VERMONT YANKEE
NUCLEAR POWER CORPORATION

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REPLY TO:
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June 5, 1984
FVY 84-59

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation
Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

References:
(a) License No. DPR-28 (Docket No. 50-271)
(b) Letter, USNRC to VYNPC, Generic Letter 84-11, NVY 84-86, dated April 19, 1984
(c) Letter, VYNPC to USNRC, FVY 84-22, dated March 13, 1984
(d) Letter, VYNPC to USNRC, FVY 84-27, dated March 23, 1984
(e) Letter, VYNPC to USNRC, FVY 84-45, dated May 15, 1984
(f) Letter, USNRC to VYNPC, NVY 83-150, dated June 27, 1983
(g) Letter, VYNPC to USNRC, FVY 84-03, dated January 20, 1984

Subject: Inspections of BWR Stainless Steel Piping (Generic Letter 84-11)

Dear Sir:

By letter dated April 19, 1984, the NRC issued Generic Letter 84-11 [Reference (b)] which describes staff recommended actions for reinspection of recirculation and residual heat removal piping systems to address Intergranular Stress Corrosion Cracking (IGSCC) found at certain Boiling Water Reactors (BWRs).

By letter dated March 13, 1984 [Reference (c)] as supplemented by letters, dated March 23 1984 [Reference (d)] and May 15, 1984 [Reference (e)], we provided you with our piping reinspection plans for our 1984 refueling outage (scheduled to commence June 16, 1984). These submittals also included our technical justification for the adequacy of weld overlays applied during the 1983 refueling outage for a second cycle of operation.

The purpose of this letter is two-fold. First, we have compared our existing reinspection program against the staff recommendations detailed on Generic Letter 84-11. Secondly, we are enclosing additional information to support the NRC's review of the adequacy of weld overlays for a second cycle of operation. This information was requested in recent conference calls with members of your staff.

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In reviewing Generic Letter 84-11, we have determined that our docketed program meets the technical criteria of the Generic Letter, except as follows:

1) Item 2(c) of Generic Letter 84-11 calls for, "Inspection of all weld overlays of welds where circumferential cracks longer than 10% of circumference were measured".

   Vermont Yankee has seventeen (17) such overlays. Ten of these are identical joints (sweep-o-let to riser). The overlay thickness is greater than 75% T_{min} at each joint. Our proposed scope is to examine five of these joints (joints with deepest flaws) for weld metal integrity and bond to base metal. If no indications are detected, the remaining five sweep-o-let joints to riser will not be re-inspected. Thus, a total of twelve overlays will be re-inspected.

   In this way, integrity of the overlay metal/bond is established for the weld deposit technique utilized at Vermont Yankee. The remaining five joints were overlayed and inspected using identical techniques and were not subject to in-process repairs which could render them more prone to defects than those in our inspection program.

   In summary:

   - All sweep-o-let to riser overlay thicknesses exceed $0.75 \times T_{min}$.
   - The five most deeply flawed joints will be examined.
   - The welding and Ultrasonic Examination (UT) technique were identical for each overlay.
   - There were no in-process repairs on the five overlays where we propose no re-inspection.
   - Examination of the additional five overlays would result in an additional man-rem radiation exposure.

2) Item 2(b)i of Attachment 2 to Generic Letter 84-11 states, "Effective overlay thickness is defined as the thickness of the overlay deposited after the first weld layer that clears dye-penetrant testing inspection."

   Vermont Yankee continues to maintain that the effective thickness of the overlay is the full overlay thickness as defined by UT or equivalent measurement technique. At the 1983 refueling outage, overlay thickness was defined by taking UT measurements of the pipe

wall before and after the overlay. The difference in readings was defined as the overlay thickness as shown on our weld overlay data sheets [Enclosure II to Reference (c)]. Ferrite readings of deposited weld metal were taken of the first layer on several joints. The initial layer results were all in excess of 8 FN confirming that very little ferrite dilution to base metal occurred. Thus, the first layer of weld metal is as resistant to IGSCC as the final layer.

In addition, ultrasonic examination confirmed weld metal to base metal bond integrity.

Crack growth into weld metal utilized for overlays is discussed in detail in Paragraph 4.3 of Reference (c). Since the weld metal utilized in Vermont Yankee's overlay program was demonstrated to have superior IGSCC resistant properties (even at the first layer) and inspection results verified integrity of the weld metal/base metal bond, it is our position that the full overlay thickness be considered effective.

Generic Letter 84-11 also requests that we provide you with our plans for interim leakage detection. It is our present intent to continue to operate the reactor during the next cycle of operation in accordance with the coolant leakage provisions detailed in the NRC Confirmatory Order, dated June 27, 1983 [Reference (f)]. However, we have decided to remove the Moisture Sensitive Tape Monitoring System which was installed during the 1983 refueling outage to augment our leakage detection capability. We have experienced operability problems with this system, as described in our letter, dated January 20, 1984 [Reference (g)], and have determined that this prototype system has little value in augmenting our existing leakage detection and monitoring capabilities.

In addition, a visual examination for leakage of the reactor coolant piping will be performed during each plant outage during which the containment is deinerted. The examination will be performed consistent with the criteria of IWA-5241 and IWA-5242 of the 1980 Edition (Winter 1980 Addenda) of Section XI of the ASME Boiler and Vessel Code. The system boundary subject to this examination will be in accordance with the criteria of IWA-5221.

By letter, dated May 15, 1984 [Reference (e)], we provided you with additional information regarding the structural integrity of weld joint overlays applied during our 1983 refueling outage. In subsequent conference calls with members of your staff, we were requested to provide a sample calculation for circumferential flaw size limits versus stress. This calculation is provided as Enclosure 1.

We trust that this information adequately addresses your concerns; however, should you have any questions regarding this matter, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Donald Hunter
Vice President

DH/gmd

Enclosure

STATE OF MASSACHUSETTS
MIDDLESEX COUNTY)ss

Then personally appeared before me, Donald Hunter, who, being duly sworn, did state that he is a Vice President of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation and that the statements therein are true to the best of his knowledge and belief.

Robert H. Groce Notary Public
My Commission Expires September 14, 1984

ENCLOSURE 1

Sample Calculation for Circumferential Flaw Size Limits Versus Stress

Utilizing equations from EPRI Report NP-2472.

$$\beta = \frac{\pi(1 - a/t - P_m/\delta_f)}{2 - a/t} \qquad \text{For } \frac{L}{2\pi R} = 1 \quad \text{or} \quad \theta + \beta > \pi$$

and

$$P_b = \frac{2\delta_f}{\pi}(2 - a/t)\sin\beta$$

replacing $a/t = y$, $P_m/\delta_f = \frac{P_m/S_m}{\delta_f/S_m} = 0.166$

then

$$\beta = \frac{\pi(1 - y - 0.166)}{2 - y} = \frac{\pi(0.834 - y)}{2 - y} \quad \text{and}$$

$$\frac{\pi}{2}\left(P_b/\delta_f\right) = (2 - y)\sin\pi\left[\left(\frac{0.834 - y}{2 - y}\right)\right]$$

CASE 1

Let $\frac{P_b + P_m}{S_m} = \underline{0.3}$

then $\frac{P_b + P_m}{S_m} = 0.3 \times 2.773 = 0.831$ and $P_b/S_m = 0.331$

$$\frac{\pi}{2}\left(P_b/\delta_f\right) = 0.173$$

$$(2 - y)\sin\pi\left[\frac{0.834 - y}{2 - y}\right] = 0.173$$

try $y = 0.77$

$$(2 - .77)\sin\pi\left[\frac{0.834 - .77}{2 - .77}\right] = 0.169$$

0.169 versus 0.173

$\therefore$ For $\frac{P_b + P_m}{S_m} = 0.3$ allowable $a/t = y = 0.77$

Revision 0