



U. S. Nuclear Regulatory Commission

NRC Perspectives on Baffle-Former Bolt Degradation

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Recent Operating Experience

- From 2010-2016, MRP-227-A inspections were performed at several Westinghouse 2-loop and 3-loop plants
 - 2-loop plants had 5-10% degraded baffle-former bolts
 - 3-loop plants had very few degraded baffle-former bolts
- In 2010, one Westinghouse 4-loop plant visually noted a large number of degraded bolts on one baffle plate (not during MRP-227-A inspection)
- In 2016, two Westinghouse 4-loop plants performed MRP-227-A inspections and found more degraded bolts than expected (27% and 22%)
- Plants with significant degradation are Westinghouse 4-loop designs with a “downflow” configuration and Type 347 stainless steel bolts



NRC Response to Recent OE

- **Reviewed recent industry and vendor guidance on this issue**
- **Evaluated immediate safety significance of issue through internal processes (LIC-504)**
- **Regional staff has been alerted to issue and have engaged the licensees at sites with susceptible reactor designs**
- **Conducting baseline inspections focused on the issue at the two plants with extensive bolt degradation in 2016**



NRC Inspections

- **The NRC staff performed targeted inspections at the two plants with significant degradation.**
- **Inspection focused on:**
 - **NDE quality and accuracy (VT, UT)**
 - **Corrective actions, including evaluation of operating units**
 - **Adequacy of replacement bolt pattern, including margin for additional failures during next cycle**
- **Results of the NRC inspections will be documented in publically available inspection reports.**



Safety Significance

- **NRC initial conclusion is that susceptible plants do not need to immediately shut down:**
 - The consequences of baffle plate detachment during normal operation would be limited to localized fuel damage, detectable by periodic coolant activity monitoring required by the TS
 - Only certain events (large LOCA, medium LOCA, or seismic events) have the potential to rapidly detach the baffle plate due to baffle-former bolt degradation
 - In such an event, the detachment of a baffle plate is not expected to pose a significant challenge to the ability to shutdown the reactor and cool the core
 - Initial assessment is that the frequency of such events does not rise to the level of an “imminent safety concern” and does not require any immediate shutdown
- **Many degraded bolts retain significant load-bearing capacity such that they would resist failure during a LOCA or seismic event**
- **NRC is monitoring inspection plans of susceptible plants.**



NRC Ongoing Actions

- **NRC is gathering information on the root cause analyses and the metallurgical analysis of the bolts as it becomes available**
- **NRC will monitor EPRI MRP changes to inspection guidelines based on current events.**
 - **NRC will review and issue a safety assessment on interim guidance issued by MRP related to baffle-former bolts**
 - **NRC may also address this issue under the review of MRP-227, Rev. 1.**
- **NRC is evaluating the need for a generic communication, such as an information notice.**