

Reactor Building Closed Loop Cooling Water (RBCLCW)

304B Chapter 11.3

Objectives

1. Identify the purposes of the Reactor Building Closed Loop Cooling Water (RBCLCW) system.
2. Summarize the function and operation of the following RBCLCW equipment:
 - a. Pumps
 - b. Recirculation Pump M/G Set Cooling Water Pumps
 - c. Heat Exchangers
 - d. Head Tanks
 - e. Radiation Monitor
 - f. Pressure Control Valve
 - g. Booster Heat Exchangers
 - h. Isolation Valves

Objectives

3. Describe the following flow paths:
 - a. Safety related component cooling
 - b. Non-safety related component cooling
 - c. Split system operation
4. List the accident conditions that will result in RBCLCW isolation.
5. Describe the systems response to:
 - a. Loss of Preferred Power
 - b. Loss Of Coolant Accident (LOCA)
 - c. Loss of Station and Instrument Air (SIA) system
6. Describe the RBCLCW system interrelationship with the following:
 - a. Emergency AC Power system
 - b. Station and Instrument Air (SIA) system
 - c. Reactor Building Service Water system

Purposes

The purposes of the Reactor Building Closed Loop Cooling Water (RBCLCW) System are to:

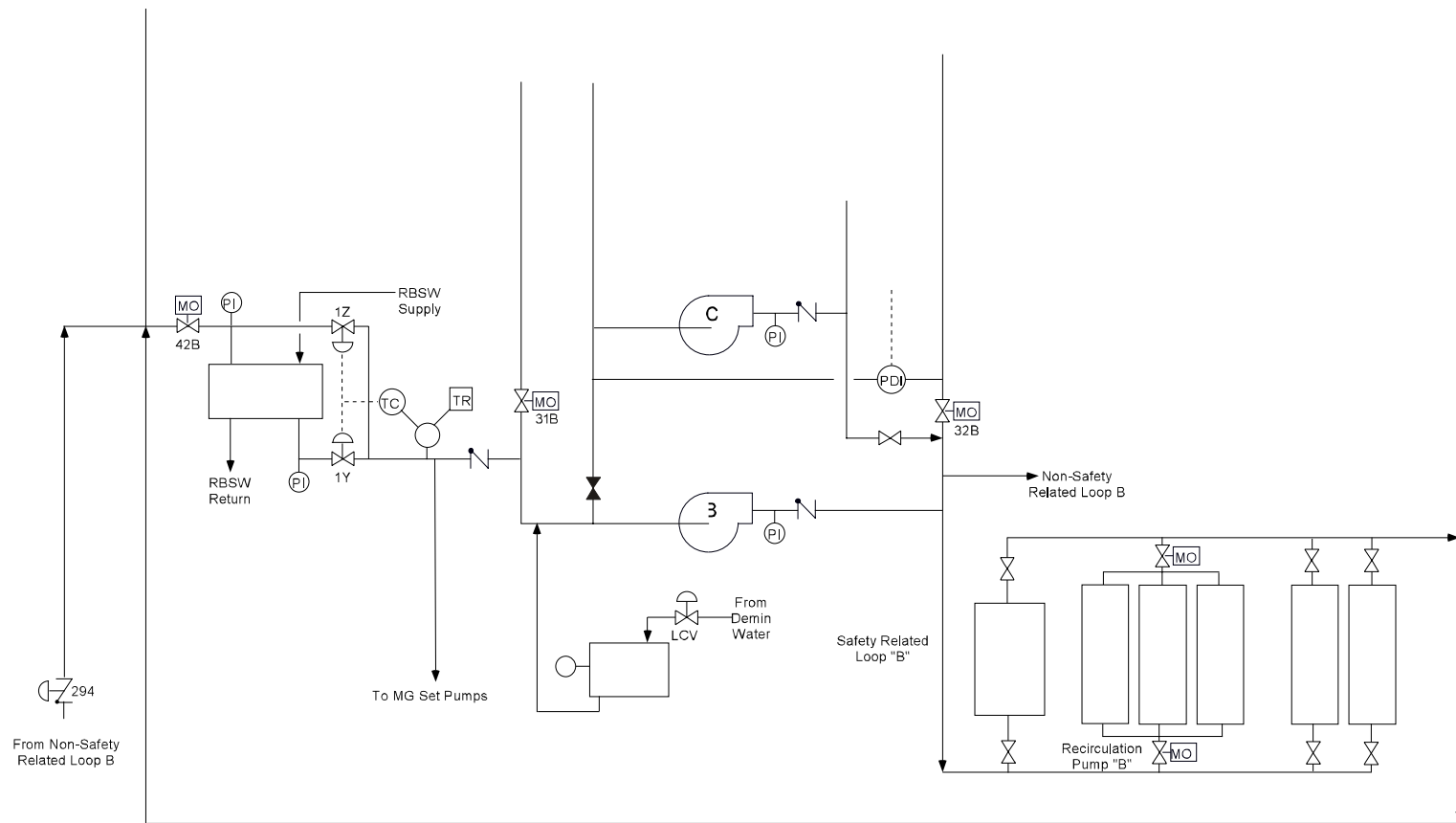
- Transfer heat from the components cooled by RBCLCW to the Reactor Building Service Water System via heat exchangers
- Provide cooling water to reactor auxiliary equipment and other miscellaneous reactor building equipment during normal operation
- Provide nuclear safety related systems with a redundant means of cooling during an accident condition in order to accomplish and maintain a safe shutdown.

Overview

- Safety-related loops
- Non-safety related loops
- Accident conditions:
 - High Drywell Pressure
 - Reactor water level 1
- System response to accident conditions

Flow Paths

- Safety-related loads
- Nonsafety-related loads
- Split system operation



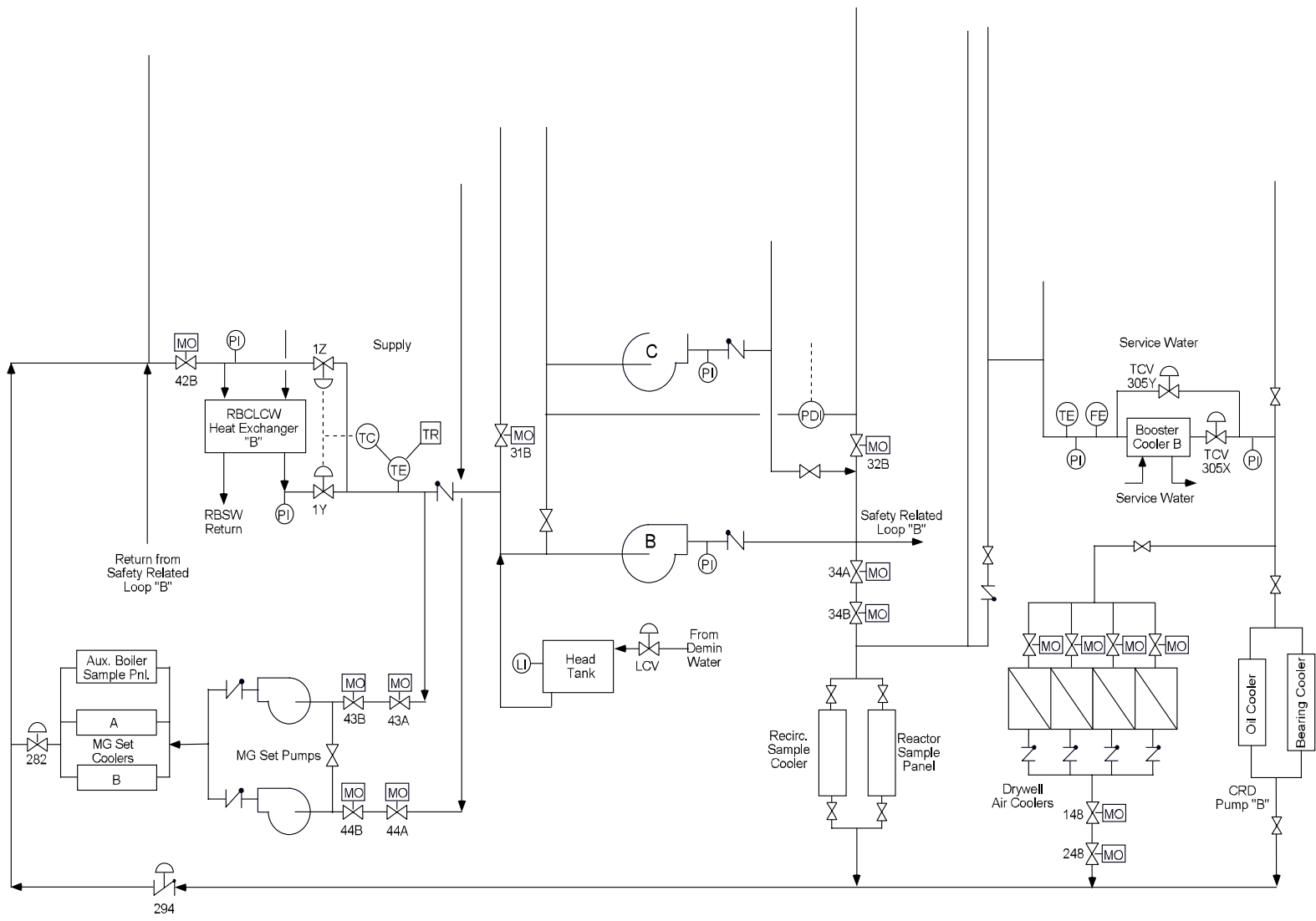
RBCLCW Safety Related Load List

Safety Related Loop "A"

- Fuel Pool Cooling Heat Exchanger A
- RHR Pump A & C Seal Coolers
- Recirculation Pump A Seal Coolers
- Recirculation Pump A Bearing Cooler
- Recirculation Pump A Motor Winding Coolers

Safety Related Loop "B"

- Fuel Pool Cooling Heat Exchanger B
- RHR Pump B & D Seal Coolers
- Recirculation Pump B Seal Coolers
- Recirculation Pump B Bearing Cooler
- Recirculation Pump B Motor Winding Coolers



RBCLCW Nonsafety Related Load List

Common Nonsafety-Related Loads

- Reactor Recirculating Water Pump M/G Set Coolers
- Auxiliary Boiler Sample Panel Cooler
- Reactor Water Recirculation Sample Panel and Cooler
- RWCU Non Regenerative Heat Exchangers
- RWCU Pump Coolers

Non-Safety Related Loop "A"

- Booster Heat Exchanger A
 - Drywell air unit coolers
 - CRD pump A oil cooler.
 - CRD pump A bearing cooler.
 - Drywell equipment drain cooler

Non-Safety Related Loop "B"

- Booster Heat Exchanger B
 - Drywell air unit coolers
 - CRD pump B oil cooler
 - CRD pump B bearing cooler

Pumps

- RBCLCW Pumps
- Recirculation Pump M/G Set Cooling Water Pumps

Heat Exchangers

- RBCLCW Heat Exchangers
- Booster Heat Exchangers (Coolers)

Head Tanks

- Surge volume
- NPSH requirements
- Inventory Control

Radiation Monitor

- Samples drawn from discharge header
- Radioactive in-leakage

Pressure Control Valve

- Differential pressure across RBCLCW pumps
- Minimizes effect when placing individual coolers in service
- Normally shut

Isolation Valves

- Pump Discharge Header Isolation Valves
- Pump Suction Header Isolation Valves
- Nonsafety-Related Loop Isolation Valves
- Recirculation pump M/G set fluid coupling cooling water pumps Valves

RBCLCW Heat Exchanger Valves

- Temperature Control
- Isolation

Booster Heat Exchanger (Cooler) Valves

- Outlet temperature control
- Bypass flow

Normal Operation

- Two RBCLCW pumps in operation
- Third RBCLCW pump in standby
- One RBCLCW heat exchanger in service
- One Booster heat exchanger in service
- Loops are cross-connected
- RWCU non-regenerative heat exchangers supplied by one NSR loop

Loss of Preferred Power

- Automatic RBCLCW Pump Starts
- RBCLCW heat exchanger inlet valves open

LOCA

- High Drywell Pressure or Reactor Water Level 1
- Split into two independent safety-related loops
- Nonsafety-related loops are isolated
- Both RBCLCW heat exchangers in service

Loss of SIA System

- RBCLCW heat exchanger and booster heat exchanger (cooler) temperature control valves fail open
- Head tank level control valves fail open

System Interfaces

- **Emergency AC Power System**
- **Station & Instrument Air System**
- **Reactor Building Service Water System**
- **Heat Load Systems**

Summary

- Safety-related
- Nonsafety-related
- LOCA
- Loss of preferred power
- Loss of SIA
- Individual components

Objectives

1. Identify the purposes of the Reactor Building Closed Loop Cooling Water (RBCLCW) system.
2. Summarize the function and operation of the following RBCLCW equipment:
 - a. Pumps
 - b. Recirculation Pump M/G Set Cooling Water Pumps
 - c. Heat Exchangers
 - d. Head Tanks
 - e. Radiation Monitor
 - f. Pressure Control Valve
 - g. Booster Heat Exchangers
 - h. Isolation Valves

Objectives

3. List the accident conditions that will result in RBCLCW isolation.
4. Describe the systems response to:
 - a. Loss of Preferred Power
 - b. Loss Of Coolant Accident (LOCA)
 - c. Loss of Station and Instrument Air (SIA) system
5. Describe the RBCLCW system interrelationship with the following:
 - a. Emergency AC Power system
 - b. Station and Instrument Air (SIA) system
 - c. Reactor Building Service Water system

Are there any questions?