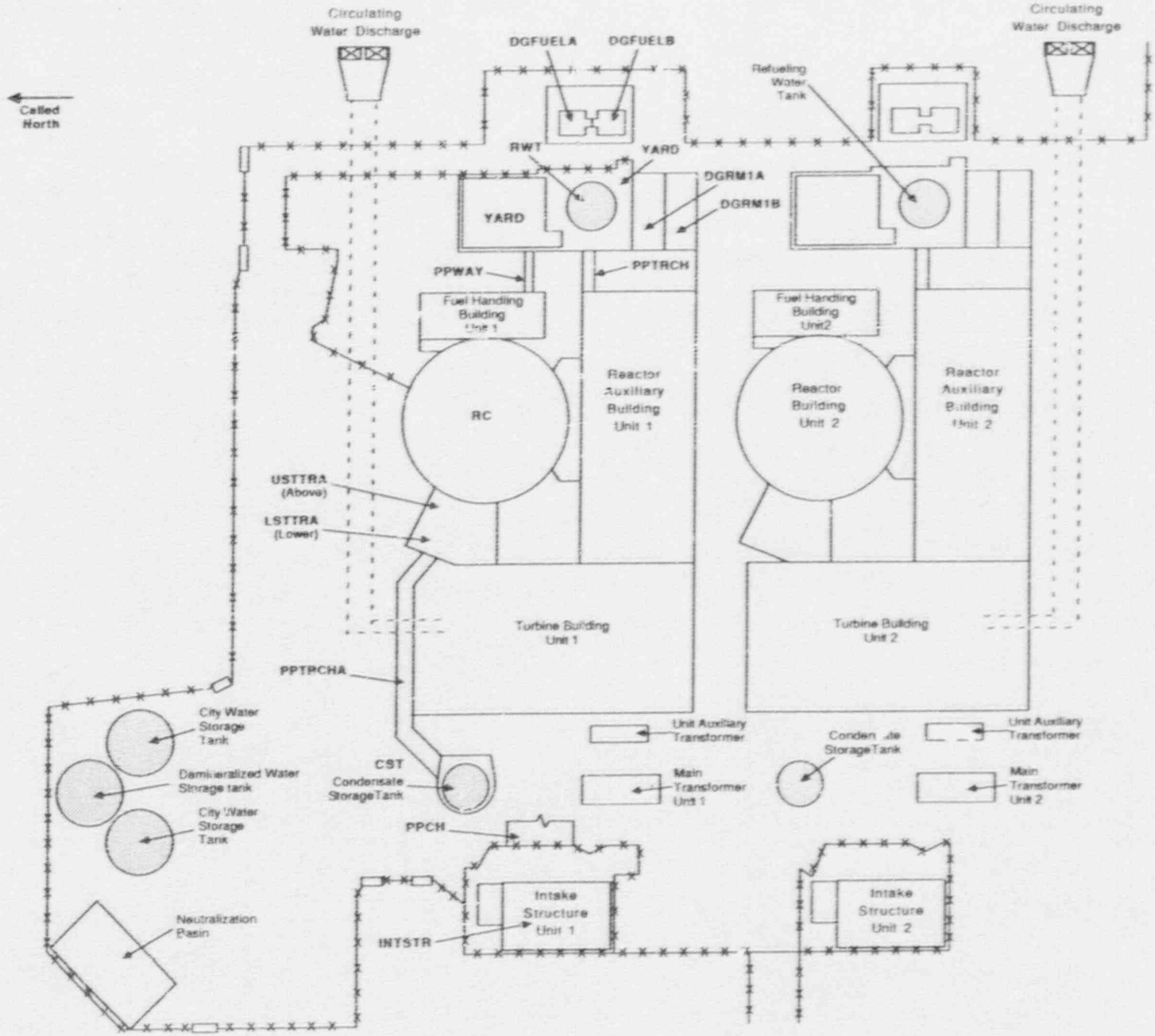


Figure 4-2. St. Lucie Site Plan

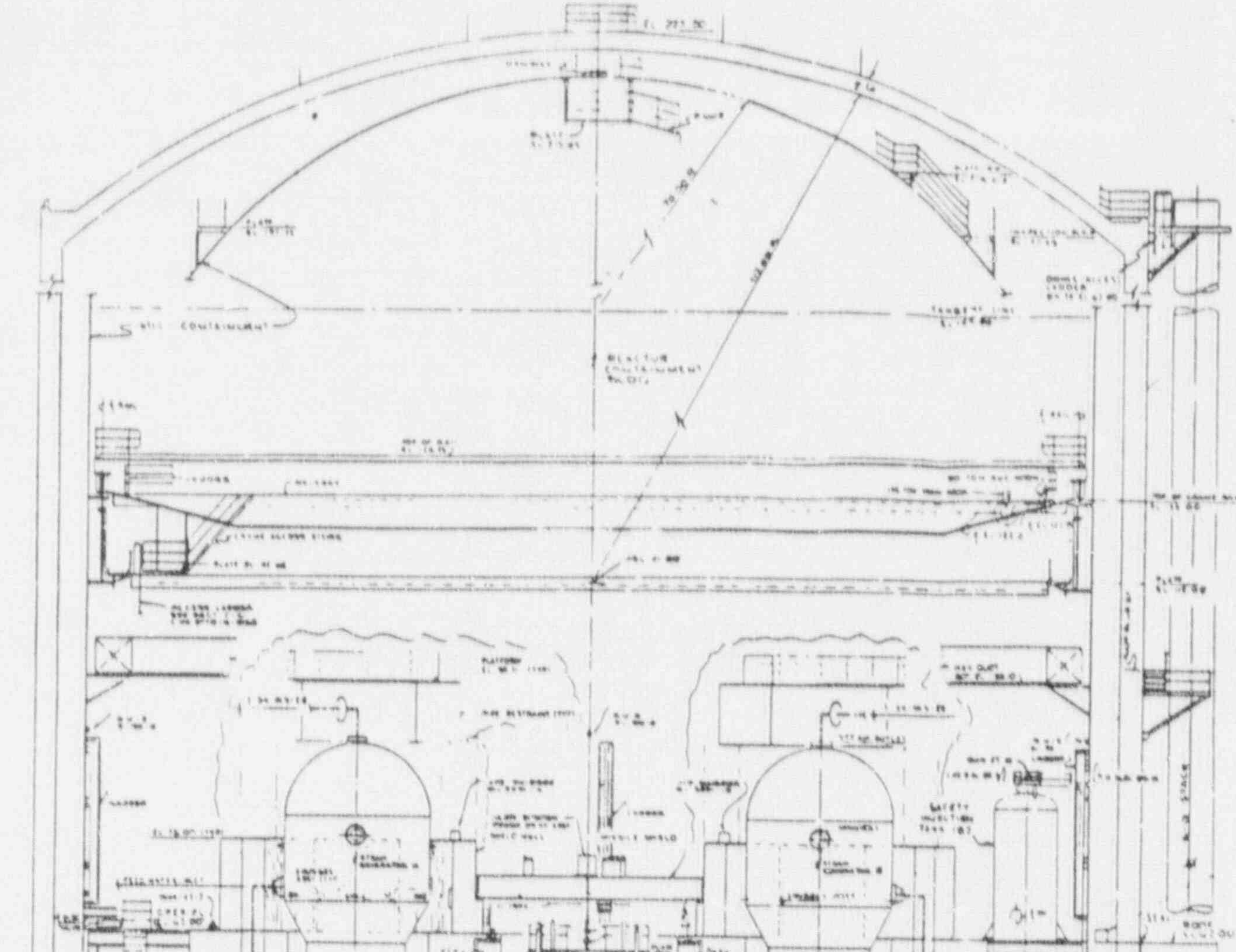


Figure 4-3. St. Lucie 1 Reactor Building Section Views

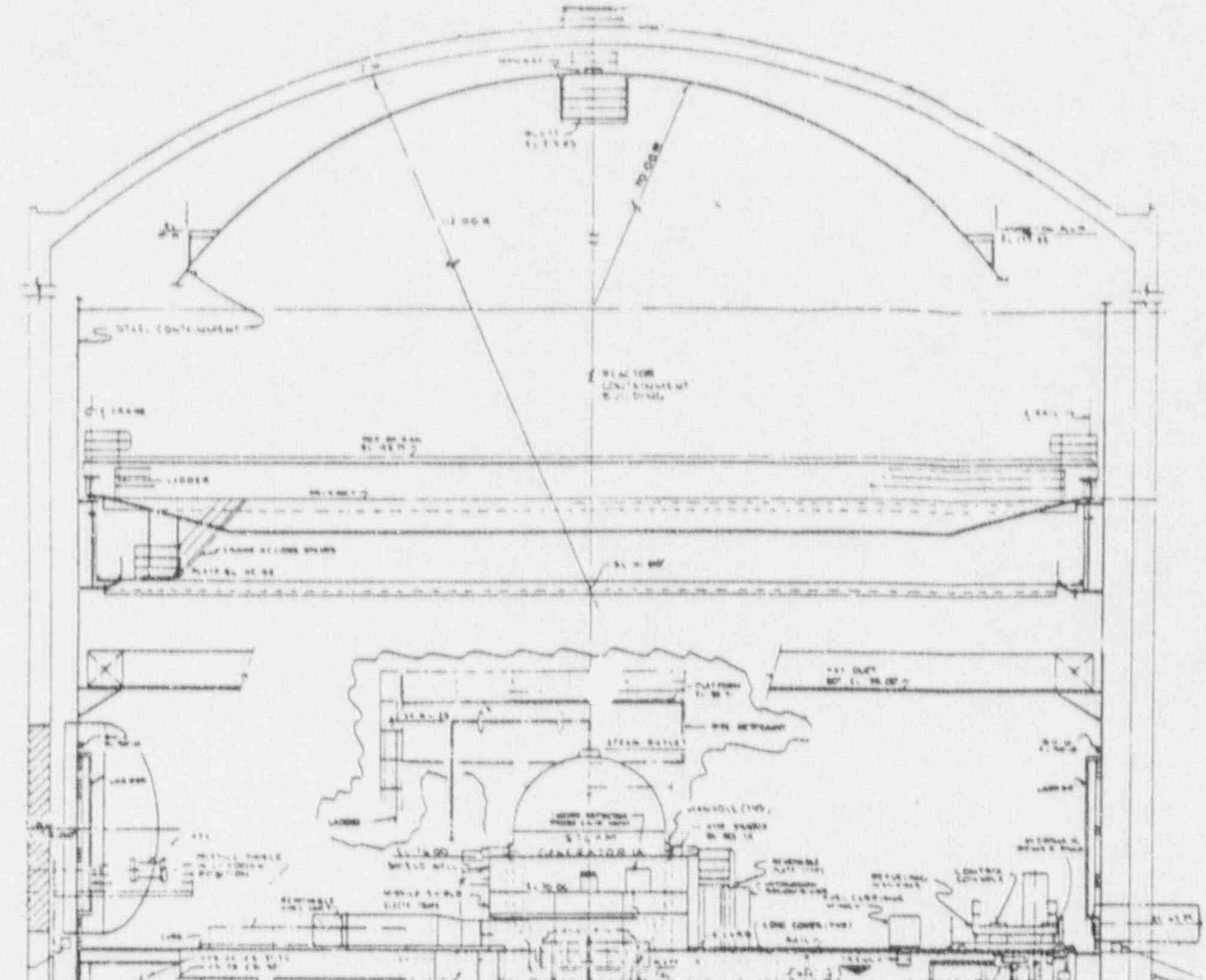


Figure 4-3. St. Lucie 1 Reactor Building Section Views (Continued)

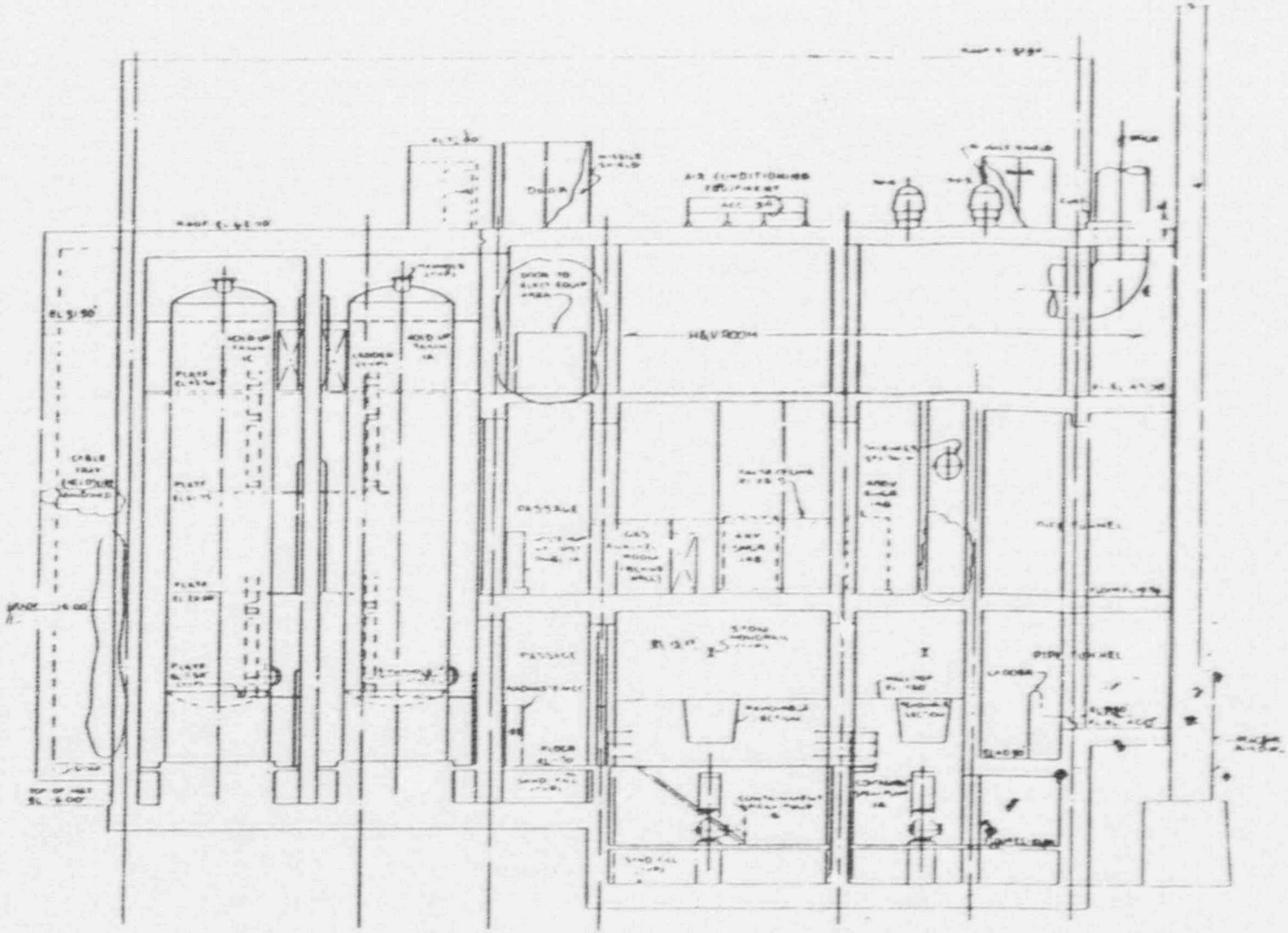


Figure 4-4. St. Lucie 1 Reactor Auxiliary Building Section Views

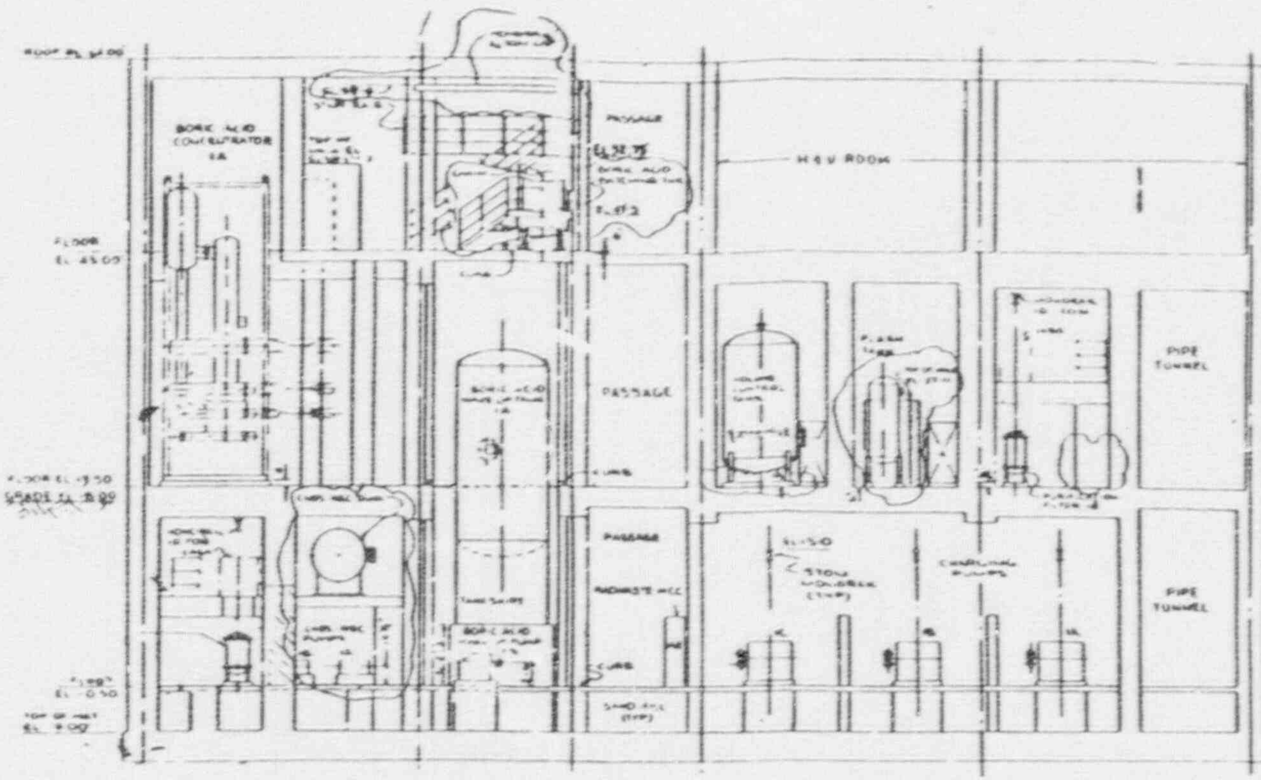


Figure 4-4. St. Lucie 1 Reactor Auxiliary Building Section Views (Continued)

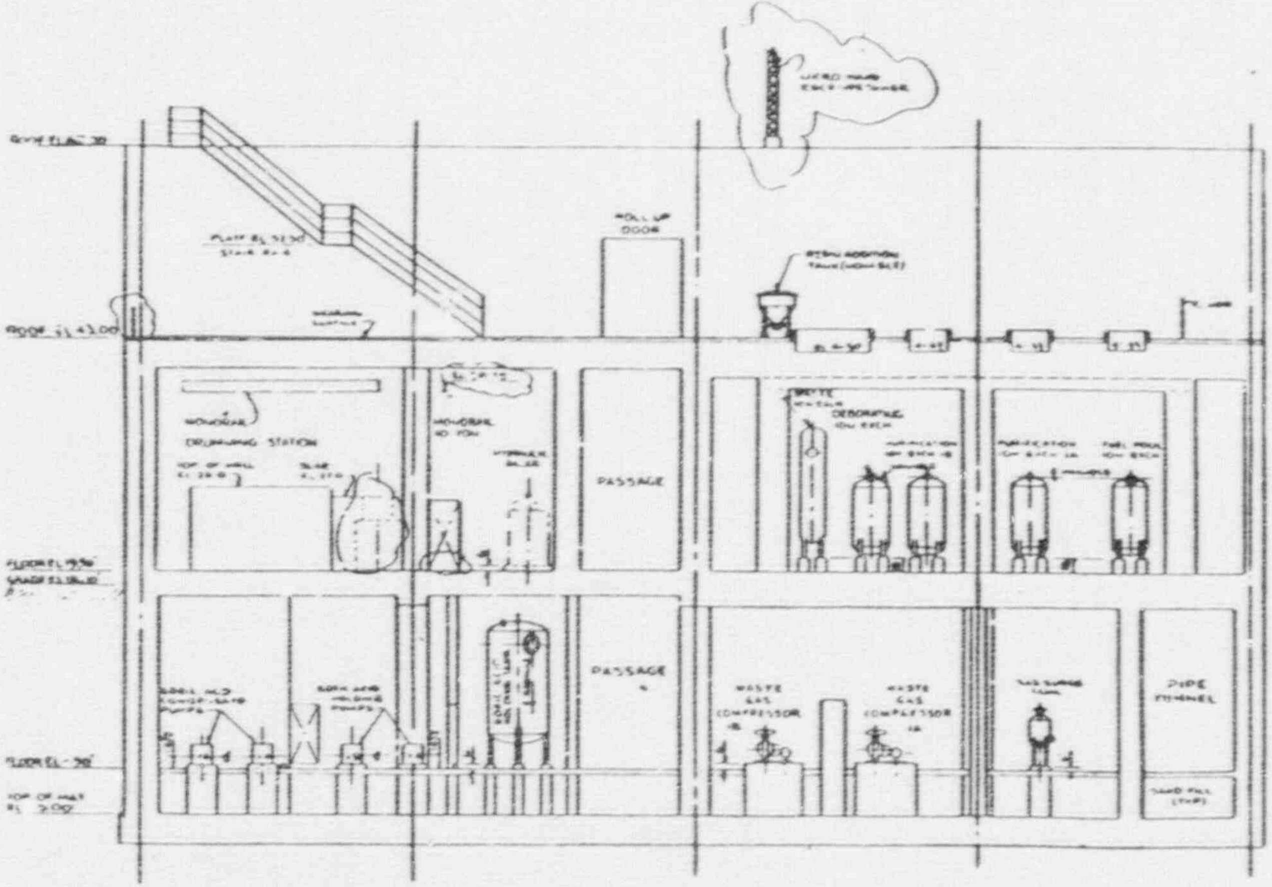


Figure 4-4. St. Lucie 1 Reactor Auxiliary Building Section Views (Continued)

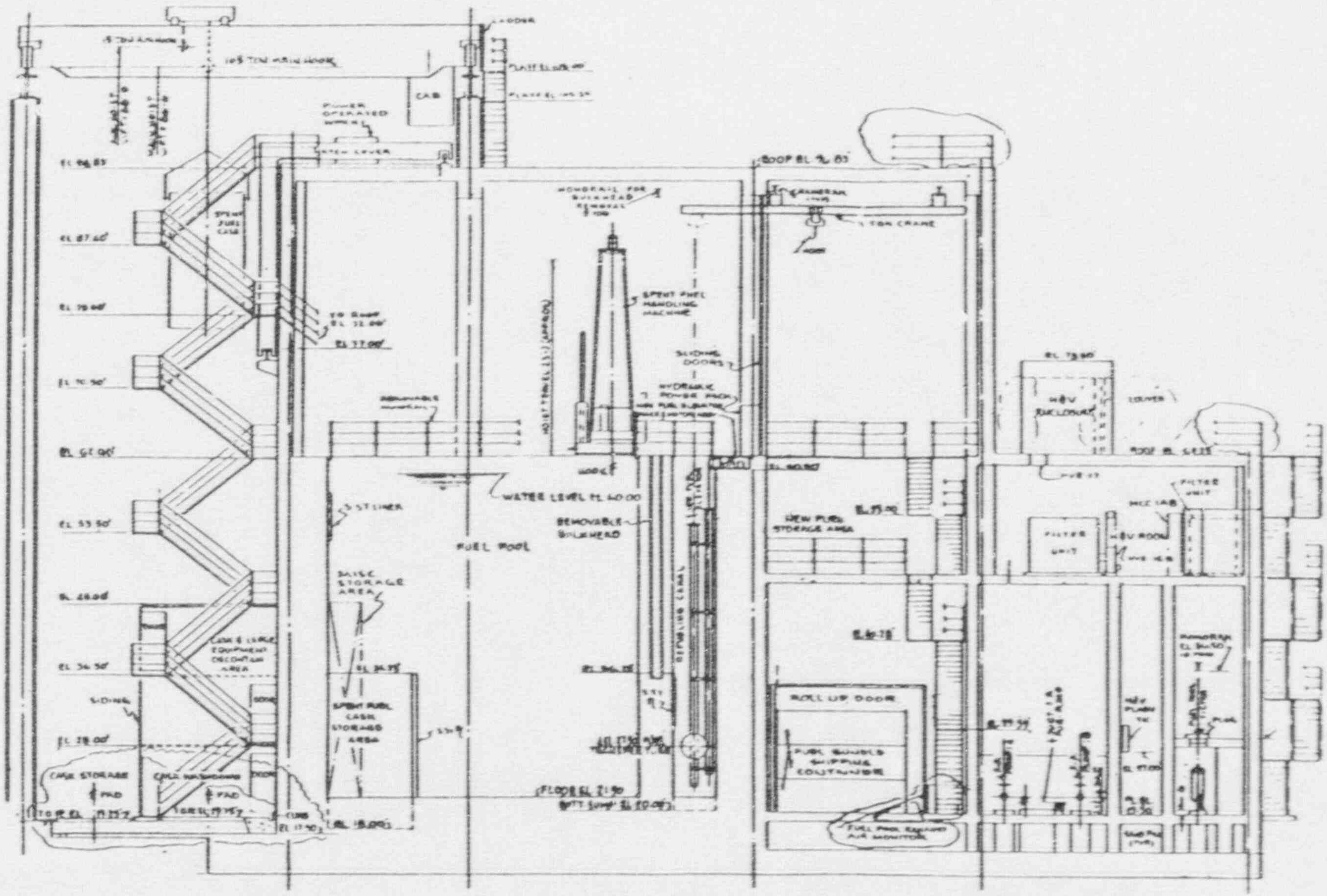


Figure 4-5. St. Lucie 1 Fuel Handling Building Section View

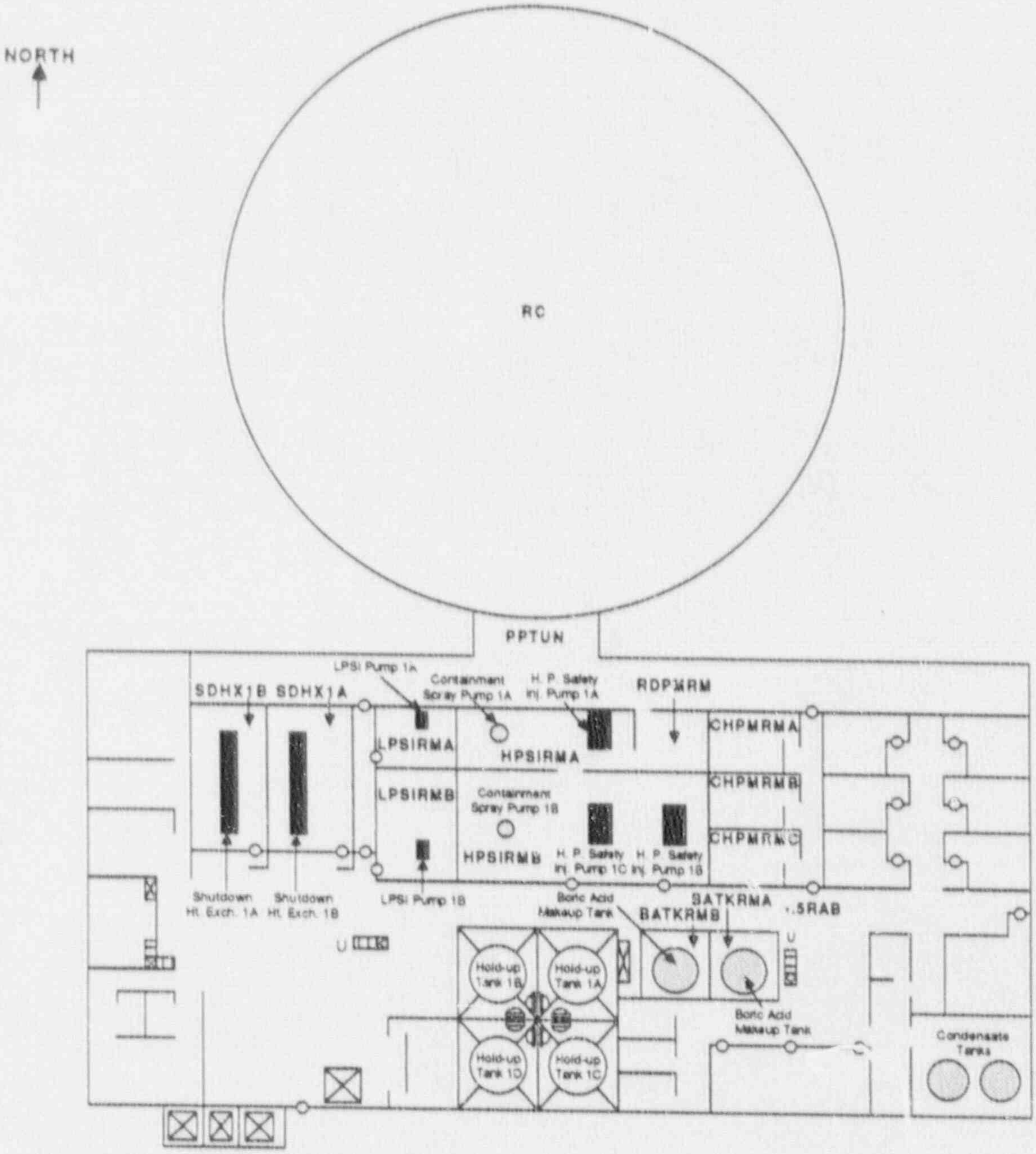


Figure 4-6. St. Lucie 1 Reactor Building, and Auxiliary Building, Elevation -.5'

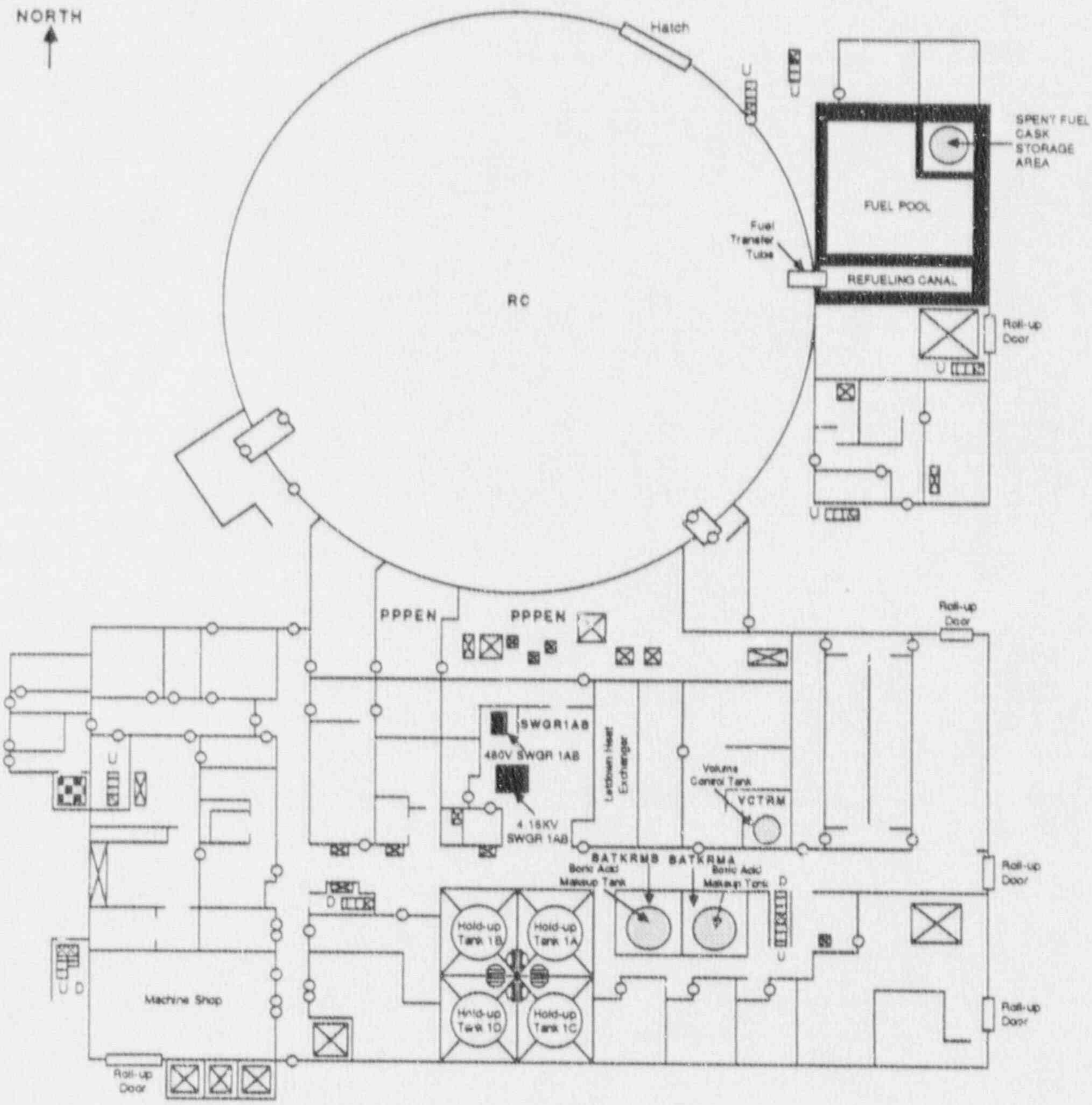


Figure 4-7. St. Lucie 1 Reactor Building, Elevation 18', Auxiliary Building, Elevation 19.5', and Fuel Handling Building, Elevation 19.5'

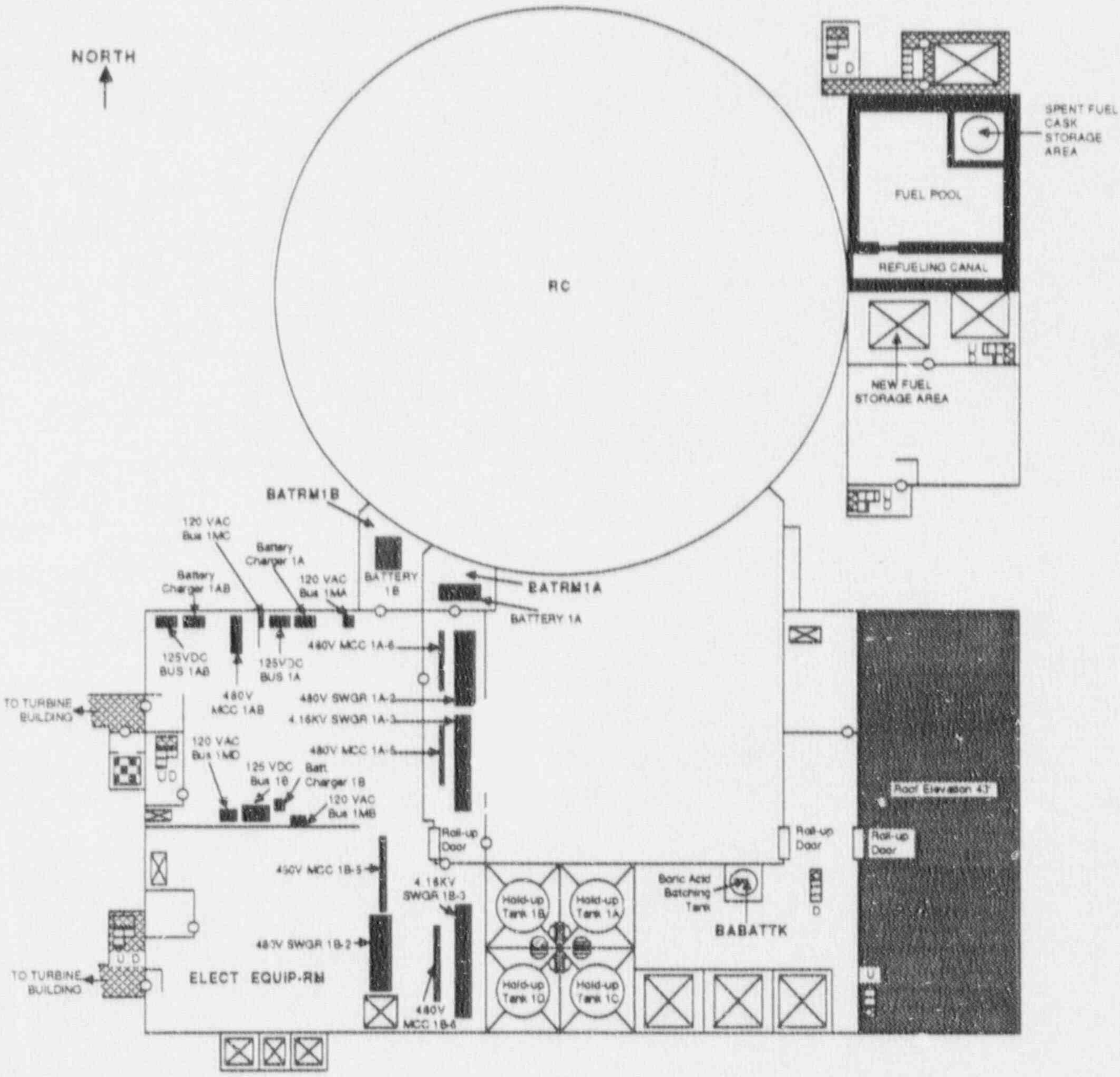


Figure 4-8. St. Lucie 1 Reacto Building, Elevation 45', Auxiliary Building, Elevation 43', and Fuel Handling Building, Elevation 48'

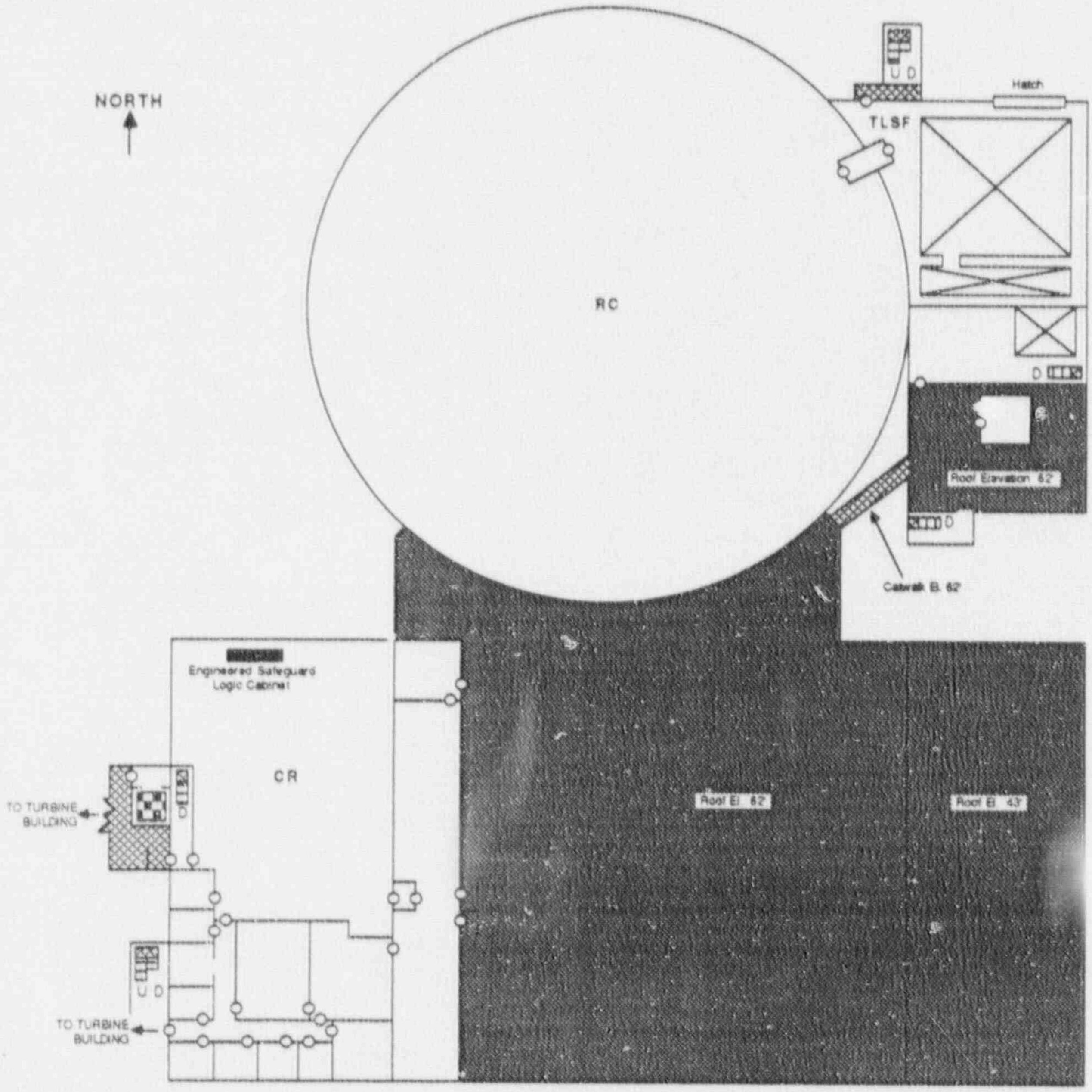


Figure 4-9. St. Lucie 1 Reactor Building, Auxiliary Building, and Fuel Handling Building, Elevation 62'

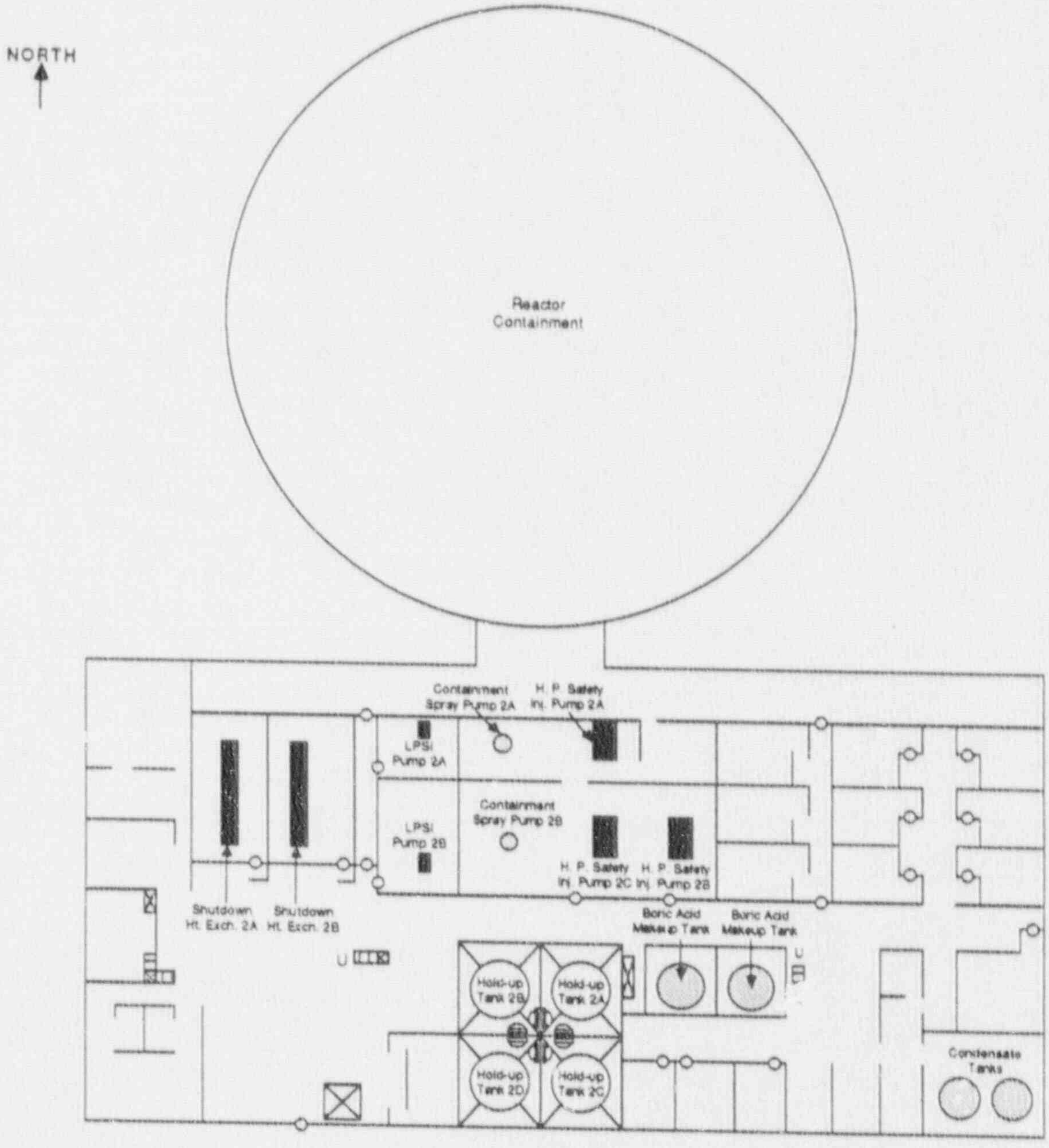


Figure 4-10. St. Lucie 2 Reactor Building, and Auxiliary Building, Elevation -.5'

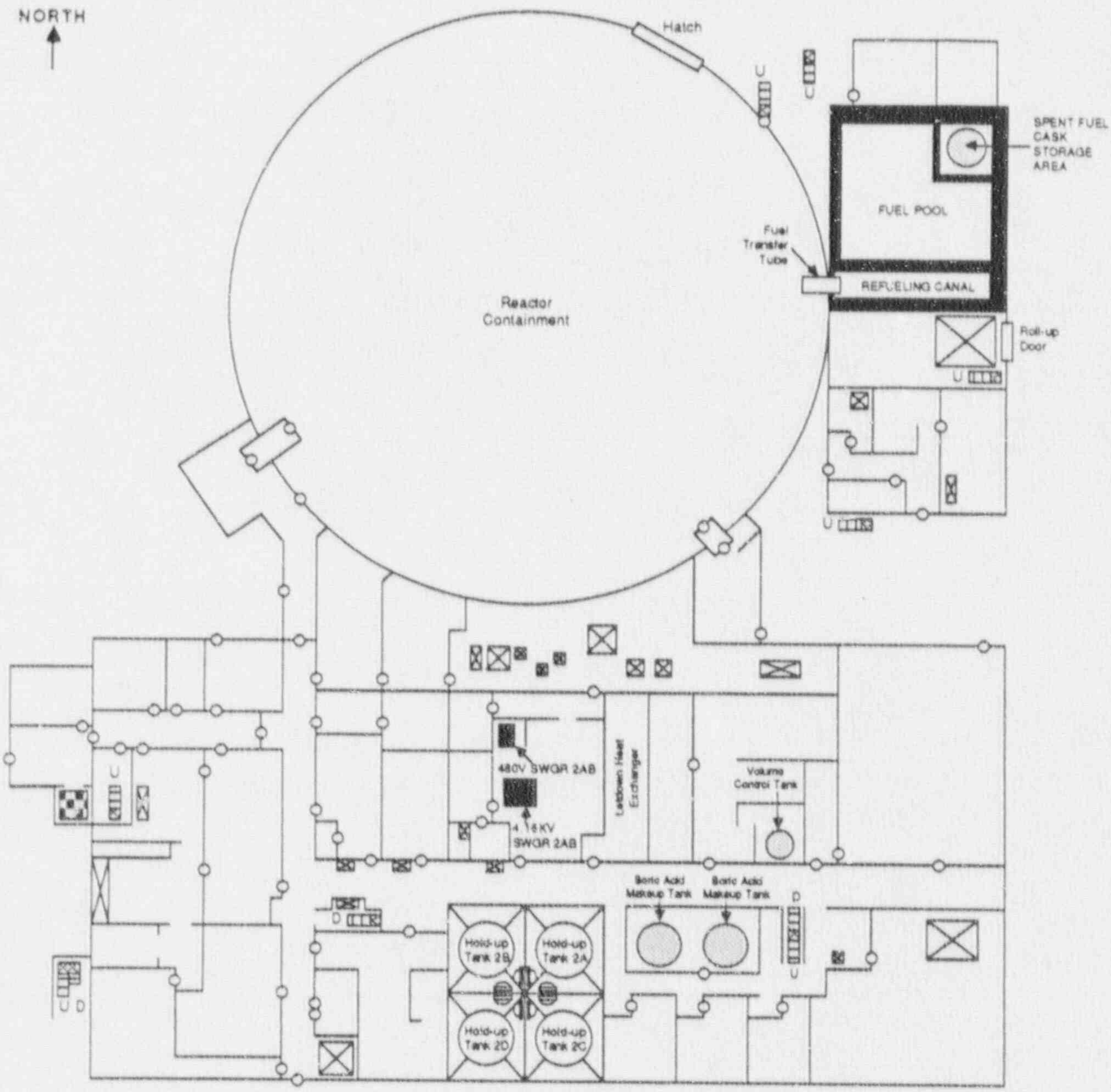


Figure 4-11. St. Lucie 2 Reactor Building, Elevation 18', Auxiliary Building, Elevation 19.5', and Fuel Handling Building, Elevation 19.5'

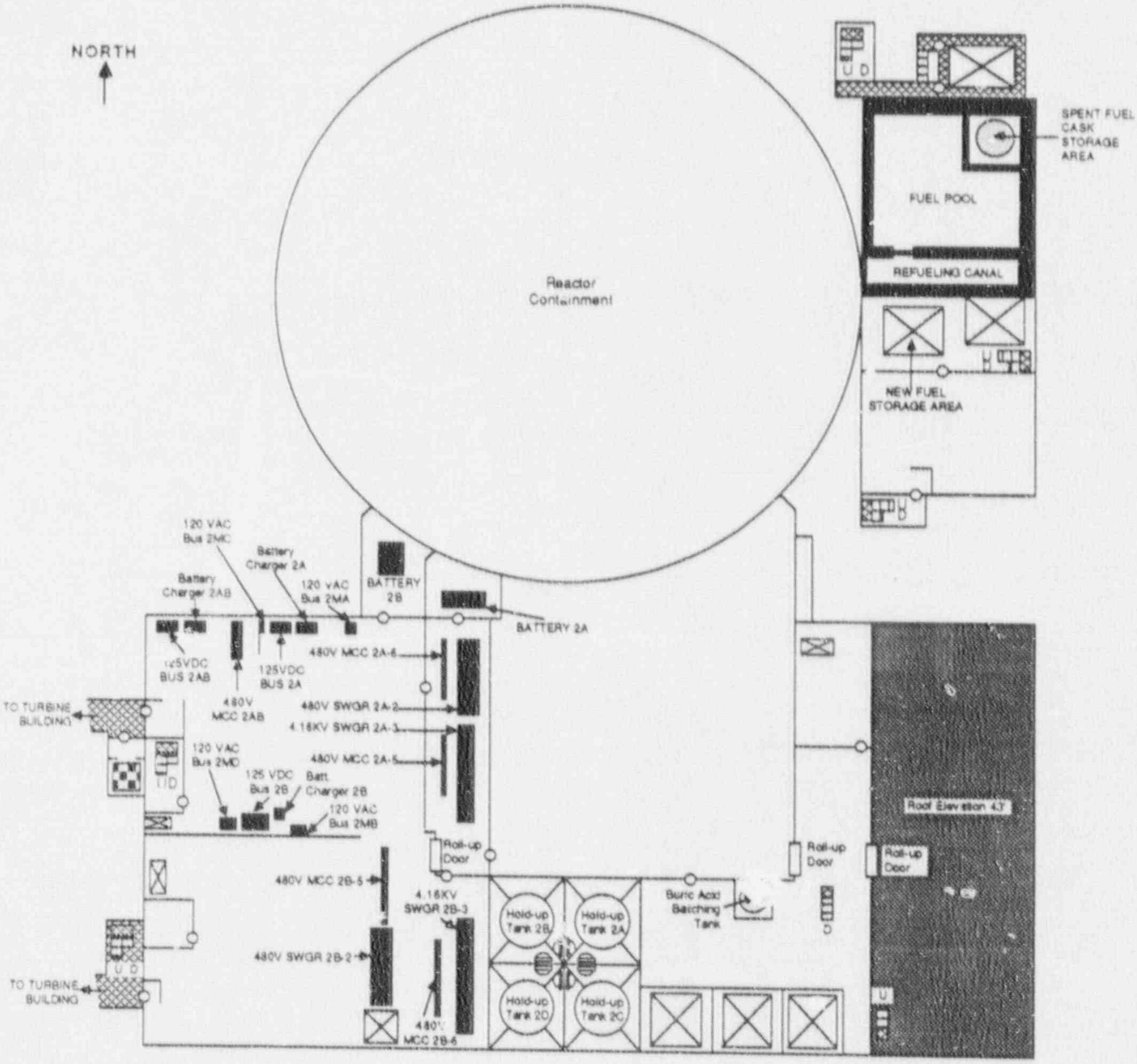


Figure 4-12. St. Lucie 2 Reactor Building, Elevation 45', Auxiliary Building, Elevation 43', and Fuel Handling Building, Elevation 48'

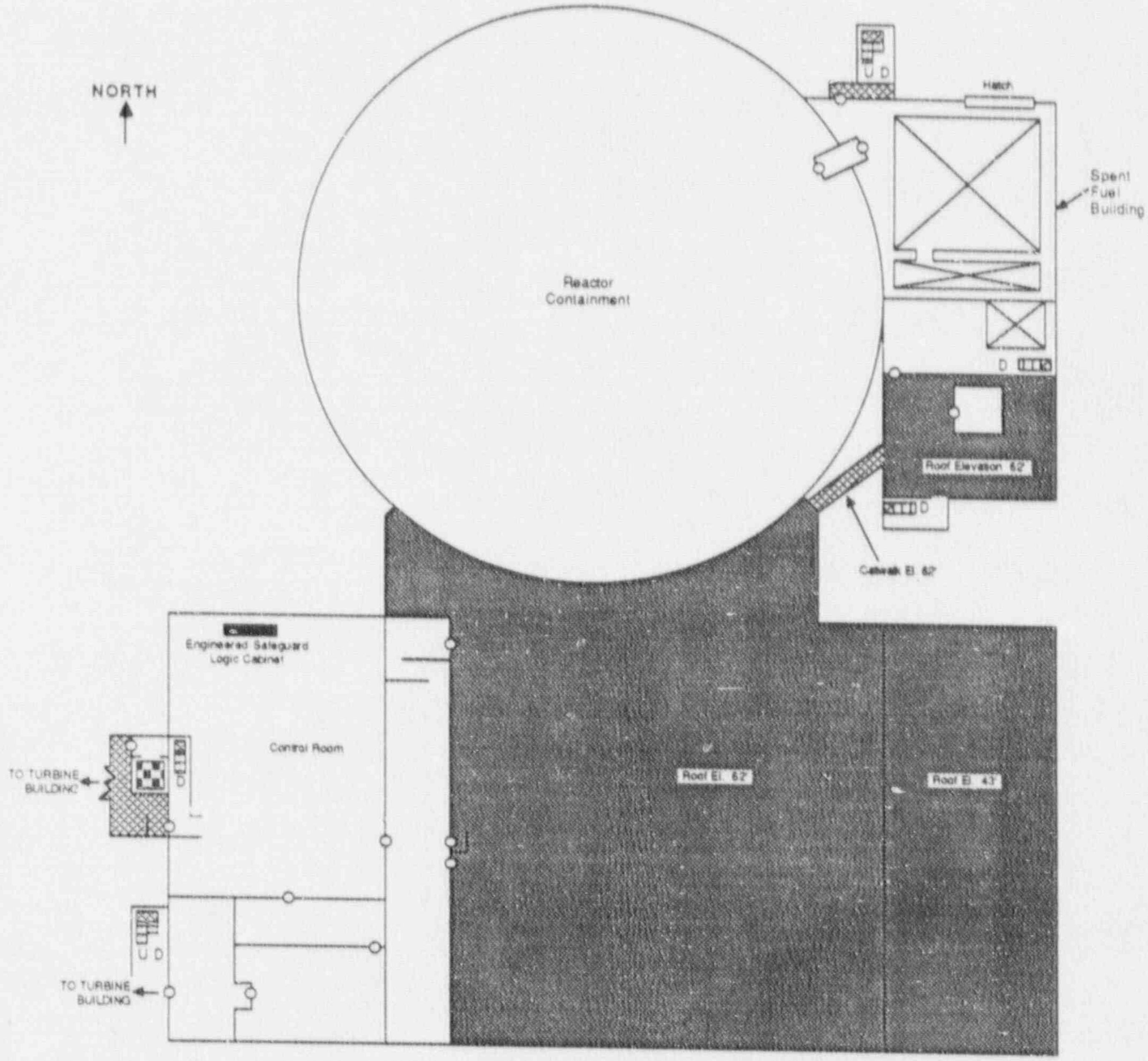


Figure 4-13. St. Lucie 2 Reactor Building, Auxiliary Building, and Fuel Handling Building, Elevation 62'

Table 4-1. Definition of St. Lucie 1 and 2 Buildin~ and Location Codes

	Codes	Descriptions
1.	-.5RAB	General Piping areas on elevation -.5' of the Auxiliary Building
2.	BABATTK	Boric acid batching tank room on elevation 43' of the Auxiliary Building
3.	BATKRMA	Boric acid makeup tank room A on elevation -.5' and 19' of the Auxiliary Building
4.	BATKRMB	Boric acid makeup tank room B on elevation -.5' and 19' of the Auxiliary Building
5.	BATRM1A	Battery Room 1A, located on the 43' elevation of the Auxiliary Building
6.	BATRM1B	Battery Room 1B, located on the 43' elevation of the Auxiliary Building
7.	CHPMRMA	Charging Pump Room A on elevation -.5' of the Auxiliary Building
8.	CHPMRMB	Charging Pump Room B on elevation -.5' of the Auxiliary Building
9.	CHPMRMC	Charging Pump Room C on elevation -.5' of the Auxiliary Building
10.	CR	Control Room, located on the 62' elevation of the Auxiliary Building - northwest corner
11.	CST	Condensate Water Storage Tank
12.	DGFUELA	Diesel generator A long-term fuel supply located on platforms to the northeast of the diesel generator building
13.	DGFUELB	Diesel generator B long-term fuel supply located on platforms to the northeast of the diesel generator building
14.	DGRM1A	Diesel Generator Room 1A
15.	DGRM1B	Diesel Generator Room 1B
16.	ELECT-EQUIP-RM	Electrical Equipment Room, located on the 43' elevation of the Auxiliary Building

Table 4-1. Definition of St. Lucie 1 and 2 Building and Location Codes (Continued)

17.	HPSIRMA	High Pressure Safety Injection Pump Room A, located on the -10' elevation of the Auxiliary Building
18.	HPSIRMB	High Pressure Safety Injection Pump Room B, located on the -10' elevation of the Auxiliary Building
19.	INTSTR	Intake Structure, located west of Reactor Building
20.	LPSIRMA	Low Pressure Safety Injection Pump Room A, located on the -10' elevation of the Auxiliary Building
21.	LPSIRMB	Low Pressure Safety Injection Pump Room B, located on the -10' elevation of the Auxiliary Building
22.	LSTTRA	Lower Steam Trestle Area between Reactor Building and Turbine Building
23.	PPCH	Pipe Chase - Trench covered with steel grating from intake structure to component cooling HX area
24.	PPEN	Pipe Penetration, located on the 19' elevation of the Auxiliary Building
25.	PPTRCH	Pipe Trench - Contains circulating and intake cooling water piping - in and around component cooling yard area
26.	PPTRCHA	Pipe Trench A - Contains Piping from CST to Auxiliary Feedwater pumps
27.	PPTUN	Pipe Tunnel North Side of the Auxiliary Building on the -.5' elevation
28.	PPWAY	Pipe Way - From component cooling pump area to pipe tunnel (PPTUN)
29.	RC	Reactor Containment
30.	RDPMRM	Reactor Drain Pump Room, located on the -.5' elevation of the Auxiliary Building
31.	RWT	Refueling Water Storage Tank, located in the yard area
32.	SDHX1A	Shutdown Heat Exchanger Room 1A, located on the -.5' elevation of the Auxiliary Building
33.	SDHX1B	Shutdown Heat Exchanger Room 1B, located on the -.5' elevation of the Auxiliary Building

Table 4-1. Definition of St. Lucie 1 and 2 Building and Location Codes (Continued)

34.	SWGR1AB	480 Bus 1AB, located on the 19' elevation of the Auxiliary Building - north side
35.	TLSF	Spent fuel operating floor
36.	USTTRA	Upper Steam Trestle Area between Reactor Building and Turbine Building
37.	VCTRM	Volume Control Tank Room on elevation 19' of the Auxiliary Building
38.	YARD	Yard Area East of Reactor - Fenced area where component cooling equipment is located

Table 4-2. Partial Listing of Components by Location at St. Lucie 1

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
-.5RAB	CVCS	CVCS-2514	MOV
BATKRMA	CVCS	BAM-TK1A	TANK
BATKRMA	CVCS	CVCS-2509	MOV
BATKRMA	CVCS	CVCS-2509	MOV
BATKRMA	CVCS	BAM-P1A	MDP
BATKRMB	CVCS	BAM-TK1B	TANK
BATKRMB	CVCS	CVCS-2508	MOV
BATKRMB	CVCS	CVCS-2508	MOV
BATKRMB	CVCS	CVCS-P1B	MDP
BATRM1A	EP	EP-BT-1A	BATT
BATRM1B	EP	EP-BT-1B	BATT
CHPMRMA	CVCS	CVCS-P1A	MDP
CHPMRMB	CVCS	CVCS-P1B	MDP
CHPMRMC	CVCS	CVCS-P1C	MDP
CST	AFWS	AFW-CST	TANK
DGRM1A	EP	EP-DG-1A	DG
DGRM1B	EP	EP-DG-1B	DG
ELECT-EQUIP-RM	ECCS	EP-BS-1A-2	BUS
ELECT-EQUIP-RM	ECCS	EP-BS-1A-2	BUS
ELECT-EQUIP-RM	ECCS	EP-BS-1B-2	BUS
ELECT-EQUIP-RM	ECCS	EP-BS-1B-2	BUS
ELECT-EQUIP-RM	EP	CB-C1A-3	CB
ELECT-EQUIP-RM	EP	CB-C1B-3	CB
ELECT-EQUIP-RM	EP	EP-BS-1A-3	BUS
ELECT-EQUIP-RM	EP	EP-BS-1B-3	BUS
ELECT-EQUIP-RM	EP	EP-BS-1A-2	BUS
ELECT-EQUIP-RM	EP	EP-BS-1B	BUS
ELECT-EQUIP-RM	EP	EP-TR-T1A-2	TRAN
ELECT-EQUIP-RM	EP	EP-TR-T1B-2	TRAN
ELECT-EQUIP-RM	EP	EP-MCC-1A-5	MCC
ELECT-EQUIP-RM	EP	EP-MCC-1A-6	MCC
ELECT-EQUIP-RM	EP	EP-MCC-1B-5	MCC
ELECT-EQUIP-RM	EP	EP-TR-T1A-3	TRAN

Table 4-2. Partial Listing of Components by Location at St. Lucie 1 (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
ELECT-EQUIP-RM	EP	EP-PHBS-1A-3	BUS
ELECT-EQUIP-RM	EP	EP-TR-T1B-3	TRAN
ELECT-EQUIP-RM	EP	EP-PHBS-1B-3	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MA	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MA	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MB	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MB	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MC	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MC	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MD	BUS
ELECT-EQUIP-RM	EP	EP-BS-1MD	BUS
ELECT-EQUIP-RM	EP	EP-DCMCC-1A	MCC
ELECT-EQUIP-RM	EP	EP-DCMCC-1A	MCC
ELECT-EQUIP-RM	EP	EP-DCMCC-1B	MCC
ELECT-EQUIP-RM	EP	EP-DCMCC-1B	MCC
ELECT-EQUIP-RM	EP	EP-DCMCC-1AB	MCC
ELECT-EQUIP-RM	EP	EP-DCMCC-1AB	MCC
ELECT-EQUIP-RM	EP	EP-INSTBS-1A	BUS
ELECT-EQUIP-RM	EP	EP-INSTBS-1B	BUS
ELECT-EQUIP-RM	EP	EP-MCC-1B-6	MCC
ELECT-EQUIP-RM	EP	EP-INV-1A	INV
ELECT-EQUIP-RM	EP	EP-INV-1B	INV
ELECT-EQUIP-RM	EP	EP-INV-1C	INV
ELECT-EQUIP-RM	EP	EP-INV-1D	INV
ELECT-EQUIP-RM	EP	EP-TR-1A	TRAN
ELECT-EQUIP-RM	EP	EP-TR-1B	TRAN
ELECT-EQUIP-RM	EP	EP-DCMCC-1A	MCC
ELECT-EQUIP-RM	EP	EP-BC-1A	BC
ELECT-EQUIP-RM	EP	EP-DC-1AA	BC
ELECT-EQUIP-RM	EP	EP-DCMCC-1B	MCC
ELECT-EQUIP-RM	EP	EP-BC-1B	BC
ELECT-EQUIP-RM	EP	EP-BC-1BB	BC
ELECT-EQUIP-RM	EP	EP-BS-1AB	MCC

Table 4-2. Partial Listing of Components by Location at St. Lucie 1 (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
ELECT-EQUIP-RM	EP	EP-BS-1AB	MCC
HPSIRMA	ECCS	CS-P1A	MDP
HPSIRMA	ECCS	HPSI-P1A	MDP
HPSIRMA	ECCS	HPSI-[illegible]	MOV
HPSIRMA	ECCS	HPSI-3656	MOV
HPSIRMA	ECCS	CS-P1A	MDP
HPSIRMA	ECCS	HPSI-P1A	MDP
HPSIRMA	ECCS	HPSI-3656	MOV
HPSIRMA	ECCS	HPSI-3656	MOV
HPSIRMB	ECCS	HPSI-3653	MOV
HPSIRMB	ECCS	HPSI-3654	MOV
HPSIRMB	ECCS	HPSI-3655	MOV
HPSIRMB	ECCS	CS-P1B	MDP
HPSIRMB	ECCS	HPSI-P1B	MDP
HPSIRMB	ECCS	HPSI-3653	MOV
HPSIRMB	ECCS	HPSI-3654	MOV
HPSIRMB	ECCS	HPSI-3655	MOV
HPSIRMB	ECCS	CS-P1B	MDP
HPSIRMB	ECCS	HPSI-3653	MOV
HPSIRMB	ECCS	HPSI-3654	MOV
HPSIRMB	ECCS	HPSI-3655	MOV
HPSIRMB	ECCS	HPSIA-P1A	MDP
HPSIRMB	ECCS	HPSI-3653	MOV
HPSIRMB	ECCS	HPSI-3654	MOV
HPSIRMB	ECCS	HPSI-3655	MOV
HPSIRMB	ECCS	HPSI-P1C	MDP
INTSTR	ICW	ICWO-P1A	MDP
INTSTR	ICW	ICWO-P1B	MDP
INTSTR	ICW	ICWO-P1C	MDP
LSTTRA	AFWS	AFW-08-03	MOV
LSTTRA	AFWS	AFW-08-13	MOV
LSTTRA	AFWS	AFW-08-14	MOV
LSTTRA	AFWS	AFW-PM1A	MDP

Table 4-2. Partial Listing of Components by Location at St. Lucie 1 (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
LSTTRA	AFWS	AFW-PM1B	MDP
LSTTRA	AFWS	AFW-PM1C	TDP
LSTTRA	AFWS	AFW-PM1C	TDP
PPPEN	CCW	CCW-14-6	MOV
PPPEN	CCW	CCW-14-6	MOV
PPPEN	CCW	CCW-14-5	MOV
PPPEN	CCW	CCW-14-5	MOV
PPPEN	ECCS	MV07-1A	MOV
PPPEN	ECCS	MV07-1B	MOV
PPTUN	ECCS	HPSI-3616	MOV
PPTUN	ECCS	HPSI-3617	MOV
PPTUN	ECCS	HPSI-3626	MOV
PPTUN	ECCS	HPSI-3627	MOV
PPTUN	ECCS	HPSI-3636	MOV
PPTUN	ECCS	HPSI-3637	MOV
PPTUN	ECCS	HPSI-3646	MOV
PPTUN	ECCS	HPSI-3647	MOV
PPTUN	ECCS	MV07-2A	MOV
PPTUN	ECCS	HPSI-3616	MOV
PPTUN	ECCS	HPSI-3617	MOV
P[illegible]	ECCS	HPSI-3626	MOV
PPTUN	ECCS	HPSI-3627	MOV
PPTUN	ECCS	HPSI-3636	MOV
PPTUN	ECCS	HPSI-3637	MOV
PPTUN	ECCS	HPSI-3646	MOV
PPTUN	ECCS	HPSI-3647	MOV
PPTUN	ECCS	MV07-2B	MOV
PPTUN	ECCS	MV07-2A	MOV
PPTUN	ECCS	MV07-2B	MOV
RC	RCS	RCS-3480	MOV
RC	RCS	RCS-3481	MOV
RC	RCS	RCS-3652	MOV
RC	RCS	RCS-3651	MOV

Table 4-2. Partial Listing of Components by Location at St. Lucie 1 (Continued)

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
RC	RCS	RCS-1402	MOV
RC	RCS	RCS-1403	MOV
RC	RCS	RCS-1404	MOV
RC	RCS	RCS-1405	MOV
RWT	ECCS	HPSI-RWT	TANK
RWT	ECCS	MV07-1A	MOV
RWT	ECCS	HPSI-RWT	TANK
RWT	ECCS	MV07-1A	MOV
RWT	ECCS	HPSI-RWT	TANK
SDHX1A	ECCS	HPSI-3663	MOV
SDHX1B	ECCS	HPSI-3662	MOV
SWGR1AB	EP	EP-BS-B1AB	BUS
SWGR1AB	EP	EP-BS-1AB	BUS
SWGR1AB	EP	EP-BS-B1AB	BUS
SWGR1AB	EP	EP-BS-1AB	BUS
USTTRA	AFWS	AFW-09-12	MOV
USTTRA	AFWS	AFW-09-13	MOV
USTTRA	AFWS	AFW-09-14	MOV
USTTRA	AFWS	AFW-09-10	MOV
USTTRA	AFWS	AFW-09-11	MOV
USTTRA	AFWS	AFW-09-09	MOV
YARD	CCW	CCW-14-1	MOV
YARD	CCW	CCW-14-2	MOV
YARD	CCW	CCW-14-3	MOV
YARD	CCW	CCW-14-4	MOV
YARD	CCW	CCW-HX1A	HX
YARD	CCW	CCW-HX1B	HX
YARD	CCW	CCW-P1A	MDP
YARD	CCW	CCW-P1B	MDP
YARD	CCW	CCW-P1C	MDP
YARD	ICW	CCW-HX1A	HX
YARD	ICW	CCW-HX1B	HX

5. BIBLIOGRAPHY FOR ST. LUCIE 1 AND 2

1. NUREG-0635, "Generic Evaluation of Feedwater Transients and Small Break Loss of Coolant Accidents in Combustion Engineering Designed Operating Plants", Appendix X.7, "St. Lucie Unit 1 Auxiliary Feedwater System", USNRC, January 1980.

2. NUREG-0842, "Environmental Statement Related to the Operation of St. Lucie Plant, Unit No. 2", USNRC.

3. NUREG-0843, Safety Evaluation Report Related to the Operation of St. Lucie Plant, Unit No. 2", USNRC.

4. NUREG-0949, "Technical Specifications for St. Lucie Plant Unit No. 2", USNRC.

5. NUREG/CR-2749, Volume 10, "Socioeconomic Impacts of Nuclear Generating Stations: Saint Lucie Case Study", Mountain West Research, Inc., July 1982.

6. NUREG/CR-4710, "Shutdown Decay Heat Removal Analysis of a Combustion Engineering 2-Loop Pressurized Water Reactor - Case Study", Sandia National Laboratories, August 1987.

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)

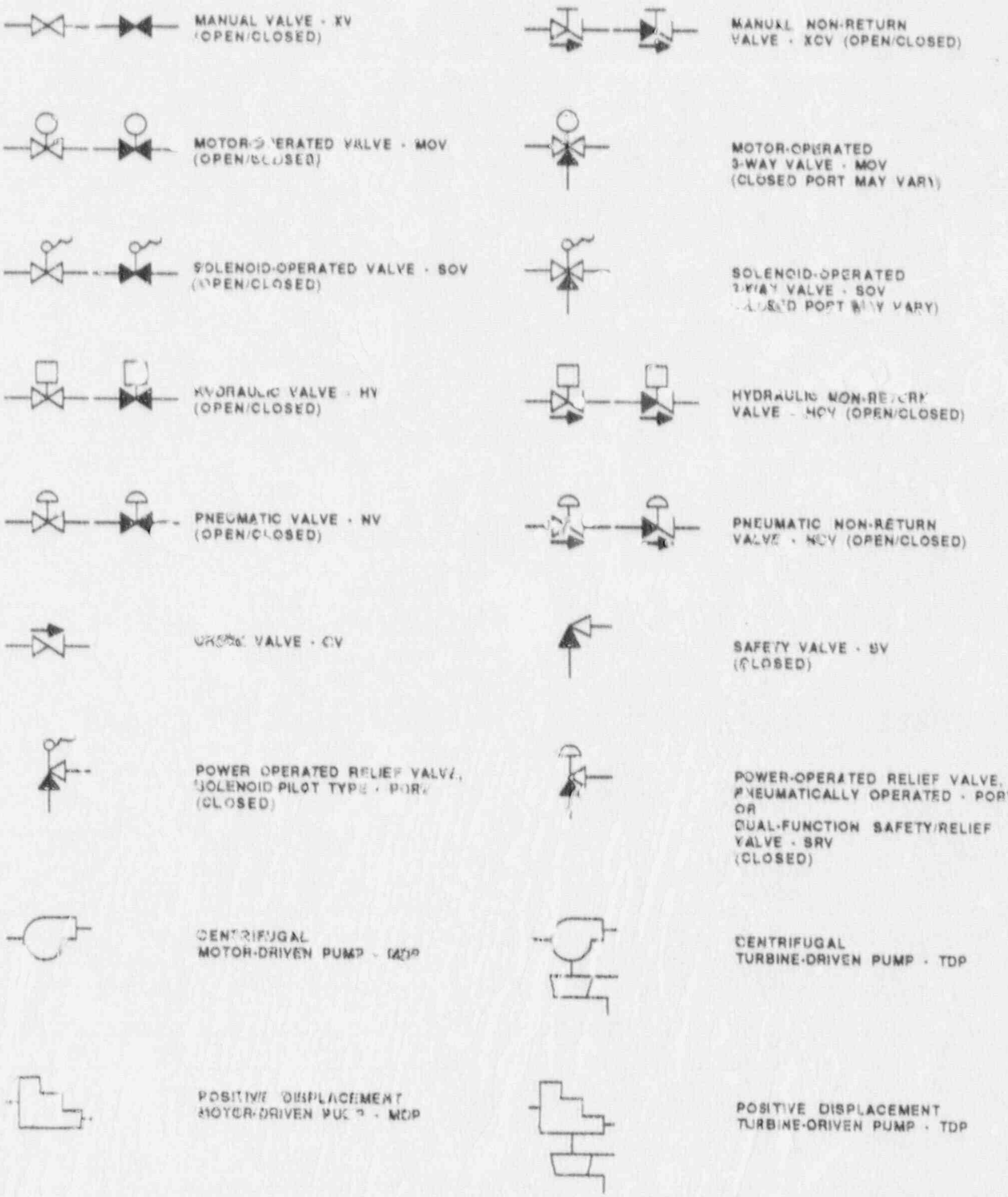


Figure A-1. Key To Symbols In Fluid System Drawings

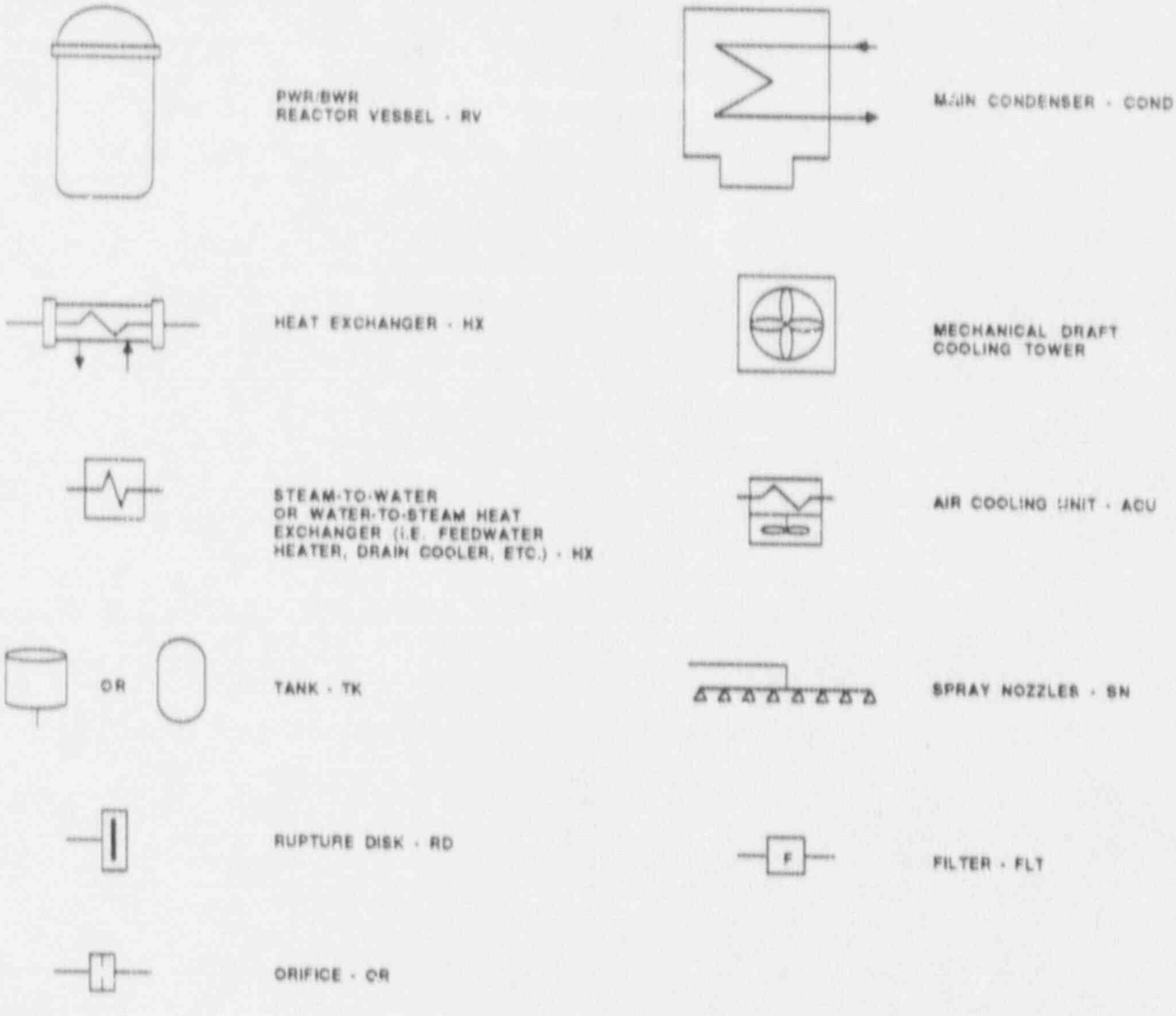


Figure A-1. Key To Symbols In Fluid System Drawings (Continued)

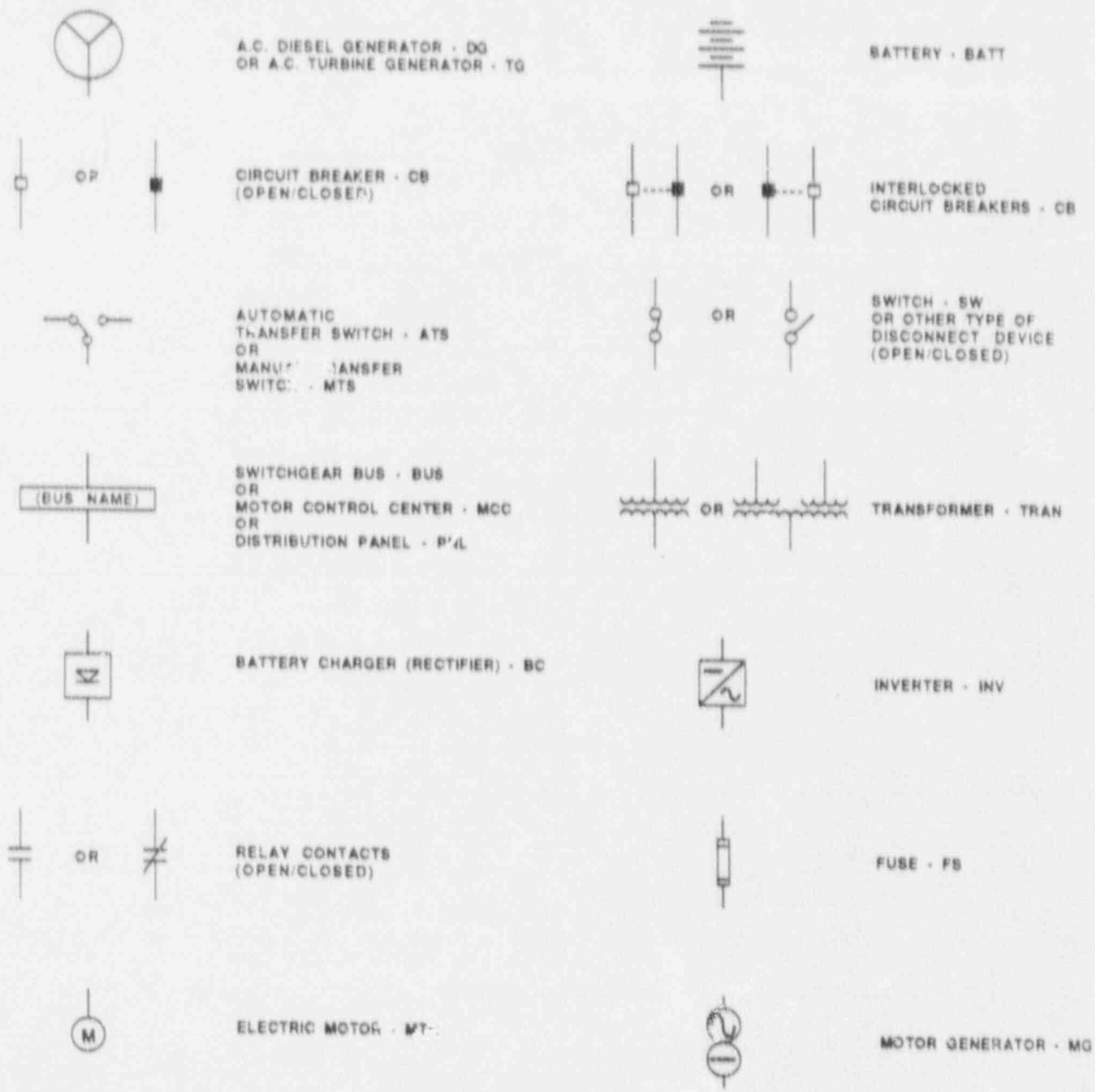


Figure A-2. Key To Symbols In Electrical System Drawings

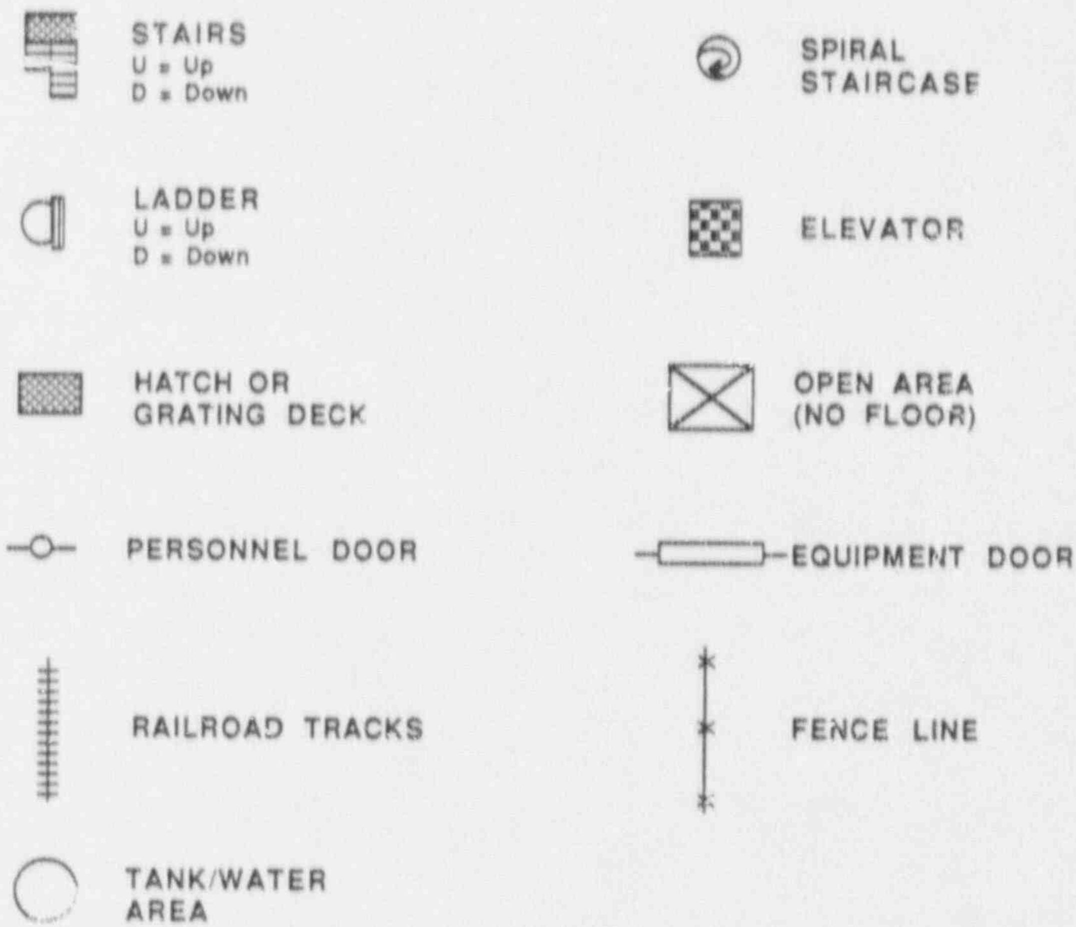


Figure A-3. Key To Symbols In Facility Layout Drawings

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
AFWS	Auxiliary Feedwater System
ECCS	Emergency Core Cooling System (including HPSI and LPSI)
CVCS	Chemical and Volume Control System (Charging System)
EP	Electric Power System
CCW	Component Cooling Water System
ICW	Intake Cooling 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