December 18, 2000

Mr. Michael R. Kansler
Vice President, Operations Support
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE: LABORATORY TESTING OF NUCLEAR-GRADE ACTIVATED CHARCOAL (TAC NO. MA7281)

Dear Mr. Kansler:

The Commission has issued the enclosed Amendment No. 228 to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated November 23, 1999, as supplemented by letter dated October 19, 2000.

The amendment incorporates the use of American Society for Testing and Materials (ASTM) D3803-1989, "Standard Test Method for Nuclear-Grade Activated Carbon," into the ANO-2 TSs.

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

Sincerely,

/RA/

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 228 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 228
License No. NPF-6

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated November 23, 1999, as supplemented by letter dated October 19, 2000, 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, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-6 is hereby amended to read as follows:

   2. Technical Specifications

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 228 , 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

Robert A. Gramm

Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 18, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 228

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

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

Remove	Insert
3/4 9-13	3/4 9-13
B 3/4 9-3	B 3/4 9-3

SURVEILLANCE REQUIREMENT (Continued)

2. Verifying within 31 days after removal that laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration less than 5.0% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C and a relative humidity of 95%.

3. Verifying a system flow rate of 39,700 cfm ± 10% during system operation when tested in accordance with ANSI N510-1975.

b. After every 720 hours of charcoal adsorber operation by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b. of Regulatory Guide 1.52, Revision 2, March 1978, shows the methyl iodide penetration less than 5.0% when tested in accordance with ASTM D3803-1989 at a temperature of 30°C and a relative humidity of 95%.

c. At lease once per 18 months by verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is < 6 inches Water Gauge while operating the system at a flow rate of 39,700 cfm ± 10%.

d. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove ≥ 99% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 39,700 cfm ± 10%.

e. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove ≥ 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 39,700 cfm ± 10%.

3/4.9.9 and 3/4.9.10 WATER LEVEL-REACTOR VESSEL AND SPENT FUEL POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 12% iodine gap activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

3/4.9.11 FUEL HANDLING AREA VENTILATION SYSTEM

The limitations on the fuel handling area ventilation system ensure that all radioactive materials released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorbers prior to discharge to the atmosphere. The operation of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

Acceptable removal efficiency is shown by methyl iodide penetration of less than 5.0% when tests are performed in accordance with ASTM D3803-1989, "Standard Test Method for Nuclear-Grade Activated Carbon," at a temperature of 30°C and a relative humidity of 95%. The penetration acceptance criterion is determined by the following equation:

$$\text{Allowable Penetration} = \frac{[100\% - \text{methyl iodide efficiency for charcoal credited in accident analysis}]}{\text{safety factor of 2}}$$

Applying a safety factor of 2 is acceptable because ASTM D3803-1989 is a more accurate and demanding test than older tests.

3/4.9.12 FUEL STORAGE

Region 1 and Region 2 of the spent fuel storage racks are designed to assure fuel assemblies of less than or equal to 5.0 w/o U-235 enrichment that are within the limits of Figure 3.9.2 will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in unborated water. These conditions have been verified by criticality analyses.

The requirement for 1600 ppm boron concentration is to assure the fuel assemblies will be maintained in a subcritical array with $K_{eff} \leq 0.95$ in the event of a postulated accident. Analysis has shown that, during a postulated accident with the fuel stored within the limits of this specification, that a K_{eff} of ≤ 0.95 will be maintained when the boron concentration is at or above 1000 ppm.

Normally, fuel stored in a cross-hatch storage configuration must have all four diagonal spaces or at least two adjacent faces remain vacant to meet the criticality safety analysis mentioned above. However, the spent fuel pool walls may be credited as a neutron leakage path. Therefore, vacant spaces face adjacent to the walls of the Region I cross-hatch configured assemblies may be used to store fuel assemblies that are outside of the area of the graph enclosed by Curve A on Figure 3.9.2, excluding the most southeast and southwest corner spaces of Region 1 which must remain empty.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 228 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated November 23, 1999, as supplemented by letter dated October 19, 2000, Entergy Operations, Inc. (the licensee), submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2), Technical Specifications (TSs). The requested changes would incorporate the use of American Society for Testing and Materials (ASTM) D3803-1989, "Standard Test Method for Nuclear-Grade Activated Carbon," into the ANO-2 TSs.

The October 19, 2000, supplemental letter provided clarifying information that did not change the scope of the original Federal Register notice or the initial no significant hazards consideration determination.

2.0 EVALUATION

The Nuclear Regulatory Commission (NRC) staff, with technical assistance from Brookhaven National Laboratory (BNL), has reviewed the licensee's submittals. In addition, the staff has reviewed the attached BNL Technical Evaluation Report (TER) regarding the proposed TS changes for ANO-2. Based on its review, the staff adopts the TER. In view of the above, and because the NRC staff considers ASTM D3803-1989 to be the most accurate and most realistic protocol for testing charcoal in safety-related ventilation systems, the NRC staff finds that the proposed TS changes satisfy the actions requested in Generic Letter (GL) 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," dated June 3, 1999, and are acceptable.

The NRC received a letter from ASTM dated March 9, 2000, in response to a March 8, 2000, Federal Register Notice (65 FR 12286 - 12299) related to revising testing standards in accordance with ASTM D3803-1989 for laboratory testing of activated charcoal. ASTM notified the NRC that the 1989 standard is out of date and should be replaced by D3803-1991(1998). The staff acknowledges that the most current version of ASTM D3803 is ASTM D3803-1991 (reaffirmed in 1998). However, it was decided, for consistency purposes, to have all of the nuclear reactors test to the same standard (ASTM D3803-1989) because, prior to GL 99-02 being issued, approximately one third of nuclear reactors had TSs that referenced ASTM D3803-1989 and there are no substantive changes between the 1989 and 1998 versions.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas 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 (65 FR 12291, dated March 8, 2000). 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, Brookhaven National Laboratory

Principal Contributor: J. Segala

Date: December 18, 2000

ATTACHMENT

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. NPF- 6
ENTERGY OPERATIONS, INC.
ARKANSAS NUCLEAR ONE - UNIT 2
DOCKET NO. 50 - 368

1.0 INTRODUCTION

By letters dated November 23, 1999 (CNRO-99/00026) and August 2, 1999 (0CAN089902), Entergy Operations 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 Arkansas Nuclear One - Unit 2 (ANO-2). By letter dated November 23, 1999, Entergy Operations requested changes to Technical Specifications (TS) Sections 4.9.11.2.a..2 and 4.9.11.2.b, covering the Fuel Handling Area Ventilation System, for ANO-2. The ANO-2 control room ventilation system is currently tested in accordance with ASTM D3803-1989, as required by ANO-2 TS Amendment 206. By letter dated October 19, 2000, Entergy Operations submitted additional information related to ventilation systems requested by the Plant Systems Branch and related to accident analyses requested by the Probabilistic Safety Assessment Branch. The proposed changes would revise the TS surveillance testing of the safety related ventilation system charcoal 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.

By letter dated August 2,1999, Entergy stated that it will not be seeking a technical specification (TS) change for the Reactor Building Purge Filtration System on ANO-2. The basis for this is that this system is not used during power operation and provides no safety function for design basis accidents. ANO-2 TS 3/4.6.1.6 requires the purge valves in this system to be closed while in Modes 1 through 4. This system is only used to vent the reactor building during shutdown. The fuel handling accident in containment, as discussed in ANO-2 Safety Analysis Report (SAR) Section 15.1.23, does not credit filtration in the release of radionuclides to the environment. Also, the safety evaluation for Amendment 203 (dated April 16, 1999) to the ANO-2 Operating License,

which granted the ability to leave the reactor building equipment hatch open during fuel movement for potential fuel handling events inside containment, does not take credit for filtration in meeting Part 100 limits for potential fuel handling events inside containment. Therefore, the ANO-2 safety analysis does not credit the Reactor Building Purge Filtration System in meeting 10CFR100 accident dose limits. Entergy stated that a future TS change request will be processed to remove this filtration system from the TS. Based on review of the technical information provided by the licensee, there is no need to modify the charcoal testing requirements, per GL99-02, for this system.

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 Fuel Handling Area Ventilation System (FHAVS) are shown in Table 1 and Table 2, respectively, for ANO-2.

With respect to the Control Room Ventilation System (CRVS), since the current TS calls for laboratory charcoal testing in accordance with ASTM D3803-1989, ANO-2 is considered as a Group 1 plant under GL 99-02. Therefore, no TS amendment is warranted. On the basis of the information provided in letter dated October 19, 2000, the TS surveillance requirements for this system is also included in Table 1 and Table 2.

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 of 95% for the FHAVS is acceptable because it is consistent with ASTM D3803-1989. This is consistent with the actions requested in GL 99-02.

By letter dated October 19, 2000, the credited removal efficiency for radioactive organic iodine for the FHAVS is 90%. The proposed test penetration for radioactive methyl iodide for this system is less than 5%. The proposed test penetration was obtained by applying a safety factor of 2 to the credited efficiency. The proposed safety factor of 2 for all systems 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 October 19, 2000, the actual face velocity of the FHAVS is 39.55 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.

Principal Contributors: Richard E. Deem and Mano Subudhi
Date: November 20, 2000

TABLE 1 - CURRENT TS REQUIREMENTS

System Description						Current TS Requirements					
TS Section	System	Bed Thick-ness (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)							
Not stated	Control Room Ventilation System (CRVS)*	4	0.2445/2 " bed 0.489/ 4" bed	40.86	Not stated	<0.5	Not stated	ASTM D3803-1989	30	95	Not stated (40)***
4.9.11. 2.a.2 and 4.9.11. 2.b	Fuel Handling Area Ventilation System (FHAVS)	2	0.253	39.55	90	<1	Not stated (10)**	Reg. Guide 1.52 Rev.2, March 1978 Regulatory Position C.6.a	80	70	20% of the system design flow

* With respect to the Control Room Ventilation System, ANO Unit 2 is considered as a Group 1 plant under GL 99-02.

** Safety factor is calculated based on the credited efficiency and test penetration.

*** Test face velocity is in accordance with ASTM D3803-1989 requirements.

TABLE 2 - PROPOSED TS REQUIREMENTS											
System Description						Proposed TS Requirements					
TS Section	System	Bed Thickness (inches)	Actual Charcoal		Credited Efficiency (% methyl iodide)	Test Penetration (methyl iodide)	Safety Factor	Test Standard	Test Temp (°C)	Test RH (%)	Test Face Velocity (fpm)
			Res. Time (sec)	Face Velocity (fpm)							
Not stated	Control Room Ventilation System (CRVS)*	4	0.2445 /2" bed 0.489/ 4" bed	40.86	Not stated	≤0.5	Not stated	ASTM D3803-1989	30	95	Not stated (40)**
4.9.11. 2.a.2 and 4.9.11. 2.b	Fuel Handling Area Ventilation System (FHAVS)	2	0.253	39.55	90	<5.0%	2	ASTM D3803-1989	30	95	Not stated (40)**

* With respect to the Control Room Ventilation System, ANO Unit 2 is considered as a Group 1 plant under GL 99-02.

** Test face velocity is in accordance with ASTM D3803-1989 requirements.