



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NOS. 194 AND 175 TO  
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

Virginia Electric and Power Company (the licensee) submitted a request on March 30, 1995, to make temporary changes to the Technical Specification (TS) requirements applicable to the service water system (SWS) and the Component Cooling Water (CCW) System for North Anna Unit Nos. 1 and 2 (NA-1&2). The proposed changes would allow one of the two service water loops to be isolated from the CCW heat exchangers during power operation while the isolated section is being refurbished. The staff issued a request for additional information on July 19, 1995, and the licensee responded to the staff's request in a letter dated August 24, 1995. The licensee's letter dated August 24, 1995, provided additional information that was not outside the scope of the staff's initial proposed determination of no significant hazards consideration as noticed in the Federal Register on May 10, 1995 (60 FR 24923).

2.0 BACKGROUND

The SWS for the NA-1&2 consists of two loops which are shared between NA-1&2. The NA-1 and NA-2 service water pumps (two for each unit) can be aligned to either the "A" or the "B" service water loop. Also, with the exception of the recirculation spray heat exchangers, the components that are cooled by the SWS can be aligned to either the "A" or the "B" loop. Two of the recirculation spray heat exchangers in each plant (four total) are cooled by one service water loop, and the remaining four recirculation spray heat exchangers are cooled by the other service water loop. Since the recirculation spray heat exchangers are 100% redundant, only two are required to mitigate the effects of an accident on a given unit.

During normal operation, one service water pump is usually running on each loop and each SW loop provides cooling water for the following loads: one CCW heat exchangers; three charging pump lube-oil, gear box, and seal coolers; two air compressors; and one main control room air conditioning condenser. During design basis accident conditions, at least one service water pump is running on each loop and each SW loop provides cooling water for the following loads: two recirculation heat exchangers on the accident unit; three charging pump lube-oil, gear box, and seal coolers; one air compressor; one main control

room air conditioning condenser; and one component cooling heat exchanger on the non-accident unit initially and two component cooling heat exchangers placed in service later for cooldown of the non-accident unit.

During emergency conditions, the SWS is also designed to provide backup cooling water to the fuel pit coolers, the recirculation air cooling coils, and the containment hot pipe penetration cooling coils, as well as backup feedwater for the steam generators. Additionally, the service water isolation valves for the CCW heat exchangers on an accident unit shut on receipt of a containment depressurization actuation signal to assure sufficient service water flow for the recirculation spray heat exchangers.

The licensee has undertaken a long-term project to refurbish the SWS piping at NA-1&2. To date, the SWS refurbishment activities have been accomplished by entering Action Statement "d" of TS 3.7.4.1, which allows one of the two redundant service water loops to be removed from service for up to seven days. However, the licensee expects that the SWS piping refurbishment associated with the CCW heat exchangers will take about 49 days to complete on each SWS loop. During this period, the SWS loop that is being refurbished will not be able to supply cooling water to the CCW heat exchangers but all other loads will remain connected.

The CCW system normally provides cooling for the following plant components:

- reactor coolant pump thermal barriers, bearing oil coolers, and motor-stator outlet air;
- excess letdown heat exchangers (intermittent heat load);
- non-regenerative heat exchangers;
- reactor unit sample coolers (intermittent heat load);
- seal-water heat exchangers;
- residual heat removal (RHR) pump seal coolers (during unit cooldown);
- RHR heat exchangers (during unit cooldown);
- boron recovery system equipment (intermittent heat load);
- fuel pit coolers and spent-fuel cask;
- control rod drive mechanism air coolers;
- liquid waste disposal system equipment (intermittent heat load);
- gaseous waste disposal system equipment;

- neutron shield tank coolers;
- steam generator blowdown sample coolers;
- steam generator blowdown tank vent condenser;
- primary drain coolers;
- containment vacuum pump heat exchangers; and
- containment hot pipe penetration cooling coils (ten per unit).

In order to proceed with the SWS refurbishment activities, the licensee has requested a temporary change to TS 3.7.4.1, "Service Water System - Operating," to allow plant operation with only one loop of service water available to/from the Unit 1 and Unit 2 CCW heat exchangers. Consistent with this, TS 3.7.3.1, "Component Cooling Water Subsystem - Operating," would also be temporarily changed to allow the CCW subsystems to be operable with only one loop of service water available. The proposed temporary changes provide clarification that the provisions of TS 3.0.4 are not applicable provided the provisions of the temporary TS requirements are satisfied. Other provisions of the proposed temporary TS would require that the automatic isolation function of the service water isolation valves for the CCW heat exchangers be defeated, and that all four service water pumps (i.e., two on each loop) be operable during the periods when the service water piping associated with the CCW heat exchangers is being refurbished.

### 3.0 EVALUATION

Making lengthy repairs to the NA-1&2 SWS poses quite a challenge for the licensee because the SWS is shared between NA-1 and NA-2. Consequently, when either unit is operating, both service water loops are required to be operable. The licensee would prefer not to shut down both units to perform the SWS refurbishment as this would result in replacement power costs. Also, performing the SWS refurbishment with both units shutdown would not be optimal since increased demands would be placed on the SWS via the CCW heat exchangers in the way of decay heat removal. Similarly, performing the SWS refurbishment with one unit operating and one unit shutdown would also involve increased demand on the CCW heat exchangers of the shutdown unit. Therefore, given this situation, the licensee's request to temporarily change the TS to allow the SWS piping to be refurbished in the vicinity of the CCW heat exchangers while both units are operating is reasonable.

The NA-1&2 SWS is needed for normal plant operation and to mitigate the effects of design-basis accident (DBA) conditions. Although the CCW system is not needed to mitigate the effects of a DBA, it represents a major SWS heat load during plant operation to provide cooling for components such as the reactor coolant pump motors; and the CCW system is needed for removing decay heat from the spent fuel pit during plant shutdown conditions. Therefore, care must be taken to assure that the SWS and CCW cooling functions are not

jeopardized while the desired SWS piping refurbishment activities are being completed.

The SWS piping refurbishment activities associated with the CCW heat exchangers are expected to take about 49 days to complete on each service water loop. During this period, the SWS loop being refurbished will be isolated from and bypass the CCW heat exchangers such that cooling water for the CCW heat exchangers will only be available from the other (unaffected) service water loop. For much of this time, both service water loops will still be operable and available to supply cooling water to all of the other SWS heat loads. However, there will be several occasions when Action Statement "d" of TS 3.7.4.1 will be entered allowing the service water loop being refurbished to be inoperable at times for up to seven days. Consequently, the following two operating conditions must be considered: (a) periods when both service water loops are operable, but only one service water loop is available to cool the CCW heat exchangers of both units; and (b) periods when only one service water loop is operable. Each of these situations has been evaluated and discussed in the licensee's submittals of March 30 and August 24, 1995, and in particular, the following considerations and contingencies provide assurance that the service water and the CCW systems will be available to perform their functions during the SWS piping refurbishments activities:

- Hydraulic analyses that have been performed by the licensee indicate that the SWS will remain capable of performing its function during normal plant operation as well as during accident situations, recognizing the alignment restrictions that will be imposed during the refurbishment process and contingencies for which provision has been made.
- In order to prevent inadvertent isolation of the CCW heat exchangers, the autoclosure feature of the service water isolation valves will be defeated during periods when both SWS loops are operable. Ample service water flow will be available to the recirculation spray heat exchangers during this period from the SWS loop that is being refurbished. However, during periods when only one SWS loop is operable, the autoclosure feature of the CCW heat exchanger service water isolation valves will remain enabled to assure sufficient flow of service water to the recirculation spray heat exchangers in the event of an accident.
- During the course of the SWS refurbishment, piping that must remain operable will retain its seismic qualification along with other governing design basis requirements.
- An extensive SWS piping inspection program has been in place for several years and based on data collected from this program, the licensee has determined that the SWS corrosion consists of a relatively low general wall corrosion rate with more rapid localized random pitting corrosion. The licensee's analysis of

the data indicates that the SWS header to/from the CCW heat exchangers remains fully operable and the structural integrity has not been compromised. Therefore, it is unlikely that a pipe break will occur in the SWS while refurbishment activities associated with the CCW heat exchangers are being completed.

- Lifting of equipment and piping sections over the fully intact service water header will be limited to the maximum extent possible and service water piping will be shielded/protected as necessary in order to minimize the risk of damage to the SWS.
- An alternate, temporary source of cooling water will be available to the charging pumps and to the control room/emergency switchgear room air conditioning system as a precautionary measure in the unlikely event that a loss of service water should occur.
- Temporary pipe clamps and other emergency repair equipment will be staged in the Auxiliary Building where SWS piping is being refurbished to facilitate emergency repair of the SWS should it be necessary.
- No unit outages will be planned for the periods when the SWS piping associated with the CCW heat exchangers is being refurbished, as this would increase the demands placed on the service water and CCW systems.
- Four out of four main service water pumps will be required to be operable when the SWS piping associated with the CCW heat exchangers is being refurbished. No major maintenance or testing is planned to be performed on the main service water pumps while the SWS piping is being refurbished. This will assure reliability of the service water cooling capability.
- SWS pipe refurbishment work will be scheduled to occur when the service water supply temperature is expected to be around 75° F (typically, October through April) in order to maximize the performance capability of the SWS.
- Provision for contingencies that have been outlined in support of the SWS refurbishment activities will be assured through station administrative controls and temporary operating procedures (TOPs). The TOPs will include detailed step-by-step alignment changes that will be necessary as well as the initial conditions which must be satisfied, special precautions and limitations that apply, as well as any contingency actions that are necessary.
- Operating crews have been trained on the use of Abnormal Procedure O-AP-12 for the loss of service water, and additional training will be provided for operation of the plant during periods when

only one service water loop is operable, as well as on the implementation of contingencies and TOPs associated with the SWS restoration project.

The licensee's assessment and discussion of the SWS piping refurbishment activities are comprehensive, and the provisions for contingencies and compensatory measures that will be implemented by the licensee are sufficient to assure continued operability of the service water and CCW systems during the refurbishment period. Therefore, the temporary changes that were requested for NA-1&2 TS are acceptable.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendments. The State official had no comment.

#### 5.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding (60 FR 24923). Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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