

Recent Issues with VE of Upper-Head Nozzles

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Recent Operational Experience

In the past year there have been two instances where a licensee had issues performing VE

The acceptance criteria for VE under N-729-1 was not well understood

Appropriate cleaning techniques were not used

These difficulties resulted in delays in issuing the required verbal relief

BMV Relevant Conditions

From N-729-1

“Relevant conditions for the purposes of the VE shall include areas of corrosion, boric acid deposits, discoloration, and other evidence of nozzle leakage”

“Components with relevant conditions require further evaluation. This evaluation shall include determination of the source of the leakage and correction of the source of leakage in accordance with -3142.3.”

Indications of Possible Nozzle Leakage

“A nozzle with relevant conditions indicative of possible nozzle leakage shall be acceptable for continued service if the results of supplemental examinations [-3200(b)] meet the requirements of -3130.”

“A component with relevant conditions indicative of possible nozzle leakage shall be acceptable for continued service if a repair/replacement activity corrects the defect in accordance with IWA-4000.”

Examples



From 07/10/2001 Public Meeting

Leaks Happen

Boric acid on the upper head can come from two main sources

- Leakage through the annulus from PWSCC of the nozzle
- Leakage from seals or weld leaks in the CRDM housings

Determining where the source of the boric acid can be challenging

While the NRC is very concerned with the effects of boric acid corrosion of the upper head, unnecessary inspections do not serve any safety purpose

Determining the Source of Boric Acid

Chemical analysis may be used, depending on the source of the leak

EPRI provides guidelines in the publically-available “Visual Examination for Leakage of PWR Reactor Head Penetrations Revision 2” EPRI Report 1007842

“Compressed air, in the range of 40–60 psi (276–414 kPa), or a vacuum directed at deposits has been used to distinguish whether a deposit is loose buildup of material simply resting against a penetration that is easily removed or is a tightly adhering deposit, originating from the annulus of a leaking penetration.”

Tightly-Adhering Boric Acid

If a nozzle has tightly-adhering boric acid deposits after light cleaning, then the NRC staff consider this a relevant indication of possible nozzle leakage

A steamer from above does not serve as an indication of the source of the boric acid

Power-washing the head prior to using the vacuuming or 40-60 psi air makes it very challenging to prove the source of the leakage

Conclusions

Small amounts of boric acid at the annulus is a relevant indication

Appropriate cleaning techniques are described in EPRI Report 1007842

Supplemental examinations or repair/replacement are required if the relevant indications cannot be cleaned using light cleaning methods of demonstrated not to be RCS leakage via chemical analysis