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October 19, 2000

0CAN100003

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station OP1-17
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1 and Unit 2
Docket No. 50-313 and 50-368
License No. DPR-51 and NPF-6
Supplemental Information Regarding ANO-1 and ANO-2 Laboratory Testing of Activated Charcoal (TAC Nos. MA7280/ MA7281)

Gentlemen:

Entergy Operations, Inc. received a request for additional information (RAI) from the NRC Plant Systems Branch on August 3, 2000, with respect to Entergy's November 23, 1999, proposed revision (CNRO-99/00026) to the testing standards associated with laboratory testing of activated charcoal. On September 1, 2000, Entergy received three additional questions for ANO-1 and one additional question for ANO-2 from the Probabilistic Safety Assessment Branch. A written response to the remaining August 3, 2000, questions and all of the September 1, 2000, questions is provided in the attachment to this letter for ANO-1 and ANO-2.

In responding to the aforementioned RAIs, four ANO-1 Technical Specification (TS) Bases pages require minor revisions. These bases changes are discussed in the attachment to this letter and include marked-up and proposed pages from the current ANO-1 TS Bases. The attached responses do not propose further changes to the TS, nor change the no significant hazards considerations of the original submittal (CNRO-99/00026). Therefore, Entergy Operations, Inc. requests approval of the proposed ANO-1 TS Bases changes in conjunction with Entergy's November 23, 1999, proposed revision. We request an implementation period of 60 days. Should further information be required, please call Dave Bice at 501-858-5338.

A081

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 19, 2000.

Very truly yours,

Jimmy D. Vandergrift
Director, Nuclear Safety Assurance

JDV/dbb
Attachment

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ATTACHMENT

TO

0CAN100003

RESPONSE TO NRC REQUEST

FOR ADDITIONAL INFORMATION

ASSOCIATED WITH LABORATORY

TESTING OF ACTIVATED CHARCOAL

LICENSE NOS. DPR-51 AND NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT ONE AND UNIT TWO

DOCKET NOS. 50-313 AND 50-368

NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING LABORATORY TESTING OF ACTIVATED CHARCOAL

PLANT NAME: ARKANSAS NUCLEAR ONE - UNIT 1

NRC Plant Systems Branch (PSB) RAIs

The following requests or questions refer to the Penetration Room Ventilation System and the Fuel Handling Area Ventilation System, unless otherwise noted:

NRC SPLB Question 1: GL 99-02, under requested actions required each licensee to provide, in part, the charcoal bed depth, total residence time per bed depth, and penetration at which the current TS require the test to be performed for each ESF ventilation system.

Please refer to or provide docketed information stating:

a) charcoal bed depth,
b) total residence time per bed depth, and
c) allowable penetration at which the current TS require the testing to be performed.

Response:

	Penetration Room Ventilation	Fuel Handling Area Ventilation
Charcoal bed depth	2 inch (type II trays)	2 inch (type II trays)
Residence time per bed depth	0.242 sec/2 inch	0.235 sec/2 inch
Current TS allowable penetration	10% (90% removal)	10% (90% removal)
Submittal TS allowable penetration	5%	5%
Accident analysis efficiency credit	90%	90%

NRC SPLB Question 2: 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."

Under Section D in Attachment 1 of the November 23, 1999 letter (CNRO-99/00026), it states, "The affected systems for each facility have face velocities of approximately 40 ft/min, recognizing air flow distribution tolerances of ± 20% are acceptable per RG [Regulatory Guide] 1.52. Therefore, this specific request is not applicable."

Concerning the actual and test face velocities:

a) Please indicate the actual system face velocities and how they are calculated.

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. Per GL 99-02, if this value is >110% of 40 ft/min, then the TS should be revised to specify that value as the test face velocity. (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)

b) [Subsequent conversations between Arkansas Nuclear One (ANO) and the NRC resolved item 2.b of the August 3, 2000 NRC questions for both Unit 1 (ANO-1) and Unit 2 (ANO-2). No further discussion is being provided.]

Response:

Penetration Room Ventilation System:	System design flow rate = 1800 cfm ± 10% (1620 cfm - 1980 cfm), 6 ea. Type II trays @ 8 sq. ft/tray 1980 ÷ (6 x 8) = 41.25 ft/min face velocity
Fuel Handling Area Ventilation System:	System design flow rate = 39,000 cfm ± 10% (35,100 cfm – 42,900 cfm) 126 ea. Type II trays @ 8 sq. ft/tray 42,900 ÷ (126 x 8) = 42.55 ft/min face velocity

NRC SPLB Question 3: With respect to the Control Room Ventilation System, since the current TS call for laboratory charcoal testing in accordance with ASTM D3803-1989, ANO Unit 1 is considered a Group 1 plant under GL 99-02. Per GL 99-02, Requested Action No. 1, please provide the charcoal bed depth, the residence time per 2 in. of bed depth, the allowable test penetration, the test temperature and relative humidity (RH) at which the Control Room Ventilation System is tested. If the RH is <95%, typically 70%, please indicate whether TS-controlled heaters are available whose capacity has been approved by the NRC to maintain the RH below 95% during accident conditions.

Response:

ANO-1 Control Room Ventilation System

Protocol	ASTM D3803-1989, Temperature = 30° C, Relative Humidity = 95%
Charcoal bed depth	2 inch (7 type II trays, 6 ea. in recirculation loop, 1 ea. for makeup air)
Design Flowrate	2000 cfm ± 10%
Residence time per 2 inch bed depth	0.2182 sec/2inches
Face velocity	2200 ÷ (6 x 8) = 45.83 ft/min
Face velocity	367 ÷ (1 x 8) = 45.83 ft/min
Current TS allowable penetration	≤ 2.5%

NRC SPLB Question 4: On pages 109a and 110i of the TS bases, in the last sentence of the fourth paragraph, it states, "If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to Regulatory Guide 1.52." Since GL 99-02 indicates that ASTM D3803-1989 is the only test standard which provides accurate and reproducible test results, please justify why replacement charcoal should continue to be tested in accordance with Regulatory Guide 1.52.

Response:

As stated in the aforementioned submittal to the NRC dated November 23, 1999, ANO intends to replace charcoal that is tested and found to be unacceptable per the ASTM D3803-1989 testing standard with new charcoal tested to ASTM D3803-1989. At present, the ANO-1 Penetration Room Ventilation System and the ANO-1 and ANO-2 Fuel Handling Area Ventilation Systems are being tested to both the current TS requirements and test protocol ASTM D3803-1989 at 30° C and 95% RH. Therefore, revised ANO-1 TS Bases pages 109a and 110i are provided at the end of this attachment. The revision deletes reference to Regulatory Guide 1.52 and inserts reference to ASTM D3803-1989. The NRC Staff is requested to use the attached revised Bases pages in place of their corresponding pages provided in the original Entergy submittal dated November 23, 1999 (CNRO-99/00026).

NRC Probabilistic Safety Assessment Branch (SPSB) RAIs

NRC SPSB Question 1: In the Bases Section for the penetration room ventilation system is the statement, "The laboratory carbon sample test results should indicate a radioactive methyl iodide removal efficiency of at least 90 percent for expected accident conditions." That statement is erroneous. It should state "...at least 95 percent ..." consistent with Technical Specification 3.13.1.b. A similar misstatement is made in the Bases for the fuel-handling area ventilation system.

Response:

The TS associated with these Bases requires at least a 90% methyl iodide removal efficiency, while the acceptance criteria for the testing method requires an efficiency of ≥ 95%. The current Bases statement was intended to indicate the minimum removal efficiency value credited in the safety analysis (90%). However, for the sake of clarity, the affected ANO-1 Bases pages 66d and 66h are proposed for revision and are included at the end of this attachment. The proposed revision replaces the word "indicate" with the word "ensure." This change, in concert with the November 23, 1999, proposed change, will more directly point the reader to the minimum removal efficiency allowed by analysis and removes the implication that the removal efficiency noted in the Bases is in reference to the test acceptance criteria. The NRC Staff is requested to use the attached revised bases pages in place of their corresponding pages provided in the original Entergy submittal dated November 23, 1999.

NRC SPSB Question 2: In the Bases Section for the penetration room ventilation system it states, "If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to Regulatory Guide 1.52." That statement is inappropriate because Regulatory Guide 1.52, Section 3.i calls for replacement charcoal to meet the qualification and batch test results of Table 5.1 of ANSI N509-1976. This Table does not reference the ASTM D3803-1989 protocol because the ASTM Standard was not in existence at that time. Table 5.1 utilizes a test protocol which is unacceptable. The acceptance value for the methyl iodine test should be based upon the facility's technical specifications and not a pre-determined value. A similar misstatement is included in the Bases for the fuel-handling area ventilation system.

Response:

This question refers to the same discrepancy noted in Plant Systems Branch Question 4 above. Please see the response to Question 4.

NRC SPSB Question 3: A review of the data in the SPSB Accident Analyses Workbook files indicates that the licensee had assumed credit for the purge exhaust system. Both the staff's calculations which confirmed the licensee's conclusions on the loss-of-coolant accident (LOCA) and the licensee's calculation in Amendment 28 to FSAR Section 6.6.3 assumed credit for 90 percent removal efficiency for iodine by the purge exhaust system. Yet, there is no technical specification which addresses the purge exhaust system. It is possible that subsequent LOCA analyses did not credit the purge exhaust system. This discrepancy needs to be reconciled.

Response:

The ANO-1 Safety Analysis Report (SAR) does not credit the reactor building purge exhaust system in any accident analysis. This system is intended to be used for normal purging and ventilation operations during periods the reactor coolant system (RCS) temperature is < 200°F and to support long-term cleanup activities post-accident. In ANO-1 Operating License Amendment 55 dated May 15, 1981, ANO-1 was restricted from operating the reactor building purge exhaust system in Modes 1 through 4. ANO-1 TS 3.22 currently provides the operability criteria for the reactor building purge exhaust and filtration system. ANO-1 TS 3.23 additionally requires the reactor building purge valves to remain closed whenever the RCS temperature is ≥ 200°F.

PLANT NAME: ARKANSAS NUCLEAR ONE - UNIT 2

NRC Plant Systems Branch RAIs

The following requests or questions refer to the Fuel handling Area Ventilation System, unless otherwise noted:

NRC SPLB Question 1: GL 99-02, under requested actions required each licensee to provide, in part, the charcoal bed depth, total residence time per bed depth, and penetration at which the current TS require the test to be performed for each ESF ventilation system.

Please refer to or provide docketed information stating:

a) charcoal bed depth,
b) total residence time per bed depth, and
c) allowable penetration at which the current TS require the testing to be performed.

Response:

	Fuel Handling Area Ventilation
Charcoal bed depth	2 inch (deep bed)
Residence time per bed depth	0.253 sec/2 inch
Current TS allowable penetration	<1 % (when tested per N509-1976 Table 5.1, test 5.b, @80°C and 70% RH)
Submittal TS allowable penetration	5%
Accident analysis efficiency credit	90%

NRC SPLB Question 2: 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."

Under Section D in Attachment 1 of the November 23, 1999 letter (CNRO-99/00026), it states, "The affected systems for each facility have face velocities of approximately 40 ft/min, recognizing air flow distribution tolerances of ± 20% are acceptable per RG [Regulatory Guide] 1.52. Therefore, this specific request is not applicable."

Concerning the actual and test face velocities:

a) Please indicate the actual system face velocities and how they are calculated.

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. Per GL 99-02, if this value is >110% of 40 ft/min, then the TS should be revised to specify that value as the test face velocity. (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 N51 0-1975 can be used to calculate the actual system face velocities).

Response:

Fuel Handling Area Ventilation Sys:	System design flow rate = 39,700 cfm ± 10% (35,730 cfm – 43,670 cfm) 24 deep bed compartments with ≈ 46 sq. ft each 43,670 ÷ (24 x 46) = 39.55 ft/min face velocity

NRC SPLB Question 3: With respect to the Control Room Ventilation System, since the current TS call for laboratory charcoal testing in accordance with ASTM D3803-1989, ANO Unit 2 is considered a Group 1 plant under GL 99-02. Per GL 99-02, Requested Action No. 1, please provide the charcoal bed depth, the residence time per 2 in. of bed depth, the allowable test penetration, the test temperature and relative humidity (RH) at which the Control Room Ventilation System is tested. If the RH is <95%, typically 70%, please indicate whether TS-controlled heaters are available whose capacity has been approved by the NRC to maintain the RH below 95% during accident conditions.

Response:

	Control Room Ventilation System
Protocol	ASTM D3803-1989, Temperature = 30° C, Relative Humidity = 95%
Charcoal bed depth	4 inch (deep bed)
Design flowrate	2000 cfm ± 10%
Residence time per 2 inch bed depth	0.2445 sec/per 2 in of bed depth (0.489 sec/per 4 inch. bed depth)
Face velocity	40.86 ft/min
Current TS allowable penetration	≤ 0.5%

NRC Probabilistic Safety Assessment Branch RAI

NRC SPSB Question 1: The licensee has indicated that there is no requirement for the purge exhaust filter system because no credit is taken for the system to mitigate the consequences of an accident. In Section 15.4.7 of Supplement 1 to the staff SE for the operating license it is stated that the purge exhaust system is utilized to mitigate the consequences of a fuel-handling accident inside containment and that the purge exhaust system is identical to the system in the fuel-handling building. The information in the staff's SE was based upon staff letter dated 3/11/77 and the licensee's response of 4/6/77. Therefore, it would appear that technical specifications similar to those listed for the fuel-handling ventilation system need to be proposed.

Response:

The ANO-2 SAR does not credit the containment purge exhaust system in any accident analysis. This system is intended to be used for normal purging and ventilation operations during periods the RCS temperature is < 200°F and to support long-term cleanup activities post-accident. ANO-2 TS 3.9.4 currently provides the operability criteria for the containment purge exhaust and filtration system. ANO-2 TS 3.6.1.6 additionally requires the containment purge valves to be locked closed whenever RCS temperature is ≥ 200°F. The safety evaluation report associated with ANO-2 Operating License Amendment 166 dated September 25, 1995, accepted the ANO-2 analyzed fuel handling accident as being within SRP limits.

PROPOSED ANO-1 TECHNICAL SPECIFICATION BASES CHANGES

Bases

The penetration room ventilation system is designed to collect and process potential reactor building penetration leakage to minimize environmental activity levels resulting from post accident reactor building leaks. The system consists of sealed penetration rooms, two redundant filter trains and two redundant fans discharging to the unit vent. The entire system is activated by a reactor building engineered safety features signal and initially requires no operator action. Each filter train is constructed with a prefilter, a HEPA filter and a charcoal adsorber in series. The design flow rate through each of these filters is 2000 scfm, which is significantly higher than the 1.25 scfm maximum leakage rate from the reactor building at a leak rate of 0.1% per day.

High efficiency particulate air (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The in-place test results should indicate a system leak tightness of less than 1 percent bypass leakage for the charcoal adsorbers and a HEPA efficiency of at least 99 percent removal of DOP particulates. The laboratory carbon sample test results should ensure a radioactive methyl iodide removal efficiency of a least 90 percent for expected accident conditions. Acceptable removal efficiency is shown by a 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.

If the efficiencies of the HEPA filters and charcoal adsorbers are as specified, the resulting doses will be less than the 10CFR100 guidelines for the accidents analyzed. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers.

If one circuit of the penetration room ventilation system is found to be inoperable, there is not an immediate threat to the containment system performance and reactor operation may continue for a limited period of time while repairs are being made.

High efficiency particulate air (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine absorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The in-place test results should indicate a system leak tightness of less than 1 percent bypass leakage for the charcoal adsorbers and a HEPA efficiency of at least 99 percent removal of DOP particulates. The laboratory carbon sample test results should ensure a radioactive methyl iodide removal efficiency of at least 90 percent for expected accident conditions. Acceptable removal efficiency is shown by a 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:

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If the efficiencies of the HEPA filters and charcoal adsorbers are as specified, the resulting doses will be less than the 10CFR100 guidelines for the accidents analyzed. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers.

Bases

The penetration room ventilation system is designed to collect and process potential reactor building penetration room leakage to minimize environmental activity levels resulting from post accident reactor building leaks. The system consists of a sealed penetration room, two redundant filter trains and two redundant fans discharging to the unit vent. The entire system is activated by a reactor building pressure engineered safety features signal and initially requires no operator action.

Since the system is not normally operated, a periodic test is required to show that the system is available for its engineered safety features function. During this test the system will be inspected for such things as water, oil, or other foreign material, gasket deterioration in the HEPA units, and unusual or excessive noise or vibration when the fan motor is running.

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. Pressure drop should be determined at least once per 18 months to show system performance capability.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. The charcoal adsorber efficiency test procedures should allow for obtaining at least two samples. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. Tests of the charcoal adsorbers with halogenated hydrocarbon refrigerant and of the HEPA filter bank with DOP aerosol shall be performed in accordance with ANSI N510 (1975) "Standard for Testing of Nuclear Air Cleaning Systems." Any HEPA filters found defective shall be replaced with filters qualified according to Regulatory Position C.3.d. of Regulatory Guide 1.52. Radioactive methyl iodide removal efficiency tests shall be performed in accordance with ASTM D3803-1989. If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to ASTM D3803-1989.

Operation of the system each month for 1 hour will demonstrate operability of the active system components and the filter and adsorber system. If significant painting, fire or chemical release occurs such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign material, the same tests and sample analysis shall be performed as required for operational use. The determination of significant shall be made by the operator on duty at the time of the incident. Knowledgeable staff members should be consulted prior to making this determination.

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. Pressure drop and air distribution should be determined once every 18 months to show system performance capability.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. The charcoal adsorber efficiency test procedures should allow for obtaining at least two samples. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. Tests of the charcoal adsorbers with halogenated hydrocarbon refrigerant and of the HEPA filter bank with DOP aerosol shall be performed in accordance with ANSI N510 (1975) "Standard for Testing of Nuclear Air Cleaning Systems." Any HEPA filters found defective shall be replaced with filters qualified according to Regulatory Position C.3.d. of Regulatory Guide 1.52. Radioactive methyl iodide removal efficiency tests shall be performed in accordance with ASTM D3803-1989. If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to ASTM D3803-1989.

MARKUP OF CURRENT ANO-1 TECHNICAL SPECIFICATIONS BASES

(FOR INFO ONLY)

Bases

The penetration room ventilation system is designed to collect and process potential reactor building penetration leakage to minimize environmental activity levels resulting from post accident reactor building leaks. The system consists of sealed penetration rooms, two redundant filter trains and two redundant fans discharging to the unit vent. The entire system is activated by a reactor building engineered safety features signal and initially requires no operator action. Each filter train is constructed with a prefilter, a HEPA filter and a charcoal adsorber in series. The design flow rate through each of these filters is 2000 scfm, which is significantly higher than the 1.25 scfm maximum leakage rate from the reactor building at a leak rate of 0.1% per day.

High efficiency particulate air (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The in-place test results should indicate a system leak tightness of less than 1 percent bypass leakage for the charcoal adsorbers and a HEPA efficiency of at least 99 percent removal of DOP particulates. The laboratory carbon sample test results should ~~indicate~~ ensure a radioactive methyl iodide removal efficiency of a least 90 percent for expected accident conditions. Acceptable removal efficiency is shown by a 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.

If the efficiencies of the HEPA filters and charcoal adsorbers are as specified, the resulting doses will be less than the 10CFR100 guidelines for the accidents analyzed. Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers.

If one circuit of the penetration room ventilation system is found to be inoperable, there is not an immediate threat to the containment system performance and reactor operation may continue for a limited period of time while repairs are being made.

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Bases

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Since the system is not normally operated, a periodic test is required to show that the system is available for its engineered safety features function. During this test the system will be inspected for such things as water, oil, or other foreign material, gasket deterioration in the HEPA units, and unusual or excessive noise or vibration when the fan motor is running.

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. Pressure drop should be determined at least once per 18 months to show system performance capability.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. The charcoal adsorber efficiency test procedures should allow for obtaining at least two samples. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. Tests of the charcoal adsorbers with halogenated hydrocarbon refrigerant and of the HEPA filter bank with DOP aerosol shall be performed in accordance with ANSI N510 (1975) "Standard for Testing of Nuclear Air Cleaning Systems." Any HEPA filters found defective shall be replaced with filters qualified according to Regulatory Position C.3.d. of Regulatory Guide 1.52. Radioactive methyl iodide removal efficiency tests shall be performed in accordance with ASTM D3803-1989. If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to ASTM D3803-1989~~Regulatory Guide 1.52~~.

Operation of the system each month for 1 hour will demonstrate operability of the active system components and the filter and adsorber system. If significant painting, fire or chemical release occurs such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemicals or foreign material, the same tests and sample analysis shall be performed as required for operational use. The determination of significant shall be made by the operator on duty at the time of the incident. Knowledgeable staff members should be consulted prior to making this determination.

Pressure drop across the combined HEPA filters and charcoal adsorbers of less than 6 inches of water at the system design flow rate will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. Pressure drop and air distribution should be determined once every 18 months to show system performance capability.

The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated. The charcoal adsorber efficiency test procedures should allow for obtaining at least two samples. Each sample should be at least two inches in diameter and a length equal to the thickness of the bed. Tests of the charcoal adsorbers with halogenated hydrocarbon refrigerant and of the HEPA filter bank with DOP aerosol shall be performed in accordance with ANSI N510 (1975) "Standard for Testing of Nuclear Air Cleaning Systems." Any HEPA filters found defective shall be replaced with filters qualified according to Regulatory Position C.3.d. of Regulatory Guide 1.52. Radioactive methyl iodide removal efficiency tests shall be performed in accordance with ASTM D3803-1989. If laboratory test results are unacceptable, all charcoal adsorbents in the system shall be replaced with charcoal adsorbents qualified according to ASTM D3803-1989~~Regulatory Guide 1.52~~.