

Reactor Vessel

Chapters 2.1

OBJECTIVES

1. Identify the purposes of the reactor vessel system.
2. Recognize the purpose of each the following major reactor vessel components:
 - a) Jet pumps
 - b) Control rod guide tubes
 - c) Fuel support pieces and orifices
 - d) Fuel assemblies
 - e) Steam separator assembly
 - f) Dryer assembly
 - g) Main steam line penetrations
 - h) Feedwater spargers
 - i) Reactor recirculation pumps

Objectives

3. Recognize the flow path order of the following reactor vessel components:
 - Jet pumps
 - Control rod guide tubes
 - Fuel support pieces and orifices
 - Fuel assemblies
 - Steam separator assembly
 - Dryer assembly
 - Main steam line penetrations
 - Feedwater spargers
 - Reactor recirculation pumps

Objectives

4. Identify whether the flow through each of the following components is water, steam or a mixture of both.
 - a. Jet pumps
 - b. Control rod guide tubes
 - c. Fuel support pieces and orifices
 - d. Fuel assemblies
 - e. Steam separator assembly
 - f. Dryer assembly
 - g. Main steam line penetrations
 - h. Feedwater spargers
 - i. Reactor recirculation pumps

Objectives

5. Identify the internal components and their arrangement in providing 2/3 core coverage capability following a Loss Of Coolant Accident (LOCA).

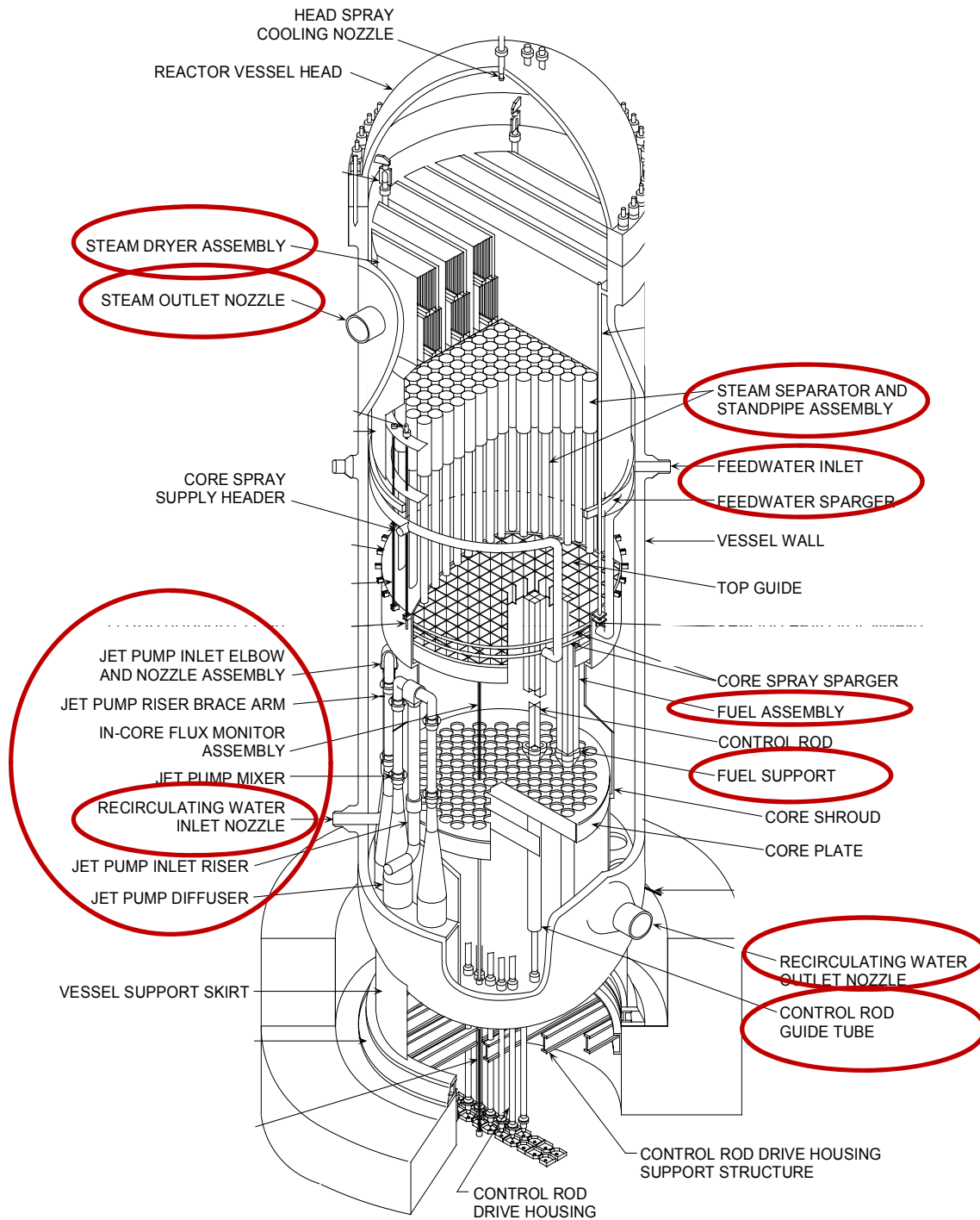
Objectives

6. Describe how the reactor vessel system interrelates with:
 - Fuel and Control Rods System
 - Control Rod Drive System
 - Recirculation System
 - Main Steam System
 - Condensate and Feedwater System
 - Reactor Water Cleanup System
 - Reactor Vessel Instrumentation System
 - Source Range Monitoring System
 - Intermediate Range Monitoring System
 - Local Power Range Monitoring System
 - Traversing Incore Probe System
 - Standby Liquid Control System
 - Core Spray System
 - Residual Heat Removal System

Purposes

The 7 purposes of the reactor vessel are to:

- house the reactor core.
- support and align the fuel and control rods.
- provide a flow path for the circulation of coolant past the fuel.
- remove moisture from the steam exiting the reactor vessel.
- provide an internal, re-floodable volume to assure core cooling capability following a loss of coolant accident.
- serve as part of the reactor coolant boundary.
- limit downward control rod motion following a postulated failure of a control rod drive housing.



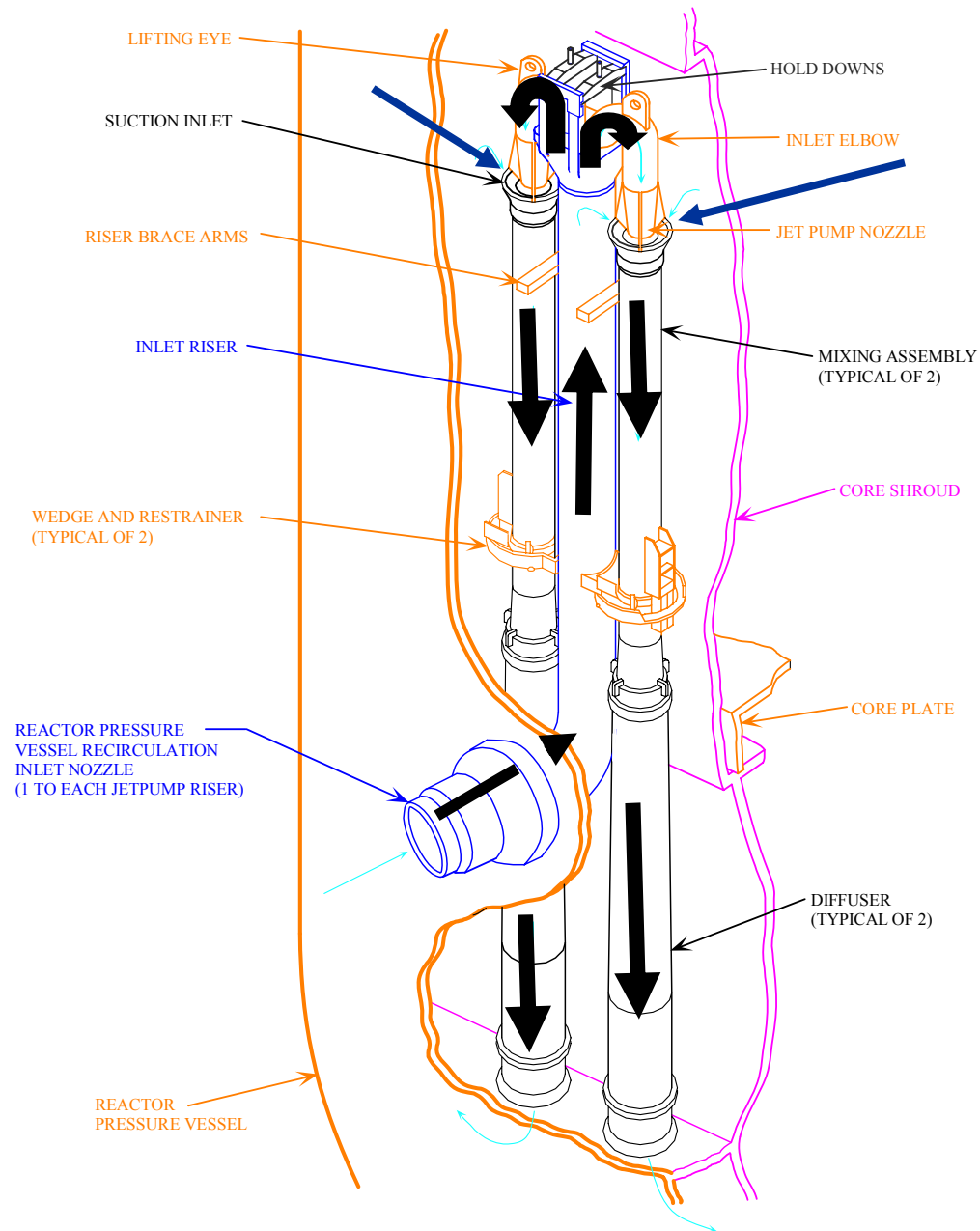


Figure 2.1-3 Jet Pump Assembly

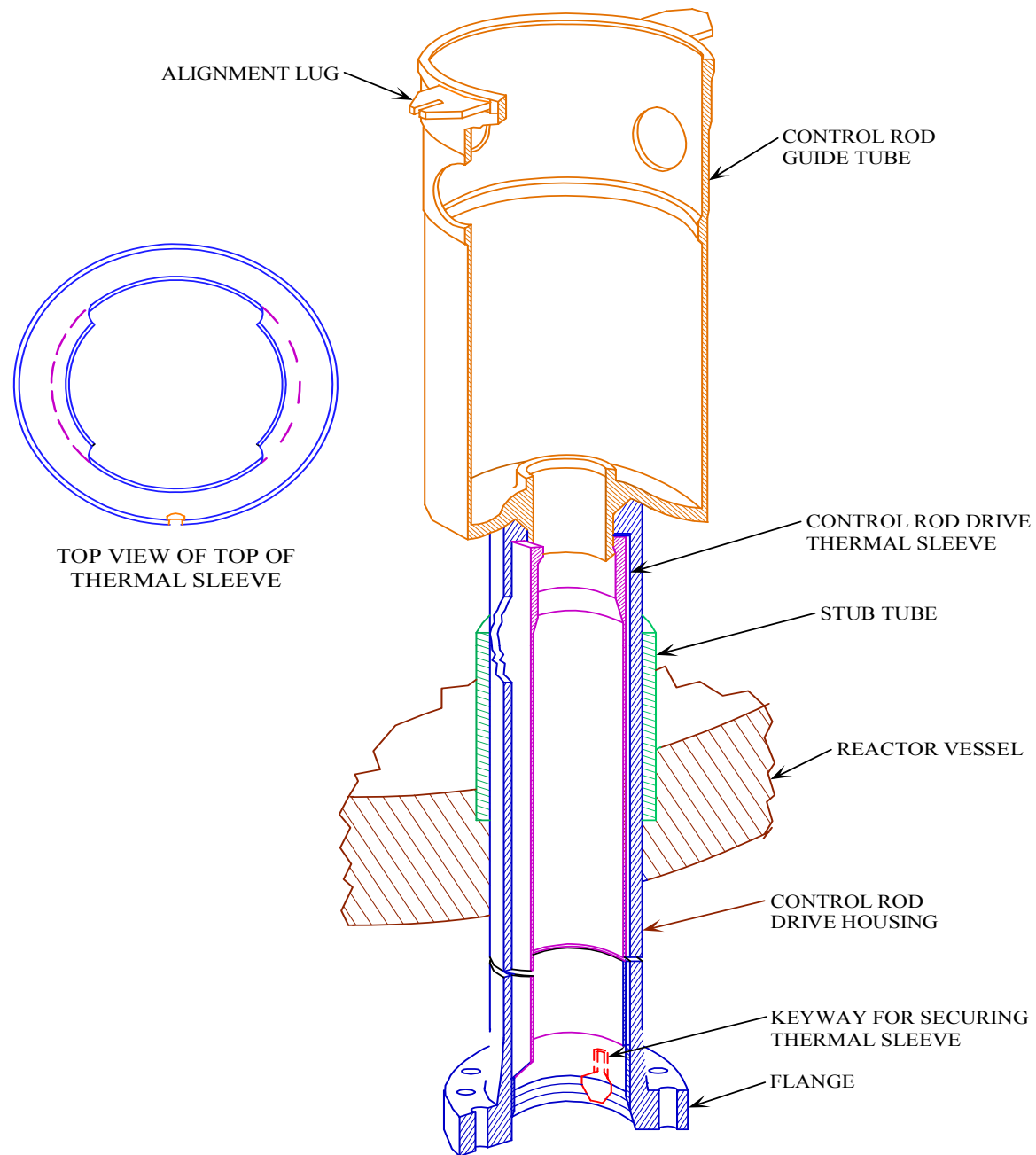


Figure 2.1-5

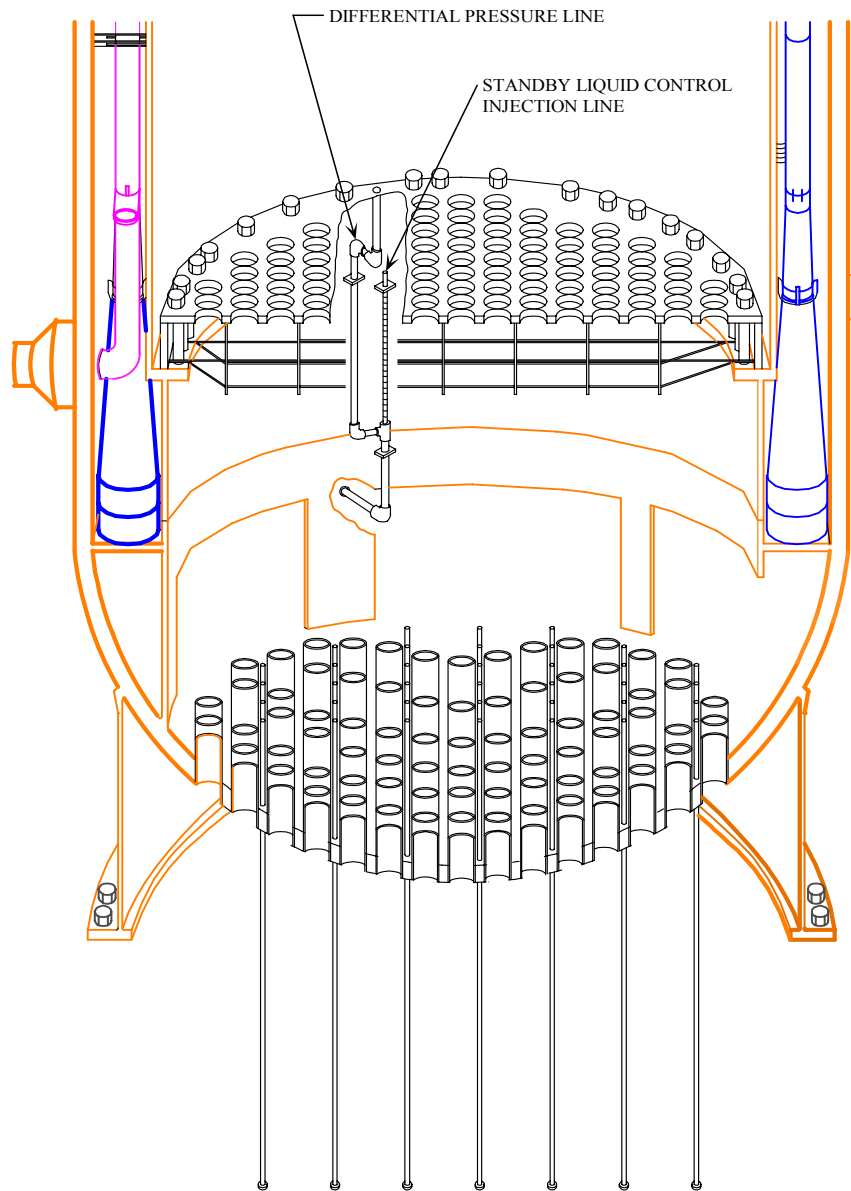
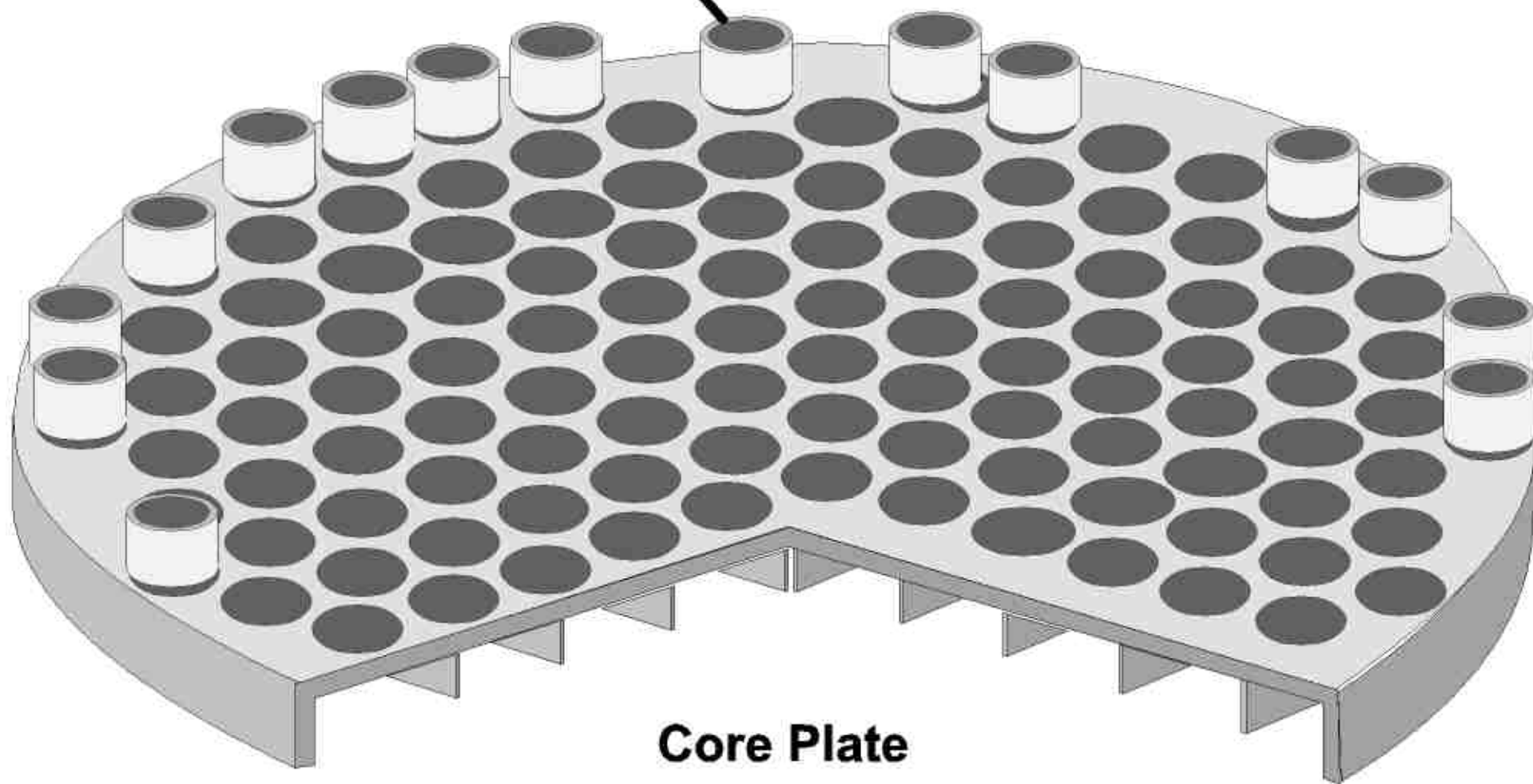
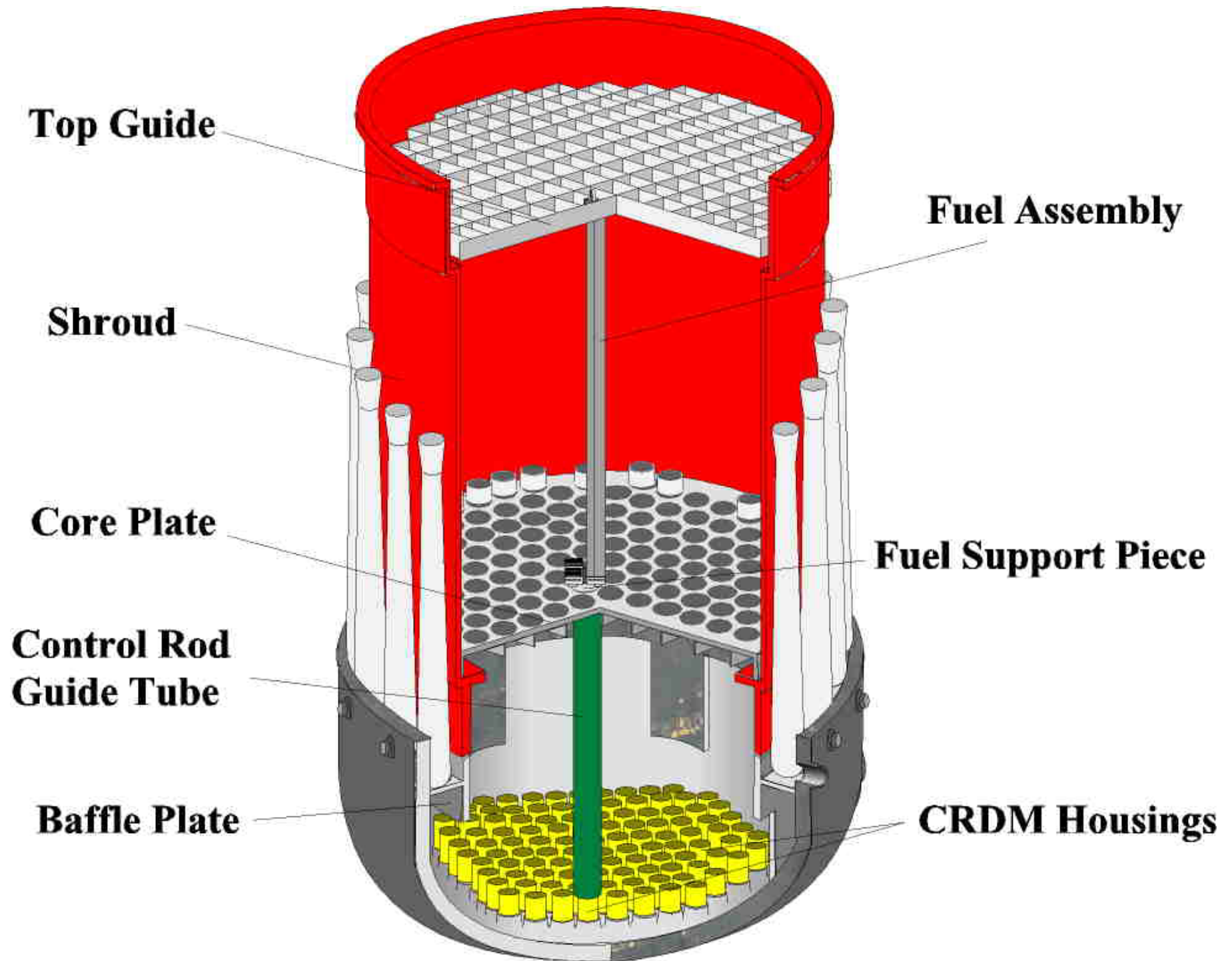


Figure 2.1-4 Differential Pressure and Standby Liquid Control Line

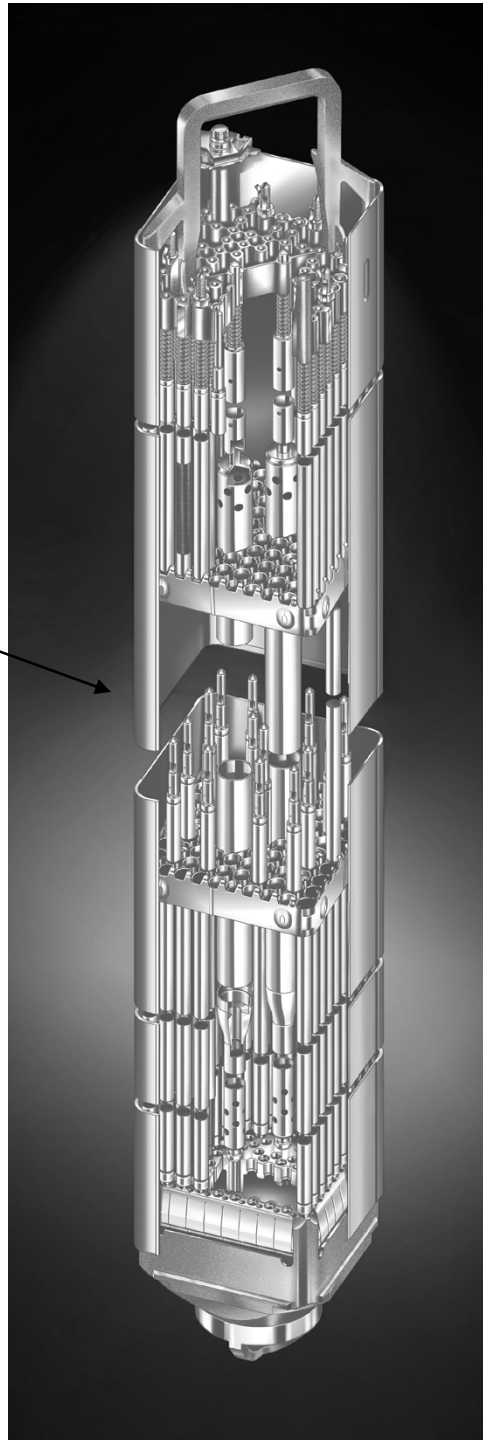
Peripheral Fuel Supports



Core Plate



Spacer
8 per bundle



GE14
Bundle

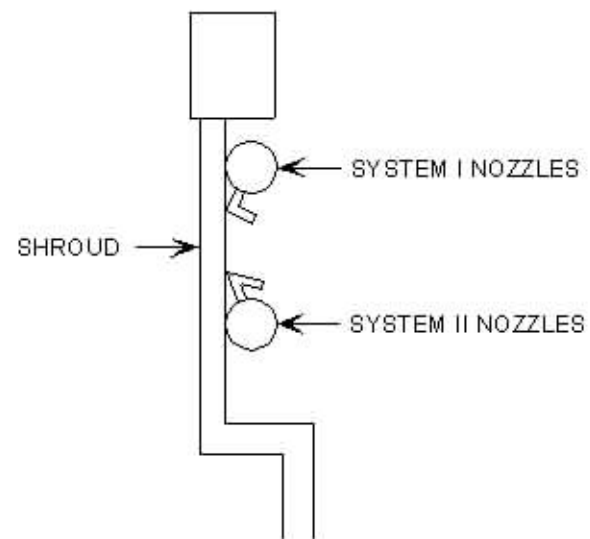
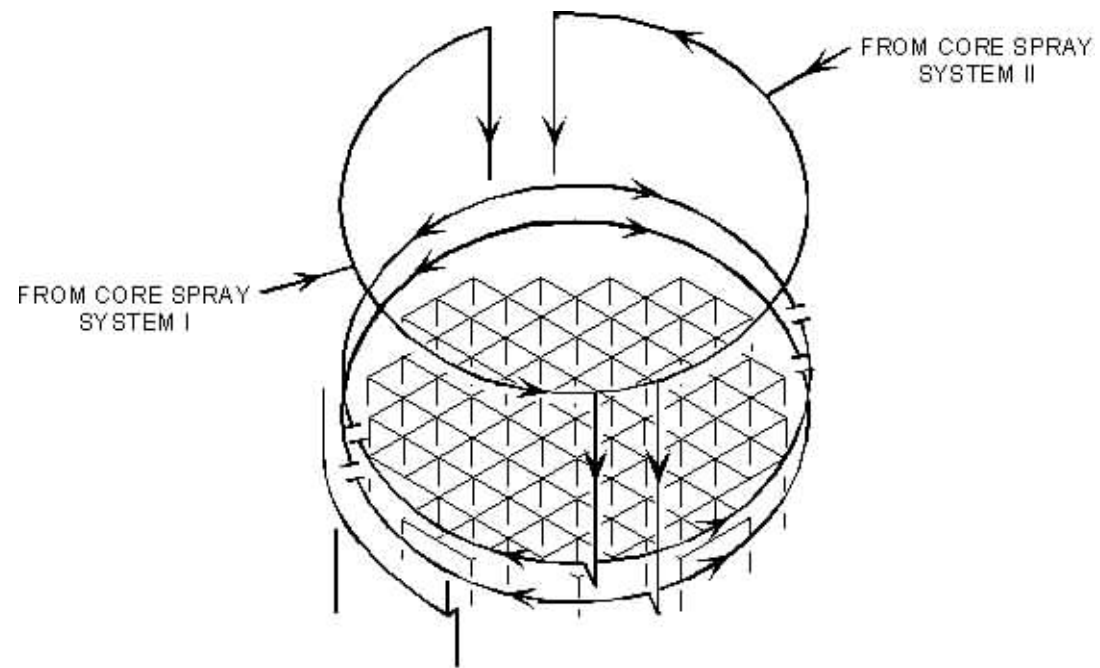


Figure 2.1-8 Core Spray Piping In Vessel

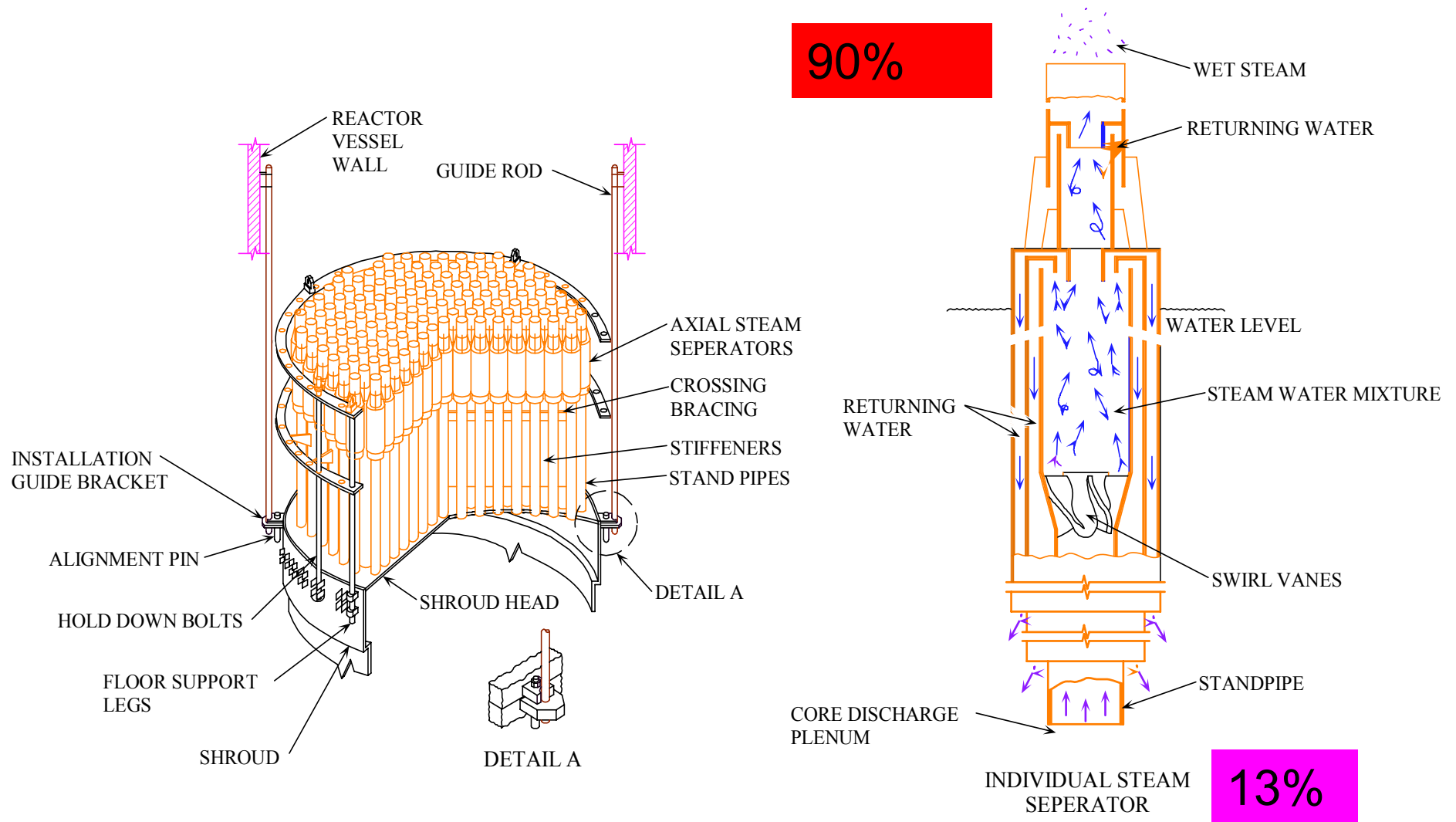
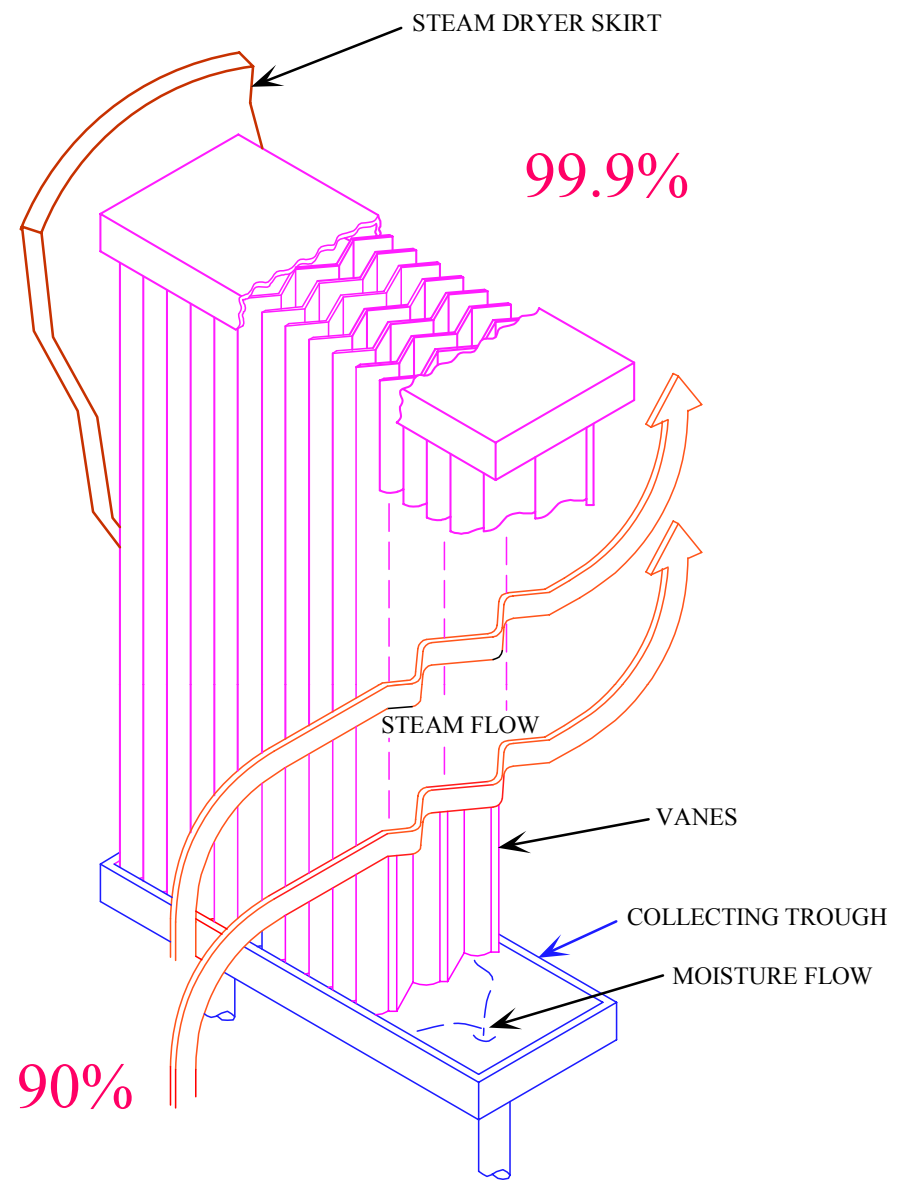
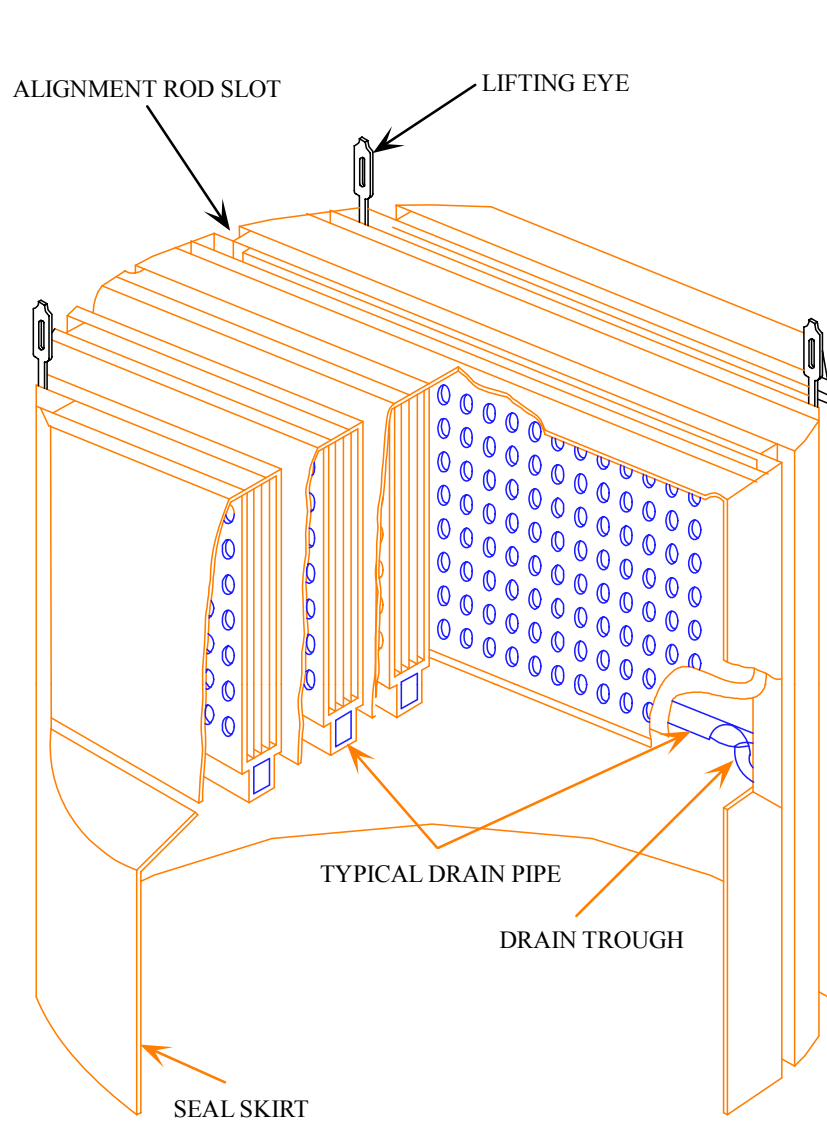


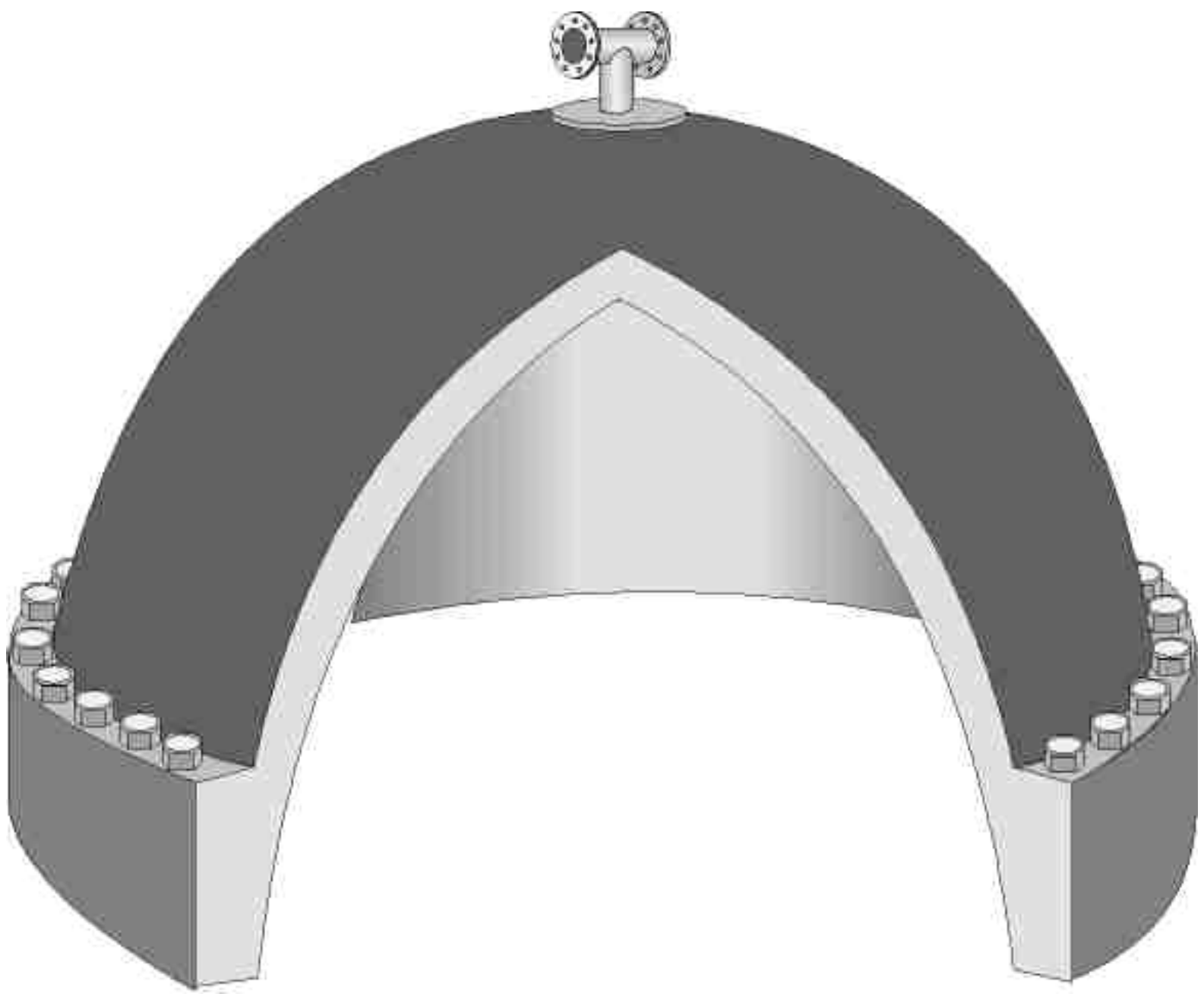
Figure 2.1-11 Shroud Head and Steam Separator Assembly



ALIGNMENT
ROD SLOT

INDIVIDUAL DRYER PANEL

Figure 2.1-12 Steam Dryer Assembly



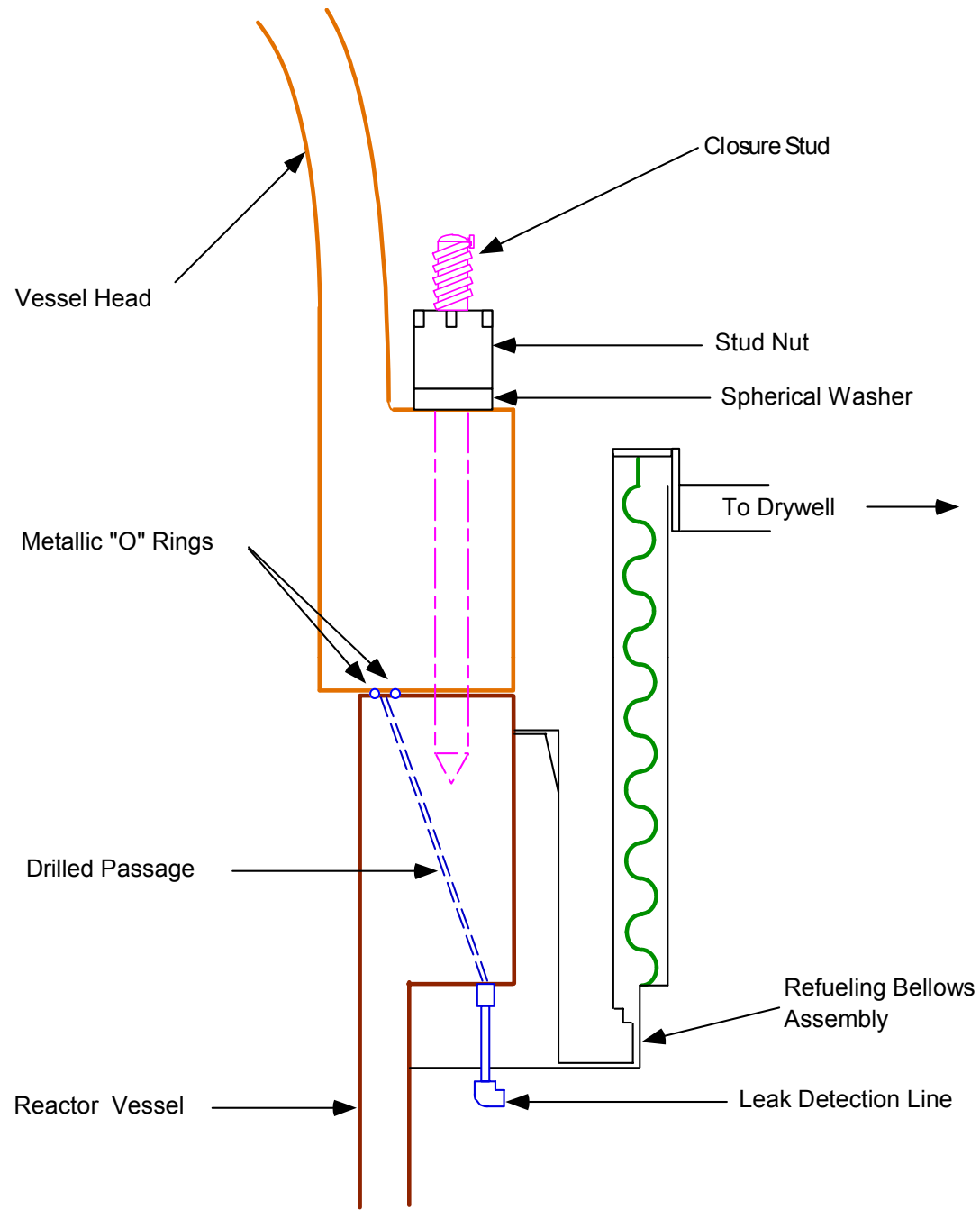
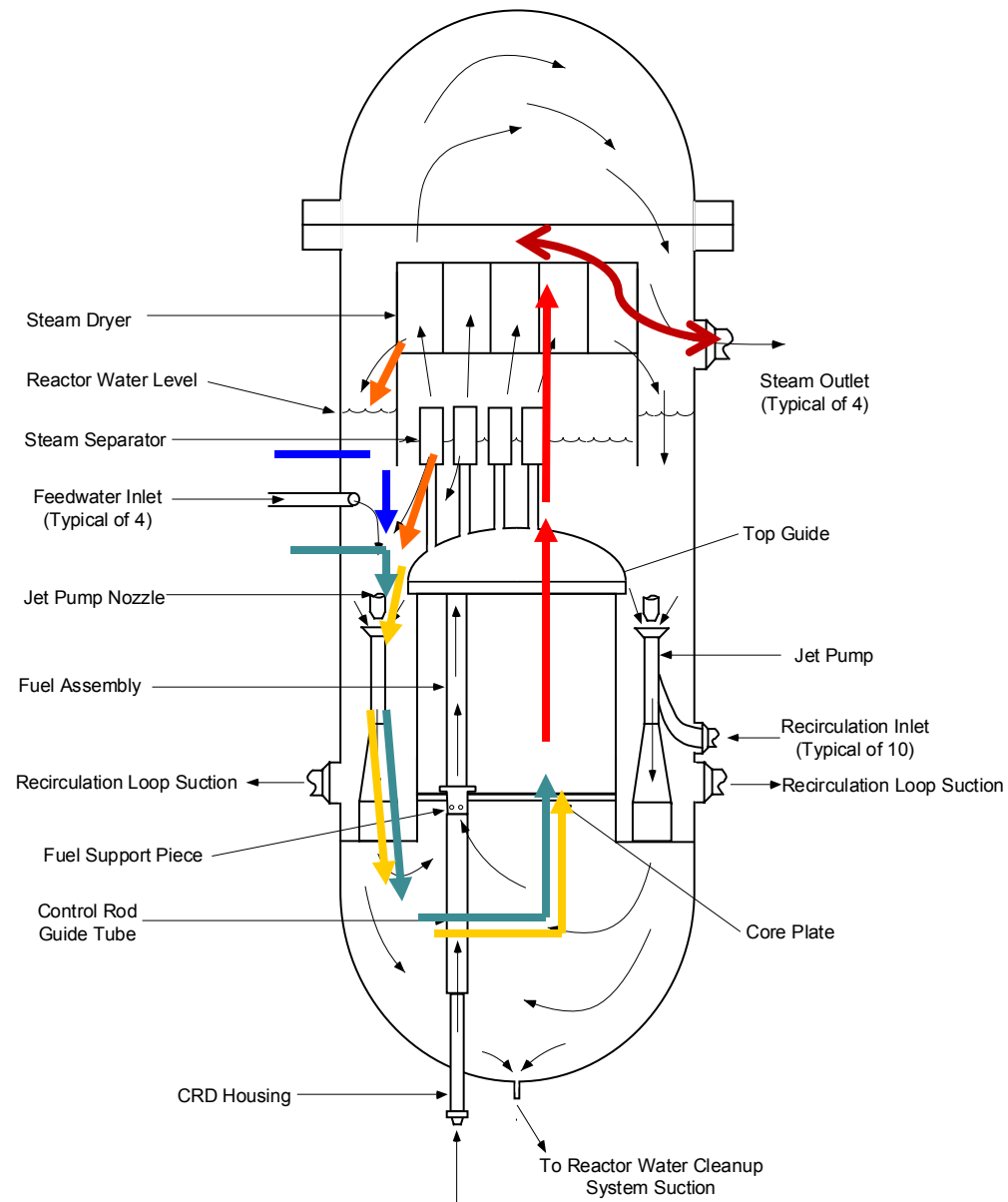


Figure 2.1-15 Reactor Vessel Closure Assembly



Steam

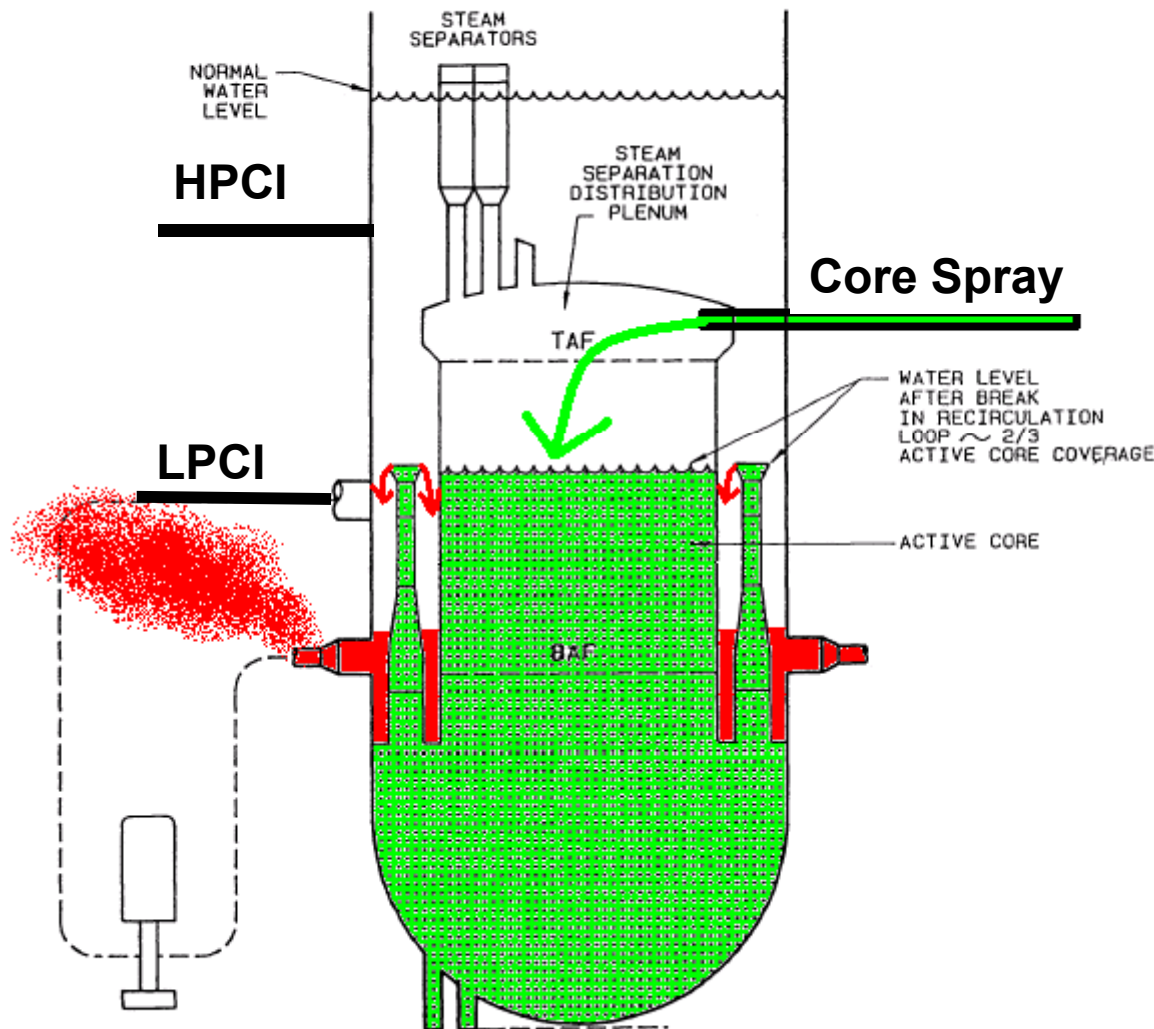
Steam/ water mix

Design Bases-Floodable Volume

- **“Floodable Volume”**

- Provided by:
 - shroud
 - shroud support assembly
 - jet pumps

- Jet Pumps act like standpipes.



System Interfaces

