About AREVA TN

AREVA TN, a division of AREVA Inc., is a leader in the American nuclear market offering innovative total systems solutions for used fuel and radioactive waste management and transportation. More than 50 percent of American nuclear plant operators use AREVA TN's used fuel storage or transport solutions, irradiated waste removal and processing, and pool to pad services.

As part of AREVA, the global leader in nuclear technology, AREVA TN offers the industry an unparalleled level of engineering, technical and logistics expertise.

AREVA TN's track record of providing safe storage and transportation of used fuel is driven by state-of-the-art products and services, innovative engineering solutions, and integrity in meeting customer expectations for low-dose and error-free campaigns. AREVA TN customers include utilities, reactor operators, research reactors and the U.S. government.

AREVA TN's products are marked by the highest standard of safety, uncompromising commitment to quality and operational dependability, and "as promised" service integrity.

AREVA TN Americas

Jeffery Isakson, VP, Sales & Marketing
7135 Minstrel Way, Suite 300
Columbia, MD 21045 USA
Tel: 410 910 6810
www.us.areva.com/AREVATN

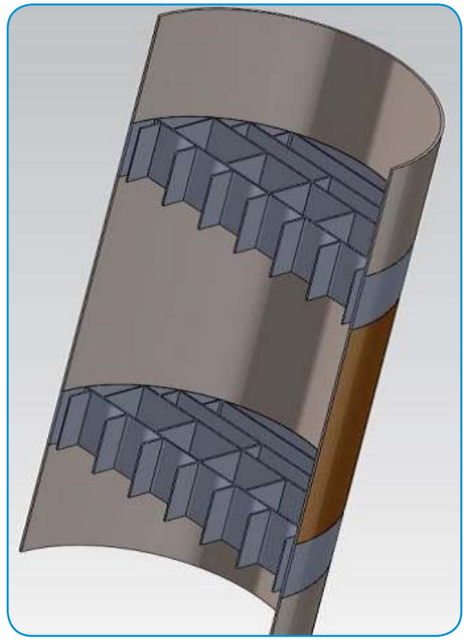
For more information,
contact your VP, Key Account:
Tel: 704 805 2305 – Fax: 434 382 5629
regional.manager@areva.com – www.us.areva.com

6/14 **ANP:U-423-V2-14-ENG**

AREVA TN NUHOWS RadWaste Canisters

AREVA TN's NUclear HOrizontal Waste Storage (NUHOWS) RadWaste Canister (RWC) provides customers with an innovative, flexible and cost-effective solution for long-term interim storage and future transport/disposal of irradiated reactor components.

AREVA TN has developed these unique RWCs to house control rod blades (CRBs), local power range monitors (LPRMs), jet pumps and miscellaneous material. The LPRMs can be processed and fit into the void spaces of the RWC. The TN RWC can be shipped off site in AREVA TN's rail cask (MP197HB).



Large Capacity

The NUHOWS RWC volume (330 cubic feet) facilitates custom internal configurations tailored to plant needs, enabling interim storage of hardware with high packaging efficiency that can accommodate 50+ whole CRBs or 110+ flattened CRBs or up to 20 jet pumps.

Retrievable and Transportable

The RWC uses a contamination-free loading and transfer process to a concrete Horizontal Storage Module (HSM), which features the most robust radiation shielding in the industry. The RWC is easily retrievable, allowing the flexibility to do multiple loadings. Thus, the RWC can be partially loaded, stored and subsequently returned to the used fuel pool for loading components to fill the RWC.

NUHOWS RWC Specifications

- Accommodates irradiated reactor components such as control rod blades, jet pumps, fuel channels, etc.
- Stainless steel shell
- Carbon steel liner
- Bolted or welded lid
- Capacity: 330 cubic feet
- Dimensions:
  - 67" / 63" external/ internal diameter
  - 194" / 182" external/ internal length
- 56 tons maximum loaded weight

Features and Benefits

- Lower radiation levels – reduced personnel exposure
- Internal designs tailored to store various reactor components in processed or unprocessed form – reduced rigging and processing time
- More stable than vertical systems:
  - No tip-over analysis required, no stack-up evolution, no outside heavy lifts – reduced risk and project cost
- No floor load concerns, no interference concerns, no haul path modifications needed – reduced project cost

AREVA
forward-looking energy

RWCs for Irradiated Hardware

RWC major materials include:

- Outer shell and end covers: A240 Type 304 stainless steel
- Bottom and top shield discs: A36 carbon steel
- Liner and internal support structure: A36 carbon steel
- Closure seals: EPDM O-rings
- Closure bolts: alloy steel, zinc-plated or black oxide coated

Control Rod Blade RWC

The internals for the CRBs consist of two ¼ inch steel plate grids with compartments to receive 4-6 compressed blades each. The grids are located about ¼ length from the top and bottom of the blades, which are estimated to be 154 inches long after removal of the velocity limiters. The blades are assumed to compact to 2 x 10 inches, and each compartment has a minimum variance of ¼ inch additional space. For example, a compartment for 4 blades is at least 10.25 x 8.25 inches.

Jet Pump RWC

The jet pump RWC will be the same as the CRB RWC with the exception of the internals. The internals will be capable of housing twenty (20) whole jet pumps.

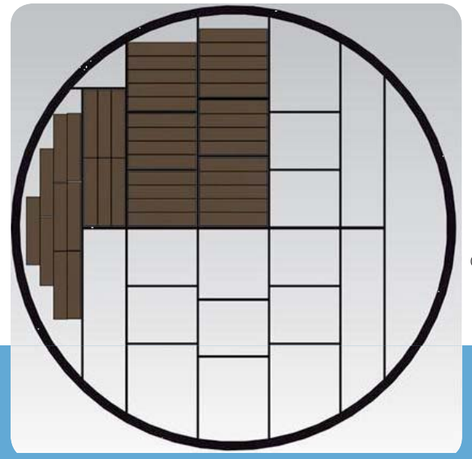
The internal structure for the jet pumps consists of a series of pedestals at two different heights, with a cone on each to fit inside the bottom of the jet pump and hold it vertical. The pedestals are at three different heights to allow close packing of the jet pump inlet mixer bodies without interference between the U-bends at the top or the brackets and wedge at the lower middle on the opposite side.

This arrangement allows for all jet pumps to be lifted by standard means by their lifting lug. The close packing requires that the jet pumps be placed on the pedestals in a specified order, and that they are lowered onto the pedestal in one orientation and then rotated to their final storage position to allow for a 20 jet pump loading. The base for the pedestals is raised to eliminate the need for a spacer between the jet pumps and the lid/shield plug. As with the CRB RWC, an internal spacer will be provided to account for any void space in the upper part of the RWC.

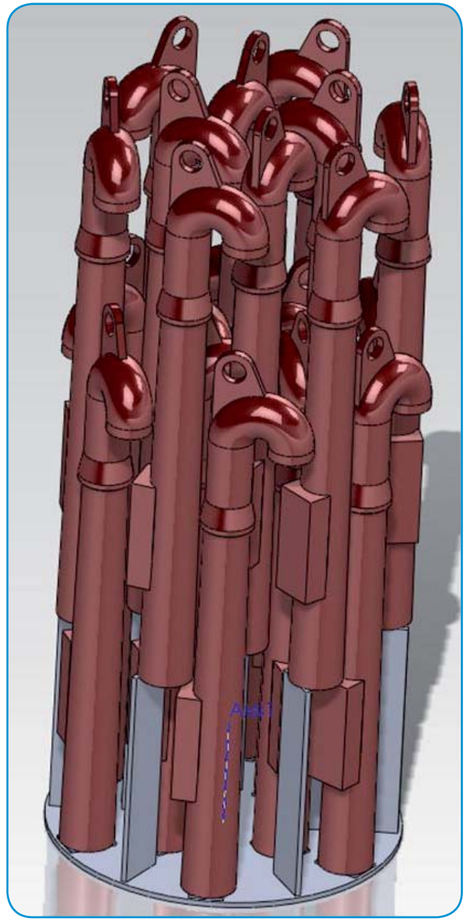
RWC Specifications

- Outside diameter: 67.19 inches
- Outside length: 186.5 inches
- Outer shell thickness: 0.50 inches
- Liner thickness: 1.25 inches
- Cavity ID (inside liner): 63 inches
- ID at closure ring: 60 inches
- Cavity length: 171.65 inches
- Total steel thickness at bottom: 7 inches
- Total steel thickness at top: 7 inches
- RWC for flattened blades: 33,200 lbs.
- RWC for jet pumps: 33,800 lbs.
- RWCs for irradiated hardware: Up to 122 blades can be packed

The grids serve as a spacer, not as a structural item. If a partial RWC loading is done, the CRBs are placed in the portion of the RWC that will be considered the bottom when the RWC (in the transfer cask) is down-ended on the transfer trailer. This will allow the blades to support each other from the bottom up. Based on a CRB length of 154 inches, there will be 17 inches of space between the top of the control blades and the shield plug. This space can be filled with a spacer that is provided, or if there is additional material to store, it can be placed in this space.



Control Rod Blade RWC layout



Jet Pump RWC layout

Closure Operations

The closure operations with the RWC are similar to the NUHOMS® DSC operations, except for protection of the sealing surface, draining, drying, leak testing, and lid closure. After the waste has been loaded into the canister, the shield plug is lowered into place. The cask is then lifted from the pool, decontaminated and placed in a decontamination pit or equivalent location. The inflatable annulus seal is removed, the cask annulus drained, and the lid put into place using a tapered guide pin to maintain orientation so that the drain port is correctly located and the lid is bolted shut. The canister is drained by inserting a tube vertically through the port to the bottom of the canister; provision has been made in both internal structures to keep this space clear of waste. Water is then pumped out through the tube, while air enters the annulus between the tube and the port. When all the water is pumped out, the tube may be connected to a vacuum pump or an industrial wet/dry vacuum to suck up residual liquid water, after which the tube is removed. Further dewatering of the canister interior can be accomplished by vacuum drying using a port cover with a vacuum adapter. Finally, the test cover is removed and replaced with the port shield plug and port cover. The cask lid is put in place and the cask transfer operation is completed per standard NUHOMS® operating procedures.

Lift Rig

A simple lift device will be necessary to lift the empty RWCs and place them in the transfer cask. This is a non-critical lift, so the lifting device will be designed and tested to ASME 30.20 and procured as not important to safety.