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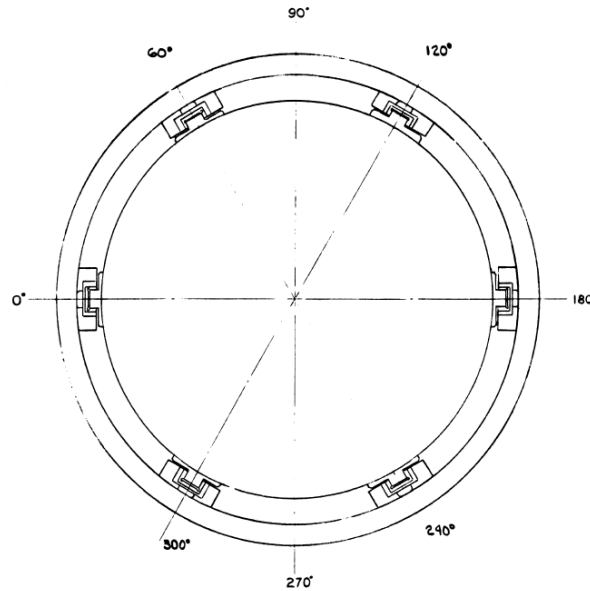
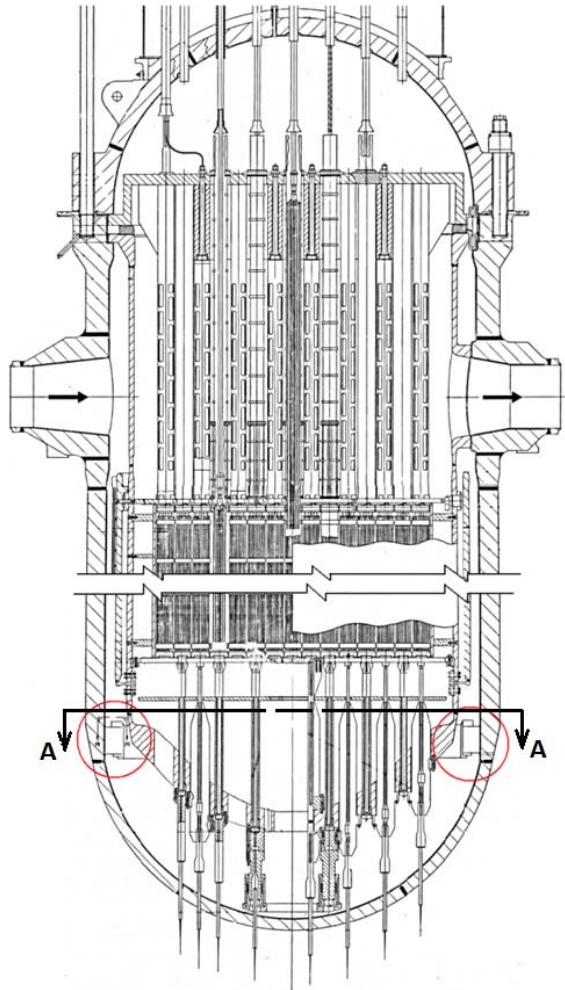
Industry and NRC Coordination Meeting Materials Programs Technical Exchange

Clevis Insert Bolt Update

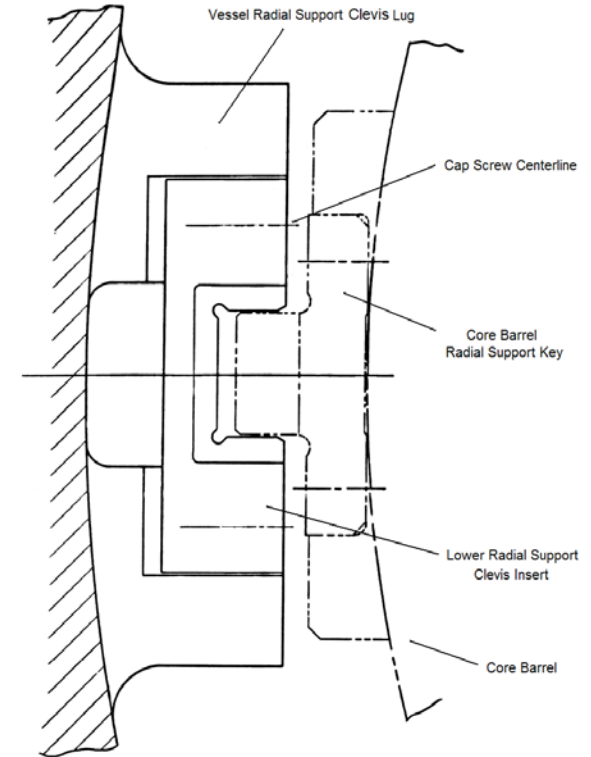
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Industry and NRC Coordination Meeting Materials Programs Technical Exchange Clevis Insert Bolt Update - Background



Section A-A
(Internal Details Removed for Clarity)



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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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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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