



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

DO NOT REMOVE

October 5, 1982

Docket Nos. 50-280  
and 50-281

*Posted  
Amdt-81  
to DPR-37*

Mr. R. H. Leasburg  
Vice President - Nuclear Operations  
Virginia Electric and Power Company  
Post Office Box 26666  
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Dear Mr. Leasburg:

The Commission has issued the enclosed Amendment No. 80 to Facility Operating License No. DPR-32 and Amendment No. 81 to Facility Operating License No. DPR-37 for the Surry Power Station, Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated August 17, 1982.

These amendments revise the Technical Specifications related to the degraded voltage protection system. The proposed Technical Specifications require the operability of voltage sensing channels, establishes setpoints for degraded voltage and loss of power, and requires periodic testing and calibration.

Copies of the Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

*Joseph D. Neighbors*  
Joseph D. Neighbors, Project Manager  
Operating Reactors Branch #1  
Division of Licensing

Enclosures:

- 1. Amendment No. 80 to DPR-32
- 2. Amendment No. 81 to DPR-37
- 3. Safety Evaluation
- 4. Notice of Issuance

cc w/enclosures:  
See next page

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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-280

SURRY POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 80  
License No. DPR-32

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated August 17, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-32 is hereby amended to read as follows:

**B. Technical Specifications**

The Technical Specifications contained in Appendix A, as revised through Amendment No. 80, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Steven A. Varga, Chief  
Operating Reactors Branch #1  
Division of Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: October 5, 1982



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

SURRY POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 81  
License No. DPR-37

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated August 17, 1982, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

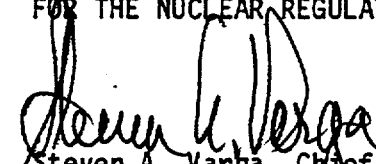
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-37 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 81, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

  
Steven A. Varga, Chief  
Operating Reactors Branch #1  
Division of Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: October 5, 1982

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 80 TO FACILITY OPERATING LICENSE NO. DPR-32

AMENDMENT NO. 81 TO FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NOS. 50-280 AND 50-281

Revise Appendix A as follows:

Revise Pages

3.7-16

3.7-19

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4.6-2

Insert Pages

3.7-16

3.7-19

4.1-9

4.6-2

TAL 3.7-2

ENGINEERED SAFEGUARDS ACTION

INSTRUMENT OPERATING CONDITIONS

	1	2	3	4
<u>FUNCTIONAL UNIT</u>	<u>MIN. OPERABLE CHANNELS</u>	<u>DEGREE OF REDUNDANCY</u>	<u>PERMISSIBLE BYPASS CONDITIONS</u>	<u>OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 EXCEPT AS CONDITIONED BY COLUMN 3 CANNOT BE MET</u>
d. Station Blackout Start Motor Driven Pump	2	0		Restore inoperable channel within 48 hours or be in hot shutdown within next 6 hours and in cold shutdown within the following 30 hours.
e. Trip of Main Feedwater Pumps Start Motor Pumps	1/Pump	1/Pump		Restore inoperable channel within 48 hours or be in hot shutdown within next 6 hours and in cold shutdown within the following 30 hours.
<b>4. LOSS OF POWER</b>				
a. 4.16 KV Emergency Bus Undervoltage (Loss of Voltage)	2/Bus	1/Bus		Place inoperable channel in tripped condition within one hour.
b. 4.16 KV Emergency Bus Undervoltage (Grid Degraded Voltage)	2/Bus	1/Bus		Place inoperable channel in tripped condition within one hour.



TABLE 3.7-4.

ENGINEERED SAFETY FEATURE SYSTEM INITIATION LIMITS INSTRUMENT SETTING

<u>NO.</u>	<u>FUNCTIONAL UNIT</u>	<u>CHANNEL ACTION</u>	<u>SETTING LIMIT</u>
6.	AUXILIARY FEEDWATER		
a.	Steam Generator Water Level Low-Low	Aux. Feedwater Initiation S/G Blowdown Isolation	$\geq 5\%$ narrow range
b.	RCP Undervoltage	Aux. Feedwater Initiation	$\geq 70\%$ nominal
c.	Safety Injection	Aux. Feedwater Initiation	All S.I. setpoints
d.	Station Blackout	Aux. Feedwater Initiation	$\geq 46.7\%$ nominal
e.	Main Feedwater Pump Trip	Aux. Feedwater Initiation	N.A.
7.	LOSS OF POWER		
a.	4.16 KV Emergency Bus Undervoltage (Loss of Voltage)	Emergency Bus Separation and Diesel start	$75^{+1}_{-1}\%$ volts with a 2+5,-0.1 second time delay
b.	4.16 KV Emergency Bus Undervoltage (Degraded Voltage)	Emergency Bus Separation and Diesel start	$90^{+1.0}_{-1.0}\%$ volts with a 60+3.0 second time delay (Non CLS, Non SI) 7+.35 second time delay (CLS or SI Conditions)

AMENDMENT NOS. 80 & 81

<u>CHANNEL DESCRIPTION</u>	<u>CHECK</u>	<u>CALIBRATE</u>	<u>TEST</u>	<u>REMARKS</u>
35. LOSS OF POWER				
a. 4.16 KV Emergency Bus undervoltage (Loss of voltage)	N.A.	R	M	
b. 4.16 KV Emergency Bus undervoltage (Degraded voltage)	N.A.	R	M	

- b. Automatic start of each diesel generator, load shedding, and restoration to operation of particular vital equipment, initiated by a simulated loss of off-site power together with a simulated safety injection signal. Testing will also demonstrate that the loss of voltage and degraded voltage protection is defeated whenever the emergency diesel is the sole source of power to an emergency bus and that this protection is automatically reinstated when the diesel output breaker is opened. This test will be conducted during reactor shutdown for refueling to assure that the diesel generator will start within 10 sec and assume load in less than 30 sec after the engine starting signal.
- c. Availability of the fuel oil transfer system shall be verified by operating the system in conjunction with the monthly test.
- d. Each diesel generator shall be given a thorough inspection during each refueling interval utilizing the manufacturer's recommendations for this class of stand-by service.

## 2. Acceptance Criteria

The above tests will be considered satisfactory if all applicable equipment operates as designed.

## B. Fuel Oil Storage Tanks for Diesel Generators

1. A minimum fuel oil storage of 35,000 gal shall be maintained on-site to assure full power operation of one diesel generator for seven days.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 80 TO FACILITY OPERATING LICENSE NO. DPR-32  
AND AMENDMENT NO. 81 TO FACILITY OPERATING LICENSE NO. DPR-37  
VIRGINIA ELECTRIC AND POWER COMPANY  
SURRY POWER STATION, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-280 AND 50-281

INTRODUCTION

By letter dated August 17, 1982, the Virginia Electric and Power Company (the licensee) proposed changes to the Technical Specifications appended to Facility Operating License Nos. DPR-32 and DPR-37 for the Surry Power Station, Unit Nos. 1 and 2. The requested change would revise the Technical Specifications related to the degraded voltage protection system.

DISCUSSION

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Virginia Electric and Power Company (VEPCO) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated September 26, 1977, October 15, 1979, May 26, 1981, March 31, 1982, June 11, 1982, June 30, 1982 and August 17, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications was performed by LLL, under contract to the NRC, and with

general supervision by NRC staff. This work is reported by LLL in "Degraded Grid Protection for Class 1E Power Systems Surry Power Station, Units 1 and 2" (attached). We have reviewed this Technical Evaluation Report and concur in conclusion that the proposed electrical design modifications and Technical Specification changes are acceptable.

#### EVALUATION

The criteria used by LLL in its technical evaluation of the proposed changes include GDC-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1977 ("Voltage Ratings for Electrical Power Systems and Equipment - 60 Hz"); and staff positions defined in NRC Generic Letter to VEPCO dated June 3, 1977.

The existing loss of voltage protection at Surry consist of two undervoltage relays on each 4160 volt Class 1E bus arranged in a two-out-of-two coincident logic. If the bus voltage should degrade to 84% of nominal for 12 seconds, the relays will start the diesel generators. Continued voltage degradation to 79.5% of nominal for an additional 12 seconds will result in disconnection of the offsite power, load shedding of selected Class 1E loads, and transfer of the Class 1E buses to the onsite emergency diesel generator.

The existing design will not automatically shed all normal Class 1E running loads when transferring from offsite power to the onsite emergency diesel generators. The only Class 1E loads automatically shed for this transfer are the residual heat removal (RHR) and component cooling water (CCW) pumps. These loads are connected to 4160 volt stub buses which are fed from the

4160 volt Class 1E buses. After the diesel generator breaker closes and the bus voltage is restored above 79.5% voltage setpoint, the above load shed feature is reinstated and safety load sequencing will occur.

The following electrical system design modifications were proposed by VEPCO:

1. Modify the existing loss of voltage relaying on each 4160 volt Class 1E bus to provide a two-out-of-three logic per bus. The relays have a setpoint of  $75\% \pm 1\%$  of nominal and a time delay of 2 seconds + 5 seconds - 0.1 seconds.
2. Install three undervoltage (degraded grid protection) relays on each 4160 volt Class 1E bus with a two-out-of-three logic per bus. These relays will have a setpoint of  $90 \pm 1\%$  of nominal with a time delay of  $7 \pm 0.35$  seconds for a safety injection (SI) on consequence limiting sequence (CLS), and  $60 \pm 3$  seconds for non-accident conditions. System operation is as follows:

If the Class 1E bus voltage should degrade to less than 90% of nominal, under non-accident conditions, the undervoltage relays will, after 10 seconds, actuate an alarm in the control room. If the undervoltage persists; at 50 seconds, the diesel generators are automatically started, after 60 seconds the offsite source is disconnected and the Class 1E buses are transferred to the onsite emergency diesel generators. If an SI or CLS signal exists concurrent with the degraded voltage, the 10, 50 and 60 second time delays are bypassed and a 7 second time delay is used. At 7 seconds

the diesel generators receive a start signal and the transfer from offsite to onsite power is initiated. Upon transfer initiation for an SI or CLS condition, the offsite source breaker, the stub bus tie breaker, the RHR, CCW and bus 1H charging pump breaker are automatically tripped. Once the diesel generator achieves acceptable frequency and voltage, the output breaker will close and safety loads sequencing will occur. Closing the diesel generator breaker will automatically bypass the loss of voltage and degraded grid voltage relays on the 4160 volt Class 1E buses. If the diesel generator breaker should trip, the undervoltage protection relays will be automatically reinstated.

The licensee's analysis shows that the undervoltage (degraded grid protection) relay setpoint of 90% of nominal with a time delay of 7 seconds for accident conditions and 60 seconds for non-accident conditions will provide protection to all Class 1E equipment. The licensee has provided Technical Specifications for the proposed design modifications which include relay setpoints with tolerances, surveillance requirements and limiting conditions for operation. An analysis to substantiate the limiting conditions for operation and minimum and maximum setpoint limits were included as part of the modification proposal.

We have reviewed the LLL Technical Evaluation Report and concur in its findings that:

1. The proposed degraded grid modifications will protect the Class 1E equipment and systems from sustained degraded voltage of the offsite power system.
2. The load shedding feature is automatically bypassed when the onsite emergency diesel generators are supplying the Class 1E buses. This feature will be automatically reinstated if the diesel generator breaker should trip.
3. The proposed Technical Specification changes and additions are acceptable.

We therefore find the Surry Power Station, Units 1 and 2 degraded grid voltage protection design acceptable subject to completion of all proposed modifications.

#### EVALUATION

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.



CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of an accident previously evaluated, do not create the possibility of an accident of a type different from any evaluated previously, and do not involve a significant reduction in a margin of safety, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will not be conducted in compliance with the Commission's regulations and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: October 5, 1982

Principal Contributor:  
R. Prevatte

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19455

TECHNICAL EVALUATION REPORT ON THE  
PROPOSED DESIGN MODIFICATIONS  
AND TECHNICAL SPECIFICATION CHANGES  
ON GRID VOLTAGE DEGRADATION FOR THE  
SURRY POWER STATION, UNITS 1 AND 2

(Docket Nos. 50-280, 50-281)

James C. Selan

August 25, 1982



This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the Laboratory.

This work was supported by the United States Nuclear Regulatory Commission under a Memorandum of Understanding with the United States Department of Energy.

NRC FIN No. A-0250

## ABSTRACT

This report documents the technical evaluation of the proposed design modifications and Technical Specification changes for protection of the Class 1E equipment from grid voltage degradation for the Surry Power Station, Units 1 and 2. The review criteria are based on several IEEE standards and the Code of Federal Regulations. The evaluation finds that the proposed design modifications and Technical Specification changes will ensure that the Class 1E equipment will be protected from sustained voltage degradation.

## FOREWORD

This report is supplied as part of the Selected Electrical, Instrumentation, and Control Systems Issues Program being conducted for the U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by Lawrence Livermore National Laboratory.

The U. S. Nuclear Regulatory Commission funded the work under the authorization entitled "Electrical, Instrumentation and Control System Support," B&R 20 19 04 031, FIN A-0250.

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TECHNICAL EVALUATION REPORT ON THE  
PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES  
ON GRID VOLTAGE DEGRADATION FOR THE  
SURRY POWER STATION, UNITS 1 AND 2  
(Docket Nos. 50-280, 50-281)

James C. Selan  
Lawrence Livermore National Laboratory

1. INTRODUCTION

By letter dated June 3, 1977 [Ref. 1], the U. S. Nuclear Regulatory Commission (NRC) requested the Virginia Electric and Power Company (VEPCO), the licensee, to assess the susceptibility of the Class 1E electrical equipment to sustained degraded voltage conditions at the offsite power sources and to the interaction between the offsite and onsite emergency power systems at the Surry Power Station, Units 1 and 2. In addition, the NRC requested that the licensee compare the current design of the emergency power systems at the plant facilities with the NRC staff positions as stated in the June 3, 1977 letter [Ref. 1], and that the licensee propose plant modifications, as necessary, to meet the NRC staff positions, or provide a detailed analysis which shows that the facility design has equivalent capabilities and protective features. Further, the NRC required certain Technical Specifications be incorporated into the facility's operating license.

By letters dated September 26, 1977 [Ref. 2], October 15, 1979 [Ref. 3], May 26, 1981 [Ref. 4], March 31, 1982 [Ref. 5], June 11, 1982 [Ref. 6], June 30, 1982 [Ref. 7], and August 10, 1982 [Ref. 8], the licensee proposed certain design modification details, additions to the Technical Specifications, and limiting conditions for operation (LCO's). The design modification details a degraded voltage protection system for the Class 1E equipment. The additions to the Technical Specifications and LCO's are in regard to calibrations, surveillance requirements, test requirements, and "action" statements associated with the existing undervoltage protection system.

The purpose of this report is to evaluate the licensee's proposed design modifications, Technical Specification changes, and proposed LCO's to determine that they meet the criteria established by the NRC for the protection of Class 1E equipment from grid voltage degradation.

## 2. DESIGN BASIS CRITERIA

The design basis criteria that were applied in determining the acceptability of the system modification to protect the Class 1E equipment from degradation of grid voltages are as follows:

- (1) General Design Criterion 17 (GDC 17), "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," Code of Federal Regulations, Title 10, Part 50 (10 CFR 50) [Ref. 8].
- (2) IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" [Ref. 9].
- (3) IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations" [Ref. 10].
- (4) NRC staff positions as stated in a letter dated June 3, 1977 [Ref. 1].

## 3. EVALUATION

### 3.1 EXISTING UNDERVOLTAGE PROTECTION

The Class 1E power system is supplied from the 34.5/4.16 kV reserve station service transformers (RSST's). The RSST's are equipped with automatic load tap changers (LTC) on the secondary side. The LTC's provide an output voltage adjustment of  $\pm 10\%$  voltage over full range operation by 32 taps, each of 0.625% voltage adjustment. Each tap change takes approximately 1.9 seconds.

The present undervoltage protection system design consists of two undervoltage relays on each 4160-volt Class 1E bus in a 2-out-of-2 coincident logic. After a bus voltage of 84% of 4160 volts (3494 volts) for 12 seconds, the relays initiate diesel generator starting. Continued voltage degradation to 79.5% of 4160 volts (3307 volts) for 12 additional seconds will cause the relays to initiate bus disconnection from the offsite source, load shedding of certain loads, and diesel generator breaker closing.

Another level of undervoltage protection exists on 4 kV transfer buses D, E, and F in a 2 out-of-2-coincident logic. This detection system has a voltage setpoint of 45.8% of 4160 volts (1905 volts). Actuation of these relays will automatically start the auxiliary feedwater pump and align appropriate MOV's under CLS conditions.

The existing design does not have a feature to automatically load shed the normally running loads on the Class 1E buses when transferring from the off-site sources to the diesel generators. The only loads which are automatically shed in the transfer are the residual heat removal (RHR) and component cooling (CC) pumps. These loads are connected to the stub buses which are fed from the 4160-volt Class 1E buses. After the diesel generator breaker closes and the bus voltage returns above the 79.5% voltage setpoint, the load shedding capability is restored for the RHR and CC pumps. Following diesel generator breaker tripping, manual load shedding may be required to limit the starting load on the bus after manually resetting and reclosing the breaker.

### 3.2 MODIFICATIONS

The licensee has proposed the following modifications to the existing undervoltage protection scheme (first level) in addition to adding a second level of undervoltage protection for sustained degraded voltages. The existing first-level scheme will be modified to a 2-out-of-3 coincident logic system. This scheme will initiate the automatic transfer of the Class 1E buses from the offsite source to the diesel generator at a voltage setpoint of  $75\% \pm 1\%$  of 4160 volts (3120 volts) with a time delay of 2 seconds, + 5 seconds, - 0.1 seconds. The functions of these relays remain the same.

The second-level scheme will consist of adding three undervoltage and time-delay relays on each 4160-volt Class 1E bus in a 2-out-of-3 coincident logic scheme. Additional auxiliary relays and alarms will also be incorporated into the design. The two different types of auxiliary relays to be used will operate in 0.014 and 0.084 seconds. The setpoints for this system are  $90\% \pm 1.0\%$  of 4160 volts (3744 volts) with a time delay of  $7 \pm 0.35$  seconds for a safety injection (SI) or consequence limiting sequence (CLS) and  $90\% \pm 1.0\%$  of 4160 volts (3744 volts) with a time delay of  $60 \pm 3$  seconds for non-accident conditions. System operation is as follows:

- (1) For voltage degradation to 90% of 4160 volts, the 2-out-of-3 logic scheme will initiate an alarm in the control room at 10 seconds, start the diesel generators at 50 seconds, and transfer the Class 1E buses from the offsite source to the diesel generators at 60 seconds. If an SI or CLS signal is concurrent with the degraded voltage, the 10, 50, and 60 second time delays are bypassed and a 7 second time delay is used. At 7 seconds the diesel generators receive a start signal and the transfer from offsite to onsite power is initiated.
- (2) Upon transfer initiation for an SI or CLS condition, the off-site source feeder breakers to the Class 1E buses, the stub bus tie breaker, the RHR and CC pumps, and a charging pump are automatically tripped.
- (3) Once the diesel generators reach a specified level of rated speed and voltage, the output breakers close 2 seconds after the feeder breaker opens. Upon closing of the breaker the first and second levels of undervoltage protection are automatically bypassed. Following breaker tripping, both levels of protection are automatically reinstated.

- (4) For an SI condition concurrent with undervoltage actuation, the charging pump, low head safety injection pump, and the filter exhaust fans receive immediate starting signals. At 50 seconds after the SI, the steam generator auxiliary feedwater pumps are started.
- (5) For a CLS condition concurrent with undervoltage actuation, the loads associated with a SI plus the containment spray pumps receive immediate start signals. In addition to the starting of the steam generator auxiliary feedwater pumps at 50 seconds, the inside recirculation spray pumps start at 120 seconds and the outside recirculation spray pumps start at 300 seconds.

### 3.3 DISCUSSION

This section presents a statement on the NRC staff position from their June 3, 1977 letter [Ref. 1] followed by an evaluation of the licensee's design.

#### 3.3.1 NRC Staff Position 1: Second Level of Undervoltage or Overvoltage Protection with a Time Delay

This position is to be met by the licensee meeting certain criteria. Each criterion has been evaluated against the licensee's proposal and is addressed below.

- (1) "The selection of voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels."

The licensee's analysis shows that the setpoint of 90% of 4160 volts (3744 volts) with a time delay of 7 seconds for an accident condition or 60 seconds for a non-accident condition will provide protection of all Class 1E equipment including relays, contactors, and other components whose functional performance would be inadequate because of undervoltage.

- (2) "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power sources."

The proposed modifications incorporate a 2-out-of-3 coincident logic to preclude spurious tripping from the offsite source.



(3) "The time delay selected shall be based on the following conditions."

(a) "The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis."

The maximum time delay assumed in the FSAR accident analysis is 10 seconds. That is, the diesel generators must be up to speed and voltage and accepting load within 10 seconds. The time delay of  $7 \pm .35$  seconds (for accident conditions) and the 2 seconds, + 5 seconds, - 0.1 second for diesel generator breaker closure do not exceed the 10 second time delay.

(b) "The time delay shall minimize the effect of short-duration disturbances from reducing the availability of the offsite power sources."

The time delays selected are long enough to override any short duration transients.

(c) "The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components."

The licensee's analysis has shown that the time delays will not cause the failure of any equipment connected to and associated with the Class 1E power system.

(4) "The undervoltage monitors shall automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time delay limits have been exceeded."

The 2-out-of-3 coincident logic of the undervoltage relays will initiate the automatic disconnection of the Class 1E buses from the offsite source whenever the voltage and time delay setpoints are exceeded.

(5) "The voltage monitors shall be designed to satisfy the requirements of IEEE Standard 279-1971."

The licensee states and my review finds that the proposed modifications will comply with the requirements of IEEE 279-1971.

(6) "The Technical Specifications shall include limiting conditions for operation, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection monitors."

The licensee submitted draft Technical Specifications for the proposed design modifications which included trip setpoints with tolerances, surveillance requirements, and limiting conditions for operation.

3.3.2 NRC Staff Position 2: Interaction of Onsite Power Sources with Load Shed Feature

The second position requires the system be designed to prevent automatic load shedding of the emergency buses once the onsite sources are supplying power to all sequenced loads. If an adequate basis can be provided for retaining the load-shed feature, the licensee must assign maximum and minimum values to the setpoint of the load-shed feature. These setpoints must be documented in the Technical Specifications. The load-shedding feature must also be reinstated if the onsite source supply breakers are tripped.

The undervoltage relays (both first and second levels) are disabled once the diesel generators are supplying the Class 1E buses. This allows for the loads starting not to interact with the load shedding feature. Following tripping of the onsite sources the undervoltage relays are reinstated.

3.3.3. NRC Staff Position 3: Onsite Power Source Testing

The third position requires that certain test requirements be included in the Technical Specifications. These tests are to "...demonstrate the full functional operability and independence of the onsite power sources at least once per 18 months during shutdown." The tests are to simulate loss of offsite power in conjunction with a safety-injection actuation signal and to simulate interruption and subsequent reconnection of onsite power sources. These tests will verify the proper operation of the load-shed system, the load-shed bypass circuitry, and that there is no adverse interaction between the onsite and offsite power sources.

The licensee will verify the requirements of the NRC with a test of the system by simulating a loss of offsite power in conjunction with a LOCA signal. The test sequence will be bus de-energization, load shedding, voltage restoration, and load sequencing. The operating time on emergency onsite power will be at least 5 minutes with full load. The licensee will also interrupt the diesel generator power source while they are supplying the Class 1E buses to test the reinstatement of the load-shedding circuitry, the load-shedding operation and then upon re-energization of the onsite power source, test the load-sequencing circuitry.

3.4 TECHNICAL SPECIFICATIONS

The changes proposed by VEPCO to the Surry Power Station, Units 1 and 2 Technical Specification, reflect the proposed design modifications. Specifically, the proposed changes:

- (1) Include the trip setpoints for the loss of voltage scheme of 75% + 1% of 4160 volts (3120 volts) with a time delay of 2 seconds, + 5 seconds, - 0.1 second.

- (2) Include the trip setpoints for the degraded voltage scheme of  $90\% \pm 1\%$  of 4160 volts (3744 volts) with a time delay of  $60 \pm 3$  seconds for non-CLS or non-SI conditions and  $7 \pm 0.35$  seconds for CLS or SI conditions.
- (3) Provide the required coincident logic (2-out-of-3).
- (4) Provide the surveillance requirements to demonstrate at least once per 18 months that the loss of offsite power in conjunction with an SI signal will provide the sequence of Class 1E bus de-energization, load shedding, voltage restoration, and load sequencing. Also, that upon interruption of the onsite sources the loads are shed, buses re-energized, and subsequent load sequencing occurs as designed.
- (5) Provide the surveillance requirements for channel calibration during refueling shutdown and the monthly channel functional test.
- (6) Incorporate action statements regarding limiting conditions for operation when the number of operable channels for undervoltage protection is reduced.

#### 4. CONCLUSIONS

Based on the information submitted by VEPCO, it has been determined that the proposed design modifications and Technical Specification changes meet the requirements of NRC Staff Position 1. The voltage trip settings and time delays for both accident and non-accident conditions will automatically protect the Class 1E equipment from sustained voltage degradation.

The licensee is automatically bypassing the load-shed feature once the diesel generators are supplying the Class 1E buses and will auto-reinstate the load-shed feature following generator breaker tripping. Therefore, NRC Staff Position 2 is met.

The proposed additions to the Technical Specifications and the method of testing the logic circuitry have been reviewed and found to meet the requirements of NRC Staff Position 3.

The licensee is required to submit formal Technical Specifications to document the modifications to the undervoltage protection scheme and the onsite source test requirements.

Accordingly, I recommend that the NRC approve the proposed design modifications and proposed Technical Specifications changes.

## REFERENCES

1. NRC letter to VEPCO, dated June 3, 1977.
2. VEPCO letter (C. M. Stallings) to NRC (E. G. Case), dated September 26, 1977.
3. VEPCO letter (C. M. Stallings) to NRC (H. R. Denton), dated October 15, 1979.
4. VEPCO letter (P. R. Sylvia) to NRC (H. R. Denton), dated May 26, 1981.
5. VEPCO letter (R. H. Leasburg) to NRC (H. R. Denton), dated March 31, 1982.
6. VEPCO letter (R. H. Leasburg) to NRC (S. A. Varga), dated June 11, 1982.
7. VEPCO letter (R. H. Leasburg) to NRC (S. A. Varga), dated June 30, 1982.
8. Telecopy (G. S. Shukla) to NRC (D. Prevatte), dated August 10, 1982.
9. Code of Federal Regulations, Title 10, Part 50 (10 CFR 50), General Design Criterion 17 (GDC 17), "Electric Power Systems" of Appendix A "General Design Criteria for Nuclear Power Plants."
10. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."
11. IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NOS. 50-280 AND 50-281VIRGINIA ELECTRIC AND POWER COMPANYNOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY  
OPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 80 to Facility Operating License No. DPR-32 and Amendment No. 81 to Facility Operating License No. DPR-37 issued to Virginia Electric and Power Company (the licensee), which revised Technical Specifications for operation of the Surry Power Station, Unit Nos. 1 and 2, respectively, (the facilities), located in Surry County, Virginia. The amendments are effective as of the date of issuance.

The amendments revise the Technical Specifications related to the degraded voltage protection system. The proposed Technical Specifications require the operability of voltage sensing channels, establishes setpoints for degraded voltage and loss of power, and requires periodic testing and calibration.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of these amendments was not required since these amendments do not involve a significant hazards consideration.

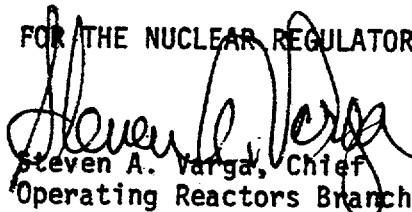
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The Commission has determined that the issuance of these amendments will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of these amendments.

For further details with respect to this action, see (1) the application for amendments dated August 17, 1982, (2) Amendment Nos. 80 and 81 to License Nos. DPR-32 and DPR-37, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. and at the Swem Library, College of William and Mary, Williamsburg, Virginia 23185. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland, this 5th day of October 1982.

FOR THE NUCLEAR REGULATORY COMMISSION

  
Steven A. Varga, Chief  
Operating Reactors Branch #1  
Division of Licensing