NRC Perspectives on Baffle-Former Bolt Degradation

July 19, 2016

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.