NUCLEAR POWER PLANT SYSTEM SOURCEBOOK

RIVER BEND 1

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NUCLEAR POWER PLANT SYSTEM SOURCEBOOK

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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.

RIVER BEND 1
RECORD OF REVISIONS

REVISION	ISSUE	COMMENTS
0	9/89	Original report

RIVER BEND 1 SYSTEM SOURCEBOOK

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

1. SUMMARY DATA ON PLANT

Basic information on the River Bend 1 nuclear power plant is listed below:

- Docket number: 50-458
- Operator: Gulf States Utilities Co.
- Location: Louisiana, 24 miles north of Baton Rouge
- Commercial operation date: 1986
- Reactor type: BWR/6
- NSSS vendor: General Electric
- Power (MWt/MWe): 2894/936
- Architect-engineer: Stone and Webster
- Containment type: Steel and reinforced concrete cylinder (Mark III)

2. IDENTIFICATION OF SIMILAR NUCLEAR POWER PLANTS

The River Bend 1 plant contains a General Electric BWR/6 nuclear steam supply system with a Mark III containment incorporating the drywell/pressure suppression concept. The plant also has a secondary containment structure of reinforced concrete. Other BWR/6 plants in the United States are as follows:

- Clinton 1
- Grand Gulf 1 & 2
- Perry 1 & 2

It should be noted that a second unit on the River Bend site was scheduled but construction has been halted.

River Bend 1 uses a high pressure core spray system, a reactor core isolation cooling system, a low pressure core spray system, and a multi-mode RHR system. The reactor core isolation cooling and RHR systems include the capability for steam condensing. Special features of River Bend 1 include the following:

- There is no cable spreading room. Cables for the control room feed into four separate cable chases.

- The high pressure core spray system has its own diesel generator as an alternate power supply (typical of BWR/6 plants).

3. SYSTEM INFORMATION

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

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

Table 3-1. Summary of River Bend 1 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
- Reactor Core Isolation Cooling (RCIC) Systems	Same	3.2	5.4.6
- Emergency Core Cooling Systems (ECCS)	Same		
- High-Pressure Injection & Recirculation	High-Pressure Core Spray (HPCS) System	3.3	6.3.1.2.1, 6.3.2.2.1
- Low-pressure Injection & Recirculation	Low Pressure Core Spray (LPCS) System	3.3	6.3.1.2.2, 6.3.2.2.3
	Low-Pressure Coolant Injection (LPCI) Mode (an operating mode of the RHR system)	3.3	5.4.7.1.1.2, 6.3.1.2.3 6.3.2.2.4
- Automatic Depressurization System (ADS)	Same	3.3	6.3.1.2.4, 6.3.2.2.2
- Decay Heat Removal (DHR) System (Residual Heat Removal (RHR) System)	Residual Heat Removal (RHR) System (a multi-mode system)	3.3	5.4.7
- Main Steam and Power Conversion Systems	Main Steam Supply System,	X	10.3
	Condensate and Feedwater System,	X	10.4.7
	Circulating Water System	X	10.4.5
- Other Heat Removal Systems	Steam-condensing RHR/RCIC operation	3.2	5.4.6.1.1, 5.4.7.1.1.4

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

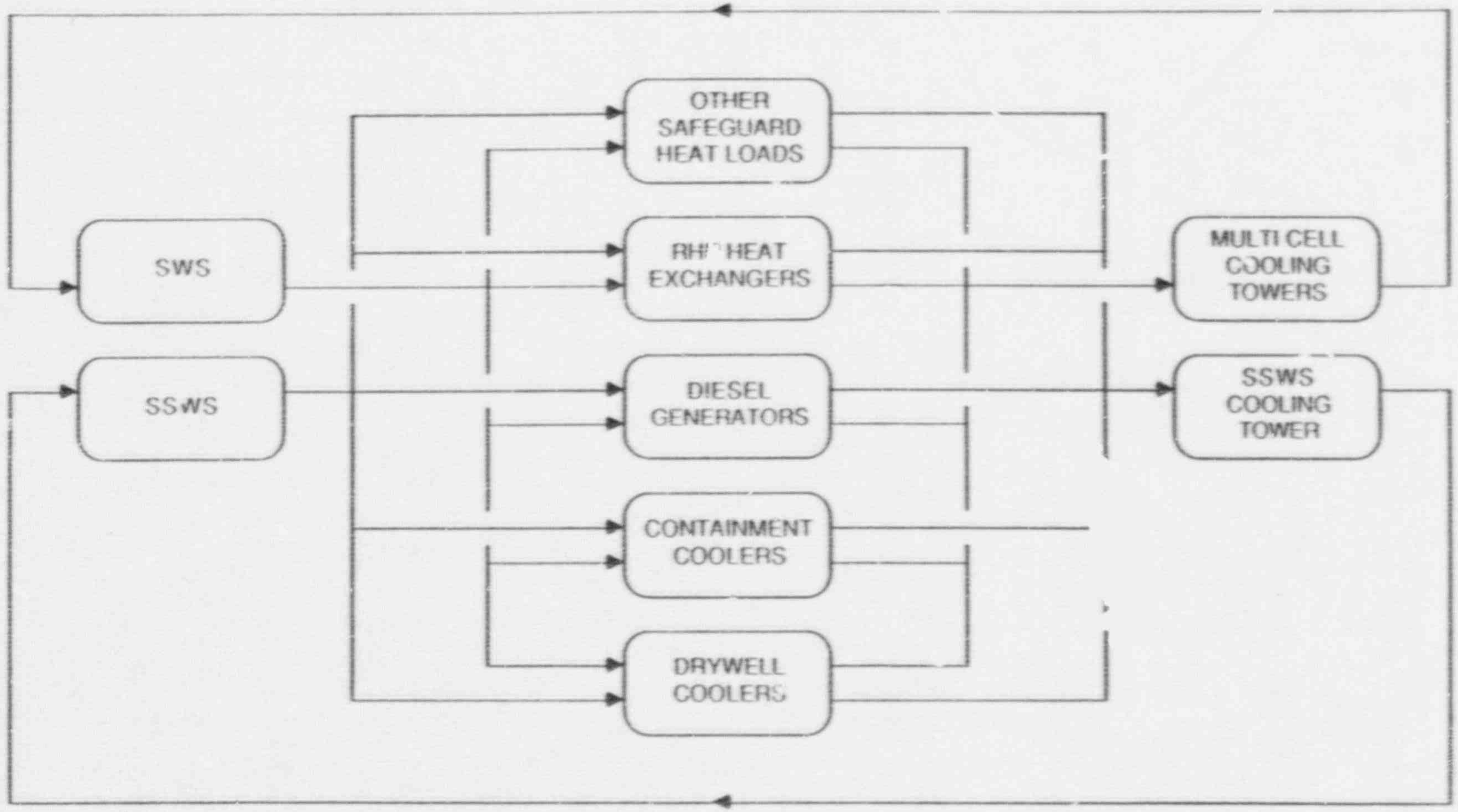
Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Reactor Coolant Inventory Control Systems			
- Reactor Water Cleanup (RWCU) System	Same	X	5.4.8
- ECCS	See above	-	-
- Control Rod Drive Hydraulic System (CRDHS)	Same	3.6	4.6.1.1.2.4
Containment Systems			
- Primary Containment	Same (drywell and pressure suppression chamber)	X	6.2.1
- Secondary Containment	Same	X	6.2.3
- Standby Gas Treatment System (SGTS)	Same	X	6.2.3.2.1
- Containment Heat Removal Systems			
- Suppression Pool Cooling System	Suppression Pool Cooling Mode (an operating mode of the RHR System)	3.3	5.4.7.1.1.3, 6.2.2
- Containment Spray System	Same (an operating mode of the RHR system)	3.3	6.3.2
- Containment Fan Cooler System	Containment Ventilation System	X	6.2.2, 9.4.5.2.6
- Containment Normal Ventilation Systems	Containment Ventilation System	X	9.4.5.2.6
- Combustible Gas Control Systems	Hydrogen Mixing System	X	6.2.5.2.1, 6.2.5.5.1
	Hydrogen Recombiner System	X	6.2.5.2.2, 6.2.5.5.2
	Containment Hydrogen Purge System	X	6.2.5.2.3, 6.2.5.5.3
	Hydrogen Analyzer System	X	6.2.5.2.4, 6.2.5.5.4
	Hydrogen Control System	X	6.2.5.2.5, 6.2.5.5.5

Table 3-1. Summary of River Bend I Systems Covered in this Report (Continued)

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Reactor and Reactivity Control Systems			
- Reactor Core	Same	X	4
- Control Rod System	Control Rod Drive System	X	4.6
- Chemical Poison System	Standby Liquid Control System (SLCS)	X	9.3.5
Instrumentation & Control (I&C) Systems			
- Reactor Protection System (RPS)	Same	3.4	7.2
- Engineered Safety Feature Actuation System (ESFAS)	Engineered Safety Features Systems	3.4	7.3
- Remote Shutdown System	Same	X	7.4.1.4
- Other I&C Systems	Various other systems	X	7.4 to 7.7
Support Systems			
- Class 1E Electric Power System	Same	3.5	8.3
- Non-Class 1E Electric Power System	Same	3.5	8.2, 8.3
- Diesel Generator Auxiliary Systems	Same	3.5	8.3.1.1.3.6.1, 9.4.5.5.2
- Component Cooling Water (CCW) System	Reactor Plant Component Cooling Water System	X	9.2.2

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

Generic System Name	Plant-Specific System Name	Report Section	FSAR Section Reference
Support Systems (continued)			
- Service Water System (SWS)	Normal Service Water System	X	9.2.1
- Residual Heat Removal Service Water (RHRSW) System	Standby Service Water (SSW) System	3.7	9.2.7
- Other Cooling Water Systems	Turbine Plant Component Cooling Water System	X	9.2.8
	Ventilation Chilled Water System	X	9.2.9
- Fire Protection Systems	Same	X	9.5.1
- Room Heating, Ventilating, and Air-Conditioning (HVAC) Systems	Same	X	9.4
- Instrument and Service Air Systems	Compressed Air Systems	X	9.3.1
- Refueling and Fuel Storage Systems	Fuel Storage and Handling	X	9.1
- Radioactive Waste Systems	Radioactive Waste Management Systems	X	11
- Radiation Protection Systems	Same	X	12



SSWS = Standby Service Water System
SWS = Service Water System

Figure 3-1. Cooling Water Systems Functional Diagram for River Bend 1

3.1 REACTOR COOLANT SYSTEM (RCS)

3.1.1 System Function

The RCS, also called the Nuclear Steam Supply System (NSSS), is responsible for directing the steam produced in the reactor to the turbine where it is used to rotate a generator and produce electricity. 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 recirculation loops, (c) recirculation pumps, (d) 16 safety/relief valves, and (e) connected piping out to a suitable isolation valve boundary. Simplified diagrams of the RCS and important system interfaces are shown in Figures 3.1-1 and 3.1-2. A summary of data on selected RCS components is presented in Table 3.1-1.

3.1.3 System Operation

During power operation, circulation in the RCS is maintained by one recirculation pump in each of the two recirculation loops and the associated jet pumps internal to the reactor vessel. The steam water mixture flows upward in the core to the steam dryers and separators where the entrained liquid is removed. The steam is piped through the main steam lines to the turbine. The separated liquid returns to the core, mixed with the feedwater and is recycled again.

About 1/2 of the liquid in the downcomer region of the reactor vessel is drawn off by the recirculation pumps. The discharge of these pumps is returned to the inlet nozzles of the jet pumps at high velocity. As the liquid enters the jet pumps the slow moving liquid in the upper region of the downcomer is induced to flow through the jet pumps, producing reactor coolant circulation.

The steam that is produced by the reactor is piped to the turbine via the four main steam lines. There are two main steam isolation valves (MSIVs) in each main steam line. Condensate from the turbine is returned to the RCS as feedwater.

Following a transient that involves the loss of the main condenser or loss of feedwater, heat from the RCS is dumped to the suppression chamber via safety/relief valves on the main steam lines (see Figure 3.1-3). A LOCA inside containment or operation of the Automatic Depressurization System (ADS) also dumps heat to the suppression chamber. Makeup to the RCS is provided by the Reactor Core Isolation Cooling (RCIC) system (see Section 3.2) or by the Emergency Core Cooling System (ECCS, see Section 3.3). Heat is transferred from the containment to the ultimate heat sink by the Residual Heat Removal (RHR) system operating in the suppression pool cooling mode. Actuation systems provide for automatic closure of the MSIVs and isolation of other lines connected to the RCS.

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. Total volume: 15,940 ft^3
2. Water volume: 9,170 ft^3 (including recirculation loops).
3. Steam volume: 6,770 ft^3
4. Steam flow: 12.45 x 10^6 lb/hr.
5. Normal operating pressure: 1025 psia

B. Safety/Relief Valves (16)
1. Set pressure: 1103 to 1123 psig
2. Relief capacity: 895,000 to 913,000 lb/hr (each)

C. Recirculation Pumps (2)
1. Rated flow: 32,500 gpm @ 815 ft. head (353 psid)
2. Type: Vertical centrifugal

D. Jet Pumps (20)
1. Total flow: 1.228 x 10^6 lb/hr @ 85.2 ft. head [illegible] psid)

3.1.6 Support Systems and Interfaces

A. Motive Power
The recirculation pumps are supplied with Nonclass 1E power from an AC motor generator set.

B. MSIV Operating Power
The instrument air system supports normal operation of the MSIVs. Valve operation is controlled by an AC and DC solenoid pilot valve. Both solenoid valves must be deenergized to cause MSIV closure. This design prevents spurious closure of an MSIV if a single solenoid valve should fail. MSIVs are designed to fail closed if instrument air is lost or if both AC and DC control power is lost to the solenoid pilot valves. This is achieved by a local dedicated air accumulator for each MSIV and an independent valve closing spring.

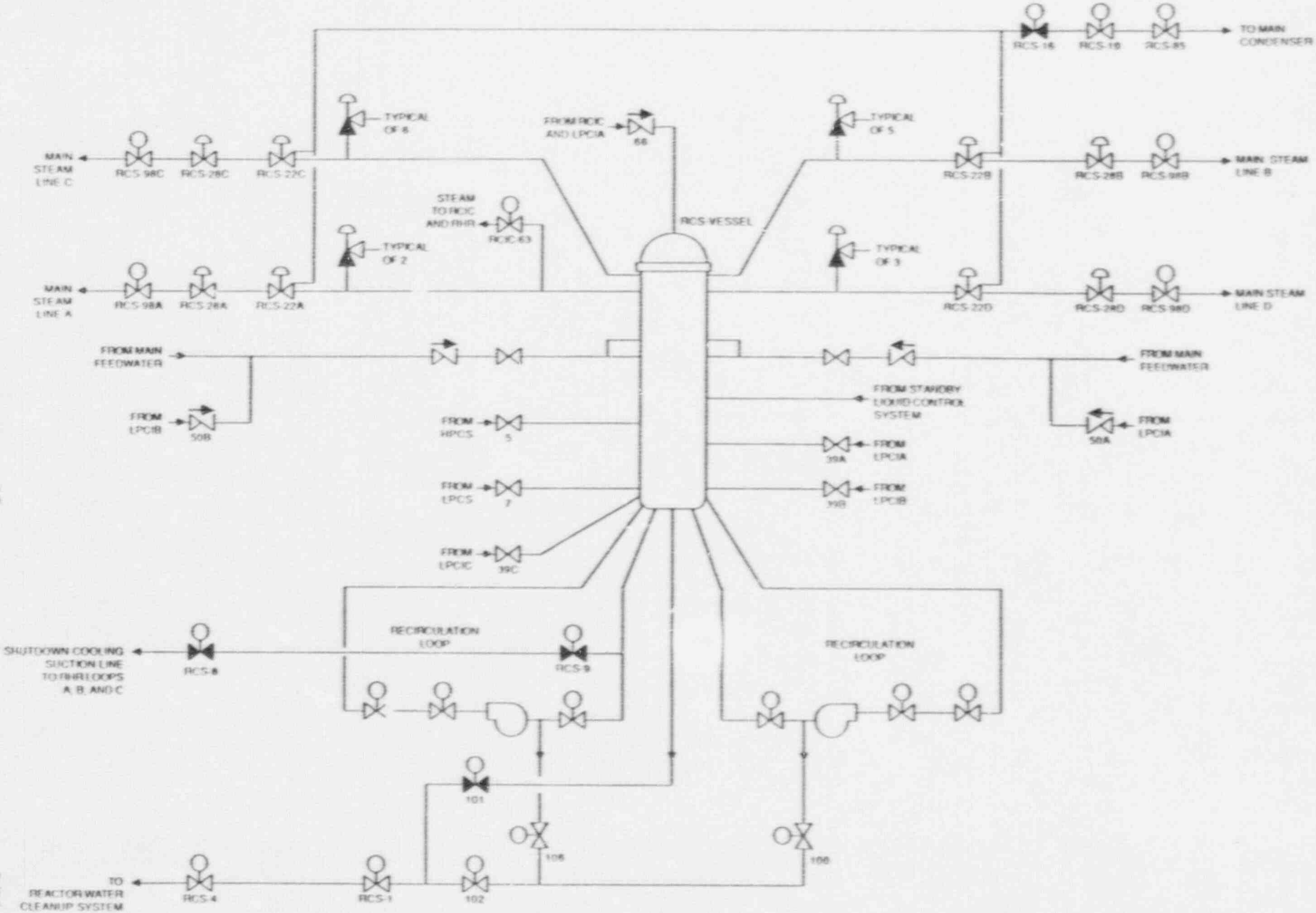


Figure 3.1-1. River Bend 1 Reactor Coolant System

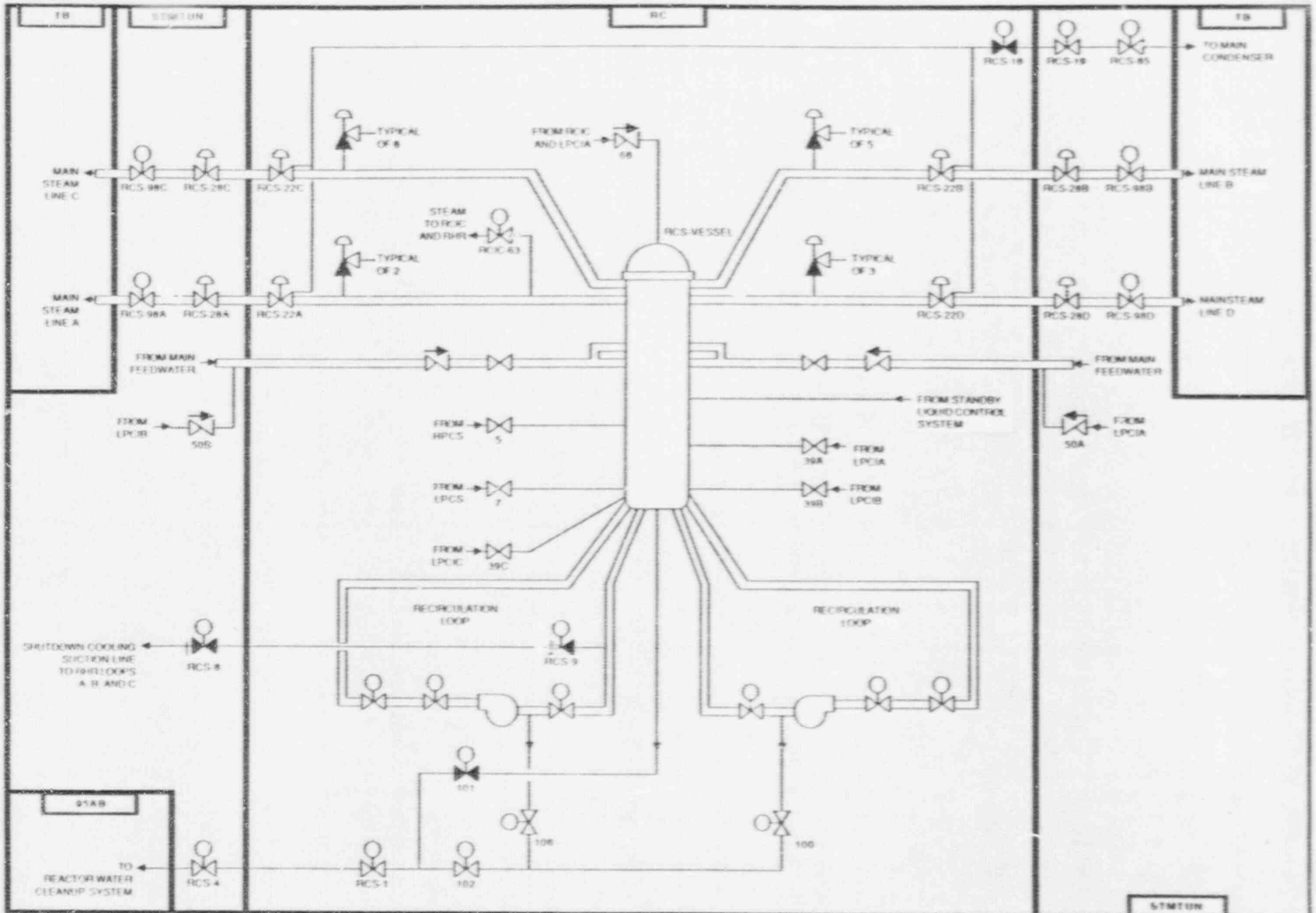


Figure 3.1-2. River Bend 1 Reactor Coolant System Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
RCS-1	MOV	RC	MCC-2D	480	141AB	AC/B
RCS-16	MOV	RC	MCC-2D	480	141AB	AC/B
RCS-19	MOV	STMTUN	MCC-2L	480	141AB	AC/A
RCS-22A	NV	RC				
RCS-22B	NV	RC				
RCS-22C	NV	RC				
RCS-22D	NV	RC				
RCS-28A	NV	STMTUN				
RCS-28B	NV	STMTUN				
RCS-28C	NV	STMTUN				
RCS-28D	NV	STMTUN				
RCS-4	MOV	STMTUN	MCC-2L	480	141AB	AC/A
RCS-41A	SRV	RC				
RCS-41B	SRV	RC				
RCS-41C	SRV	RC				
RCS-41D	SRV	RC				
RCS-41F	SRV	RC				
RCS-41G	SRV	RC				
RCS-41L	SRV	RC				
RCS-47A	SRV	RC				
RCS-47B	SRV	RC				
RCS-47C	SRV	RC				
RCS-47D	SRV	RC				
RCS-47F	SRV	RC				
RCS-51B	SRV	RC				
RCS-51C	SRV	RC				
RCS-51D	SRV	RC				
RCS-51F	SRV	RC				

Table 3.1-1. River Bend 1 Reactor Coolant System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
RCS-8	MOV	STMTUN	MCC-2L	480	141AB	AC/A
RCS-85	MOV	STMTUN	MCC-2F	480	114ABE	AC-B
RCS-9	MOV	RC	MCC-2K	480	141AB	AC/B
RCS-98A	MOV	STMTUN	MCC-2H	480	114ABE	AC/B
RCS-98B	MOV	STMTUN				
RCS-98C	MOV	STMTUN				
RCS-98D	MOV	STMTUN				
RCS-VESSEL	RV	RC				

3.2 REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.2.1 System Function

The reactor core isolation cooling system provides adequate core cooling in the event that reactor isolation is accompanied by loss of feedwater flow. This system provides makeup at reactor operating pressure and does not require RCS depressurization. The RCIC system is not considered to be part of the Emergency Core Cooling System (ECCS, see Section 3.3) and does not have a LOCA mitigating function.

3.2.2 System Definition

The reactor core isolation cooling system consists of a steam-driven turbine pump and associated valves and piping for delivering makeup water from the condensate storage tank or the suppression pool to the reactor pressure vessel. The RCIC can also operate in conjunction with the RHR system in the steam condensing mode, in which condensed steam is delivered from the RHR heat exchanger outlets to the RCIC pump suction, for return to the RCS.

Simplified drawings of the reactor core isolation cooling system are shown in Figures 3.2-1 and 3.2-2. A summary of data on selected RCIC system components is presented in Table 3.2-1.

3.2.3 System Operation

During normal operation the RCIC is in standby with the steam supply valves to the RCIC turbine driven pump closed and the pump suction aligned to the condensate storage tank.

Upon receipt of an RPV low water level signal, the turbine-pump steam supply valves are opened and makeup water is supplied to the RPV. The primary water supply for the RCIC is the condensate storage water tank. The suppression pool is used as a backup water supply. Reactor core heat is dumped to the suppression pool via the safety/relief valves which cycle as needed to limit RCS pressure. The RCIC turbine also exhausts to the suppression pool.

The RCIC can also operate in conjunction with the RHR system in the steam condensing mode, in which condensed steam is delivered from the RHR heat exchanger outlets to the RCIC pump suction, for return to the RCS. In this mode of operation, reactor core heat is transferred to the RHR system rather than to the suppression pool. The RCIC turbine still exhausts to the suppression pool.

3.2.4 System Success Criteria

For the RCIC system to be successful there must be at least one water source and supply path to the turbine-driven pump, an open steam supply path to the turbine, an open discharge path to the RCS, and an open turbine exhaust path to the suppression pool.

3.2.5 Component Information

A. Steam turbine-driven RCIC pump:
   1. Rated Flow: 625 gpm @ 2980 ft. head (1192 psid)
   2. Rated Capacity: 100%
   3. Type: centrifugal

B. Condensate Storage Tank
   1. Capacity: 620,000 gal (125,000 gal reserved for RCIC and HPCS)

3.2.6 Support System and Interfaces

A. Control Signals
   1. Automatic
      a. The RCIC pump is automatically actuated on a reactor vessel low water level signal.
      b. The RCIC pump is automatically tripped on a reactor vessel high water level signal signal. It may then be necessary to restart the pump manually.
   2. Remote Manual
      The RCIC pump can be actuated by remote manual means from the Main Control Room.

B. Motive Power
   1. The RCIC turbine driven pump is supplied with steam from main steam loop A, upstream of the main steam isolation valves.
   2. The RCIC motor-operated valves are either Class 1E AC or Class 1E DC loads that can be supplied from the standby diesel generators or the station batteries, respectively, as described in Section 3.5.

C. Other
   1. Lubrication and cooling for the turbine-driven pump are assumed to be supplied locally.
   2. A room ventilation system cooled by the standby service water system (see Section 3.7) provides RCIC room cooling.

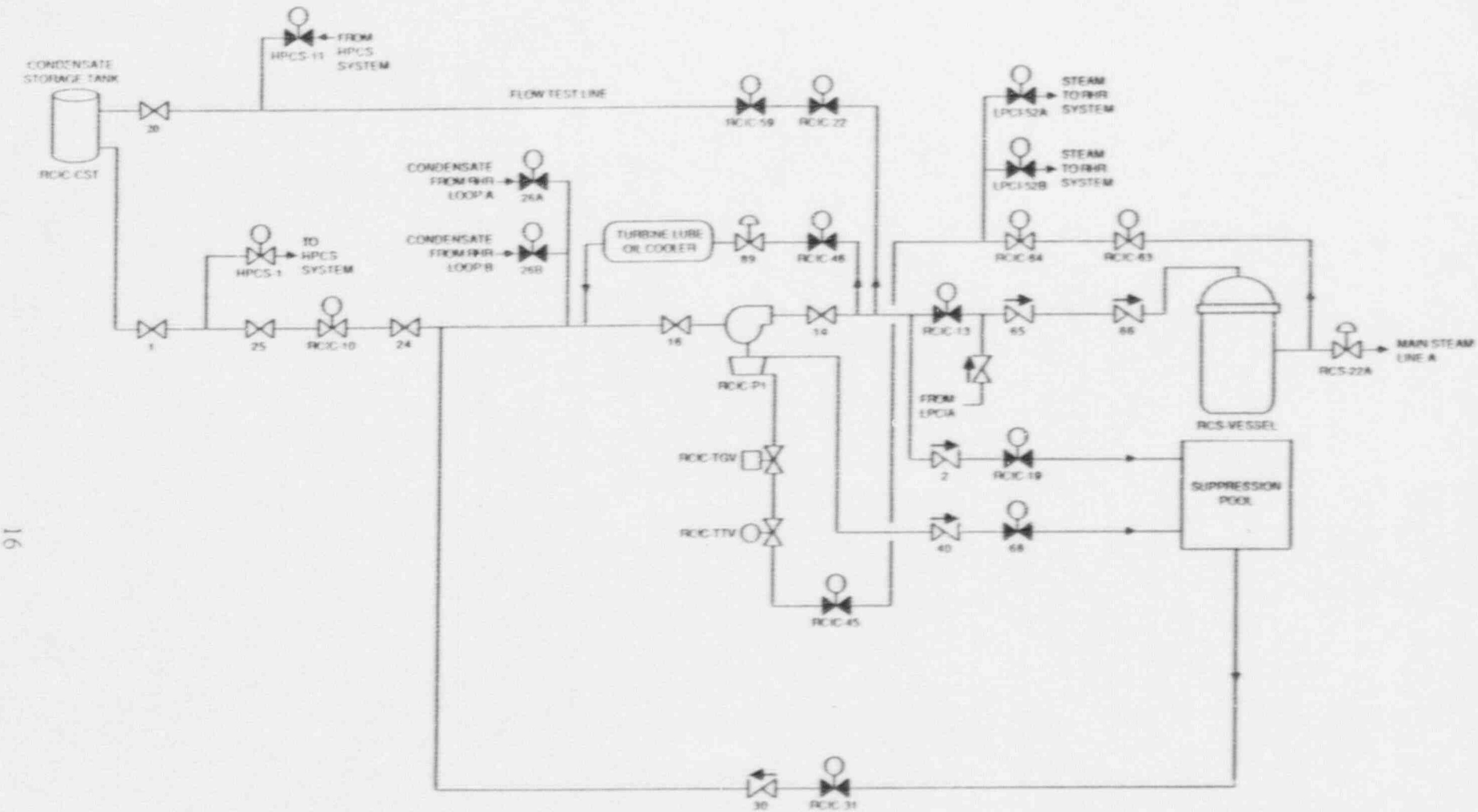


Figure 3.2-1. River Bend 1 Reactor Core Isolation Cooling System

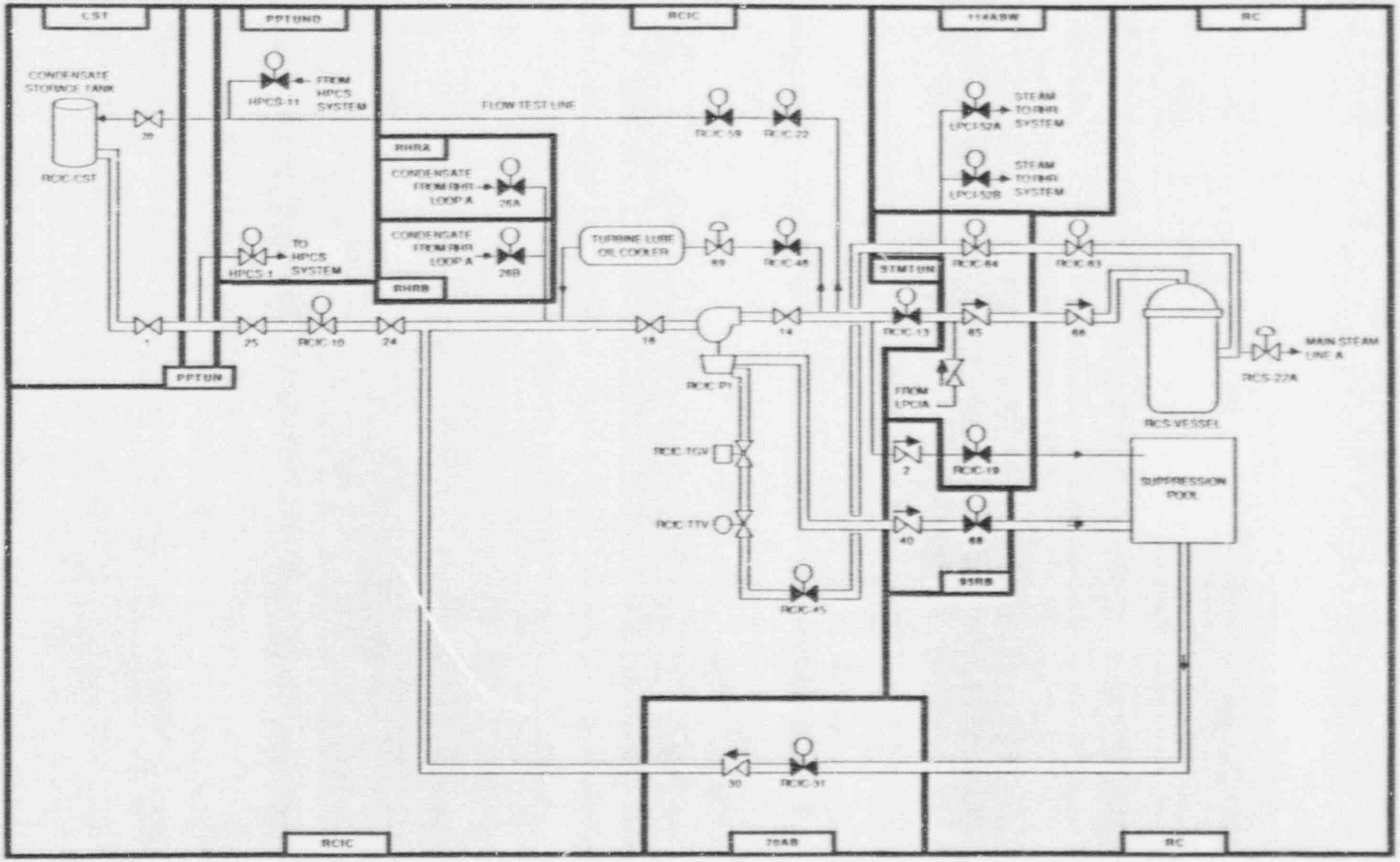


Figure 3.2-2. River Bend 1 Reactor Core Isolation Cooling System Showing Component Locations

Table 3.2-1. River Bend 1 Reactor Core Isolation Cooling System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
RCIC-10	MOV	RCIC	MCC-1	480	95AB	DC/A
RCIC-13	MOV	RCIC	MCC-1	480	95AB	DC/A
RCIC-19	MOV	STMTUN	MCC-1	480	95AB	DC/A
RCIC-22	MOV	RCIC	MCC-1	480	95AB	DC/A
RCIC-31	MOV	70AB	MCC-1	480	95AB	DC/A
RCIC-45	MOV	RCIC	MCC-1	480	95AB	DC/A
RCIC-46	MOV	RCIC	MCC-1	480	95AB	DC/A
RCIC-59	MOV	RCIC	MCC-1	480	95AB	
RCIC-63	MOV	RC	MCC-2D	480	141AB	AC/B
RCIC-63	MOV	RC	MCC-2D	480	141AB	AC/B
RCIC-64	MOV	STMTUN	MCC-2L	480	141AB	AC/A
RCIC-64	MOV	STMTUN	MCC-2L	480	141AB	AC/A
RCIC-CST	TANK	CST				
RCIC-P1	TDP	RCIC				
RCIC-TGV	HV	RCIC				
RCIC-TTV	MOV	RCIC	MCC-1	480	95AB	DC/A
SUPP	TANK	RC				

3.3 EMERGENCY CORE COOLING SYSTEM (ECCS)

3.3.1 System Function

The ECCS 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 ECCS also performs suppression pool cooling and containment spray functions and has a capability for mitigating transients.

3.3.2 System Definition

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

- High Pressure Core Spray (HPCS) System
- Automatic Depressurization System (ADS)
- Low Pressure Core Spray System (LPCS)
- Low Pressure Coolant Injection (LPCI) System

The HPCS system is provided to supply make-up water to the reactor pressure vessel (RPV) in the event of a small break LOCA which does not result in a rapid depressurization of the reactor vessel. The HPCS system consists of a motor-driven pump, system piping, valves and controls. A dedicated diesel generator supplies electric power to HPCS components.

The automatic depressurization system (ADS) provides automatic RPV depressurization for small breaks so that the low pressure systems (LPCI and LPCS) can provide makeup to the RCS. The ADS utilize 7 of the 16 safety/relief valves that discharge the high pressure steam to the suppression pool.

The LPCS system supplies make-up water to the reactor vessel at low pressure. The system consists of a motor-driven pump to supply water from the suppression pool to a spray sparger in the reactor vessel above the core.

The low pressure coolant injection system is an operating mode of the RHR system, and provides make-up water to the reactor vessel at low pressure. The LPCI system consists of three loops, designated LPCI A, LPCI B, and LPCI C. Each loop consists of a motor driven pump which supplies water from the suppression pool into the reactor vessel. The RHR system can be manually realigned as needed to perform suppression pool cooling or containment spray as part of the basic emergency core cooling function.

Simplified drawings of the HPCS system are shown in Figures 3.3-1 and 3.3-2. The LPCS system is shown in Figures 3.3-3 and 3.3-4. A flow diagram of LPCI A is shown in Figures 3.3-5 and 3.3-6, LPCI B is shown in Figures 3.3-7 and 3.3-8, and LPCI C is shown in Figures 3.3-9 and 3.3-10. Interfaces between these systems and the RCS are shown in Section 3.1. A summary of data on selected ECCS components is presented in Table 3.3-1.

3.3.3 System Operation

All ECCS systems normally are in standby. The manner in which the ECCS operates to protect the reactor core is a function of the rate at which coolant is being lost from the RCS. The HPCS system is normally aligned to take a suction on the Condensate Storage Tank (CST). The HPCS system is automatically started in response to decreasing RPV water level, and will serve as the primary source of makeup if RCS pressure remains high. Reactor core heat is dumped to the suppression pool via the safety/relief valves which cycle as needed to limit RCS pressure. A dedicated diesel generator supplies electric power to HPCS components. If the break is of such a size that the coolant loss exceeds the

HPCS system capacity, then the LPCS and LPCI systems can provide higher capacity makeup to the reactor vessel.

The Automatic Depressurization System will automatically reduce RCS pressure if a break has occurred and RPV water level is not maintained by the HPCS system. Rapid depressurization permits flow from the LPCS or LPCI systems to enter the vessel. Water can be taken from the suppression pool by each of these system for injection into the core. The three LPCI pumps deliver water through three separate reactor vessel penetrations.

3.3.4 System Success Criteria

LOCA mitigation requires that both the emergency coolant injection (ECI) and emergency coolant recirculation (ECR) functions be accomplished. The ECCS success criteria are not clearly defined in the River Bend 1 FSAR but can be inferred from pump capacities that are defined based on certain design basis accidents that are considered in the licensing process based on licensing considerations. The ECI system success criteria for a large LOCA are the following:

- The low pressure core spray pump with a suction on the suppression pool, or
- 1 of the 3 low pressure coolant injection pumps with a suction on the suppression pool.

The ECI system success criteria for a small LOCA are the following:

- The high-pressure core spray (HPCS) pump with a suction on the suppression pool or the condensate storage tank, or
- The automatic depressurization system (ADS) and 1 of 3 LPCI pumps with a suction on the suppression pool, or
- The automatic depressurization system and the low pressure core spray pump with a suction on the suppression pool.

The success criterion for the ADS is the use of any 1 of 2 ADS trains. Note that there may be integrated success criteria involving combinations of core spray and LPCI pumps. It is possible that the coolant inventory control function for some small LOCAs can be satisfied by low-capacity high-pressure injection systems such as the control rod drive hydraulic system (see Section 3.6).

The ECR success criteria for LOCAs are related to the ECI success criteria above. All injection systems essentially are operating in a recirculation mode when drawing water from the suppression pool.

For transients, the success criteria for reactor coolant inventory control involve the following:

- Either the reactor core isolation cooling (RCIC) system (not part of the ECCS, see Section 3.2), or
- Small LOCA mitigating systems

For the suppression pool cooling function to be successful, either RHR train A or B must be aligned for containment heat removal and the associated standby service water train must be operating to complete the heat transfer path from the RHR heat exchangers to the ultimate heat sink.

3.3.5 Component Information

A. Motor-driven HPCS pump P1
  1. Rated flow: 467 gpm @ 1177 psid, 1400 gpm @ 1147 psid, 5010 gpm @ 200 psid (vessel to pump suction)
  2. Rated capacity: 100%
  3. Type: centrifugal

B. Motor-driven LPCS pump P1
  1. Rated flow: 4,900 gpm @ 113 psid (vessel to drywell)
  2. Rated capacity: 33 1/3%
  3. Type: centrifugal

C. Motor-driven LPCI pumps P1A, P1B, P1C
  1. Rated flow: 14,900 gpm @ 20 psid (vessel to drywell)
  2. Rated capacity: 100%
  3. Type: centrifugal

D. Automatic-depressurization valves (7)
  1. Rated flow: 800,000 lb/hr @ 1125 psig (each)

E. Pressure Suppression Chamber
  1. Design temperature: 185°F
  2. Operating temperature: 100°F
  3. Minimum water volume: 124,726 ft^3

3.3.6 Support Systems and Interfaces

A. Control signals
  1. Automatic
     a. The HPCS pump, LPCS pump, and the LPCI pumps, and all the associated valves function upon receipt of low water level in the reactor vessel or high pressure in the drywell.
     b. The HPCI pump is automatically tripped on a reactor vessel high water level signal. It may then be necessary to restart the pump manually.
     c. The ADS system is actuated upon coincident signals of the reactor vessel low water level, drywell high pressure, and discharge pressure indication on any LPCI or LPCS pump but with a 2-min delay.
     d. HPCS pump suction is automatically switched to the suppression pool on high suppression pool water level.
     e. LPCI initiation automatically causes all RHR components to perform their function under the LPCI mode.
  2. Remote manual
     ECCS pumps and valves and the ADS can be actuated by remote manual means from the main control room.

B. Motive Power
   1. The ECCS motor-driven pumps and motor-operated valves are Class 1E AC loads that can be supplied from the emergency diesel generator, as described in Section 3.5.
   2. The components of the HPCS are powered from a dedicated diesel generator.

C. Other
   1. Lubrication and cooling for the ECCS pumps are assumed to be supplied locally.
   2. Room ventilation systems are cooled by standby service water (see Section 3.7).

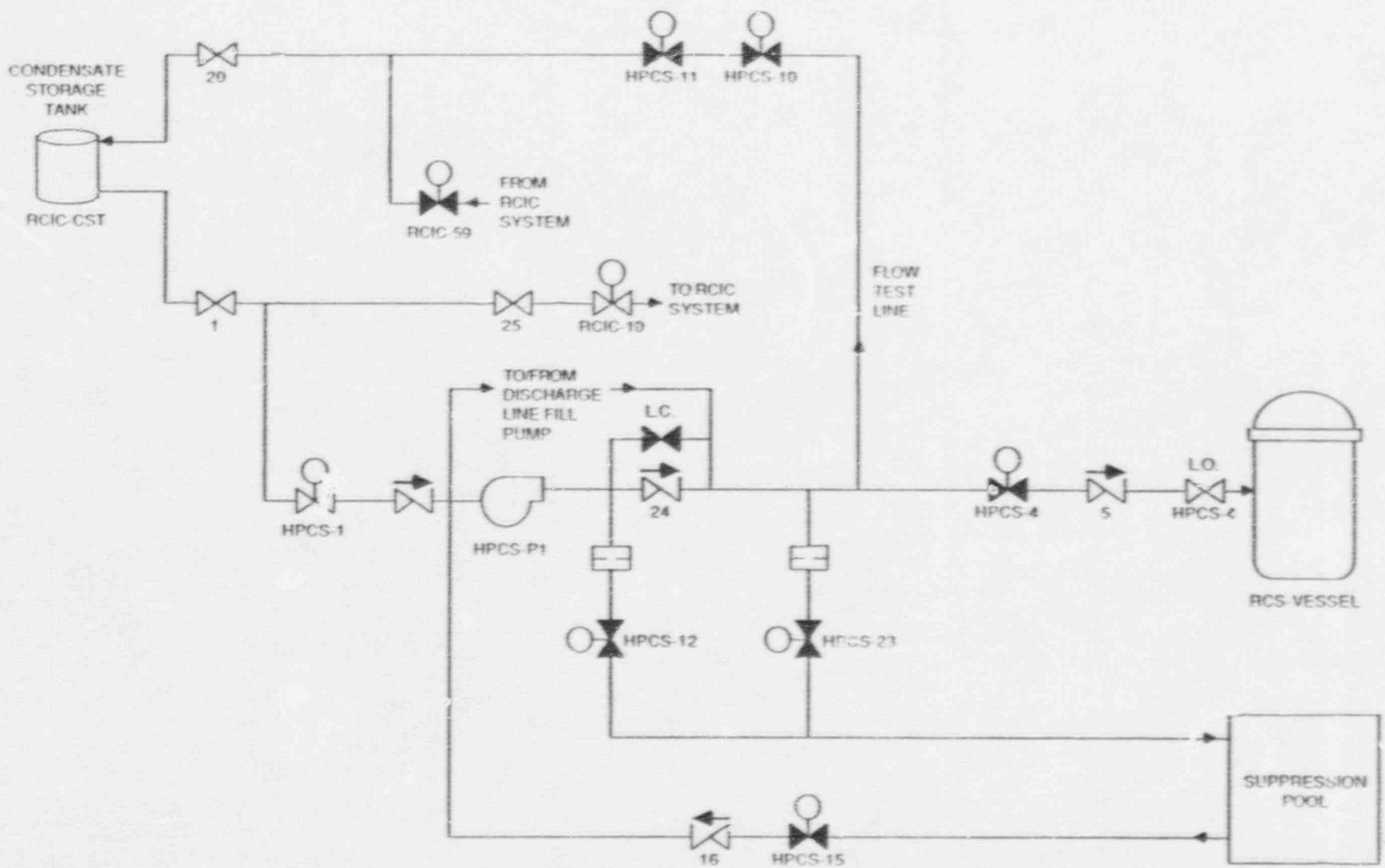


Figure 3.3-1. River Bend 1 High Pressure Core Spray System

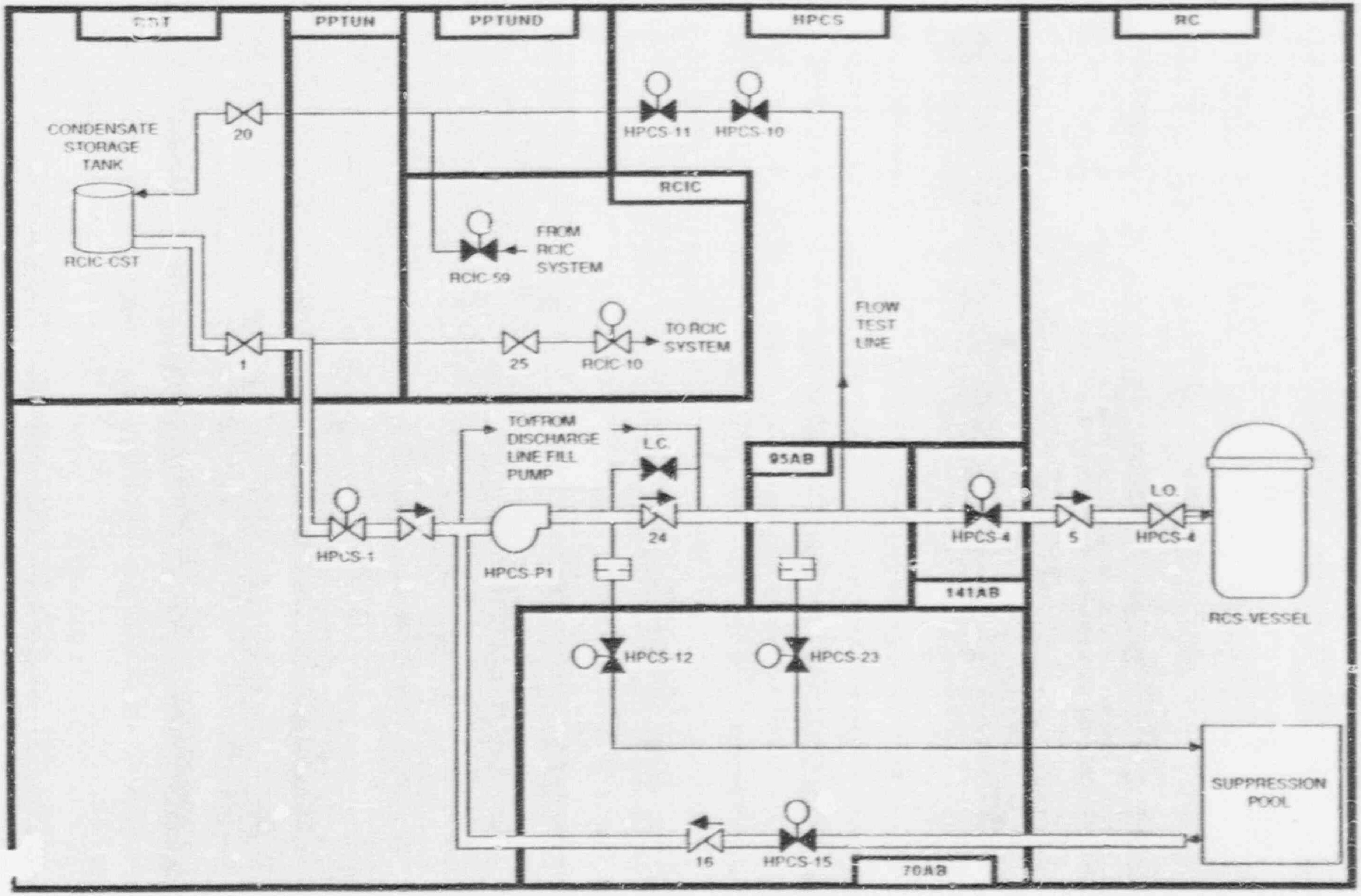


Figure 3.3-2. River Bend 1 High Pressure Core Spray System Showing Component Locations

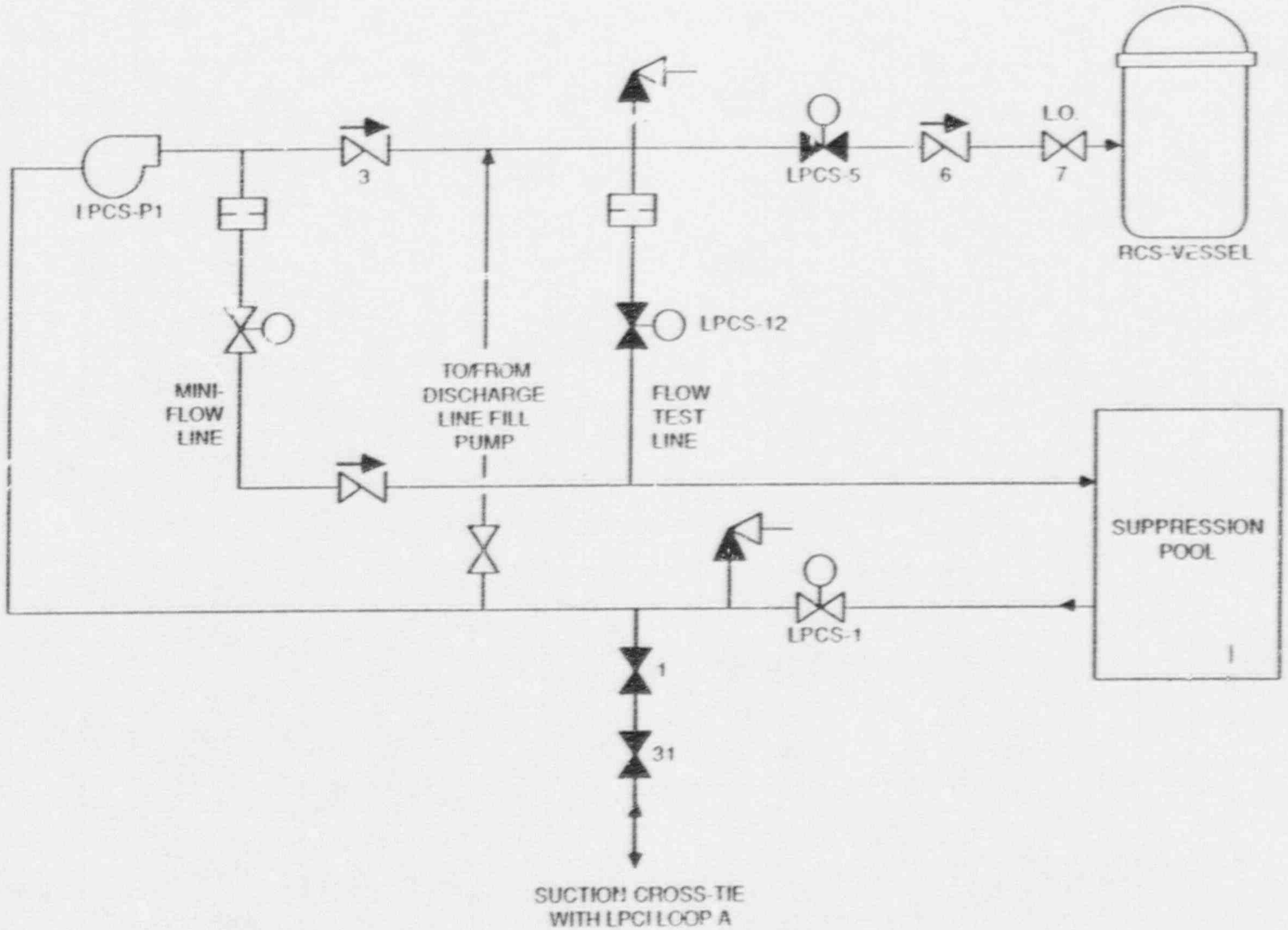


Figure 3.3-3. River Bend 1 Low Pressure Core Spray System

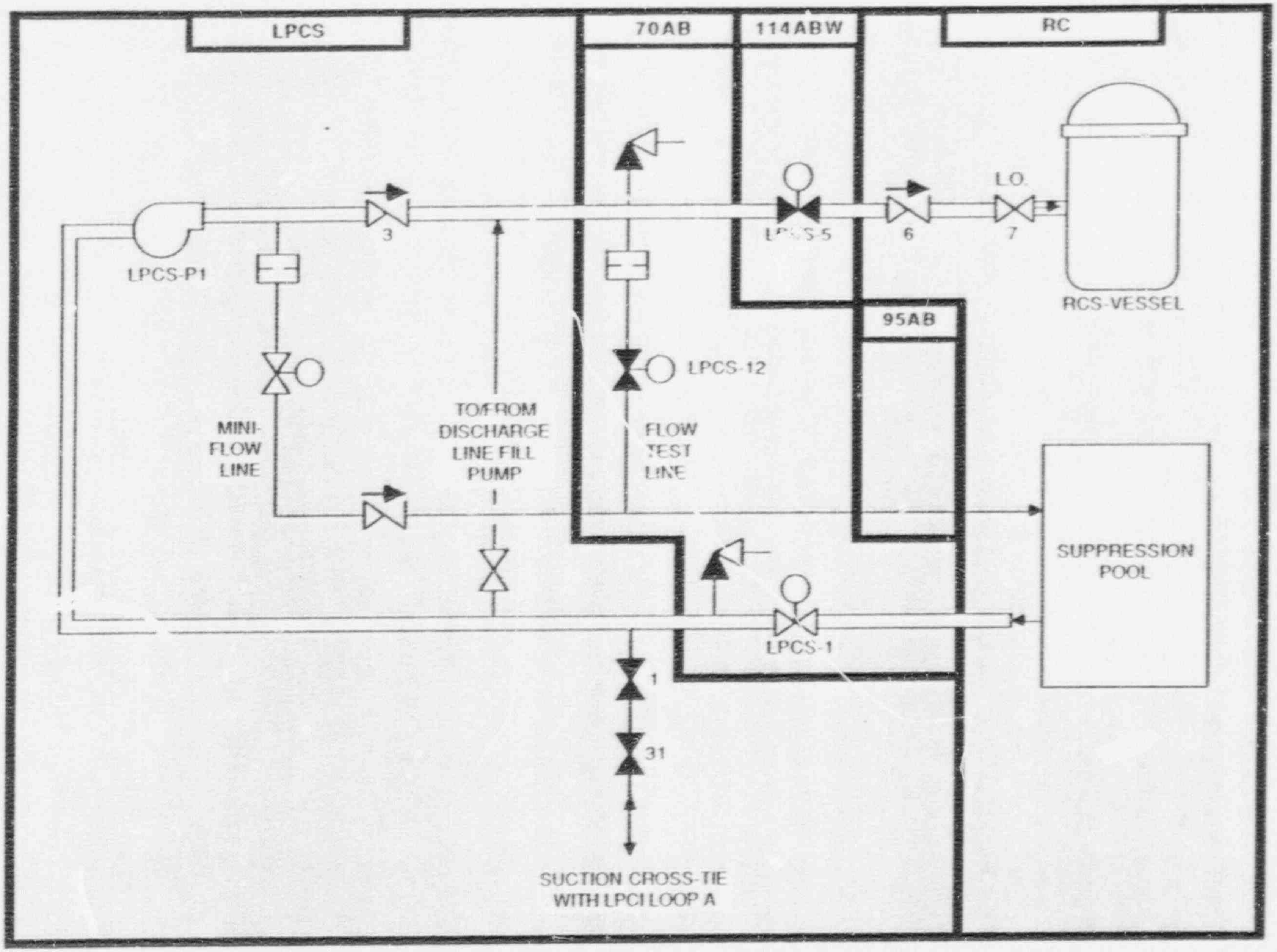


Figure 3.3-4. River Bend 1 Low Pressure Core Spray System
Showing Component Locations

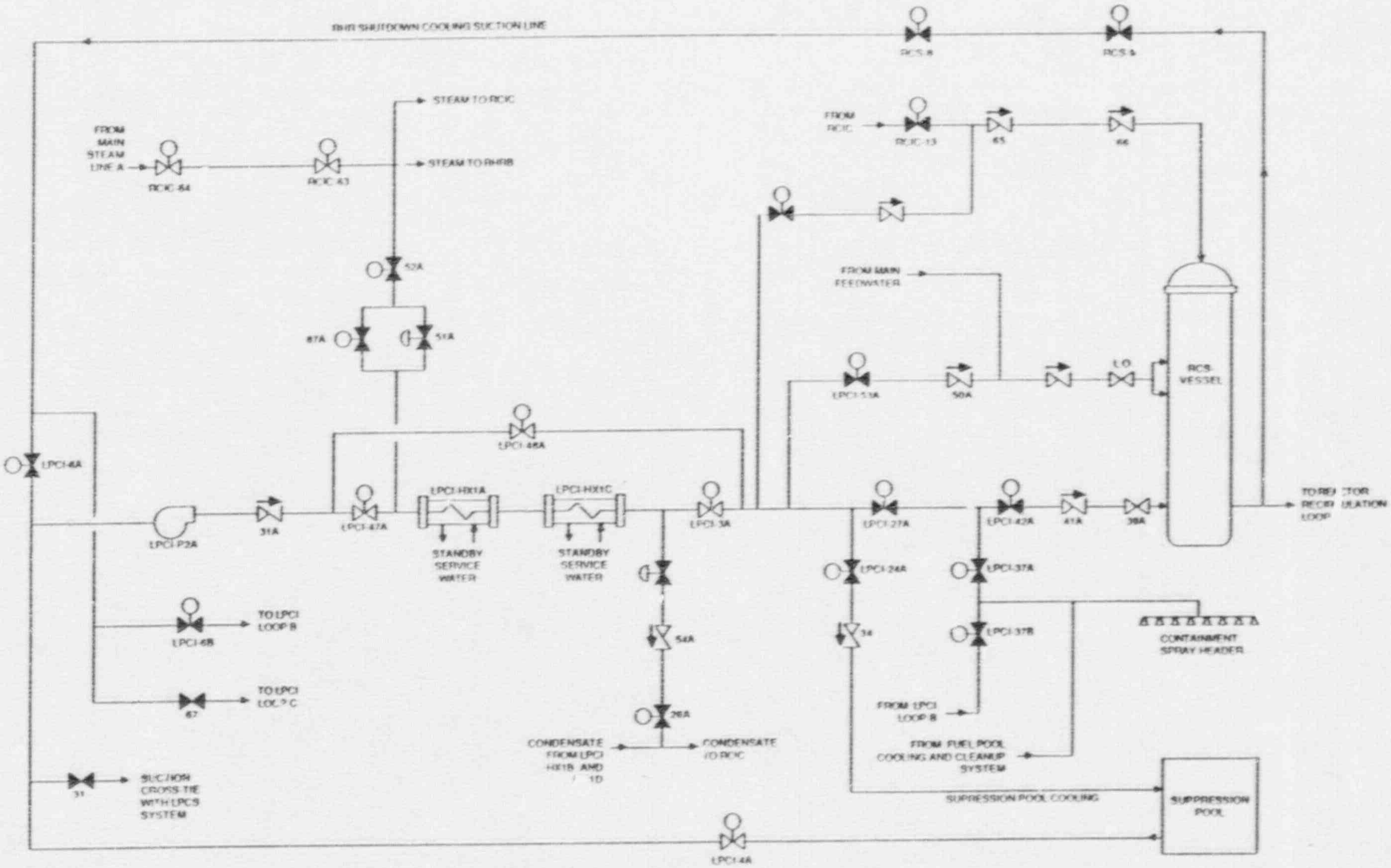


Figure 3.3-5. River Bend 1 Low Pressure Coolant Injection System Loop A

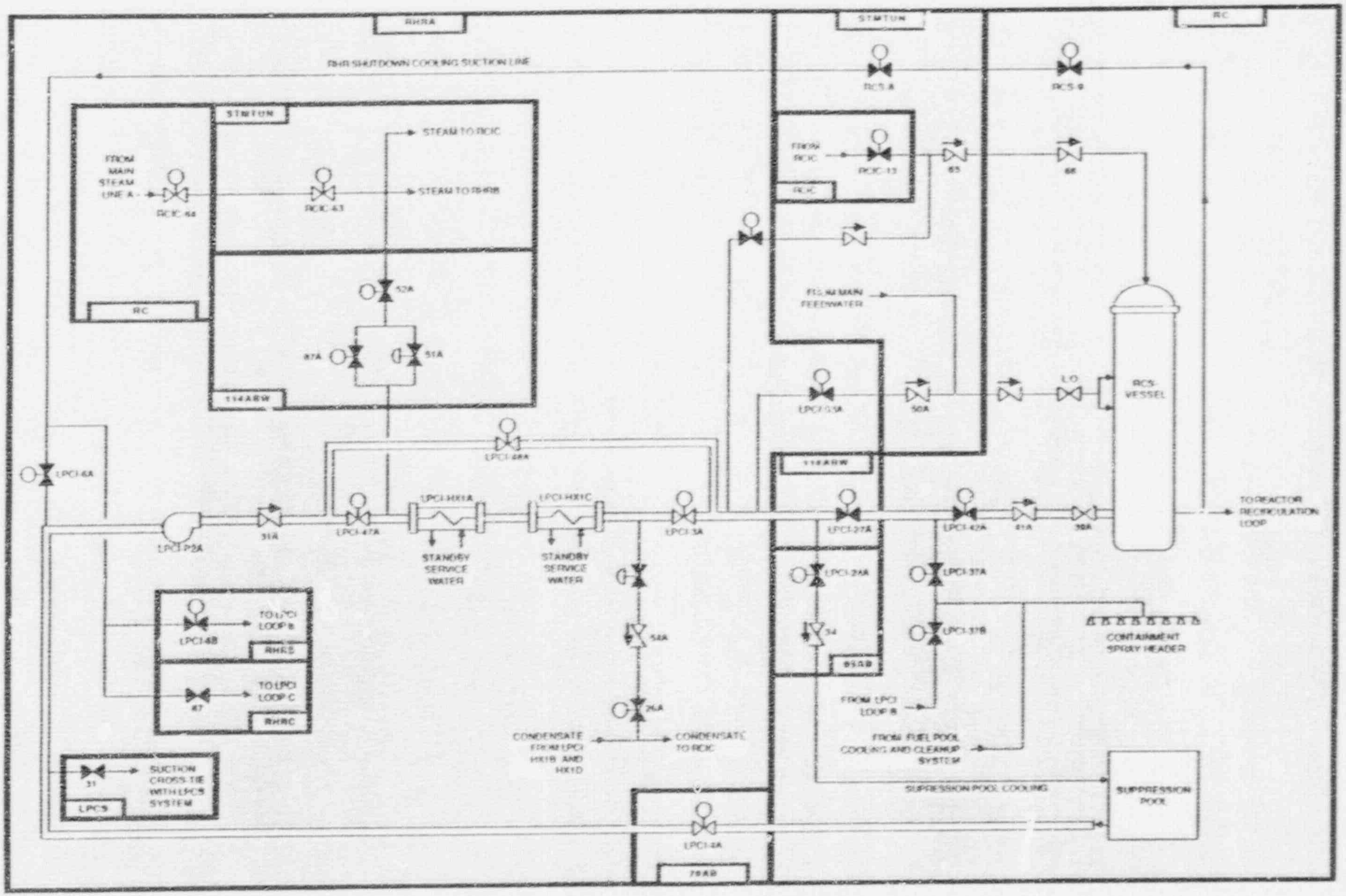


Figure 3.3-6. River Bend 1 Low Pressure Coolant Injection System Loop A Showing Component Locations

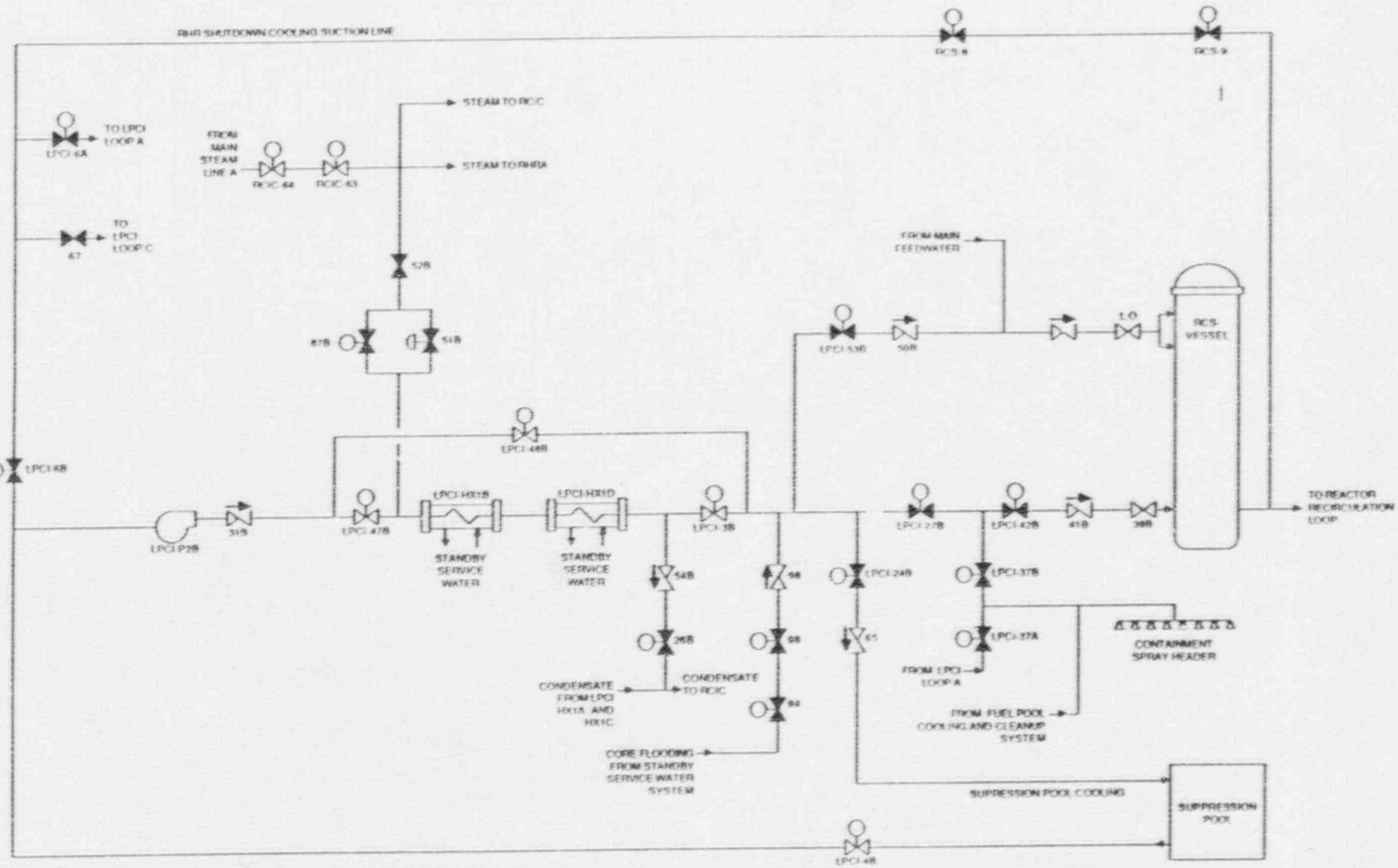


Figure 3.3-7. River Bend 1 Low Pressure Coolant Injection System Loop B

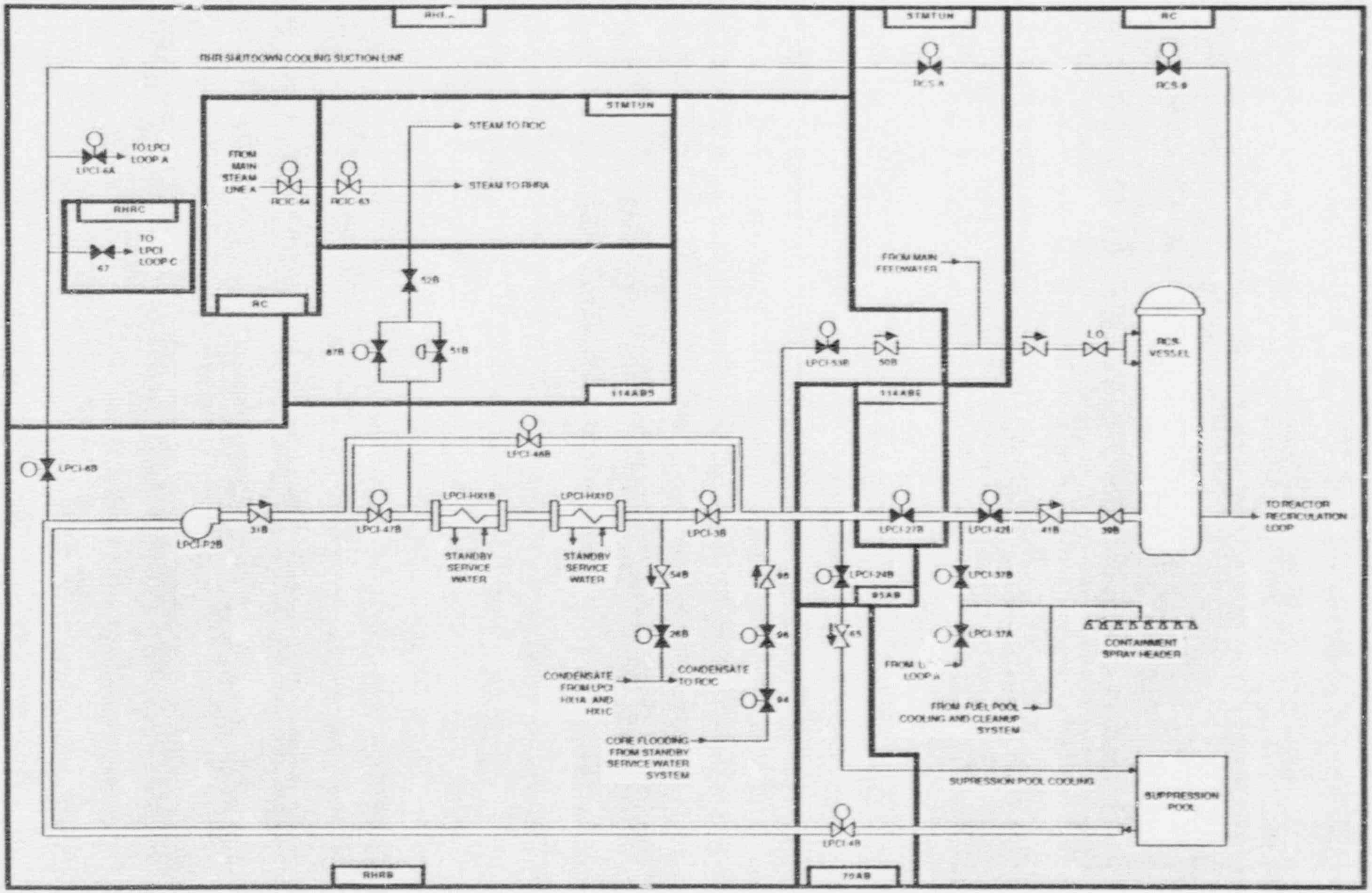


Figure 3.3-8. River Bend 1 Low Pressure Coolant Injection System Loop B Showing Component Locations

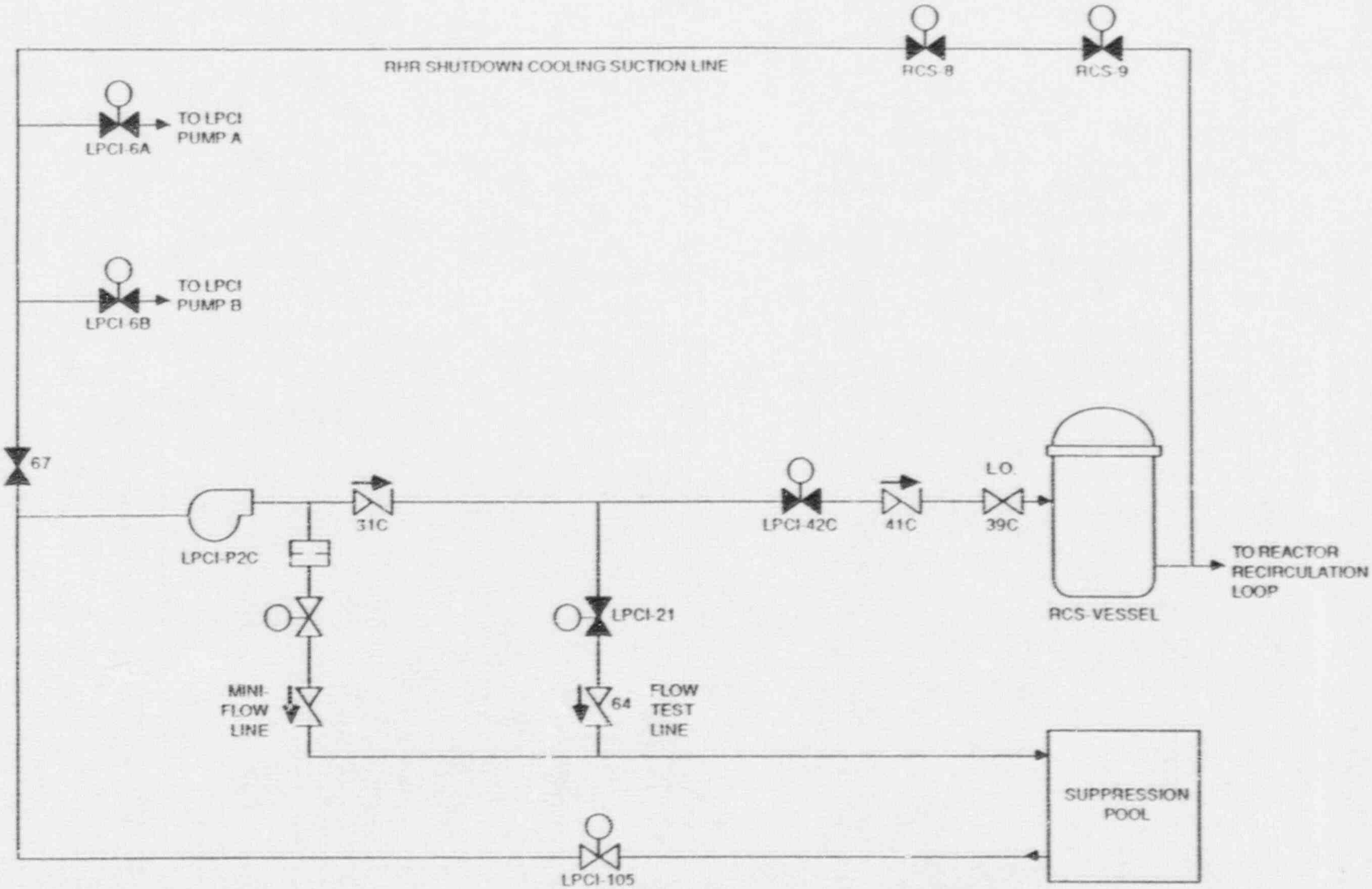


Figure 3.3-9. River Bend 1 Low Pressure Injection System Loop C

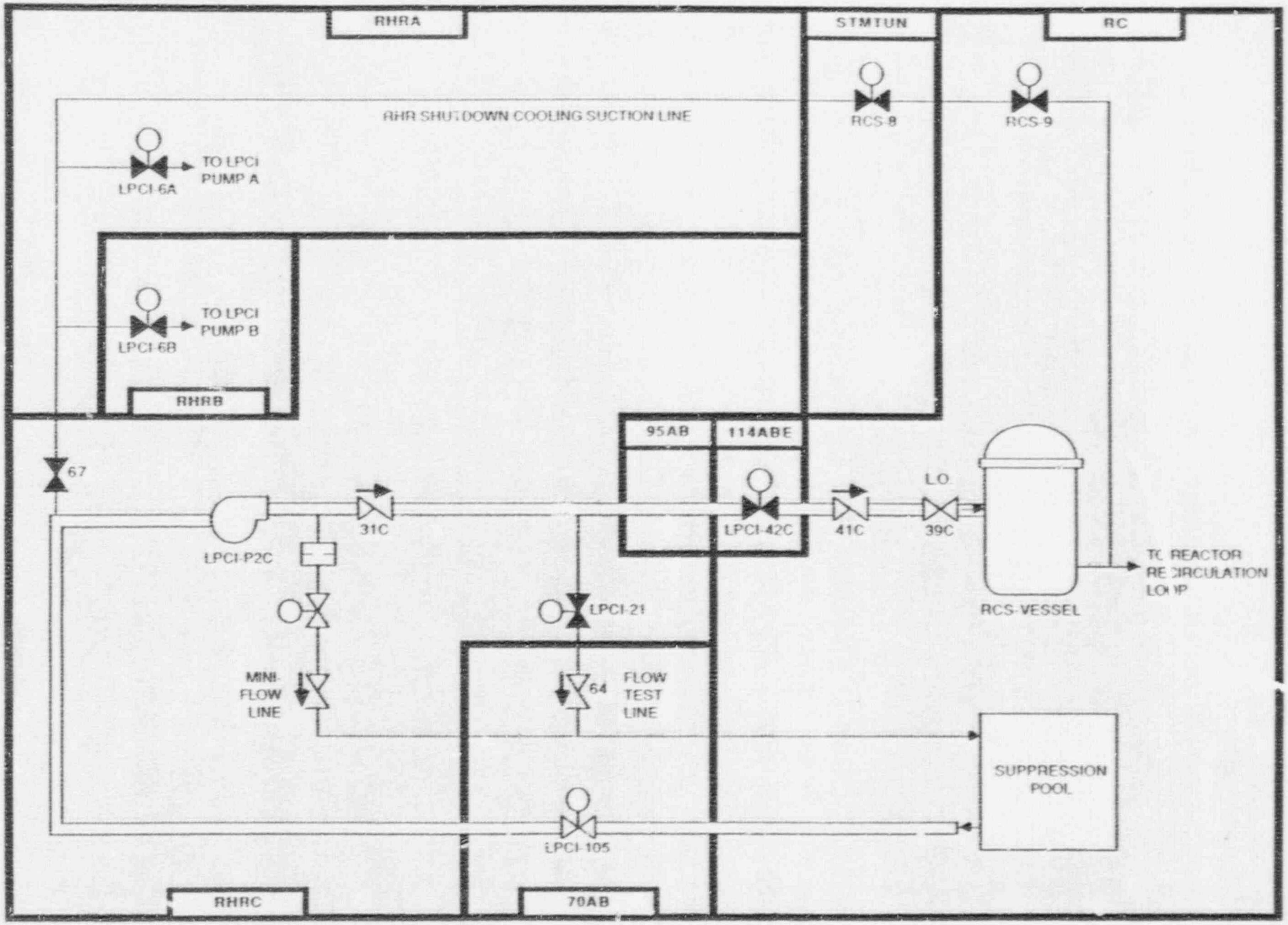


Figure 3.3-10. River Bend 1 Low Pressure Injection System Loop C Showing Component Locations

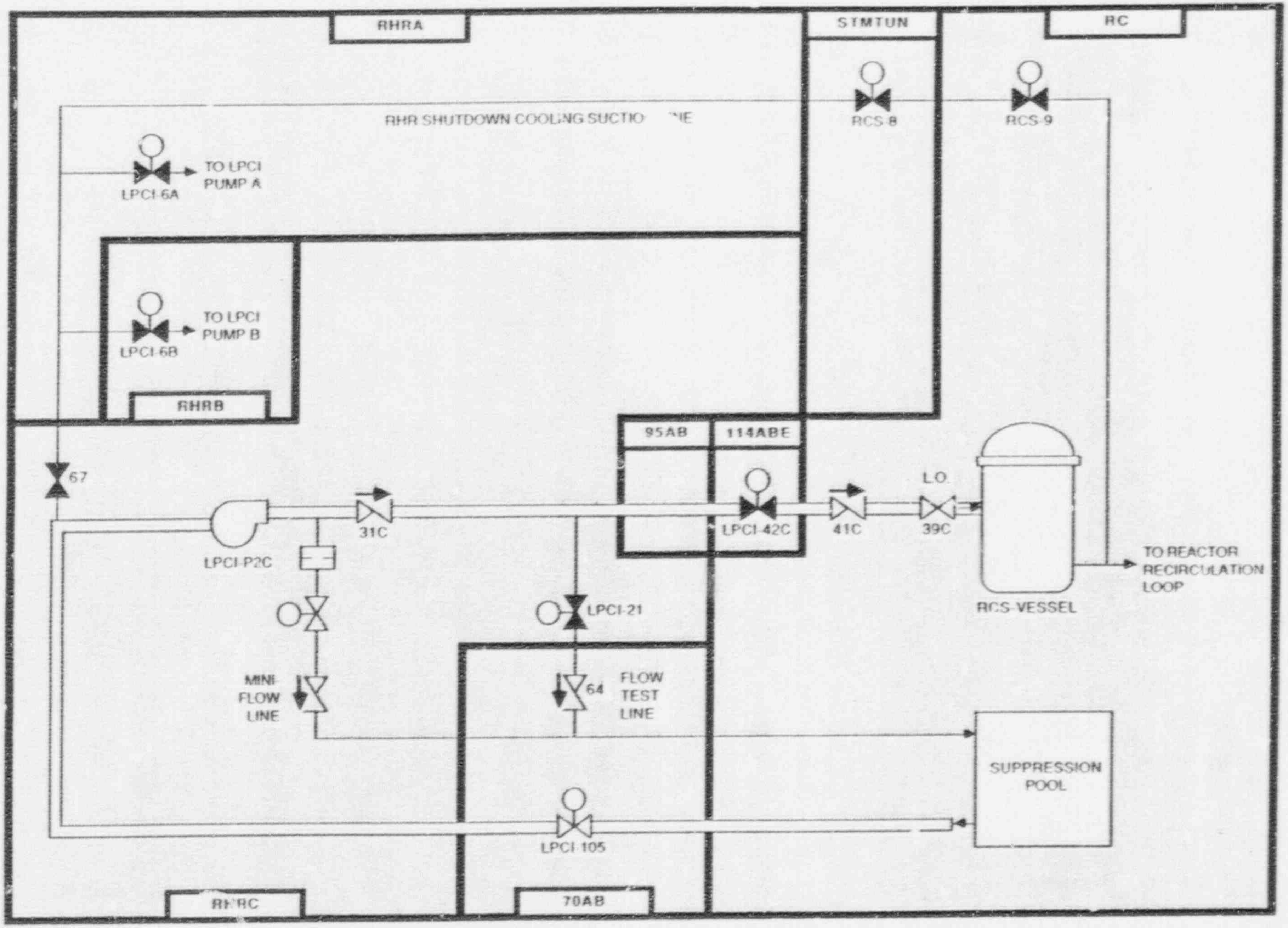


Figure 3.3-10. River Bend 1 Low Pressure Injection System Loop C Showing Component Locations

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

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
HPCS-1	MOV	HPCS	MCC-S002	480	SWGRMC	AC/C
HPCS-10	MOV	HPCS	MCC-S002	480	SWGRMC	AC/C
HPCS-11	MOV	HPCS	MCC-S002	480	SWGRMC	AC/C
HPCS-12	MOV	70AB	MCC-S002	480	SWGRMC	AC/C
HPCS-15	MOV	70AB	MCC-S002	480	SWGRMC	AC/C
HPCS-23	MOV	HPCS	MCC-S002	480	SWGRMC	AC/C
HPCS-4	MOV	141AB	MCC-S002	480	SWGRMC	AC/C
HPCS-P1	MDP	HPCS	BUS-S004	4160	SWGRMC	AC/C
LPCI-105	MOV	70AB	MCC-2F	480	114ABE	AC/B
LPCI-21	MOV	RHRC	MCC-2F	480	114ABE	AC/B
LPCI-24A	MOV	95AB	MCC-2E	480	114ABW	AC/A
LPCI-24B	MOV	95AB	MCC-2F	480	114ABE	AC/B
LPCI-27A	MOV	114ABW	MCC-2J	480	141AB	AC/A
LPCI-27B	MOV	114ABE	MCC-2H	480	114ABE	AC/B
LPCI-37A	MOV	RC	MCC-2C	480	141AB	AC/A
LPCI-37B	MOV	RC	MCC-2K	480	141AB	AC/B
LPCI-3A	MOV	RHRA	MCC 2E	480	114ABW	AC/A
LPCI-3B	MOV	RHRB	MCC-2F	480	114ABE	AC/B
LPCI-40	MOV	RHRA	MCC-2E	480	114ABW	AC/A
LPCI-42A	MOV	RC	MCC-2C	480	141AB	AC-A
LPCI-42B	MOV	RC	MCC-2K	480	141AB	AC/B
LPCI-42C	MOV	114ABE	MCC-2F	480	114ABE	AC/B
LPCI-47A	MOV	RHRA	MCC-2E	480	114ABW	AC/A
LPCI-47B	MOV	RHRB	MCC-2F	480	114ABE	AC/B
LPCI-48A	MOV	RHRA	MCC-2E	480	114ABW	AC/A
LPCI-48B	MOV	RHRB	MCC-2F	480	114ABE	AC/B
LPCI-49	MOV	RHRA	MCC-2H	480	114ABE	AC/B
LPCI-4A	MOV	70AB	MCC-2E	480	114ABW	AC/A

Table 3.3-1. River Bend 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.
LPCI-4B	MOV	70AB	MCC-2F	480	114ABE	AC/B
LPCI-53A	MOV	RHRA	MCC-2G	480	114ABW	AC/A
LPCI-53B	MOV	RHRB	MCC-2H	480	114ABE	AC/B
LPCI-6A	MOV	RHRA	MCC-2E	480	114ABW	AC/A
LPCI-6B	MOV	RHRB	MCC-2F	480	114ABE	AC/B
LPCI-P1A	MDP	RHRA	BUS-ENS1A	4160	SWGRMA	AC/A
LPCI-P2B	MDP	RHRB	BUS-ENS1B	4160	SWGRMB	AC/B
LPCI-P2C	MDP	RHRC	BUS-ENS1B	4160	SWGRMB	AC/B
LPCS-1	MOV	70AB	MCC-2D	480	141AB	AC/B
LPCS-12	MOV	70AB	MCC-2E	480	114ABW	AC/A
LPCS-5	MOV	114ABW	MCC-2J	480	141AB	AC/A
LPCS-P1	MDP	LPCS	BUS-ENS1A	4160	SWGRMA	AC/A

3.4 INSTRUMENTATION AND CONTROL (I&C) SYSTEMS

3.4.1 System Function

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

3.4.2 System Definition

The RPS includes sensor and transmitter units, logic units, and output trip relays that interface with the control circuits for components in the Control Rod Drive Hydraulic System (see Section 3.6). The ESF system includes independent sensor and transmitter units, logic units, and relays that interface with the control circuits for the many different components that can be actuated by ESF. Operator instrumentation display systems consist of display panels that are powered by 120 VAC power (see Section 3.5). The RSS includes transfer and control switches at remote shutdown panels and other related control points for equipment which is controlled during remote shutdown.

3.4.3 System Operation

A. RPS

The RPS has four input instrument channels and two output actuation trains. The variables monitored by the RPS are listed below:

- Neutron monitoring system
- Reactor vessel high pressure
- Reactor vessel low water level
- Reactor vessel high water level
- Turbine stop valve closure
- Turbine control valve fast closure
- Main steam line isolation valve closure
- Scram discharge instrument volume high water level
- Drywell high pressure
- Main steam line high radiation
- Manual

Both output channels must be de-energized to initiate a scram. The failure of a single component or power supply does not prevent a desired scram or cause an unwanted scram.

B. ESF

The ESF system has up to four input instrument channels for each sensed parameter, and two output trains. In general, each train controls equipment powered from different Class 1E electrical buses. Details regarding ESF actuation logic are included in the system description for the actuated system.

C. Remote Shutdown

The Remote Shutdown System (RSS) is designed to achieve and maintain hot reactor shutdown and subsequently to achieve cold shutdown from outside the main control room following these postulated conditions:

- The plant is at normal operating conditions, all plant personnel have been evacuated from the main control room, and it is inaccessible for control of the plant.
- The initial event that causes the main control room to become inaccessible is assumed to be such that the reactor operator can manually scram the reactor.

The RSS is required only during times of main control room inaccessibility when normal plant operating conditions exist, (i.e. no transients or accidents are occurring). Some of the existing systems used for normal reactor shutdown operation are also utilized in the remote shutdown capability to shut down the reactor from outside the main control room. The functions needed for remote shutdown control are provided with manual transfer switches which override controls from the main control room and transfer the controls to the remote shutdown panel and other selected control points. Remote shutdown control is not possible without actuation of the transfer switches. Power supplies and control logic are transferred and isolated. The isolated Division I and III control logic circuits required to shutdown the plant in the event of a main control room fire are furnished power from independently fused power supplies. Access to the remote shutdown panels is administratively and procedurally controlled via the plant security system. Local transfer switch positions are monitored via remote annunciation in the main control room, while proper system lineup (local control switches) is monitored via remote indication at the RSS Division I panel. The controls available at the RSS panels are listed below:

Division I Remote Shutdown Panel	Division II Remote Shutdown Panel
RCIC System MOVs	RHR System pumps 2B and 2C
RCIC air compressor	RHR System MOVs (trains B and C)
Nuclear boiler system air-operated SRVs	Nuclear boiler system air-operated SRVs 51C, 51D and 51G
Standby service water system pumps 2A, 3A, 3C	Standby service water system pumps 2B and 2D
Standby service water system MOVs (trains A and C)	Standby service water system MOVs (trains B and D)
Standby service water pressure controllers 32A and 32C	

3.4.4 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 is implemented by the scram pilot valves in the control rod drive hydraulic system (see Section 3.6). Details of the RPS for River Bend 1 have not been determined.

B. Other Actuation Systems

A single component usually receives a signal from only one actuation system output train. Trains A and B must be available in order to automatically actuate their respective components. Actuation systems other than the RPS typically use 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 actuation system output channels to send an actuation signal. Note that there may be some 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 other actuation systems for River Bend 1 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 other actuation 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.

3.4.5 Support Systems and Interfaces

A. Control Power

1. RPS

   The RPS is powered from two 120 VAC RPS buses.

2. ESF System

   The ESF system is assumed to be powered from 120 VAC buses.

3. Operator Instrumentation

   Operator instrumentation displays are powered from the 120 VAC instrumentation power panels as described in Section 3.5.

3.4.6 Section 3.4 Reference

1. River Bend Final Safety Analysis Report, Section 7.4.1.4.

3.5 ELECTRIC POWER SYSTEM

3.5.1 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.

3.5.2 System Definition

The River Bend onsite Class 1E electric power system consists of three independent trains, denoted 1A, 1B, and 1C. Train 1C is dedicated to components of the HPCS system.

Trains 1A and 1B consist of a standby diesel generator, a 4160 VAC switchgear bus, two 480 VAC load center buses, a station battery, and a 125 VDC bus. The HPCS train is similar, except that there is one 480 VAC motor control center connected directly to the 4160 VAC bus.

The system also contains two 120 VAC uninterruptible power supplies which supply power to vital instrumentation panels.

A simplified one-line diagram of the electric power system is shown in Figure 3.5-1. A summary of data on selected electric power system components is presented in Table 3.5-1. A partial listing of electrical sources and loads is presented in Table 3.5-2.

3.5.3 System Operation

During normal operation the Class 1E AC system is supplied by three normal 4160 VAC buses, NNS1A, NNS1B, and NNS1C. These normal buses are supplied by the main generator through the station transformer. An alternate source of power is offsite power.

The three standby diesel generators are started automatically upon either loss of voltage on the associated standby 4160 VAC bus, or a LOCA signal, or a manual start signal. Diesel generator 1A is connected to 4160 VAC bus ENS1A, diesel generator 1B is connected to 4160 VAC bus ENS1B, and the HPCS diesel generator 1C is connected to 4160 VAC bus S004. Bus ENS1A feeds the 480 VAC load center buses JS1A and JS2A, which in turn feed various Train 1A MCCs. Bus ENS1B feeds 480 VAC buses JS1B and JS2B, which in turn feed various Train 1B MCCs. Bus S004 feeds 480 VAC MCC S002 directly through a transformer.

The 125 VDC subsystem consists of three buses, each associated with a separate load group. DC Bus 1A is normally supplied by bus JS1A through battery charger 1A, DC bus 1B is normally supplied by bus JS1B through battery charger 1B, and DC bus S001 is normally supplied by MCC S002 through batter charger S001. Station batteries 1A, 1B, and S001 float on their respective DC buses.

The 120 VAC subsystem consists of two uninterruptible power supplies, in Trains 1A and 1B, that feed the plant vital instrumentation panels. Each UPS receives power from both the 480 VAC subsystem and the 125 VDC subsystem. The 120 VAC subsystem also includes two RPS buses for powering Reactor Protection System instrumentation. The connection between the RPS buses and the remainder of the electric power system could not be determined from available information.

Redundant safety equipment such as motor driven pumps and motor operated valves are supplied by different buses of MCCs. For the purpose of discussion, this equipment has been grouped into "load groups". Load group "AC/A" contains components receiving electric power either directly of indirectly from 4160 bus ENS1A. Load group "AC/B" contains components powered either directly or indirectly from 4160 bus ENS1B. Load group "AC/C" contains components powered either directly or indirectly from 4160 bus S004. Components receiving DC power are assigned to load groups "DC/A" to "DC/C", based on the battery source.

3.5.4 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

3.5.5 Component Information

A. Standby diesel generators 1A, 1B
   1. Continuous power rating: 3500 kW
   2. 2-hour rating: 3850 kW
   3. Rated voltage: 4160 VAC
   4. Manufacturer: unknown

B. HPCS diesel generator 1C
   1. Continuous power rating: 2850 kW
   2. Rate voltage: 4160 VAC
   3. Manufacturer: unknown

C. Station batteries 1A, 1B, S001
   1. Type: Lead-acid
   2. Cells: 60
   3. Design capacity: about 4 hours with design loads

3.5.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The standby diesel generators are automatically started on loss of voltage on their associated bus or on a LOCA signal
   2. Remote manual
      The diesel generators can be started, and many distribution circuit breakers can be operated from the main control room.

B. Diesel Generator Auxiliary Systems
   The following auxiliaries are provided for each emergency diesel generator:
   - Cooling
     The standby service water system (see Section 3.7) provides for diesel cooling.
   - Fueling
     An independent day tank is provided for each diesel. A day tank will support almost two hours of diesel operation with design loads.
   - Lubrication
     Each diesel generator has a self-contained lubrication system.

- Starting
  An independent starting air accumulator is provided for each diesel generator.
- Ventilation
  Details on diesel room ventilation systems have not been determined.

C. Switchgear and Battery Room Ventilation Systems
Details on switchgear and battery room ventilation systems have not been determined.

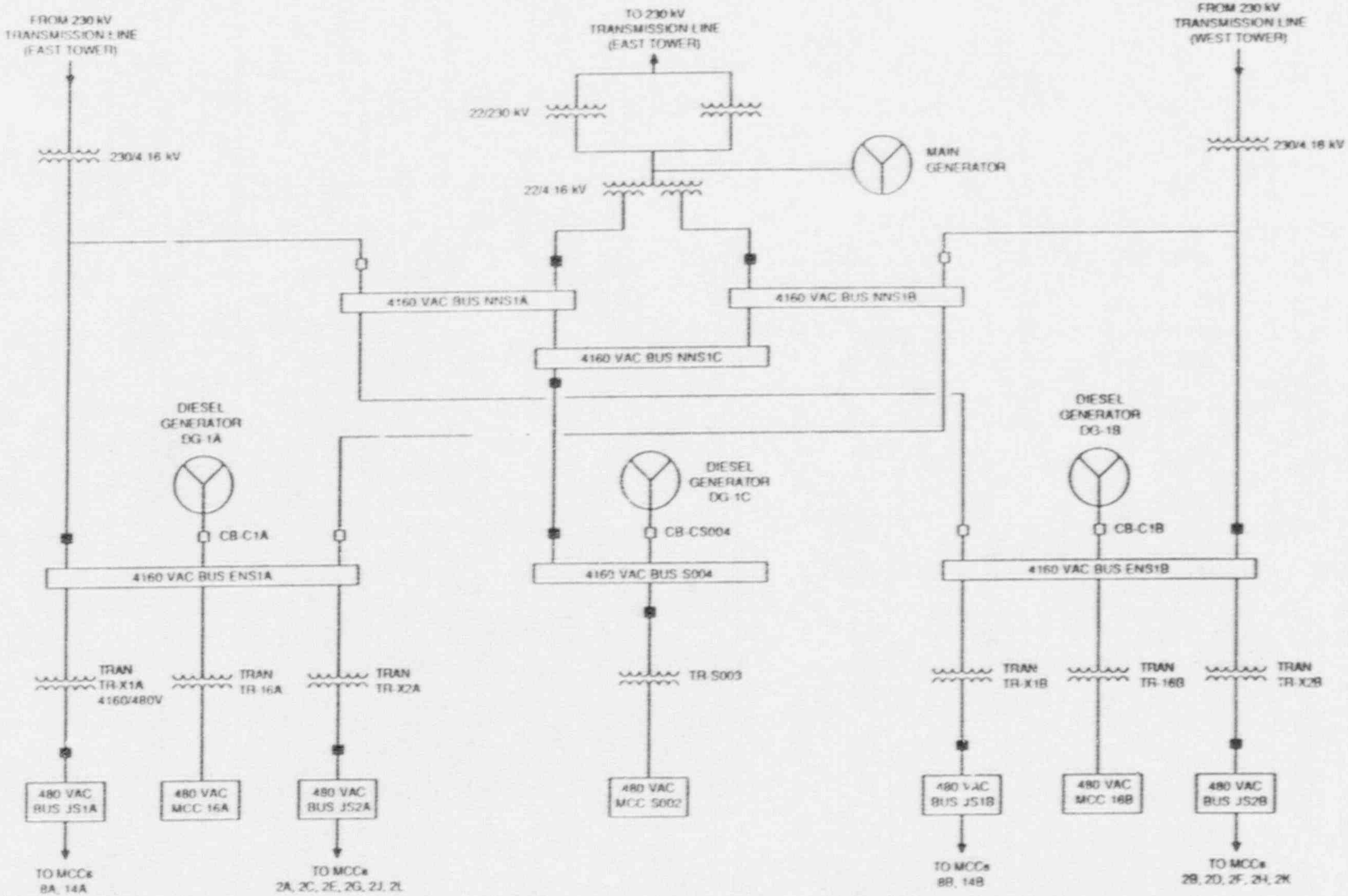


Figure 3.5-1. River Bend 1 4160 and 480 VAC Electric Power Distribution System

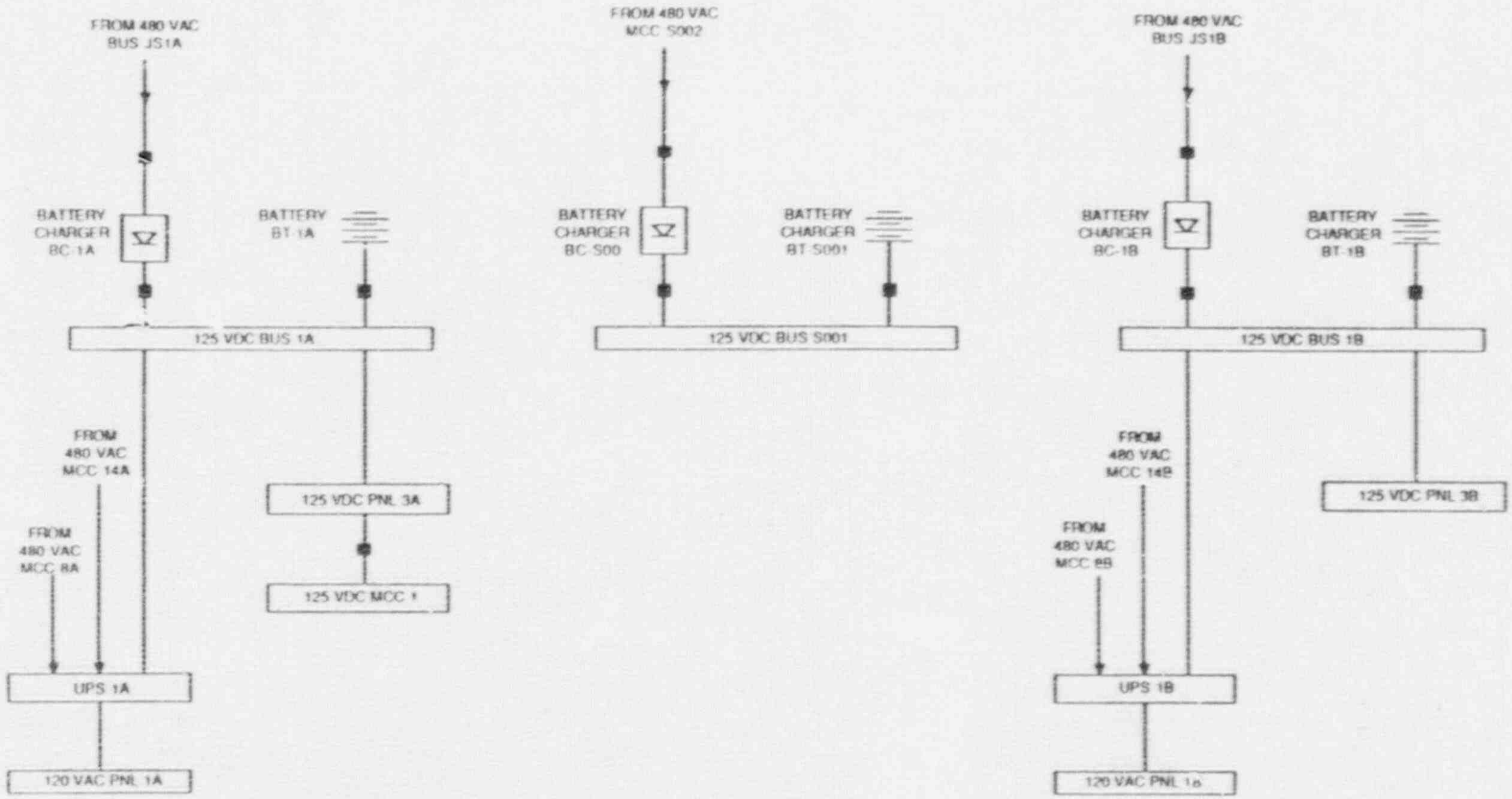


Figure 3.5-2. River Bend 1 125VDC and 120 VAC Electric Power Distribution System

Table 3.5-1. River Bend 1 Electric Power System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
BC-1A	BC	DCEQRMA	BUS-JS1A	125	SWGRMA	AC/A
BC-1B	BC	DCEQRMB	BUS-JS1B	125	SWGRMB	AC/B
BC-S001	BC	DCEQRMC	MCC-S002	125	SWGRMC	AC/C
BT-1A	BATT	BATRMA		125		DC/A
BT-1B	BATT	BATRMB		125		DC/B
BT-S001	BATT	BATRMC		125		DC/C
BUS-DC1A	BUS	SWGRMA	BT-1A	125	BATRMA	DC/A
BUS-DC1A	BUS	SWGRMA	BC-1A	125	DCEQRMA	DC/A
BUS-DC1B	BUS	SWGRMB	BT-1B	125	BATRMB	DC/B
BUS-DC1B	BUS	SWGRMB	BC-1B	125	DCEQRMB	DC/B
BUS-ENS1A	BUS	SWGRMA	DG-1A	4160	DGRMA	AC/A
BUS-ENS1B	BUS	SWGRMB	DG-1B	4160	DGRMB	AC/B
BUS-JS1A	BUS	SWGRMA	TR-X1A	480	SWGRMA	AC/A
BUS-JS1B	BUS	SWGRMB	TR-X1B	480	SWGRMB	AC/B
BUS-JS2A	BUS	141AB	TR-X2A	480	SWGRMA	AC/A
BUS-JS2B	BUS	141AB	TR-X2B	480	SWGRMB	AC/B
BUS-S001	BUS	DGHALLC	BT-S001	125	BATRMC	DC/C
BUS-S001	BUS	DGHALLC	BC-S001	125	DCEQRMC	DC/C
BUS-S004	BUS	SWGRMC	DG-1C	4160	DGRMC	AC/C
CB-C1A	CB	SWGRMA	DG-1A	4160	DGRMA	AC/A
CB-C1B	CB	SWGRMB	DG-1B	4160	DGRMB	AC/B
CB-CS004	CB	SWGRMC	DG-1C	4160	DGRMC	AC/C
DG-1A	DG	DGRMA		4160		AC/A
DG-1B	DG	DGRMB		4160		AC/B
DG-1C	DG	DGRMC		4160		AC/C
MCC-1	MCC	95AB	PNL-DC3A	125	DGHALLA	DC/A
MCC-14A	MCC	SWGRMA	BUS-JS1A	480	SWGRMA	AC/A
MCC-14B	MCC	SWGRMB	BUS-JS1B	480	SWGRMB	AC/B

Table 3.5-1. River Bend 1 Electric Power System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
MCC-16A	MCC	SSWCT	TR-X3A	480	SWGRMA	AC/A
MCC-16B	MCC	SSWCT	TR-X3B	480	SWGRMB	AC/B
MCC-2A	MCC	141AB	BUS-JS2A	480	141AB	AC/A
MCC-2B	MCC	141AB	BUS-JS2B	480	141AB	AC/B
MCC-2C	MCC	141AB	BUS-JS2A	480	141AB	AC/A
MCC-2D	MCC	141AB	BUS-JS2B	480	141AB	AC/B
MCC-2E	MCC	114ABW	BUS-JS2A	480	141AB	AC/A
MCC-2F	MCC	114ABE	BUS-JS2B	480	141AB	AC/B
MCC-2G	MCC	114ABW	BUS-JS2A	480	141AB	AC/A
MCC-2H	MCC	114ABE	BUS-JS2B	480	141AB	AC/B
MCC-2J	MCC	141AB	BUS-JS2A	480	141AB	AC/A
MCC-2K	MCC	141AB	BUS-JS2B	480	141AB	AC/B
MCC-2L	MCC	141AB	BUS-JS2A	480	141AB	AC/A
MCC-8A	MCC	SWGRMA	BUS-JS1A	480	SWGRMA	AC/A
MCC-8B	MCC	SWGRMB	BUS-JS1B	480	SWGRMB	AC/B
MCC-S002	MCC	SWGRMC	TR-S003	480	SWGRMC	AC/C
PNL-1A	PNL	CR	UPS-1A	120	DCEQRMA	AC/A
PNL-1B	PNL	CR	UPS-1B	120	DCEQRMB	AC/B
PNL-DC3A	PNL	DGHALLA	BUS-DC1A	125	SWGRMA	DC/A
PNL-DC3B	PNL	DGHALLB	BUS-DC1A	125	SWGRMB	DC/B
TR-S003	XFMR	SWGRMC	BUS-S004	480	SWGRMC	AC/C
TR-X1A	XFMR	SWGRMA	BUS-ENS1A	480	SWGRMA	AC/A
TR-X1B	XFMR	SWGRMB	BUS-ENS1B	480	SWGRMB	AC/B
TR-X2A	XFMR	141AB	BUS-ENS1A	480	SWGRMA	AC/A
TR-X2B	XFMR	141AB	BUS-ENS1B	480	SWGRMB	AC/B
UPS-1A	UPS	DCEQRMA	BUS-DC1A	120	SWGRMA	AC/A
UPS-1A	UPS	DCEQRMA	MCC-8A	120	SWGRMA	AC/A
UPS-1A	UPS	DCEQRMA	MCC-14A	120	SWGRMA	AC/A

Table 3.5-1. River Bend 1 Electric Power System Data Summary for Selected Components (Continued)

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
UPS-1B	UPS	DCEQRMB	BUS-DC1B	120	SWGRMA	AC/B
UPS-1B	UPS	DCEQRMB	MCC-8B	120	SWGRMB	AC/B
UPS-1B	UPS	DCEQRMB	MCC-14B	120	SWGRMB	AC/B

Table 3.5-2. Partial Listing of Electrical Sources and Loads at River Bend 1

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
BC-1A	125	DC/A	DCEQRMA	EP	BUS-DC1A	BUS	SWGRMA
BC-1B	125	DC/B	DCEQRMB	EP	BUS-DC1B	BUS	SWGRMB
BC-S001	125	DC/C	DCEQRMC	EP	BUS-S001	BUS	DGHALLC
BT-1A	125	DC/A	BATRMA	EP	BUS-DC1A	BUS	SWGRMA
BT-1B	125	DC/B	BATRMB	EP	BUS-DC1B	BUS	SWGRMB
BT-S001	125	DC/C	BATRMC	EP	BUS-S001	BUS	DGHALLC
BUS-DC1A	125	DC/A	SWGRMA	EP	PNL-DC3A	PNL	DGHALLA
BUS-DC1A	125	DC/B	SWGRMB	EP	PNL-DC3B	PNL	DGHALLB
BUS-DC1A	120	AC/A	SWGRMA	EP	UPS-1A	UPS	DCEQRMA
BUS-DC1B	120	AC/B	SWGRMA	EP	UPS-1B	UPS	DCEQRMB
BUS-ENS1A	4160	AC/A	SWGRMA	ECCS	LPCI-P1A	MDP	RHRA
BUS-ENS1A	4160	AC/A	SWGRMA	ECCS	LPCS-P1	MDP	LPCS
BUS-ENS1A	480	AC/A	SWGRMA	EP	TR-X1A	XFMR	SWGRMA
BUS-ENS1A	4160	AC/A	SWGRMA	SSW	SSW-P2A	MDP	SSWCT
BUS-ENS1A	480	AC/A	SWGRMA	EP	TR-X2A	XFMR	141AB
BUS-ENS1B	4160	AC/B	SWGRMB	ECCS	LPCI-P2B	MDP	RHRB
BUS-ENS1B	4160	AC/B	SWGRMB	ECCS	LPCI-P2C	MDP	RHRC
BUS-ENS1B	480	AC/B	SWGRMB	EP	TR-X1B	XFMR	SWGRMB
BUS-ENS1B	480	AC/B	SWGRMB	EP	TR-X2B	XFMR	141AB
BUS-ENS1B	4160	AC/B	SWGRMB	SSW	SSW-P2B	MDP	SSWCT
BUS-ENS1B	4160	AC/B	SWGRMB	SSW	SSW-P2D	MDP	SSWCT
BUS-JS1A	125	AC/A	SWGRMA	EP	BC-1A	BC	DCEQRMA
BUS-JS1A	480	AC/A	SWGRMA	EP	MCC-14A	MCC	SWGRMA
BUS-JS1A	480	AC/A	SWGRMA	EP	MCC-8A	MCC	SWGRMA
BUS-JS1B	125	AC/B	SWGRMB	EP	BC-1B	BC	DCEQRMB
BUS-JS1B	480	AC/B	SWGRMB	EP	MCC-14B	MCC	SWGRMB
BUS-JS1B	480	AC/B	SWGRMB	EP	MCC-8B	MCC	SWGRMB
BUS-JS2A	480	AC/A	141AB	EP	MCC-2A	MCC	141AB
BUS-JS2A	480	AC/A	141AB	EP	MCC-2C	MCC	141AB
BUS-JS2A	480	AC/A	141AB	EP	MCC-2E	MCC	114ABW
BUS-JS2A	480	AC/A	141AB	EP	MCC-2G	MCC	114ABW

Table 3.5-2. Partial Listing of Electrical Sources and Loads at River Bend 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
BUS-JS2A	480	AC/A	141AB	EP	MCC-2J	MCC	141AB
BUS-JS2A	[illegible]0	AC/A	141AB	EP	MCC-2L	MCC	141AB
BUS-JS2B	480	AC/B	141AB	EP	MCC-2B	MCC	141AB
BUS-JS2B	480	AC/B	141AB	EP	MCC-2D	MCC	141AB
BUS-JS2B	480	AC/B	141AB	EP	MCC-2F	MCC	114ABE
BUS-JS2B	480	AC/B	141AB	EP	MCC-2H	MCC	114ABE
BUS-JS2B	480	AC/B	141AB	EP	MCC-2K	MCC	141AB
BUS-S004	4160	AC/C	SWGRMC	ECCS	HPCS-P1	MDP	HPCS
BUS-S004	480	AC/C	SWGRMC	EP	TR-S003	XFMR	SWGRMC
BUS-S004	4160	AC/C	SWGRMC	SSW	SSW-P2C	MDP	SSWCT
DG-1A	4160	AC/A	DGRMA	EP	BUS-ENS1A	BUS	SWGRMA
DG-1A	4160	AC/A	DGRMA	EP	BUS-ENS1A	BUS	SWGRMA
DG-1A	4160	AC/A	DGRMA	EP	CB-C1A	CB	SWGRMA
DG-1B	4160	AC/B	DGRMB	EP	BUS-ENS1B	BUS	SWGRMB
DG-1B	4160	AC/B	DGRMB	EP	BUS-ENS1B	BUS	SWGRMB
DG-1B	4160	AC/B	DGRMB	EP	CB-C1B	CB	SWGRMB
DG-1C	4160	AC/C	DGRMC	EP	BUS-S004	BUS	SWGRMC
DG-1C	4160	AC/C	DGRMC	EP	BUS-S004	BUS	SWGRMC
DG-1C	4160	AC/C	DGRMC	EP	CB-CS004	CB	SWGRMC
MCC-1	480	DC/A	95AB	RCIC	RCIC-10	MOV	RCIC
MCC-1	480	DC/A	95AB	RCIC	RCIC-13	MOV	RCIC
MCC-1	480	DC/A	95AB	RCIC	RCIC-19	MOV	STMTUN
MCC-1	480	DC/A	95AB	RCIC	RCIC-22	MOV	RCIC
MCC-1	480	DC/A	95AB	RCIC	RCIC-31	MOV	70AB
MCC-1	480	DC/A	95AB	RCIC	RCIC-45	MOV	RCIC
MCC-1	480	DC/A	95AB	RCIC	RCIC-46	MOV	RCIC
MCC-1	480		95AB	RCIC	RCIC-59	MOV	RCIC
MCC-1	480	DC/A	95AB	RCIC	RCIC-TTV	MOV	RCIC
MCC-14A	120	AC/A	SWGRMA	EP	UPS-1A	UPS	DCEQRMA
MCC-14B	120	AC/B	SWGRMB	EP	UPS-1B	UPS	DCEQRMB
MCC-16A	480	AC/A	SSWCT	SSW	SSW-40A	MOV	SSWCT

Table 3.5-2. Partial Listing of Electrical Sources and Loads at River Bend 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
MCC-16A	480	AC/A	SSWCT	SSW	SSW-501A	MOV	PPTUN
MCC-16A	480	AC/A	SSWCT	SSW	SSW-505A	MOV	SSWCT
MCC-16B	480	AC/B	SSWCT	SSW	SSW-40B	MOV	SSWCT
MCC-16B	480	AC/B	SSWCT	SSW	SSW-40D	MOV	SSWCT
MCC-16B	480	AC/B	SSWCT	SSW	SSW-501B	MOV	PPTUN
MCC-16B	480	AC/B	SSWCT	SSW	SSW-505B	MOV	SSWCT
MCC-2C	480	AC/A	141AB	ECCS	LPCI-37A	MOV	RC
MCC-2C	480	AC-A	141AB	ECCS	LPCI-42A	MOV	RC
MCC-2D	480	AC/B	141AB	ECCS	LPCS-1	MOV	70AB
MCC-2D	480	AC/B	141AB	RCIC	RCIC-63	MOV	RC
MCC-2D	480	AC/B	141AB	RCIC	RCIC-63	MOV	RC
MCC-2D	480	AC/B	141AB	RCS	RCS-1	MOV	RC
MCC-2D	480	AC/B	141AB	RCS	RCS-16	MOV	RC
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-24A	MOV	95AB
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-3A	MOV	RHRA
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-40	MOV	RHRA
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-47A	MOV	RHRA
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-48A	MOV	RHRA
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-4A	MOV	70AB
MCC-2E	480	AC/A	114ABW	ECCS	LPCI-6A	MOV	RHRA
MCC-2E	480	AC/A	114ABW	ECCS	LPCS-12	MOV	70AB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-105	MOV	70AB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-21	MOV	RHRC
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-24B	MOV	95AB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-3B	MOV	RHRB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-42C	MOV	114ABE
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-47B	MOV	RHRB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-48B	MOV	RHRB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-4B	MOV	70AB
MCC-2F	480	AC/B	114ABE	ECCS	LPCI-6B	MOV	RHRB
MCC-2F	480	AC-B	114ABE	RCS	RCS-85	MOV	STMTUN

Table 3.5-2. Partial Listing of Electrical Sources and Loads at River Bend 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
MCC-2G	480	AC/A	114ABW	ECCS	LPCI-53A	MOV	RHRA
MCC-2H	480	AC/B	114ABE	ECCS	LPCI-27B	MOV	114ABE
MCC-2H	480	AC/B	114ABE	ECCS	LPCI-49	MOV	RHRA
MCC-2H	480	AC/B	114ABE	ECCS	LPCI-53B	MOV	RHRB
MCC-2H	480	AC/B	114ABE	RCS	RCS-98A	MOV	STMTUN
MCC-2J	480	AC/A	141AB	ECCS	LPCI-27A	MOV	114ABW
MCC-2J	480	AC/A	141AB	ECCS	LPCS-5	MOV	114ABW
MCC-2K	480	AC/B	141AB	ECCS	LPCI-37B	MOV	RC
MCC-2K	480	AC/B	141AB	ECCS	LPCI-42B	MOV	RC
MCC-2K	480	AC/B	141AB	RCS	RCS-9	MOV	RC
MCC-2L	480	AC/A	141AB	RCIC	RCIC-64	MOV	STMTUN
MCC-2L	480	AC/A	141AB	RCIC	RCIC-64	MOV	STMTUN
MCC-2L	480	AC/A	141AB	RCS	RCS-19	MOV	STMTUN
MCC-2L	480	AC/A	141AB	RCS	RCS-4	MOV	STMTUN
MCC-2L	480	AC/A	141AB	RCS	RCS-8	MOV	STMTUN
MCC-8A	120	AC/A	SWGRMA	EP	UPS-1A	UPS	DCEQRMA
MCC-8A	480	AC/A	SWGRMA	SSW	SSW-506A	MOV	PPTUNDG
MCC-8A	480	AC/A	SWGRMA	SSW	SSW-77A	MOV	PPTUNDG
MCC-8A	480	AC/A	SWGRMA	SSW	SSW-77A	MOV	PPTUNDG
MCC-8B	120	AC/B	SWGRMB	EP	UPS-1B	UPS	DCEQRMB
MCC-8B	480	AC/B	SWGRMB	SSW	SSW-506B	MOV	PPTUNDG
MCC-8B	480	AC/B	SWGRMB	SSW	SSW-77B	MOV	PPTUNDG
MCC-8B	480	AC/B	SWGRMB	SSW	SSW-77B	MOV	PPTUNDG
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-1	MOV	HPCS
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-10	MOV	HPCS
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-11	MOV	HPCS
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-12	MOV	70AB
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-15	MOV	70AB
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-23	MOV	HPCS
MCC-S002	480	AC/C	SWGRMC	ECCS	HPCS-4	MOV	141AB
MCC-S002	125	AC/C	SWGRMC	EP	BC-S001	BC	DCEQRMC

Table 3.5-2. Partial Listing of Electrical Sources and Loads at River Bend 1 (Continued)

POWER SOURCE	VOLTAGE	EMERG LOAD GRP	POWER SOURCE LOCATION	LOAD SYSTEM	LOAD COMPONENT ID	COMP TYPE	COMPONENT LOCATION
MCC-S002	480	AC/C	SWGRMC	SSW	SSW-40C	MOV	SSWCT
PNL-1A	120	AC/A	CR	I&C		PNL	CR
PNL-1B	120	AC/B	CR	I&C		PNL	CR
PNL-DC3A	125	DC [illegible]	DGHALLA	EP	MCC-1	MCC	95AB
TR-[illegible]003	480	AC/C	SWGRMC	EP	MCC-S002	MCC	SWGRMC
TR-X1A	480	AC/A	SWGRMA	EP	BUS-JS1A	BUS	SWGRMA
TR-X1B	480	AC/B	SWGRMB	EP	BUS-JS1B	BUS	SWGRMB
TR-X2A	480	AC/A	SWGRMA	EP	BUS-JS2A	BUS	141AB
TR-X2B	480	AC/B	SWGRMB	EP	BUS-JS2B	BUS	141AB
TR-X3A	480	AC/A	SWGRMA	EP	MCC-16A	MCC	SSWCT
TR-X3B	480	AC/B	SWGRMB	EP	MCC-16B	MCC	SSWCT
UPS-1A	120	AC/A	DCEQRMA	EP	PNL-1A	PNL	CR
UPS-[illegible]	120	AC/B	DCEQRMB	EP	PNL-1B	PNL	CR

3.6 CONTROL ROD DRIVE HYDRAULIC SYSTEM (CRDHS)

3.6.1 System Function

The CRDHS supplies pressurized water to operate and cool the control rod drive mechanisms during normal operation. This system implements a scram command from the reactor protection system (RPS) and drives control rods rapidly into the reactor. The CRDHS also can provide makeup water to the RCS.

3.6.2 System Definition

The CRDHS consists of two high-head, low-flow, pumps, piping, filters, control valves, one hydraulic control unit for each control rod drive mechanism, and instrumentation. Water is supplied from condensate and from the condensate storage tank. The CRDHS also includes scram valves, scram accumulators, and a scram discharge volume (dump tank).

Details of the scram portion of a typical BWR CRDHS are shown in Figure 3.6-1.

3.6.3 System Operation

During normal operation the CRDHS pumps provide a constant flow for drive mechanism cooling and system pressure stablilization. Excess water not used for cooling is discharged to the RCS. Control rods are driven in or out by the coordinated operation of the direction control valves. Insertion speed is controlled by flow through the insert speed control valve. Rod motion may be either stepped or continuous.

A reactor scram is implemented by pneumatic scram valves in the CRDHS. An inlet scram valve opens to align the insert side of each control rod drive mechanism (CRDM) to the scram accumulator. An outlet scram valve opens to vent the opposite side of each CRDM to the dump tank. This coordinated action results in rapid insertion of control rods into the reactor.

Although not intended as a makeup system, the CRDHS can provide a source of cooling water to the RCS during vessel isolation. It is noted in NUREG-0626 (Ref 1), that this function is particularly important for some BWR/1 and BWR/2 plants for which the CRDHS is the primary source of makeup on vessel isolation. In later model BWR plants, RCS makeup at high pressure is performed by the RCIC (see Section 3.2) and HPCI or HPCS (see Section 3.3) systems. The maximum RCS makeup rate of the CRDHS is about 200 gpm with both pumps operating (Ref. 2).

3.6.4 System Success Criteria

For the scram function to be accomplished, the following actions must occur in the CRDHS:

- A scram signal must be transmitted by the RPS to the actuated devices (i.e., pilot valves) in the CRDHS.
- The pneumatic inlet scram valve and outlet scram valve must open in the hydraulic control units (HCUs) for the individual control rod drives. This is accomplished by venting the instrument air supply to each valve as follows:
  - Both scram pilot valves in each HCU must be deenergized, or
  - Either backup scram pilot valve must be energized.
- A high-pressure water source must be available from the scram accumulator in each HCU.
- A hydraulic vent path to the scram discharge volume must be available and sufficient collection volume must exist in the scram discharge volume.
- A specified number of control rods must respond and insert into the reactor core (specific number needed is not known).

3.6.5 Component Information

A. Control rod drive pumps (2)
   1. Rated capacity: 100% (for control rod drive function)
   2. Type: centrifugal

B. Condensate Storage Tank
   1. Capacity: 620,000 gal

3.6.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      The RPS transmits scram commands to solenoid pilot valves which control the pneumatic scram valves

   2. Remote Manual
      a. A reactor scram can be initiated manually from the control room
      b. The CRDHS can be operated manually from the control room to insert and withdraw rods, or to inject water into the RCS

B. Motive Power
   1. The control rod drive pumps are Class 1E AC loads that can be supplied from the emergency diesel generator as described in Section 3.5.

3.6.7 Section 3.6 References

1. NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant-Accidents in GE-designed Operating Plants and Near-term Operating License Applications," USNRC, January 1980.

2. Harrington, R.M., and Ott, L.J., "The Effect of Small-Capacity, High-Pressure Injection Systems on TQUV Sequences at Browns Ferry Unit One," NUREG/CR-3179, Oak Ridge National Laboratory, September 1983.

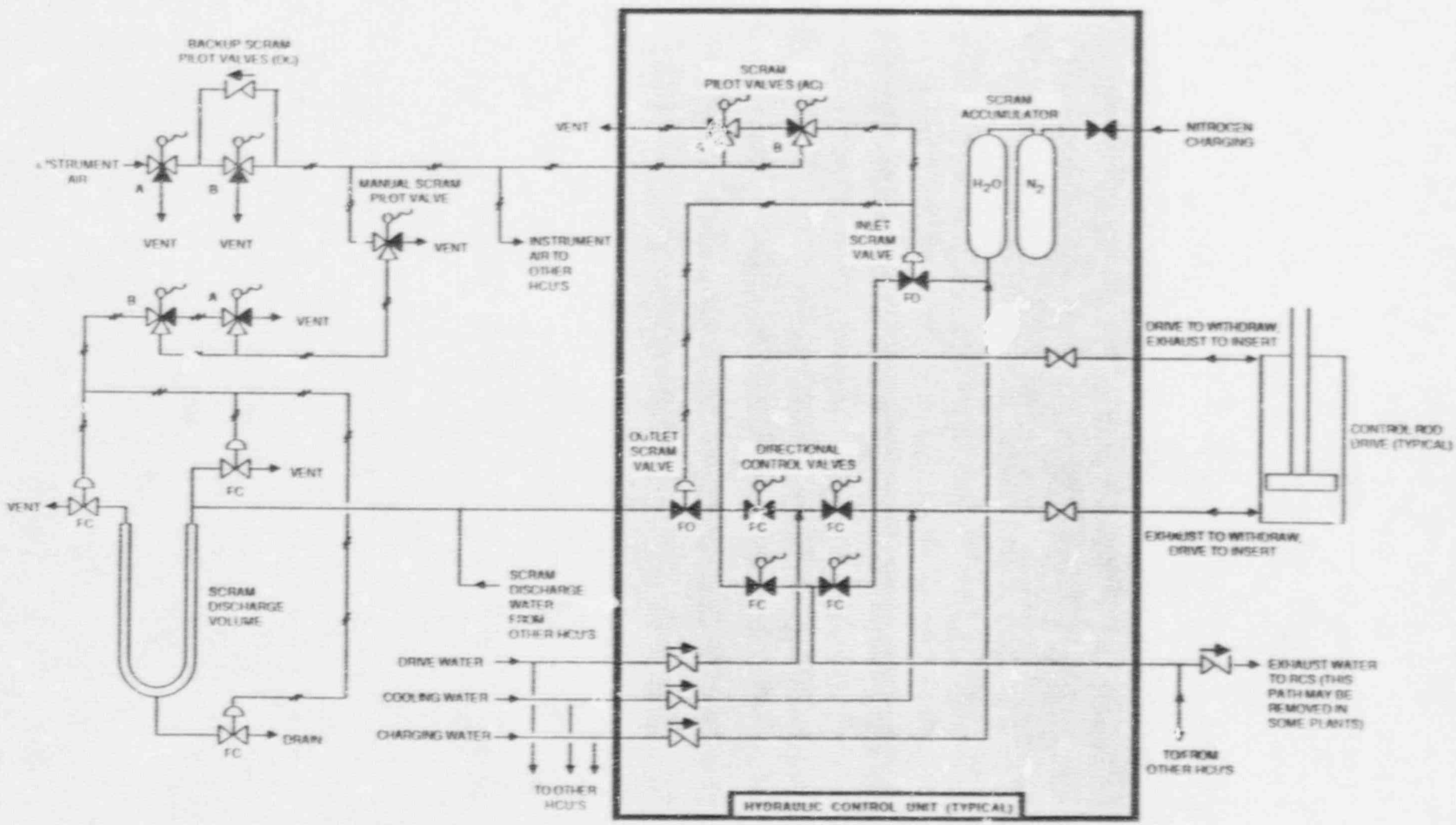


Figure 3.6-1. Simplified Diagram Of Portions Of The Control Rod Drive Hydraulic System That Are Related To The Scram Function

3.7 STANDBY SERVICE WATER (SSW) SYSTEM

3.7.1 System Function

The Standby Service Water System provides cooling water from the ultimate heat sink, the standby cooling tower, to various heat loads in the plant, including the standby and HPCS diesel generators, RHR heat exchangers, RHR pump seal coolers, various room cooler units, and the control room air conditioners.

3.7.2 System Definition

The SSW system contains four motor driven pumps which take suction from the standby cooling tower water storage basin. The pumps supply two headers from which the heat loads are supplied. The two redundant systems merge to supply the HPCS diesel generator and HPCS pump room cooler. Simplified drawings of the SSW are shown in Figures 3.7-1 and 3.7-2. A summary of the data on selected SSW components is presented in Table 3.7-1.

3.7.3 System Operation

The SSW system has the capability to provide cooling water to essential equipment through two separate supply lines. Each supply line is capable of providing sufficient cooling water for all of the following minimum conditions which are essential to the safe shutdown of the reactor:

- Two RHR pumps operating
- One standby diesel generator and the HPCS diesel generator operating
- Two control room air-conditioning chillers operating
- Auxiliary building unit coolers operating
- One of two containment unit coolers operating

During the initial phase of recovery from a LOCA, all SSW pumps start automatically. However, only one pump is needed to satisfy the cooling requirements of the above equipment. Later, when the RHR heat exchangers are required for decay heat removal, two SSW pumps must operate.

The two redundant SSW trains merge to supply the HPCS diesel generator and the HPCS pump room cooler.

The SSW discharges to the ultimate heat sink, which consists of one 200 percent cooling tower and one 100 percent capacity water storage basin. The basin is designed to provide necessary cooling for up to 30 days.

3.7.4 System Success Criteria

During the initial phase of recovery from a LOCA, only one SSW pump is required to satisfy the cooling requirements of the system. Later, when the RHR heat exchangers are required for decay heat removal, two SSW pumps must operate.

3.7.5 Component Information

A. Standby Service Water Pumps 2A, 2B, 2C, 2D
   1. Rated flow: 7690 gpm @ 170 ft. head (74 psid)
   2. Rated capacity: 50%
   3. Type: vertical centrifugal

3.7.6 Support Systems and Interfaces

A. Control Signals
   1. Automatic
      Upon receipt of a LOCA or loss of offsite power signal, all pumps are started.
   2. Remote manual
      The SWS pumps can be actuated by remote manual means from the control room.

B. Motive Power
   The SWS pumps are Class 1E AC loads that can be supplied from the standby diesel generators as described in Section 3.5. Pump 2A is supplied from diesel generator-1A, pumps 2B and 2D are supplied from diesel generator-1B, and pump 2C is supplied from diesel generator-1C.

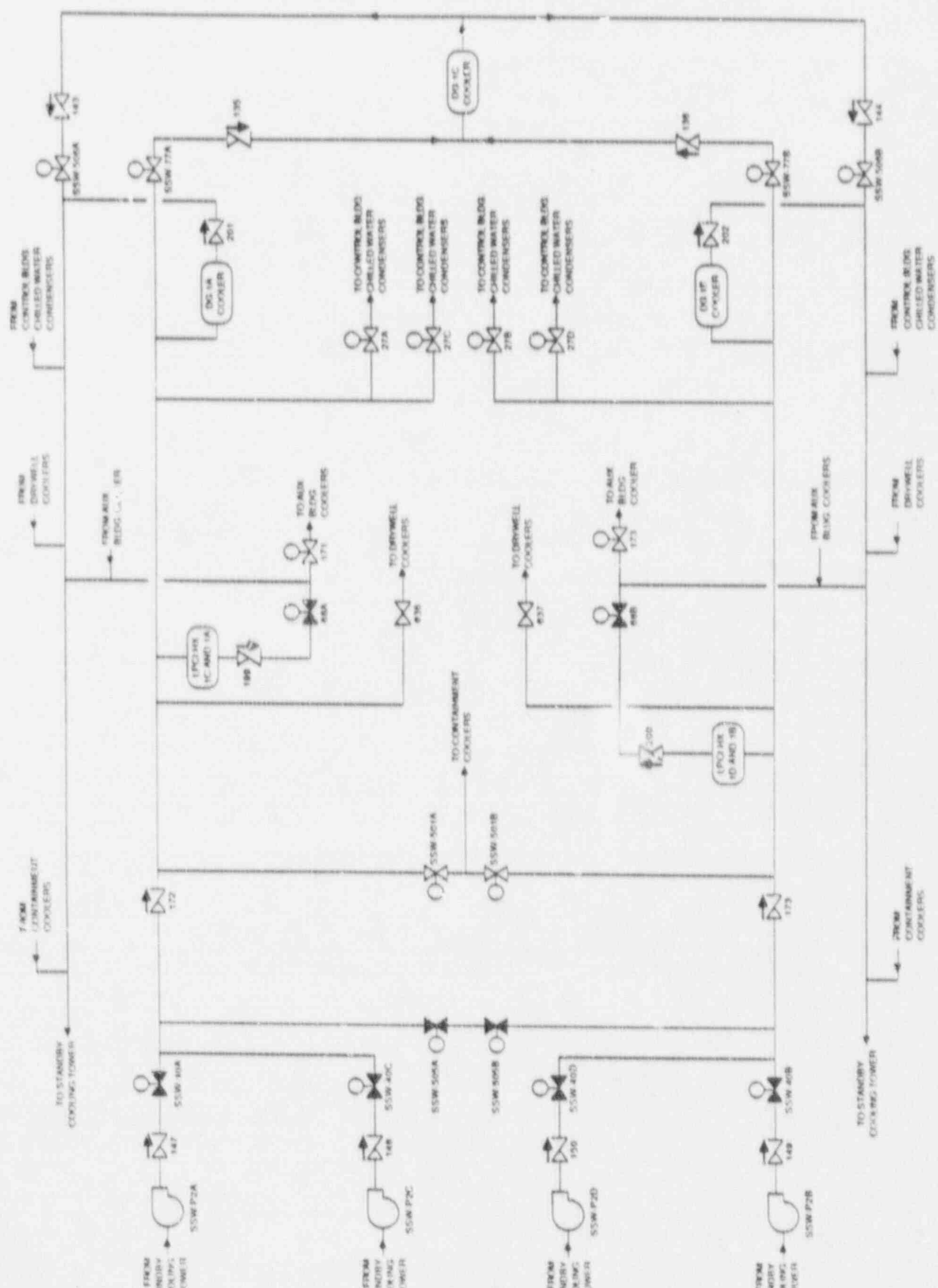


Figure 3.7-1. River Bend 1 Standby Service Water System

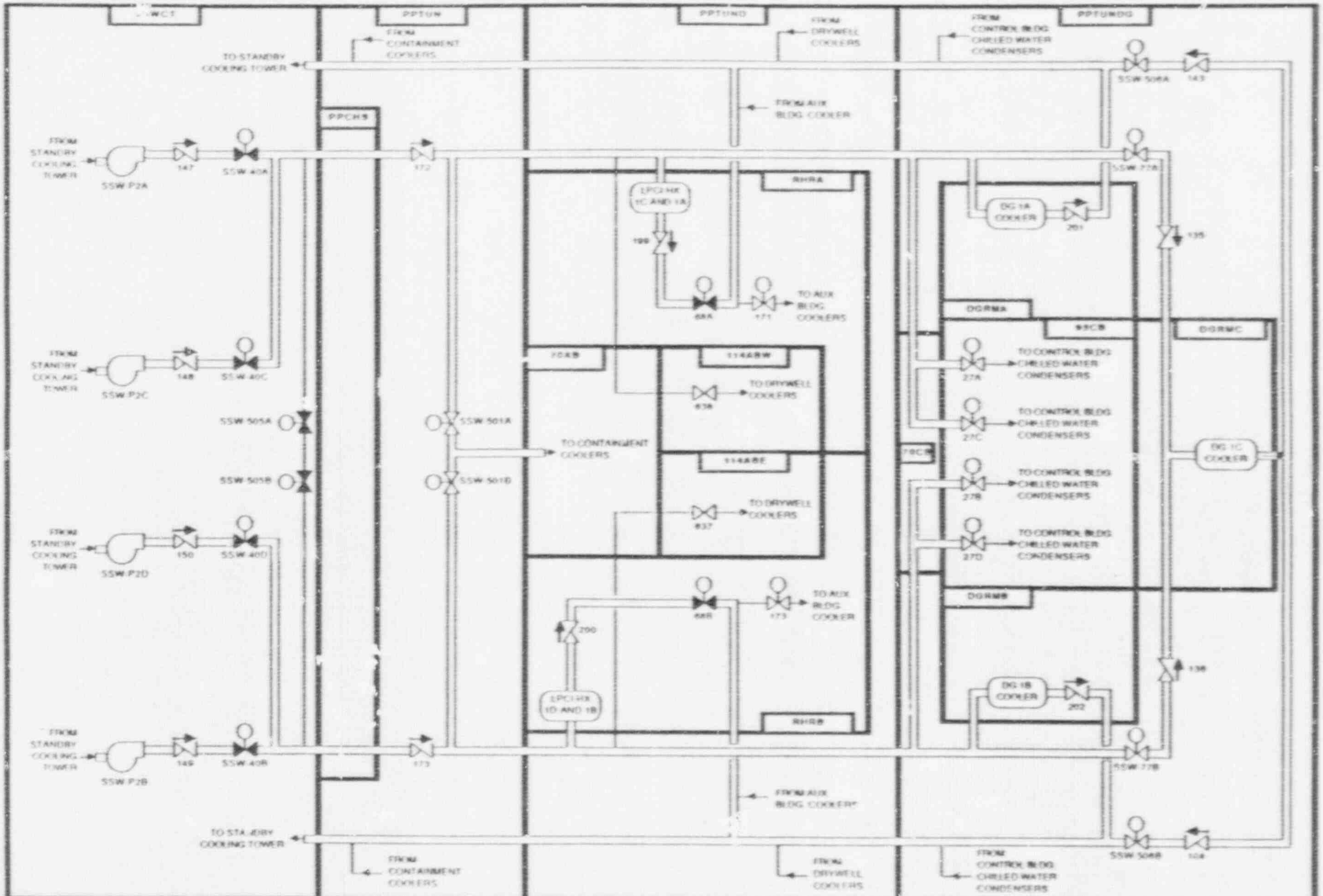


Figure 3.7-2. River Bend 1 Standby Service Water System Showing Component Locations

Table 3.7-1. River Bend 1 Standby Service Water System Data Summary for Selected Components

COMPONENT ID	COMP. TYPE	LOCATION	POWER SOURCE	VOLTAGE	POWER SOURCE LOCATION	EMERG. LOAD GRP.
SSW-40A	MOV	SSWCT	MCC-16A	480	SSWCT	AC/A
SSW-40B	MOV	SSWCT	MCC-16B	480	SSWCT	AC/B
SSW-40C	MOV	SSWCT	MCC-S002	480	SWGRMC	AC/C
SSW-40D	MOV	SSWCT	MCC-16B	480	SSWCT	AC/B
SSW-501A	MOV	PPTUN	MCC-16A	480	SSWCT	AC/A
SSW-501B	MOV	PPTUN	MCC-16B	480	SSWCT	AC/B
SSW-505A	MOV	SSWCT	MCC-16A	480	SSWCT	AC/A
SSW-505B	MOV	SSWCT	MCC-16B	480	SSWCT	AC/B
SSW-506A	MOV	PPTUNDG	MCC-8A	480	SWGRMA	AC/A
SSW-506B	MOV	PPTUNDG	MCC-8B	480	SWGRMB	AC/B
SSW-77A	MOV	PPTUNDG	MCC-8A	480	SWGRMA	AC/A
SSW-77A	MOV	PPTUNDG	MCC-8A	480	SWGRMA	AC/A
SSW-77B	MOV	PPTUNDG	MCC-8B	480	SWGRMB	AC/B
SSW-77B	MOV	PPTUNDG	MCC-8B	480	SWGRMB	AC/B
SSW-P2A	MDP	SSWCT	BUS-ENS1A	4160	SWGRMA	AC/A
SSW-P2B	MDP	SSWCT	BUS-ENS1B	4160	SWGRMB	AC/B
SSW-P2C	MDP	SSWCT	BUS-S004	4160	SWGRMC	AC/C
SSW-P2D	MDP	SSWCT	BUS-ENS1B	4160	SWGRMB	AC/B

4. PLANT INFORMATION

4.1 SITE AND BUILDING SUMMARY

The River Bend Station nuclear plant is located in West Feliciana Parish on the east bank of the Misssissippi River, approximately 24 miles north-northeast of Baton Rouge, Louisiana. The site is 3342 acres in area. Originally two units were scheduled, but construction on Unit 2 has been halted. Figure 4-1 shows a general view of the site and the surrounding area (from Ref. 1).

The major structures at this facility include the reactor building, turbine building, fuel building, auxiliary building, diesel generator building, control building, and cooling tower. The site general arrangement is shown in Figure 4-2.

The reactor building is located on the north side of the turbine building. This building contains the primary containment housing the reactor vessel and recirculation piping. The spent fuel pool is located in the fuel building, north of the reactor building. Section drawings of the River Bend reactor building are shown in Figures 4-3 and 4-4.

The auxiliary building is located between the reactor building and the turbine building, and contains ECCS and RCIC equipment.

The diesel generator building is located east of the reactor building and houses the emergency diesel generators. The control building is directly south of the diesel generator building and contains the control room, switchgear and electrical equipment rooms, and cable chases.

The standby service water cooling tower is located to the northwest of the reactor building, and serves as the plant's ultimate heat sink.

4.2 FACILITY LAYOUT DRAWINGS

Figures 4-5 through 4-8 are simplified building layout drawings for the River Bend 1 containment, auxiliary building and intake structure. The turbine and service building, maintenance shop, and technical support building are not shown on these drawings. 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 4, Oak Ridge National Laboratory, Nuclear Safety Information Center, March 1975.

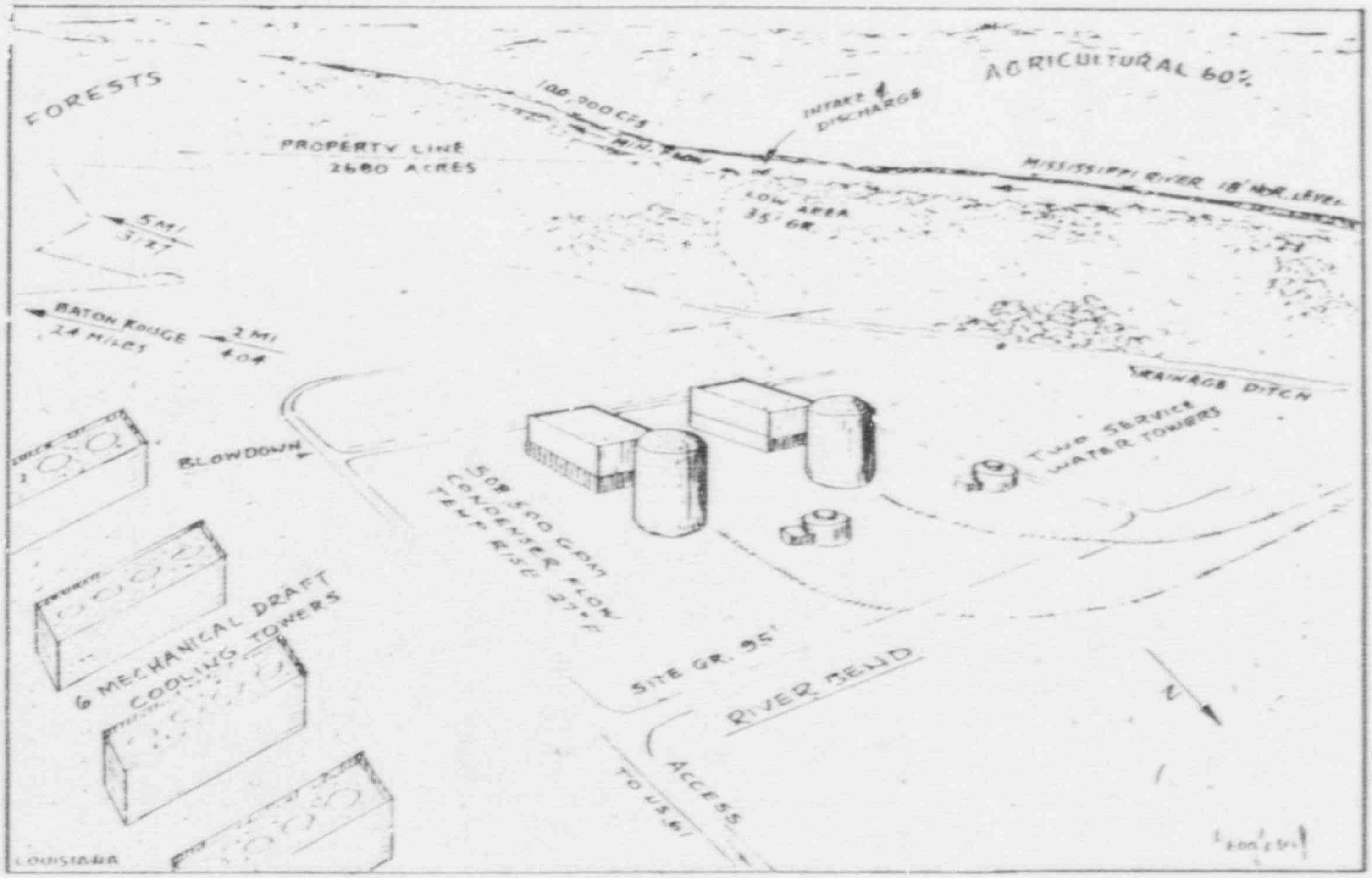


Figure 4-1. General View of River Bend Station and Vicinity

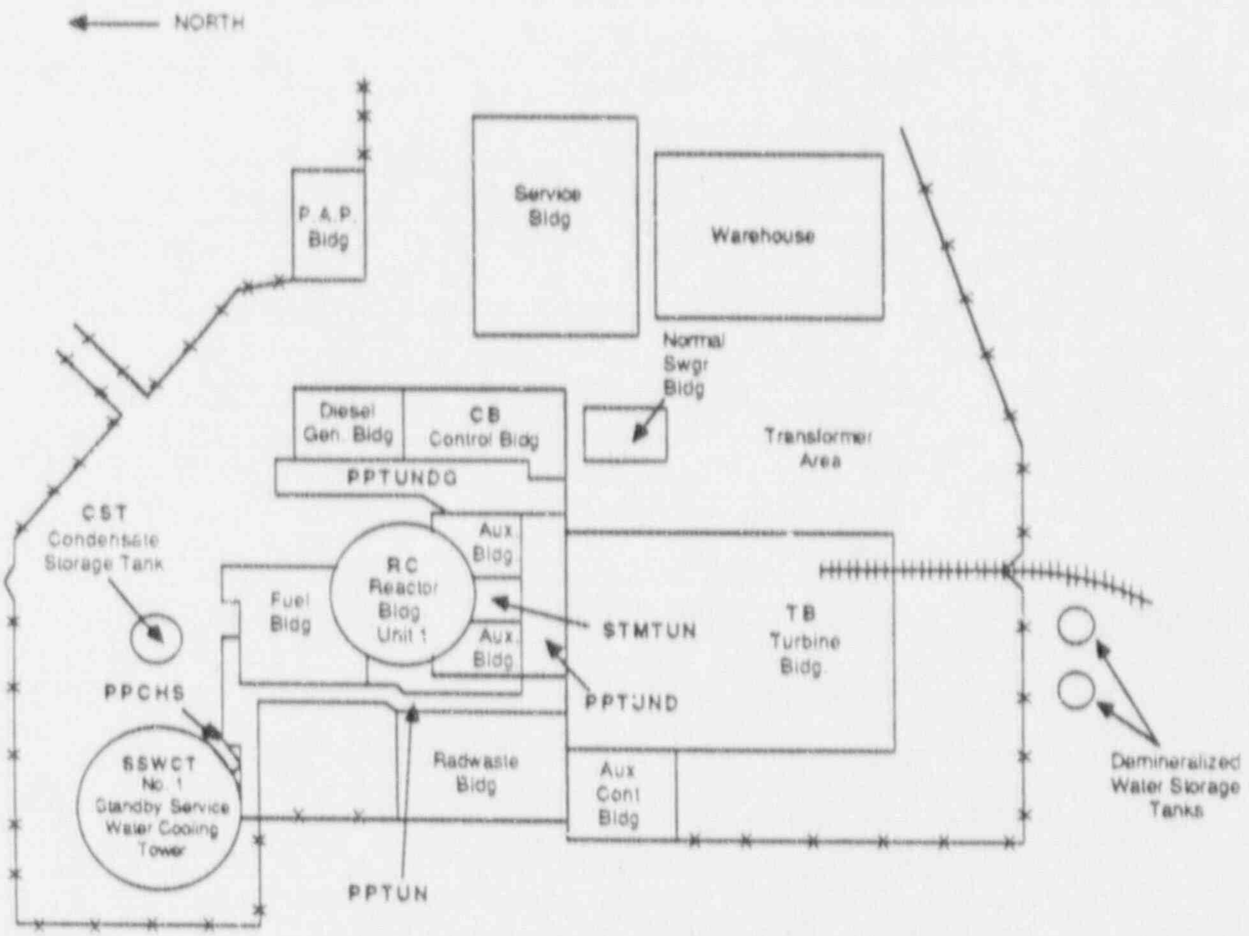


Figure 4-2. River Bend 1 Plot Plan

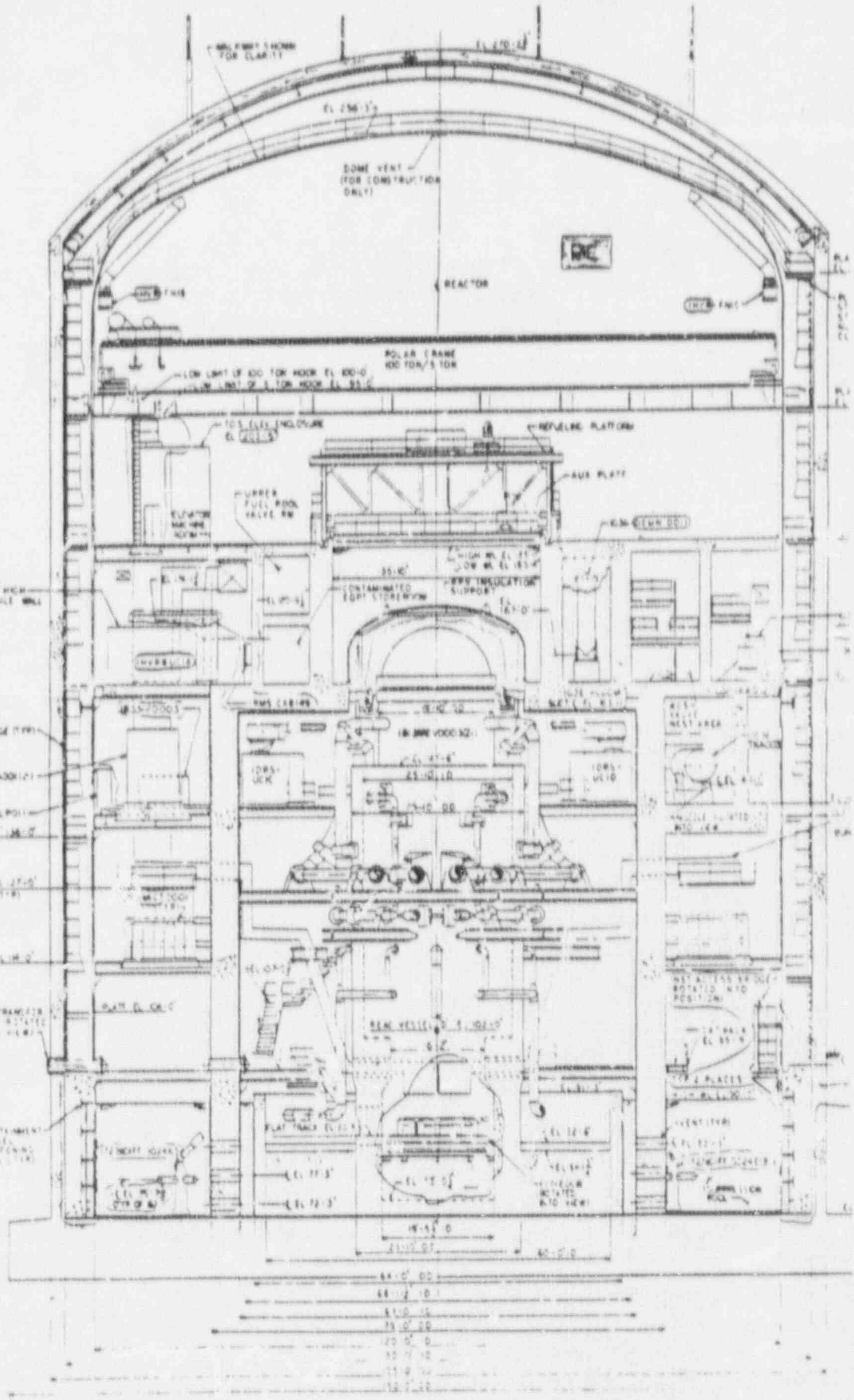


Figure 4-3. River Bend Reactor Building Sections

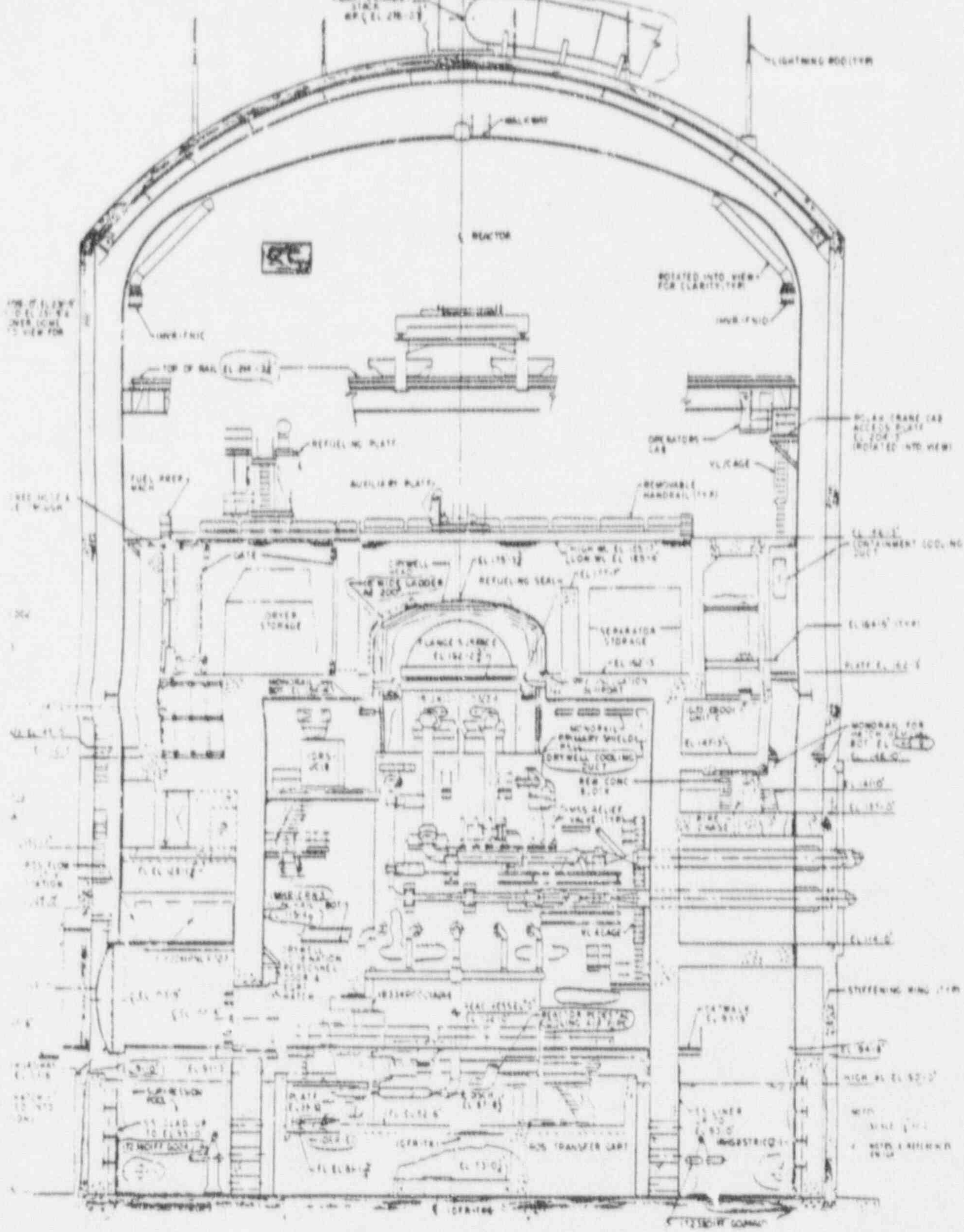


Figure 4-4. River Bend Reactor Building Sections

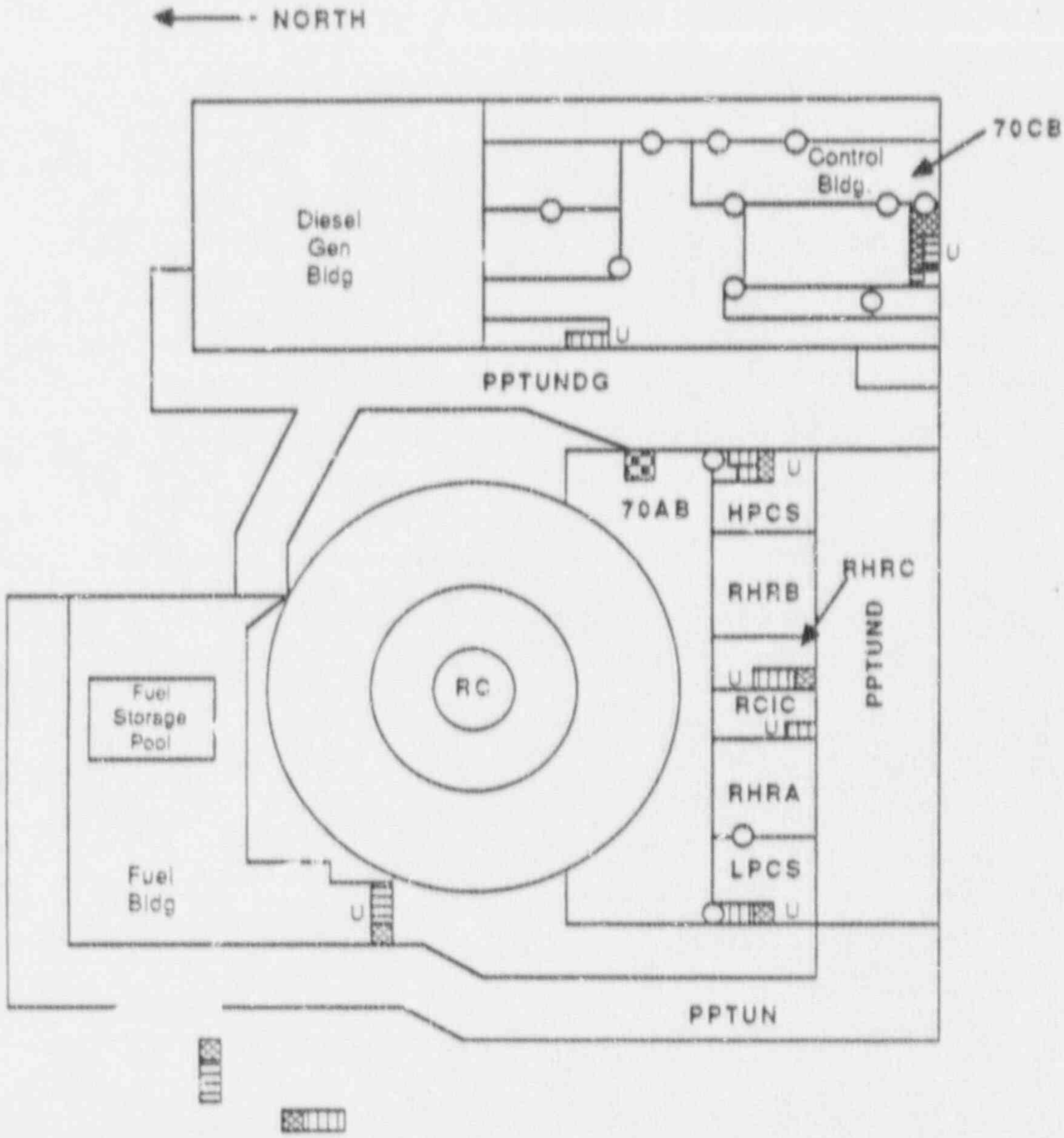


Figure 4-5. River Bend 1 Station Arrangement, Elevation 70'

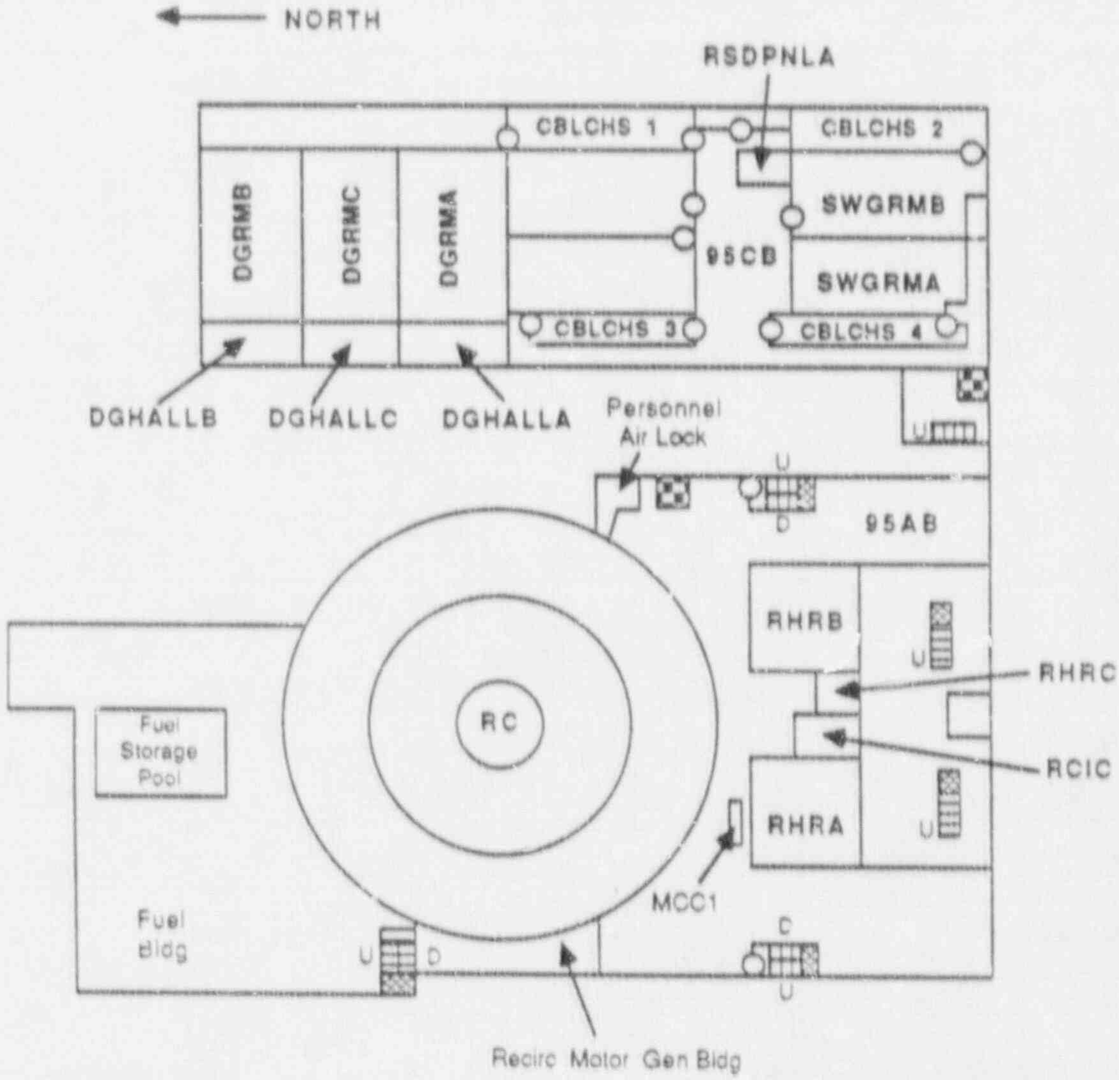


Figure 4-6. River Bend 1 Station Arrangement, Elevation 95'

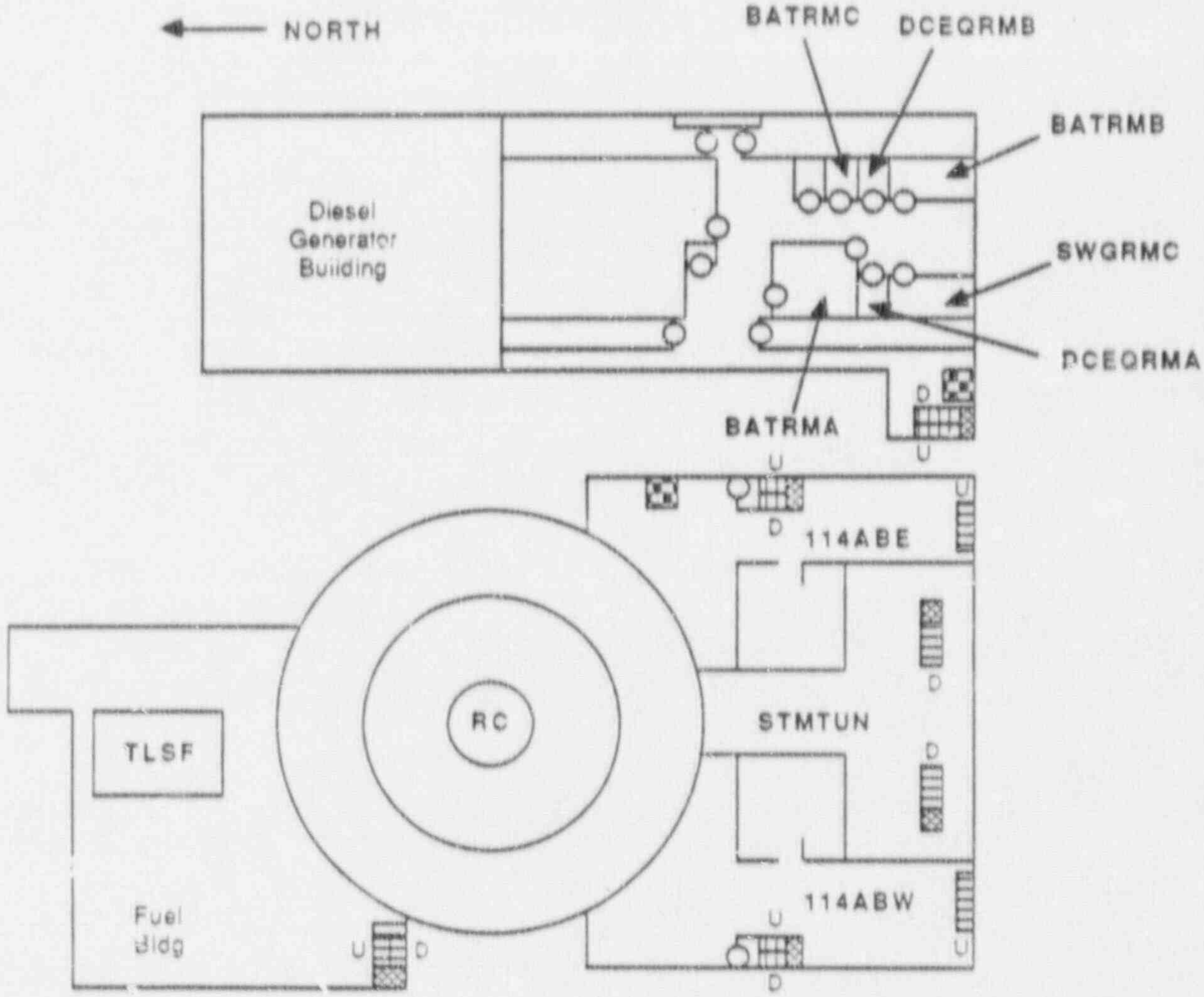


Figure 4-7. River Bend 1 Station Arrangement, Elevation 114'

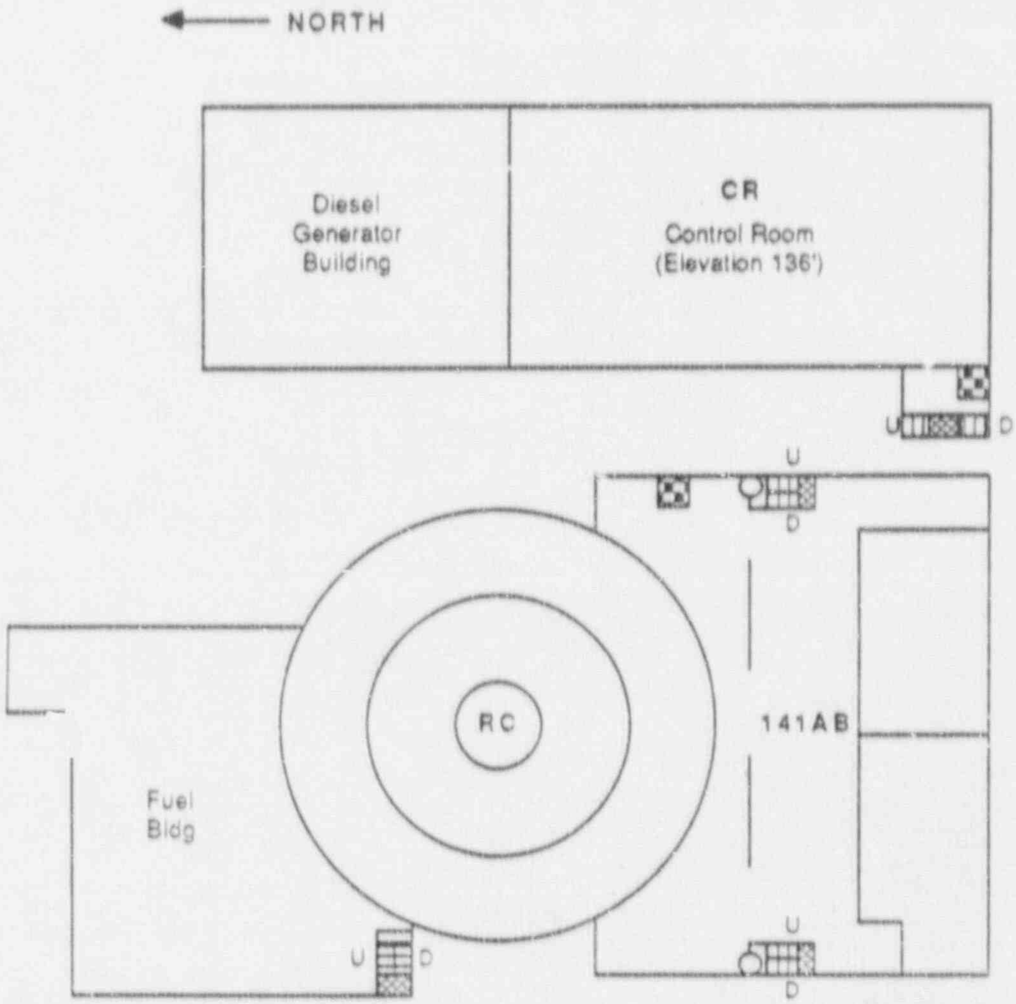


Figure 4-8. River Bend 1 Station Arrangement, Elevation 141'

Table 4-[illegible] Definition of River Bend 1 Building and Location Codes

	Codes	Descriptions
1.	70AB	70' elevation of the Auxiliary Building
2.	70CB	70' elevation of the Control Building
3.	95AB	95' elevation of the Auxiliary Building
4.	95CB	95' elevation of the Control Building
5.	114ABE	114' elevation of the Auxiliary Building - east side
6.	114ABW	114' elevation of the Auxiliary Building - west side
7.	141AB	141' elevation of the Auxiliary Building
8.	BATRMA	Battery Room A, located on the 115' elevation of the Control Building
9.	BATRMB	Battery Room B, located on the 115' elevation of the Control Building
10.	BATRMC	Battery Room C, located on the 115' elevation of the Control Building
11.	CBLCHS1	Cable Chase No. 1, located below Control Room on the 98' elevation of the Control Building
12.	CBLCHS2	Cable Chase No. 2, located below Control Room on the 98' elevation of the Control Building
13.	CBLCHS3	Cable Chase No. 3, located below Control Room on the 98' elevation of the Control Building
14.	CBLCHS4	Cable Chase No. 4, located below Control Room on the 98' elevation of the Control Building
15.	CR	Control Room, located on the 136' elevation of the Control Building
16.	CST	Condensate Storage Tank, located north of Reactor Containment in Yard Area
17.	DCEQRMA	DC Equipment Room A, located on the 115' elevation of the Control Building
18.	DCEQRMB	DC Equipment Room B, located on the 115' elevation of the Control Building

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

Codes	Descriptions
19. DGHALLA	Diesel Generator A Hall, located just outside of the Diesel Generator Room A
20. DGHALLB	Diesel Generator B Hall, located just outside of the Diesel Generator Room B
21. DGHALLC	Diesel Generator C Hall, located just outside of the Diesel Generator Room C
22. DGRMA	Diesel Generator Room A, located on the 98' elevation of the Diesel Generator Building
23. DGRMB	Diesel Generator Room B, located on the 98' elevation of the Diesel Generator Building
24. DGRMC	Diesel Generator Room C, located on the 98' elevation of the Diesel Generator Building
25. HPCS	High Pressure Core Spray Pump Room, located on the 70' elevation of the Auxiliary Building
26. LPCS	Low Pressure Core Spray Pump Room, located on the 90' elevation of the Auxiliary Building
27. PPCHS	Pipe Chase, adjacent to Pump House connecting Pipe Tunnel (area PPTUN) to Service Water Cooling Tower (area SSWCT)
28. PPTUN	Pipe Tunnel, connecting Pipe Chase to Pipe Tunnel "D" - running on north and west side of the Reactor Building at the 66' and 70' elevations
30. PPTUND	Pipe Tunnel "D", connecting Pipe Tunnel to Pipe Tunnel "DG" - runs on south side of Reactor Building at the 70' elevation
31. PPTUNDG	Pipe Tunnel, connecting Pipe Tunnel "D" with the Diesel Generator Building and Control Building
32. RC	Reactor Containment
33. RCIC	Reactor Core Isolation Cooling Pump Room, located on the 70' elevation of the Auxiliary Building
34. RHRA	Residual Heat Removal Pump Room "A" (LPCI), located on the 70' elevation of the Auxiliary Building
35. RHRB	Residual Heat Removal Pump Room "B" (LPCI), located on the 70' elevation of the Auxiliary Building

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

Codes	Descriptions
36. RHRC	Residual Heat Removal Pump Room "C" (LPCI), located on the 70' elevation of the Auxiliary Building
37. RSDPNLA	Remote Shutdown Panel "A", located in the Control Building at the 98' elevation
38. RSDPNLB	Remote Shutdown Panel "B", located in the Control Building at the 98' elevation
39. SSWCT	Standby Service Water Cooling Tower, located northwest of the Reactor Building
40. STMTUN	Steam Tunnel, located on the south side and adjacent to the Reactor Building at the 114" elevation
41. SWGRMA	Switchgear Room A, located on the 98' elevation of the Control Building
42. SWGRMB	Switchgear Room B, located on the 98' elevation of the Control Building
43. SWGRMC	Switchgear Room C, located on the 98' elevation of the Control Building
44. TB	Turbine Building
45. TLSF	Spent fuel operating floor, located on the 113' of the Fuel Building

Table 4-2. Partial Listing of Components by Location at River Bend 1

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
114ABE	ECCS	LPCI-27B	MOV
114ABE	ECCS	LPCI-42C	MOV
114ABE	EP	MCC-2F	MCC
114ABE	EP	MCC-2H	MCC
114ABW	ECCS	LPCI-27A	MOV
114ABW	ECCS	LPCS-5	MOV
114ABW	EP	MCC-2E	MCC
114ABW	EP	MCC-2G	MCC
141AB	ECCS	HPCS-4	MOV
141AB	EP	BUS-JS2A	BUS
141AB	EP	BUS-JS2B	BUS
141AB	EP	TR-X2A	XFMR
141AB	EP	TR-X2B	XFMR
141AB	EP	MCC-2A	MCC
141AB	EP	MCC-2C	MCC
141AB	EP	MCC-2J	MCC
141AB	EP	MCC-2L	MCC
141AB	EP	MCC-2B	MCC
141AB	EP	MCC-2D	MCC
141AB	EP	MCC-2K	MCC
70AB	ECCS	HPCS-15	MOV
70AB	ECCS	HPCS-12	MOV
70AB	ECCS	LPCI-4A	MOV
70AB	ECCS	LPCI-4B	MOV
70AB	ECCS	LPCI-105	MOV
70AB	ECCS	LPCS-1	MOV
70AB	ECCS	LPCS-12	MOV
70AB	RCIC	RCIC-31	MOV
95AB	ECCS	LPCI-24A	MOV
95AB	ECCS	LPCI-24B	MOV

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
95AB	EP	MCC-1	MCC
BATRMA	EP	BT-1A	BATT
BATRMB	EP	BT-1B	BATT
BATRMC	EP	BT-S001	BATT
CR	EP	PNL-1A	PNL
CR	EP	PNL-1B	PNL
CST	ECCS	RCIC-CST	TANK
CST	RCIC	RCIC-CST	TANK
DCEQRMA	EP	BC-1A	BC
DCEQRMA	EP	UPS-1A	UPS
DCEQRMA	EP	UPS-1A	UPS
DCEQRMA	EP	UPS-1A	UPS
DCEQRMB	EP	BC-1B	BC
DCEQRMB	EP	UPS-1B	UPS
DCEQRMB	EP	UPS-1B	UPS
DCEQRMB	EP	UPS-1B	UPS
DCEQRMC	EP	BC-S001	BC
DGHALLA	EP	PNL-DC3A	PNL
DGHALLB	EP	PNL-DC3B	PNL
DGHALLC	EP	BUS-S001	BUS
DGHALLC	EP	BUS-S001	BUS
DGRMA	EP	DG-1A	DG
DGRMA	SSW	DG-1A	DG
DGRMA	SSW	DG-1A	DG
DGRMB	EP	DG-1B	DG
DGRMB	SSW	DG-1B	DG
DGRMB	SSW	DG-1B	DG
DGRMC	EP	DG-1C	DG
DGRMC	SSW	DG-1C	DG
DGRMC	SSW	DG-1C	DG

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
DGRMC	SSW	DG-1C	DG
DGRMC	SSW	DG-1C	DG
HPCS	ECCS	HPCS-P1	MDP
HPCS	ECCS	HPCS-1	MOV
HPCS	ECCS	HPCS-10	MOV
HPCS	ECCS	HPCS-11	MOV
HPCS	ECCS	HPCS-23	MOV
LPCS	ECCS	LPCS-P1	MDP
PPTUN	SSW	[illegible]-501A	MOV
PPTUN	SSW	SSW-501B	MOV
PPTUNDG	SSW	SSW-506A	MOV
PPTUNDG	SSW	SSW-506B	MOV
PPTUNDG	SSW	SSW-77A	MOV
PPTUNDG	SSW	SSW-77A	MOV
PPTUNDG	SSW	SSW-77B	MOV
PPTUNDG	SSW	SSW-77B	MOV
RC	ECCS	RCS-41B	SRV
RC	ECCS	RCS-VESSEL	RV
RC	ECCS	SUPP	TANK
RC	ECCS	RCS-VESSEL	RV
RC	ECCS	SUPP	TANK
RC	ECCS	LPCI-37A	MOV
RC	ECCS	LPCI-42A	MOV
RC	ECCS	LPCI-37B	MOV
RC	ECCS	LPCI-42B	MOV
RC	ECCS	RCS-VESSEL	RV
RC	ECCS	RCS-41C	SRV
RC	ECCS	RCS-41D	SRV
RC	ECCS	RCS-41F	SRV
RC	ECCS	RCS-47A	SRV

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
RC	ECCS	RCS-47C	SRV
RC	ECCS	RCS-51G	SRV
RC	RCIC	RCIC-63	MOV
RC	RCIC	RCIC-63	MOV
RC	RCIC	RCS-VESSEL	RV
RC	RCIC	SUPP	TANK
RC	RCS	RCS-16	MOV
RC	RCS	RCS-22A	NV
RC	RCS	RCS-22A	NV
RC	RCS	RCS-22B	NV
RC	RCS	RCS-22C	NV
RC	RCS	RCS-22C	NV
RC	RCS	RCS-22D	NV
RC	RCS	RCS-41B	SRV
RC	RCS	RCS-VESSEL	RV
RC	RCS	RCS-9	MOV
RC	RCS	RCS-1	MOV
RC	RCS	RCS-41A	SRV
RC	RCS	RCS-22B	NV
RC	RCS	RCS-22D	NV
RC	RCS	RCS-41C	SRV
RC	RCS	RCS-41D	SRV
RC	RCS	RCS-41F	SRV
RC	RCS	RCS-47A	SRV
RC	RCS	RCS-47C	SRV
RC	RCS	RCS-51G	SRV
RC	RCS	RCS-41B	SRV
RC	RCS	RCS-41C	SRV
RC	RCS	RCS-41D	SRV
RC	RCS	RCS-41F	SRV

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
RC	RCS	RCS-41G	SRV
RC	RCS	RCS-41L	SRV
RC	RCS	RCS-47A	SRV
RC	RCS	RCS-47B	SRV
RC	RCS	RCS-47C	SRV
RC	RCS	RCS-47D	SRV
RC	RCS	RCS-47F	SRV
RC	RCS	RCS-51B	SRV
RC	RCS	RCS-51C	SRV
RC	RCS	RCS-51D	SRV
RC	RCS	RCS-51F	SRV
RCIC	RCIC	RCIC-22	MOV
RCIC	RCIC	RCIC-10	MOV
RCIC	RCIC	RCIC-13	MOV
RCIC	RCIC	RCIC-45	MOV
RCIC	RCIC	RCIC-46	MOV
RCIC	RCIC	RCIC-TGV	HV
RCIC	RCIC	RCIC-P1	TDP
RCIC	RCIC	RCIC-TTV	MOV
RCIC	RCIC	RCIC-59	MOV
RHRA	ECCS	LPCI-P1A	MDP
RHRA	ECCS	LPCI-3A	MOV
RHRA	ECCS	LPCI-6A	MOV
RHRA	ECCS	LPCI-40	MOV
RHRA	ECCS	LPCI-47A	MOV
RHRA	ECCS	LPCI-48A	MOV
RHRA	ECCS	LPCI-49	MOV
RHRA	ECCS	LPCI-53A	MOV
RHRB	ECCS	LPCI-P2B	MDP
RHRB	ECCS	LPCI-3B	MOV

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
RHRB	ECCS	LPCI-6B	MOV
RHRB	ECCS	LPCI-47B	MOV
RHRB	ECCS	LPCI-48B	MOV
RHRB	ECCS	LPCI-53B	MOV
RHRC	ECCS	LPCI-P2C	MDP
RHRC	ECCS	LPCI-21	MOV
SSWCT	EP	MCC-16A	MCC
SSWCT	EP	MCC-16B	MCC
SSWCT	SSW	SSW-P2A	MDP
SSWCT	SSW	SSW-P2B	MDP
SSWCT	SSW	SSW-P2C	MDP
SSWCT	SSW	SSW-P2D	MDP
SSWCT	SSW	SSW-40A	MOV
SSWCT	SSW	SSW-40B	MOV
SSWCT	SSW	SSW-40C	MOV
SSWCT	SSW	SSW-40D	MOV
SSWCT	SSW	SSW-505A	MOV
SSWCT	SSW	SSW-505B	MOV
STMTUN	RCIC	RCIC-64	MOV
STMTUN	RCIC	RCIC-19	MOV
STMTUN	RCIC	RCIC-64	MOV
STMTUN	RCS	RCS-19	MOV
STMTUN	RCS	RCS-65	MOV
STMTUN	RCS	RCS-28A	NV
STMTUN	RCS	RCS-28A	NV
STMTUN	RCS	RCS-28A	NV
STMTUN	RCS	RCS-28B	NV
STMTUN	RCS	RCS-28C	NV
STMTUN	RCS	RCS-98A	MOV
STMTUN	RCS	RCS-8	MOV

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
STMTUN	RCS	RCS-4	MOV
STMTUN	RCS	RCS-28B	NV
STMTUN	RCS	RCS-28B	NV
STMTUN	RCS	RCS-28C	NV
STMTUN	RCS	RCS-28D	NV
STMTUN	RCS	RCS-28C	NV
STMTUN	RCS	RCS-28D	NV
STMTUN	RCS	RCS-28D	NV
STMTUN	RCS	RCS-98B	MOV
STMTUN	RCS	RCS-98C	MOV
STMTUN	RCS	RCS-98D	MOV
SWGRMA	EP	BUS-ENS1A	BUS
SWGRMA	EP	CB-C1A	CB
SWGRMA	EP	BUS-ENS1A	BUS
SWGRMA	EP	BUS-DC1A	BUS
SWGRMA	EP	BUS-DC1A	BUS
SWGRMA	EP	BUS-JS1A	BUS
SWGRMA	EP	TR-X1A	XFMR
SWGRMA	EP	MCC-8A	MCC
SWGRMA	EP	MCC-14A	MCC
SWGRMB	EP	BUS-ENS1B	BUS
SWGRMB	EP	CB-C1B	CB
SWGRMB	EP	BUS-ENS1B	BUS
SWGRMB	EP	BUS-DC1B	BUS
SWGRMB	EP	BUS-DC1B	BUS
SWGRMB	EP	BUS-JS1B	BUS
SWGRMB	EP	TR-X1B	XFMR
SWGRMB	EP	MCC-8B	MCC
SWGRMB	EP	MCC-14B	MCC
SWGRMC	EP	BUS-S004	BUS

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

LOCATION	SYSTEM	COMPONENT ID	COMP TYPE
SWGRMC	EP	CB-CS004	CB
SWGRMC	EP	BUS-S004	BUS
SWGRMC	EP	MCC-S002	MCC
SWGRMC	EP	TR-S003	XFMR

5. BIBLIOGRAPHY FOR RIVER BEND 1

1. NUREG-0989, "Safety Evaluation Report Related the the Operation of River Bend Station", USNRC

2. NUREG-1172, "Technical Specifications for River Bend Station", USNRC

3. NUREG-1073, "Final Environmental Statement Related to the Operation of River Bend Station", USNRC, January 1985.

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)

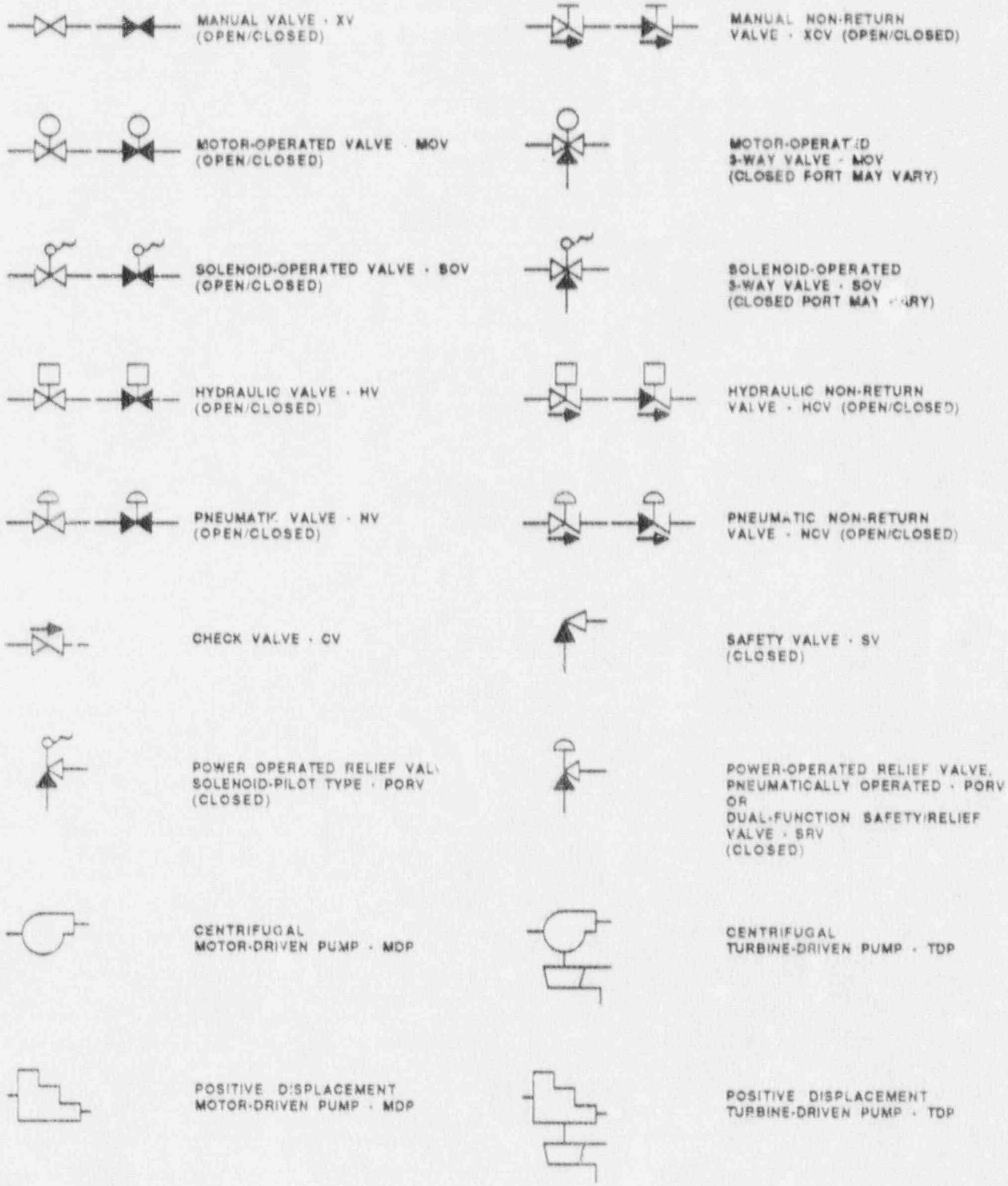


Figure A-1. Key To Symbols In Fluid System Drawings

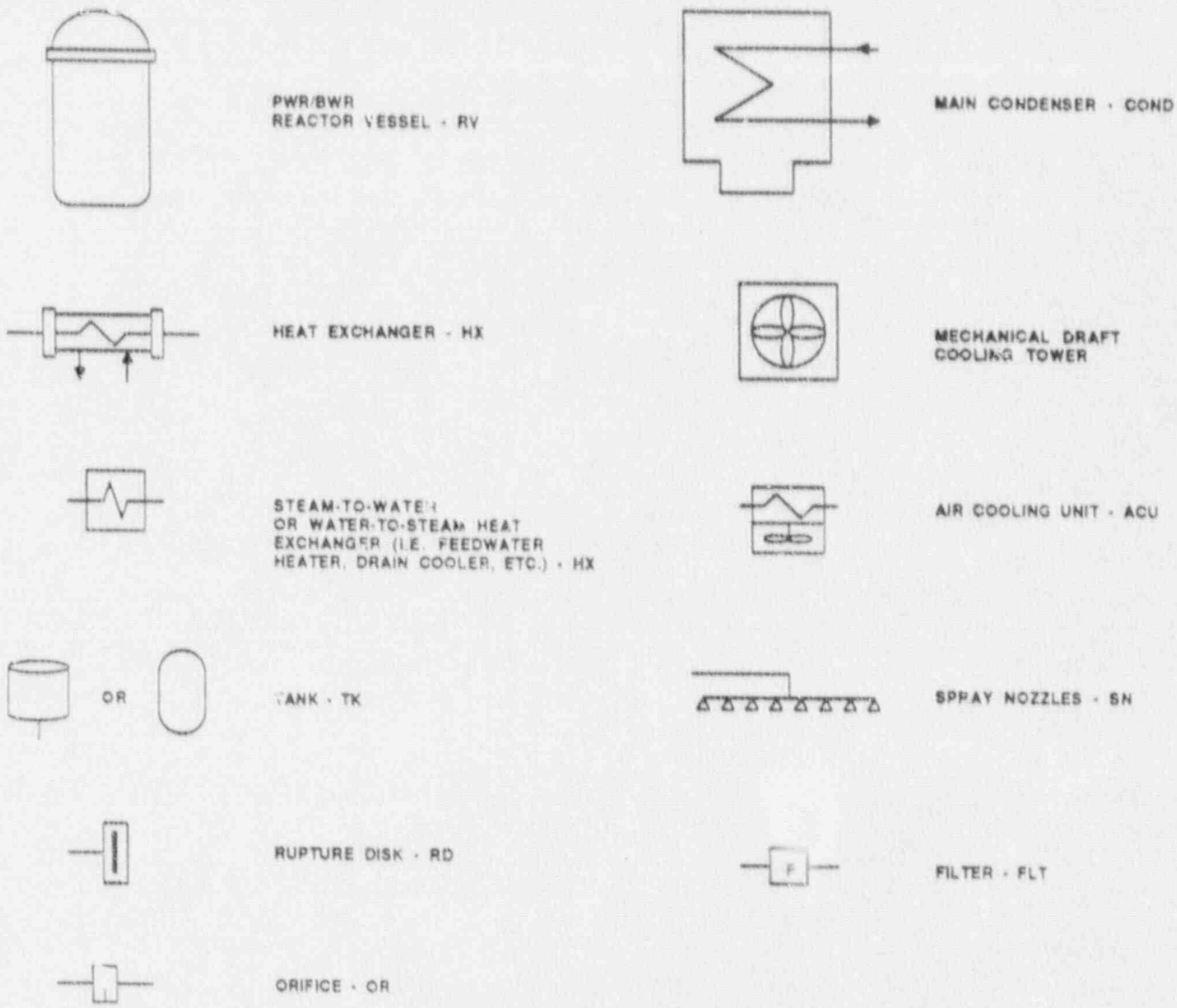


Figure A-1. Key To Symbols In Fluid System Drawings (Continued)

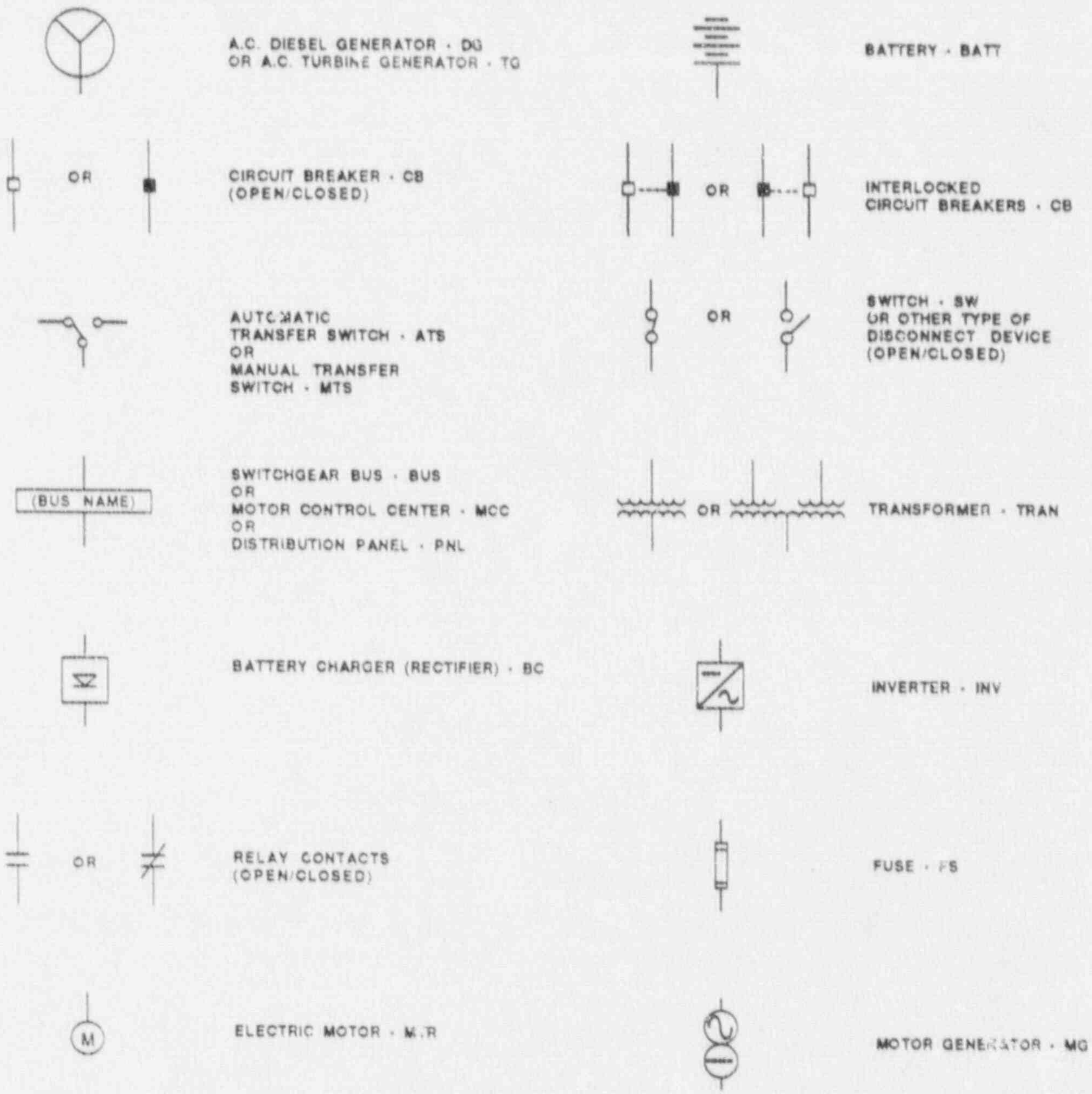


Figure A-2. Key To Symbols In Electrical System Drawings

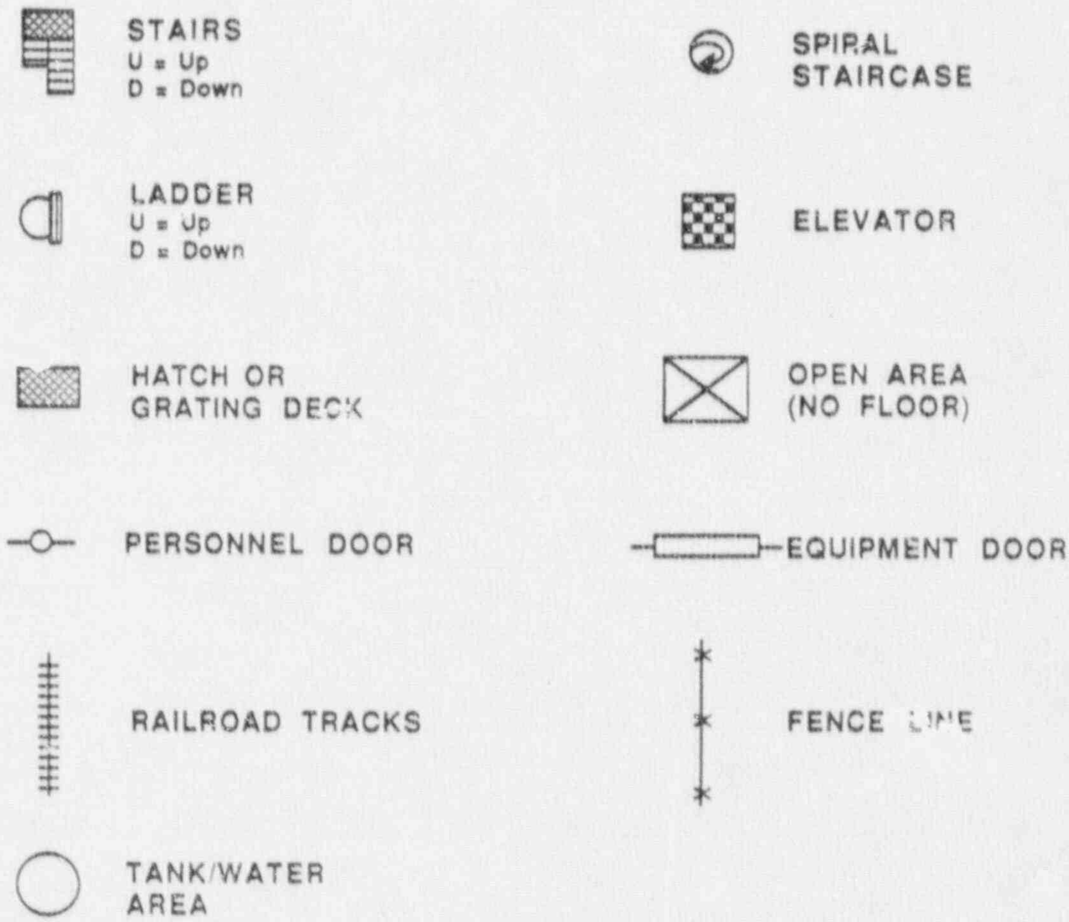


Figure A-3. Key To Symbols In Facility Layout Drawings

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
RCIC	Reactor Core Isolation Cooling System
ECCS	Emergency Core Cooling Systems (including HPCI, LPCI, LPCS and ADS)
EP	Electric Power System
CCW	Component Cooling Water System
SSW	Standby Service Water System

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

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

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

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

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

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

TABLE B-1. COMPONENT TYPE CODES

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

TABLE B-1. COMPONENT TYPE CODES (Continued)

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