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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 122 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 104 TO FACILITY OPERATING LICENSE NPF-17

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter dated April 11, 1991, as supplemented July 3, 1991, Duke Power Company (the licensee) requested amendments to the Technical Specifications (TSs) appended to Facility Operating License Nos. NPF-9 and NPF-17 for the McGuire Nuclear Station, Units 1 and 2. The proposed amendments would revise TS 3/4.6.1.8, "Annulus Ventilation System," and TS 3/4.7.6, "Control Area Ventilation System."

Specifically, the licensee proposed to test, via a laboratory, representative carbon samples from the charcoal adsorbers of the subject ventilation systems per the ASTM D3803-89 method instead of the currently used Regulatory Guide 1.52, Revision 2 method as supplemented by ASTM D3803-86, Test Method A. Additionally, for the above laboratory tests, the licensee proposed higher methyl iodide penetrations through the carbon samples than those specified in the existing TSs (for the Annulus Ventilation System, 4 percent instead of the existing 0.71 percent; for the Control Area Ventilation System, 0.95 percent instead of the existing 0.175 percent). The licensee uses these acceptance criteria for assuming the same adsorption efficiencies of elemental and organic forms of radioiodine in their design basis offsite dose analysis (95 percent both for elemental and organic forms for the 2-inch charcoal adsorber in the Annulus Ventilation System and 99 percent both for the elemental and organic forms for the 4-inch charcoal adsorber in the Control Area Ventilation System). Also, the licensee proposed a new ACTION statement for the Annulus Ventilation and Control Area Ventilation heaters. The proposed ACTION allows continued plant operation provided the inoperable heaters are restored to operable status within 7 days or the licensee files a special report in accordance with Specification 6.9.2 with the NRC within 30 days specifying the reason for their inoperability and the planned actions to restore the pre-heaters to their operable status. In addition, the licensee proposed a few administrative changes for consistency with other proposed changes identified above and provided the associated BASES and justifications for the proposed TS changes.

The licensee's July 3, 1991, submittal provided supplemental information that was clarifying in nature and did not affect the scope of the noticed action or the NRC staff's proposed significant hazards consideration analysis.

2.0 EVALUATION

During a review of the heating, ventilating, and air conditioning (HVAC) systems at Catawba Nuclear Station, it was discovered that the pre-heaters in some engineered safety feature (ESF) filter units were not conservatively sized for all postulated operating modes. A station specific review revealed that this problem also applied to McGuire. The pre-heaters are used to control the relative humidity of the influent air entering the carbon adsorber. These filters were designed in a manner that assumes the heaters maintain the relative humidity of the air at 70% or less. Duke Power's review revealed that during postulated low voltage conditions with loss of one of the two offsite power sources and all plant auxiliaries of the unit aligned to the other power source through the remaining step-up transformer with a concurrent loss of coolant accident (LOCA), sufficient power may not be supplied to these heaters to enable them to maintain the less than or equal to 70% relative humidity. The affected systems are the Annulus Ventilation System and the Control Area Ventilation System.

After exploring different options to address this situation, the licensee elected to use the laboratory test method described in ASTM D3803-1989 for testing carbon samples taken from the annulus and Control Area Ventilation System charcoal adsorbers. The ASTM D3803-1989 testing method calls for testing the charcoal samples at 95 percent RH and 30°C, instead of maintaining the RH and $\leq$ 70 percent. The major difference between the proposed ASTM 3803-1989 test method and other methods currently available is that the proposed method requires a long pre-conditioning period (18 hours) for the carbon samples prior to the methyl iodide challenge portion of the test. Other methods currently available do not require the carbon samples to be pre-conditioned. The NRC staff finds the proposed laboratory testing method to be conservative and, therefore, acceptable.

The licensee proposed higher methyl iodide penetration limits (i.e., reduced carbon adsorber radioiodine removal efficiency) for testing of samples taken from the subject charcoal adsorbers even though the licensee did not change the assumed carbon adsorber efficiencies in the current design basis offsite dose calculation. The licensee provided the following justification:

(1) The 95 percent RH laboratory test is much more stringent since adsorption is strongly dependent upon humidity conditions of the influent air and the adsorption efficiency decreases with increased humidity.

(2) The proposed ASTM D3803-1989 method is a stringent procedure since it requires that the carbon sample be pre-conditioned by saturating it before testing it. The pre-conditioning is conservative since it will saturate the carbon beyond the conditions to which the subject charcoal adsorbers are expected to be exposed during design basis events. Therefore, radioiodine penetration during an actual accident would be lower than that predicted by the laboratory test.

In addition, the NRC staff notes that the heaters will continue to be available and will be subject to periodic surveillance tests to maintain them in the desired state. Furthermore, except at times when there is an unlikely combination of adverse circumstances identified above, the heaters are expected to control the RH of the influent air entering the adsorber section at 70 percent or less.

For the above reasons, the NRC staff considers that it is unlikely that the subject charcoal adsorber efficiencies for elemental radioiodine during a postulated design basis accident at any time between two successive surveillance tests will dip below the assumed values for the species in the safety analysis, due to possible degradation of the adsorber with time. This is so, since, for a given charcoal adsorber condition, elemental iodine penetration is known to be much less than organic iodine penetration and the proposed acceptance criterion is tied to organic species penetration.

Regarding organic iodine, for want of data, the NRC staff cannot conclude that the marginal safety factors (penetration assumed in the design basis accident analysis/ penetration required to be demonstrated by laboratory test) integrated in the licensee's proposed methyl iodide penetration values are sufficient to account for possible degradation of the adsorbers with time even though such penetration values are demonstrated under test conditions more stringent than what can be expected during actual design basis accidents. This is true particularly during times when the heaters do not perform as designed. The staff considers that reduced adsorber efficiencies for the subject adsorbers for the organic species which reflect the proposed penetration values and a safety factor of five (staff generally uses this value for filters outside the containment) are more appropriate. Therefore, the staff independently reassessed the previously calculated design basis LOCA doses for the McGuire plants (the LOCA is the limiting accident). The staff performed such a reassessment to determine whether the proposed increases in the methyl iodide penetration values are acceptable.

The NRC staff reassessed the previously calculated design basis LOCA site boundary (site boundary, since it is the limiting case as shown in Table 15.4-6, NUREG-0422, Supplement No. 4, January 1981 and Table 15.6.4-9, UFSAR for McGuire, December 1987) and control room doses for the McGuire plants using 80 and 95 percent adsorption efficiencies for organic iodine for the charcoal adsorbers in the Annulus and Control Area Ventilation Systems, respectively. These efficiencies correspond to a safety factor of at least five applied on proposed methyl iodide penetration limits of 4 percent and 0.95 percent for the annulus and control area charcoal adsorbers respectively. The staff also used (1) a primary containment leak rate of 0.3 percent of containment volume per day for the first day instead of 0.2 percent per day originally used, to reflect the increase in the leak rate (Table 15.6.4-10, UFSAR, McGuire, December 1987), and (2) updated dose factors (unweighted values per committed dose equivalent per unit intake) in Publication No. 30 of the International Commission on Radiological Protection, "Limits for Intakes of Radionuclides by Workers." The updated dose factors are more realistic than those listed in Publication No. 2 which the staff used previously. The reassessment showed that the site boundary (0-2 hour) doses (whole body and thyroid) were within the 10 CFR Part 100 limits and the control room doses complied with General Design Criterion 19 limits. Based on the dose reassessment findings, the staff has determined that the proposed methyl iodide penetrations for the subject charcoal adsorbers are acceptable.

With regard to the heaters, the licensee's proposed change to the specified corrective ACTION for an inoperable ventilation system means that the specified ACTION (restoring the inoperable ventilation system to OPERABLE status within 7 days or being in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours) does not have to be entered into if the heaters in the subject system are inoperable. However, the licensee has proposed corrective ACTION (TS 3.6.1.8.b, 3.7.6.b and 3.7.6.d) which requires the licensee to restore the inoperable heaters to OPERABLE status within 7 days or to file a special report to NRC within 30 days in accordance with TS 6.9.2, specifying the reason for the heater inoperability and the planned actions to restore the heaters to their OPERABLE status. The NRC staff finds the proposed changes will keep the heaters in an OPERABLE status. The staff also finds the proposed corrective ACTIONS when heaters are found to be inoperable during surveillance tests to be consistent with their reduced importance because of the licensee's proposed method for laboratory testing. Based on the above considerations, the staff finds the proposed changes relating to the heaters acceptable.

The NRC staff finds other proposed changes (i.e., TS 4.6.1.8.d.5 and TS 4.7.6.e.4 which refer to heater performance verification at a nominal voltage of 600V AC; deletion of a footnote relating to Unit 1 on McGuire TS pages 3/4 6-16 and 6-17) either provide clarification as to how the heaters have to be tested or are administrative in nature. Therefore, the staff finds such proposed TS changes acceptable.

Discussion between the NRC staff and the licensee resulted in the licensee's supplemental response of July 3, 1991, to revise the wording of the BASES of TS 3/4.7.6 and 3/4.6.1.8 to reflect the findings of this safety evaluation. The staff considers the rewording of the BASES to be appropriate.

Based on the above findings, the staff concludes that the licensee's proposed changes to McGuire, Units 1 and 2, TS 3/4.6.1.8 and 3/4.7.6 (identified in their submittal dated April 11, 1991), dealing with the Annulus and Control Area Ventilation Systems are acceptable and, therefore, should be granted. The staff also concludes that the BASES as reworded in the licensee's July 3, 1991, submittal are acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to 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 (56 FR 22463). 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.

5.0 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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Date: July 15, 1991