

Pressurized Water Reactor Internals Aging Management MRP-227-A Inspection Services

Background

The nuclear power industry's Materials Reliability Program (MRP) has developed guidelines for long-term aging management of pressurized water reactor (PWR) internals. MRP-227-A, Rev. 0, Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines, provides direction for establishing plant-specific PWR internals aging management programs to monitor the condition of the internals in order to maintain appropriate levels of plant safety and reliability.

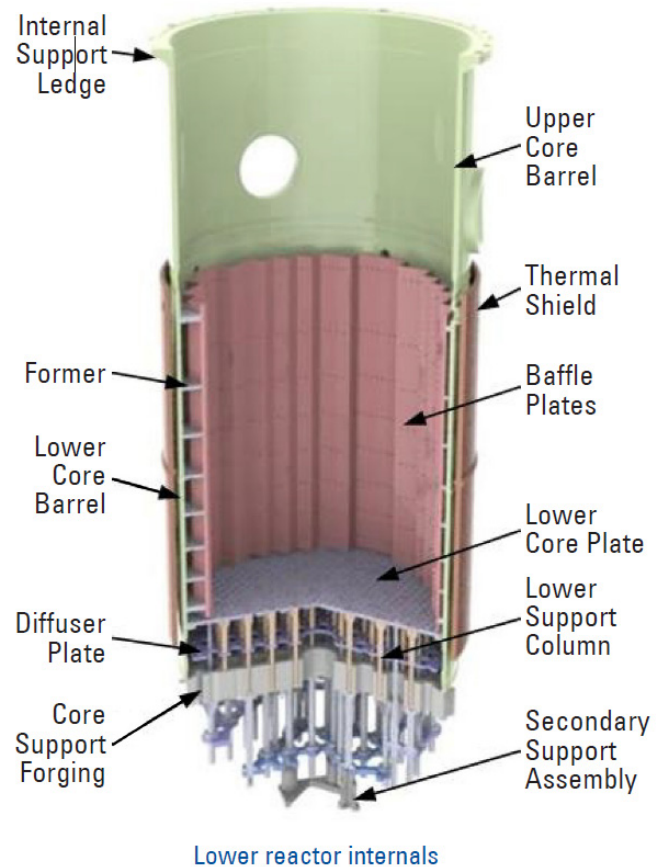
To support the industry in implementing these guidelines, Westinghouse has developed a comprehensive four-step approach, which includes the following:

1. Scope definition
2. Aging management program plan development
3. Inspection and evaluation (I&E) program development
4. I&E program implementation

Outage planning and inspection service capabilities are critical elements to successful MRP-227 implementation. Westinghouse's broad range of inspection capabilities and resources provides comprehensive, synergistic solutions to minimize the impact of inspection services on the overall outage schedule.

Description

The Westinghouse I&E program implementation provides specific service options to address the component and inspection technique guidelines identified by MRP-227-A. Westinghouse's service portfolio encompasses engineering analyses, inspection services and mitigation alternatives as they relate to the reactor internals.



Inspection capabilities provided by Westinghouse include visual and enhanced visual examinations, direct physical measurements and volumetric examinations of the primary components, as well as inspection of relevant and expansion components, if necessary.

The primary components that require inspection vary by plant design, as described below:

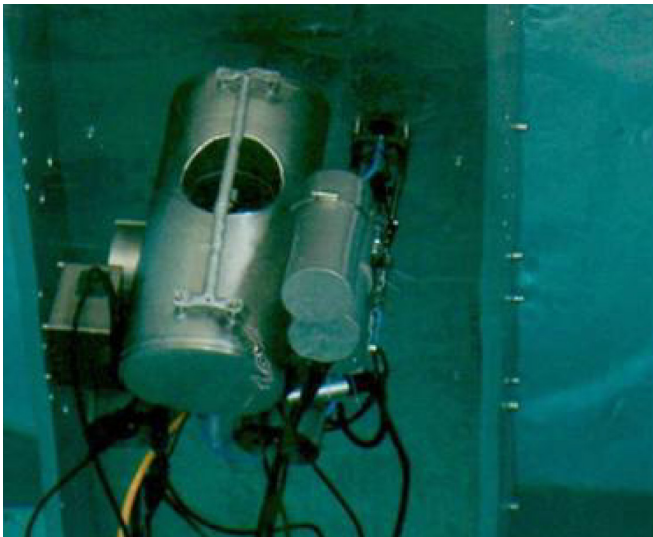
- Westinghouse plant primary components include: control rod guide tube assembly, core barrel welds, baffle-former assembly and bolting, alignment and interfacing components, and thermal shield assembly.

- Babcock and Wilcox plant primary components include: bolting (upper core barrel, lower core barrel, baffle to former and flow distributor), plenum cover weldment rib pads/support flange, control rod guide tube spacer castings, internal baffle-to-baffle bolts and locking devices/welds, and baffle-to-former bolts and locking devices/welds.
- Combustion Engineering plant primary components include: core shroud assembly both bolted and welded, lower support structure, core support barrel, upper internals and control element assemblies.

Westinghouse's inspection services capabilities, when combined with engineering pre-inspection preparations, allow it to provide an all-inclusive, wide-ranging portfolio of service solutions for reactor internals aging management.

Benefits

- Experienced personnel and proven equipment to support effective implementation of MRP-227-A requirements
- Broad range of inspection capabilities and resources to provide comprehensive, synergistic solutions directed towards minimizing the impact of the inspection services on the overall outage schedule
- Qualified and demonstrated ultrasonic inspection techniques for all baffle-former bolt designs, including the two difficult-to-inspect configurations: internal hexagon socket with welded lock washer and lock bar



Baffle bolt ultrasonic testing on mockup with mini-sub

- Resources to provide timely completion of analysis and disposition of outage inspection results
- Resources with proven experience to support permanent repair, replacement or mitigation of the components
- Allows the utility to be positioned to meet the industry and regulatory requirements for supporting long-term aging management of reactor internals.

Experience

Westinghouse is the demonstrated leader in providing support to meet industry requirements. Its global inspection service team combines state-of-the-art equipment and technology with highly trained and qualified personnel to provide comprehensive inspection service solutions to meet I&E requirements.

Westinghouse has been a full participant and contributing author working closely with the nuclear industry and the U.S. Nuclear Regulatory Commission in the development of the reactor internals aging management criteria.

Westinghouse's inspection program is part of an ongoing, all-inclusive strategy that is continually reviewed and improved based on technical advances, responsible financial management scenarios and integrated planning solutions to provide future generations with safe, clean and reliable electricity.

WesDyne is the nondestructive inspection branch of Westinghouse and a leading supplier of mechanized nondestructive examination (NDE) products for all inspection needs worldwide. As such providing turnkey and one-off-type solutions with a focus on the nuclear market. WesDyne's expertise spans all aspects of remote and mechanized inspections, from problem analysis and solutions generation to development and manufacturing to field deployment of personnel and equipment. Inspection capabilities cover all key NDE areas such as ultrasonic, visual, eddy current, magnetic particle, dye penetrant and X-ray.

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