

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 80 TO FACILITY LICENSE NO. DPR-34

PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

DOCKET NO. 50-267

1.0 INTRODUCTION

By letter dated April 26, 1990 (Ref. 1), as supplemented by letter dated August 3, 1990 (Ref. 2), Fublic Service Company of Colorado, (PSC), requested changes to the Technical Specifications (TS), needed to facilitate the remaining defueling of the Fort St. Vrain Nuclear Generating Station (FSV). The application references an August 16, 1989 Defueling Safety Analysis Report by PSC (Ref. 3) which describes the methodology used to defuel FSV.

The August 3, 1990 submittal provided additional information which did not alter the action described, or affect the initial no significant hazards consideration determination published in the FEDERAL REGISTER on May 30, 1990.

PSC is proposing TS changes in two significant areas:

- (a) When nine (9) or less fueled regions remain in the core, the shutdown margin assessments currently required by TS 4.1.4 and 4.1.6 are no longer required and PSC proposes to delete the assessments. PSC also proposes to revise related basis and surveilance TS to be consistent with deletion of shutdown margin assessments.
- (b) The startup channel count rate is expected to decrease to below the minimum specified level of TS 4.4.1 as defueling progresses. A new Note (u) has been proposed for TS Table 4.4-4, Startup Channel - Count Rate, which states that when nine or less fueled regions remain in the core during defueling, neutron sources may be installed near startup channel detectors to maintain the minimum specified count rate. PSC also proposed to revise related surveillance TS.

2.0 BACKGROUND

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FSV was shut down on August 18, 1989 because of control rod failures. The shutdown was made permanent because of subsequent discovery of degradation of steam generator ring headers. PSC began defueling on November 27, 1989 and completed the removal of one-third of the core (the maximum capacity of its on-site fuel storage wells) on February 7, 1990. Completion of defueling will follow resolution of final disposition of the spent fuel. PSC plans to either ship the spent fuel to a DOE facility in Idaho for reprocessing or to construct an independent spent fuel storage installation. By letter dated December 1, 1989, the NRC issued Amendment No. 74 to the Facility Operating License, which authorized the loading of unfueled and poisoned defueling elements into the core where fuel had been removed and permitted PSC to proceed with defueling. Presently, 12 fueled regions of a total of 37 have been removed from the core.

3.0 EVALUATION

Shutdown Margin Assessment

A detailed analysis was conducted by the licensee to determine the shutdown margin during the defueling sequence (Ref. 2). In addition, an analysis was performed of the shutdown margin based on experimental verification. The results of this analysis are shown and discussed in Table 3-2 and Section 3.3 of Reference 2.

Shutdown margin analyses show K $_{eff} \leq 0.95$ with all rods out and nine or less regions of fuel remaining in the core. All shutdown margin calculations were performed based on actual "as-burned" core, taking into account credit for lumped poison pins in the defueling elements. The analysis assumes that the core was at a temperature of 80°F and that samarium-149 was present in the spent fuel. The results show that the FSV reactor will have sufficient shutdown margin with nine or less fueled regions to allow the shutdown margin assessment to be discontinued.

The above referenced tables were generated by the computer code called "GAUGE." The GAUGE code is a state-of-the-art code used extensively to monitor cores, predict critical rod height and analyze reactivity changes within the core. Core performance data indicates that the GAUGE code, in general, predicts core performance with reasonable agreement. Measured and calculated data was obtained for the temperature coefficient and for control rod worth. Initial criticality and reactivity behavior with burnup was also predicted with reasonable accuracy (Reference 2). Table 3-1 of Reference 2, Report No. 2, is a comparison of Cycle 4 measured rod worths and GAUGE predictions for FSV.

The TS require that critical rod heights be predicted within +/- 0.01 delta k. In addition, GAUGE has always met the TS requirements concerning the measured versus predicted values. Since the defueling sequence assures that the core will be maintained essentially in a right circular cylinder geometry, PSC expects shutdown margin computation discrepancies to be well within 0.012 delta k. We concur with that assessment and conclude that the preposed change to TS 4.1.4 and 4.1.6 and the related basis and surveillance TS are acceptable.

Neutron Sources and Reactivity Monitoring

Core reactivity during defueling is monitored by means of the count rate on the two startup channels. Table 4.4-4 of LCO 4.4.1 (Ref. 1), identifies the trip setpoint for a rod withdrawal prohibit (RWP) on low startup channel count rate as equal to or greater than 4.2 cps. PSC analysis shows that the count rate of 4.2 cps will be maintained with nine or more fueled regions remaining in the core. The purpose of RWP is to prevent control rod pair withdrawal and reactor startup with insufficient neutron flux indication. If the measured count rate

is found to be inadequate during defueling, the RWP does not allow defueling of further regions until additional sources of neutrons can be procured and placed in the core as per LCO requirements.

As defueling continues past nine fueled regions remaining in the core, a point will be reached at which neutron sources present (from remaining fuel), will be insufficient to maintain the minimum specified count rate. As a result, the licensee has proposed TS which will allow the installation of small neutron sources near the startup channel detectors when nine or less fueled regions remain to maintain the count rate above 4.2 cps.

PSC has previously conducted count rate tests to confirm operation of the startup detectors. The purpose of the tests was to determine the capability of the startup channels to detect criticality in localized areas of the core. The recorded count rates were between 150 and 750 cps on both startup channels just prior to criticality. This testing lends credible assurance that operators will have ample warning of any criticality condition even with the proposed small neutron sources located near the detectors. In addition, as discussed above, PSC has shown that the FSV reactor shutdown margin will be sufficient to prevent criticality with nine or less fueled regions remaining in the reactor even with all control rods withdrawn. We therefore find the proposed change to Table 4.4-4 of the TS and the related surveillance TS to be acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment involves a change in a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves 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 exposures. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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 the amendment.

5.0 CONCLUSIONS

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We have reviewed the analysis submitted by the licensee for FSV requesting TS changes relating to further defueling of FSV. Based on this review, we have concluded that adequate justification was submitted and the requested TS changes are consistent with staff positions and requirements. Defueling operations as proposed for FSV are therefore acceptable.

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the FEDERAL REGISTER (55 FR 21977) on May 30, 1990 and the staff consulted with the State of Colorado. No public comments were received and the State of Colorado did not have any comments.

The staff has concluded, based on the consider tions 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 issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

REFERENCES

- Letter and attachments from A. Clegg Crawford, Public Service Company of Colorado, to USNRC, dated April 26, 1990, "Proposed Technical Specification Amendment to Complete Defueling."
- Leiter and attachment from A. Clegg Crawford, Public Service Company of Colorado, to USNRC, dated August 3, 1990, "Additional Information in Support of Proposed Technical Specification Amendment to Complete Defueling."
- Letter and attachment from A. Clegg Crawford, Public Service Company of Colorado, to USNRC, dated August 16, 1989, "Safety Analysis Report for Reactor Defueling," SAR.

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