

Basis

When the supply of compressed bottled air is depleted, the Main Control Room and Emergency Switchgear Room Emergency Ventilation System is manually started to continue to maintain the control room pressure at the design positive pressure so that leakage is outleakage. One train of the main control room emergency ventilation consists of one fan powered from an independent emergency power source.

The Main Control Room and Emergency Switchgear Room Emergency Ventilation System is designed to filter the intake air to the control room pressure envelope, which consists of the control room, relay rooms, and emergency switchgear rooms during a loss of coolant accident.

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 intake of radio-iodine to the control room.

If the system is found to be inoperable, there is no immediate threat to the control room, and reactor operation may continue for a limited period of time while repairs are being made. If the system cannot be repaired within the specified time, procedures are initiated to establish conditions for which the filter system is not required.

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5. An air distribution test across the prefilter bank shall be performed initially and after any major modification, major repair, or maintenance of the air cleaning system affecting the filter bank flow distribution. The air distribution test shall be performed with an anemometer located at the downstream side and at the center of each carbon filter.
6. In-place cold DOP tests for HEPA filter banks shall be performed:
 - a. Initially;
 - b. Once per 18 months;
 - c. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation;
 - d. After each complete or partial replacement of the HEPA filter cells; and
 - e. After any structural maintenance on the filter housing.

The procedure for in-place cold DOP tests shall be in accordance with ANSI N510-1975, Section 10.5 or 11.4. The flow rate during the in-place cold DOP tests shall be 36,000 CFM \pm 10 percent. The flow rate shall be determined by recording the flow meter reading in the control room.

7. In-place halogenated hydrocarbon leakage tests for the charcoal adsorber bank shall be performed:
 - a. Initially;
 - b. Once per 18 months;

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- c. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation;
- d. After each complete or partial replacement of charcoal adsorber trays; and
- e. After any structural maintenance of the filter housing.

The procedure for in-place halogenated hydrocarbon leakage tests shall be in accordance with ANSI N510-1975, Section 12.5. The flow rate during the in-place halogenated hydrocarbon leakage tests shall be 36,000 CFM \pm 10 percent. The flow rate shall be determined by recording the flow meter reading in the control room.

8. Laboratory analysis of each charcoal train shall be performed:
- a. Initially, whenever a new batch of charcoal is used to fill adsorbers trays; and
 - b. After 720 hours of train operation; and
 - c. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation; and
 - d. After any structural maintenance on the HEPA filter or charcoal adsorber housings that could affect operation of the charcoal adsorber; and
 - e. At least once per eighteen months, if not otherwise performed per condition 8.b, 8.c, or 8.d within the last eighteen months.

The procedure for iodine removal efficiency tests shall follow ASTM D3803. The test conditions shall be in accordance with those listed in Specification 4.12.B.7.

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5. In-place cold DOP test on HEPA filters shall show greater than or equal to 99.5 percent DOP removal. Leakage sources shall be identified, repaired, and retested. Any HEPA filters found defective shall be replaced.
6. In-place halogenated hydrocarbon leakage tests on charcoal adsorber banks shall show greater than or equal to 99 percent halogenated hydrocarbon removal. Leakage sources shall be identified, repaired, and retested.
7. Laboratory analysis on charcoal samples of the in-place charcoal adsorber, or new adsorbent, when obtained as described in Regulatory Guide 1.52, Revision 2, shall show:

Methyl iodide penetration less than or equal to 14 percent, when tested in accordance with ASTM D3803-1989 (with the exception of face velocity which is to be at 24.4 M/min), with the relative humidity equal to 95 percent, and the temperature equal to 30°C (86°F).

 - a. Laboratory analysis of charcoal adsorbers shall be available within 31 days of sampling.
 - b. If the test results are unacceptable for the in-place charcoal adsorber, all the adsorbent in the affected filter shall be replaced with new qualified adsorbent.
8. The pressure drop across filter cells and adsorbers shall not exceed 7.0 inches W.G. If this condition cannot be met, new filter cells shall be installed.

Basis

Ventilation system filter components are not subject to rapid deterioration, having lifetimes of many years, even under continuous flow conditions. The tests outlined above provide assurance of filter reliability and will ensure timely detection of conditions which could cause filter degradation.

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A pressure drop across the combined HEPA filters and charcoal adsorbers of less than 7 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. Operation of the filtration system for a minimum of 15 minutes a month prevents moisture buildup in the filters and adsorbers.

The frequency of tests and sample analysis of the degradable components of the system, i.e., the HEPA filter and charcoal adsorbers, is based on actual hours of operation to ensure that they perform as evaluated. System flow rates and air distribution do not change unless the ventilation system is radically altered.

If painting, fire, or chemical release occurs such that the HEPA filter or charcoal adsorber could become contaminated from the fumes, chemical, or foreign material, the same tests and sample analysis are performed as required for operational use.

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 99.5 percent removal of DOP particulates. The heat release from operating ECCS equipment limits the relative humidity of the exhaust air to less than 80 percent even when outdoor air is assumed to be 100 percent relative humidity and all ECCS leakage evaporates into the exhaust air stream. Methyl iodide testing to a penetration less than or equal to 14 percent (applying a safety factor of 2) demonstrates the assumed accident analysis efficiencies of 70 percent for methyl iodide and 90 percent for elemental iodine. This conclusion is supported by a July 10, 2000 letter from NCS Corporation that stated "Nuclear grade activated carbon, when tested in accordance with ASTM D3803-1989 (methyl iodide...) to a penetration of 15%, is more conservative than testing the same carbon in accordance with ASTM D3803-1979 (elemental iodine...) to a penetration of 5%. ...As a general rule, you may expect the radioiodine penetration through nuclear grade activated carbon to increase from 20 to 100 times when switching from elemental iodine to methyl iodide testing." Therefore, the efficiencies of the HEPA filters and charcoal adsorbers are demonstrated to be as specified, at flow rates, temperatures, velocities, and relative humidities which are less than the design values of the system, the resulting doses will be less than 10 CFR 100 guidelines for the accidents analyzed. The demonstration of bypass 1% and demonstration of 86 percent methyl iodide removal efficiency will assure the required capability of the adsorbers is met or exceeded.

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5. In-place halogenated hydrocarbon leakage tests for the charcoal adsorber bank shall be performed:
 - a. Initially;
 - b. Once per eighteen months;
 - c. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation;
 - d. After each complete or partial replacement of charcoal adsorber trays; and
 - e. After any structural maintenance on the filter housing.
6. The procedure for in-place halogenated hydrocarbon leakage tests shall be in accordance with ANSI N510-1975 Section 12.5. The flow rate during this test shall be that value determined under Specification 4.20.A.1 and shall be within the range specified in Specification 4.20.B.1.
7. Charcoal Adsorber shall be replaced:
 - a. After 720 hours of train operation; and
 - b. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation; and
 - c. After any structural maintenance on the HEPA filter or charcoal adsorber housing that could affect the operation of the charcoal adsorber; and
 - d. At least once per eighteen months, if not otherwise replaced per condition 7.a, 7.b, or 7.c within the last eighteen months.

Upon meeting any of these conditions, the affected charcoal bank shall be removed from service and the charcoal replaced with new charcoal meeting the specifications in 4.20.B.4.

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4. Laboratory analysis on new charcoal adsorbent shall show the methyl iodide penetration less than or equal to 14 percent, when tested in accordance with ASTM D3803-1989 (with the exception of face velocity which is to be at 24.4 M/min), with the relative humidity equal to 95 percent, and the temperature equal to 30°C (86°F).
5. The pressure drop across filter cells and adsorbers shall not exceed 5.0 inches W.G. at design flow rate. If this condition cannot be met, new filter cells shall be installed.
6. The minimum period of air flow through the filter shall be 15 minutes per month.

Basis

Ventilation system filter components are not subject to rapid deterioration, having lifetimes of many years. The tests outlined above provide assurance of filter reliability and will ensure timely detection of conditions which could cause filter degradation.

A pressure drop across the combined HEPA filters and charcoal adsorbers of less than 5 inches of water will indicate that the filters and adsorbers are not clogged by excessive amounts of foreign matter. Operation of the filtration system for a minimum of 15 minutes a month prevents moisture buildup in the filters and adsorbers.

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The frequency of tests and sample analysis are necessary to show that the HEPA filters and charcoal adsorbers can perform as evaluated.

If painting, fire, or chemical release occurs such that the HEPA filter or charcoal adsorber could become contaminated from fumes, chemicals, or foreign material, the HEPA filters are tested and the charcoal adsorbers are replaced to ensure the operational requirements are met.

The in-place test results should indicate a system leaktightness of less than 1 percent bypass leakage for the charcoal adsorbers and a HEPA efficiency of at least 99.5 percent removal of DOP particulates. Methyl iodide testing to a penetration less than or equal to 14 percent (applying a safety factor of 2) demonstrates the assumed accident analysis efficiencies of 70 percent for methyl iodide and 90 percent for elemental iodine. This conclusion is supported by a July 10, 2000 letter from NCS Corporation that stated "Nuclear grade activated carbon, when tested in accordance with ASTM D3803-1989 (methyl iodide...) to a penetration of 15%, is more conservative than testing the same carbon in accordance with ASTM D3803-1979 (elemental iodine...) to a penetration of 5%. ...As a general rule, you may expect the radioiodine penetration through nuclear grade activated carbon to increase from 20 to 100 times when switching from elemental iodine to methyl iodide testing." Therefore, if the efficiencies of the HEPA filters and charcoal adsorbers are as specified, at the temperatures, flow rates and velocities within the design values of the system, the resulting doses will be less than the allowable levels stated in Criterion 19 of the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50.

The charcoal in the Control Room Filtration System is replaced with new charcoal rather than tested for continued use because the charcoal bed design does not include a provision for taking in-place charcoal samples.

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