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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 138 TO FACILITY OPERATING LICENSE NO. DPR-40

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT NO. 1

DOCKET NO. 50-285

1.0 INTRODUCTION

By letter dated June 28, 1990, as supplemented December 20, 1990, Omaha Public Power District (OPPD) submitted a request for changes to the Fort Calhoun Station, Unit No. 1 Technical Specifications (TS). The changes would add a limiting condition for operation (LCO) in TS Section 2.6 and surveillance test requirements in TS Section 3.0 for the hydrogen purge system (HPS). The added LCO will establish the HPS configuration to meet 10 CFR 50.44 requirements for combustible gas control. The added surveillance test requirements will ensure functional capability of the HPS to perform post-LOCA hydrogen control in accordance with the guideline of Regulatory Guide 1.7. However, the current TS do not have these requirements for the HPS, therefore, whether the HPS was operable was not verified. The December 20, 1990, letter provided clarifying information that did not change the proposed no significant hazards consideration determination.

Fort Calhoun 1 does not have installed hydrogen recombiners. Hydrogen purge is the only method to reduce hydrogen concentration in the containment. In 1988, the licensee reanalyzed the hydrogen generation design basis and concluded that the HPS is sufficient to control combustible gas with radiological consequences within 10 CFR Part 100 limits. The analysis indicated that it takes approximately 45 days to reach the purge initiation point of 3% hydrogen accumulation and portable hydrogen recombiners would need to be running prior to this time to prevent the need to purge the containment. The licensee stated that a dedicated hydrogen recombiner penetration was provided on the containment and the Emergency Operation Procedure (EOP) would instruct the Technical Support Center to find and set up hydrogen recombiners when necessary.

On March 9, 1990, the staff of NRR and Region IV met with the licensee to discuss the issues resulting from the recent inspection findings (Inspection Report 50-285/89-50). As a result of that meeting, the staff has concluded that the licensee should (1) perform a full flow test of the HPS to ensure operability, (2) submit TS to specify operability and surveillance tests for the HPS, and (3) develop procedural guidance on how to implement usage of the hydrogen recombiners. Accordingly, the licensee submitted the proposed TS amendment.

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2.0 EVALUATION

The HPS at Fort Calhoun 1 is an Engineered Safety Feature (ESF) system and is designed to provide a safe, independent, monitored, and controlled means of purging any potential accumulation of combustible gas in the containment. The system consists of two purge units, each has a 250 standard cubic feet per minute (SCFM) positive displacement blower with inlet and outlet ducts, isolation valves, and two hydrogen analyzers. The HPS is utilized to maintain hydrogen concentration in the containment below the lower flammability limit of 4% by volume in accordance with the design basis as specified in Section 14.17 of the Updated Safety Analysis Report (USAR). Purging is manually initiated at 3% of hydrogen concentration in order to allow approximately 33% error in the reading of the hydrogen analyzer. The staff has previously reviewed the HPS and found it acceptable.

The licensee has revised the TS and added TS 2.6.(3)a and 2.6.(3)b in the LCO to provide minimum requirements for the HPS. TS 2.6.(3)a requires that the two blowers (VA-80A and VA-80B) shall be operable and the containment isolation valves (VA-280 and VA-289) shall be locked closed before criticality of the reactor. The HPS is manually operated and is normally isolated from the containment by two lock closed butterfly valves (VA-289 for blower VA-80A and VA-280 for blower VA-80B) outside containment and two normally closed remote manual butterfly valves (HCV-882 for blower VA-80A and HCV-881 for blower VA-80B) inside containment. The staff finds that the containment isolation provisions for the HPS satisfy 10 CFR Part 50 General Design Criterion (GDC) 56 and are acceptable. TS 2.6.(3)b requires that, after the reactor has been made critical, one of the hydrogen purge fans (VA-80A or VA-80B) may be inoperable provided the fan is restored to operable status within 30 days and the hydrogen filter system (VA-82) may be inoperable provided the system is restored to operable status within 72 hours. Otherwise, the reactor shall be placed in a hot shutdown condition within next six hours. The staff finds that the proposed LCO for the HPS operability is consistent with the Standard Technical Specifications for Combustion Engineering PWRs (CESTS), and therefore, is acceptable.

The licensee proposed to add surveillance test requirements for the HPS in TS Table 3-5. The added Item 17 of Table 3-5 specifies that:

(1) All manual valves be verified operable by completing at least one cycle during each refueling outage;

(2) Each automatic valve be cycled through at least one complete cycle of full travel from the control room during each refueling outage. Verification of the valve cycling may be determined by the observation of position indicating lights;

(3) Initiate flow through the two blowers, HEPA filter, and charcoal absorbers and verify the system operation for at least-
(a) 30 minutes with suction from the auxiliary building every month
(b) 10 hours with suction from the containment during each refueling outage; and

(4) Verify a pressure drop of less than 6 inches of water across the HEPA (VA-82) and charcoal filters during each refueling outage. Verify a system flow rate of greater than 80 SCFM and less than 230 SCFM during system operation when tested in accordance with (3)b above.

The cycling of the manual valves is required to ensure the operational readiness of the valves when they are required to be repositioned. These manual valves have remote manual operators due to potentially high radiation fields in the area of the HPS and are required to have the ability to complete one cycle from a remote operating location. The remote manual valves in the system are located at the containment penetrations and are currently locally leak rate tested in accordance with Appendix J of 10 CFR Part 50. The staff finds that the proposed surveillance test requirements for the valves would ensure valve operability to perform a purge of the containment and that the tests satisfy ASME Section XI Inservice Testing, and are therefore, acceptable.

The licensee stated that the minimum flow rate of 80 SCFM through the blowers would ensure more hydrogen is removed from the containment than is being generated. The maximum flow rate of 230 SCFM is limited to a value below the flow rate used in the design basis radiological analysis. The ability of the blowers to maintain the minimum flow for a period of 10 hours will ensure that the system fulfills the redundancy requirements. The blower units take suction from the auxiliary building during power operation and take suction from the containment during the refueling flow test. These test arrangements will ensure that there is no potential for inadvertent radiation release. The 30-minute test of the system would verify key operating parameters. The staff has reviewed the surveillance test requirements for the HPS in Table 3-5 and found that the required flow rates and test durations are based on the safety analysis which was previously reviewed by the staff. Therefore, the staff concludes that the proposed surveillance requirements for the HPS are acceptable.

The Bases for TS Sections 2.6 and 3.2 have been revised for the addition of the HPS. The licensee added Bases in TS 2.6 to require that HPS be operable in order to control combustible gas in a post-LOCA condition. The Bases state that containment integrity is maintained by ensuring containment isolation valves (VA-280, VA-289) are locked closed while HCV-881 and HCV-882 are normally closed during power operation. The blowers and associated piping and valves are single failure proof, and the applicable surveillance requirements in Table 3-5 ensure the HPS to be capable of performing its design function. The added bases for TS 3.2 further require that each of the two blowers (VA-80A or