VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 13, 2002

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

Serial No. 01-490F
NL&OS/ETS R0
Docket Nos. 50-338/-339
License Nos. NPF-4/-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
SUPPLEMENTAL RESPONSE TO NRC BULLETIN 2001-01
RESULTS OF REACTOR VESSEL HEAD PENETRATION INSPECTIONS

In letters dated November 5, 2001 and January 11, 2002 (Serial Nos. 01-490A and 01-490E), Virginia Electric and Power Company (Dominion) provided the results of the inspections performed on reactor vessel head penetration (RVHP) nozzles for North Anna Units 1 and 2, respectively. Included in those submittals was an evaluation of the remaining service life of the affected penetrations. The flaws in the affected penetrations were initially evaluated and reported using WCAP-14552 methodology, which included an assumed flaw aspect ratio of 6:1. However, some of the flaws found at North Anna had aspect ratios larger than 6:1. Subsequently, additional curves were prepared for flaw aspect ratios of 15:1, 20:1, 30:1, 65:1 and 100:1. Using the appropriate bounding aspect ratio, the flaws were reanalyzed for North Anna Units 1 and 2. The revised remaining service life for the affected penetrations is presented in the attachment to this letter.

If you have any questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachment

Commitments made in this letter: None

A088

cc: U.S. Nuclear Regulatory Commission
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SN: 01-490F
Docket Nos.: 50-338/339
Subject: Supplement Response – NRC Bulletin 2001-01

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Virginia Electric and Power Company. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 13th day of June, 2002.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment

NRC Bulletin 2001-01, Circumferential Cracking of Reactor Pressure Vessel Head (RVHP) Penetration Nozzles

Supplemental Information on the Remaining Service Life of Identified Flaws In Reactor Vessel Head Penetration Nozzles

North Anna Units 1 and 2
Virginia Electric and Power Company
(Dominion)

Supplemental Information on the Remaining Lifetime of Identified Flaws In Reactor Vessel Head Penetration Nozzles

North Anna Power Station Unit 1

Penetration	Previous Service Life (years)	Revised Service Life (years)	Comments
3	8.1	4.70	1
11	8.1	8.10	
31	4	2.37	2
33	5.1	2.74	3
52	5.9	3.34	4
57	5.1	5.10	
60	8	3.88	5
66	9	9.00	

North Anna Power Station Unit 2

Penetration	Previous Service Life (years)	Revised Service Life (years)	Comments
51	5.6	4.16	6
62	5.6	3.82	7
63	8.1	4.70	8

Comments:

1. The measured aspect ratio of the flaw is equal to 9:1. The flaw was evaluated with aspect ratio 15:1.
2. The measured aspect ratio of the most limiting flaw is equal to 13.45:1. The flaw was evaluated with aspect ratio 15:1.
3. The measured aspect ratio of the most limiting flaw is equal to 28.25:1. The flaw was evaluated with aspect ratio 30:1.
4. The measured aspect ratio of the most limiting flaw is equal to 15.29:1. The flaw was evaluated with aspect ratio 20:1.
5. The measured aspect ratio of the most limiting flaw is equal to 45:1. The flaw was evaluated with aspect ratio 65:1.
6. The measured aspect ratio of the most limiting flaw is equal to 24:1. The flaw was evaluated with aspect ratio 30:1.
7. The most limiting flaw is evaluated with aspect ratio 100:1.
8. The measured aspect ratio of the most limiting flaw is equal to 14:1. The flaw was evaluated with aspect ratio 15:1.

The reevaluation shows that the remaining service life of the penetrations reduces as the flaw aspect ratio increases.

Two inherent conservatisms exist in this service life re-evaluation by the application of a bounding flaw aspect ratio:

1 The value used in the analysis for the flaw aspect ratio is higher or equal to the measured flaw when the measured value of initial aspect ratio does not coincide with the analyzed cases of flaw aspect ratios (i.e., 6:1, 15:1, 20:1, 30:1, 65:1 and 100:1). This bounding assumption results in a prediction of shorter remaining service life.

2 As a flaw starts to grow radially into the thickness of the penetration tube, the flaw aspect ratio is expected to reduce from the initial flaw aspect ratio magnitude. However, the reanalysis is continued based on the assumption that the flaw aspect ratio will be maintained constant (i.e., at the initial flaw aspect ratio curve). As a result, the re-evaluation based on maintaining the initial aspect ratio predicts shorter remaining service life.

In addition, other conservatisms are embedded in the WCAP flaw growth methodology (e.g., flaw growth rate, maximum limit on flaw depth).

CONCLUSION

The limiting factor in the remaining life of the reactor vessel head is the propagation of a flaw on the ID of the penetration tube. Using methodology obtained from WCAP-14552 with the revised aspect ratio curves, the shallow indications detected on the ID of the penetrations have been reevaluated to determine the allowable remaining service life before repair. Periodic inspection of these indications during subsequent refueling outages will monitor potential growth of the indication and prevent exceeding service life projection assumptions, thereby assuring the continued structural integrity of the pressure boundary.