CATEGORY 1

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50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
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RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards requests relief from requirement of ASME Section XI,1989 Edition,Paragraph IWA-5250(a)(2) to remove all bolting (studs) on 4B RCP.

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CATEGORY 1 DOCUMENT

FPL

SEP 24 1997

L-97-248
10 CFR 50.55a

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Inservice Inspection Program
Third Ten Year Summary
Relief Request No.19

In accordance with 10 CFR 50.55a(a)(3)(ii), Florida Power and Light Co. (FPL) is requesting relief from the requirement of ASME Section XI, 1989 Edition, Paragraph IWA-5250(a)(2), to remove all bolting (studs) on the 4B Reactor Coolant Pump. As discussed during our telephone conversation of September 22, 1997, attached is Relief Request No. 19, Corrective Measures for Leakage at the 4B Reactor Coolant Pump flange.

Should there be any questions concerning this submittal, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

A047

CLM

Attachment

cc: L. A. Reyes, Regional Administrator, Region II, USNRC
T. P. Johnson, Senior Resident Inspector, USNRC, Turkey Point Plant
R. Croteau, Project Manager, NRR, USNRC

ATTACHMENT TO L-97-248

RELIEF REQUEST NO. 19

Background

Florida Power & Light Company (FPL) began a refueling outage on Turkey Point Unit 4 on September 8, 1997. Evidence of leakage was found at the main flange of the "4B" Reactor Coolant Pump (RCP) during a routine walkdown of systems within the containment building. This walkdown is required by plant procedures while the unit is in Mode 3. In addition, a VT-2 examination of the RCP flange bolting (studs) was performed in Mode 5. The leakage was minor (small boric acid deposits), and the accumulation had just begun touching two studs. Similar examinations in April, 1997, and in previous refueling outages, did not identify any leakage at this location. The leakage was an emergent issue for this refueling outage.

Two methods of repair were identified from vendor recommendations:

1. Retorque the flange and repair at a subsequent outage, or
2. Disassemble the pump for gasket replacement.

FPL elected to disassemble the pump to replace the flange gaskets and repair the leak. Disassembly would also allow a thorough examination of the studs as required by Section XI IWA-5250. One of the two studs closest to the source of leakage was removed, and a VT-1 visual examination performed. The stud showed no evidence of boric acid attack. Five additional studs were removed in other areas of the flange, to allow for pump disassembly. VT-1 examination of these studs also showed no evidence of boric acid attack.

The pump material is a 316 stainless steel, and is resistant to boric acid attack. The stud material is A540, a high strength, high alloy, carbon steel. The studs are susceptible to boric acid attack, and need to be examined. The studs are about 30.5 inches long and 3.5 inches in diameter. About 6 inches of the bottom end , and 8 inches of the top end of each stud is threaded. About 5 inches of each stud is threaded into the flange stud holes in the pump casing. The remaining portion of each stud (approximately 84% of the total surface area) is accessible for visual examination.

Relief Request No. 19

I. Component Identification

Turkey Point Unit 4
"4B" Reactor Coolant Pump Studs

II. Examination Requirements

Rules for Inservice Inspection of Nuclear Power Plant Components, 1989 Edition, IWA-5250(a)(2):
"If leakage occurs at a bolted connection, the bolting shall be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100...."

III. Relief Requested

FPL has removed 6 of the 24 studs from the 4B RCP main flange, and performed VT-1 visual examinations. FPL requests relief from the requirement to remove the remaining bolting (studs) from the 4B RCP. FPL proposes to perform the visual examinations of the remaining studs while still installed, instead of removing them as required by IWA-5250(a)(2).

IV. Basis for Relief

During this emergent outage activity of replacing the 4B RCP main flange gaskets, FPL has maintained the unit in a defueled status to avoid performing the repair in a reduced inventory condition. Performing the examinations as required by the 1989 edition of the ASMECode is a hardship and presents unusual difficulties without a compensating increase in the level of quality and safety.

Recognizing the hardship and negligible benefit of examining all bolting each time leakage is discovered during ASME Section XI testing, later editions of the Code have changed the required bolting examinations. This change allows a utility to judge whether the remaining bolting must be removed for examination.

The process used to remove the studs involves double nutting and placing a high torque impact wrench on the nuts. The task of removing the remaining studs increases the prospect of stud breakage or damage (which would require stud replacement) or stud hole damage. In addition, the flange sealing surface of the pump is exposed to possible damage from the equipment being used to remove the bolts. If the flange surface or stud holes suffer damage, in-situ pump casing repair would be required. All of these activities would result in unnecessary radiation exposure. With the pump impeller in place, greater than 500 mrem has been accumulated by maintenance

personnel in the removal of one quarter of the studs. With the impeller removed, the unshielded area dose rates range from 1200 to 6000 mrem/hr. With shielding in place, dose rates range from 100 to 1400 mrem/hr. In order to reinstall the studs, the studs and stud holes would need to be cleaned and studs threaded into the pump casing, resulting in additional exposure.

The remaining studs can be examined while still installed. The flange assembly is an open flange design. The thermal barrier is sandwiched between the main flange and the pump casing flange. The studs are located outside the gasket area, and the area around the studs is wide enough that a qualified VT-1 visual examiner can perform an adequate examination of the remainder of the stud while still installed (see the attached pictures). In addition, the thermal barrier will be removed before the VT-1 visual examination, allowing improved access to the studs.

Allowing FPL to examine the remaining bolts in place would accomplish the intent of the Code, which is to determine whether the leakage has caused any corrosion damage to the studs.

V. Alternative Examinations

FPL proposes to perform a VT-1 visual examination on the remaining reactor coolant pump studs while they are still installed. This is deemed reasonable, since preliminary examinations have shown no visible corrosion damage at the interface between the threaded stud and the flange top surface. Based on the tight thread fit, measurable corrosion damage is not credible in the engaged threaded stud hole without corresponding indication of damage at the first exposed threads. Approximately five inches of each stud is threaded into the pump flange. The remainder of the studs (84% of the surface area) are accessible for visual examination. This VT-1 visual examination will be used as part of the evaluation in order to determine whether the studs are acceptable for continued service or must be removed. If boric acid degradation is found on any of the in place studs, that stud will be evaluated for continued service or replacement.

Footnote 1 of Code Examination Category B-G-1 allows an examination to be performed while the stud is in place under tension, when the connection is disassembled, or when the stud is removed. The area where the boric acid accumulation was noted can be observed easily with the flange connection assembled (see the attached pictures). By removing the boric acid accumulation and leaving the stud in place, it is possible to detect boric acid degradation. Code Examination Category B-G-1, Item No. B6.180 covers the Code requirements for the RCP studs. The studs are required to be volumetrically examined, and the Code Examination Category does not contain VT-1 acceptance standards.

The other two item numbers in Examination Category B-G-1 applicable to the RCPs have the acceptance criteria listed as IWB-3517. These acceptance criteria give reasonable guidance for VT-1 examinations and are used for other examinations of Code Category B-G-1. These are the acceptance criteria FPL proposes to use for the VT-1 examination of the studs.

FPL will perform a VT-1 visual examination of the flange in accordance with the requirements of Code Item No. B6.190 at this time. This will ensure no damage is present on the flange seal surface. A volumetric examination of the 24 studs will be performed in accordance with Code requirements during this outage, to insure the integrity of the removed studs and the in place studs.

A system leakage test will be performed after reassembly of the pump.

VI. Justification for the Granting of the Relief

Should the Request for Relief be denied, the risk of damage resulting from removal of the remaining studs is significantly increased; damage to the studs, to the Reactor Coolant Pump flange surface, and the Reactor Coolant Pump casing. Regardless of the risk of damage, significant radiation dose will be expended to accomplish the removal of the studs, the cleanup of the holes, and the reinstallation of the studs.

Performance of the alternative examinations described above will provide a reasonable assurance of the continued integrity of the studs. The six studs removed provide a good sample of the total population of studs, and includes one of the studs most likely to be damaged (based on the location of the leak.) The volumetric examination will provide assurance that no studs were damaged during the removal attempts, and complete the Code required examinations. Thus an acceptable level of quality and safety will have been achieved and public health and safety will not be endangered by allowing the proposed alternative examination in lieu of the Code requirements.

VII. Attachments

Figures 1-4 are scanned photographs of the 4B Reactor Coolant Pump studs in place show the minor boric acid accumulation. These photographs were taken during the initial inspections.

Figure 1 is a closeup of the Component Cooling Water (CCW) outlet piping (between studs 10 and 11). Boric acid is visible around and under the piping. The white spot on stud 11 is glare from the camera flash.

Figure 2 is a closeup of the boric acid between studs 7 and 8.

Figure 3 is another view of the CCW outlet piping. Much of what appears white is flash glare. Boric acid is visible under the outlet piping.

Figure 4 is a poor quality closeup of the boric acid visible between studs 7 and 8.

"FIGURE 1-1" is copied from the RCP vendor manual, and clearly shows the location of the casing, the flange, the thermal barrier, and the flange bolts (studs).

FIGURE 1

FIGURE 2

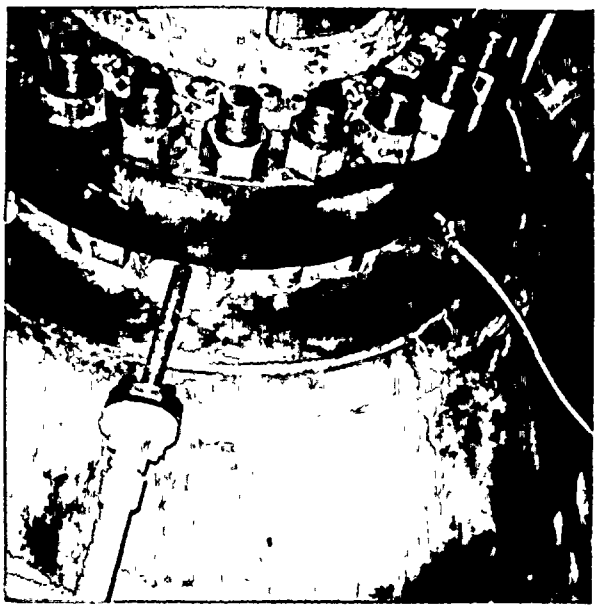

FIGURE 3

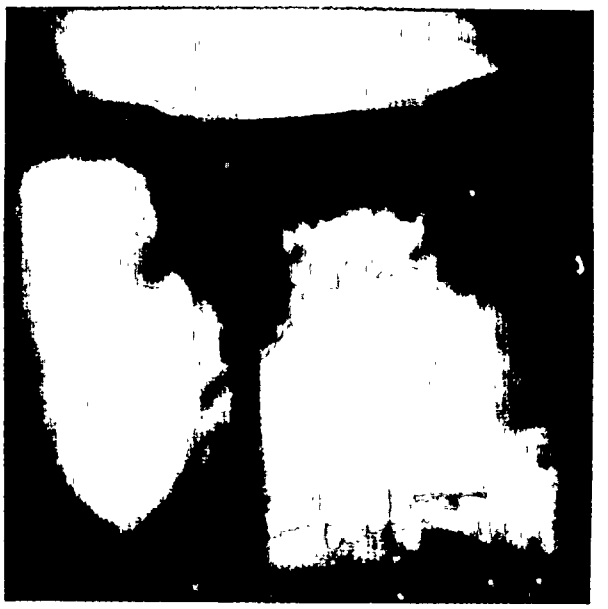

FIGURE 4

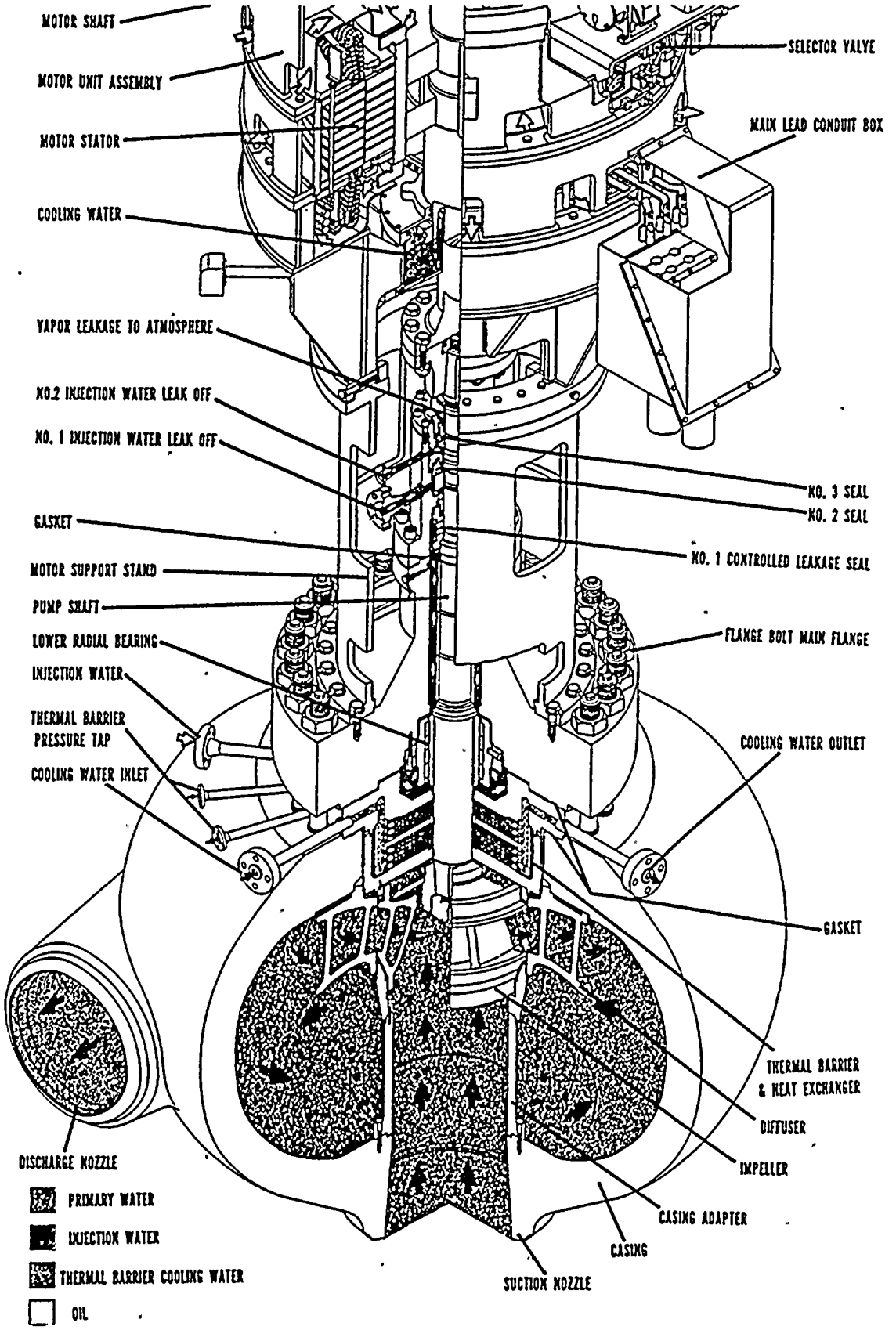

FIGURE 1-1 Cutaway View