

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

September 28, 2001

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 01-450D
NL&OS/ETS R0
Docket Nos. 50-280
50-338
License Nos. DPR-32
NPF-4

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY AND NORTH ANNA POWER STATION UNITS 1
ASME SECTION XI INSERVICE INSPECTION PROGRAM
REQUEST FOR ADDITIONAL INFORMATION
REVISED RELIEF REQUESTS - ALTERNATIVE REPAIR TECHNIQUES

In a letter dated September 20, 2001 (Serial No. 01-450B), Virginia Electric and Power Company (Dominion) requested relief (Relief Requests NDE-018 for North Anna Unit 1 and SR-25 for Surry Unit 1) to use an alternative repair technique (ambient temper bead weld repair) in the event that any flaws discovered during inspections required repair in reactor vessel head penetration attachment welds within 1/8 inch of the ferritic head material. These inspections are in progress at North Anna Unit 1 and are planned for the upcoming Fall 2001 refueling outage for Surry Unit 1.

During a telephone conference call on September 26, 2001 the NRC requested additional information on the subject relief requests. The attachment to this letter provides the requested information.

If you have any questions or require additional information, please contact Mr. Thomas Shaub at (804) 273-2763.

Very truly yours,



Leslie N. Hartz
Vice President - Nuclear Engineering

Attachment

Commitments made in this letter: None

A047

cc: U.S. Nuclear Regulatory Commission
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**REQUEST FOR ADDITIONAL INFORMATION
NORTH ANNA UNIT 1 AND SURRY UNIT 1
RELIEF REQUEST NDE-018, DATED SEPTEMBER 21, 2001,**

NRC question 1.a

NB-4622.11(d)(2) requires PT and RT examinations of the repair welds after 48 hours at ambient temperature.

- a. The proposed alternative states that radiographic testing (RT) examination cannot be performed because of configuration. Describe the difficulties with performing an RT. Use sketches to show interferences, restrictions, and other aspects of the configurations that hinder an RT examination. Explain how the integrity of the repaired volume and heat affected zone (HAZ) will be established.

Dominion response

There are a number of reasons why the configuration of the penetration-to-head partial-penetration welds makes radiography of repairs impractical. Radiography (RT) of the proposed penetration weld repairs is not feasible because the entire weld could only be seen if the film cassette were placed in the penetration tube. However, there is insufficient clearance between the penetration tubes and the thermal sleeves (which must be cut to be removed) to insert the film cassette. In addition, the centering ring on the OD of the thermal sleeves would prevent inserting the cassette far enough into the tube to see the whole weld in some cases. In many cases the proximity of other penetrations would limit the ability to place a source for an RT shot such that some proposed penetration repairs could not be radiographed at all. The curvature of the head is such that the source-to-weld-to-film alignment would be conducive to significant distortion of the RT image and there would be substantial difficulty in achieving acceptable geometric unsharpness. Furthermore the geometry of any attempted setup would involve continuous variation in material thicknesses from one edge of the radiograph to the other with consequent difficulty in achieving acceptable film densities. Finally, the radiation field on contact with the head is estimated to be 5 Rem, which would result in significant fogging of the RT film and would prevent effective interpretation of the results.

NRC question 1.a.1 and 2

1. If an alternative volumetric examination method will be used in lieu of RT, provide a comparison (advantages, disadvantages, detection sensitivity for different types of flaws, etc) of the different characteristic between the methods.
2. If the alternative to RT is a Section XI ultrasonic testing (UT) examination, describe the differences between a Section III and Section XI UT examination. The description should compare paragraphs/figures/tables with a proposed reconciliation. Items that should be included in the description are examination volume, examination coverage (scanning directions and transducers characteristics) and acceptance criteria. Include in the discussions any demonstrations performed on mock-ups and the types of flaws in the mock-up which demonstrates that a Section IX UT is capable of detecting construction repair related flaws. Are the flaws representative examples of flaws common to fabrication? Perform a comparison between RT and UT, see question 1(a)(1) above.

Dominion response

As discussed below in the response to item 1.b, it has been determined that UT is not practical. No other volumetric exam is being proposed.

NRC question 1.b

- b. The proposed alternative states that the final examination will be performed using PT and UT, if practical. Provide a discussion on when PT will be used and when UT will be used. Explain the criteria that will be used to determine if an examination is impractical. Explain how the integrity of the repaired volume and HAZ will be established.

Dominion response

As stated in the relief request in the discussion of the requirements of NB-4622.11(d)(1), final inspection will be conducted no sooner than 48 hours after completion of the welding and, "... will be by liquid penetrant and ultrasonic inspection, if practical." Subsequent evaluation has determined that ultrasonic inspection of the weld repair made with F-No. 43 filler metal (Inconel 52) is not practical because of the sound attenuation properties of the material related to the dendritic grain structure of the original weld metal and the repair weld material.

As a consequence of the inability to perform any effective volumetric exam, we will perform the examination required by NB-5245 for the original weld, which was a progressive surface exam (in this case PT) at 1/2 inch or one half the weld thickness (whichever is less) and on the final weld surface. The final surface exam will not be performed until at least 48 hours after completion of the weld. This progressive surface exam technique, which is mandated by the Code, has been shown capable of assuring the quality and integrity of welds where it is not possible to perform volumetric examinations. Per NB-4622.11(b), the repairs are limited to a maximum depth into the ferritic material of 3/8 inch after defect removal. The repairs are expected to be much less than that because potential primary water stress corrosion cracking (PWSCC) flaws are not expected to extend into the base metal. In any case, flaws will be removed prior to repair with the proposed temper bead alternative. Consequently, the heat-affected zone (HAZ) in ferritic material will be limited and the examinations described will provide assurance of its integrity. (Please note the typographical error in paragraph 1.0(c) of Enclosure 1 of the Relief Request which indicates 1/8 inch as the maximum repair depth in the ferritic material as opposed to the intended 3/8 inch.)

NRC question 1.c

- c. Provide data to support the conclusion of (1) an acceptable level of quality and safety or (2) hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Dominion response

As discussed above, the Code mandated examination during original construction for the subject welds was progressive surface examination. Because the temper bead welding technique proposed for the repairs has been shown to produce sound welds with excellent mechanical properties and no propensity for cracking, the progressive surface examination required by NB-5245 will provide an acceptable level of quality and safety consistent with original construction standards.

NRC question 2

NB-5245 requires a progressive surface examination during the welding process of the partial penetration weld. You proposed to perform a PT and UT of the finished weld and a supplemental eddy current test (ET). Explain the difference between the proposed inspections for NB-5245 and NB-4622.11(d)(2). See 1(b) above. Provide an explanation for using UT in lieu of a progressive surface examination.

Dominion response

Because of our inability to perform either UT or RT on the proposed repairs, the progressive surface examinations required by NB-5245 will be conducted.

NRC question 3

Does Code recognize ET as an acceptable surface examination? If ET is not recognized by Code as an acceptable surface examination, a request for relief is needed from the Code requirements. If request for relief to use ET is necessary, provide a comparability of the effectiveness for ET vs. PT.

Dominion response

ET is not being proposed as a substitute for PT but rather as a supplement to the PT and may be performed for information. No request for relief to use ET is required because it is not being substituted for the Code-mandated examinations.

NRC question 4

NB-4622.11(d)(3) requires that all NDE be performed according to NB-5000. Identify the NDE that will be performed according to NB-5000. On NDE that will not be performed according to NB-5000 and has not been addressed in prior answers, provide an explanation for the NDE's acceptability, which should include the advantages and disadvantages between Code requirements and the proposed alternative.

Dominion response

The PT examinations will be performed in accordance with NB-5000.

NRC question 5

The title of the proposed alternative (Enclosure 1 of the submittal) includes similar metal welds. However, you stated that NB-4622.9 is not applicable because the weld material is Inconel and base material is carbon steel. Explain the inclusion of the wording for similar metal welds in the title of the proposed alternative. If the proposed alternative also includes similar material welds, then provide a discussion of the proposed alternative for similar metal welds and explain the differences between Code requirements associated with this application.

Dominion response

The proposed alternative, while appropriate for similar metal welding, is not intended to be used for similar metal welds and will be limited to repairs to dissimilar metal welds.