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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 79 TO FACILITY OPERATING LICENSE NO. DPR-34

PUBLIC SERVICE COMPANY OF COLORADO

FORT ST. VRAIN NUCLEAR GENERATING STATION

DOCKET NO. 50-267

1.0 INTRODUCTION

Fort St. Vrain (FSV) was shutdown on August 18, 1989. By letter dated December 1, 1989 the NRC issued Amendment No. 74 to Facility Operating License No. DPR-34 which authorized Public Service Company at Colorado (PSC) to load boron poisoned defueling elements into defueled regions as part of the defueling process. At the present time, fuel has been removed from 12 of 37 core regions. The replacement, defueling elements each have 12 blind holes that are all loaded with boron carbide pins although PSC has determined that only 6 boron carbide pin locations per element are needed to maintain the reactor subcritical during defueling.

By letter dated September 14, 1990 as supplemented October 9, 1990, PSC requested an amendment to the technical specifications (TS) to permit removal of the control rod drive and orifice assemblies (CRDOAs) from core regions that have been defueled. The CRDOAs include the following components and provide the following functions:

(a) The control rod pairs and drives provide reactivity control in fueled regions as described in the Final Safety Analysis Report (FSAR) Section 3.5.3. While in a region where fuel elements have been replaced with defueling elements, the control rods no longer serve a function. When a CRDOA is replaced in a defueled region, the control rod pairs remain fully retracted and locked in place since defueling elements contain no rod channels.

(b) The variable-orifice flow-control assembly provides adjustment of helium coolant flow through each of the fueled regions (FSAR Section 3.2.2.7). The need to retain the orifice valve in a defueled region was analyzed by PSC. PSC concluded in its analysis that the variable orifice valve assemblies can be removed from defueled regions with no consequential effects on the coolant flow through fueled regions.

(c) A radiation shield is contained within the CRDOA just below the control and orifice drive mechanisms (FSAR Section 3.8.1.1.1). The shield assemblies are comprised of approximately 8 inches of lead and 14.5 inches of boronated graphite.

(d) A reserve shutdown (RSD) system, functionally independent of the normal control rods, is provided. Boronated graphite balls are contained in a hopper which is an integral part of the CRDOA. Should the normal control rods fail to insert for any reason, the RSD material can be released into the RSD channel in fueled regions.

(e) The CRDOA housing forms the primary closure for the 37 refueling penetrations. The closure system is described in FSAR Section 5.8.2.5.1.

The October 9, 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 October 17, 1990.

2.0 EVALUATION

The defueling process is very similar to the refueling process which has previously been accomplished at FSV. At FSV prior to defueling the reactor core, the auxiliary transfer cask (ATC) is used to remove the CRDOA from a top head refueling penetration and place it in an equipment storage well. After a region is defueled the CRODA is placed over that region of the core.

The proposed revision to Design Features Section of TS 6.1 reflects the status of the reactor and the active core during the defueling processes. As fuel elements are being removed, the defueling elements without fuel, control rod channels or RSD channels are being added. Consequently, control rods and RSD assemblies presently serve no function because they cannot be used in defueled regions. Moreover, since the defueling elements are not fueled and are permanently poisoned with boron carbide pins, the control rods and RSD systems are not required for reactivity control.

PSC analyzed the consequences of removal of the flow control orifice valves from defueled regions. The conclusion reached was that flow through the remaining fueled regions will be sufficient for decay heat removal. PSCs analysis shows that, assuming a decay heat value of 80 kilowatts, 0.75 lbm/s of helium flow is required to remain within the TS limit of 350 degree F maximum region temperature rise. The analysis also shows that the primary coolant circuit can be operated at this flow rate without reverse flow occurring in any region. This included the worst case scenario when all fuel elements have been removed from a region but the defueling elements have not been installed. The licensee conducted a core flow analysis for each region of the core, using the POKE computer code which is validated for FSV. The PSC analysis is conservative since the current decay heat value of 50 kilowatts is less than the 80 kilowatts used by PSC in its analysis.

The normal helium flow rate is 3.1 lbm/s with one loop II circulator in service. This is more than four times the flow rate needed to cool the core at 50 kilowatts of decay heat. There are two helium circulators in loop II so one circulator is always in reserve. In addition, the PCRV liner cooling

system will provide adequate cooling of the core if both helium circulators fail. Loop I is out of service and loop I, "A" and "B" circulator removal has been approved. Also, disposal of the loop I, "B" circulator has been approved with the "A" circulator to remain on site unless the NRC issues a possession only license (S. Weiss, NRC to A. Clegg Crawford, PSC November 29, 1990). The staff agrees that the variable-orifice flow-control assembly is no longer required for the defueled regions because of the redundancy of core cooling systems and the minor impact of the orifices on the cooling of the fueled regions.

The justification for removal of the radiation shield contained within each of the CRDOAs was provided by the PSC engineering evaluation. The PSC evaluation showed that the expected radiation exposure rates at the refueling floor above a defueled region with the CRDOA shielding removed, will not prohibit personnel access to the area. PSC has recently performed a survey of a top keyed metal reflector element for a better estimate of radiation levels on the refueling floor. PSC determined that the maximum radiation levels would be 0.8 millirem per hour with the CRDOA shielding removed and secondary cover plates installed. Worker access is however based on actual radiation measurements taken by health physics personnel. Consequently, the CRDOA radiation shield is not required for defueled regions in the permanently shutdown mode of the FSV reactor.

The FSV TS require that all primary and secondary penetration closures be in place and operable anytime the prestressed concrete reactor vessel (PCRV) is pressurized to greater than 100 psia. Since the FSV reactor has been shut down and depressurized, the primary closure portion of a CRDOA can be detached from the rest of the more radioactive portions of the assembly and reinstalled to maintain reactor integrity. The licensee indicated that this portion of the CRDOA or an alternate sealing device suitable for present reactor conditions, will be installed in refueling penetrations above defueled regions. The staff has determined that this is acceptable.

Based on the above, the staff finds that removal of the CRDOAs is acceptable. PSC will retain the removed CRDOAs on-site unless the NRC issues a possession-only license, after which they may be disposed of at a low level waste disposal facility.

3.0 TECHNICAL SPECIFICATION CHANGES

The proposed amendment would modify TS 6.1 to reflect the status of the reactor and the active core during the defueling process. As revised, the TS will not specify the number of control rods and will indicate that there are defueled regions in the core. The TS Basis has also been revised to indicate that with the reactor shutdown, the CRDOAs may be removed from defueled regions since they are not needed. These changes are acceptable.

In addition to the proposed TS changes for the CRDOAs, PSC proposed the following editorial changes to the text in the design features section of the TS.

1) Change "boron carbide-graphite balls" to "boronated graphite balls" as this is a more accurate description.

2) Remove specification of the number of control rod hoppers, fuel elements, fuel columns and regions and the dimensions of the active core as these numbers are not meaningful during and following defueling.

The staff has determined that since these changes are editorial only, they have no safety implications and are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment involves a change in 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 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the FEDERAL REGISTER on October 17, 1990 (55 FR 42097) 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 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Anthony Attard, RSB
Peter B. Erickson, NRDE

Dated: January 10, 1991