April 4, 2001

Mr. S. K. Gambhir
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 399
Hwy. 75 - North of Fort Calhoun
Fort Calhoun, NE 68023-0399

SUBJECT: FORT CALHOUN STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE: CHARCOAL ADSORBERS (TAC NO. MA6892)

Dear Mr. Gambhir:

The Commission has issued the enclosed Amendment No. 198 to Facility Operating License No. DPR-40 for the Fort Calhoun Station, Unit No. 1. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated April 14, 2000, as supplemented by letters dated June 2, July 28, and December 1, 2000, and January 31, 2001.

The amendment changes the surveillance requirements for laboratory testing of the charcoal adsorbers for the control room, the spent fuel pool storage area and the safety injection pump rooms. In addition, the amendment deletes the laboratory testing requirements for the containment charcoal adsorbers. The changes comply with the guidance of Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal."

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,
/RA/
L. Raynard Wharton, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosures: 1. Amendment No. 198 to DPR-40
2. Safety Evaluation

cc w/encls: See next page

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NRR-058

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

April 4, 2001

Mr. S. K. Gambhir
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 399
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SUBJECT: FORT CALHOUN STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT RE: CHARCOAL ADSORBERS (TAC NO. MA6892)

Dear Mr. Gambhir:

The Commission has issued the enclosed Amendment No. 198 to Facility Operating License No. DPR-40 for the Fort Calhoun Station, Unit No. 1. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated April 14, 2000, as supplemented by letters dated June 2, July 28, and December 1, 2000, and January 31, 2001.

The amendment changes the surveillance requirements for laboratory testing of the charcoal adsorbers for the control room, the spent fuel pool storage area and the safety injection pump rooms. In addition, the amendment deletes the laboratory testing requirements for the containment charcoal adsorbers. The changes comply with the guidance of Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal."

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Sincerely,

L. Raynard Wharton, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosures: 1. Amendment No. 198 to DPR-40
2. Safety Evaluation

cc w/encls: See next page

Ft. Calhoun Station, Unit 1

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

OMAHA PUBLIC POWER DISTRICT

DOCKET NO. 50-285

FORT CALHOUN STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 198
License No. DPR-40

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Omaha Public Power District (the licensee) dated April 14, 2000, as supplemented by letters dated June 2, July 28, and December 1, 2000, and January 31, 2001, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, Facility Operating License No. DPR-40 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Facility Operating License No. DPR-40 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 198, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Stephen Dembek, Chief, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 4, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 198

FACILITY OPERATING LICENSE NO. DPR-40

DOCKET NO. 50-285

Replace the following pages of Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

| REMOVE | INSERT |
|---|---|
| 2-25a | 2-25a |
| 3-20a | 3-20a |
| 3-20b | 3-20b |
| 3-20c | 3-20c |
| 3-56 | 3-56 |
| 3-57 | 3-57 |

to function during accident conditions may be inoperable for a period of no more than 24 hours. If operability is not restored within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours.

Basis

A full capacity diesel-generator is connected to each of the two engineered safeguards 4.16-kV buses. Three engineered safeguards 480-Volt double-ended load centers are provided; of the six transformers, three are connected to each of the two 4.16-kV buses. Two load centers are operated as two-bus-section units; the third is provided with a center bus manually transferable to either associated end section. The center bus section supplies HPSI Pump SI-2C, CS Pump SI-3C and Charging Pump CH-1C any of which can thus be supplied from either 4.16-kV bus if required. The containment sprays initially take coolant from the safety injection and refueling water (SIRW) tank. Before this supply of water is exhausted (at least 24 minutes)(2) the spray system is transferred to the recirculation mode and the pumps take suction from the containment sump. One shutdown cooling heat exchanger is sufficient to satisfy the spray system requirements during the long-term containment cooling period.(3) In addition, in the unlikely event of the component cooling water supply being lost, raw water can be utilized for direct cooling of certain engineered safeguard components.(4)

The containment spray system is independent from the containment air cooling and filtering unit for the containment cooling function.(5) For the limiting Loss of Coolant Accident (LOCA) scenario, one of the three spray pumps would limit the containment pressure to below the design value without taking credit for the air coolers or the cooling capacity of the safety injection system.(6)(7) For the limiting Main Steam Line Break (MSLB) scenario, a heat removal contribution is credited from the air coolers in the mitigation of containment peak pressure.(7) Credit is taken for iodine removal by the containment spray system.

The cooling equipment provided to limit the containment pressure following a DBA is divided between the independent power supply systems. The raw water and component cooling water pumps are similarly distributed on the 4.16-kV and 480 Volt buses. In the event of a DBA, loss of normal power sources and failure of one diesel-generator to operate, a minimum of at least one spray pump, and two air coolers would be connected to the available diesel-generator. This would provide adequate containment cooling equipment to limit the containment pressure below the design value for the limiting one pump, one spray header LOCA event. The limiting MSLB event in which off site power is available, is not affected by the loss of one diesel generator.

TABLE 3-5 (Continued)

MINIMUM FREQUENCIES FOR EQUIPMENT TESTS

| | | | Test | Frequency | USAR Section Reference |
|---|---|---|---|---|---|
| 10a. | (continued) | 2. | Laboratory Testing** Verify, within 31 days after removal, that a laboratory test of a sample of the charcoal adsorber, when obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows methyl iodide penetration less than 0.175% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C [86°F] and a relative humidity of 70%. | On a refueling frequency or 720 hours of system operation or after any structural maintenance on the HEPA filter or charcoal adsorber housing or following significant painting, fire, or chemical release in a ventilation zone communicating with the system. | |
| | | 3. | Overall System Operation | | |
| | | | a. Each circuit shall be operated. | Ten hours every month. | |
| | | | b. The pressure drop across the combined HEPA filters and charcoal adsorber banks shall be demonstrated to be less than 9 inches of water at system design flow rate. | R | |
| | | | c. Fan shall be shown to operate within ± 10% design flow. | R | |
| | | 4. | Automatic and manual initiation of the system shall be demonstrated. | R | |

**Tests shall be performed in accordance with applicable section(s) of ANSI N510-1980.



Amendment No. ~~15,24,128,169~~,198

TABLE 3-5 (Continued)

## MINIMUM FREQUENCIES FOR EQUIPMENT TESTS

| | | | Test | Frequency | USAR Section Reference |
|---|---|---|---|---|---|
| 10b. | Charcoal Adsorbers for Spent Fuel Storage Pool Area | 1. | In-Place Testing** Charcoal adsorbers shall be leak tested and shall show $\geq$99% Freon (R-11 or R-112) removal. | On a refueling frequency or every 720 hours of system operation, or after each complete or partial replacement of the charcoal adsorber bank, or after any major structural maintenance on the system housing or following significant painting, fire or chemical release in a ventilation zone communicating with the system. | 6.2<br>9.10 |
| | | 2. | Laboratory Testing Verify, within 31 days after removal, that a laboratory test of a sample of the charcoal adsorber, when obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows methyl iodide penetration less than 10% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C [86°F] and a relative humidity of 95%. | On a refueling frequency or 720 hours of system operation or after any structural maintenance on the HEPA filter or charcoal adsorber housing or following significant painting, fire, or chemical release in a ventilation zone communicating with the system. | |
| | | 3. | Overall System Operation | | |
| | | | a. Operation of each circuit shall be demonstrated. | Ten hours every month. | |
| | | | b. Volume flow rate through charcoal filter shall be shown to be between 4500 and 12,000 cfm. | R | |
| | | 4. | Manual initiation of the system shall be demonstrated. | R | |

**Tests shall be performed in accordance with applicable section(s) of ANSI N510-1980.



Amendment No. ~~15,24,52,128,154,169~~,198

## TABLE 3-5 (Continued)

### MINIMUM FREQUENCIES FOR EQUIPMENT TESTS

| | | | Test | Frequency | USAR Section Reference |
|---|---|---|---|---|---|
| 10c. | Charcoal Adsorbers for S.I. Pump Room | 1. | In-Place Testing** Charcoal adsorbers shall be leak tested and shall show ≥99% Freon (R-11 or R-112) removal. | On a refueling frequency or every 720 hours of system operation, or after each complete or partial replacement of the charcoal adsorber bank, or after any major structural maintenance on the system housing or following significant painting, fire or chemical release in any ventilation zone communicating with the system. | 9.10<br>6.2 |
| | | 2. | Laboratory Testing Verify, within 31 days after removal, that a laboratory test of a sample of the charcoal adsorber, when obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows methyl iodide penetration less than 10% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C [86°F] and a relative humidity of 95%. | On a refueling frequency or following 720 hours of system operation or after any structural maintenance on the HEPA filter or charcoal adsorber housing or following significant painting, fire, or chemical release in a ventilation zone communicating with the system. | |
| | | 3. | Overall System Operation | | |
| | | | a. Operation of each circuit shall be demonstrated. | Ten hours every month. | |
| | | | b. Volume flow rate shall be shown to be between 3000 and 6000 cfm. | R | |

**Tests shall be performed in accordance with applicable sections(s) of ANSI N510-1980.

Basis

The safety injection system and the containment cooling system are principal plant safeguards that are not operated during normal reactor operation.

Complete systems tests cannot be performed when the reactor is operating because a safety injection signal causes containment isolation and a containment spray system test requires the system to be temporarily disabled. The method of assuring operability of these systems is, therefore, to combine systems tests to be performed during refueling shutdowns in addition to more frequent component tests which can be performed during reactor operation.

The refueling shutdown tests demonstrate proper automatic operation of the safety injection and containment spray systems. A test signal is applied to initiate automatic action and verification made that the components receive the safety injection actuation signals in the proper sequence. The test demonstrates the operation of the valves, pump circuit breakers, and automatic circuitry.(1) (2)

During reactor operation, the instrumentation which is depended on to initiate safety injection and containment spray is generally checked daily and the initiating circuits are tested monthly. In addition, the active components (pumps and valves) are to be tested every three months to check the operation of the starting circuits and to verify that the pumps are in satisfactory running order. The test interval of three months is based on the judgement that more frequent testing would not significantly increase the reliability (i.e., the probability that the component would operate when required), yet more frequent tests would result in increased wear over a long period of time. Verification

that the spray piping and nozzles are open will be made initially by a smoke test or other suitably sensitive method, and at appropriate intervals thereafter. A single containment spray header flow rate of 1885 gpm of atomized spray is required to provide the containment response[3] specified in Section 2.4 of the Technical Specification: To achieve the 1885 gpm flow rate, no greater than ten (10) spray nozzles may be inoperable of which no more than one may be missing. Since the material is all stainless steel, normally in a dry condition, with no plugging mechanism available, retesting at appropriate intervals is considered to be more than adequate.

Other systems that are also important to the emergency cooling function are the SI tanks, the component cooling system, the raw water system and the containment air coolers. The SI tanks are a passive safeguard. In accordance with the specifications, the water volume and pressure in the SI tanks are checked periodically. The other systems mentioned operate when the reactor is in operation and are continuously monitored for satisfactory performance.

The in-containment air treatment system is designed to filter the containment building atmosphere during accident conditions. Both in-containment air treatment systems are designed to automatically start upon accident signals. Should one system fail to start, the redundant system is designed to start automatically. Each of the two systems has 100 percent capacity.[4]

High efficiency particulate air (HEPA) filters are installed before the charcoal adsorbers to prevent clogging.

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 198 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 application dated April 14, 2000, as supplemented by letters dated June 2, July 28, and December 1, 2000, and January 31, 2001, Omaha Public Power District (OPPD) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. DPR-40) for the Fort Calhoun Station, Unit No. 1 (FCS). The requested changes would change the surveillance requirements for laboratory testing of the charcoal adsorbers for the control room, the spent fuel pool storage area and the safety injection pump rooms. Also, the amendment would delete the laboratory testing requirements for the containment charcoal adsorbers. The changes comply with the guidance of Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal."

OPPD proposed to remove credit for the majority of the activated charcoal filters from the FCS design-basis accident radiological consequences analyses. Specifically, OPPD proposed to no longer take credit for iodine removal by the containment air cooling and filtering charcoal filters in the radiological analyses and delete the associated laboratory testing requirements from the technical specifications (TS). The affected design basis radiological analysis is the loss-of-coolant accident (LOCA). OPPD revised the LOCA dose analysis to take credit for iodine removal by the safety-grade containment spray system to offset the deletion of credit for the containment charcoal filters and remain within the regulatory limits for dose.

## 2.0 EVALUATION

The NRC staff, with technical assistance from Brookhaven National Laboratory (BNL), has reviewed OPPD's submittals. In addition, the staff has reviewed the attached BNL Technical Evaluation Report (TER) regarding the proposed technical specification (TS) changes for FCS. Based on its review, the staff adopts the TER.

### 2.1 Revised LOCA Dose Analysis

In order to maintain acceptable doses while not taking credit for the containment charcoal filters, OPPD revised the LOCA dose analysis to take credit for iodine removal by the containment spray system, which had not previously received credit in the previous dose analyses for FCS. The analysis inputs related to this credit are iodine removal coefficients and

decontamination factor for the containment spray system and the assumed containment mixing rate.

For the calculation of LOCA control room doses, OPPD assumed 8 cfm of unfiltered inleakage, based on tracer gas testing of the control room envelope. The staff finds this assumption to be acceptable because it is based on actual inleakage testing by an acceptable method. OPPD's calculation assumed a total emergency core cooling system (ECCS) leakage rate of 1500 cc/hour, which was doubled for dose calculational purposes in accordance with Standard Review Plan (SRP) 15.6.5, Appendix B. This assumed 1500 cc/hour ECCS leakage was intended to bound both the current TS 3.16 (2)(a) external leakage limit and the actual measured system external leakage plus the safety injection refueling water tank (SIRWT) back leakage. The January 31, 2001, letter identified that OPPD had recently determined that the assumed total ECCS leakage of 1500 cc/hour is less than the total ECCS leakage measured in 1999, the most recent surveillance test. Because of this, OPPD recalculated the dose consequences based on an assumed total ECCS leakage of 2000 cc/hour. The staff finds this assumed ECCS leakage value to be bounding for the dose calculation. All other calculation assumptions are based on the LOCA dose analysis documented in Section 14.15.8 of the FCS Updated Safety Analysis Report (USAR).

2.2 Iodine Removal Coefficients and Decontamination Factor for Containment Spray

OPPD performed an evaluation of the capability for iodine removal by the containment sprays. This evaluation included determination of iodine removal coefficients (λ) and a decontamination factor (DF). The staff performed verification of OPPD's results by comparing them to the values calculated by the staff using the methodologies described in Section 6.5.2 of the SRP.

The iodine removal coefficients calculated by OPPD and the staff are tabulated below:

**Table 1**
**Iodine Removal Coefficients**

| | **Licensee** | | **NRC** | |
|---|---|---|---|---|
| | Injection Phase | Recirculation Phase | Injection Phase | Recirculation Phase |
| λ elemental | 12.37 $hr^{-1}$ | 16.94 $hr^{-1}$ | 17.97 $hr^{-1}$ | 29.56 $hr^{-1}$ |
| λ particulate | For DF ≤ 50: 5.244 $hr^{-1}$<br><br>For DF > 50: 0.6 $hr^{-1}$ | For DF ≤ 50: 7.947 $hr^{-1}$<br><br>For DF > 50: 0.977 $hr^{-1}$ | For DF ≤ 50: 6.045 $hr^{-1}$<br><br>For DF > 50: 0.605 $hr^{-1}$ | For DF ≤ 50: 9.941 $hr^{-1}$<br><br>For DF > 50: 0.994 $hr^{-1}$ |

The results in the table indicate that all the values of iodine removal coefficients (λ) for both elemental and particulate iodine determined by OPPD are bounded by the values calculated by the staff.

OPPD proposed using DF=100 as a limiting value for the decontamination factor at FCS. This decision was justified by referencing the model in TID-14844 where it is assumed that half of the iodine released to the containment is immediately deposited on the containment internal surfaces. With this assumption, DF=100 for elemental iodine removal by sprays will correspond to DF=200 for elemental iodine removal by sprays and deposition. Since this value represents the maximum decontamination factor allowed by the SRP, use of DF=100 for a limiting value of the decontamination factor is acceptable when elemental iodine is removed by sprays only.

2.3 Containment Mixing Model

As part of their response to GL 99-02, OPPD included a calculation of containment air mixing in several zones of the containment. This model is composed of two parts: a natural circulation mixing model and a forced flow mixing model. The natural circulation mixing model is described in a Stone and Webster Engineering Corporation report, "Analysis of Containment Mixing Rate During a Design-Basis LOCA," that was attached to the July 28, 2000, OPPD submittal. This report describes only the generic mathematical model and does not provide a description of how the model was applied to the FCS analyses. In the December 1, 2000, response to a staff question, OPPD provided the description of the application of this model to FCS along with a description of the complete containment mixing model which includes forced circulation mixing.

2.3.1 Background

The FCS containment mixing model divides the containment into two zones. The first zone is above the operating floor and the second is below the operating floor. The natural circulation model is applied to the zone above the operating floor to justify that the sprayed region and the unsprayed region in this zone may be combined into one "effectively" sprayed region. The amount of mixing is not quantitatively determined (or at least not reported) for this zone. The conclusion from the use of the natural circulation mixing model is only that the total volume above the operating floor may be considered to be one well-mixed volume. The second containment zone is below the operating floor. It is not sprayed. It is subject to forced flow from the containment air recirculation, cooling and iodine removal system. This system is described in Section 6.4 of the Fort Calhoun USAR. It consists of two cooling and filtering units and two cooling units. The mixing rate between the effectively sprayed zone above the operating floor and the unsprayed zone below the operating floor is based solely on forced circulation flow by the containment air recirculation, cooling and iodine removal system. The forced flow below the operating floor is directed to the volume above the operating floor. Since the volume above the operating floor has been determined to be well mixed by use of the natural circulation mixing model, the same quantitative mixing rate is applied to the area above the operating floor as that determined by forced flow for the area below the operating floor.

2.3.2 Modeling of Containment Mixing

The natural circulation mixing model accounts for the buoyancy of the higher temperature air in the unsprayed region of the containment atmosphere above the containment operating floor. This results in mixing of this higher temperature air with the lower temperature air in the sprayed region. In addition to the natural circulation effect considered in the model, there are other mixing effects which are not included in this model. There is a strong effect due to momentum transfer between the spray droplets and the containment air which produces significant air currents to enhance air mixing between the sprayed and the unsprayed regions (see NUREG/CR-4102, "Air Currents Driven by Sprays in Reactor Containment Buildings," dated May 1986). Air currents generated by heat flow from the containment walls during the accident is also not considered. Because of the existence of these other effects, in addition to natural circulation, which significantly enhance mixing in containment, the staff considers OPPD's assumption of an effectively sprayed region above the operating floor to be acceptable.

The effectively sprayed volume above the containment floor and the zone below the operating floor are connected by a flow path that ensures flow communication between the two volumes. OPPD's December 1, 2000, submittal states that below the operating floor the primary air flow path is down through an annulus around a portion of the edge of the floor, across the containment at this level, and up to the effectively sprayed volume.

OPPD calculates the mixing below the operating floor based on forced flow from the containment air recirculation, cooling and iodine removal system. This calculation was submitted in the December 1, 2000, letter. The staff has reviewed this calculation and finds it to be acceptable. The calculation results in a mixing rate for the volume below the operating floor of $\lambda = 4.84\ hr^{-1}$.

OPPD applies the same mixing rate to the zone above the operating floor. Because of the high rate of mixing in this zone due to the sprays, the staff agrees that the use of the same value of $\lambda$ for the zone above the upper operating floor is conservative.

Therefore, the staff finds OPPD's containment mixing model to be acceptable for application to GL 99-02.

2.3.3 Assurance of Adequate Flow from the Units of the Containment Air Recirculation, Cooling and Iodine Removal System

OPPD's forced flow analysis assumes a single failure such that only one cooling and filtering unit and one cooling unit in the containment air recirculation, cooling and iodine removal system will operate during the LOCA. The flow rates assumed in the calculation are 86,500 cubic feet per minute (cfm) for the cooling and filtering unit and 52,000 cfm for the cooling unit for a total flow rate of 138,500 cfm.

FCS Technical Specification Limiting Condition for Operation (LCO) 2.4(1) requires that containment air cooling and filtering units VA-3A and B, and containment air cooling units 7C and D must be operable when the reactor is critical, except for low-power physics tests. Surveillance Requirement 3.6(3) currently requires that the containment air cooling and filtering system fans shall be shown to operate within ±10 percent design flow during each refueling

outage. This is done by surveillance test IC-ST-VA-0013. OPPD proposes to revise surveillance test IC-ST-VA-0013 to also require flow testing for the 7C and D fans of the containment air cooling units. Failure of the 7C and D fans to satisfy this flow rate test would result in operation outside the FCS licensing basis. OPPD would then be required to either restore the flow rate or justify operation at a lower flow rate. A change to the flow rate would require prior approval by the staff under the revised 10 CFR 50.59 process, specifically 10 CFR 50.59(2)(2). Therefore, the staff finds OPPD's change of the test procedure to include the 7C and D fans to be acceptable.

2.4 Revised LOCA Dose Analysis Results

As stated above, the staff found acceptable the assumptions and methodology used by OPPD in the revised LOCA dose analysis in support of this amendment. The staff verified the results by performing confirmatory calculations using the associated assumptions. OPPD's calculated doses meet the 10 CFR Part 100 offsite dose acceptance criteria of 25 rem to the whole body and 300 rem to the thyroid. The control room doses meet the dose acceptance criteria given in 10 CFR Part 50, Appendix A, General Design Criterion 19 (GDC-19) of 5 rem whole body or its equivalent to any part of the body.

2.5 Conclusion

The staff finds acceptable OPPD's revised LOCA analysis that removes credit for the containment charcoal adsorbers while taking credit for iodine removal by the containment spray system. The results of the revised analysis meet the dose acceptance criteria given in 10 CFR Part 100 for offsite dose and 10 CFR Part 50, Appendix A, GDC-19 for dose to the control room operator. The staff has determined that the removal of testing requirements for the containment charcoal adsorbers is acceptable with regard to the radiological consequences of design basis accidents.

## 3.0 STATE CONSULTATION

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

## 4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC 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 exposure. 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 (66 FR 13355). Accordingly, the amendment meets 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 amendment.

## 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Attachment: Technical Evaluation Report

Principal Contributors: M. Hart
R. Lobel
K. Parczewski

Date: April 4, 2001

TECHNICAL EVALUATION REPORT
BROOKHAVEN NATIONAL LABORATORY
FOR THE OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF SYSTEMS SAFETY AND ANALYSIS
PLANT SYSTEMS BRANCH
RELATED TO AMENDMENT TO FACILITY OPERATING
LICENSE NO. DPR-40
OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION
DOCKET NO. 50 - 285

## 1.0 INTRODUCTION

By letter dated August 2, 1999 (LIC-99-0068), Omaha Public Power District (OPPD) submitted its response to the actions requested in Generic Letter (GL) 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," dated June 3, 1999, for the Fort Calhoun Station (FCS). By the same letter, OPPD indicated that in accordance with Requested Action 5 of GL 99-02, OPPD is pursuing an alternate course of action at FCS which involves removing credit for the majority of the activated charcoal filters from the revised design basis accident radiological consequence analyses. By letter dated October 8, 1999 (LIC-99-0091), OPPD provided its basis and schedule for submitting the plan to implement the proposed course of action for NRC staff review. This proposed action involves the new accident-based radiological consequence analyses that is not crediting the Containment Air Cooling and Filtering System (CACAFS) charcoal filters.

By letter dated April 14, 2000 (LIC-00-0025), OPPD requested changes to the Technical Specifications (TS) Surveillance Requirements in TS Table 3-5 for the Control Room Filtering System (CRFS), the Spent Fuel Pool Storage Pool Area Filtering System (SFPSPAFS), and the Safety Injection Pump Room Filtering System (SIPRFS), and removing the TS basis in TS Section 2.4 and the TS Surveillance Requirements in TS Section 3.6 for the Containment Air Cooling and Filtering System (CACAFS) at the Fort Calhoun Station. By letter dated December 1, 2000 (LIC-00-0101), OPPD provided additional responses regarding charcoal bed sizes, face velocities. credited efficiencies, and other related information. The proposed changes would revise the TS surveillance testing of the safety related ventilation system charcoal filters to meet the requested actions of GL 99-02.

## 2.0 BACKGROUND

Safety-related air-cleaning units used in the engineered safety features (ESF) ventilation systems of nuclear power plants reduce the potential onsite and offsite consequences of a radiological accident by filtering radioiodine. Analyses of design basis accidents assume particular safety related charcoal adsorption efficiencies when calculating offsite and control room operator doses. To ensure that the charcoal filters used in these systems will perform in a manner that is consistent with the licensing basis of a facility, licensees have requirements in their TS to periodically perform a laboratory test (in accordance with a test standard) of charcoal samples taken from these ventilation systems.

In GL 99-02, the staff alerted licensees that testing nuclear-grade activated charcoal to standards other than American Society for Testing and Materials (ASTM) D3803-1989, "Standard Test Method for Nuclear-Grade Activated Carbon," does not provide assurance for complying with their current licensing bases with respect to the dose limits of General Design Criterion (GDC) 19 of Appendix A to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR) and Subpart A of 10 CFR Part 100.

GL 99-02 requested that all licensees determine whether their TS reference ASTM D3803-1989 for charcoal filter laboratory testing. Licensees whose TS do not reference ASTM D3803-1989 were requested to either amend their TS to reference ASTM D3803-1989 or propose an alternative test protocol.

## 3.0 EVALUATION

### 3.1 Laboratory Charcoal Sample Testing Surveillance Requirements

The current and proposed laboratory charcoal sample testing TS surveillance requirements for the Containment Air Cooling and Filtering System (CACAFS), the Control Room Filtering System (CRFS), the Spent Fuel Pool Storage Pool Area Filtering System (SFPSPAFS), and the Safety Injection Pump Room Filtering System (SIPRFS) are shown in Table 1 and Table 2, respectively, for the Fort Calhoun Station.

By letter dated April 14, 2000, OPPD requested the removal of the TS surveillance requirements for the CACAFS. By letter dated December 1, 2000, although charcoal filters for SFPSPAFS and SIPRFS are not credited in the revised analyses for mitigating the consequences of an accident, OPPD stated that they do not intend to remove the surveillance testing requirements from the TS at this time. Based on the revised accident analyses, the only system which requires TS surveillance testing of its charcoal filters is CRFS. However, Table 1 and Table 2 include all four systems for completeness.

The proposed use of ASTM D3803-1989 is acceptable because it provides accurate and reproducible test results. The proposed test temperature of 30°C and relative humidity (RH) of 95% for SFPSPAFS and SIPRFS, and the proposed test temperature of 30°C and RH of 70% for CRFS which is equipped with a heater to maintain the RH at 70%, are acceptable because it is consistent with ASTM D3803-1989. This is consistent with the actions requested in GL 99-02.

By letter dated April 14, 2000, the credited removal efficiencies for radioactive organic iodine for CRFS is 99%. Per letter dated December 1, 2000, charcoals for SFPSPAFS and SIPRFS are not credited in the revised accident analyses. The proposed test penetration for radioactive methyl iodide for CRFS, SFPSPAFS, and SIPRFS are less than 0.175%, 10%, and 10%, respectively. The safety factors for SFPSPAFS and SIPRFS are not applicable, since these systems are no longer credited in the accident analyses. The proposed safety factor of above 2 for CRFS is acceptable because it ensures that the efficiency credited in the accident analysis is still valid at the end of the surveillance interval. This is consistent with the minimum safety factor of 2 specified in GL 99-02.

The August 23, 1999 errata to GL 99-02 clarified that if the maximum actual face velocity is greater than 110% of 40 fpm, then the test face velocity should be specified in the TS. By letter dated December 1, 2000, the face velocity for CRFS, SFPSPAFS, and SIPRFS is 40 fpm. The proposed testing of the charcoal adsorbers will be performed in accordance with ASTM D3803-1989 which specifies a test face velocity of 40 fpm with appropriate margins. This is acceptable because it ensures that the testing will be consistent with the operation of the ventilation system during accident conditions. Therefore, it is not necessary to specify the face velocity in the proposed TS change. This is consistent with the errata to GL 99-02 dated August 23, 1999.

## 4.0 CONCLUSION

On the basis of its evaluation, BNL recommends that the NRC staff consider the proposed TS changes to be acceptable.

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Date: December 21, 2000

## FT. CALHOUN NUCLEAR POWER PLANT

| TABLE 1 - CURRENT TS REQUIREMENTS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **System Description** | | | | | | **Current TS Requirements** | | | | | |
| TS Section | System | Bed Thickness (inches) ** | Actual Charcoal | | Credited Efficiency (% organic iodine) | Test Penetration (% methyl iodide) | Safety Factor | Test Standard | Test Temp (° C) | Test RH (%) | Test Face Velocity (fpm) |
| | | | Res. Time (sec)** | Face Velocity (fpm)** | | | | | | | |
| 2.4<br>3.6 | Containment Air Cooling and Filtering System (CACAFS)* | Not stated | Not stated | Not stated | 0* | <15<br><10 (Initial batch test) | Not stated | Not stated | ≥121 (250°F) | >95 | ±20% of design |
| Table 3-5 | Control Room Filtering System (CRFS) | 4 | 0.50 | 40 | 99*** | <0.175 | 5.71 | ANSI N510-1980 | ≥80 (176°F) | >70 | 40±1.6 |
| Table 3-5 | Spent Fuel Pool Storage Area Filtering System (SFPSAFS)* | 1 | 0.125 | 40 | 0* | <1 Elemental | Not stated | Not stated | ≥51.6 (125°F) | >95 | ±20% of design |
| Table 3-5 | Safety Injection Pump Room Filtering System (SIPRFS)* | 1 | 0.125 | 40 | 0* | <1 Elemental | Not stated | Not stated | >51.6 (125°F) | >95 | ±20% of design |

* Per letters dated April 14, 2000 and December 1, 2000, charcoal filters for CACAFS, SFPSAFS, and SIPRFS are not credited in the revised accident analyses. Credited efficiencies based on existing accident analyses for these systems are not available.

** Per letter dated December 1, 2000.

*** Per letter dated October 8, 1999.

## FT. CALHOUN NUCLEAR POWER PLANT

| TABLE 2 - PROPOSED TS REQUIREMENTS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System Description | | | | | | Proposed TS Requirement | | | | | | |
| TS Section | System | Bed Thickness (inches) ** | Actual Charcoal | | Credited Efficiency (% organic iodine) | Test Penetration (% methyl iodide) | Safety Factor | Test Standard | Test Temp (° C) | Test RH (%) | Test Face Velocity (fpm) **** |
| | | | Res. Time (sec)** | Face Velocity (fpm)** | | | | | | | |
| 2.4 3.6 | Containment Air Cooling and Filtering System (CACAFS)* | Not stated | Not stated | Not stated | 0* | Not Applicable | Not Applic-able | Not Applicable | Not Appli-cable | Not Applic -able | Not Applic-able |
| Table 3-5 | Control Room Filtering System (CRFS) | 4 | 0.50 | 40 | 99*** | <0.175 | 5.71 | ASTM D3803-1989 | 30 | 70 | 40 |
| Table 3-5 | Spent Fuel Pool Storage Area Filtering System (SFPSAFS)* | 1 | 0.125 | 40 | 0* | <10 | Not Appli-cable | ASTM D3803-1989 | 30 | 95 | 40 |
| Table 3-5 | Safety Injection Pump Room Filtering System (SIPRFS)* | 1 | 0.125 | 40 | 0* | <10 | Not Appli-cable | ASTM D3803-1989 | 30 | 95 | 40 |

* Per letter dated April 14, 2000, charcoal filters for CACAFS are not credited in the revised accident analyses and OPPD requested removing the TS requirements for this system. Per letter dated December 1, 2000, charcoal filters for SFPSAFS and SIPRFS are also not credited in the revised accident analyses. However, for these two systems OPPD does not intent to remove the testing requirements from the TS at this time.