

Full-scope Refueling Services

Background

Since 1968, Westinghouse has provided premier customer-focused refueling services for hundreds of plant outages worldwide. Our vast experience is unequaled in the industry and uniquely qualifies us to offer superior services.

Description

The Westinghouse full-scope refueling service can be customized and scaled to meet each customer's specific needs. The service details highlighted below are typical full-scope refueling services:

- Procedure and work order review with recommendations for site implementation
- Reactor disassembly
- Equipment checkout
- Fuel and fuel component movement
- Core loading plan (CLP) verification
- Reactor re-assembly
- New fuel receipt inspection, seal table cleaning and eddy current services, and electrical disconnect and reconnect

Westinghouse will provide all the necessary tooling, procedures, planning and coordination, supervision, technical direction and qualified labor support to perform the refueling activities as specified by contract. Four shifts are used to provide for effective continuous coverage, 24 hours a day, seven days a week.

We also offer a wide variety of specialty equipment as part of this service. Like the service itself, the equipment is also tailored to meet specific customer and outage needs. Major equipment categories in a typical full-scope refueling service include the following:

- A “refuel tool box” containing various hand and specialty tools is needed during the service. In addition to common hand tools such as wrenches and screwdrivers, the refuel tool box contains calibrated temperature and dial indicators, pneumatic safety hooks and actuators, and laser level indicators.
- A variety of advanced camera systems, including underwater color zoom, B&W radiation tolerant and in-air head guide are a part of the refueling service. Included are lights, pan-and-tilt mechanisms, control consoles, monitors and DVD recordings.
- The ROS fuel identification system, which is an advanced array of integrated imaging and control components used for CLP and gap verification
- A ROS FlangeBot™, which is a wireless, remotely controlled system capable of cleaning and drying the reactor vessel flange O-ring sealing surface, and providing a finely detailed recordable video inspection
- A control rod drive shaft (CRDS) mockup and calibration tool for testing and calibrating the full length CRDS unlatching tool
- A CRDS button height measurement tool used to verify correct rod cluster control assembly (RCCA) engagement
- An air-operated vice grip system for underwater retrieval or manipulation of objects

- The ROS articulated retrieval tool, which is a light, fully submersible, articulated vacuum system developed specifically for foreign object search and retrieval (FOSAR) operations above and below the lower core plate
- Various underwater drop-light fixtures, including 400 W (50,000 lumens) and 1,000 W (140,000 lumens) high-pressure sodium lamps
- Straight and combination fuel assembly loading guides used to provide proper seating of bowed and twisted fuel assemblies
- Reactor vessel stud turnout tools, nut runners and stud-handling system
- An underwater flange cleaner and an O-ring groove cleaner

Scope of Supply

Detailed scopes of supply, where applicable, are covered in specific technical descriptions and contracts. A typical full-scope refueling service includes the following:

- Perform operational checkout of the fuel-handling equipment using site operational checkout procedures
- Perform reactor disassembly and reassembly operations, including:
 - Missile shield removal and installation (R&I)
 - Seismic restraint R&I
 - Reactor head vent R&I
 - Control rod drive mechanism (CRDM) ventilation ducting R&I
 - Instrument port conoseals R&I
 - Reactor vessel head thermal insulation R&I
 - Transfer tube blind flange R&I
 - Reactor vessel studs, de-tension and tension R&I
 - Guide studs, stud hole plugs inspection and replacement (I&R)
 - Head-lifting fixture I&R
 - Reactor vessel head R&I
 - Control rod driveshaft, unlatching and latching and drag testing
 - Upper internals lift rig I&R
 - Upper internals package R&I
 - Reactor vessel head O-ring I&R
 - Vessel stud hole cleaning
 - Reactor vessel stud, nut and washer cleaning
 - Flux thimble withdrawal and installation
 - Visual inspection and FOSAR of the reactor vessel
- Perform electrical disconnect and reconnect operations, including:
 - Power supply cables to the rod position indication detector coils, CRDM coils and CRDM cooling fan
 - Control cables from the CRDM cooling fan damper solenoids
 - In-core thermocouples
 - Cables from the CRDM cooling fan thermocouples, limit switches and pressure switches
 - Cables from the metal impact monitoring system accelerometers
 - Cables and associated wiring from the reactor vessel level monitoring system
 - Head vent pipe
 - Electrical cable and tubing support trays
- Perform fuel and fuel component handling, including:
 - New fuel receipt inspection and storage in the new fuel vault
 - Transfer of new fuel from the new fuel vault into the spent fuel pool
 - Reactor core unload and reload, including post-reload verification map
 - Fuel component shuffle

Benefits

No refueling is routine; each can present challenges and opportunities for improvement. Our background, extensive field experience, and exceptional training and qualification program enables our field personnel the ability to address and effectively resolve emergent issues.