

Burnable Poison Rod Assembly Handling Tool

Background

Westinghouse, through continuing efforts to optimize the refueling services window, and consequently, the overall outages, has designed an improved series of fuel-related handling tools with the objective of improving reliability and operability. The burnable poison rod assembly (BPRA) is among these tools. All the improvements are available in a replacement tool or as upgrades on existing tools.

Description

The BPRA handling tool transfers plate-mounted BPRAs between fuel assemblies in the fuel transfer system upender, storage racks and/or rack inserts. The transfer is accomplished by raising the BPRA out of one location up inside the tool and then lowering it out of the tool into another location. The tool is suspended from the fuel-handling machine hoist and is operated from the bridge walkway.

Comb guide assemblies position and direct the rods during withdrawal or insertion. The comb guide assemblies automatically open or close during insertion to avoid fuel assembly thimble plugs. A J-slotted gripper assembly engages the top of the BPRA. The gripper can be latched or unlocked only when the tube is in the full-down position to engage the BPRA. This feature prevents the BPRA from being accidentally released while being transferred.

Yoke Assembly Upgrade

Early designs consist of a small contact area roller with spring plungers that may not provide sufficient force to prevent the traveling actuator plate from twisting out of the guide rails. When the tool is operated and the actuator plate reaches the comb mounting area, it is prone to twisting out of the main assembly as a result of

the small guidance area. This results in down time and the need to remove the BPRA tool for repair.

During tool refurbishment, Westinghouse can replace the yoke, roller, yoke pin and spring assembly with a new design. The new design uses a deeper V-roller and heavier springs to keep the actuator from twisting out of the guide rails. Heavier springs keep the rollers from sticking and the gripper centerline distance is maintained.

Positive Gripper Lock

This improvement introduces a positive lock mechanism into the gripper assembly, which prevents the gripper from unlatching a BPRA while suspended in the tool. This changes the tool so that it can only latch or unlatch a BPRA while the guide tube is in the full-down position. This modification can be incorporated into a new BPRA tool or installed during the refurbishment of an existing tool.

The design incorporates a positive locking mechanism introduced onto the top of the guide tube. The mechanism consists of a locking plate that engages with the guide pin when the guide tube is not fully lowered. When the plate is engaged with the guide pin, the guide pin and gripper shaft are unable to move. The guide pin is replaced with a longer pin, allowing sufficient engagement with the locking plate. A modified plug is provided with a square shaft for the locking plate to ride on. The square shaft on the plug preserves the angular orientation of the locking plate while allowing it to move along the axis of the guide tube at the bottom of travel of the guide tube.

In summary, the guide pin can be actuated normally when the guide tube is at the bottom point of its travel. When the guide tube is raised to draw the BPRA into the tool, the latching plate will travel axially down the shaft of the plug, to positively lock the guide pin.

Benefits

The BPRA tool improvements include the following:

- Comb pinning to maintain alignment
- Increased comb rod diameter to prevent rod buckling
- Yoke assembly upgrade with rollers and springs, which prevents the actuator plate from twisting out of the frame
- Reduced tool head envelope for reduced opening poison racks access
- Positive gripper lock preventing inadvertent BPRA unlatching

Deliverables

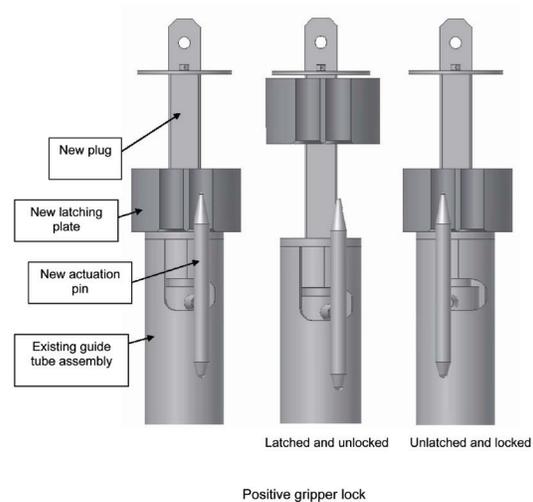
- Comb alignment and pinning
- Replacement comb rod assemblies
- Yoke assembly, including yoke, roller, yoke pin and spring assembly
- Gripper lock, including: guide pin, plug, latch plate, actuator pin and bearing
- Miscellaneous assembly hardware
- Revised tool assembly drawing documenting the modifications
- Certificate of Compliance

Customer Scope

The customer is responsible for the following:

- Identifying which tools are being modified and the applicable assembly drawing
- Initial handling and packing of the subject tool for shipment to Westinghouse

- Obtaining additional, required hardware and services not included in the modification
- Unpacking, handling and assembling the tool upon receipt



Experience

Nuclear power plants where the Westinghouse BPRA is used include: Catawba, Farley and McGuire.

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

www.westinghousenuclear.com