



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION

RELATED TO RELIEF REQUEST DATED FEBRUARY 8, 1983

Introduction

By letter dated February 8, 1983, Virginia Electric and Power Company (the licensee) requested relief from the surface examination requirement for the reactor vessel inlet nozzle-to-safe end welds. The request was to have been part of our Safety Evaluation dated February 28, 1984, but was inadvertently omitted.

The evaluation is in the same format as the February 28, 1984 Safety Evaluation.

Evaluation

A. Class 1 components

1. Request for Relief RR-16

Relief is requested from the surface examination requirement for the reactor vessel inlet nozzle-to-safe end welds. (Item B1.6, Examination Category B-F)

Code Requirement (1974 Edition, Section XI):

Examination of Pressure-Retaining dissimilar metal welds performed during each inspection interval shall cover the circumference of 100% of the welds. The welds and base material shall be examined by volumetric and surface methods and shall cover the base material for at least one wall thickness beyond the edge of the weld.

Licensee's Basis For Requesting Relief

Extent of the presently scheduled examinations of the nozzle dissimilar metal welds in accordance with IWB-2500 and IWB-2600 is Volumetric and Surface from the outside diameter (OD). This requires significant surface preparation time involving removal of interference, cleaning of the welds, moving necessary test equipment into position and conducting the examinations in a high radiation area and virtually in near contact with the loops. At Surry, it is estimated that the average general radiation levels in the vicinity of the nozzle dissimilar metal welds will be at least 500mr/hr with loop contact readings of 2-4 R/hr. At this radiation level, it is estimated that the following exposures will be incurred to complete all remaining inlet loop nozzle dissimilar metal weld inspections on Unit 1 (Unit 2 is expected to be comparable):

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	MANHOURS	MANREM
Removal of interference materials to gain access	12	6
Weld preparation around 100% of circumference	18	9
Conduct of examination	<u>9</u>	<u>4.5</u>
TOTAL	<u>39</u>	<u>19.5</u>

During this 1st Interval, the following examinations of nozzle dissimilar metal welds have been completed with no relevant flaw indications:

- Unit 1 Outlets (all loops) Volumetric (Ultrasonic Testing) and Surface OD
 Inlets (all loops) Volumetric only from ID
- Unit 2 Outlets (all loops) Volumetric and Surface

The capability exists to volumetrically examine all nozzle dissimilar metal welds from the ID as required by the follow-on 1977 and 1980 ASME Code Section XI for 1/3t. A full volumetric examination from the ID has been accomplished which adequately inspects the weld for integrity. Thus the surface preparation of the OD, in view of the anticipated exposure dose even with portable shielding and exposure time improvement techniques, would not be commensurate with the gain in weld integrity inspection.

Over 40 nozzle dissimilar metal welds are known to have been examined at various nuclear plant utilities with no service induced flaws detected.

Since thermal stress is the likely method to initiate cracks, such a flaw would be most likely to initialize itself on the ID where the thermal stress and pressure forces combine to form the greatest tensile stresses particularly during a cold water transient.

Proposed Alternate Examination

As an alternative and in agreement with Surry Technical Specification 4.2 Bases A. Reactor Pressure Vessel, Category F, it is requested that the nozzle dissimilar metal welds IWB-2600 B1.6, be volumetrically inspected from the ID without an OD Surface and Visual examination. This would greatly reduce the exposure of personnel and is commensurate with ALARA practices.

Staff Evaluation and Conclusion

Surface examination of reactor vessel nozzle-to-safe end welds usually necessitates personnel exposure to relatively high levels of radiation during erection of scaffolding, removal of insulation, preparing the weld

and base metal, performing the examination, interpreting the results, etc. The examination required by Section XI for safe end welds are surface and volumetric. The surface examination is intended to cover areas on the OD of the component where ultrasonic examination data may be difficult to interpret when the ultrasonic examination is performed from the ID. However, if satisfactory results can be obtained by the remote ultrasonic examination, the staff finds that the surface examination is impractical to perform considering personnel exposure and ALARA.

There are six nozzle-to-safe end welds on each reactor vessel at Surry Units 1 & 2, three outlet and three inlet. During the ten-year inspection interval, the outlet nozzle-to-safe end welds have been examined by surface and ultrasonic methods with no flaw indications detected. The examination history of similar type welds at other facilities indicates that the welds have not experienced service-induced flaws. Ultrasonic examination of the inlet nozzle-to-safe end welds can provide assurance that OD flaws will be detected provided the instrument calibration for such flaws is incorporated in the examination procedure. The staff has discussed the calibration method of the ultrasonic instrument with the licensee and determined that the licensee's proposed alternate examination would be acceptable provided the licensee could demonstrate that a 3% to 5% notch machined on the OD surface of the basic calibration block could be detected. The licensee has agreed to do this.

Based upon past performance of the vessel nozzle-to-safe end welds and the alternate examination with the demonstration that OD surface flaws can be detected, the staff concludes that relief from the surface examination requirement may be granted. On the basis of its review and evaluation, and pursuant to 10 CFR 50.55a(g)(b)(i), the staff concludes that the code requirements are impractical and the relief is authorized by law and will not endanger life or property or the common defense and security and is in the public interest given the burden upon the licensee that could result if the requirements were imposed. However, this granting of relief is applicable only to the first ten-year inspection interval. The staff will require that the surface examination be performed in subsequent inspection intervals unless an alternative equal or superior to the requirement is provided.

Dated: May 7, 1985

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