

# PWR Reactor Internals Aging Management Pre-inspection Engineering Package

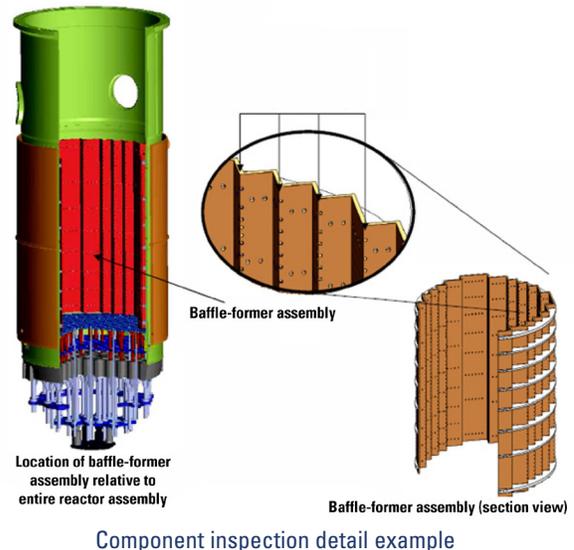
## Background

The nuclear power industry is committed to providing clean, safe and reliable energy to the world. In alignment with this goal, the industry Materials Reliability Program (MRP) has developed an inspection and evaluation guideline for long-term aging management of pressurized water reactor (PWR) internals, MRP-227-A. Endorsed by the U.S. Nuclear Regulatory Commission after a comprehensive safety review, this document provides utilities with a strategy for the long-term use of the reactor internals.

## Description

Westinghouse has developed the following comprehensive four-step approach for inspection implementation of reactor internals aging management:

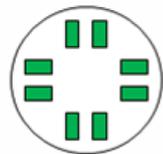
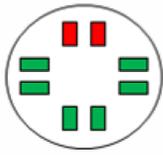
1. Scope definition
2. Aging management program plan development
3. Inspection and evaluation (I&E) program development
4. I&E program implementation, industry reporting, response and follow-up



Step 3 includes the pre-inspection engineering package (PIEP), which provides engineering tools to support inspections and includes the following elements:

- Component inspection details (CIDs)
- Acceptance criteria
- Inspection response plan (IRP)

## Top flange viewed from below



## Bottom flange viewed from above

 Failed weld  
 Intact weld

### Acceptance criteria example

CIDs feature inspection illustrations including details that support required industry MRP-227-A inspections. CIDs provide a clear understanding of the components to be inspected and the inspection requirements, supporting data gathering and retention compliance with MRP-227-A.

Acceptance criteria provide a detailed technical basis to perform flaw-tolerance evaluations. The timely completion of assessments of outage inspection results directly supports plant reliability and return-to-service within regularly scheduled maintenance intervals.

IRPs are based on plant-specific factors within manageable levels of risk to identify and plan for contingency actions in response to inspection findings. The interactive planning tool employs expertise from all plant operation perspectives and outlines responses to the inspection, allowing the plant to safely and quickly return to power. Activities support permanent repair, replacement or mitigation of the components, aligned with a regularly scheduled maintenance outage, in a safe and economical manner.

All PIEP tools comply with the MRP-227-A recommendations and industry standards to support outage execution.

The methodologies as defined by the Pressurized Water Reactor Owners Group (PWROG) in WCAP-17096-NP provide the basis for the acceptance criteria and utilize the inspection parameters defined in MRP-228. IRPs are fully aligned with industry consensus-defined processes in MRP-318 and PWROG WCAP-17436.

## Benefits

The Westinghouse PIEP program effectively implements the requirements of MRP-227-A aligned with MRP-228 inspection and Generic Aging Lessons Learned life extension aging management requirements. Upon completion of the PIEP program, the utility will be positioned to meet the industry and regulatory requirements for supporting long-term aging management of reactor internals.

## Experience

- Westinghouse has been a full participant and contributing author that has worked closely with the international nuclear industry and the U.S. Nuclear Regulatory Commission in the development of reactor vessel internals aging management criteria.
- Westinghouse has an experienced and knowledgeable team that is focused on working with plants to meet the I&E requirements.
- Westinghouse is the demonstrated leader in providing support to meet industry requirements.

The Westinghouse four-step reactor internals aging management program is a living strategy that is continually reviewed and improved based on technical advances, responsible financial management scenarios and integrated planning solutions in order to provide future generations with safe, clean and reliable electricity.