

# Turbine Building Closed Loop Cooling Water (TBCLCW)

304B Chapter 11.5

# Objectives

1. Identify the purpose of the Turbine Building Closed Loop Cooling Water (TBCLCW) system.
2. Recognize the purpose, function and operation of the following major components:
  - a. pumps
  - b. surge tank
  - c. heat exchangers
  - d. pressure control valve
  - e. temperature control valve
  - f. radiation monitor
3. Describe the system flow path during normal operation..

# Objectives

4. Describe how the TBCLCW system interfaces with the following systems:
  - a. Condensate and feedwater system
  - b. Offgas system
  - c. Turbine building service water system

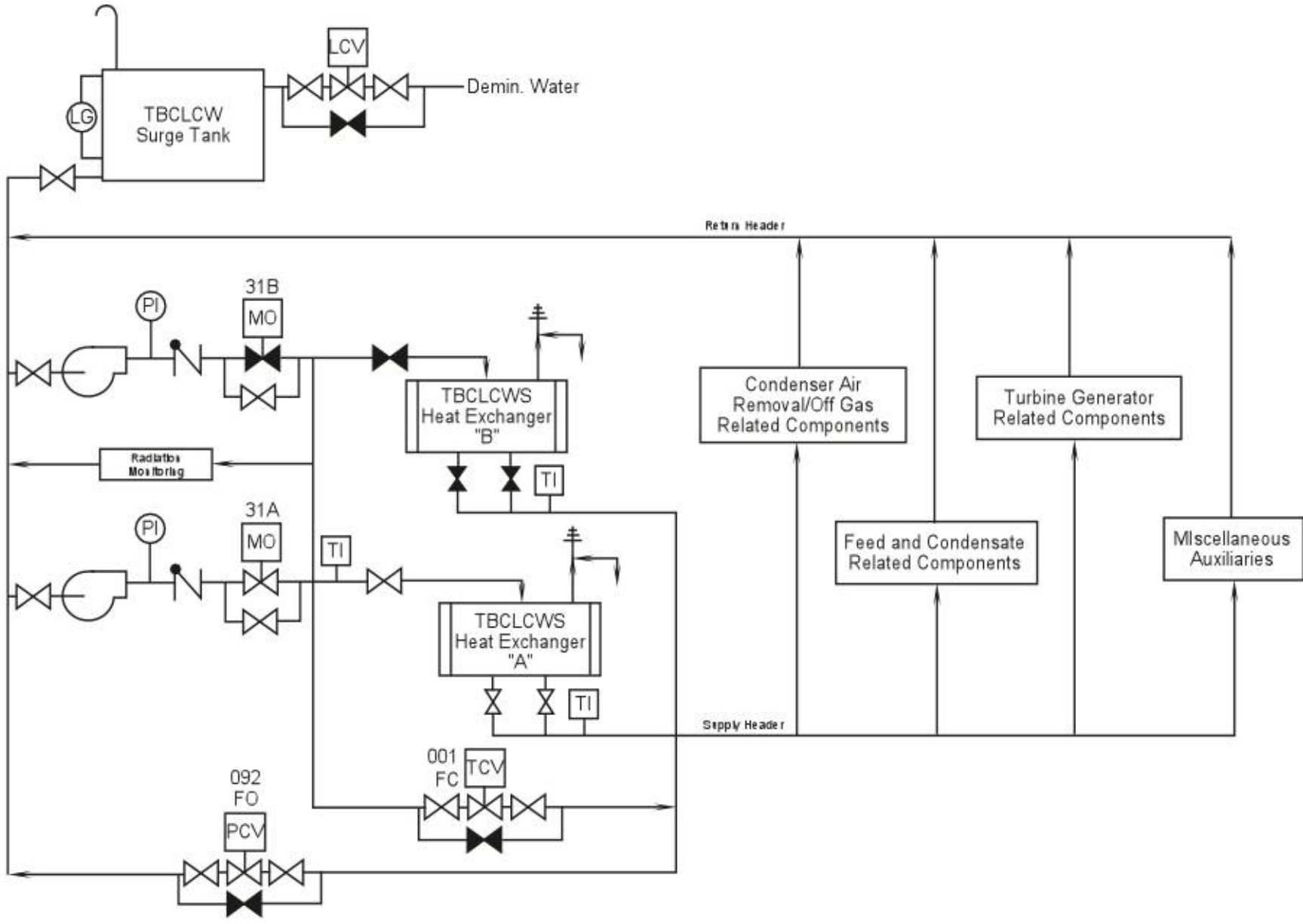
# Purposes

## **TBCLCW:**

Transfers heat from non-safety related components in the turbine building, radwaste building, and office and service building to the turbine building service water (TBSW) system.

# Overview

FIGURE 11.5-1 Turbine Building Closed Loop Cooling Water System



Objective 3

# TBCLCW Pumps

- Two 100% capacity pumps with rated flow of 17,800 gpm each
- One pump normally running with second pump in standby
- Standby pump automatically starts if running pump trips

# Surge Tank

- Surge tank connected to pump suction header
- Reduces pressure pulses, accomodates thermal expansion of system water, ensures adequate NPSH for pumps, provides low pressure inlet for makeup water, provides means to detect system leakage
- Automatic makeup from demin water

# Heat Exchangers

- Two 100% capacity shell and tube heat exchangers
- TBSW flow through tubes
- TBCLCW flow through shell
- Each heat exchanger designed to handle entire system head load



# Pressure Control Valve

- PCV-092 located in line connecting pump suction header with heat exchanger outlet header
- Modulates to maintain constant system pressure as TBCLCW system loads vary
- When system pressure drops, closes to route more water through pump
- When system pressure rises, opens to have more flow bypass pump

# Temperature Control Valve

- TCV-001 located in line connecting the pump discharge header and the heat exchanger outlet header
- Modulates to maintain constant system temperature (95°F) as loads on the TBCLCW system vary
- When system temperature drops, opens to bypass more flow around heat exchanger
- When system temperature rises, closes to route more flow through heat exchanger

# Radiation Monitor

- Located in the TBCLCW pump discharge line
- Designed to detect in-leakage of radioactive contaminants caused by the failure of a cooler served by the TBCLCW system
- No automatic actions associated with this radiation monitor

# Normal Operation

One TBCLCW pump sends water through the shell side of one TBCLCW heat exchanger where TBSW flow through the tubes removes its heat.

The cooler water leaving the TBCLCW heat exchangers is routed through components in the turbine building, radwaste building, and the office and service building.

# Turbine Building Loads (abridged)

- Station air compressors
- Generator stator cooling unit
- Condensate pump motor bearings
- Condensate booster pump lube oil coolers
- Feedwater pump turbine lube oil coolers
- Main turbine lube oil coolers
- Offgas de-superheater condensers

# Radwaste Building Loads

- Waste evaporator
- Sample system coolers
- Regenerant evaporator
- Radwaste vent glycol chillers

# Office & Service Building Load

- Air conditioning condenser

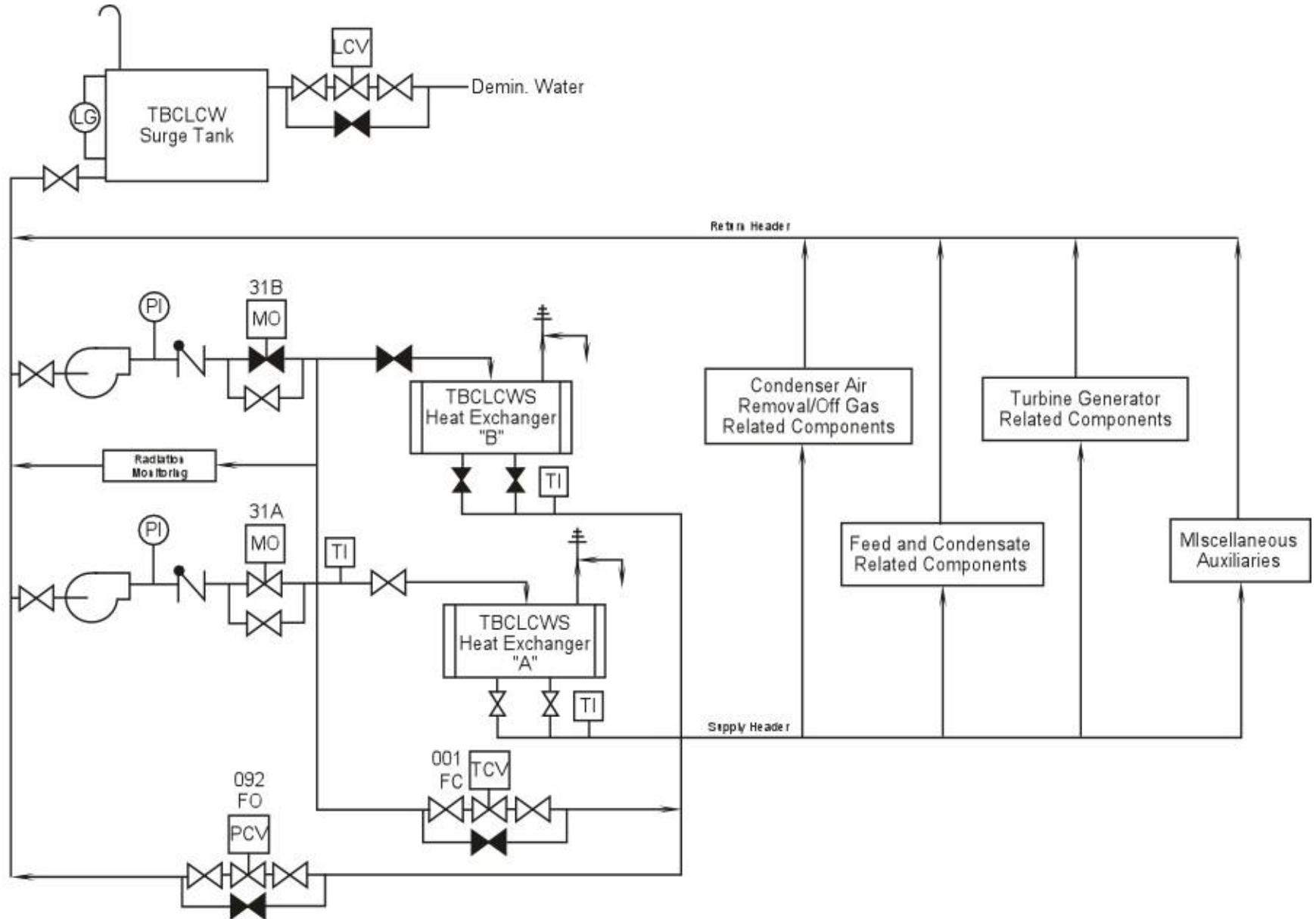
# System Interfaces

- Condensate and feedwater
- Offgas
- Turbine building service water



# Review

FIGURE 11.5-1 Turbine Building Closed Loop Cooling Water System



Objective 3

# Objectives

1. Identify the system's purposes.
2. Recognize the purpose, function and operation of major system components.
3. Describe the system flow path during normal operation.
4. Describe the system's interfaces with other plant systems.

Are there any questions?