VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 30, 1978

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
Attn: Mr. Albert Schwencer, Chief
Operating Reactors Branch No. 1
Division of Reactor Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 371
PO&M/HSM:bep/mc

Docket No. 50-280
50-281
License Nos. DPR-32
DPR-37

Dear Mr. Case:

Enclosed herewith are 40 copies of Revision 5 to the document entitled "Steam Generator Repair Program, Surry Power Station, Unit Nos. 1 and 2" submitted in our letter dated August 17, 1977, Serial No. 351. The revision contains supplemental information requested by your staff.

The document should be revised in accordance with the attached instructions.

If you have any questions regarding this material, we would be pleased to meet with your staff at their convenience to discuss them.

Very truly yours,

W. L. Stallings for

C. M. Stallings
Vice President - Power Supply
and Production Operations

Attachment
cc: Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement

STEAM GENERATOR REPAIR PROGRAM
FOR THE SURRY POWER STATION
UNIT NOS. 1 AND 2

REVISION 5

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STEAM GENERATOR REPAIR PROGRAM

FOR THE

SURRY POWER STATION

UNIT NOS. 1 AND 2

Docket Nos. 50-280
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License Nos. DPR-32
DPR-37

Issued August 17, 1977
Revised December 2, 1977
Revised April 21, 1978
Revised June 2, 1978
Revised June 13, 1978
Revised June 30, 1978

VIRGINIA ELECTRIC AND POWER COMPANY

4.4.1.1 Reserve Station Service Transformers

Three Reserve Station Service transformers are shared by both units. The 4,160 v emergency busses for both units are normally powered from these transformers during operation. All 4,160 v buses, normal and emergency, are powered from the transformers during start-up, shutdown, or hot standby. During the replacement of the steam generators, it is planned that all the 4,160 v busses of the unit which is out of service be powered from the reserve station service transformers. This will ensure adequate power for all station auxiliaries that will be required during the outage (e.g., lighting, heating, ventilating, turbing gear, and sump pumps) and for loads of those systems shared by both units which are powered from busses of the unit which is out of service. Power to the operating unit's 4,160 v emergency buses will be powered as usual from the reserve station service transformers. Major loads attributable to the repair effort will be reviewed to determine the effect on the station electrical systems and offsite power services may be used.

4.4.1.2 Emergency Diesel Generators

Unit Nos. 1 and 2 share a swing diesel generator. Safety injection signal (SIS) on either unit closes the breaker connecting the generator to the emergency bus of the unit in which the signal occurs and blocks closure of the breaker which would connect the generator to the other unit's emergency bus. It can be postualted that an actual SIS in one unit and a spurious SIS signal in the other unit occurs and causes the closure of both breakers to be blocked. For this reason, Surry has a manual override that allows an operator to close the generator breaker on the unit which has had an actual SIS. During the replacement of steam generators, the swing diesel generator can be dedicated to the unit which is operating and the interlocks with the other unit can be disconnected from the circuit. This ensures that no signal from the unit which is out of service will have any effect on the ability of the swing diesel generator to perform its safety function for the operating unit. The diesels are mechanically independent.

The emergency diesel generators have an eight (8) hour oil supply in their day tanks to assure that fuel oil is available to power the diesels during postulated accidents. The main fuel oil storage tank and associated piping to the day tank are not required to be operable under accident conditions. The fuel oil

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line itself is encased in concrete and is buried about 4½ feet below the ground surface. The transport of heavy loads should not affect its integrity. However, following the replacement activities, its integrity will be verified by appropriate tests and/or checks. 5

4.4.2 Fire Hazards Analysis

The "Fire Protection Systems Review" for the Surry Power Station, Unit Nos. 1 and 2, dated July 1, 1977 and submitted to the NRC on July 1, 1977 is applicable to the steam generator repair effort. Although the results of the review will not be repeated herein, sections of the review which may be especially applicable to the construction period are identified and described below:

Section A.9 of the Response to Appendix A of BTP 9.5-1 identified those systems and structures which are shared by both units. Each is reviewed for the potential effects on the safest shutdown of either reactor in the event of fire. These analyses remain as valid when one unit is out of service for maintenance or construction as when both units are operating.

Section F.1.b of the Responses to Appendix A delineates fire protection guidelines for the containment during refueling and maintenance. In accordance with these guidelines, additional fire protection will be provided in areas of the containment where maintenance introduces a fire hazard. Also, in accordance with these guidelines, the quantity and type of combustibles brought into the containment for maintenance purposes will be controlled by procedure.

Section G.1 of the Responses to Appendix A delineates special protection guidelines for welding and cutting. In accordance with these guidelines, such activity will be governed by procedures which conform to NPPA Standards No. 51 and No. 51.3.

4.4.3 Construction Hazards Analysis

Installation activities related to steam generator repair do not differ significantly in type from maintenance activities accomplished during previous outages. Existing administrative procedures will be augmented by additional procedures as necessary to assure that the repair work is carried out safely and that the repair effort does not interfere with the operating unit. Existing station procedures, as supplemented by procedures applicable to the repair program, will be followed. These procedures are fully documented and discussed in the Nuclear Power Station Quality Assurance Manual, the Security Program Manual, the Health Physics Manual, etc. Where appropriate, these manuals may be revised in accordance with established procedures.

Appropriate precautions will be exercised to assure that radiation exposure will be maintained as low as reasonably achievable, including consideration of the guidelines contained in Regulatory Guide 8.8.

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4.4.4 Steam Generator Transport

4.4.4.1 The major accident of concern is the possibility of either dropping of the steam generator outside of the containment or while placing it in the onsite storage vault. The steam generator section to be disposed of is about 43 feet long and a maximum of 14 feet in diameter. Lifting outside of containment will be accomplished by means of mobile cranes. The steam generator will be moved from containment to the onsite storage vault on the transporter used to move the new steam generators from the bar to containment. It is estimated that the maximum lift would be on the order of 20 feet in order to clear the side walls of the storage vault.

The major source of potential contamination is the interior of the steam generator tubes and the primary side plenum at the bottom of the steam generator. The primary system inlet and outlet nozzles will be fitted with plugs welded in place. Because of the location of the inlet and outlet on the bottom of the steam generator, it is estimated that the long axis of the steam generator would have to hit the ground at an angle of less than 30° from the vertical in order for the inlet or outlet nozzle to receive the maximum impact.

The worst case for the purpose of analyses assumed would be for the steam generator to fall during the lift into the storage vault, such that the lower end hits the vault wall, shearing off one of the primary nozzles. The wall could possibly collapse and the steam generator could end up part in and part out of the vault, perhaps buckled over part of the wall, but with the sheared nozzle on the ground.

It has been conservatively assumed that about 20% of the activity in the steam generator is non-adherent. This non-adherent crud could also be dislodged by impact. For the purpose of analysis, it is also assumed that the impact would shear the nozzle plug so as to release a portion of the loose activity equivalent to the ratio of one nozzle opening to the cross-sectional area of the lower shell diameter of the steam generator. The majority of this would end up under the steam generator because of the position of fall. It has been assumed that 0.1% of the crud released (see Table 5.4-1) would be airborne and in the respirable range. If the crud in the steam generator is still wet or at least damp because of the humid conditions, it is not expected to be readily airborne. Conversely, if steam generator dries out because of residual heat the loose crud is expected to adhere more tightly to the piping and again not be readily airborne.

The accident is assumed to result in a puff release under very stable conditions and a 1 m/sec wind. Calms at Surry occur about 5.1% of the time while wind speeds between 0.5

and 3.5 m/sec occur about 33% of the time. The assumed release conditions are representative of the site meteorology. The dispersion was based upon equation 3.158, page 115 of "Meteorology and Atomic Energy" and data presented on page 406 of the same reference. The storage facility will be located about 500 feet from the site boundary. Further dispersal of the spill would be prevented by cleanup procedures implemented as soon as feasible. Dose conversion factors were based upon inhalation of insoluble particulates as presented in USNRC Reg. Guide 1.109. The estimated dose received by an individual at the site boundary is 24 mrem and is presented in Table 5.4-1. Doses further offsite would be proportionally smaller as a result of dispersion and deposition.

4.4.4.2 Steam Generator Drop Inside Containment

A steam generator drop inside containment would result in the release similar to the drop outside containment. However, any airborne material would be removed by deposition in containment or by the containment ventilation filtration system. Offsite exposures as a result of this accident would be less than those estimated above as a result of the smaller source term and potentially greater dispersion afforded since the release would probably occur over some period of time and not as a true puff release.

4.4.4.3 Steam Generator Transportation On-Site

An evaluation of the haul route to be utilized for the transport of the steam generators was made to determine any possible damage to subsurface piping, tunnels and electrical ducts. The route was inspected for degradation and was found to be in good condition. The route was also checked for overhead obstructions. None were found. The only safety-related piping or electrical conduits passing under a section of this route are the fuel oil lines from the service building and the conduit containing power cables and control wiring to the fuel oil pumps. These are enclosed in concrete and are at a depth such that the load from the movement of steam generators will be dissipated and will not cause damage to them.

The dropping of a steam generator on either radwaste facilities or the fuel building is not within the range of the lifting devices to be used to lift the steam generators from the equipment hatch platform to the transporter vehicle.

4.4.5 Conclusions

Based on the analyses performed to date, it is not anticipated that the steam generator repair program will have any significant effect on the operating unit and that the repair activities can be completed in a safe manner. Ongoing evaluations which are being conducted while completing detailed engineering are not expected to alter this basic conclusions.

e. Radiation surveys and posting of radiation areas will be performed.

f. Preliminary cleaning and decontamination may be performed.

g. The installation of temporary equipment, such as lighting, temporary, electrical equipment, fire protection equipment, etc. may be performed.

h. Some scaffolding may be installed.

Activities that involve the lifting of heavy loads, removal of equipment required for unit shutdown or refueling, or breaching of major systems, e.g. reactor coolant will not be performed. The activities listed above are not intended to be inclusive, but provides a representative listing of the type of activities that may be performed. All activities conducted during the time that fuel is in the reactor or is being moved will be reviewed and monitored by operating personnel.

4.7.2 Refueling Activities

Upon the completion of major replacement activities, the unit will be refueled in preparation for returning the unit to service. It is estimated that refueling will commence about 13 days prior to unit startup. During this period the following typical activities will be performed.

a. Functional testing of equipment
b. Cleanup
c. Removal of temporary equipment, e.g. scaffolding, tools, etc.

4.7.3 Residual Heat Removal Capability

Based on current estimates, the reactors will contain fuel for about twenty-five (25) days during the steam generator replacement outage. The residual heat removal (RHR) system is used to remove decay heat when fuel is in the reactor vessel. An evaluation of the effects of steam generator replacement activities on the RHR system has been performed. This evaluation considered the unique aspects of the replacement activities. Of primary concern during the replacement activities is to assure that there is no mechanical damage to RHR components, including the potential consequences of fire. Because of the limited work activities that will be performed with fuel in the reactor, heavy loads will not be lifted over RHR components; therefore, the consequences of damage is negligible. 5

As related to potential fire damage to the RHR, the fire protection measures discussed provide the capabilities to extinguish

any potential fires before the capability of the RHR system is affected. During the period that the reactor is fueled, a "fire watch" will be implemented for the RHR cable area to provide further assurance that any fire would not go undetected. 5