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

PUBLIC SERVICE COMPANY OF COLORADO

DOCKET NO. 50-267

FORT ST. VRAIN NUCLEAR GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 28
License No. DPR-34

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Public Service Company of Colorado (the licensee) dated July 6, 1982 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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 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.

DESIGNATED ORIGINAL
Certified By Patricia J. Noonan

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Section 2.D of Facility Operating License No. DPR-34 is hereby amended to read as follows:

   2.D.(2) <u>Technical Specifications</u>

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 28, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

   2.D.(4) Delete. This condition has been fulfilled.

   2.D.(5) Remove in its entirety.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A. Clark

Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Attachment:
Changes to the
Technical Specifications

Date of Issuance: October 5, 1982

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 28 TO FACILITY OPERATING LICENSE NO. DPR-34

DOCKET NO. 50-267

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

REMOVE	INSERT
Table of Contents in its entirety (1-vi)	Table of Contents in its entirety (i-vii)
	2-7
	2-8
4.1-11	4.1-11
4.1-12	4.1-12
	4.1-12a
	4.1-12b
	4.1-12c
	4.1-12d
	4.1-12e
4.1-13	4.1-13
4.2-2 (dated 12/8/76)	4.2-2
	5.1-7 (new)
	5.1-8 "
	5.1-9 "
	5.1-10 "

FORT ST. VRAIN NUCLEAR GENERATING STATION

TECHNICAL SPECIFICATIONS

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Specification LCO 4.2.2 - Operable Circulator, Limiting Conditions for Operation

A circulator shall not be considered operable unless the following conditions or system requirements are met for that circulator:

a) Emergency Feedwater and Firewater are available to drive the water turbine and the capability for turbine water drainage exists. The Emergency Feedwater or Condensate Header may be inoperable for up to 24 hours without the helium circulators being considered inoperable.

b) The normal bearing water system is operable.

c) The associated bearing water accumulator system is operable.

d) Both Bearing Water Makeup Pumps are operable to provide required makeup. One of the bearing water makeup pumps may be inoperable for 24 hours without the helium circulators being considered inoperable.

Basis for Specification LCO 4.2.2

The requirements for an operable circulator specified above provide for adequate circulator water turbine supply and circulator auxiliary supplies to assure safe shutdown cooling. Operation of one circulator on emergency feedwater would provide adequate helium circulation following a postulated depressurization accident. Each independent bearing water system provides a continuous supply of bearing water to the two circulators in each primary cooling loop. In addition, a backup bearing water system is provided which automatically introduces water to the circulators if the normal supply fails. Two gas pressurized bearing water accumulators (one each for the two circulators in each primary coolant loop) are provided.

2.21 Individual Refueling Region Outlet Temperature

The individual refueling region outlet temperature is defined as follows:

a) For Regions 1 through 19 and 21 through 31, the measured refueling region outlet temperature.

b) For Regions 20 and 32 through 37, whichever of the following temperatures is hottest: 1) the measured refueling region outlet temperature or 2) the refueling region outlet temperature based upon the following quantities:

   1) The ratio of the relative power in each of these regions to that in their "comparison regions" as determined from physics calculations.

   2) The ratio of the helium flow rate through each of these regions to that through their "comparison regions" as determined based upon inlet orifice valve positions.

   3) The measured refueling region outlet temperatures of their "comparison region."

2.22 Comparison Region

A comparison region is a core refueling region whose power, flow, and coolant outlet temperature characteristics are used to determine the outlet temperature of a region for which the measured outlet temperature is unreliable. Experience has shown that Regions 20 and 32 through 37 have the potential for significant discrepancies between measured and actual region outlet temperature. These discrepancies are caused by a transverse flow of relatively cool helium from the core reflector interface along the region outlet thermocouple sleeve. This flow passes over the region outlet thermocouple assemblies of these regions and depresses the indicated outlet temperature.

The reactivity requirements for the reserve shutdown system can be summarized as follows:

	Cooldown and Xe Decay (Δk)	Pa Decay (7d) Sm Buildup	Required Shutdown (Δk)	Total Worth 35 Units Operable	Full Pa Decay Sm Buildup	Total Worth 37 Unit Operable
Beginning of Initial Cycle	.089	0.0	0.01	.099	0.0	.099
Middle of Initial Cycle	.081	.002	0.01	.093	.030	.121
Equilibrium Cycle	.076	.002	0.01	.088	.024	.110

As stated in Section 3.5.3.3 of the FSAR, the nominal worth for all 37 channels of the reserve shutdown system is .12 Δk at all times in the absence of control rods. It was calculated to be as large as .14 Δk in the initial core and .13 Δk in the equilibrium core. This is sufficient reactivity control to cover core cooldown, Xe decay, and full Pa decay. With the maximum worth channel inoperative in each subsystem, the worth of the 35 inserted units was calculated to be greater than .101 Δk in the initial core and .088 Δk in the equilibrium core. This is sufficient reactivity control to cover core cooldown, Xe decay, and the first 7 days of Pa decay.

Specification LCO 4.1.7 - Core Inlet Orifice Valves, Limiting Condition for Operation

a) For a core average outlet temperature greater than or equal to 950°F, the core inlet orifice valves shall be adjusted to the following conditions: the individual region outlet temperature for the nine regions whose valves are most fully closed, and any region with control rods inserted more than two feet into the core, shall not exceed the core average outlet temperature by more than the limit (Mismatch B) shown in Figure 4.1.7-1. The individual region outlet temperature for the remaining regions shall not exceed the core average outlet temperature by more than the limit (Mismatch A) shown in Figure 4.1.7-1.

b) For a core average outlet temperature less than 950°F, the individual region outlet temperature for all 37 regions shall not exceed the core average outlet temperature +400°F, and the conditions of LCO 4.1.9 must be met.

c) For any region being used as a comparison region, the percent "region peaking factor (RPF) discrepancy," %ΔRPF, given by

$$\%\Delta RPF = \left(\frac{\text{RPF measured} - \text{RPF calculated}}{\text{RPF calculated}}\right) \times 100\%$$

shall not be less than minus 10% (i.e., $RPF_{measured}$ shall not be less than 90% of $RPF_{calculated}$), without corrective action as specified below.

Corrective action shall be initiated at the onset of a condition exceeding the limits stated in a) and b). If these limits are exceeded by 1) 100°F or more, an immediate orderly shutdown shall be initiated; 2) 50°F or more, but less than 100°F, corrective action must be successful within two hours or an orderly shutdown shall be initiated; 3) less than 50°F, corrective action must be successful within 24 hours or an orderly shutdown shall be initiated.

Corrective action shall be initiated upon discovery of a percent region peaking factor discrepancy exceeding the limit stated in c). If the limit is exceeded, 1) a new comparison region which meets the limit shall be used or 2) the inferred coolant temperature rise (i.e., the individual refueling region outlet temperature minus the core inlet temperature) in the region (20 or 32 through 37) being controlled by the comparison region shall be increased by a percent amount equal to or greater than that by which the limit stated in c) is exceeded.

Basis for Specification LCO 4.1.7

Experience gained during rise-to-power testing has shown Regions 20 and 32 through 37 have the potential for significant discrepancies between measured and actual region outlet temperature. These discrepancies are caused by a transverse flow of relatively cool helium from the core reflector interface along the region outlet thermocouple sleeve. This flow passes over the region outlet thermocouple assemblies of these regions and depresses the indicated region outlet temperature.

To compensate for these potential transverse flow-induced temperature measurement errors, Regions 20 and 32 through 37 shall have their region outlet temperatures determined by the power and flow characteristics of other regions in the core referred to as comparison regions. The comparison region method of operation was first developed for use during rise-to-power and fluctuation testing above 70% power in test procedure RT-500K. Experience obtained during that test indicates that, by use of comparison regions, Regions 20 and 32 through 37 can be operated in a manner consistent with the original reactor design intent and consistent with the criteria upon which Specification SL 3.1 is based.

If the measured region outlet temperature in Regions 20 and 32 through 37 is higher than that based upon the comparison region conditions, the measured region outlet temperature is assumed to be correct.

Use of comparison regions requires that conditions in the comparison regions (power, flow, and outlet temperature) be well known. Region peaking factor discrepancies result from combinations of errors or uncertainties in measured region outlet temperature, region flow inferred from orifice valve position, and calculated region power. Based upon an evaluation of data obtained during the rise-to-power testing program, region peaking factor discrepancies up to 10% (positive or negative) are not unexpected or considered to be excessive. Under the comparison region method of operation, only excessively negative region peaking factor discrepancies in a comparison region could result in prolonged, high fuel temperatures in the region being operated with the comparison region. The corrective action specified in LCO 4.1.7c will protect the fuel from such conditions.

During RT-500K. testing, the difference (i.e., mismatch) between the measured region outlet temperature of any region and the core average outlet temperature at 100% power was maintained within the limits of Figure 4.1.7-1. The limits in this figure are more conservative than those used to develop Specification SL 3.1 and those contained in Specification LCO 4.1.7 at the time RT-500K was conducted. In addition, Figure 4.1.7-1 directly limits the maximum region outlet temperature to 1,555°F, which is consistent with Table 3.6-1 of the FSAR. By requiring that the limits in Figure 4.1.7-1 be met, maximum fuel temperatures are kept within FSAR stated values regardless of the power level or the amount of core bypass flow which may exist.

During power operation with a core average outlet temperature less than 950°F, sufficient over-cooling of the core is provided with a +400°F deviation between the maximum region outlet temperature and the core average outlet temperature to assure that Specification SL 3.1 remains valid and that the integrity of the fuel particles is preserved.

The times at temperature exceeding the limits given represent conditions significantly below the core safety limit.

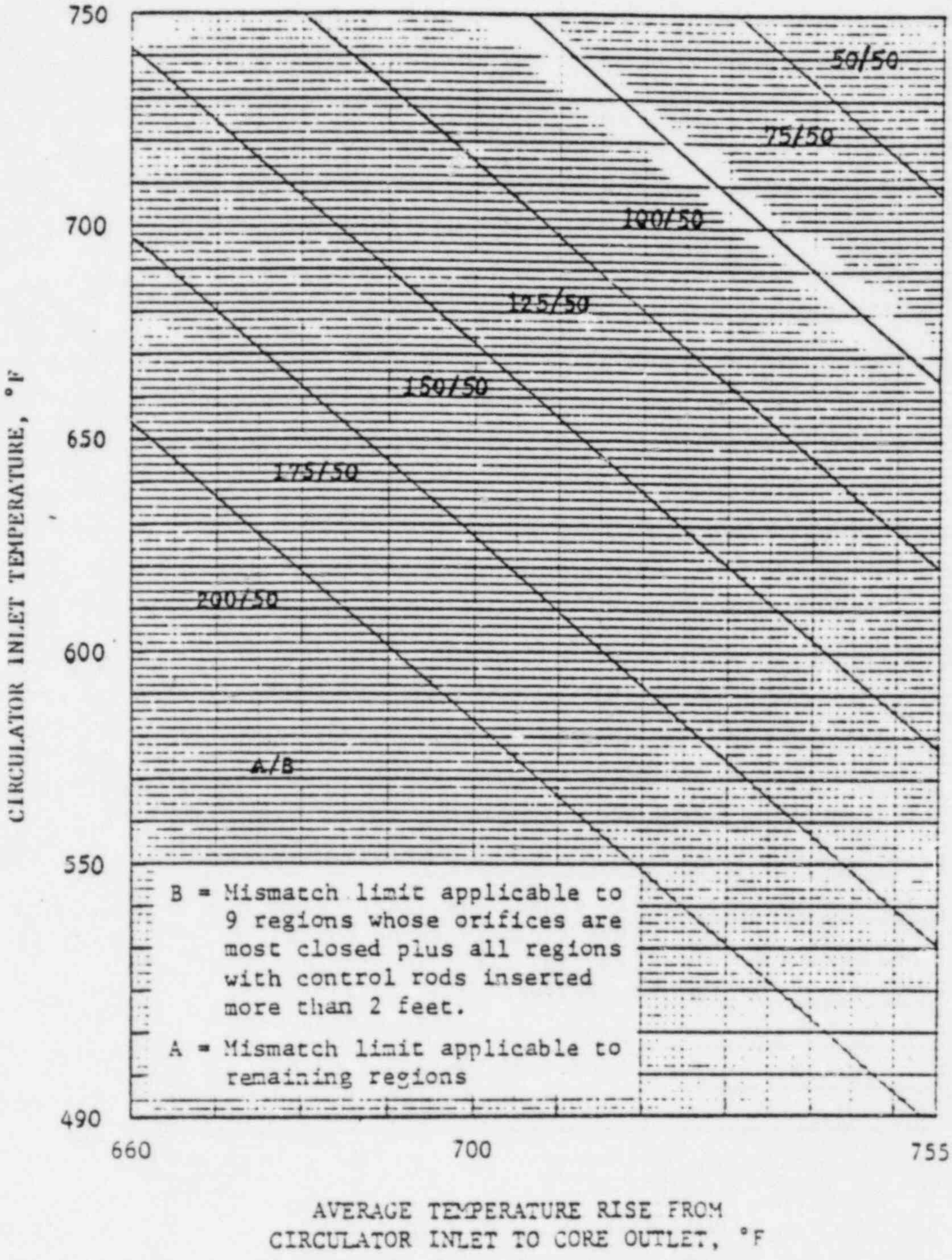

Figure 4.1.7-1. Allowable Difference (Mismatch) Between Region Outlet Temperature and Core Average Outlet Temperature

Specification LCO 4.1.8 - Reactivity Status, Limiting Conditions for Operation

If the difference between the observed and the expected reactivity, based on normalization to a base steady core condition, reaches 0.01 Δk, the reactor shall be shut down and reactor operations shall not be resumed until permission is received from the NFSC.

The initial base steady state core condition and changes of this base shall be approved by the NFSC.

Changes to the base approved by the NFSC shall be reported immediately to the Director, Office of Nuclear Reactor Regulation.

Specification SR 5.1.7 - Region Peaking Factor Surveillance

The calculated region peaking factors (RPF's) used in determining the individual region outlet temperatures for Regions 20 and 32 through 37 and the percent RPF discrepancy (see LCO 4.1.7) for Regions 1 through 19 and 21 through 31 shall be evaluated according to the following schedule for each refueling cycle:

a) Calculated RPF's:

1) Prior to initial power operation after refueling.

2) At the equivalent of 20 ($\pm$5) effective days at rated thermal power after refueling.

3) At the equivalent of 40 ($\pm$5) effective days at rated thermal power after refueling.

4) At monthly intervals thereafter, provided that the core has accumulated an exposure of at least the equivalent of 10 effective days at rated thermal power since the previous evaluation. If the core has accumulated an exposure of less

than the equivalent of 10 effective days at rated thermal power since the previous evaluation, the evaluation may be deferred until the next applicable interval.

b) Percent RPF Discrepancy: Within a total elapsed time of 10 calendar days at reactor power levels above 40% of rated thermal power after the completion of any of the "Calculated RPF" evaluations required above with the following qualifications:

1) A "Percent RPF Discrepancy" evaluation shall be performed prior to exceeding 40% of rated thermal power for the first time after refueling, but at a reactor power above 30% of rated thermal power.

2) If the total elapsed time at reactor power levels above 40% of rated thermal power does not exceed 10 calendar days prior to the subsequent "Calculated RPF"

evaluation, the "Percent RPF Discrepancy" evaluation is not required, but the total elapsed time at reactor power levels above 40% of rated thermal power between "Percent RPF Discrepancy" evaluations shall not exceed 45 calendar days.

Basis for Specification SR 5.1.7

The calculated region peaking factors for Regions 20 and 32 through 37 and their comparison regions will change during the refueling cycle as fission product inventories saturate, fissile material and burnable poison are depleted, and control rods are withdrawn from the core. Evaluations based upon operating experience gained prior to completion of rise-to-power testing (i.e., Cycles 1 and 2 and part of Cycle 3) indicate that the ratio of the calculated region peaking factors in Regions 20 and 32 through 37 to the calculated region peaking factors in comparison regions as a function of control rod configuration, changes gradually in a predictable manner during a refueling cycle. A surveillance check of the calculated region peaking factors at the specified frequency will assure that the appropriate region peaking factors continue to be used in determining the region outlet temperature for Regions 20 and 32 through 37.

The calculated and measured region peaking factors for Regions 1 through 19 and 21 through 31 (candidate comparison regions) will change during the refueling cycle as fission product inventories saturate, fissile material and burnable poison are depleted, control rods are withdrawn from the core, and region flow characteristics change. A surveillance check of the percent region peaking factor discrepancy will provide assurance that the requirements of LCO 4.1.7c are being met for comparison regions. The frequency for surveillance has been established based upon conservative evaluations of potential fuel kernel migration, which could occur if a region with an excessively large, negative region peaking factor discrepancy were used as a comparison region.