

Auxiliary Feedwater System

ACADs (08-006) Covered

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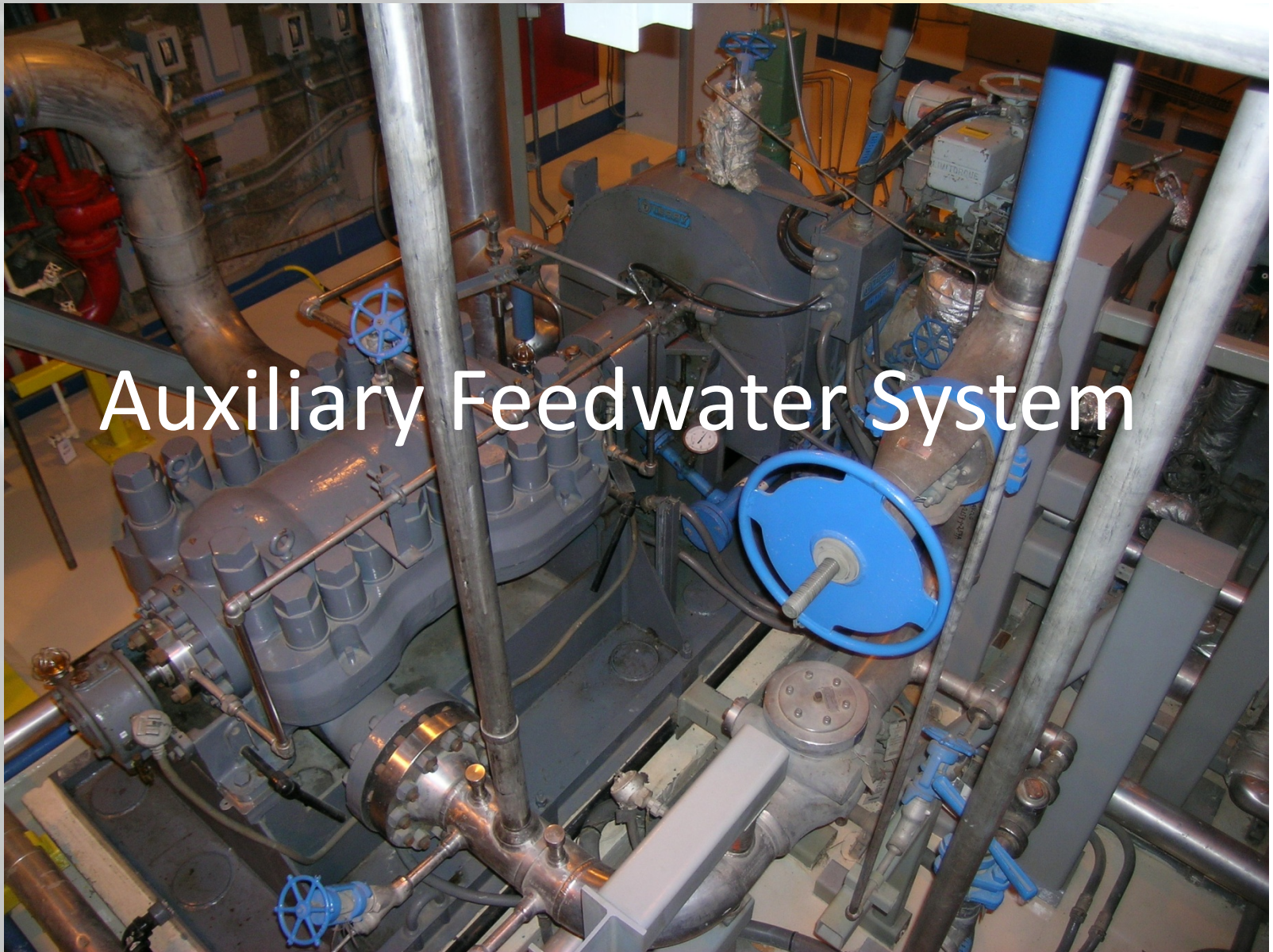
Keywords

Components, functions, operation, Auxiliary feedwater, Startup, hot standby, plant cooldown, emergency.

Description

Supporting Material





Auxiliary Feedwater System

OBJECTIVES

1. State the purpose of the Auxiliary Feedwater System.
2. List the major components in the AFW System and state the function of each.
3. Describe the operation of the AFW System during:
 - a. Startup
 - b. Hot standby
 - c. Plant cooldown
 - d. Emergency
4. Describe the normal line-up for the AFW System.
5. List the signals which initiate the automatic starting of the motor-driven and turbine-driven AFW pumps.



Auxiliary Feedwater System

Purpose:

Serves as a backup system for feeding steam generators whenever RCS temperature is above 350°F and main feed system is not available.

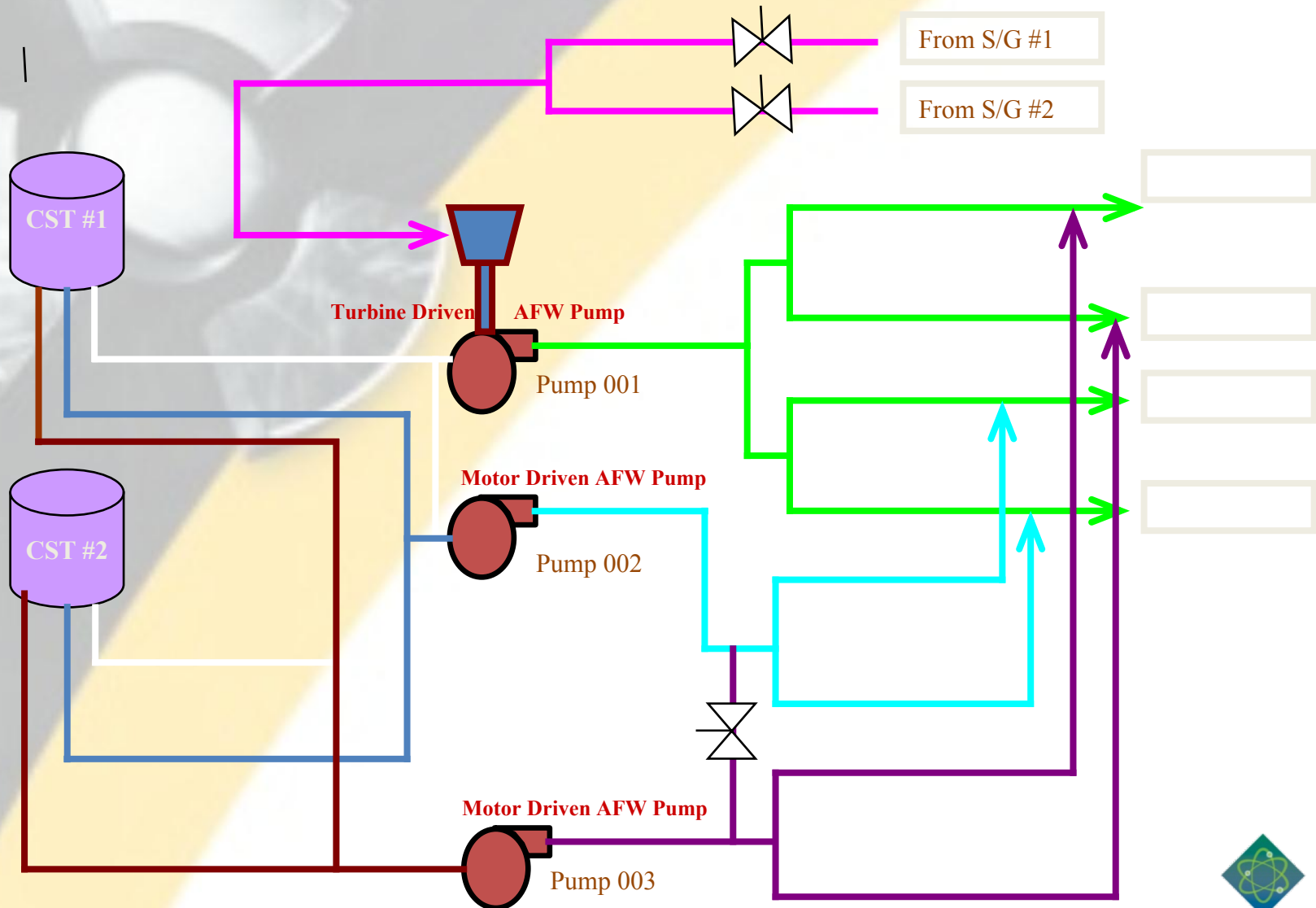
Level must be maintained in SG even during emergency since SG is the reactor's heat sink.

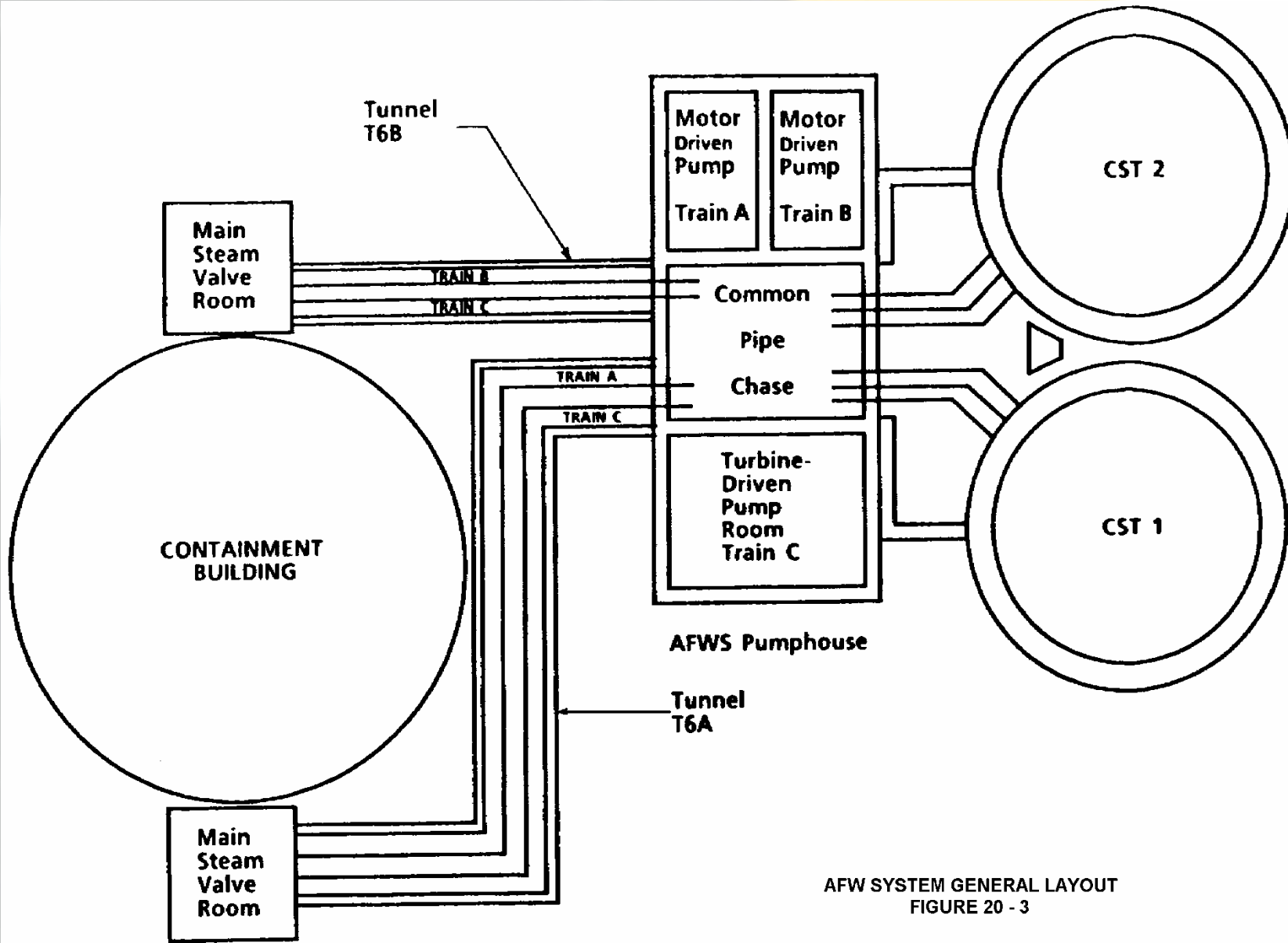


Components:

- **Two Motor Driven Pumps**
- **One Steam Turbine Driven Pump**
- **Two Condensate Storage Tanks**
- **Associated Piping, Valves, & Controls**

Auxiliary Feedwater System





AFW SYSTEM GENERAL LAYOUT
FIGURE 20 - 3

MDAFW Pump

- Each pump is capable of 100% capacity.
- 630 gpm (including recirculation flow) @1517 psi
 - Takes suction from one CST
 - Motors are air cooled
- Each pump feeds 2 SGs

MDAFW Pump

- The pumps may be operated manually or will start automatically upon detected loss of heat sink and loss of power events
- Automatically started by
 - 1) Low water level in any one SG (2 of 3 coincidence)
 - 2) Both MFPs tripped
 - 3) SI (Safety Injection)
 - 4) Blackout signal





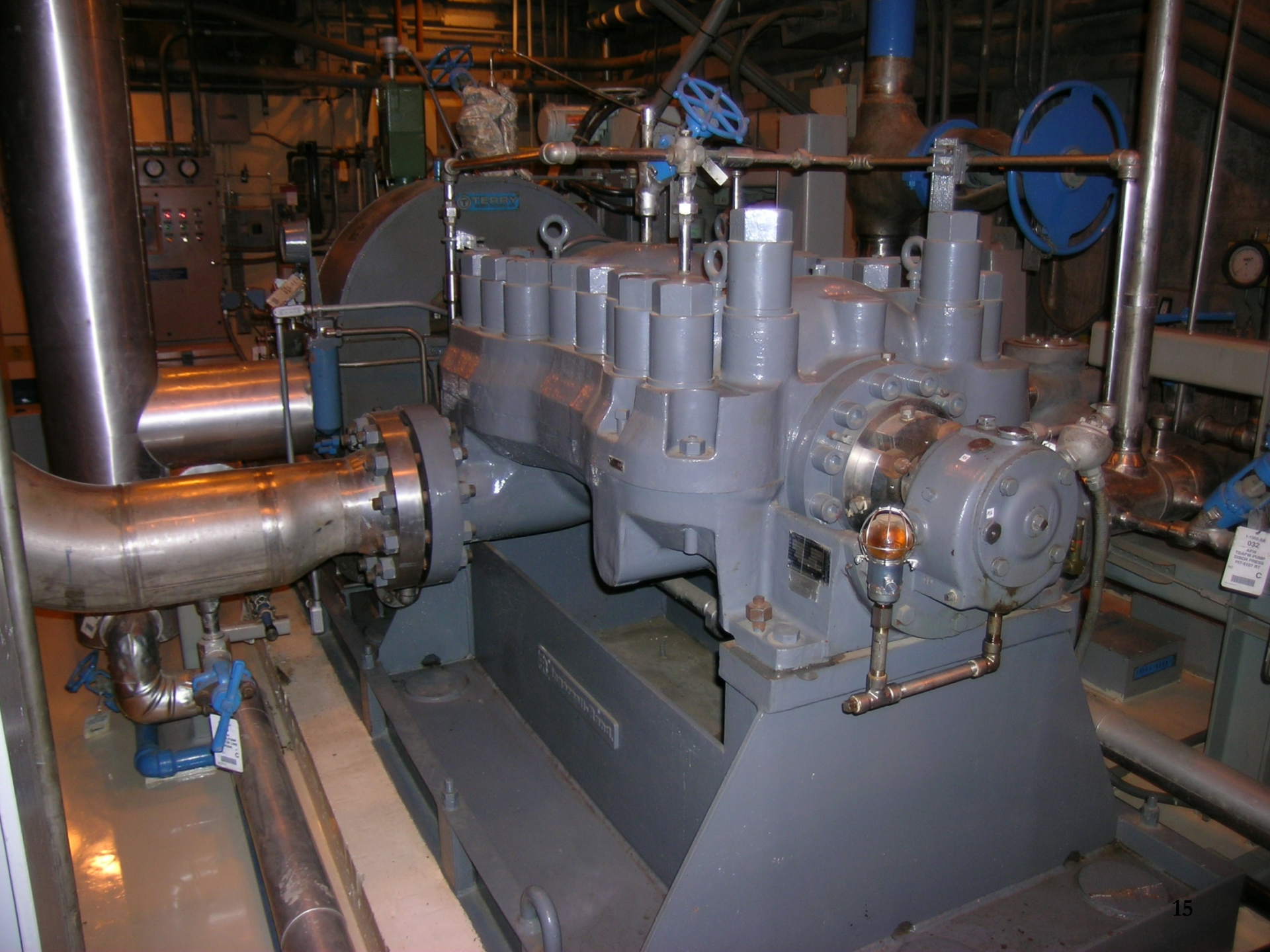
Motor Driven AFW Pump Suction Piping

TDAFW Pump

- Power supply is Main Steam pressure upstream of MSIV's (Loops 1 & 2)
- Exhaust to atmosphere
- Apply feedwater to SGs during emergencies when the main feedwater and motor-driven pumps are inoperable
 - Capacity - 1175 gpm (almost twice capacity of MDAFW pump)
 - Aligned to all four SGs
- Auto started by 2 SGs at low level setpoint (2 of 3 coinc per SG)



Turbine Driven AFW Pump



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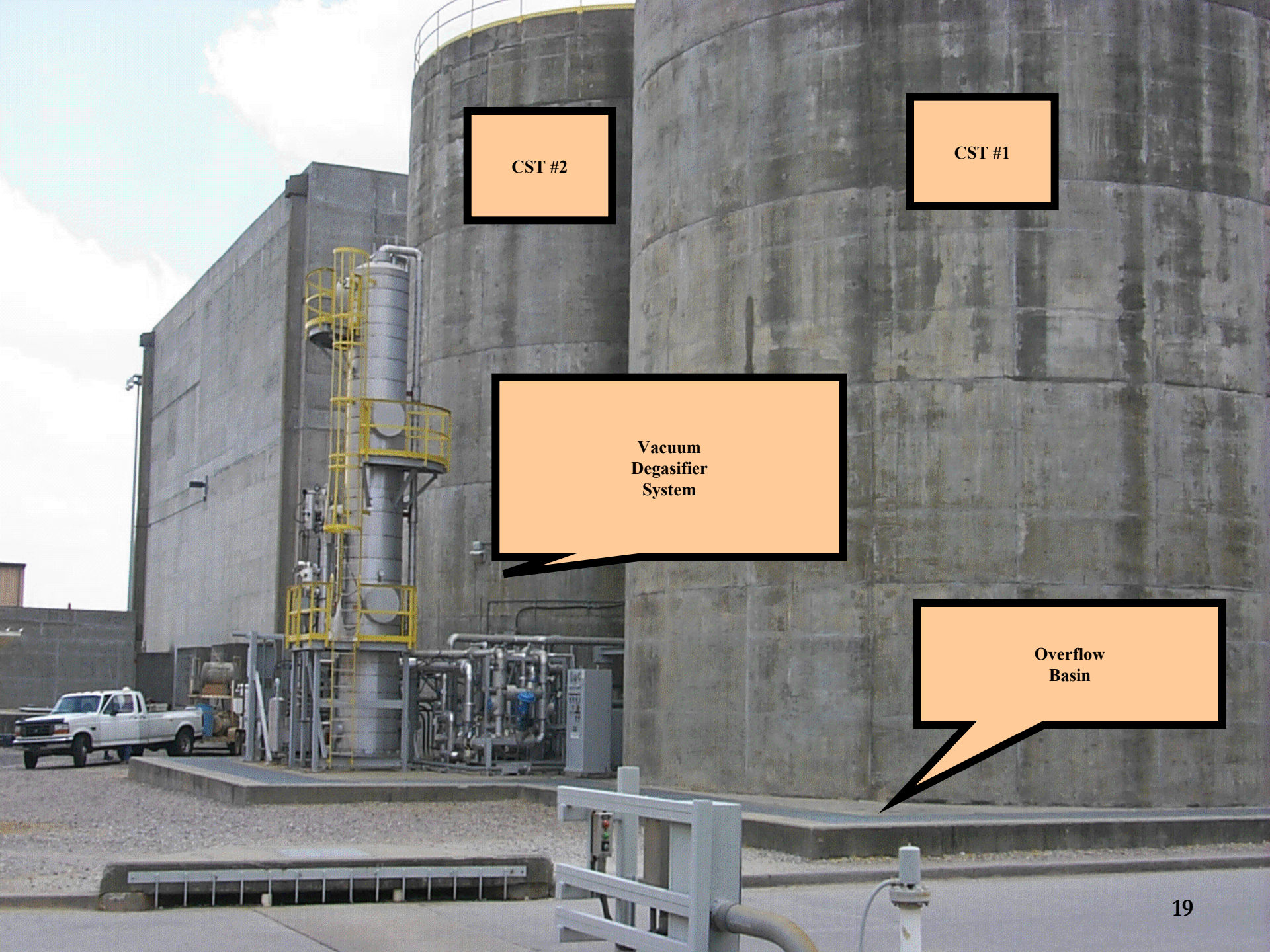


Condensate Storage Tanks(CST)

- **Vertical, cylindrical tanks of reinforced concrete with a stainless steel liner**
- **CST #1 normally lined up to provide water to the AFW system (Manual valves)**
- **CST #2 provides an alternate water source**

CST Capacity

- Capacity - 480,000 gallons each**
- All non-safety system consuming CST water take a suction via a standpipe with nozzle level that ensures the minimum water level is maintained available**



CST #2

CST #1

**Vacuum
Degasifier
System**

**Overflow
Basin**

AFW Actuation Signal

- Automatic features - AFW is aligned to be placed in service automatically in the event of an emergency
 - Auxiliary feedwater actuation signal (Motor Driven)
 - SI signal (associated train)
 - Loss of offsite power (blackout) associated train
 - Lo-Lo Level in SG - 38% - 2/4 on 1/4 SG
 - Both SGFPs trip (2/2)

TDAFW Actuation Signal

– Actuating signals

- Lo-Lo SG water level - 38% - 2/4 on 2/4 steam generators
- Loss of offsite power (black out on either train)

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