December 2 1993

Docket Nos. 50-338
and 50-339

Mr. W. L. Stewart
Senior Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060

Dear Dr. Stewart:

SUBJECT: NORTH ANNA POWER STATION, UNITS NO. 1 AND NO. 2 (NA-1&2) TEMPORARY EXEMPTION FROM REQUIREMENTS OF 10 CFR PART 50, APPENDIX A, GENERAL DESIGN CRITERION-2 FOR NA-1&2 (TAC NOS. M87124 AND M87125)

The Commission has issued the enclosed temporary exemption from the requirements of 10 CFR Part 50, Appendix A, General Design Criterion-2 (GDC-2), for NA-1&2. The Virginia Electric and Power Company (VEPCO) plans to perform refurbishment activities for restoration of certain portions of the auxiliary service water system (SWS) lines during the period of January 3, 1994 to October 14, 1994.

Implementation of the auxiliary SWS repair and replacement program requires removing the surrounding earth and/or concrete encasement of certain portions of normally buried SW auxiliary lines. As a result, the normal design basis protection against natural phenomena afforded by earth and concrete encasement will temporarily be removed from certain auxiliary SW components. Therefore, pursuant to 10 CFR 50.12(a), VEPCO has requested a temporary exemption from the requirements of 10 CFR Part 50, Appendix A, GDC-2, for NA-1&2 during the Phase 1, Stage 4 SWS restoration activities. VEPCO has requested that the GDC-2 exemption period be from January 3, 1993 until October 14, 1994.

A safety evaluation supporting the above exemption is also enclosed. Also, a copy of the exemptions is being forwarded to the Office of Federal Register for publication.

Sincerely,
(Original Signed By Jan Norris For)
Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

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Enclosures:
1. Exemption
2. Safety Evaluation

cc w/enclosures:
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Virginia Electric & Power Company

North Anna Power Station
Units 1 and 2

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	)	
	)	Docket Nos. 50-338
VIRGINIA ELECTRIC AND POWER COMPANY	)	and 50-339
	)	
(North Anna Power Station, Units No. 1 and No. 2)	)	

EXEMPTION

I.

Virginia Electric and Power Company (the licensee) is the holder of Facility Operating License Nos. NPF-4 and NPF-7 which authorize operation of North Anna Power Station, Units No. 1 and No. 2 (NA-1&2, the facility) at steady-state power levels not in excess of 2893 megawatts thermal. The licenses provide, among other things, that the facility is subject to all the rules, regulations, and orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility employs pressurized water reactors (PWRs) located at the licensee's site in Louisa County, Virginia.

The licensee is implementing a refurbishment and restoration program for the NA-1&2 service water system (SWS). The program is being conducted in several stages. The subject Phase 1, Stage 4 is to be conducted for a period of time beginning January 3, 1994 and ending October 13, 1994, and will be performed during dual unit operating conditions. The scope of Stage 4 involves restoration of the two 24-inch auxiliary supply lines from Lake Anna to the main SW headers. This consists of approximately 900 linear feet of

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piping (450 feet per line). Each 450-foot line consists of approximately 185 feet of direct buried piping, 230 feet of concrete-encased piping and 35 feet of exposed piping. To support the Phase 1, Stage 4 SWS restoration program, the licensee has identified one temporary exemption required at this time. The exemption is specified below.

II.

The Code of Federal Regulations at 10 CFR Part 50, Appendix A, General Design Criterion-2 (GDC-2) requires that: Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as ... tornadoes, ... without loss of capability to perform their safety functions.

The licensee has requested the temporary exemption from GDC-2 because of planned maintenance which will expose portions of the SWS piping to the potential effects of postulated missiles generated by natural phenomena. Earth and concrete protect the piping systems from the effects of severe weather events at the NA-1&2 site, such as tornadoes, for conformance with the requirements of GDC-2. The excavation of the auxiliary service water lines will affect only the missile shield protection aspects of GDC-2, with seismic qualification being retained. While producing a minimal increase in missile interaction risk, excavation of the piping does not result in total vulnerability to missiles. In the area of the planned excavation, the lines are substantially below grade and are adjacent to the turbine building structure. This will prevent some lateral aspects of missile vulnerability.

The licensee is providing contingency measures with compensatory actions to provide added assurance of safe operation of the facility during the

exemption period. Although the exemption is requested only for missile protection, the risk to the plant due to construction mishaps is more significant than the risk due to natural phenomena. Therefore, the compensatory measures are geared toward preventing such mishaps in addition to minimizing the potential for missiles generated by severe weather. As stated in the staff's Safety Evaluation dated December 27, 1993, these compensatory actions include but are not limited to the following:

- Electronic scanning and nondestructive locating methods will be used to accurately determine underground locations of piping, duct banks, and other buried utilities prior to excavation.
- Machine excavation will be limited to an elevation that does not pose a threat to the auxiliary service water (ASW) lines. The remaining excavation will be performed by hand operated power and manual tools.
- Physical barriers will be used to keep vehicles a safe distance from the excavation site.
- Loose materials in and around the excavation will be limited to only those absolutely necessary for activities in progress.
- Lifting and rigging components will be inspected and load tested. Lifting of equipment or construction materials over the excavation will be performed with adequate precautions in accordance with approved procedures.
- Direct verbal communication (using dedicated radios if necessary) will be maintained between equipment operators and supervisors/observers.
- Operable ASW lines will retain their seismic qualification.

- Engineering reviews will be performed for shoring and temporary supports(if required) in the excavation area.
- Gasoline powered equipment will be refilled using small containers and the number of containers within the excavation area will be restricted. This is in accordance with the existing station procedures.
- Worker training and shift briefings will be conducted for all aspects of the project.
- Severe weather procedures will be used to provide notification to clear the area of vehicles and loose materials in the event of a tornado watch or other high wind conditions.
- Adequate wind protection and heating will be provided during freezing weather conditions.

Considering the existing design features and compensatory measures proposed by the licensee, the likelihood of damage to the exposed auxiliary SWS lines from postulated missiles generated by natural phenomena is minimal. Also, based on the compensatory measures provided, assurance exists that the ability to bring the plant to a safe shutdown will be maintained following any natural phenomena, including tornadoes or other severe weather which could result in airborne missiles. Therefore, there is reasonable assurance that the proposed GDC-2 exemption will present no undue risk to public health and safety.

III.

The Commission has determined, pursuant to 10 CFR 50.12(a), that special circumstances as set forth in 10 CFR 50.12(a)(2)(v). The exemption would provide only temporary relief from the applicable regulation (GDC-2). The

exemption is requested for a specific time period after which the facility would again be in conformance with all the requirements of GDC-2. The licensee has made good faith efforts in considering alternatives to the exemption requests and has concluded that the Phase 1, Stage 4 SWS refurbishment and restoration program can only be conducted without the subject exemption during a period when both NA-1&2 are shut down and defueled. The impact of scheduling such a dual-unit outage would have significant consequences in terms of power supply, fuel storage, capacity, and replacement power costs. Finally, the exemption will indirectly result in benefits to the public from increased reliability of the upgraded safety-related SWS.

Based on the above and on review of the licensee's submittal, as summarized in the Safety Evaluation dated December 27, 1993, the NRC staff concludes that the likelihood of unacceptable damage to the exposed auxiliary SW lines due to tornadoe-borne missiles during the exemption period is low.

Based on the low probability of unacceptable events, coupled with the comprehensive compensatory measures which the licensee has committed to, the NRC staff finds the proposed exemption from GDC-2 acceptable.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the subject exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. The Commission further determines that special circumstances, as provided in 10 CFR 50.12(a)(2)(v), are present justifying the exemption; namely, that the exemption would provide only temporary relief

from the applicable regulations and that the licensee has made good faith efforts to comply with the regulations.

Therefore, the Commission hereby approves the following exemption: NA-1&2 may operate without conforming to the requirements of GDC-2 as they apply to the buried portions of the auxiliary SWS lines from Lake Anna to the main SWS header providing that compensatory measures as described herein are continued for the period of the exemption.

Pursuant to 10 CFR 51.32, the Commission has determined that granting the above exemption will have no significant impact on the quality of the human environment (October 7, 1993, 58 FR 52332),

The subject Phase 1, Stage 4 SWS GDC-2 exemption is effective from its date of issuance through October 14, 1994.

FOR THE NUCLEAR REGULATORY COMMISSION

Gus C. Lainas, Acting Director
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 27th day of December 1993.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FACILITY OPERATING LICENSE NOS. NPF-4 AND NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

NORTH ANNA POWER STATION, UNITS NO. 1 AND NO. 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By letters dated May 18 and July 16, 1992, Virginia Electric and Power Company (VEPCO or the licensee), informed the staff of plans to perform extensive refurbishment activities for restoration of certain portions of the service water system (SWS) at North Anna Power Station, Units 1 and 2. The July 16, 1992, letter also requested a temporary exemption from the requirements of 10 CFR Part 50, Appendix A, Criterion 2 (GDC-2), "Design bases for protection against natural phenomena," to allow excavation of certain portions of the SWS piping during Phase I of the project. The temporary exemption was necessary because the excavation exposed certain portions of the piping to missiles generated by natural phenomena, e.g., tornadoes. By letter dated December 3, 1992, the staff provided a safety evaluation and granted the requested temporary exemption to GDC-2 for Stage 1 of Phase I of the VEPCO project. Stage 1 mainly involved the SWS supply and return headers to the containment recirculation spray heat exchangers.

By letter dated July 30, 1993, the licensee requested another temporary exemption to GDC-2 to perform Stage 4 of Phase I of the SWS restoration project. This temporary exemption is necessary in order to allow excavation of portions of the auxiliary service water (ASW) lines with both units operating. The scope of Phase I, Stage 4, involves restoration of the 24-inch ASW supply lines from Lake Anna to the main SWS headers in the turbine building. This consists of approximately 900 linear feet of piping (450 feet per line). Each 450 foot line consists of approximately 185 feet of buried piping, 230 feet of concrete encased piping and 35 feet of exposed piping.

The primary goal of Stage 4 is to refurbish (clean, repair and coat) as much of the existing piping as possible, thereby minimizing pipe replacement. The concrete encased sections will be refurbished. It is also planned to refurbish the buried piping with the exception of a small piece that must be removed for access. If repair of the buried piping becomes impractical, it will be excavated and replaced. For conservatism in evaluating the GDC-2 exemption, it was assumed that all of the buried piping will be excavated and replaced. In addition to the restoration of the ASW supply lines, two 8-inch branch lines from the circulating water screen wash pump discharge up to the first isolation valves will be replaced.

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The requested exemption is for a specified time period, specifically from January 3, 1994 through October 14, 1994.

2.0 EVALUATION

The SWS can be supplied by either of two ultimate heat sinks (UHSs), the service water reservoir (SWR) via the SWS pumps or the Lake Anna reservoir via the ASW pumps. There are four 100% SWS pumps and two 100% ASW pumps. The SWR is treated water and, therefore, the normal supply for the SWS. Lake Anna is an untreated source of water and is, therefore, only used as a backup to the SWR and for makeup to the SWR. Both UHSs are safety-related sources and both are capable of independently providing at least a 30-day supply of water following any design basis accident. Both systems are designed to withstand all natural phenomena except for the SWR spray arrays which are not tornado missile-protected.

While producing some increase in missile interaction risk, excavation of the piping does not result in total vulnerability to missiles. In the area of the planned excavation, the lines are substantially below grade and are adjacent to the turbine building structure. This will prevent some lateral aspects of missile vulnerability. During the restoration of these lines, the seismic capability of the operable train will be maintained. Therefore, the only added vulnerability is from missiles or construction mishaps. The risk from construction mishaps is considerably less than it was during Stage 1 because loss of the ASW system does not affect the ability of either unit to shut down or mitigate the consequences of an accident. The SWS would still be available with water being supplied by the SWR via the SW pumps. During Stage 1 the SWS headers were vulnerable to construction mishaps that could have affected both sources of water, since both UHSs use the SWS headers to supply cooling loads.

The risk from tornado missiles is also less for Stage 4 than it was for Stage 1 because in addition to missile damage to the excavated piping, the spray array to the SWR would also have to be rendered inoperable by missile damage. Even this would not result in a loss of SWS flow but only in a reduced heat removal capacity of the SWR. A bypass is provided around the spray headers and is used during winter months for normal operation. The SWR volume is sufficiently large (originally designed for 4 unit operation) such that adequate heat dissipation exists for normal operation without spray flow during certain times of the year. To completely lose the spray capability due to missiles (flow blockage) would not immediately result in a loss of heat sink. The bypass around the spray arrays would still provide some heat removal capability following a loss of the spray system. Under these conditions the volume and surface area of the SWR still provides a certain amount of heat removal capacity (dependent on weather conditions). Hot standby conditions could be maintained for some undetermined amount of time since the significant heat loads come from reactor cooldown or accident heat loads.

Even though the added risk is small, the licensee is providing contingency measures with compensatory actions to provide added assurance of safe operation of the facility during the exemption period. Although the exemption is requested only for missile protection, the risk also includes construction mishaps, although as previously noted, this risk is much less than it was during Stage 1 because the SWS would still be operable from the SWR via the SW pumps. However, since a construction mishap is a more probable event, the compensatory measures are geared toward preventing such mishaps in addition to minimizing the potential for missiles generated by severe weather. Also, during work in the turbine building valve pit (TBVP), where the potential for construction mishaps to damage one SWS line exists, additional contingency measures and compensatory actions will be provided. The contingency measures and compensatory actions include but are not limited to the following:

- Electronic scanning and nondestructive locating methods will be used to accurately determine underground locations of piping, duct banks, and other buried utilities prior to excavation.

- Machine excavation will be limited to an elevation that does not pose a threat to the ASW lines. The remaining excavation will be performed by hand operated power and manual tools.

- Physical barriers will be used to keep vehicles a safe distance from the excavation site.

- Loose materials in and around the excavation will be limited to only those absolutely necessary for activities in progress.

- Lifting and rigging components will be inspected and load tested. Lifting of equipment or construction materials over the excavation will be performed with adequate precautions in accordance with approved procedures.

- Direct verbal communication (using dedicated radios if necessary) will be maintained between equipment operators and supervisors/observers.

- Operable ASW lines will retain their seismic qualification.

- Engineering reviews will be performed for shoring and temporary supports (if required) in the excavation area.

- Gasoline powered equipment will be refilled using small containers and the number of containers within the excavation area will be restricted. This is in accordance with the existing station procedures.

- Worker training and shift briefings will be conducted for all aspects of the project.

- Severe weather procedures will be used to provide notification to clear the area of vehicles and loose materials in the event of a tornado watch or other high wind conditions.

- Adequate wind protection and heating will be provided during freezing weather conditions.

The following additional actions will be used during work in the turbine building valve pit:

- A temporary water supply from either the primary grade water or fire water systems will be available as a contingency to the charging pump coolers should the normal SWS supply be interrupted.

- Motor-operated valves isolating the ASW lines from the SWS lines will be administratively locked closed and additional blind flanges will be installed.

- During the disassembly or reassembly of components, an operator will be stationed at the SW pump house with direct communications to the TBVP to isolate the affected SWS header immediately if the integrity of operable motor-operated valves is lost.

- Communication between the control room and TBVP will be maintained at other times. Control room operators will be informed of the work in progress as part of the normal shift turnover.

- Materials and tools necessary for performing emergency repair of pressurized pipe will be staged near the TBVP. Procedures will be developed and plant personnel will be trained in the use of these procedures and materials.

- Lifting and rigging components will be inspected and load tested. Pre-job briefings will be conducted for the intended route of removed or new pipe sections with the emphasis placed on "important to safety" of keeping these pipe sections below the pressurized piping.

- Pressurized ASW piping (only one ASW train is inoperable at any given time) will be covered with a protective blanket to minimize the impact of a blow from a heavy object.

The staff has reviewed the licensee's proposed exemption to GDC-2, including the contingency and compensatory measures, and concluded that the likelihood of missile damage to the exposed ASW lines or other safety-related equipment banks is small during the periods for which the requested exemption would apply. The staff has further concluded that with the contingency and

compensatory measures provided, adequate assurance exists that the ability to bring the plant to a safe shutdown will be maintained following any natural phenomena, including tornadoes or other severe weather which could result in airborne missiles.

3.0 CONCLUSION

Based on the its review, the staff has concluded that the licensee's proposed temporary exemption to GDC-2 should be granted. This conclusion is based on the low probability of missile generation during the period of exemption coupled with the natural missile protection provided by the surrounding structures, and the contingency and compensatory measures that will be in place. The staff also concluded that the risk associated with the Stage 4 work is significantly less than that associated with the Stage 1 work which the staff has already approved and has been completed. This conclusion is based in part on the fact that redundant trains of SW (via the SWR) will remain operable throughout Stage 4 of Phase I.

Principal Contributor: W. LeFave

Date: December 27, 1993