

Refueling and Vessel Servicing Equipment

Chapter 11.8

LEARNING OBJECTIVES

1. Identify the purposes of the Refueling and Vessel Servicing system.
2. Recognize the purpose, function and operation of the following major components:
 - a. spent fuel pool
 - b. new fuel storage vault
 - c. refueling platform
 - d. reactor building overhead crane
 - e. fuel preparation machines
 - f. jib cranes
 - g. new fuel inspection stand

LEARNING OBJECTIVES

3. Describe the design features of the new fuel storage vault and spent fuel pool that prevent criticality.
4. Describe how the Refueling and Vessel Servicing system interfaces with the following systems:
 - a. Reactor Manual Control system
 - b. Fuel Pool Cooling and Cleanup system

Purposes

The Refueling and Vessel Servicing Systems:

- provide the facilities for handling and storing new and spent fuel
- provide the equipment for vessel refueling
- provide the equipment for the servicing of vessel internal components

Components

New Fuel Storage Vault

- Provides storage for 240 new fuel bundles
- $K_{\text{eff.}} < 0.95$
 - dry vault $K_{\text{eff.}} < 0.95$ due to under moderation
 - wet vault $K_{\text{eff.}} < 0.95$ due to storage rack geometry

Spent Fuel Pool (SFP)

- Provides storage for 2,176 fuel bundles
- Storage rack geometry ensures $K_{\text{eff.}} < 0.95$
- No single failure will cause:
 - Inability to maintain irradiated fuel underwater
 - The ability to re-establish normal SFP water level

Components

Refueling Platform

- Provides the means for moving fuel and components between the reactor and the spent fuel pool
- Four components
 - Platform
 - Trolley
 - Refueling grapple
 - Frame mounted hoist
- Refueling Grapple limits upward movement to within 8 ft. of the surface of the pool / reactor
- Grapple design will not allow opening once the fuel bundle has been lifted

Components

Reactor Building Overhead Crane

- 125 ton bridge crane spanning the length of the RB
- Used for moving major vessel components:
 - DW head,
 - Vessel head
 - Steam Dryer
 - Steam separator
- Moves new fuel boxes to the refueling floor
- Moves the Spent Fuel Shipping Cask to and from the refueling floor

Components

Fuel Preparation Machines (2)

- Air driven underwater upright rail system
- Located on the walls of the Spent Fuel Pool (SFP)
- Used for the following tasks:
 - placing new fuel into the spent fuel pool
 - removing channels from spent fuel
 - channeling new fuel
 - provides a platform for fuel bundle inspection

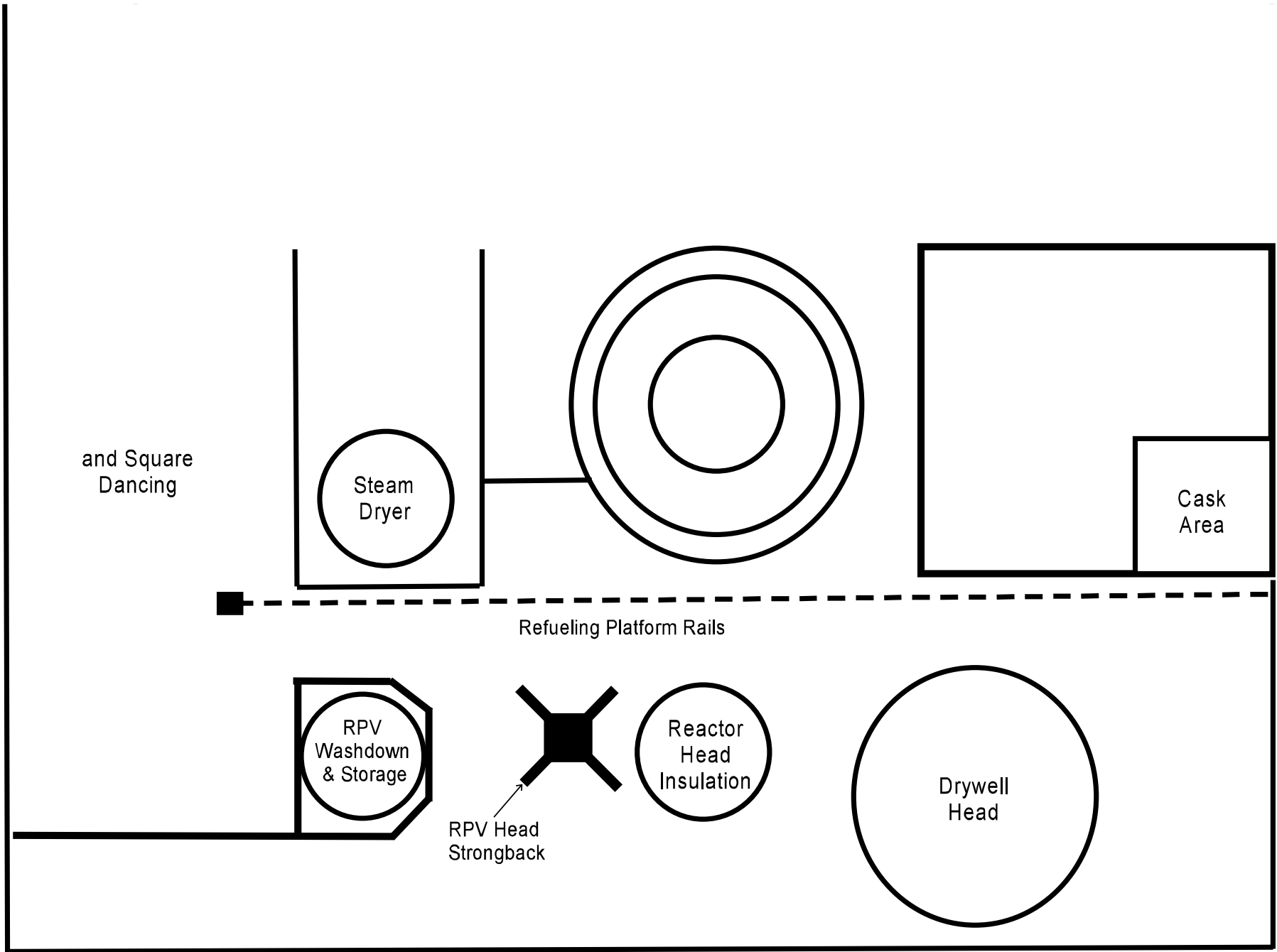
Jib Cranes

- Motor driven swing boom and trolley crane
- Located on the refueling floor by the SFP
- 1000 # crane for moving various components in the SFP

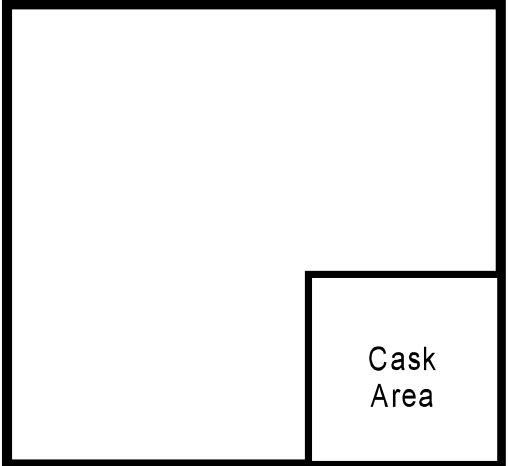
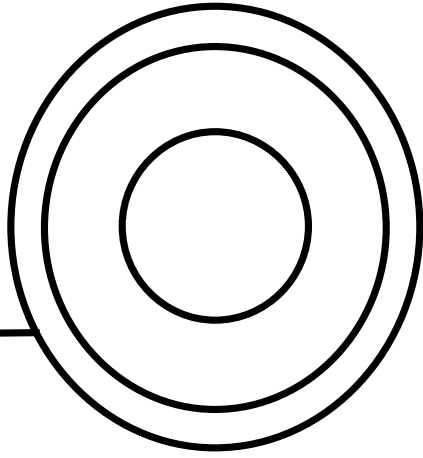
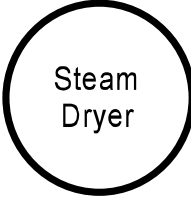
Components

New Fuel Inspection Stand

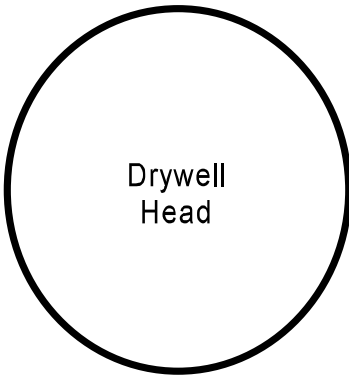
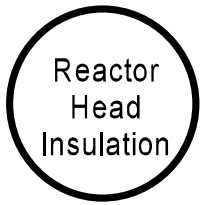
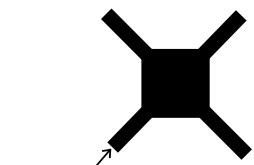
- 2 bundle stand located on the refueling floor
- stand allows bundles to rotate for inspection
- Allows bundle inspection prior to storage



and Square
Dancing



Refueling Platform Rails



System Interfaces

Fuel Pool Cooling and Cleanup System (Section 11.7)

- Removes decay heat from the fuel assemblies
- Maintains clarity and purity of the fuel pool water.

Reactor Manual Control System (Section 7.1)

- Provides rod withdrawal blocks and refueling platform interlocks when the platform is in use.

OBJECTIVE REVIEW

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