August 2, 1989

Docket Nos. 50-280
and 50-281

DISTRIBUTION
See attached sheet

Mr. W. R. Cartwright
Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060

Dear Mr. Cartwright:

SUBJECT: SURRY UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS RE: INDIVIDUAL ROD POSITION INDICATING SYSTEM (TAC NOS. 69106 AND 69107)

The Commission has issued the enclosed Amendment No. 131 to Facility Operating License No. DPR-32 and Amendment No. 131 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 5, 1988, as supplemented January 25, 1989.

These amendments revise the requirements governing the operability of the Individual Rod Position Indicating System (IRPIS). The changes involve shifting the emphasis from the IRPIS to the demand position indicating system (the step counters) for rod group position information during shutdown and certain transient operational modes such as reactor startup.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by

Bart C. Buckley, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 131 to DPR-32
2. Amendment No. 131 to DPR-37
3. Safety Evaluation

cc w/enclosures:
See next page

[SURRY AMEND 69106/69107]

LA:PDII-2	PM:PDII-2	D:PDII-2	SRXB	OGC
DMiller	BBuckley:bd	HBerkow	WHodges	
07/13/89	07/13/89	07/14/89	07/19/89	07/24/89

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PDR ADOCK 05000280
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Mr. W. R. Cartwright
Virginia Electric and Power Company

Surry Power Station

cc:
Michael W. Maupin, Esq.
Hunton and Williams
Post Office Box 1535
Richmond, Virginia 23212

Mr. Michael Kansler, Manager
Surry Power Station
Post Office Box 315
Surry, Virginia 23883

Resident Inspector
Surry Power Station
U.S. Nuclear Regulatory Commission
Post Office Box 166, Route 1
Surry, Virginia 23883

Mr. Sherlock Holmes, Chairman
Board of Supervisors of Surry County
Surry County Courthouse
Surry, Virginia 23683

Mr. W. T. Lough
Virginia Corporation Commission
Division of Energy Regulation
Post Office Box 1197
Richmond, Virginia 23209

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street N.W., Suite 2900
Atlanta, Georgia 30323

C. M. G. Buttery, M.D., M.P.H.
Department of Health
109 Governor Street
Richmond, Virginia 23219

Attorney General
Supreme Court Building
101 North 8th Street
Richmond, Virginia 23219

DATED: August 2, 1989

AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. DPR-32 - SURRY UNIT 1
AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. DPR-37 - SURRY UNIT 2

Docket File
NRC & Local PDRs
PDII-2 Reading
S. Varga, 14/E/4
G. Lainas, 14/H/3
H. Berkow
D. Miller
B. Buckley
OGC-WF
D. Hagan, 3302 MNBB
E. Jordan, 3302 MNBB
B. Grimes, 9/A/2
T. Meek (8), P1-137
Wanda Jones, P-130A
J. Calvo, 11/F/23
ACRS (10)
GPA/PA
OC/LFMB
B. Sinkule, R-II
M. Chatterton

cc: Plant Service list

DF01
1|1

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-280

SURRY POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 131
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 5, 1988, as supplemented January 25, 1989, 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. 131, 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

Herbert N. Berkow

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 2, 1989

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. 131
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 5, 1988, as supplemented January 25, 1989, 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. 131 , 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

Herbert N. Berkow

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 2, 1989

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 131 FACILITY OPERATING LICENSE NO. DPR-32

AMENDMENT NO. 131 FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NOS. 50-280 AND 50-281

Revise Appendix A as follows:

Remove Pages	Insert Pages
TS 3.12-8	TS 3.12-8
TS 3.12-10	TS 3.12-10
TS 3.12-11	TS 3.12-11
TS 3.12-13	TS 3.12-13
---	TS 3.12-13a
TS 4.1-6	TS 4.1-6
TS 4.1-7	TS 4.1-7

ΔT and Overtemperature ΔT trip settings shall be reduced by the equivalent of 2% power for every 1% quadrant to average power tilt.

C. Inoperable Control Rods

1. A control rod assembly shall be considered inoperable if the assembly cannot be moved by the drive mechanism or the assembly remains misaligned from its group step demand position by more than ±24 steps during the "Thermal Soak" period, as defined in Section 3.12.E.1.b, or ±12 steps otherwise during power operation. No tolerance limit is required in the shutdown modes, but a rod shall be considered inoperable if the rod position indicators do not verify rod movement upon demand. Additionally, a full-length control rod shall be considered inoperable if its rod drop time is greater than 2.4 seconds to dashpot entry.
2. No more than one inoperable control rod assembly shall be permitted when the reactor is critical.
3. If more than one control rod assembly in a given bank is out of service because of a single failure external to the individual rod drive mechanism, (i.e. programming circuitry), the provisions of Specifications 3.12.C.1 and 3.12.C.2 shall not apply and the reactor may remain critical for a period not to exceed two hours provided immediate attention is directed toward making the necessary repairs. In the event the affected assemblies cannot be returned to service within this specified period, the reactor will be brought to hot shutdown conditions.
4. The provisions of Specifications 3.12.C.1 and 3.12.C.2 shall not apply during physics tests in which the assemblies are intentionally misaligned.
5. Power operation may continue with one rod inoperable provided that within one hour either:
   a. the rod is no longer inoperable as defined in Specification 3.12.C.1, or

5. If power has been reduced in accordance with Specification 3.12.C.5.b, power may be increased above 75% power provided that:
   a) an analysis has been performed to determine the hot channel factors and the resulting allowable power level based on the limits of Specification 3.12.B.1, and
   b) an evaluation of the effects of operating at the increased power level on the accident analyses of Table 3.12-1 has been completed.

D. Core Quadrant Power Balance:

1. If the reactor is operating above 75% of rated power with one excore nuclear channel out of service, the core quadrant power balance shall be determined:
   a. Once per day, and
   b. After a change in power level greater than 10% or more than 30 inches of control rod motion.
2. The core quadrant power balance shall be determined by one of the following methods:
   a. Movable detectors (at least two per quadrant)
   b. Core exit thermocouples (at least four per quadrant)

E. Rod Position Indicator Channels

1. Rod Position Indication shall be provided as follows:
   a. Above 50% power, the rod position indication system shall be operable and capable of determining the control rod positions to within ±12 steps of their respective group step demand counter indications.
   b. From movement of control banks to achieve criticality up to 50% power, the rod position indication system shall be operable and capable of determining the control rod positions to within ±24 steps of their respective group step demand counter indications for a maximum of one hour out of twenty-four, and to within ±12 steps otherwise. During the one-hour "Thermal Soak" period, the step demand counters shall be operable and capable of determining the group demand positions to within ±2 steps.

c. In hot, intermediate and cold shutdown conditions, the step demand counters shall be operable and capable of determining the group demand positions to within ±2 steps. The rod position indicators shall be available to verify rod movement upon demand.

2. If a rod position indicator channel is out of service, then:
   a. For operation above 50% of rated power, the position of the RCC shall be checked indirectly using the movable incore detectors at least once per 8 hours and immediately after any motion of the non-indicating rod exceeding 24 steps, or
   b. Reduce Power to less than 50% of rated power within 8 hours. During operations below 50% of rated power, no special monitoring is required.
3. If more than one rod position (RPI) indicator channel per group or two RPI channels per bank are inoperable during control bank motion to achieve criticality or power operations, then the requirements of Specification 3.0.1 will be followed.

<u>Basis</u>

The reactivity control concept assumed for operation is that reactivity changes accompanying changes in reactor power are compensated by control rod assembly motion. Reactivity changes associated with xenon, samarium, fuel depletion, and large changes in reactor coolant temperature (operating temperature to cold shutdown) are compensated for by changes in the soluble boron concentration. During power operation, the shutdown groups are fully withdrawn and control of power is by the control groups. A reactor trip occurring during power operation will place the reactor into the hot shutdown condition. The control rod assembly insertion limits provide for achieving hot shutdown by reactor trip at any time, assuming the highest worth control rod assembly remains fully withdrawn, with sufficient margins to meet the assumptions used in the accident analysis. In addition, they provide a limit in service, the effects of malpositioned control rod assemblies are observable from nuclear and process information displayed in the Main Control Room and by core thermocouples and in-core movable detectors. Below 50% power, no special monitoring is required for malpositioned control rod assemblies with inoperable rod position indicators because, even with an unnoticed complete assembly misalignment (full length control rod assembly 12 feet out of alignment with its bank), operation at 50% steady state power does not result in exceeding core limits.

The "Thermal Soak" allowance below 50% power, during which the rod position indication system tolerance requirement is relaxed, provides time for the system to reach thermal equilibrium. A total of one hour in twenty-four is available for this allowance, which may be a continuous hour or may consist of discrete, shorter intervals. For such a short period of time, a misaligned rod does not pose an unacceptable risk. At these conditions, the rod position indicators should still be used to verify rod movement but not their exact location. The tolerance is tightened after one hour to ensure that the thermal overshoot does not conceal an actual rod misalignment.

The reliance upon the step demand counters at hot and cold shutdown conditions shifts the monitoring of rod position from the rod position indication system to the more reliable demand counters when RCS temperature is changing greatly but the core remains subcritical. The step demand counters also provide precise group demand positions during the thermal soak period.

The specified control rod assembly drop time is consistent with safety analyses that have been performed.

An inoperable control rod assembly imposes additional demands on the operators. The permissible number of inoperable control rod assemblies is limited to one in order to limit the magnitude of the operating burden, but such a failure would not prevent dropping of the operable control rod assemblies upon reactor trip.

Two criteria have been chosen as a design basis for fuel performance related to fission gas release, pellet temperature, and cladding mechanical properties. First, the peak value of fuel centerline temperature must not exceed 4700°F. Second, the minimum DNBR in the core must not be less than the applicable design limit in normal operation or in short term transients.

TABLE 4.1-1

MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

Channel Description	Check	Calibrate	Test	Remarks
1. Nuclear Power Range	S	D(1) Q(3) R(4)	M(2)	1) Against a heat balance standard 2) Signal at ΔT; bistable action (permissive, rod stop, trip) 3) Upper and lower chambers for symmetric offset by means of the movable incore detector system 4) Neutron detectors may be excluded from Channel Calibration
2. Nuclear Intermediate Range (below P-10 setpoint)	*S	R(2)	P(1)	1) Log level; bistable action (permissive, rod stop, trip) 2) Neutron detectors may be excluded from Channel Calibration
3. Nuclear Source Range (below P-6 setpoint)	*S	R(2)	P(1)	1) Bistable action (alarm, trip) 2) Neutron detectors may be excluded from Channel Calibration
4. Reactor Coolant Temperature	*S	R	M(1) M(2)	1) Overtemperature ΔT 2) Overpower ΔT
5. Reactor Coolant Flow	S	R	M	
6. Pressurizer Water Level	S	R	M	
7. Pressurizer Pressure (High & Low)	S	R	M	
8. 4 KV Voltage and Frequency	N.A.	R	M	
9. Analog Rod Position	*S(1,2) (4)	R	M(3)	1) With step counters 2) Each six inches of rod motion when data logger is out of service 3) Rod bottom bistable action 4) N.A. when reactor is in hot, intermediate or cold shutdown

TABLE 4.1-1 (Continued)

MINIMUM FREQUENCIES FOR CHECK, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

	Channel Description	Check	Calibrate	Test	Remarks
10.	Rod Position Bank Counters	S(1,2) Q(3)	N.A.	N.A.	1) Each six inches of rod motion when data logger is out of service 2) With analog rod position 3) For the control banks, the benchboard indicators shall be checked against the output of the bank overlap unit.
11.	Steam Generator Level	S	R	M	
12.	Charging Flow	N.A.	R	N.A.	
13.	Residual Heat Removal Pump Flow	N.A.	R	N.A.	
14.	Boric Acid Tank Level	*D	R	N.A.	
15.	Refueling Water Storage Tank Level	S	R	M	
16.	Volume Control Tank Level	N.A.	R	N.A.	
17.	Reactor Containment Pressure-CLS	*D	R	M(1)	1) Isolation valve signal and spray signal
18.	Boric Acid Control	N.A.	R	N.A.	
19.	Containment Sump Level	N.A.	R	N.A.	
20.	Accumulator Level and Pressure	S	R	N.A.	
21.	Containment Pressure-Vacuum Pump System	S	R	N.A.	
22.	Steam Line Pressure	S	R	M	

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. DPR-32

AND AMENDMENT NO.131 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

1.0 INTRODUCTION

By letter dated August 5, 1988 and supplemented by letter dated January 25, 1989, Virginia Electric and Power Company (the licensee) requested changes to the Technical Specifications for Surry Units 1 and 2. The proposed changes would revise the requirements governing the operability of the Individual Rod Position Indicating System (IRPIS). The basic thrust of the proposed changes is to shift the emphasis from the IRPIS to the demand position indicating system (the step counters) for rod group position information during shutdown and certain transient operational modes such as reactor startup.

The Technical Specifications for the Surry Plants (and most Westinghouse reactors) require the position of all control rods as indicated by the IRPIS to be in agreement with the group step counter demand position within ±12 steps. A step is 5/8 inch. The ±12 step requirement reflects the accident analysis assumption that the rods can be misaligned by 24 steps, which consists of an indicated 12 step misalignment with a 12 step uncertainty. Many Westinghouse plants have experienced difficulties with calibration and accuracy of the IRPIS. The instrumentation readout design is based on the assumption that the secondary output voltage is a linear function of rod position, when in fact it is not. The deviation is normally absorbed by the ±12 step allowance for rod misalignment. The second and more serious drawback of the system is that it is highly sensitive to both RCS temperature changes and rod motion. Calibration is usually done at hot operating temperatures at the beginning-of-cycle. When the reactor is cooled to hot and cold shutdown, the calibration curve becomes inaccurate and may be off as much as 60 steps or over one-fourth of the core height.

The transient thermal response problem is one of "overshoot." If a rod is inserted or withdrawn, the IRPIS will show greater movement than actual for a period of time. The indicated error can be as high as 25 steps and the time for the IRPIS to reach equilibrium can be as much as 45 minutes.

2.0 EVALUATION

The licensee has proposed changes to the Technical Specifications which will emphasize the demand position indicating system during the shutdown modes and during startup and shutdown operations. The proposed changes will be discussed separately.

During shutdown conditions, the IRPIS operability requirements will be replaced with a requirement for a ±2 step demand counter accuracy. The demand position indicators have been very reliable at Surry and throughout the industry. In the shutdown modes, the Technical Specifications require a minimum of 1.0% shutdown reactivity margin and the procedures for determining required boron concentrations include a conservative allowance for calculation and measurement uncertainties. Since keff is less than 0.99 in shutdown modes and due to the high reliability of the demand position indicators, the IRPIS is not needed to guarantee subcriticality and/or shutdown margin in these modes. In addition, the staff has approved this change on other plants. Therefore, the proposed change is acceptable.

The second change proposed was incorporation of a "soak time" of up to 1 hour for every 24 hours below 50% power. The IRPIS channels will still verify that the rods are moving in or out on demand but will not be relied on for precise position indication. The licensee analyzed the impact of statically misaligned or dropped rods in core power distribution for each reload core to demonstrate that the Condition II DNB limits are met for power levels up to and including hot full power. The 1 hour "thermal soak" will apply only at power less than 50%. In addition, the 1 hour soak time for every 24 hours below 50% power ensures that the IRPIS is still used a minimum of 96% of the time even at low power. We find this change acceptable.

3.0 SUMMARY

We have reviewed the request of the licensee to change the Technical Specifications on the IRPIS for the Surry Power Station Units 1 and 2. Based on the review, we conclude that the changes as proposed by the licensee are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of the facilities components located within the restricted areas as defined in 10 CFR Part 20. The staff has determined that these 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. 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 these amendments.

5.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: August 2, 1989

Principal Contributor:

M. Chatterton