From: <sepelakb@firstenergycorp.com>
To: "Lawrence Burkhart" <LJB@nrc.gov>
Date: 6/6/01 11:08AM
Subject: Draft Response to RAI on Relief Request

Attached is a Word file containing the draft response to the RAI on the BV relief request submitted on 2/6/01.

(See attached file: Relief Request RAI Response.doc)

Draft Response to RAI Regarding BV-1 Relief Request 1-TYP-3-B5.70

2.1 List the obtained coverage for each specific weld and any significant indications. For welds not examined for the third interval yet, submit relief after the examinations have been performed.

Response:
The following welds have been examined to date in the third interval:
DLW-LOOP1-2-F04 10/20/97 UT-97-055 Limited – Operator calculation reports 51.8% examined – No recorded indications

DLW-LOOP 1-3-F05 10/20/97 UT-97-064 Limited – Operator calculation reports 51.8% examined – No recorded indications

2.2 What is the reason for the examination coverage change? Please provide the reasoning and documentation for the current credited examination coverage being lower than previous examinations. The submittal stated that the limitations are documented in the most recent examination reports. Please provide documentation on the limitations and explain the current methods used to calculate coverage. Discuss and compare the changes in limitations and coverage calculations from previous intervals.

Response:

Both changes in calculated coverage were the result of search unit contact limitations identified in the circumferential scans (directions 3 & 4) performed in 1997. None of the previous examinations identified limitations for the circumferential scanning directions. The limiting condition noted in 1997 is the proximity of the channel head curvature, which limits the ability of the relatively large contoured dual element search unit to make contact on the channel head side(s) of the weld(s). This causes search unit “lift-off”. The same type of search unit has been used to examine these welds since 1984.

In March 1998, the method for calculating coverage for all weld configurations at Beaver Valley Power Station was standardized. This has occasionally resulted in additional limitations being identified, particularly on austenitic welds.

The principal coverage limitation is in the scan direction 2 scan. The identified circumferential scan limitations are the result of differences in examiner technique. Past experience in the examination of this weld configuration has shown that large contoured search units require much more couplant than smaller search units. Liberal application of couplant can often overcome some of the surface irregularities that cause loss of contact. Due to the high UT

"noise" inherent in coarse-grained materials, loss of contact is readily apparent to the examiner. In the most recent examinations, the examiner felt that there was a sufficient loss of contact to result in a limitation, which was identified on the examination report.

The examination coverage for piping welds (since 1998) is calculated based on a two-dimensional cross-section of the weld and adjacent material obtained through UT profiling and design drawings. These coverage percentages are input into a calculation to determine examination coverage. Each of the four scan directions is given an equal value for overall coverage in the following manner:

Scan direction 1 = axial scan from the datum point side of the weld (usually upstream)
Scan direction 2 = axial scan from the opposite side of the weld (usually downstream)
Scan direction 3 = clockwise circumferential scan (facing direction of flow)
Scan direction 4 = counterclockwise circumferential scan

In both of these cases, the following limitations were identified:

Scan direction 1 (axial scan from elbow) – complete coverage	100%
Scan direction 2 (axial scan from channel head) – no coverage	0%
Scan direction 3 (cw circumferential scan) – limited coverage	55%
Scan direction 4 (ccw circumferential scan) – limited coverage	55%

210% covered out of possible "400%" (210 / 400) = 52.5% coverage is obtained using the current coverage calculation methodology.

2.3 What assurance is provided that a significant flaw would be detected with the limited UT coverage?

Response:

The refracted longitudinal wave ultrasonic technique employed for these examinations has been demonstrated to be the most effective technique for the examination of austenitic welds joining cast stainless steel components. The ultrasonic examination procedure used to perform the examinations has demonstrated the ability to detect flaws in welds joining cast stainless components.

The principal coverage limitation is in the axial scan direction 2 examination from the nozzle side of the weld. The axial scan from the fitting side would detect significant circumferentially oriented flaws within the required examination volume. The identified circumferential scan limitation is based on limited coverage of the inside diameter (ID) surface on the nozzle side of the weld. Shallow, inside diameter axially oriented flaws on the nozzle side of the required volume may not be detected, however the probability of detection of such hypothetical flaws would increase significantly if they grew to significant through-wall dimension, because through-wall growth would also result in a corresponding increase in flaw length.

Surface examinations (liquid penetrant) are also performed on these welds at the same frequency as the volumetric UT examination.

2.4 What is the weld configuration (include base materials and weld in the diagrams)

Response:

The weld configuration and materials are shown in the attached sketch derived from fabrication drawings and ultrasonic profiling. The welds are 308L filler material joining A351 Grade CF8A cast stainless steel elbows to A216 Grade WCC steam generator channel heads. The channel heads are clad with 309L/308L stainless steel and the weld – deposited safe-ends are made with 309L/308L stainless steel material.

What prevents examining these welds from the ID?

Response:
The welds are only physically accessible for a brief period of time during refueling outages prior to installation of the nozzle dams used to facilitate steam generator tubing examinations. High radiation dose considerations preclude manual UT examination from the ID surface. There are currently no qualified robotic delivery systems or examination techniques to perform volumetric examination of these weld configurations from the inside diameter surface.

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