UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 118 AND 106 TO

FACILITY OPERATING LICENSE NOS. NPF-76 AND NPF-80

STP NUCLEAR OPERATING COMPANY, ET AL.

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By application dated August 31, 1998, as supplemented by letters dated April 19, August 18, and October 21, 1999, STP Nuclear Operating Company (the licensee) requested changes to the South Texas Project, Units 1 and 2, Technical Specifications (TSs). The proposed changes would revise TS 3/4.4.9.3 by revising the cold overpressure mitigation curve to accommodate the replacement steam generators (SGs) and by adding two surveillances (for the centrifugal charging pumps and the emergency core cooling system (ECCS) accumulators) to ensure the operability of the cold overpressure mitigation system (COMS).

The October 21, 1999, supplement provided a revised implementation date. This information was with the scope of the original application and *Federal Register* notice and did not change the staff's initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

STP Nuclear Operating Company is planning on replacing the South Texas Project, Unit 1 SGs in May 2000 and the South Texas Project, Unit 2 SGs in the fall of 2002. The current plant designs include the Westinghouse Model E SGs. The licensee plans on installing Westinghouse Model Δ94 SGs. Differences in reactor coolant system (RCS) volume and flow resistance; and SG volume, metal mass, heat transfer surface area, and heat transfer coefficient will result from the SG replacement. These differences affect the low- temperature overpressure protection (LTOP) transient analyses. Therefore, the licensee reanalyzed these transients. The new analyses were performed to bound plant operations at either unit with either SG design. The new analyses resulted in new, more limiting, maximum allowable power-operated relief valve (PORV) setpoint curves. The maximum allowable setpoint curves are curves of maximum pressures at which the PORVs could lift and still provide the required overpressure protection.

Accordingly, by letter dated August 31, 1998, as supplemented by letters dated April 19, August 18, and October 21, 1999, the licensee proposed changes to the TSs to replace the current PORV setpoint curves with the new curves. The PORV setpoint curves are included in the TSs as Figure 3.4-4, "Nominal Maximum Allowable PORV Setpoint for the Cold

Overpressure System." The licensee further requested that the proposed setpoint curves be applied to both units because the curves bound operation of either unit with either SG design. In addition, the licensee proposed changes to TS 3.4.9.3 to add restrictions, actions, and surveillance requirements (SRs) on ECCS accumulators and charging pumps. These changes were proposed to provide consistency between the TSs and the assumptions used in the analyses.

3.0 DISCUSSION

The COMS mitigates overpressure transients at low temperatures so that the integrity of the reactor coolant pressure boundary is not compromised by violating 10 CFR Part 50, Appendix G. This system utilizes the two pressurizer PORVs to accomplish this function. One PORV has adequate relieving capacity to prevent overpressurization of the RCS for the limiting transients; however, two are utilized to provide redundancy. The system is manually enabled by the operators. When enabled, the COMS actuation logic monitors both RCS temperature and pressure and provides an actuation signal to the PORVs when these parameters approach the analyzed reactor vessel pressure-temperature limits.

The design basis of COMS considers both mass-addition and heat-addition transients during water-solid RCS conditions. Two mass-addition cases are analyzed. The first case is analyzed for RCS temperatures ≤ 200 °F and involves maximum injection from one centrifugal charging pump with the charging control valve fully open. The second case, for 350 °F > RCS temperatures > 200 °F, involves injection from a combined maximum deliverable flow from one high head safety injection pump and one centrifugal charging pump with the charging control valve fully open. The heat-addition analysis accounts for heat input from the secondary sides of all SGs into the RCS upon starting a single reactor coolant pump (RCP). The heat-addition transient analysis assumes that the secondary side temperatures of all SGs are 50 °F higher than the RCS temperature.

4.0 EVALUATION

The licensee proposed to replace the PORV maximum allowable setpoint curves in Figure 3.4-4 of the TSs with the new curves provided in the August 18, 1999, letter. The licensee further requested that the new curves be applied to both South Texas units. In addition, the licensee proposed changes to TS 3.4.9.3 to include restrictions, actions, and SRs on safety injection accumulators and charging pumps.

The licensee analyzed two mass-addition events and one heat-addition event, as described in Section 2.0 above. The licensee performed each analysis with the more limiting characteristics of either the Model Δ94 SGs or the Model E SGs for the analysis. This resulted in analyses bounding both units with either SG design and, therefore, allows the licensee to apply the same curve to both South Texas units. The analyses were performed in accordance with WCAP-13782, Revision 1, "Setpoint Program Determination for the Westinghouse Cold Overpressure Mitigating System in the Houston Lighting & Power, South Texas Units 1 and 2, Revision 2," dated February 1994 (submitted as an attachment to an application from Houston Lighting & Power to NRC, dated March 16, 1994), as amended by Westinghouse to make it conform to WCAP-14040-NP-A, Revision 2 (Nonproprietary), "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," dated January 1996 (which was provided to the NRC by letter dated January 15, 1996).

WCAP-14040-NP-A, Revision 2, was approved by the staff by letter of October 16, 1995. WCAP-13782, Revision 2, is the same methodology that the licensee used in development of the curves currently in Figure 3.4-4. The licensee performed analyses for four RCPs and two RCPs in operation. RCP operation affects the dynamic head in the system and consequently, the required setpoints of the PORVs. The proposed Figure 3.4-4 includes a curve for each of the analyzed configurations.

The licensee's analyses demonstrated that operation with the proposed PORV setpoint curves provides the required LTOP protection as follows:

- The peak RCS pressure from the design-basis mass-addition and heat-addition events was shown to not exceed the upper pressure limit. The upper pressure limit is the lower of the following pressures:

    a) 10 CFR Part 50, Appendix G, with American Society of Mechanical Engineers (ASME) N-514 steady-state maximum allowable reactor coolant pressure boundary heatup/cooldown pressure limits with margins for instrumentation uncertainty, or

    b) 800 psig (to limit loads on PORV discharge piping and supports when the valve cycles open and closed during a subcooled water discharge).

- The minimum RCS pressure from a design-basis mass-addition or heat-addition event was shown to stay above the RCP No. 1 seal differential pressure limit.

- The final selected PORV setpoints were selected to prevent simultaneous actuation of the LTOP PORVs (i.e., the higher PORV setpoint is above the peak RCS pressure expected to occur when the lower set PORV opens).

Based on the above, the licensee concluded that the LTOP design basis continues to be met with the revised PORV setpoint curves.

Item a) under the first bullet above indicates that the licensee applied ASME Code Case N-514 to establish the LTOP pressure limits. ASME Code Case N-514 allows a 10-percent relaxation of the limits required by 10 CFR 50.60 and Appendix G. Therefore, the licensee applied for an exemption from 10 CFR 50.60 and requested authorization to use the method presented in ASME Code Case N-514 for establishing the overpressure protection limits. The licensee was granted this exemption and was authorized to use the method in ASME Code Case N-514 by letter dated May 4, 1999.

In the original August 31, 1998 submittal, the licensee did not account for pressure instrument uncertainty. The pressure instrument uncertainty, as provided in the licensee's April 19, 1999, letter is minus 48.6 psi and was accounted for in the licensee's final submittal as a result of questions raised by the staff.

As a result of questions raised by the staff and in order to provide consistency between the TS and the assumptions used in the analyses, the licensee proposed changes to TS 3.4.9.3 to include restrictions, actions, and SRs on ECCS accumulators and charging pumps. The licensee's proposed changes require that the ECCS accumulators be isolated and that a

maximum of one centrifugal charging pump be capable of injecting into the RCS when the TS is applicable. The restriction on the accumulators is applicable only when the accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by Figures 3.4-2 and 3.4-3. These proposed TSs provide the restrictions necessary to ensure that the TS sections on the safety injection accumulators and the centrifugal charging pumps are consistent with the analysis assumptions and are therefore acceptable. In addition, restriction on RCP operations in TS Sections 3.4.1.3 and 3.4.1.4.1 and Figure 3.4-4; on high head safety injection pump operations in TS Sections 3.5.3.1 and 3.5.3.2; and on positive displacement pump operation in SR 4.4.9.3.3 were reviewed and found to be consistent with the assumptions in the analyses.

TS 3.4.9.3.b allows the licensee to establish a vent of at least 2.0 square inches in lieu of the PORVs for LTOP. The licensee evaluated the effect of the SG replacement on the adequacy of this vent area. The 2.0 square inches required by the TS is greater than and bounded by the area of a PORV (the orifice area of a PORV is 1.368 square inches). Therefore, since the analyses discussed earlier demonstrated the adequacy of the PORVs, the required vent area is also adequate.

In addition, a footnote to TS 3.4.9.3 allows the licensee to use the residual heat removal (RHR) pump discharge relief valves for LTOP. The licensee noted that credit is not taken for the RHR pump discharge relief valves in preventing or mitigating the licensing basis LTOP events. However, maintenance activities during an outage may render both PORVs inoperable. In such a situation, the RHR discharge relief valves may be used until the RCS pressure reaches the level necessary to test the PORVs for return to operable status. Therefore, the licensee evaluated the adequacy of RHR discharge relief valves. The licensee concluded that the valves are capable of providing overpressure protection while the PORVs are tested and returned to operable status because the valves are significantly larger than the pressurizer PORVs and because they are set to actuate at a pressure less than the 10 CFR Part 50, Appendix G, limits (adjusted by ASME Code Case N-514). The licensee's evaluation included consideration of measurement uncertainty. The staff reviewed the licensee's evaluation and finds it acceptable.

5.0 SUMMARY

The staff has reviewed the licensee's requested changes and supporting analyses. The staff finds that the analyses were performed consistent with the review requirements of Standard Review Plan Section 5.2.2, "Overpressure Protection," Revision 2, issued November 1988 and Branch Technical Position RSB 5-2, "Overpressurization Protection of Pressurized Water Reactors While Operating at Low Temperatures," Revision 1, dated November 1988. Based on these analyses, the staff concludes that the COMS will, when set according to the proposed PORV setpoint curves in Figure 3.4-4, prevent RCS pressure from exceeding the Appendix G pressure limits (adjusted by 10 percent per ASME Code Case N-514). As stated earlier, the licensee was granted an exemption from 10 CFR 50.60 and authorization to use ASME Code Case N-514 by letter dated May 4, 1999. Based on the above discussion, the staff finds the proposed changes acceptable.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Texas State official was notified of the proposed issuance of the amendments. The State official had no comments.

7.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 and change surveillance requirements. The NRC staff has determined that the 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 the amendments involve no significant hazards consideration, and there has been no public comment on such finding (64 *FR* 48867). Accordingly, the 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 the amendments.

8.0 CONCLUSION

The Commission 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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