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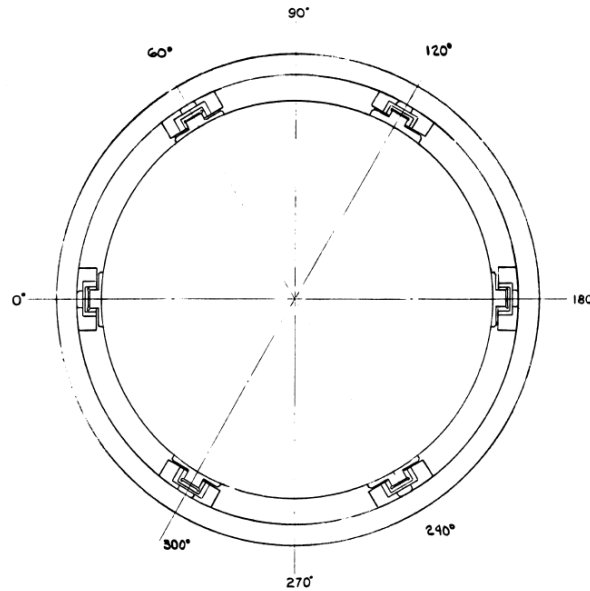
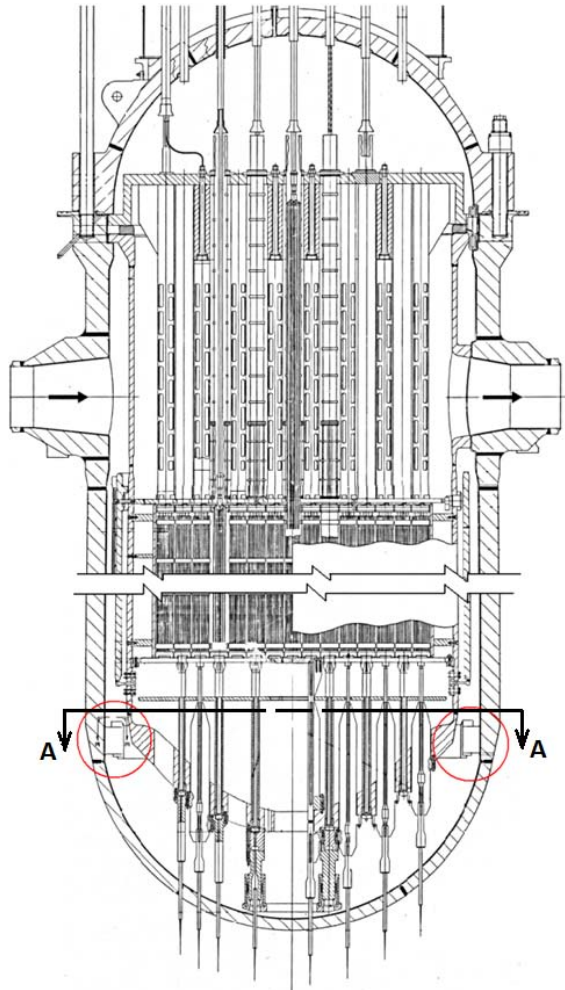
# Industry and NRC Coordination Meeting Materials Programs Technical Exchange

## Clevis Insert Bolt Update

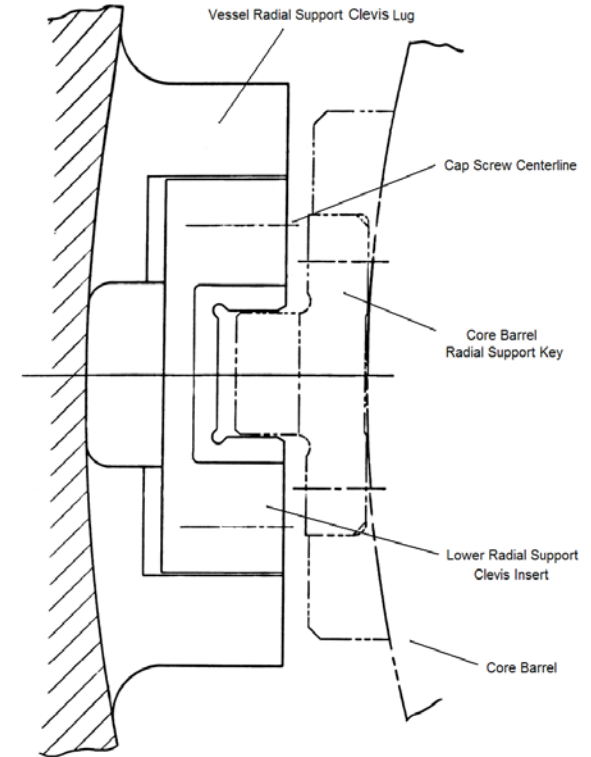
Bryan Wilson, Westinghouse

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# Industry and NRC Coordination Meeting Materials Programs Technical Exchange Clevis Insert Bolt Update - Background



Section A-A  
(Internal Details Removed for Clarity)



# Industry and NRC Coordination Meeting

## Materials Programs Technical Exchange

### Clevis Insert Bolt Update - Recent OE Root Cause

- D.C. Cook Issued Root Cause Evaluation (AR 2010-1804-10)
  - Root Cause → PWSCC of Alloy X-750 with a susceptible heat treatment
  - All 29 bolts removed, were either already separated, separated during removal, or had cracks present
  - All failures/cracking was at the head-to-shank transition radius
  - Fracture mode was essentially 100% intergranular on all bolts
- Industry Impact:
  - All Westinghouse and CE plants are potentially susceptible:
    - Similar heat treatments are used on all Alloy X-750 clevis insert bolts
    - Preload stress in the bolts is similar for all plant
  - Visual inspection of bolts alone is not 100% reliable for confirming bolt integrity

# Industry and NRC Coordination Meeting Materials Programs Technical Exchange **Clevis Insert Bolt Update - NRC 3/27/14 Meeting Summary**

- **Overview**
  - Design Introduction
  - Safety Functions
  - Design Configurations
  - Potential Failure Modes Related to Clevis Insert Bolt Failures
  - Why Failure Modes are Unlikely to Occur
  - Detection Methods
  - Conclusion
- **Basic Conclusions**
  - All design configurations are inherently safe
    - Loose parts are captured (with the possible exception of lock bars)
    - No single point failure leading to loss of function
  - Concerns are primarily commercial in nature
  - Visual inspection of wear surfaces and general condition will provide the appropriate level of aging management without the need for bolt inspections
- **PWROG project, PA-MSR-1198, will provide utilities the technical basis for the safety case argument presented in the NRC discussion**

# Industry and NRC Coordination Meeting Materials Programs Technical Exchange **Clevis Insert Bolt Update - Pending Westinghouse Communication**

- Technical Bulletin (TB) is the proposed communication tool
- Much of the detail in IG-10-1 will be included
- The TB will also:
  - Include a discussion on evaluations performed considering the 4 different Westinghouse and CE clevis insert designs
  - Summarize the Root Cause Analysis findings and discuss industry impacts
  - Reaffirm that the findings of the RCA do not change the conclusion that this is not an immediate safety concern
  - Identify that there are asset management risks that need to be considered
  - Provide clear inspection recommendations which can enhance focus of the base aging management program:
    - For monitoring conditions directly related to functional performance
    - For managing bolt degradation to reduce asset management risk
  - Provide optional approaches to support a proactive asset management program

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## Materials Programs Technical Exchange

### Clevis Insert Bolt Update - Potential Inspection Options

- **Base Aging Management Program**
  - Visual examination (VT3) of the following at your next 10-year ISI or earliest opportunity when the lower internals are removed
  - For monitoring conditions related to functional performance:
    - Radial key / clevis insert interfacing surfaces; look for aggressive or abnormal wear as compared to previous inspection (if available)
    - Interface between the clevis insert and vessel lug; look for signs of looseness or dislocation
  - For managing bolt degradation to reduce asset management risk:
    - Bolt heads; look for wear between the bolt head and lock bar and/or bolt head dislocation (not 100% reliable for confirming bolt integrity)
    - Dowel pins; look for broken tack welds and dislocation of the dowel pin
- **Optional Approaches to Support a Proactive Asset Management Program**
  - UT examination
  - Bolt replacement

## **Clevis Insert Bolt Update - Aging Management Requirements Clarification**

- MRP-227-A requires inspection of the clevis insert for wear only, but lacks specificity
- Considering the following changes for MRP-227, Rev. 1:
  - Recategorization of the clevis inserts and bolts as Primary components
  - Add specifics related to inspection requirements and logic for requiring certain inspections

# Questions?

*The Materials Subcommittee is established to provide a forum for the identification and resolution of materials issues including their development, modification and implementation to enhance the safe, efficient operation of PWR plants.*





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