ATTACHMENT 1

TO P-92196

LIST OF PROPOSED CHANGES

SECTION	PROPOSED CHANGE
4.2.15	Delete this Specification in its entirety.

ATTACHMENT 2

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top casing. In this case, the local temperature in the concrete would be less than 250°F, an allowable and acceptable concrete temperature. (FSAR Section 5.4.5.3).

Specification LCO 4.2.15 - PCRV Cooling Water System Temperatures, Limiting Conditions for Operation

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ATTACHMENT 3

TO P-92196

Safety Analysis for Deletion of Specification LCO 4.2.15

Background

Specification LCO 4.2.15, "PCRV Cooling Water System Temperatures, Limiting Conditions for Operation", specifies allowable temperatures associated with the PCRV and the PCRV cooling water. PSC has submitted a proposed amendment to the FSV Facility License and Technical Specifications (PSC letter, Crawford to Weiss, dated March 19, 1992, P-92115) which would delete LCO 4.2.15. The basis for its deletion is that once the fuel elements are permanently removed from the PCRV, PCRV temperatures no longer need to be controlled by the Technical Specifications since the PCRV is no longer relied upon to provide the primary coolant pressure boundary and contain fission products which could potentially be released into the primary coolant from the active core. This analysis demonstrates that the early implementation of deletion of LCO 4.2.15, now that all fuel elements have been permanently removed from the PCRV, does not adversely affect public health and safety.

As discussed in the basis of LCO 4.2.15 and in the FSAR, the PCRV temperature limits provided assurance of the following:

1) The maximum PCRV liner cooling water outlet temperature limit is sufficiently low so that concrete temperature between cooling tubes will not exceed 150° F.

2) By maintaining external concrete temperature, averaged over 24 hours, within 50° F of the PCRV liner cooling water outlet temperature (representative of liner temperature), concrete stresses resulting from the temperature gradient across the concrete will be within allowables.

3) The weekly average outlet temperature of the PCRV liner cooling water system is not allowed to vary by more than 14° F per week. This assures that significant changes in the bulk concrete temperature occur slowly.

4) The 85° F minimum temperature requirement assures that the temperature of the active core will not decrease below 80° F, which was the core temperature assumed in the core shutdown margin assessments (LCO/SR 3/4.1.4 and 3/4.1.6) for determining the reactivity contribution due to the fuel's negative temperature coefficient of reactivity.

5) In order to prevent possible brittle fracture of the carbon steel liner, the temperature of the PCRV liner is maintained above the fracture transition elastic (FTE) temperature, which is approximately equal to the nil ductility transition (NDT) temperature plus 60° F.

It has been necessary to periodically provide steam from an auxiliary boiler to heating coils in PCRV liner cooling water surge tanks to meet the minimum average cooling water temperature requirements. Once LCO 4.2.15 is deleted, PSC will isolate the supply of water to the PCRV liner cooling tubes (including the core support floor cooling tubes) and will no longer provide steam to heat water in the surge tanks. With cooling water flow to the PCRV liner cooling tubes isolated, the PCRV bulk temperature will gradually equilibrate with the Reactor Building ambient temperature. The safety analysis which follows reviews the effects of no PCRV liner cooling on PCRV structural integrity, addressing concerns discussed in the above paragraphs.

Safety Analysis

As described in Technical Specification Design Feature DF 6.2.1, the PCRV functioned as the primary coolant pressure boundary, while helium served to cool the active core. The PCRV provided the secondary containment boundary of the large quantity of fission products in the fuel particles of the core, with the fuel particle coatings providing the primary boundary for fission product containment. The PCRV provided defense-in-depth protection since it was designed to retain primary coolant, and fission products in the primary coolant, in the postulated event of fuel particle coating failure under extreme conditions of primary coolant temperature and pressure resulting from accident scenarios.

With all the fuel elements permanently removed from the PCRV and the PCRV depressurized, the PCRV no longer performs this primary coolant and fission product containment safety function. Instead, it serves to store and contain activity generated during previous reactor operation, and shields personnel from radioactive internal components. PSC intends to assure maintenance of the continued structural integrity of the PCRV up to the time when dismantling of the PCRV begins, during decommissioning. However, with all fuel elements removed from the PCRV and the PCRV depressurized, the requirements of LCO 4.2.15 are no longer necessary to protect the health and safety of the public, as justified in the following paragraphs.

Concrete begins to lose some of its structural strength at temperatures above approximately 200° F. The thermal barrier and the PCRV liner cooling system were designed to protect the PCRV and core support floor (CSF) liners and concrete from high primary coolant temperatures and to maintain the concrete adjacent to the liners within its maximum allowable temperature of 150° F between tubes.

With all fuel elements permanently removed from the PCRV, the core heat source no longer exists, and the threat of concrete damage from high internal temperatures is eliminated. The specification requirement which limits the maximum PCRV liner cooling water temperature is no longer required to protect the concrete from excessive temperatures.

The PCRV liner cooling system served to cool the liner and inner concrete surfaces during normal operation, which prevented high internal temperatures and resulting high differential temperature through the concrete, minimizing thermal stresses. With the reactor core heat source permanently removed from the PCRV, the potential for high differential temperatures across the PCRV is greatly reduced. If all cooling water flow to the PCRV liner cooling tubes were isolated, the PCRV temperatures would eventually equilibrate with Reactor Building temperatures, with no significant temperature difference between the inner and outer concrete surfaces.

Rapid heating or cooling of the PCRV bulk concrete, faster than 14° F per week, was not permitted since significant thermal stresses could arise during the transition from one equilibrium temperature to another. The PCRV liner cooling system tubes, which surround the PCRV and CSF liners, have the potential for causing rapid temperature transitions, if hot or cold water (relative to PCRV temperatures) is supplied to this system. This potential is removed with the PCRV liner cooling tubes isolated.

It is anticipated that the PCRV will gradually decrease to equilibrium temperatures lower than those at which it is presently maintained, with PCRV liner cooling water flow isolated. Under steady state conditions at a lower bulk concrete temperature, PCRV liner and concrete stresses will be somewhat reduced due to thermal contraction of steel and concrete at the lower temperature. Since these materials are maintained in a state of net compression by the prestressing tendons, the thermal contraction will result in a slight relaxation of stresses.

Since all fuel elements have been permanently removed from the PCRV, the concern with core reactivity increases caused by fuel temperature reduction is eliminated. There is no longer the need for a minimum PCRV liner cooling water temperature limitation, from the standpoint of reactivity and core shutdown margins.

The end-of-life FTE temperatures are calculated to be less than 15° F for both the liner and weldment materials, at the most highly irradiated portion of the liner (top head). It is not considered credible that the PCRV liner could reach these low temperatures. Even if Reactor Building heating were lost in the winter, it is estimated to take weeks before the inside of the PCRV would be reduced to low temperatures, due to the 9 ft. minimum thickness of the PCRV concrete. The building heating system would be repaired before the interior of the PCRV could decrease to extremely low temperatures approaching the FTE temperature. Deletion of LCO 4.2.15 would not increase the probability of brittle fracture of the PCRV liner.

Based on the above discussions, PSC does not consider cracking of the liner or concrete to be credible with deletion of LCO 4.2.15 and with no PCRV liner cooling water flow. Even if it were hypothesized that the PCRV or CSF liner were to crack, this would not represent a health or safety threat to either occupational workers in the Reactor Building or to members of the general public since the PCRV would be depressurized and there would be no driving force to cause the release of significant quantities of activity from the PCRV. The PCRV concrete, maintained under considerable compressive stresses, would continue to shield personnel from the activated components within the PCRV.

Conclusion

Based on the above information, it is concluded that deletion of LCO 4.2.15 would not increase the probability or consequences of accidents or malfunctions of equipment important to safety previously evaluated in the FSAR. The source terms of accidents involving the PCRV and analyzed in the FSAR are effectively removed with no fuel elements in the PCRV and with the PCRV depressurized to approximately atmospheric pressure. The probability of failure of the PCRV is not increased with deletion of LCO 4.2.15 requirements. In fact, with the primary heat source (active core) removed from the PCRV, the probability of challenging the integrity of the liner or concrete is reduced. Brittle fracture of the PCRV liner is not considered credible with no PCRV liner cooling, since this would require the top head liner to decrease to temperatures below 15[illegible] F. Deletion of LCO 4.2.15 does not create the possibility of new accidents or malfunctions not previously evaluated in the FSAR. Even in the event of postulated cracking of the PCRV concrete and/or liner due to high stresses, which is not considered credible, release of significant quantities of activity from the PCRV would not occur since the PCRV will not be pressurized. Since the absence of PCRV liner cooling would not pose a threat to PCRV integrity, and lower PCRV temperatures could not cause an increase in reactivity, there is no reduction in safety margins identified in the basis of LCO 4.2.15. Therefore, deletion of LCO 4.2.15 does not involve an unreviewed safety question.