



Emergency Core Cooling Systems

Section 5.2



Objectives

1. Explain why Emergency Core Cooling Systems (ECCSs) are incorporated into plant design.
2. State the purposes of the following systems:
 - a. Accumulator injection system,
 - b. High head injection system,
 - c. Intermediate head injection (safety injection) system, and
 - d. Low head injection system.

Objectives (cont'd)

3. State the purposes of the following major components:
 - a. Refueling water storage tank (RWST), and
 - b. Containment recirculation sump.

4. List the order of ECCS injection during the following abnormal conditions:
 - a. Small (slow depressurization) loss of coolant accident (LOCA), and
 - b. Large loss of coolant accident.

Objectives (cont'd)

5. Describe the ECCS flowpaths during the following modes of operation:
 - a. Cold-leg injection,
 - b. Cold-leg recirculation, and
 - c. Hot-leg recirculation.

10CFR50, App. A (GDC 35)

- “A system to provide abundant emergency core cooling shall be provided.”
- Following loss of coolant, it must transfer heat such that:
 - Fuel and clad damage that could interfere with core cooling is prevented.
 - Clad metal-water reaction is limited to negligible amounts.

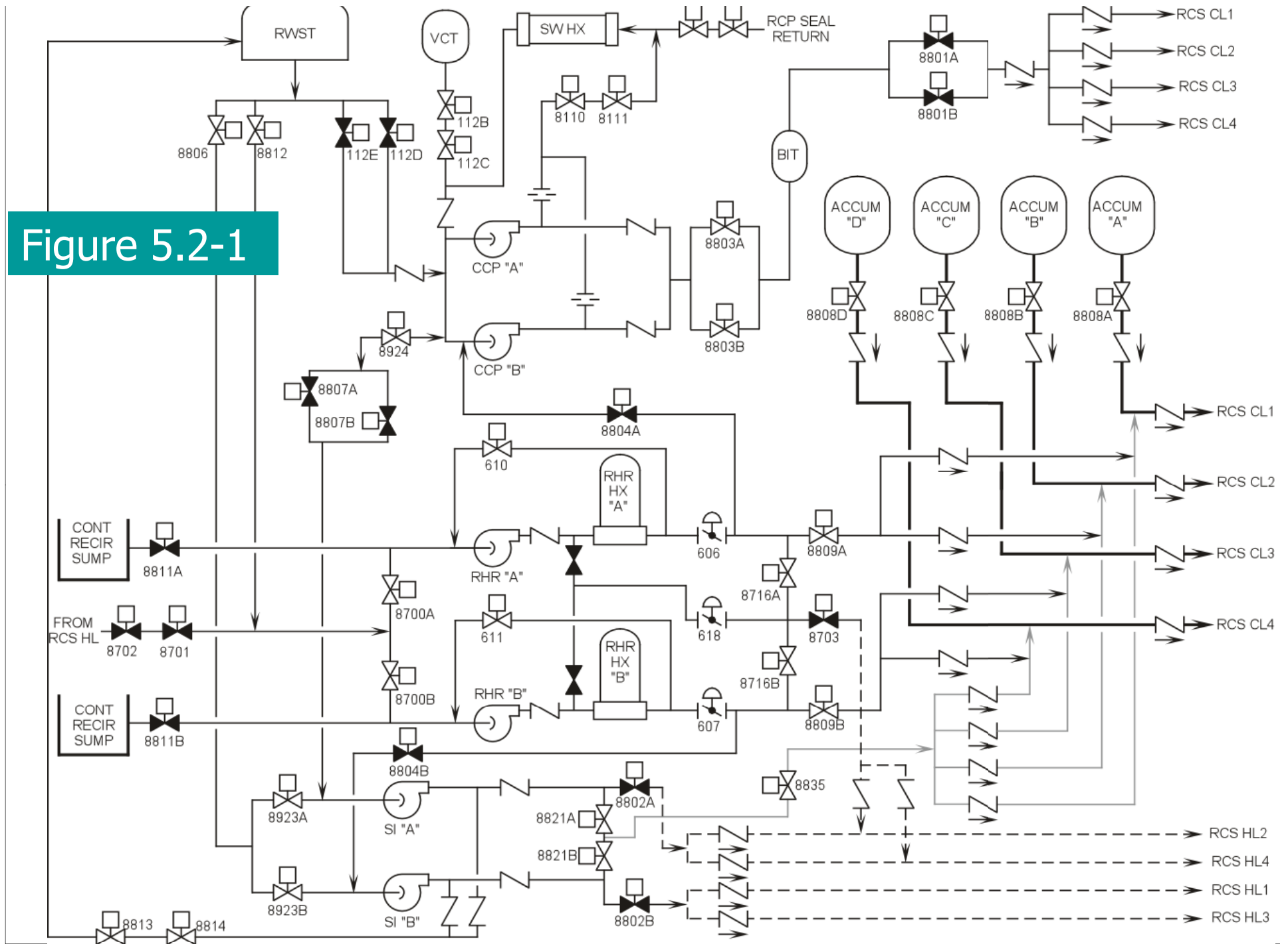
More ECCS requirements:
10CFR50.46 – ECCS acceptance
criteria

- Peak clad temp $\leq 2200^{\circ}\text{F}$
- Max clad oxidation ≤ 0.17 times the total clad thickness
- Max hydrogen generation $\leq 1\%$ of hypothetical amount if all clad reacted
- Changes in core geometry will allow core cooling
- Long-term cooling is maintained

The ECCS is designed to mitigate these accidents:

- Loss of coolant from the RCS
- Steam generator tube rupture
- Pipe break in the main steam system

Figure 5.2-1



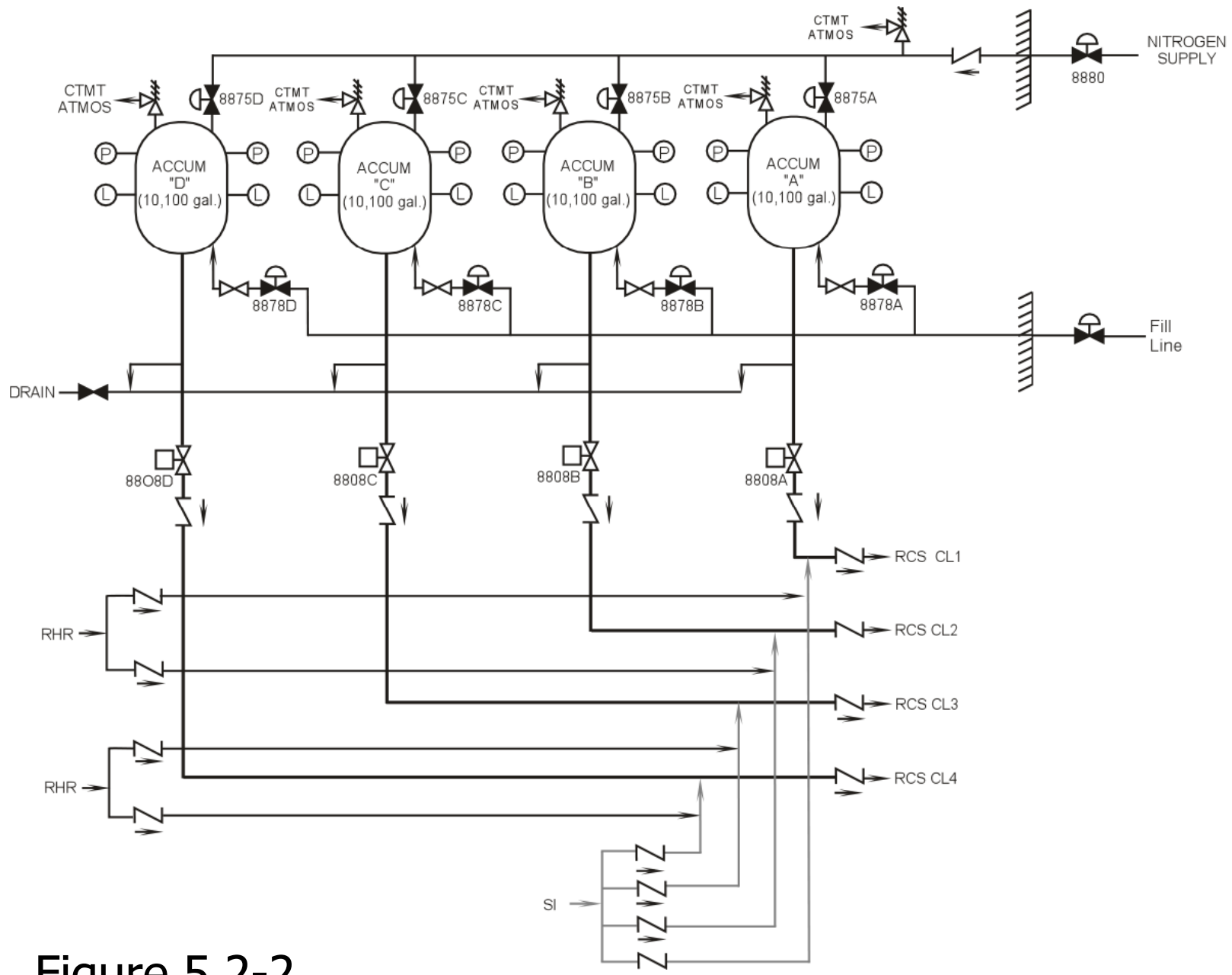


Figure 5.2-2

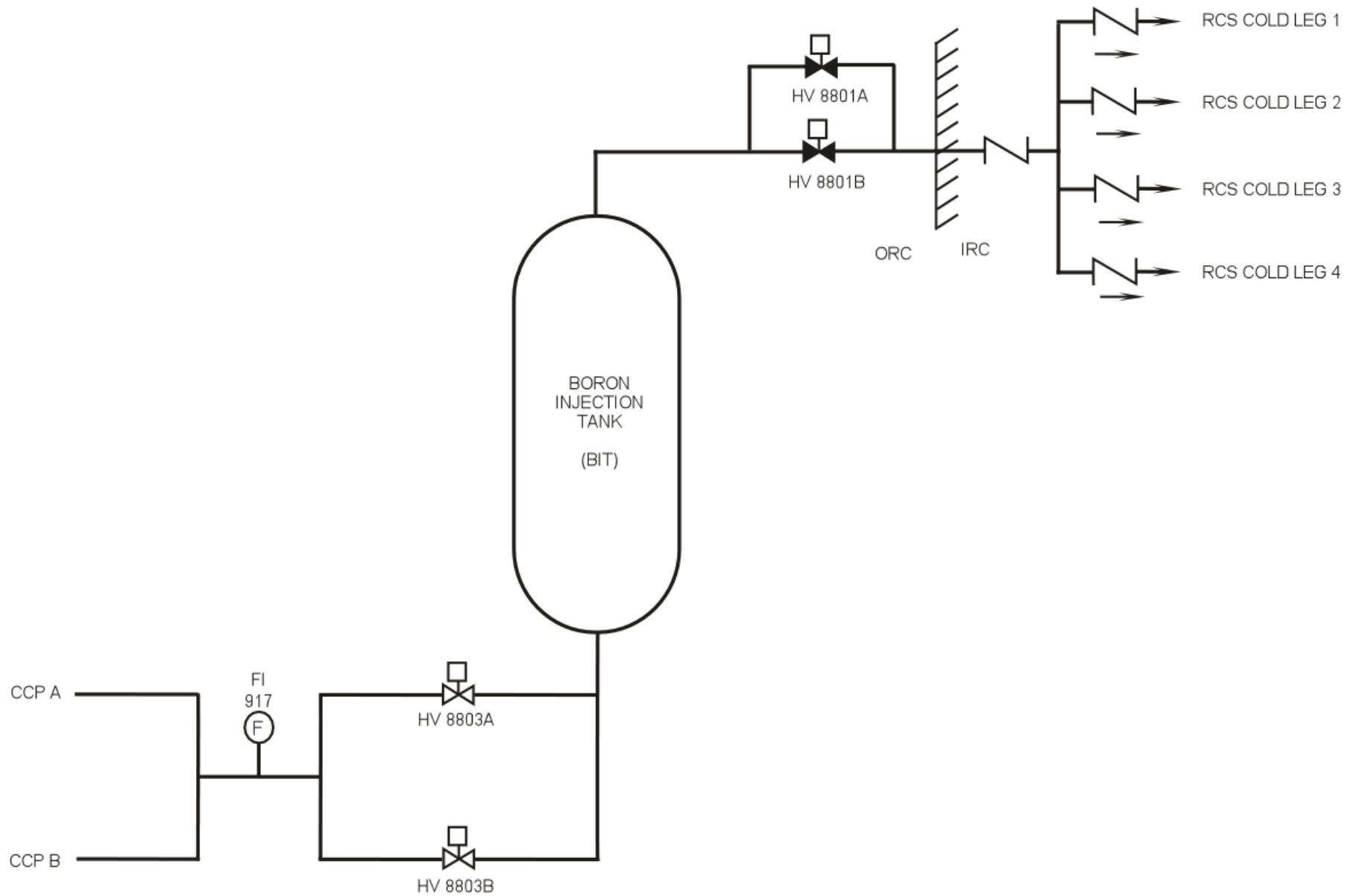
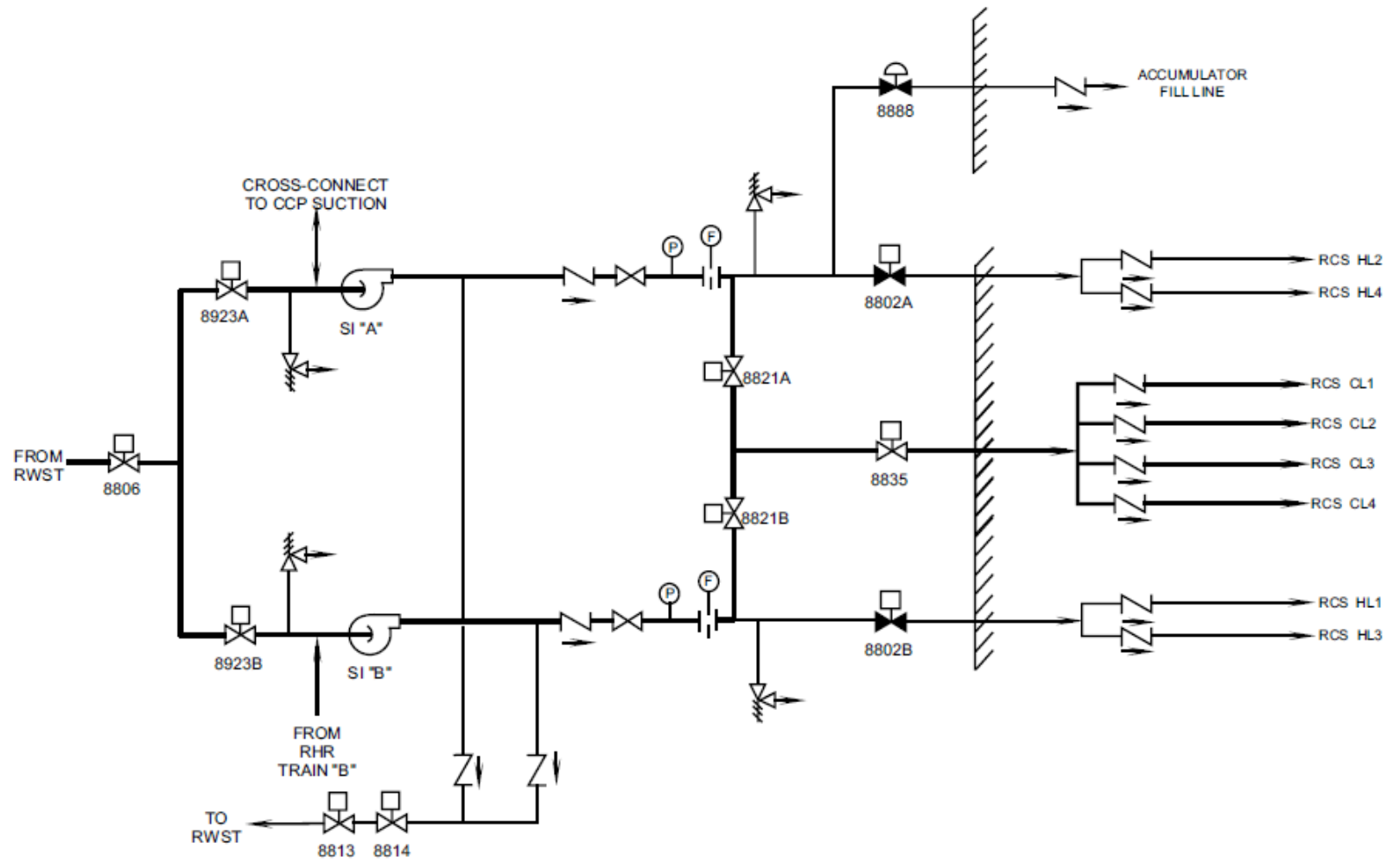


Figure 5.2-4 Safety Injection System



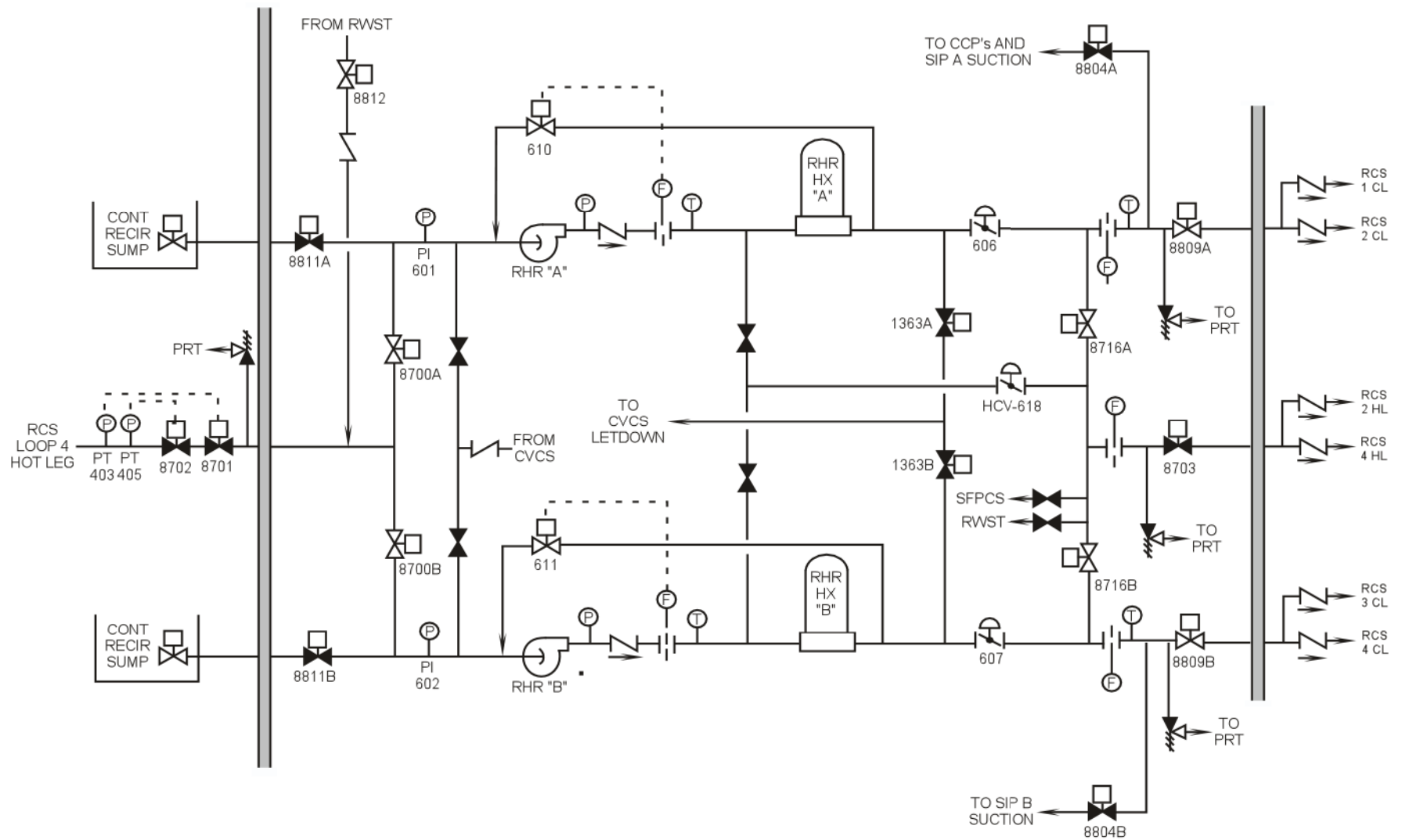
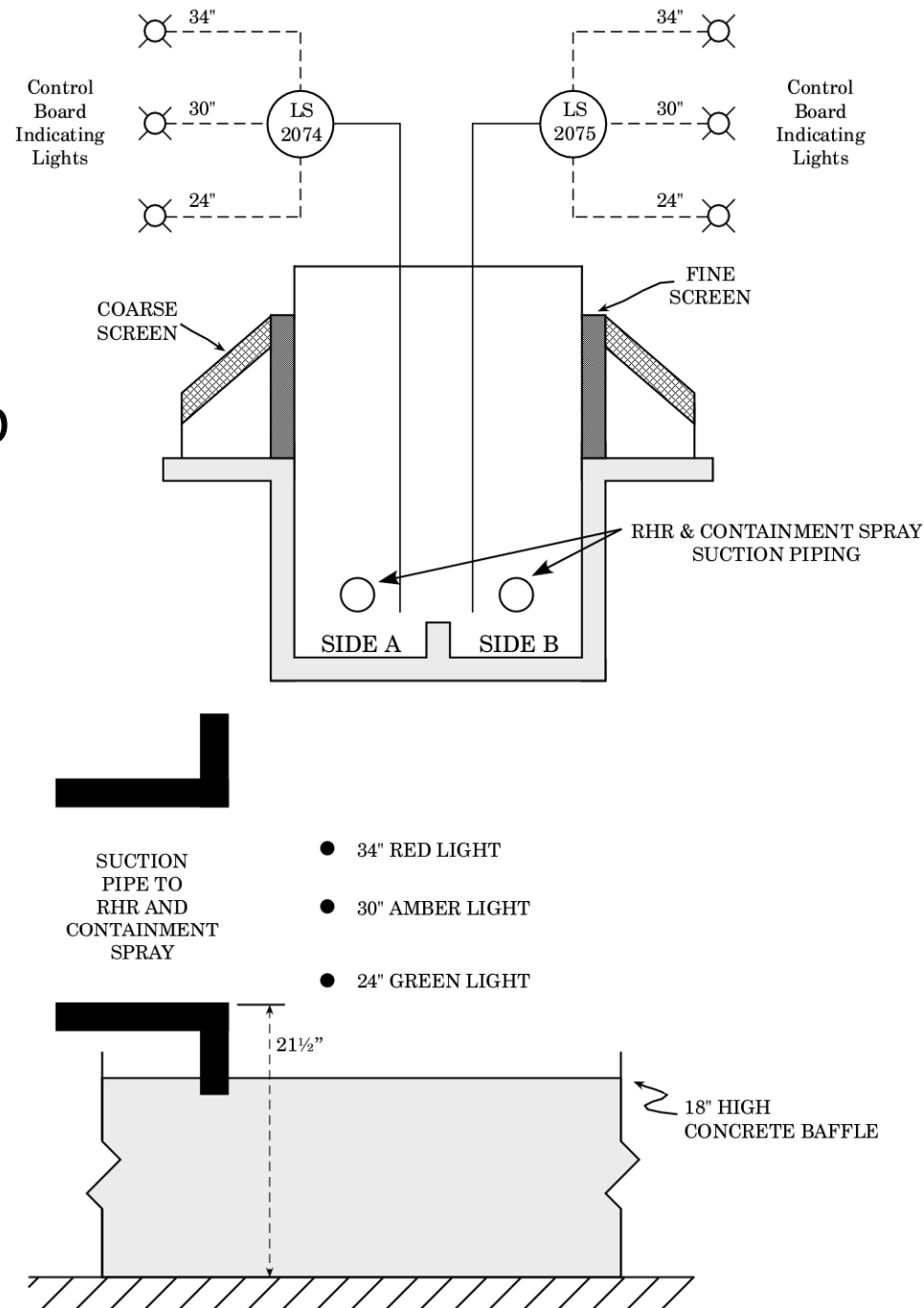


Figure 5.2-5

Figure 5.2-7
Containment
Recirculation Sump
Details



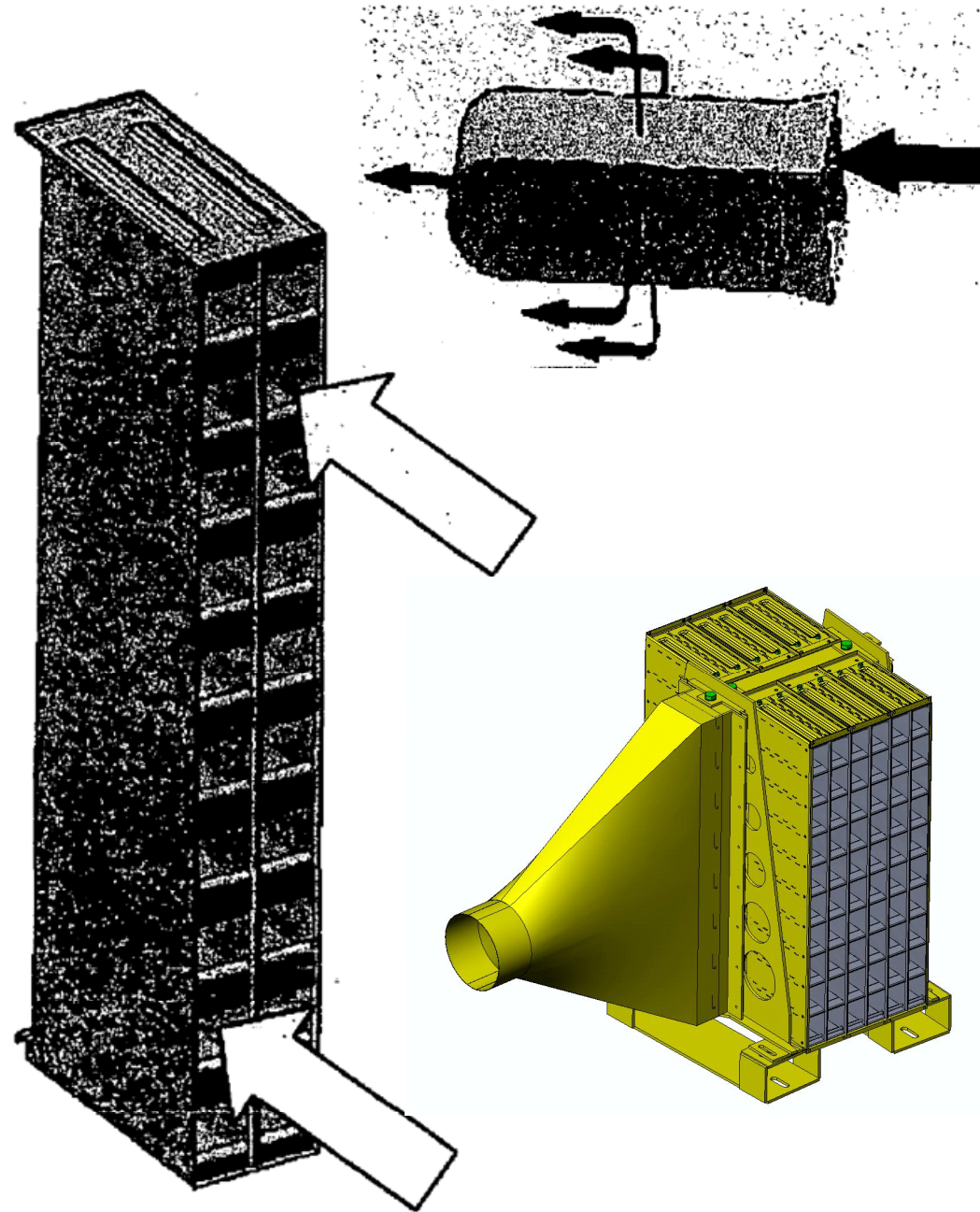


Figure 5-.2-8 Recirculation Sump
Cartridge Pocket Screens

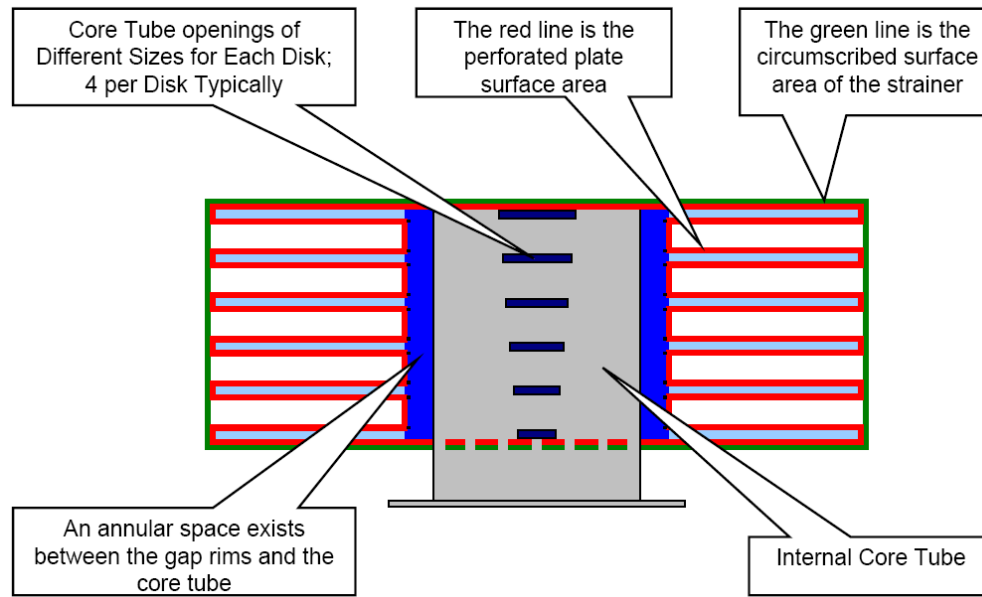
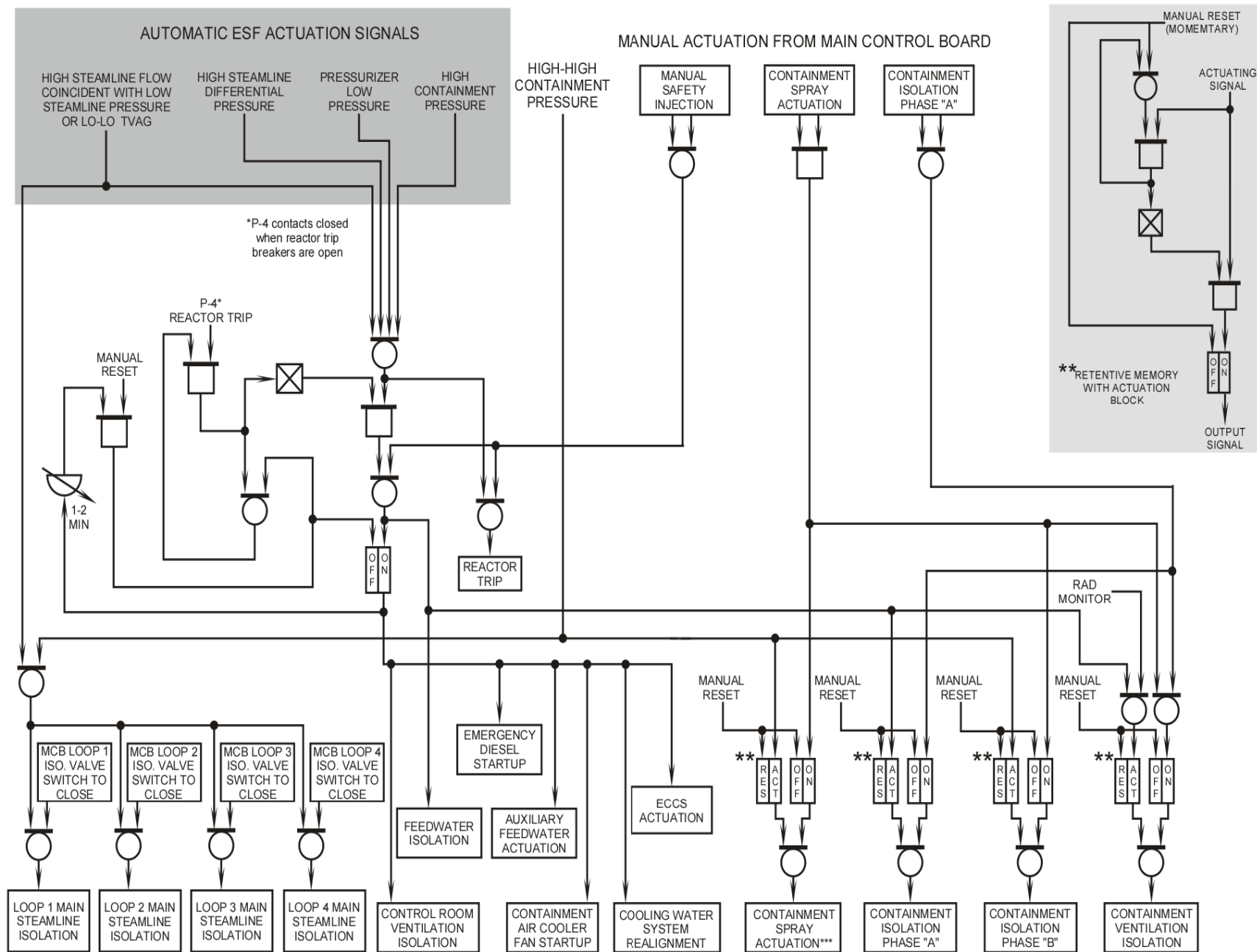


Figure 5.2-9 Recirculation Sump Sure-Flow Strainer

Figure 12.3-1 Engineered Safety Features Logic



***Containment spray pumps will start on a containment spray actuation signal only if the DBA sequencer has already been initiated by an ESF actuation.