Omaha Public Power District
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LIC-00-0101

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, DC 20555

References:
1. Docket No. 50-285
2. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated April 14, 2000 (LIC-00-0025)
3. NRC Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," dated June 3, 1999
4. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated June 2, 2000 (LIC-00-0056)

SUBJECT: Updated Information on the Application for Amendment of Facility Operating License No. DPR-40 related to Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal."

Staff members from the NRC and Omaha Public Power District (OPPD) have recently had several discussions about information provided in the previous OPPD submittals referenced above (i.e., References 2 and 4) related to the application for amendment of Facility Operating License DPR-40. As a result of these discussions, OPPD provides the enclosed NRC questions and OPPD responses. Reference 2 contains the application for amendment related to Generic Letter 99-02. Reference 4 contains an OPPD calculation related to a large break loss of coolant accident. This submittal addresses all requested information and should allow continued processing of the application for amendment to support Fort Calhoun Station's 2001 Refueling Outage which has a scheduled start date of March 16, 2001.

A081

Employment with Equal Opportunity

I declare under penalty of perjury under the laws of the United States of America that I am authorized by Omaha Public Power District to provide this information and that the foregoing is true and correct. Please contact me if you have any questions.

Sincerely,

S. K. Gambhir
Division Manager
Nuclear Operations

SKG/DLS/dls

Enclosure

c: E. W. Merschoff, NRC Regional Administrator, Region IV (w/o enclosure)
L. R. Wharton, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector (w/o enclosure)
Winston & Strawn (w/o enclosure)

ENCLOSURE
Response to NRC Questions Related to References 2 and 4

1) **NRC Question:** Requested action 1 of Generic Letter (GL) 99-02 requested that each licensee provide the specific test protocol, temperature, relative humidity, charcoal bed depth, total residence time per bed depth, and penetration for each ESF ventilation system. Please refer to or provide docketed information stating the bed depth for the Spent Fuel Pool Storage Area Filtering System (SFPSAFS) and the Safety Injection Pump Room Filtering System (SIPRFS) and the total residence times for the Control Room Filtering System (CRFS), the SFPSAFS and the SIPRFS.

   OPPD Response: Both the SFPSAFS and the SIPRFS have 1" bed depth filters. The total residence time for the CRFS is 0.5 sec (4" effective bed depth). The total residence time for both the SFPSAFS and the SIPRFS is 0.125 sec (1" effective bed depth).

2) **NRC Question:** Requested action 2 of GL 99-02 states, "If the system has a face velocity greater than 110% of 0.203 m/s [40 ft/min], then the revised TS should specify the face velocity." Please refer to or provide docketed information that indicates the actual system face velocity for the CRFS, SFPSAFS and SIPRFS and describes how it is calculated for these systems. The actual system face velocities can be calculated by dividing the maximum accident condition system flow rates specified in the technical specification (TS) (nominal + typically 10% upper value) by the total exposed surface area of the charcoal filter media. The guidance on calculation of the residence times in ASME AG-1-1997, Division II, Sections FD and FE, Articles 1 - 1000, or in ANSI N510-1975 can be used to calculate the actual system face velocities. It should be noted that the face velocity should be consistent with the bed depth and residence time (Bed Depth = Face Velocity x Residence Time).

   OPPD Response: The CRFS has a 40 fpm face velocity (total flow = 2000 cfm or 500 cfm/filter). The SFPSAFS has a 40 fpm face velocity (total flow = 6000 cfm @ 25 ft^2 / filter and six filters). The SIPRFS has a 40 fpm face velocity (total flow = 12,000 cfm @ 25 ft^2 / filter and 12 filters).

3) **NRC Question:** In order for the staff to verify that a safety factor as low as 2 is used, the staff needs to know the charcoal adsorber removal efficiencies which are credited in the radiological accident analyses for organic iodide. Please refer to or provide docketed information stating the credited organic iodide efficiency for the SFPSAFS and the SIPRFS.

   OPPD Response: The spent fuel pool area charcoal filter unit is not credited in mitigating the consequences of a fuel handling accident (USAR 14.18.4). The safety injection pump room charcoal filters are not credited either in the current LOCA calculations (USAR 9.10) or in the revised LOCA analysis prepared by Stone and Webster Engineering Corporation in support of this license amendment application. Although these filters are not credited for mitigating the consequences of an accident, OPPD does not intend to remove the testing requirements from the Technical Specifications at this time.

4) **NRC Question:** Does the double asterisk in Table 3-5 (related to CRFS) of the Fort Calhoun Station (FCS) Technical Specifications, which states that the laboratory testing "shall be performed in accordance with applicable selection(s) of ANSI N510-1980," mean that OPPD is taking exception to ASTM D3803-1989?

   OPPD Response: No exceptions are being taken. Once the change is approved, CRFS will be tested to ASTM D3803-1989 standards. ANSI N510-1980, Section 13.3 states to test in accordance with ASTM D3803 and Technical Specifications.

5) **NRC Question:** In Section 10.a.2.b of Table 3-5, does the statement "at a bed depth of 4 inches" mean that the CRFS has a bed depth of 4 inches? Or, does it mean that only 4 inches is tested?

   OPPD Response: The CRFS has 2 banks of 2" bed filter trays for a 4" effective bed.

6) **NRC Question:** The charcoal testing for the control room filtering system is performed at an RH of 70%. Please provide TS sections for safety related heaters or calculations indicating that the control room is maintained at this RH during an accident condition.

   OPPD Response: USAR Section 9.10.3.4 states that each control room charcoal filter unit (VA –64A/B) is provided with a heater to maintain maximum air stream relative humidity below 70%.

7) **NRC Question:** The Containment Air Cooling Fans (VA-7C/D) are credited in the Stone and Webster mixing model during a LOCA. Does OPPD intend to revise the FCS Technical Specifications to require flow testing for VA-7C/D?

   OPPD Response: FCS will revise an existing surveillance test (IC-ST-VA-0013) to require flow testing for the VA-7C/D fans. The surveillance test currently satisfies the requirements of Technical Specification 3.6(3) f (page 3-55) for the Containment Recirculation Air Cooling and Filtering System. After the Surveillance Test is revised, the Tech Spec requirement will also apply to the VA-7C/D fans. IC-ST-VA-0013 testing of the VA-7C/D fans to demonstrate compliance with the mixing requirements will be conducted in the 2001 refueling outage. Mixing capability consistent with analysis will be demonstrated by fan testing before leaving Mode 2 in the 2001 refueling outage startup. If necessary, fan blade adjustment or reanalysis will be performed to confirm the tested fan flowrates are consistent with the mixing analysis. Subsequent GL 99-02 closeout NRC inspections could verify that the testing results met analysis and design requirements. If the amendment request contained in Reference 2 is approved, then the FCS USAR (section 6.4) will be revised to specify the design requirements for the VA-7C/D fans to ensure the mixing requirements are not inadvertently removed from the surveillance test without NRC approval in accordance with the revised 10 CFR 50.59 process. Under the revised 50.59 process, which goes into effect in February 2001, paragraph 50.59(2)(2) requires that any change to requirements that more than minimally affects the frequency of an accident, likelihood of a malfunction or the consequences of the accident or

malfunction would require prior NRC approval. The revised 50.59 process therefore ensures maintenance of the design function.

8) **NRC Question:** How was the mixing rate derived in the Stone and Webster, Inc. containment mixing model?

OPPD Response: The following are excerpts (*with clarification comments in italics*) from SWEC Calculation 08639-US (B)-002 Rev. 0 relevant to development of mixing rate, λ_M, for Fort Calhoun Station.

ASSUMPTIONS

1. The airflow generated by the containment air recirculation coolers (CFC – containment fan coolers) is not credited for mixing above the operating floor.
2. Only one unit of the Cooling and Filtering Units and one unit of the Cooling Units of the Containment Fan Recirculation System is credited for mixing in the unsprayed region below the operating floor.
3. The air flow rates identified for the containment air recirculation fan coolers are nominal and the actual flow rates are ±10%.

DATA - Direct Spray Coverage

Below the Operating Floor
The unsprayed volume below the operating floor = 355,455 ft^3
The maximum containment free volume is assumed to be $1.16x10^6$ ft^3 or 10% greater than the minimum free volume of 1.05 $x10^6$ ft^3 (Available from FCS UFSAR Table 14.16-2 pg. 5, Rev. 2, 2/2/98).

Containment Recirculation Fan System
Available from FCS UFSAR Section 6.4.4 pg. 11 of 19 Rev. 1, 9/24/98:
"A containment high pressure (CPHS) and/or a pressurizer low pressure signal (PPLS) (see Section 7.3.2) initiates the following:

a. VA-3A & VA-3B are started with PPLS OR CPHS via the sequencer.
b. VA-7C & VA-7D are started with PPLS AND CPHS via the sequencer.
c. On the cooling and filtering units, the face dampers open and the bypass dampers close.
d. The component cooling water system valves on the cooling coil supply and return lines receive actuation signals to open.

All four units are then operating in the emergency mode. If all normal power sources are lost and only one cooling unit fan and one cooling and filtering unit fan operate."
Available from FCS UFSAR Section 6.4.4 Table 6.4-6 "Fan Design and Operating Data" pg. 10 of 19 Rev. 1, 9/24/98:
Cooling and Filtering Units, Item No. VA-3A & 3B

Flow, cfm per unit (Accident Operation)	86,500
Cooling Units, Item No's 7C & 7D	
Flow, cfm per unit	52,000

Available from FCS UFSAR Section 6.4.4 pg. 12 of 19 Rev. 1, 9/24/98:
"An analysis was performed to determine the distribution of air in the containment after a DBA. The results of this analysis are listed below. For case I, it was assumed that the ring header, supplying air to the various regions of the containment, collapses due to the high containment pressure created by the DBA blowdown and all the air leaving the cooling units exits through the hatches at the bottom and at the top of the plenum. For case II, it was assumed that the ring header is sheared off on both sides of the air plenum and the air leaving the cooling units exit through the hatches at the bottom and at the top of the plenum as well as through the openings left by the sheared off ring header."

Flow Distribution

	Case I	Case II
Basement Level	20%	10%
Intermediate Level	30%	13%
Operating Level	45%	73%
Containment Dome	5%	4%"

Available from FCS UFSAR Section 6.4.4 pg. 15 of 19 Rev. 1, 9/24/98:
"Flow channels between the various levels inside the containment are provided by annular gaps between the edges of the floor and the containment shell in addition to hatchways. The aggregate area of these gaps far exceeds the cross sectional area of the ductwork. Assuming the ductwork fails during the DBA, air discharged from the fans will be directed through the fusible link operated hatches, reinforcing the tendency of the cooled mixture to go to the bottom of the containment. This hatch is located over the annulus at the edge of the containment floor. If a portion of the normal ductwork remains intact, it will conduct air directly to the bottom of the containment."

CALCULATION

Mixing Analysis (Containment Fan Coolers)
Below the Operating Floor
Minimum flow distribution below the operating floor = 23% (10%+13%)
Minimum flow fraction (due to variation from nominal flow) = 0.90
Nominal Fan Flow (cfm) = 138,500 (86,500 + 52,000)
Unsprayed Volume below the operating floor = 355,455 ft^3

$$\lambda_M = \frac{138{,}500\,\frac{\text{ft}^3}{\text{min}} * 60\,\frac{\text{min}}{hr} * 0.90 * 0.23}{355{,}455\,\text{ft}^3}$$

$$= \frac{4.84}{\text{hr}}$$

ADDITIONAL INFORMATION

The Fort Calhoun Station mixing rate, λ_M, between the effectively sprayed and unsprayed volumes is based solely on forced circulation by the containment fan coolers.

Assuming that the exhaust ring header is sheared off on both sides of the air plenum, approximately 23% of total airflow is directed down below the operating floor through the annulus opening at elevation 1048' adjacent to plenum damper with a fusible link. Since this air flow causes slight pressurization of the intermediate and basement levels located at elevations between 996' and 1048', multiple flow paths are established across these levels and upward through the openings in the operating floor at elevation 1048' and openings in the intermediate floor at elevation 1013'.

On the intermediate level (elevation between 1013' and 1048'), the primary flow path is down through the annulus opening adjacent to plenum damper, across the containment at this level, and up to the effectively sprayed volume through the annulus opening in the operating floor on the opposite side of the containment. On the basement level (elevation between 996' and 1013'), several flow paths connect from multiple openings that are located close to the annulus opening adjacent to plenum damper, across the containment at this level, and up to the intermediate level through the openings in the floor located at elevation 1013'.

The natural circulation model is solely used above the operating level to determine the effectively sprayed volume. Because the sprayed and unsprayed volumes above the operating level have been combined into an effectively sprayed region, the spray aerosol removal coefficient has been adjusted to account for the finite mixing rate. The methodology for adjusting the spray removal coefficient is Stone & Webster Proprietary. The higher the mixing rate in this volume, the lower the correction factor for the spray aerosol removal coefficient. A description of the methodology is contained in the most recent submittal for the Millstone Unit 3 Supplemental Leakage Collection and Release System.