Virginia Electric and Power Company
Richmond, Virginia 23261

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U. S. Nuclear Regulatory Commission
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Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
SERVICE WATER SYSTEM RESTORATION ACTIVITIES

Virginia Electric and Power Company is planning extensive refurbishment activities for restoration of certain portions of the existing buried and concrete encased Service Water headers at North Anna Power Station. The three principle activities involved are: 1) enhancing the current chemical treatment to control sulfate reducing bacteria in the system, 2) cleaning, repairing, and coating of large bore concrete encased piping, and 3) replacing certain portions of the buried piping. These activities continue the repair and replacement project already initiated on the smaller bore Service Water distribution piping and the Service Water reservoir spray arrays. Additional details of this portion of the Service Water project are provided in the attachment.

Implementation of this portion of the Service Water repair and replacement project will require removing the surrounding earth and/or concrete encasement of certain portions of the normally buried and protected Service Water headers, electrical system ductbanks, and the emergency diesel generators fuel oil supply piping to gain access to the Service Water headers. As a result, the normal design basis protection against natural phenomena afforded by the earth and/or concrete encasement will be temporarily removed which will require specific exemption from the applicable regulations. It is our intent to request specific exemption in accordance with the criteria specified in 10 CFR 50.12. The exemption is intended to support work planned for the Unit 1 steam generator replacement outage currently scheduled to begin in January 1993, the Unit 2 refueling outage currently scheduled to begin in September 1993, and the time interval between the outages.

Specific exemption will be requested from 10 CFR Part 50, Appendix A, Criteria 2 (GDC-2) "Design basis for protection against natural phenomena." Exemption from this requirement will be necessary during the excavation of the main and auxiliary Service Water supply and return headers, and during the excavation of the Service Water supply and return lines for the Unit 1 and Unit 2 Containment Recirculation Spray heat exchangers. We anticipate that the GDC-2 exemption will be needed on three separate occasions as this work will be performed in three distinct stages.

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The first occasion requiring exemption will extend from thirty days prior to the initiation of the Unit 1 steam generator replacement outage through thirty days after the outage and will support the work on the Service Water supply and return lines for the Unit 1 Recirculation Spray heat exchangers. The second occasion will be for approximately 120 days between the Unit 1 steam generator replacement outage and the 1993 Unit 2 refueling outage. The exemption will support the installation of new access ports on the thirty six inch main Service Water headers. Finally, the third occasion will be from thirty days prior to the initiation of the 1993 Unit 2 refueling outage through thirty days after the outage. The exemption will support the work on the Service Water supply and return lines for the Unit 2 Recirculation Spray heat exchangers.

As described in 10 CFR 50.12(a)(2), special circumstances must be present for the NRC to consider granting an exemption. Two of the examples of special circumstances stated in the regulation apply in this case. The first special circumstance is that the exemption provides only temporary relief from the applicable regulation and that the licensee has made good faith efforts to comply with the regulation. The second special circumstance is that compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted.

The first special circumstance is met in that each occasion for exemption from GDC-2 will be only temporary and have specific duration dates. Concerning the second special circumstance, we have made a good faith effort in considering alternatives to an exemption request and have concluded that the project could only be conducted without an exemption if both units are shutdown and defueled. As there are no dual unit outages planned or scheduled, we believe that this alternative represents an undue hardship, and this falls within the scope of the second special circumstance. The impact of scheduling such a dual unit outage and simultaneously defueling both units would have potentially significant consequences in terms of power supply, fuel storage capacity and replacement power costs. We believe that it was never the intent of the regulation to require such actions to ensure compliance with the regulation. Also, the schedule that we are proposing for this portion of the Service Water project will accelerate the timetable for restoring the portions of the Service Water system that have become degraded. We conclude that the undue hardship and other cost criterion described in the second special circumstance is met.

Because of time and schedular restraints, we will submit separate, specific detailed exemption requests for each stage of the construction effort. The first detailed exemption request will address the scope of work to be performed in conjunction with the North Anna Unit 1 steam generator replacement outage. The Service Water activities will require exemption for a period beginning thirty days prior to the outage and ending thirty days after the outage. It is our intent to submit this detailed exemption request by July 15, 1992. To support the current project and outage schedules, we will request your approval of the exemption by November 13, 1992. This initial exemption request will also provide a schedule for the submittal, and requested approval dates, for the remaining exemption requests.

Prior to submitting each exemption request, we will complete a safety analysis to ensure that the effects resulting from the implementation of each of the temporary exemptions will be acceptable. As part of this effort, we will develop specific contingency measures and compensatory actions to provide added assurance of the safe operation of the facility during each exemption period. We will submit detailed descriptions of these measures and actions as part of the exemption requests.

In addition, in order to implement the Service Water system restoration project, we also intend to rely on Technical Specification 3/4.7.4.1 which permits us to remove one Service Water header for up to 168 hours in support of Service Water upgrade activities. Our current schedule will require four entries into the 168 hour Action Statement during the first and third stages of the project with two entries taking place at the beginning of each stage and two at the end. Two entries will be required for the second stage. Also, once the first stage has been entered, conditions may require an additional two entries during the Unit 1 steam generator replacement outage. Therefore, over a period of approximately one year, we anticipate entering the Action Statement a maximum of twelve times.

Because multiple entries into the Action Statement will be required, we will develop appropriate compensatory and contingency measures to ensure availability of required safety functions. These compensatory and contingency measures will be available for NRC review. As part of our safety evaluation supporting the restoration project, we will review and confirm that the analyses and assumptions supporting Technical Specification 3/4.7.4.1 remain valid.

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

Very truly yours,

W. L. Stewart
Senior Vice President - Nuclear

Attachment

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North Anna Power Station

SERVICE WATER SYSTEM RESTORATION PROJECT - PHASE I
NORTH ANNA POWER STATION

1.0 BACKGROUND

Virginia Electric and Power Company has recently completed an extensive evaluation of the material condition of the North Anna Power Station Units 1 and 2 Service Water System and has developed a comprehensive action plan to: 1) address and attempt to eliminate the root cause of the existing corrosion damage, 2) prolong the remaining life of currently acceptable portions of the system and 3) provide repair and/or replacement designs for degraded sections.

The existence of pitting corrosion in the system has been known for some time. Only recently, however, have we been able to more accurately characterize microbiologically influenced corrosion (MIC) pitting depths and densities in representative areas of the system. By using dynamic ultrasonic (UT) scanning techniques and physical hands-on measurements where possible, Engineering personnel have been able to calculate general and pitting corrosion rates.

Current rates of corrosion on uncoated carbon steel materials are estimated at 0-6 mils per year (mpy) (0.001 - 0.006 inches per year) for general corrosion wall loss and 1-20 mpy (0.001 - 0.020 inches per year) for pitting corrosion wall loss. These values represent average wall loss over the life of the system. Current rates in specific areas can be higher depending on location, flow conditions and the random nature of pitting attack. The 24 inch lines have been the most susceptible to general and pitting corrosion largely due to the stagnant and low flow conditions present. Of particular concern are the inaccessible 24 inch lines, i.e., those that are direct buried or encased in concrete.

Virginia Electric and Power Company is planning an extensive refurbishment program for the existing uncoated, buried and concrete encased 24 inch Service Water pipe sections. This program will consist of a combination of in-place cleaning / assessing / repairing and/or internal coating of certain portions and replacement of other portions as described in the following paragraphs.

2.0 SERVICE WATER SYSTEM DESCRIPTION

The Service Water System uses a spray pond (Service Water reservoir) as its normal source of water and its heat sink. Makeup for evaporation, wind drift, and blowdown is provided from Lake Anna. In the event of a failure in the function of the reservoir, Lake Anna provides a backup source of cooling water. Together, the reservoir and Lake Anna form the station's ultimate heat sink. There are four Service Water pumps located in the Service Water Pump House which utilize the the reservoir as their heat sink. The Service Water pumps and reservoir provide the required cooling in the event of a LOCA in one unit and a safe shutdown and cooldown of the unaffected unit assuming the most limiting single failure.

The Service Water System is a shared system common to both Units 1 and 2. Service Water is pumped from the reservoir to various safety-related systems and components via redundant supply headers and back to the reservoir via redundant return headers and spray systems. The reservoir water is chemically treated with corrosion inhibitors and biocides which are injected into the supply headers near the Service Water Pump House. Makeup water added to the reservoir (from Lake Anna as described above) is not treated prior to mixing with treated reservoir water.

The Service Water System provides a supply of cooling water to various safety related and non-safety related components. The system operates during normal plant operation, shutdown operation, and during and after accident situations. Service Water also serves as a backup supply source for the Auxiliary Feedwater System and backup cooling for certain components normally cooled by the closed Component Cooling water system.

There are two Service Water loops (one supply and one return header each) that provide Service Water to both units. Two loops are used to increase the reliability of the system as each loop has 100 percent capacity.

The two supply headers consist of 36 inch diameter lines which run from the Service Water Pump House to the main power block of the station. Various size branch lines off of these headers feed the components. The 36 inch headers are internally coated and are externally coated and/or wrapped where direct buried. Lines 24 inch and smaller are not internally coated but were externally protected when buried.

The two return headers collect the Service Water from the plant components and systems and return it to the reservoir via the Service Water Valve House. As with the supply headers, these lines are 36 inch diameter, internally coated and externally coated and/or wrapped. The lines reduce to 32.25 inches diameter from the Service Water Tie-in Vault to the Service Water Valve House and are externally coated but are not internally coated. Service Water can also be returned to the Unit 2 discharge tunnel when Service Water is being supplied from Lake Anna by the Auxiliary Service water Pumps.

3.0 RECENT IMPROVEMENTS AND MODIFICATIONS

Numerous upgrades have been implemented over the last decade in response to the initial discovery of system corrosion problems. These have included the replacement of smaller distribution lines, redesign and replacement of the spray arrays and headers in the reservoir, mechanical and chemical cleaning of Service Water piping, and improvements in chemical addition and control in the Service Water system.

These efforts have contributed to significant improvements in the condition of Service Water system components and in the quality of water chemistry However, in spite of these efforts, additional work is required to address the effects of corrosion on the larger uncoated header piping which is buried in soil and encased in concrete. Plans for refurbishment of these lines are outlined in Section 4.0.

4.0 PLANNED IMPROVEMENTS AND MODIFICATIONS

Plans for the current system upgrade have been divided into two categories, designated as Phase I and Phase II. The specific upgrade activities were ranked based on such factors as safety significance, perceived benefits, current condition of components, cost and schedule. Those activities viewed as a high priority are grouped into Phase I, with lower priority items being Phase II. Phase I activities are the focus of this submittal. Phase II, which includes potential reservoir relining, internal recoating of the 36 inch headers (which are currently coated), and repair and/or replacement of other accessible piping, will be evaluated and pursued in the future as necessary.

Phase I includes an enhancement to the current Service Water chemical treatment program. Addition of an improved microbiocide is being implemented to specifically control sulfate-reducing bacteria (SRB), considered to be the significant contributor to pitting of the carbon steel Service Water piping. The objective is to appreciably reduce the pitting corrosion rate caused by these SRBs and thereby prolong the remaining life of the system piping.

The principal Phase I effort consists of an extensive cleaning, assessing, repairing, internal coating,and replacement program for over 2100 linear feet of buried or concrete encased 24 inch diameter lines. Approximately 1500 feet will be repaired and coated, and 600 feet will be replaced. The piping primarily consists of the stagnant supply and return headers to the Unit 1 and Unit 2 Recirculation Spray Heat Exchangers, the auxiliary supply and return headers from Lake Anna, and the normally-flowing supply and return headers to the Unit 1 and Unit 2 Component Cooling heat exchangers.

The major difficulty to be encountered in addressing these pipe sections is a lack of access. The only built-in access ports into the 24 inch piping are located in the basement of the Auxiliary Building. The rest of the piping has no provision for access except via removal of certain expansion joints or valves. Personnel safety issues and confined area entry requirements make entries into the pipe for visual inspections or in-situ repairs difficult and time consuming activities.

The overall objective of this effort is to clean and restore internal pipe surfaces as required to assure continued structural integrity and apply a protective coating to minimize or eliminate further corrosion. In general, the refurbishment process which is discussed below will only be used on concrete encased pipe sections. Pipe sections which are direct buried (24 inch diameter) will be replaced with new piping similarly coated internally and protected externally from corrosion. New accesses will also be added in strategic locations to facilitate pipe repair and coating as well as future inspections and maintenance.

The following sequence outlines the individual work activities required to perform interior restoration and coating work on these pipe sections. The activities required for the interior restoration and coating work will be verified by a full-scale fabricated mock-up that will demonstrate under simulated conditions that the procedures, techniques, equipment and personnel can accomplish the objectives of the project. The mock-up will also be used to qualify application personnel and stress personnel safety requirements. The sequence of activities presented below details the four major processes involving initial cleaning and surface preparation, corrosion assessment, repairing, and coating application and inspection.

1. Initial cleaning and surface preparation will involve a combination of hydrolazing (high pressure water blasting) and abrasive blasting. The hydrolazing will remove the gross deposits of dirt, mud, silt, debris and corrosion products. After removing any remaining water and drying, a production abrasive blast cleaning will be performed to facilitate assessing the pipe interior for general condition and corrosion damage.

2. A manual and/or remote condition assessment technique will be used to accurately assess the actual pipe condition following cleanup. The technique will be based on the following considerations: personnel safety, technique accuracy and repeatability, relative ease of implementation, and overall cost effectiveness. A comprehensive internal examination will be carried out to assess overall pipe conditions and identify the need for repairs based on required minimum wall thickness criteria.

3. Areas identified by the corrosion assessment as requiring base metal repair will be filled by welding.

4. Following required weld repairs and final surface preparation, a coating system will be applied. Application of an epoxy patch compound will be applied to pits and other surface irregularities requiring filling to assist in the subsequent application of epoxy coating. Two coats of epoxy coating will be applied over the prepared substrate. Final coating operations will include final dry film thickness readings to verify achievement of minimum thicknesses and final cure of the coating system.

In parallel with the pipe refurbishment program, an evaluation of the Service Water pumps will be performed. This effort will focus on the condition of critical pump components and determining the need for rebuilding or replacing them. Modifications or upgrades will then be implemented as appropriate.

It is possible that certain areas may lend themselves to a different type of repair than simple weld metal buildup. Should this arise, an alternative "engineered" repair may be preferred from a design and/or construction perspective. We would propose to submit these permanent repair alternatives for relief from code requirements under 10 CFR 50.55a only in cases where the benefits are obvious.

5.0 IMPLEMENTATION SCHEDULE - PHASE I

Repair and/or replacement of the uncoated buried or concrete encased 24 inch lines will be implemented in stages over the next four years during planned Unit 1 and Unit 2 outages. The work will begin during the 1993 Unit 1 Steam Generator Replacement outage with repair of the concrete encased portions and replacement of the direct buried portions of the four lines to and from the Unit 1 Recirculation Spray heat exchangers. Subsequent outages will address the four lines to the Unit 2 Recirculation Spray heat exchangers (1993 and 1995), two auxiliary Service Water supply lines (1994) and the four lines to the Unit 1 and Unit 2 Component Cooling heat exchangers (1994 and 1995). Enhanced chemical treatment is nearing implementation. Service Water pump work will be initiated following the Unit 1 steam generator replacement outage (1993).

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