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VIRGINIA ELECTRIC AND POWER COMPANY

August 13, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark
Operating Reactors Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Serial No. 276
PSE&C: FCP
Docket No. 50-339
License No. NPF-7

Dear Mr. Denton:

In compliance with 10CFR50.55(e), NRC Region II was notified on April 28, 1978 that maximum dose rates on the containment operating floor of North Anna Unit 2 could exceed the values presented in the FSAR, resulting in the potential for excess exposure to operating personnel. On May 25, 1978, an interim report was submitted to NRC Region II (Serial No. 300) stating that we were investigating several methods of reducing the higher than anticipated radiation levels. In our final report submitted on January 31, 1979, (Serial No. 300A) we described the supplemental shield that had been installed in North Anna Unit 2. Also, in this letter, we stated that we would obtain experimental confirmation of the adequacy of the supplemental shield in reducing the Unit 2 containment dose rates.

In addressing the effectiveness of the supplemental shielding there are three areas or zones of concern. These zones are defined in Section 12 of the North Anna FSAR and are as follows:

Zone I - Continuous access
Maximum dose rate: 0.75 mrem/hr
Applicable containment location: outside surface of containment including uncontrolled areas of the equipment hatch platform.

Zone II - Periodic access
Maximum dose rate: 2.5 mrem/hr
Applicable containment location: inside reactor containment personnel lock.

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Zone IV - Controlled access
Maximum dose rate: 100 mrem/hr
Applicable containment location: Annulus between crane wall and containment wall.

Since the supplemental shielding was installed in Unit 2 prior to startup, there is no pre-shield dose rate data available. Therefore, postulated dose rates based on a partial radiation survey conducted in the Unit 1 containment at 100% power prior to supplemental shield installation will be used for Unit 2 comparisons. A copy of this survey, conducted on March 14, 1978, is provided as Attachment No. 1. The post-shield dose rate data is from a 100% power survey taken on October 15, 1980. A copy of this survey is provided as Attachment No. 2. The results of the surveys are summarized below:

	Maximum dose rate per zone at 100% power - mrem/hr	
Zone	Pre-Shield*	Post-Shield
I	Not available	< 0.6
II	Not available	3.0
IV	650	50

*Postulated values based on Unit 1 survey. During the Unit 1 survey, certain areas were not surveyed either because they were not included in the planned points or because radiation levels were prohibitive.

The survey values were taken in mrem/hr for neutrons and mR/hr for gammas. The dose rate values for neutrons being in mrem/hr were directly usable. The values for gammas being given as an exposure rate in mR/hr were converted to dose rates in mrem/hr. This conversion was made by assuming a direct one to one relationship between R and rem. We feel this is a conservative assumption which is applicable over a broad gamma energy spectrum. After conversion, the gamma dose rates were added to the neutron values giving total dose rates in mrem/hr. It is these total dose rates that are presented above.

The comparison of pre-shield and post-shield dose rate values indicates a significant decrease as a result of the installation of the supplemental shielding. In one area, inside the personnel lock, the maximum post-shield dose rate was 3.0 mrem/hr as opposed to the FSAR maximum value of 2.5 mrem/hr. All other areas were within the FSAR limits. We feel this higher value in the personnel lock was caused by an overresponse of the neutron survey instrument. The type of neutron survey instrument used for all surveys was the Eberline Model PNR-4 (nine inch remball). Recent detailed studies conducted by the Environmental Measurement Laboratory of the Department of Energy (EML-376) at North Anna and seven other PWR power stations using bonner sphere neutron spectral analysis indicates the nine inch remball will give dose rate readings from 150 to 185 percent of actual. If it is assumed the neutron dose rates from the survey are 150 percent of actual, the values for the reactor containment personnel lock will drop to within the FSAR limits. We feel this is a conservative assumption and is applicable to this situation.

In addition, our letter of March 1, 1979, Serial No. 123, stated that we would advise you following the completion of the radiation-thermal test if a periodic testing program is warranted for the saddle segments of the supplemental shield. The test results indicate that the shield material will maintain its structural integrity during normal operation in excess of ten years. In the unlikely event that the material begins to deteriorate, it would be detected through radiation surveys made of the containment during entries a power. In addition, the shield material must be removed to complete the periodic inservice inspection of the reactor nozzles. Should material defects be indicated at this time, the defective portion would be replaced at the next outage of sufficient duration.

A copy of the radiation-thermal test results is provided as Attachment No. 3 and completes the requirements of condition 2.C.(19) of Amendment No. 2 to License No. NPF-7, dated December 29, 1980.

The results of our investigation indicate the adequacy of the supplemental shielding installed in Unit 2 in reducing the maximum containment dose rates to within the FSAR values. Should any significant new information be developed, we will promptly inform you.

Very truly yours,

R. H. Leasburg
Vice President - Nuclear Operations

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Enclosures