Spent Fuel Bay

Chemistry Control
Spent Fuel Bay System

Objectives

• State the purpose of the Spent Fuel Bay System.

• List the main components that make up the Spent Fuel Bay System. For each of these components, state the purpose and mode of operation under normal plant conditions.

• List the primary objectives of Chemistry Control of the Spent Fuel Bay System
Spent Fuel Bay System

Objectives

• List the main Chemical parameters monitored in the Spent Fuel Bay System as well as their approximate values under normal conditions.

• For each of the parameters monitored in the Spent Fuel Bay water, state the rational behind the chemistry specification for each parameter.
Spent Fuel Bay System

Objectives

- State the possible causes as well as corrective actions to employ for each of the following out-of-spec. parameters:
  - pH - *High or Low*
  - Conductivity - *High*
  - Chloride - *High*
  - Gas Release from SFB Water (H₂, O₂, N₂,) - *High*

- State the main hazards (conventional & radiological) associated with the Spent Fuel Bay System.
Spent Fuel Bay System

Objectives

- List all operational (Chemical) or sampling requirements associated with the Spent Fuel Bay System for the following conditions:
  - Prior to transfer of spent fuel from the reactor
  - During reactor shutdown

- Correctly obtain a sample from the Spent Fuel Bay System both main System and the outlet of the purification System.
Spent Fuel Bay System

System Purpose

• Provides a means of short-term (ie up to 7 years) storage and cooling of used nuclear fuel which is discharged from the reactor.

• The volume of light water contained in the SFB compartments can be:
  
  – adjusted simultaneously to achieve bulk level control in all compartments during normal operation.
  
  – controlled independently to control the amount of shielding provided during normal operation, and to facilitate inspections.
Main Components

• **Pumps - 3481-P1, P2 and P3**
  » three 100% capacity pumps.

• **Heat Exchanger - 3481-HX1**
  » removes residual heat from the demineralized water before returning it to the zone assemblies.

• **Ion Exchange Columns - 3481-IX1 & IX2**
  » Each column contains 0.22 m$^3$ of resin.
  » one vessel in service - the other on ‘Stdby’
Spent Fuel Bay System

**Purpose of Chemistry Control**

- Maintains the water in state of high purity at all times.
  - corrosion and fouling of metal surfaces is minimized.
  - radionuclides in water are minimized.
  - achieved by maintaining high purity water which reduces the net suspended solids to a minimum
  - high clarity of water is necessary to assist visual inspection of used fuel
Materials of Construction

• Stainless Steel - Type 304L
  – Heat Exchangers, pumps, compressors, ion exchanger columns, storage bay tank floor liner
  – Used fuel remote handling tools
  – Used fuel storage trays

• Fiber-glass epoxy
  – storage bay tank wall liner
Spent Fuel Bay System

Chemistry Control

• Use of Demineralized water maintained at a pH in the range of 5.5 to 8.5
• Conductivity < 0.2 mS/m (<2 umho/cm)
• Chloride < 0.2 mg/Kg
• Fission products - non detectible
• Use of ion-exchange resins in the purification system to remove ionic, suspended, and radioactive impurities