



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

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

FACILITY OPERATING LICENSE

License No. NPF-4

1. The Nuclear Regulatory Commission (the Commission) having found that:
  - A. The issuance of this license to the Virginia Electric and Power Company (VEPCO) and the Old Dominion Electric Cooperative (ODEC) for the North Anna Power Station, Unit No. 1 (facility) 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, as amended, 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 operating license can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the rules and regulations of the Commission;
  - D. VEPCO is technically and financially qualified to engage in the activities authorized by this operating license in accordance with the rules and regulations of the Commission;
  - E. VEPCO and the Old Dominion Electric Cooperative (ODEC) have satisfied the applicable provisions of 10 CFR Part 140, "Financial Protection Requirements and Indemnity Agreements," of the Commission's regulations;
  - F. The issuance of this operating license will not be inimical to the common defense and security or to the health and safety of the public;
  - G. After weighing the environmental, economic, technical, and other benefits of the facility against environmental and other costs and considering available alternatives, the issuance of Facility Operating License No. NPF-4, subject to the conditions for protection of the environment set forth herein, is in accordance with Appendix D to 10 CFR Part 50 of the Commission's regulations and all applicable requirements have been satisfied; and

- H. The receipt, possession, and use of source, byproduct, and special nuclear material as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30, 40, and 70, including 10 CFR Sections 30.33, 40.32, and 70.23 and 70.31; and
  - I. The Old Dominion Electric Cooperative is a partial financial owner of the facility and will not operate the facility.
2. Facility Operating License No. NPF-4 is hereby issued to the Virginia Electric and Power Company (VEPCO) and Old Dominion Electric Cooperative (ODEC) to read as follows:
- A. This license applies to the North Anna Power Station, Unit No. 1, a pressurized water reactor and associated equipment (the facility), owned by the Virginia Electric and Power Company and the Old Dominion Electric Cooperative. The facility is located near Mineral, in Louisa County, Virginia, and is described in the "Updated Final Safety Analysis Report" and the Environmental Report as supplemented and amended (Supplements 1 through 4, Appendix L).
  - B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses:
    - (1) Pursuant to Section 103 of the Act and 10 CFR Part 50, "Licensing of Production and Utilization Facilities," VEPCO and ODEC to possess and VEPCO to use and operate the facility at the designated location in Louisa County, Virginia in accordance with the procedures and limitations set forth in this license;
    - (2) Pursuant to the Act and 10 CFR Part 70, VEPCO to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Updated Final Safety Analysis Report;
    - (3) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, VEPCO to receive, possess, and use at any time any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
    - (4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, VEPCO to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material, without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
    - (5) Pursuant to the Act and 10 CFR Parts 30 and 70, VEPCO to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
  - C. This license shall be deemed to contain and is subject to the condition specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of

Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

VEPCO is authorized to operate the North Anna Power Station, Unit No. 1, at reactor core power levels not in excess of 2893 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 230, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Additional Conditions

The matters specified in the following conditions shall be completed to the satisfaction of the Commission within the stated time periods following the issuance of the condition or within the operational restrictions indicated. The removal of these conditions shall be made by an amendment to the license supported by a favorable evaluation by the Commission:

a. VEPCO may use up to four (4) fuel assemblies containing advanced zirconium based allows as described in the licensee's submittal dated September 4, 1996, as supplemented February 3, 1997.

b. If VEPCO plans to remove or to make significant changes in the normal operation of equipment that controls the amount of radioactivity in effluents from the North Anna Station, the Commission shall be notified in writing regardless of whether the change affects the amount of radioactivity in the effluents.

c. VEPCO shall implement a procedure that will prohibit entry into an extended Emergency Diesel Generator Outage Time (14 days), for scheduled maintenance purposes, if severe weather conditions are expected, as described in the licensee's application dated June 25, 1998, and evaluated in the staff's Safety Evaluation dated August 26, 1998.

(4) The licensee is authorized to receive from the Surry Nuclear Power Station Units No. 1 and 2, possess, and store irradiated Surry fuel assemblies containing special nuclear material, enriched to not more than 4.1% by weight U-235 subject to the following conditions:

a. Surry fuel assemblies may not be placed in North Anna Power Station Units No. 1 and 2 reactors.

b. Irradiated fuel shipped to North Anna shall have been removed from the Surry reactors no less than 730 days prior to shipment.

- c. No more than 500 Surry irradiated fuel assemblies shall be received for storage at the North Anna Units No. 1 and 2 spent fuel pool.

(5) Environmental Protection Plan

The Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 197, is hereby incorporated in the license. The licensee shall operate the facility in accordance with the Environmental Protection Plan.

D. Fire Protection

VEPCO shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report for the facility and as approved in the SER dated February 1979 subject to the following provision:

The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

E. Physical Protection

The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, guard training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The plans, which contain Safeguards Information protected under 10 CFR 73.21, are entitled: "North Anna Power Station Security Plan," with revisions submitted through February 24, 1988; "North Anna Power Station Guard Training and Qualification Plan," with revisions submitted through May 14, 1987; and "North Anna Power Station Safeguard Contingency Plan," with revisions submitted through January 9, 1987. Changes made in accordance with 10 CFR 73.55 shall be implemented in accordance with the schedule set forth therein.

- F. This license is effective as of the date of issuance and shall expire at midnight on April 1, 2018.

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by:  
R. C. DeYoung, for

Roger S. Boyd, Director  
Division of Project Management  
Office of Nuclear Reactor Regulation

Attachments:

1. Appendix A, Technical Specifications
2. Appendix B, Environmental Protection Plan

Date of Issuance: APR 1 1978

Amendment No. 230

## 2.0 SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

### 2.1 SAFETY LIMITS

#### REACTOR CORE

2.1.1 The combination of THERMAL POWER, pressurizer pressure, and the highest operating loop coolant temperature ( $T_{avg}$ ) shall not exceed the limits shown in Figures 2.1-1 for 3 loop operation and 2.1-2 and 2.1-3 for 2 loop operation.

APPLICABILITY: MODES 1 and 2.

#### ACTION:

Whenever the point defined by the combination of the highest operating loop average temperature and THERMAL POWER has exceeded the appropriate pressurizer pressure line, be in HOT STANDBY within 1 hour.

#### REACTOR COOLANT SYSTEM PRESSURE

2.1.2 The Reactor Coolant System pressure shall not exceed 2735 psig.

APPLICABILITY: MODES 1, 2, 3, 4 and 5.

#### ACTION:

##### MODES 1 and 2

Whenever the Reactor Coolant System pressure has exceeded 2735 psig, be in HOT STANDBY with the Reactor Coolant System pressure within its limit within 1 hour.

##### MODES 3, 4 and 5

Whenever the Reactor Coolant System pressure has exceeded 2735 psig, reduce the Reactor Coolant System pressure to within its limit within 5 minutes.

TABLE 2.2-1  
REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
1. Manual Reactor Trip	Not Applicable	Not Applicable
2. Power Range, Neutron Flux	Low Setpoint - $\leq 25\%$ of RATED THERMAL POWER High Setpoint - $\leq 109\%$ of RATED THERMAL POWER	Low Setpoint - $\leq 26\%$ of RATED THERMAL POWER High Setpoint - $\leq 110\%$ of RATED THERMAL POWER
3. Power Range, Neutron Flux, High Positive Rate	$\leq 5\%$ of RATED THERMAL POWER with a time constant $\geq 2$ seconds	$\leq 5.5\%$ of RATED THERMAL POWER with a time constant $\geq 2$ seconds
4. Power Range, Neutron Flux, High Negative Rate	$\leq 5\%$ of RATED THERMAL POWER with a time constant $\geq 2$ seconds	$\leq 5.5\%$ of RATED THERMAL POWER with a time constant $\geq 2$ seconds
5. Intermediate Range, Neutron Flux	$\leq 35\%$ of RATED THERMAL POWER	$\leq 40\%$ of RATED THERMAL POWER
6. Source Range, Neutron Flux	$\leq 10^5$ counts per second	$\leq 1.3 \times 10^5$ counts per second
7. Overtemperature $\Delta T$	See Note 1	See Note 3
8. Overpower $\Delta T$	See Note 2	See Note 3
9. Pressurizer Pressure - Low	$\geq 1870$ psig	$\geq 1860$ psig
10. Pressurizer Pressure - High	$\leq 2360$ psig	$\leq 2370$ psig
11. Pressurizer Water Level - High	$\leq 92\%$ of instrument span	$\leq 93\%$ of instrument span
12. Loss of Flow	$\geq 90\%$ of design flow per loop*	$\geq 89\%$ of design flow per loop*

\* Design flow per loop is one-third of the minimum allowable Reactor Coolant System Total Flow Rate as specified in Table 3.2-1.

TABLE 2.2-1 (Continued)  
REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

Operation with 3 Loops	Operation with 2 Loops (no loops isolated)*	Operations with 2 Loops (1 loop isolated)*
$K_1 = 1.264$	$K_1 = ( \quad )$	$K_1 = ( \quad )$
$K_2 = 0.0220$	$K_2 = ( \quad )$	$K_2 = ( \quad )$
$K_3 = 0.001152$	$K_3 = ( \quad )$	$K_3 = ( \quad )$

and  $f_1(\Delta I)$  is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

- (i) for  $q_t - q_b$  between -44 percent and +3 percent,  $f_1(\Delta I) = 0$  (where  $q_t$  and  $q_b$  are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and  $q_t + q_b$  is total THERMAL POWER in percent of RATED THERMAL POWER).
- (ii) for each percent that the magnitude of  $(q_t - q_b)$  exceeds -44 percent, the  $\Delta T$  trip setpoint shall be automatically reduced by 1.67 percent of its value at RATED THERMAL POWER.
- (iii) for each percent that the magnitude of  $(q_t - q_b)$  exceeds +3 percent, the  $\Delta T$  trip setpoint shall be automatically reduced by 2.00 percent of its value at RATED THERMAL POWER.

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\* Values dependent on NRC approval of ECCS evaluation for these operating conditions.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTSNOTATION (Continued)

NOTE 2: Overpower  $\Delta T \leq \Delta T_0 \left[ K_4 - K_5 \left( \frac{\tau_3 S}{1 + \tau_3 S} \right) T - K_6 (T - T') - f_2(\Delta I) \right]$

Where:  $\Delta T_0$  = Indicated  $\Delta T$  at RATED THERMAL POWER

$T$  = Average temperature, °F

$T'$  = Indicated  $T_{avg}$  at RATED THERMAL POWER  $\leq 586.8^\circ\text{F}$

$K_4$  = 1.079

$K_5$  = 0.02/°F for increasing average temperature

$K_5$  = 0 for decreasing average temperature

$K_6$  = 0.00164 for  $T > T'$ ;  $K_6 = 0$  for  $T \leq T'$

$\frac{\tau_3 S}{1 + \tau_3 S}$  = The function generated by the rate lag controller for  $T_{avg}$  dynamic compensation

$\tau_3$  = Time constant utilized in the rate lag controller for  $T_{avg}$   
 $\tau_3 = 10$  secs.

$S$  = Laplace transform operator ( $\text{sec}^{-1}$ )

$f_2(\Delta I)$  = 0 for all  $\Delta I$

NOTE 3: The channel's maximum trip point shall not exceed its computed trip point by more than 2 percent span.