



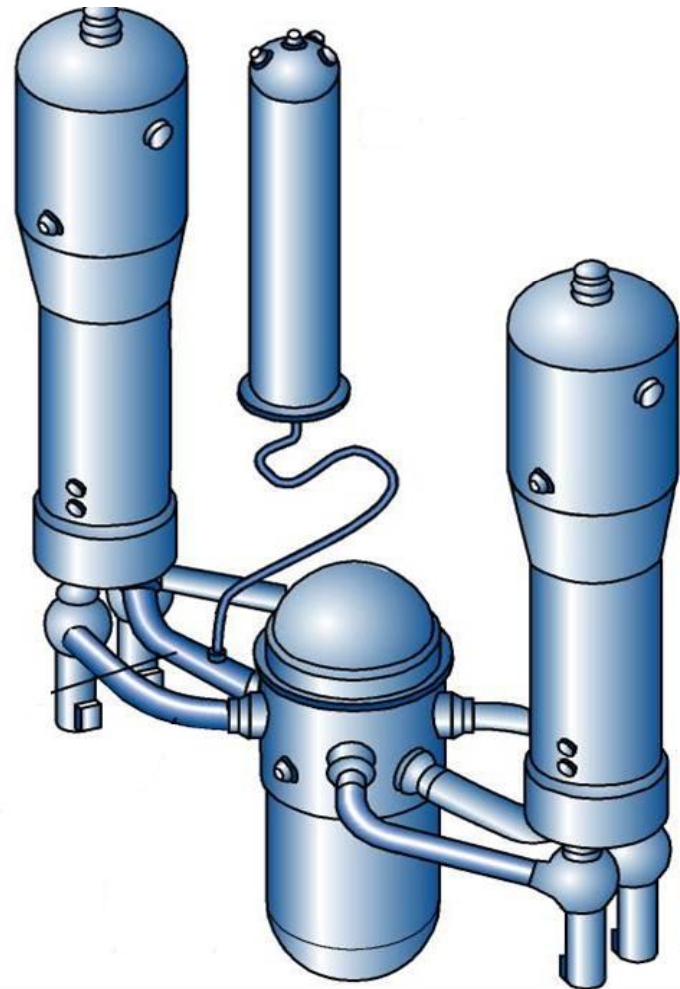
U.S. NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Reactor Coolant System

AP1000 Technology Chapter 3.0



Objectives

- 1. Describe the arrangement of the reactor coolant system for the AP1000 design.**
- 2. Describe the major differences between the reactor coolant systems of the AP1000 and currently operating Westinghouse plants.**
- 3. State the purposes of the automatic depressurization system.**

Major Components:

Reactor vessel
SGs
RCPs
Pressurizer
Hot legs
Cold legs
PZR surge line

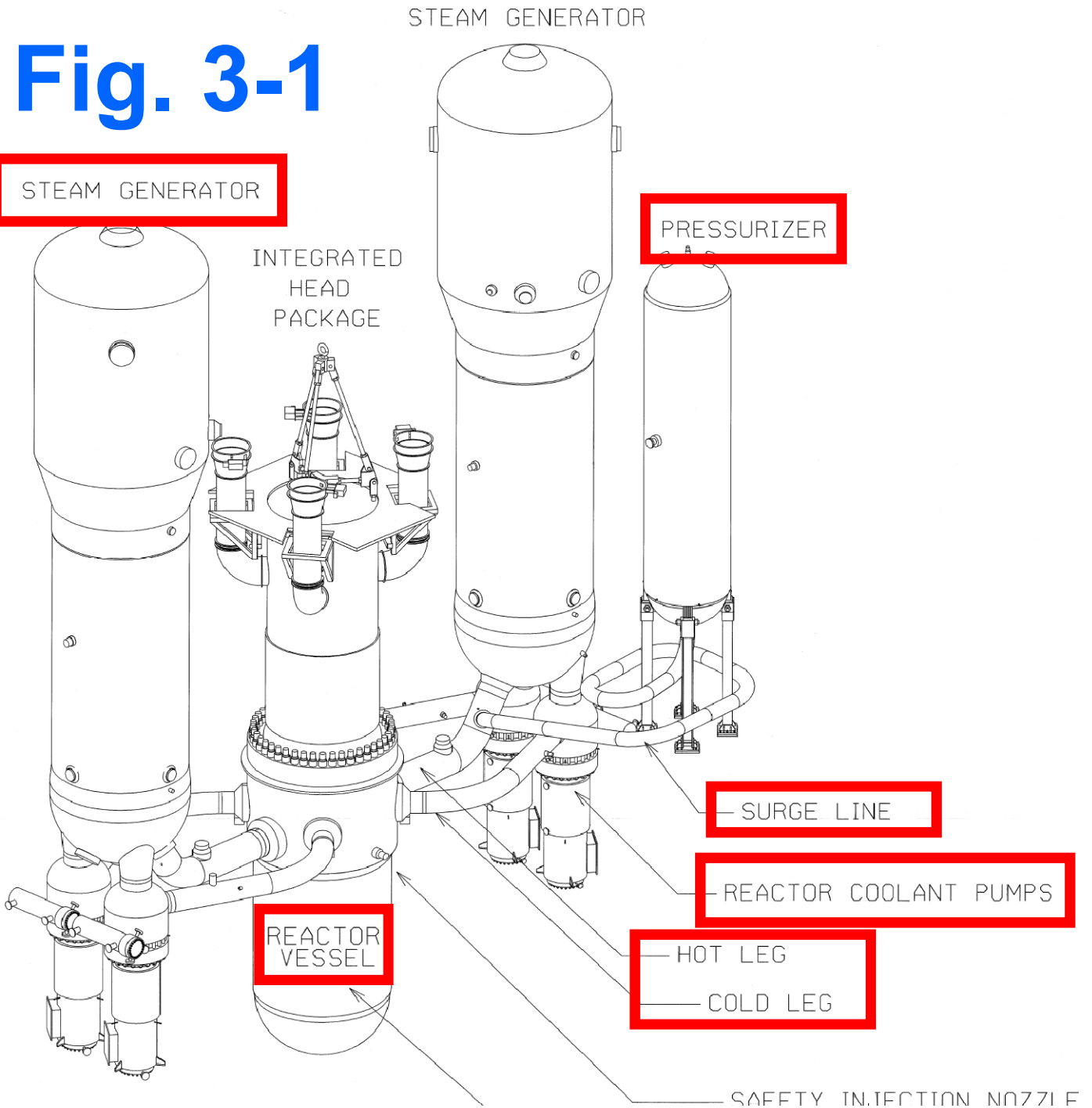


Fig. 3-2

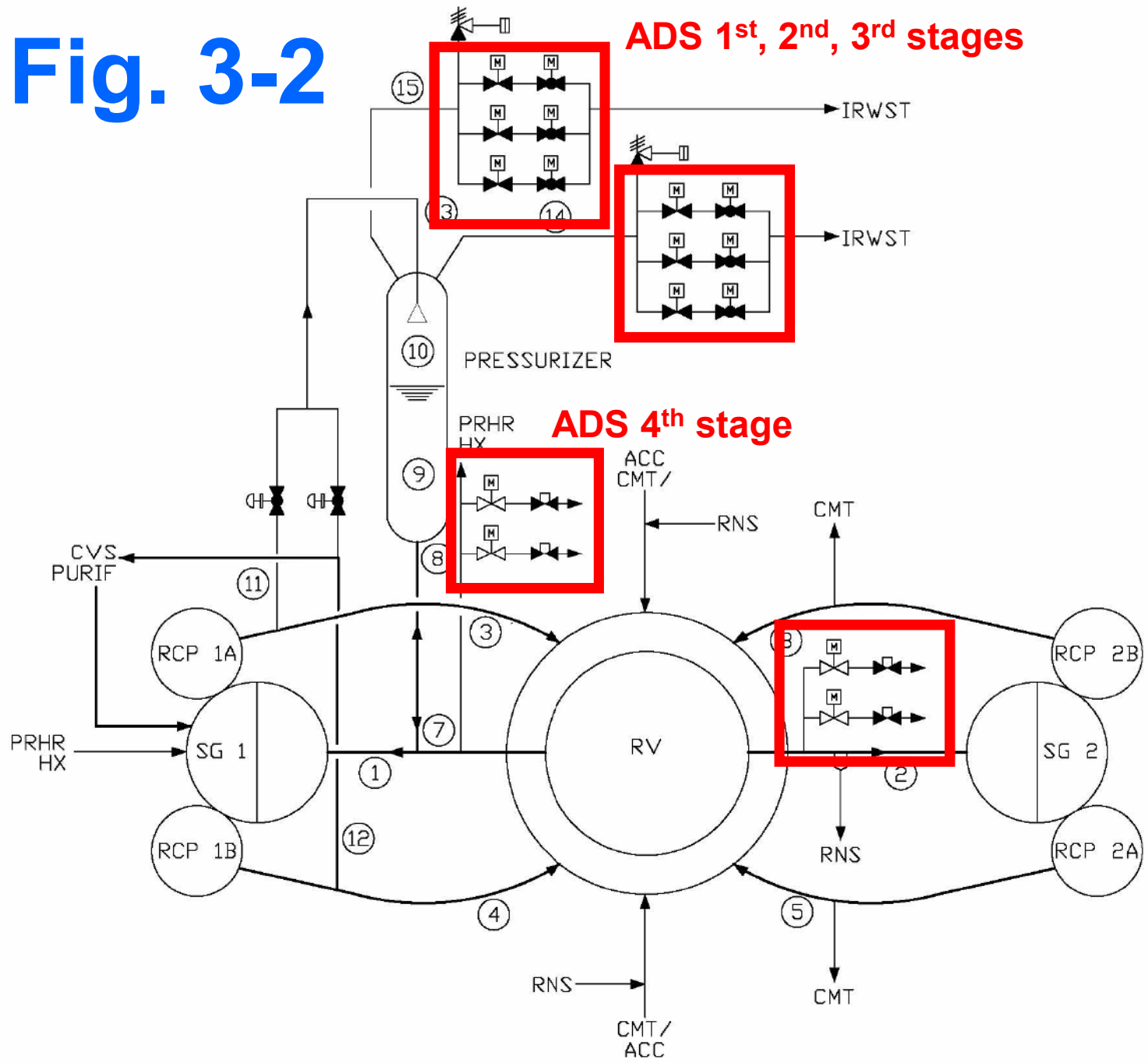
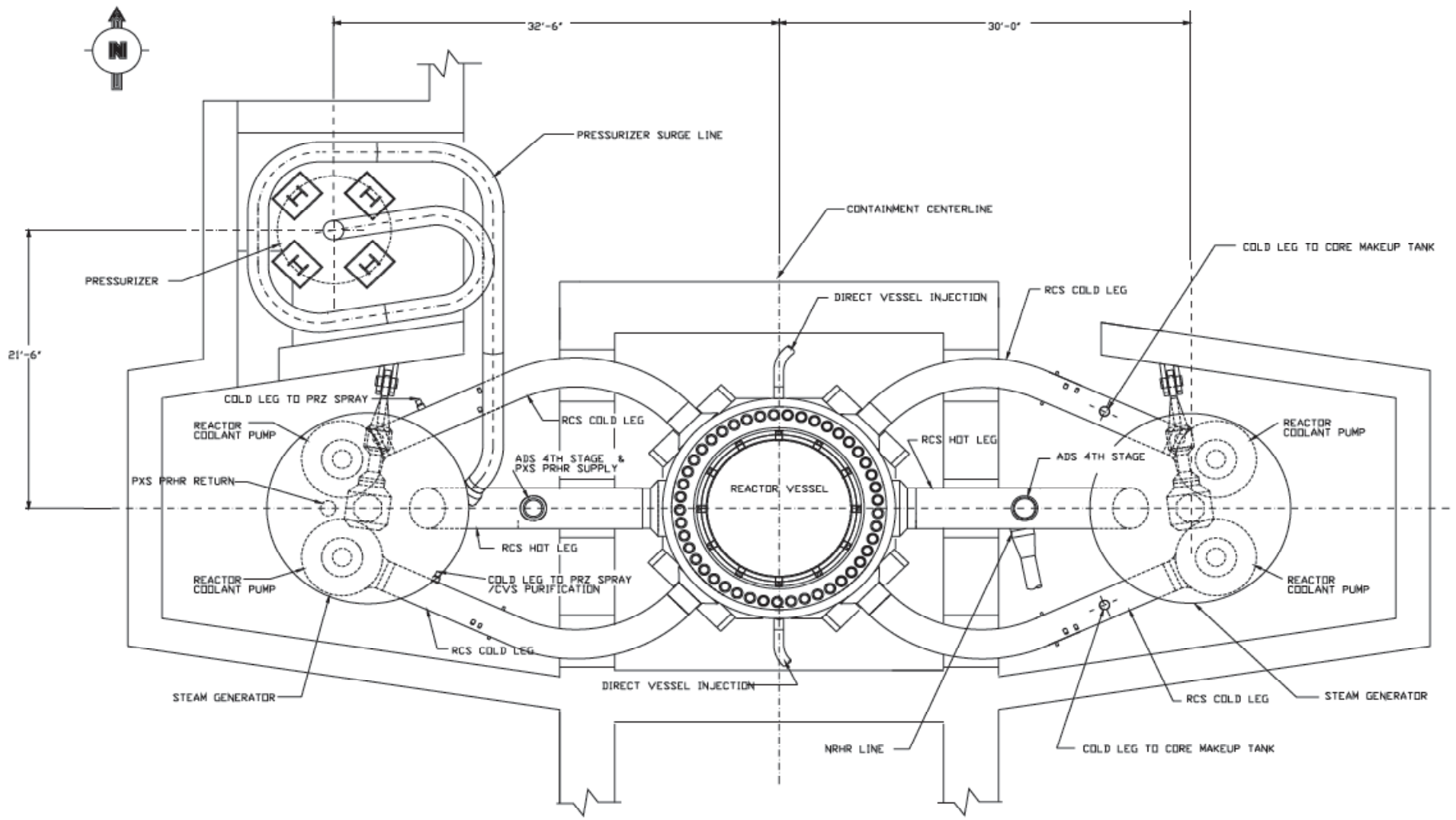


Fig. 3-3



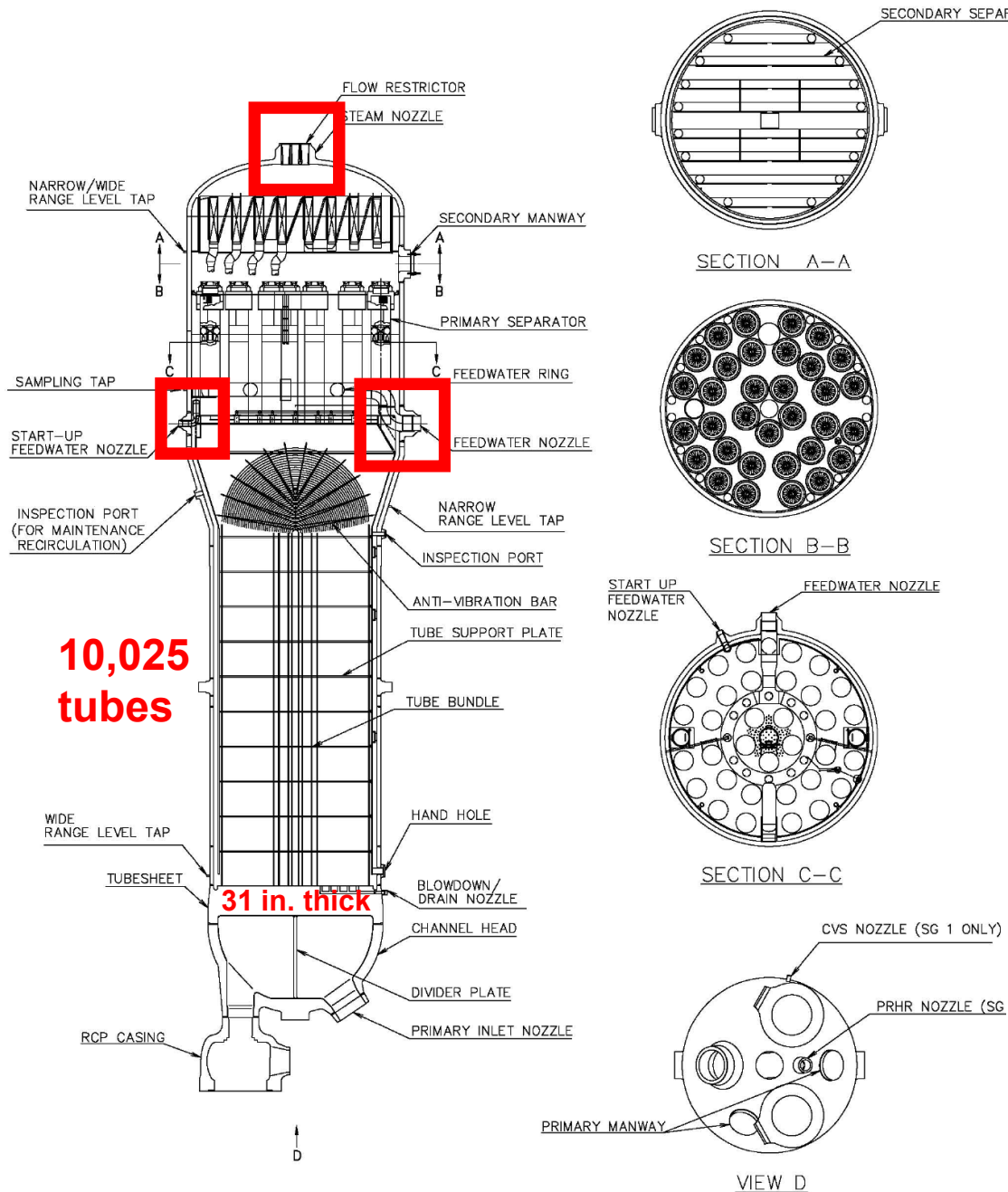
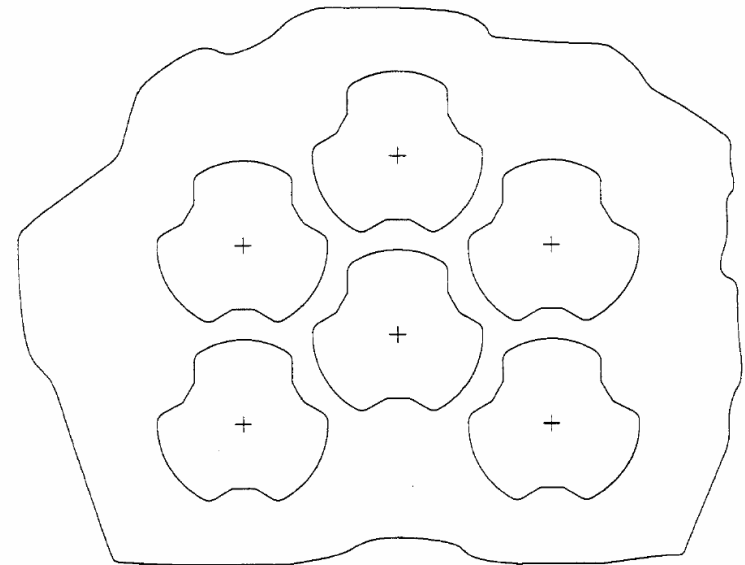
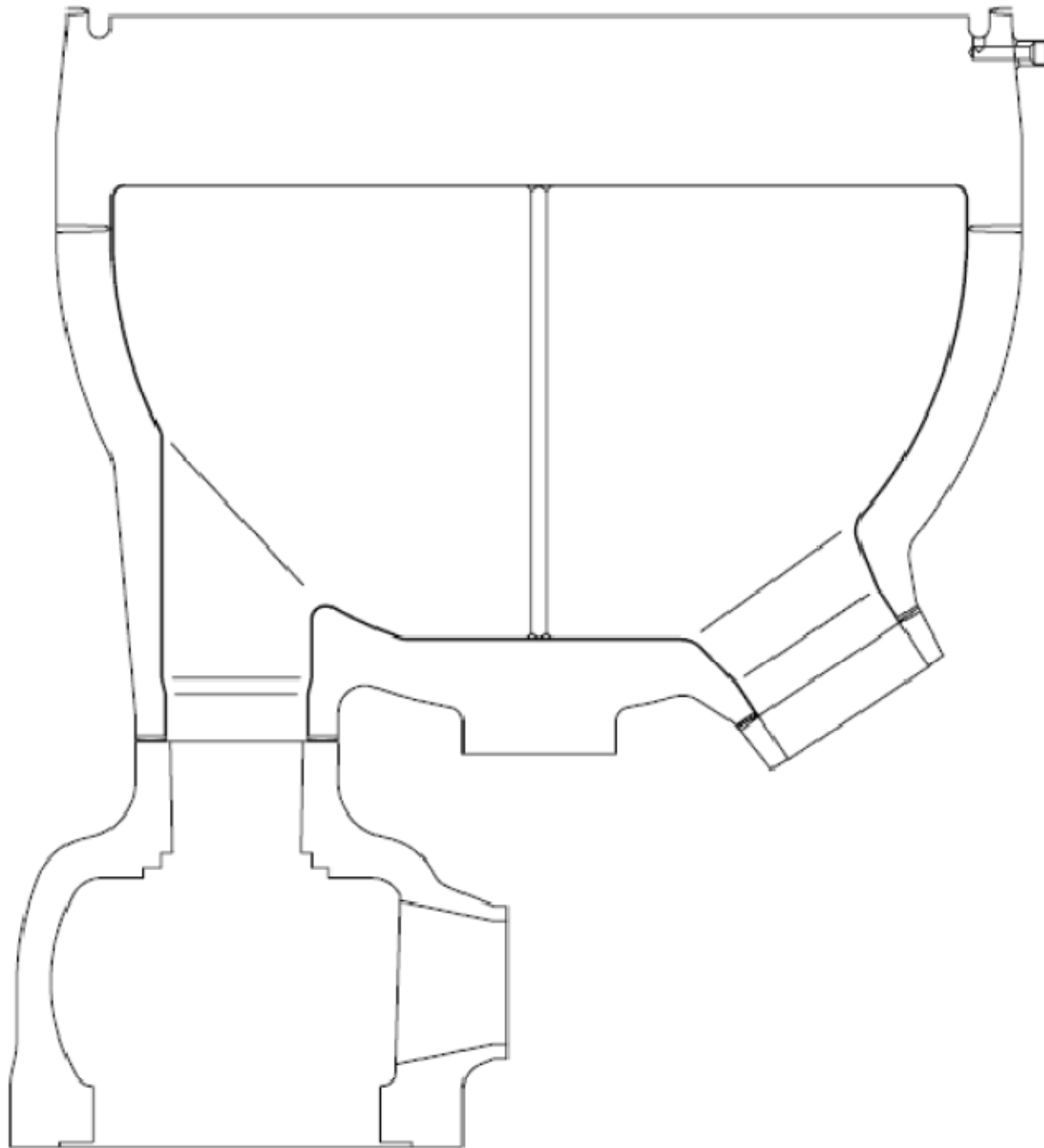


Fig. 3-5 SG

- Alloy 690 tubes
- Trifoil tube support plates (Fig. 3-6)
- Main & SU FW nozzles
- Built-in flow restrictor





RCP pump casings are welded to SG channel head during SG fabrication.

Loop Piping Connection at SG

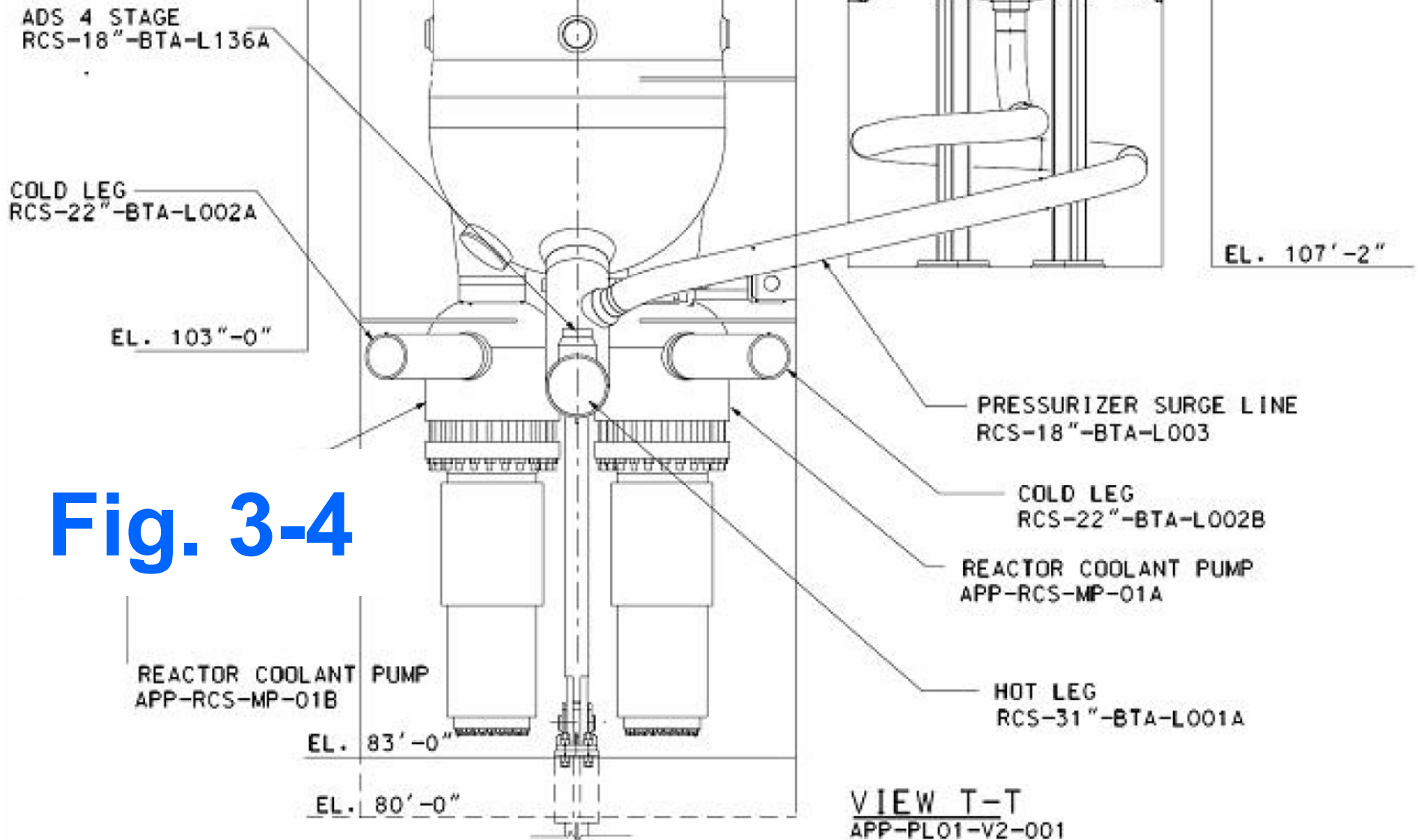
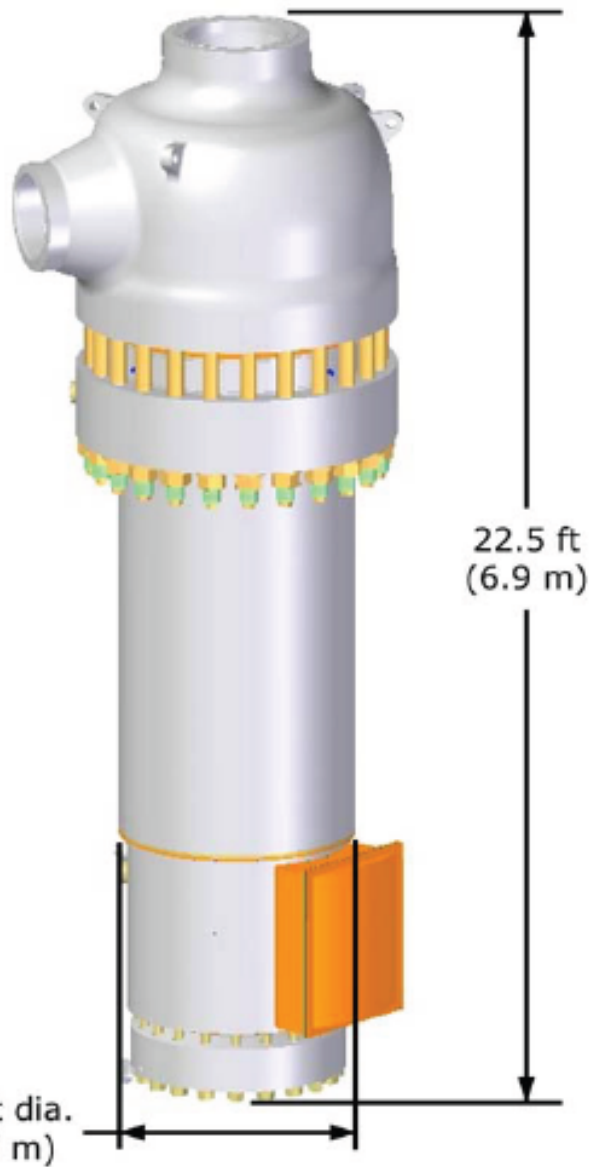
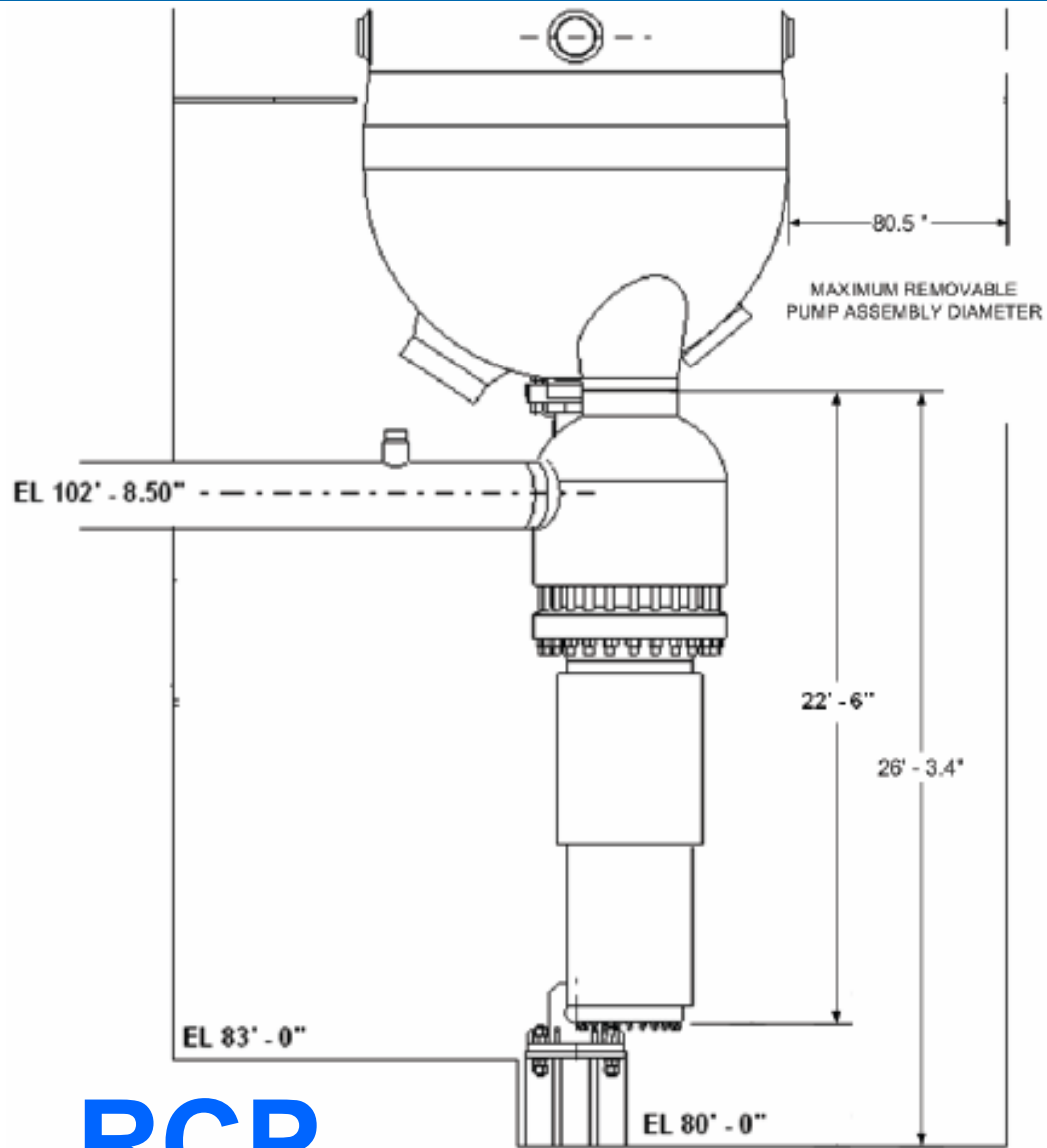


Fig. 3-4



200,850 lbs per pump
(91,106 kg)



RCP

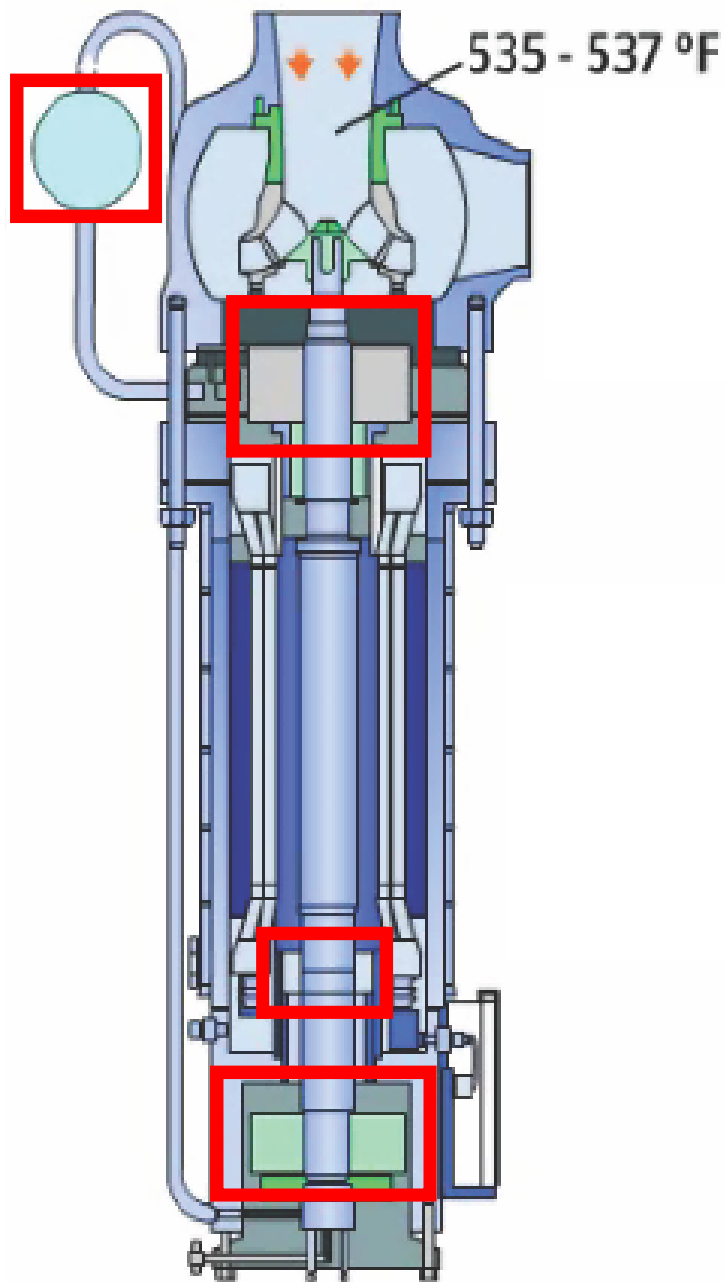


Fig. 3-7 RCP

- Centrifugal canned-motor pump (no seals)
- Welded directly to 1 of 2 SG outlet nozzles
- Aux. impeller circulates coolant through motor & then to external HX
- CCW supplied to external HX & stator cooling jacket
- 2 flywheel assemblies
- Variable speed during SUs

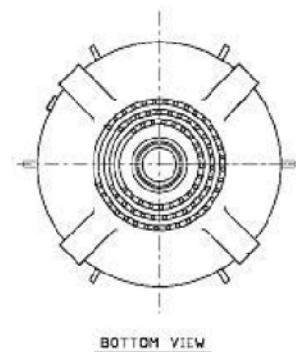
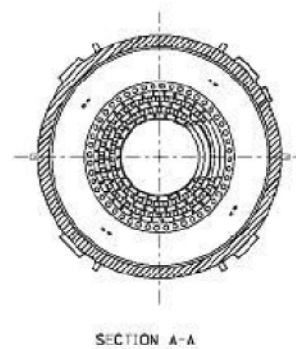
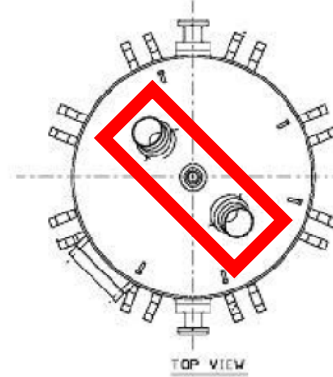
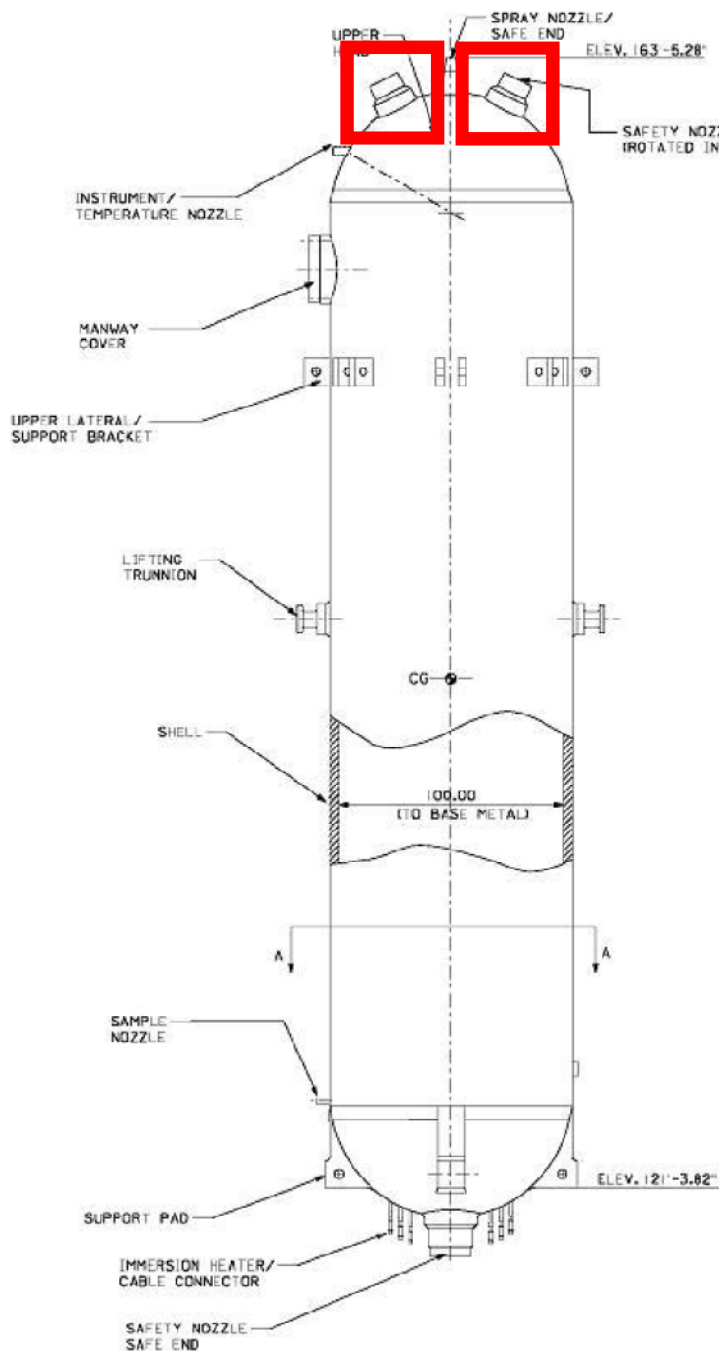


Fig. 3-8 PZR

- 2 nozzles for safety valves, ADS valves

Fig. 3-9 PZR Relief Module

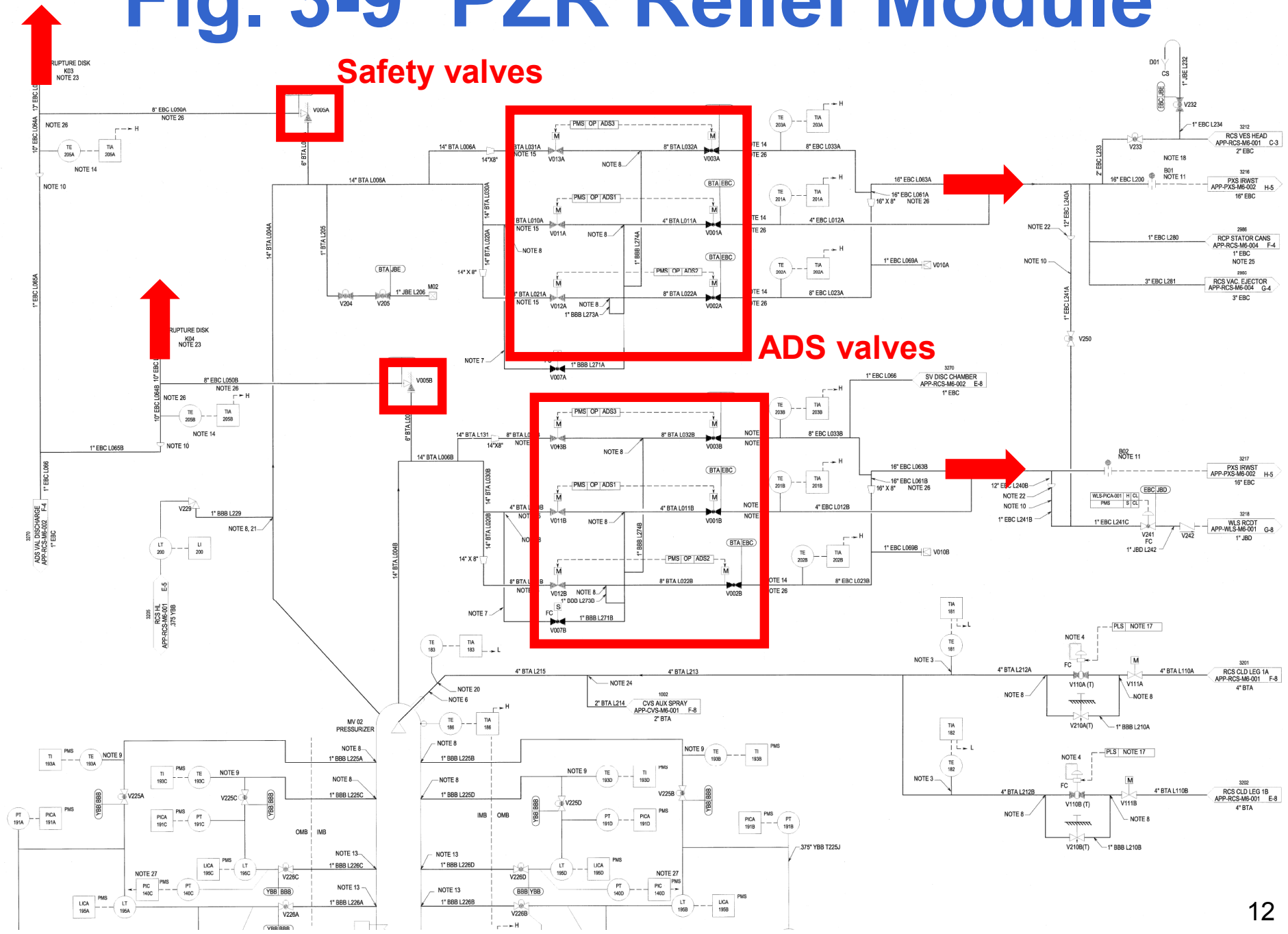


Fig. 3-9 PZR Relief Module



Safety valves

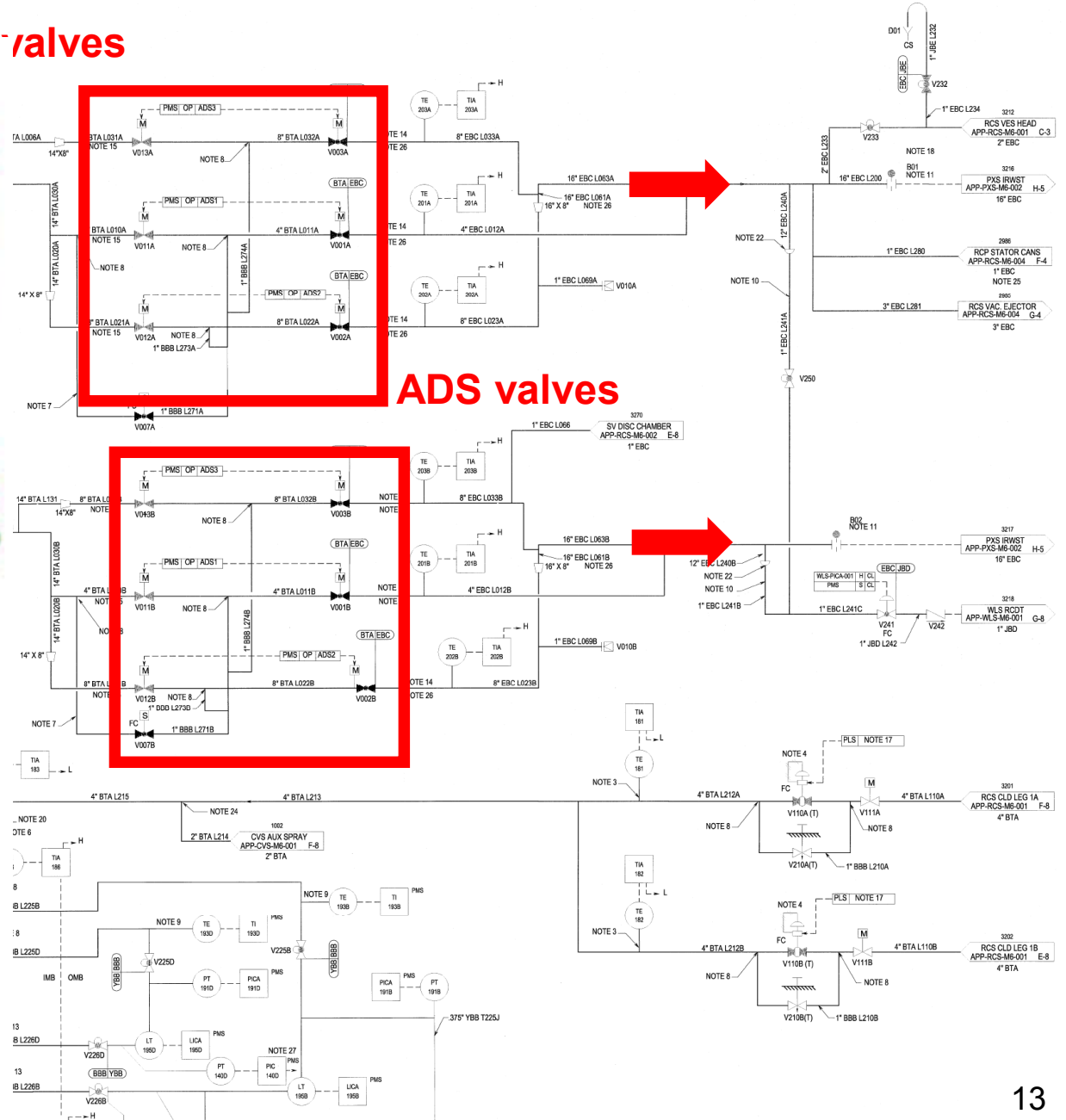
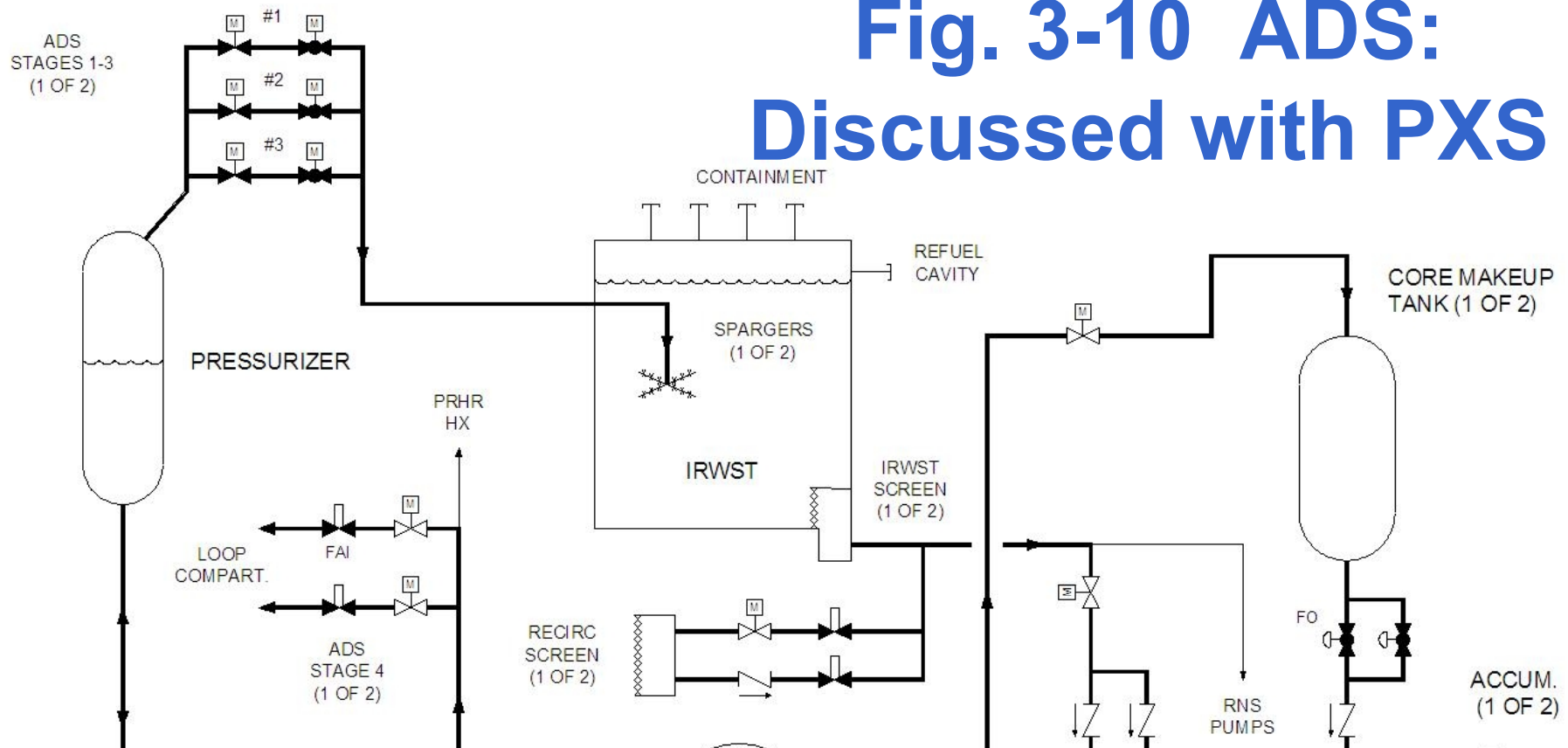


Fig. 3-10 ADS: Discussed with PXS



Purposes:

- Depressurization of RCS to allow injection from some portions of PXS
- Removal of noncondensable gases from PZR steam space via 1st-stage valves

Summary of Major Differences

- **2 RCPs/loop**
- **Canned-motor RCPs**
- **RCP suction nozzles welded directly to SG outlet nozzles**
- **ADS valves**
- **Vessel direct injection lines for safety injection**
- **PZR safety valves relieve to atmosphere**

Review: A major difference between the AP1000 plant & existing Westinghouse plants is the use of...

- a. U-tube type steam generators.**
- b. Canned-motor reactor coolant pumps.**
- c. A pressurizer for RCS pressure control.**
- d. Pressurizer safety valves.**

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Review: Each reactor coolant pump takes a suction from...

- a.** A steam generator outlet.
- b.** Cold-leg piping.
- c.** Hot-leg piping.
- d.** A reactor vessel outlet nozzle.

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Review: Automatic depressurization valves are provided to...

- a.** Vent the reactor vessel head.
- b.** Depressurize the RCS during cooldowns.
- c.** Serve as part of bleed and feed cooling of the core.
- d.** Depressurize the RCS to promote passive core cooling during accidents.

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Review: Safety injection from the passive core cooling system is delivered to...

- a. The reactor vessel.**
- b. The cold legs.**
- c. The hot legs.**
- d. The reactor cavity.**

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