

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

February 6, 1995

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Serial No. 95-048  
NL&P/MAE: R4  
Docket Nos. 50-338  
50-339  
License Nos. NPF-4  
NPF-7

Gentlemen:

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**NORTH ANNA POWER STATION UNITS 1 AND 2**  
**MSLB ACCIDENT ANALYSIS - RPS AND ESFAS INSTRUMENTATION**  
**REQUEST FOR ENFORCEMENT DISCRETION**

Pursuant to 10 CFR Part 2, Appendix C, Virginia Electric and Power Company (Virginia Power) requests the NRC to exercise enforcement discretion regarding compliance with Technical Specifications 3.3.1.1, Table 3.3-1, "Reactor Trip System Instrumentation," and 3.3.2.1, Table 3.3-3, "Engineered Safety Features Actuation System Instrumentation." This request is made to allow continued operation with one train of the solid state protection system (SSPS) inoperable for longer than the 6 hours allowed by TS 3.3.2.1. The enforcement discretion would also allow each reactor trip breaker to be bypassed for maintenance for longer than the 2 hours allowed by TS 3.3.1.1, Action 1.

On February 2, 1995, the NRC verbally informed Virginia Power of a potential vulnerability that had been identified in the industry with respect to Solid State Protection System (SSPS) power supplies. Specifically, on February 1, 1995, several utilities identified a condition for which the original high energy line break (HELB) analysis for the Turbine Building had not evaluated the potential failure effect of the unisolated Class II channels on the safety-related Class I SSPS logic power supplies. We have reviewed the issue and have determined that such a postulated failure or other postulated scenarios could result in the failure of one train of the SSPS. Therefore, the occurrence of the HELB coincident with a single active failure of the other SSPS train could result in both trains of SSPS not being available to mitigate the consequences of the HELB. Rather than continue to assess every potential initiating scenario, we have determined that the prudent action would be to request an enforcement discretion to correct the identified deficiencies rather than delaying the corrective actions in order to complete the required engineering evaluations. Accordingly, we declared one train of SSPS inoperable at 1430 hours on February 3, 1995, and entered the appropriate action for Technical Specification 3.3.2.1.

A design change will be implemented to provide electrical isolation between the Class II circuitry and the Class I SSPS power supplies. Following approval of the design change, and applicable training, the design change will be implemented on one channel of each train, one unit at a time. Post modification testing will then be performed to verify correct implementation of the design change. To allow adequate time to develop the design change and train personnel and to permit work to be

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performed on only one train of the SSPS at a time, enforcement discretion from the above Technical Specification requirements is required. The period of time for this enforcement discretion is not to extend beyond 1430 hours on February 13, 1995. If not completed by this time, North Anna Units 1 and 2 would comply with the action required by Technical Specification 3.3.2.1.

The compensatory measures, the justification for the duration of the request, the significant hazards consideration, and the evaluation of the potential impact on the environment are discussed in the following sections.

#### Specific Enforcement Discretion Request

With respect to Technical Specification 3.3.1.1, Table 3.3-1, Action 1 for automatic trip logic, enforcement discretion is requested to permit the automatic trip logic to remain in the bypass condition for up to 6 hours per train per unit in lieu of the specified 2 hours per train per unit for the purpose of implementing and testing modifications for correction of problems described in this enforcement discretion request.

With respect to Technical Specification 3.3.2.1, Table 3.3-3, all Actions, enforcement discretion is requested to permit all Engineered Safety Feature (ESF) related items and Actions to be extended 10 days with individual actuation system logic allowed to remain in the bypass condition for up to 6 hours per train per unit in lieu of the specified 2 hours per train per unit for the purpose of implementing and testing modifications to correct the problems described in this enforcement discretion request.

#### SAFETY IMPACT AND POTENTIAL CONSEQUENCES

The SSPS receives input signals from plant sensors. The plant sensors are divided into four channels (I, II, III, and IV). Each channel provides input to SSPS through a separate input bay. In addition, each SSPS input bay is powered from one of the four vital A.C. busses. Through the input bay, power is supplied to the logic bay and to those input signals that do not originate from the 7300 Process Protection System or the Nuclear Instrumentation System (NIS).

The input from plant sensors is then processed through the logic circuitry of the SSPS to determine required equipment actuations to mitigate the consequences of an accident. After the logic circuitry has processed the input signals, the appropriate signals are then sent to the output bay of the SSPS, where output slave relays actuate the appropriate plant equipment. The slave relays in the output bay are powered from Vital Bus I for train A and Vital Bus III for train B.

The steam impingement resulting from a HELB could cause a short circuit (i.e. short or low resistance to ground) in the wiring/circuitry associated with the Turbine lube oil (auto stop oil pressure) switch input or a Turbine throttle valve switch input to SSPS. This may result in the failure of the fuses for the logic power supplies in one train of the SSPS which would render the ESF actuation train inoperable, though a reactor trip would still occur. If a single active failure renders the other SSPS train inoperable, no automatic ESF equipment actuation would occur to mitigate the consequences of the MSLB.

## Nuclear Analysis

Virginia Power has reviewed a summary notification of the Westinghouse evaluation results for the Diablo Canyon MSLB outside containment. The evaluation assumed the following:

1. A double-ended rupture of a main steam line with a resultant effective break size of 1.4 square feet (flow restrictor) per steam generator.
2. Initial conditions of hot zero power which maximizes steam generator water volume and minimizes initial stored energy in the RCS.
3. End-of-life reactivity conditions (most limiting).
4. No decay heat.
5. All rods fully inserted except for the most reactive rod being fully withdrawn.
6. No operator action.
7. No automatic equipment actuation through active means – this limits safety injection to the passive actuation of the SI accumulators.
8. 100% power nominal main feedwater flow.
9. Maximum auxiliary feedwater flow.

With the exception of assumptions 1 and 7 above, the remaining assumptions are consistent with the main steam line break analysis assumptions in Chapter 15 of the North Anna UFSAR. Assumptions 1 and 7 above have specifically been changed in the Westinghouse analysis for Diablo Canyon to address the requirements associated with this postulated loss of the SSPS. Assumption 1 has been changed to assume the unisolated blowdown of all steam generators in a MSLB outside of containment (resulting in the loss of the SSPS) in lieu of the limiting condition in the Chapter 15 accident analysis of an unisolated blowdown of one steam generator. Isolation of the unaffected steam generators must be manually actuated in this case due to the assumed loss of the SSPS. Assumption 7 has been changed to assume the loss of automatic ESF actuation as a result of the loss of the SSPS.

The results of the Westinghouse evaluation for Diablo Canyon indicate that, although the reactor does return to power, the DNB design basis is met and the current UFSAR licensing basis MSLB core response remains bounding.

The results of the Diablo Canyon evaluation are consistent with previous North Anna MSLB transient analysis experience and MSLB sensitivity studies. It is, therefore, expected that the same analysis for North Anna would show similar results. Also, it should be noted that the current North Anna operating cores have additional core shutdown margin for the control rods beyond what was assumed in the North Anna licensing basis analysis.

## Probability of Main Steam Line Failure Coincident with SSPS Train Failure

In contrast to the potential vulnerability identified by the NRC, the length and physical configuration of piping and location of restraints at North Anna would appear to limit the likelihood of direct impingement on the subject electrical terminal boxes, thereby reducing the probability of occurrence or probability of immediate failure following a MSLB.

The length of pipe in the North Anna steam lines from the main steam header to the turbine was specifically evaluated for its contribution to the potential vulnerability. The estimated initiating event mean frequency of the scenario was calculated to be  $4.8\text{E-}5/\text{year}$ . The dominant function contributing to the conditional probability of core damage is auxiliary feedwater. The unavailability of auxiliary feedwater in the North Anna Individual Plant Examination (IPE) is  $3.0\text{E-}4$  with both emergency buses available and  $1.5\text{E-}3$  with one bus unavailable. Conservatively assuming the auxiliary feedwater unavailability is equal to .01 due to the postulated scenario, the contribution to core damage frequency (CDF) is  $4.8\text{E-}7/\text{year}$ . Over the ten day repair period for the enforcement discretion, this represents a  $1.3\text{E-}8$  probability of core damage due to the scenario.

The increase in CDF of  $4.8\text{E-}7/\text{year}$  for this temporary increase in risk is below the guidelines for temporary increases in risk presented in the Nuclear Energy Institute (NEI) Draft "PSA Applications Guide." It represents less than 1.0% of the  $6.8\text{E-}5/\text{year}$  total core damage frequency for North Anna. Therefore, the incremental change in CDF associated with this enforcement discretion is considered non-risk significant.

#### Corrective Action

To assure that a HELB will not cause short circuits that could result in the failure of one train of the SSPS, a design change will be implemented to electrically isolate the direct contact SSPS inputs from the Class I SSPS logic power supplies. The design change will be performed on only 1 of the 2 channels in each train of SSPS. Following approval of the design change, maintenance crews will be trained on implementation of the design change in the SSPS. The same crews will be responsible for the implementation of the design change on both units. Post-modification testing will be required to verify correct implementation of the design change.

#### Compensatory Measures

The following compensatory measures will be taken to provide additional assurance that the public health and safety will not be adversely affected by this enforcement discretion request.

1. The design change will be performed on only one channel of one train of the SSPS at a time. This will provide assurance that at least one train of SSPS would perform its required function to mitigate the consequences of postulated accidents.
2. Optional train-related maintenance and surveillance testing will be suspended until the implementation of the design change. Technical Specifications required surveillance testing will be evaluated for the impact on the calculated core damage frequency prior to their performance and to determine the need for additional enforcement discretion.
3. Plant evolutions significant to risk will be avoided.
4. An Operations Standing Order will be prepared describing the condition and the proper implementation of the emergency procedure for responding to a MSLB that affects the SSPS. The operators on shift will be briefed on the scenario of concern, how to identify the scenario, and mitigating actions to take.



5. A unit will not be voluntarily ramped down (such as for load follow) until the design change implementation is completed for that unit. The end of cycle power coastdown of Unit 2 will continue.
6. Activities on the turbine deck that could result in damage to the steam lines (such as movement of loads over the high pressure turbines) will be restricted until implementation of the above mentioned design change.
7. The above mentioned design change will not be implemented until associated events at Salem have been reviewed and evaluated.

#### SIGNIFICANT HAZARDS CONSIDERATION

The proposed enforcement discretion for the Technical Specifications described above does not result in a significant hazards consideration as defined in 10 CFR 50.92. Specifically, the proposed enforcement discretion does not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated. The probability of a MSLB accident is not affected by the proposed enforcement discretion. The only equipment failure potentially affected is failure of one train of SSPS. Failure of the SSPS as the initiating event or failure of an SSPS train following any accident other than a steam line break is unaffected. Using the NEI Draft "PSA Application Guide," a risk assessment was performed that indicated the increase in probability resulting from the proposed enforcement discretion was insignificant. The consequences of a malfunction of the SSPS due to a MSLB in the Turbine Building coincident with a single active failure of one train of the SSPS were evaluated by Westinghouse for Diablo Canyon. The evaluation concluded that the DNBR limits would be satisfied. A preliminary assessment indicates that results similar to the Diablo Canyon evaluation would be expected for North Anna. Therefore, the request does not involve a significant increase in the probability or consequences of an accident or malfunction previously evaluated.
2. Create the possibility of a new or different kind of accident from previously evaluated. A MSLB has been evaluated in the UFSAR. The evaluation assumes that at least one train of the SSPS is available to mitigate the consequences of the MSLB in the Turbine Building. However, the MSLB in the Turbine Building could render both trains of the SSPS inoperable when a single active failure is considered.

Should a MSLB occur, the operator must identify the need for Safety Injection (SI) in accordance with Emergency Procedure E-0. The Operator will enter Emergency Procedure E-0, check if SI is actuated, verify proper actuation of SI equipment, and manually align equipment, if required. A preliminary review of the operator response to the MSLB without SSPS was performed. Virginia Power believes this review indicates that the operators would be capable of mitigating the consequences of the MSLB in adequate time to prevent fuel damage.

Westinghouse also performed an evaluation for Diablo Canyon of a MSLB without any SSPS available or operator action. The Westinghouse evaluation concluded that DNBR limits would be satisfied. We believe results similar to the Diablo Canyon evaluation would be expected for North Anna. Therefore, enforcement discretion does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Involve a significant reduction in the margin of safety. A risk assessment was performed that determined that the probability of a MSLB that disables one train of SSPS coincident with a single active failure of the other SSPS train during the period of the enforcement discretion was insignificant. A Virginia Power preliminary review of the operator response to the MSLB without SSPS demonstrates that the operators would be capable of mitigating the consequences of the MSLB in adequate time to prevent fuel damage.

Westinghouse also performed an evaluation for Diablo Canyon of a MSLB without any SSPS available or operator action. The Westinghouse evaluation concluded that DNBR limits would be satisfied. We believe results similar to the Diablo Canyon evaluation would be expected for North Anna. Therefore, the enforcement discretion does not involve a significant reduction in the margin of safety.

## ENVIRONMENTAL CONSEQUENCES

The proposed enforcement discretion not change the types of any effluents that may be released offsite, nor create a significant increase in individual or cumulative occupational radiation exposure. The proposed enforcement discretion only extends existing action statement intervals for completion of modifications to the SSPS. The necessary modifications will be implemented in a manner that does not affect the ability of the SSPS to perform its required function to mitigate the consequences of postulated accidents. Therefore, the consequences of accidents related to or dependent on the SSPS will not be adversely affected.

## CONCLUSION

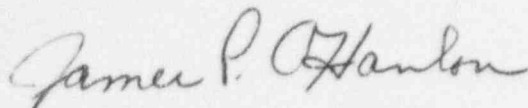
This enforcement discretion was reviewed and approved by the Station Nuclear Safety and Operating Committee. It has been determined that no significant hazards consideration exists.

On February 3, 1995, by telephone conference calls between our staffs, we requested enforcement discretion to extend action statement intervals associated with Technical Specification 3.3.1.1, Table 3.3-1, and Technical Specification 3.3.2.1, Table 3.3-3, for completion of modifications to the SSPS. At 1624 hours, the NRC granted verbal approval for discretionary enforcement to extend the 2 hour action statement for the automatic trip logic of Technical Specification 3.3.1.1, Table 3.3-1, Action 1, to 6 hours per train per unit for the purpose of implementing and testing modifications to correct the problems associated with the SSPS. Approval was also received to permit all ESF related items and actions to be extended for 10 days with individual actuation system logic allowed to be extended from 2 hours to 6 hours per train per unit for the purpose

of implementing and testing modifications to correct the problems described in this enforcement discretion request. This enforcement discretion will expire at 1430 hours on February 13, 1995.

Should you have any questions, please contact us.

Very truly yours,

A handwritten signature in cursive script, reading "James P. O'Hanlon".

James P. O'Hanlon  
Senior Vice President - Nuclear

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