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3.22 AUXILIARY VENTILATION EXHAUST FILTER TRAINS

Applicability

Applies to the abilities of the safety-related system to remove particulate matter and gaseous iodine following a LOCA or a refueling accident.

Objective

To specify requirements to ensure the proper function of the system.

Specifications

- A. During station operation or refueling operations, the following conditions shall be met:
1. System flow rate test in the LOCA mode of operation shall show design flow of 34,000 cfm \pm 10 percent.
 2. Air distribution test across the prefilter-bank shall show uniformity of air velocity within \pm 20 percent of average velocity.
 3. In-place cold DOP tests on HEPA filters shall show greater than or equal to 99.5 percent DOP removal.
 4. In-place halogenated hydrocarbon leakage tests on charcoal adsorber banks shall show greater than or equal to 99 percent halogenated hydrocarbon removal.

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5. Laboratory analysis on charcoal samples shall show at least 95 percent methyl iodine removal at 0.125 sec. residence time, 0.5 to 1.5 mg/m³ inlet methyl iodide concentration, relative humidity greater than or equal to 80 percent, and air temperature greater than or equal to 125°F. The Laboratory Analysis shall be completed and the results available within 31 days of sampling.
 6. The pressure drop across filter cells and adsorbers shall not exceed 7.0 inches W.G at design flow rate.
- B. With one circuit of the filter system inoperable for any reason, return the circuit to operable status within 7 days or be in the cold shutdown condition within 48 hours and refer to Technical Specification 3.10 for restriction regarding fuel handling operations.

Basis

The purpose of the filter trains located in the auxiliary building is to provide standby capability for removal of particulate and iodine contaminants from the exhaust air of the charging pump cubicles of the auxiliary building, fuel building, decontamination building, safeguards building adjacent to the containments, and the reactor containment (during shutdown) which discharge through the ventilation vent and could require filtering prior to release. During normal plant operation, the exhaust from any one of these areas can be diverted, if required, through the auxiliary building filter trains remotely from the control room. The safeguards building exhaust and the charging pump cubicle exhaust are automatically diverted through the filter trains in

the event of a LOCA (diverted on safety injection system signal). The fuel building exhaust and purge exhaust are aligned to continuously pass through the filters during spent fuel handling.

High efficiency particulate absolute (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 99.5 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. The laboratory carbon sample tests are required to indicate a radioactive methyl iodide removal efficiency of at least 95 percent at a relative humidity greater than or equal to 80 percent. The dose calculations for LOCA and fuel handling accidents assume 90 percent and 70 percent, respectively, iodine removal efficiency for the air passing through the charcoal filters. Therefore, if the efficiencies of the HEPA filters and charcoal adsorbers are demonstrated to be as specified, at flow rates, velocities, and relative humidities which are greater than the design values of the system, the resulting doses will be less than 10 CFR 100 and criterion 19 of the General Design Criteria for Nuclear Power Plants, Appendix "A" to 10CFR Part 50 guidelines for the accidents analyzed. The demonstration of bypass leakage less than or equal to 1% and the demonstration of 95 percent methyl iodide removal efficiency will assure the required capability of the filters is met or exceeded.

3.23 CONTROL AND RELAY ROOM AIR FILTRATION SYSTEM

APPLICABILITY

Applies to the control room and relay room air filtration system.

OBJECTIVE

To specify requirements to ensure the proper function of the control room and relay room air filtration system.

SPECIFICATION

- A. During station operation, the following conditions for the control room and relay room air filtration system shall be met:
1. Fan flow rate test shall be no less than 750 cfm and not greater than 1100 cfm.
 2. In-place cold DOP tests on HEPA filters shall show greater than or equal to 99.5 percent DOP removal.
 3. In-place halogenated hydrocarbon leakage tests on charcoal adsorber banks shall show greater than or equal to 99 percent halogenated hydrocarbon removal.
 4. Laboratory analysis on charcoal samples shall show at least 95 percent methyl iodide removal, at 0.125 sec residence time, with 0.05 to 0.15 mg/m³ inlet methyl iodide concentration, relative humidity greater than or equal to 95 percent, and air temperature greater than or equal to 125°F. The laboratory analysis shall be completed and the results available within 31 days of sampling.
 5. The pressure drop across filter cells and adsorbers shall not exceed 5.0 inches W.G at fan flow rate.

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- B. With one (1 of a total of 4) circuit of the filter system inoperable for any reason, return the circuit to operable status within 7 days or be in the cold shutdown condition within 48 hours and refer to Technical Specification 3.10 for restrictions regarding fuel handling operations.

Basis

The control room and relay room air filtration 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 LOCA. The isolation and pressurization with bottled air of the areas within the pressure envelope are covered in Technical Specification 3.19. When the supply of compressed bottled air is depleted, the control room and relay room air filtration system is manually started to continue to maintain the control room pressure at the design positive pressure so that all leakage is outleakage.

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 radioiodine to the control room. 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. The laboratory carbon sample test results should indicate a radioactive methyl iodide removal efficiency of at least 95 percent for expected accident conditions. The control room dose calculations assume only 90 percent iodine removal efficiency for the air passing through the charcoal filters. Therefore, if the efficiencies of the HEPA filters and charcoal adsorbers are demonstrated to be as specified, at flow rates, velocities and temperatures

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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.

If the system is found to be inoperable, there is no immediate threat to the control room and reactor operation or refueling 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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4.12 AUXILIARY VENTILATION EXHAUST FILTER TRAINS

Applicability

Applies to the testing of safety-related air filtration systems.

Objective

To verify that leakage efficiency and iodine removal efficiency are within acceptable limits.

Specifications

A. Tests and Frequency

1. Auxiliary ventilation system exhaust fan flow rate through the filters in the LOCA mode of operation shall be determined initially, after any structural maintenance on the HEPA filter or charcoal adsorber housings, once per refueling cycle, i. e. approximately 18 months, following painting, fire, or chemical release in any ventilating zone communicating with the system during system operation or after partial or complete replacement of the HEPA filters or charcoal adsorbers.
2. The system exhaust fan flow rate through each filter train shall be determined for the LOCA mode of operation by aligning Unit 1 or Unit 2 Safeguards room exhaust and the exhaust from three charging pump

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cubicles through the filters and recording the flow meter reading in the control room.

3. 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 flow distribution of the air across the face of the prefilter/HEPA filter bank.
4. The air distribution test shall be performed with an anemometer located at the upstream side and at the center of each prefilter cell.
5. In-place cold DOP tests for HEPA filter banks shall be performed:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every 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 the HEPA filter cells, and
 - e. After any structural maintenance on the filter housing.
6. The procedure for in-place cold DOP tests shall be in accordance with ANSI N510-1975, Section 10.5 or 11.4.

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7. In-place halogenated hydrocarbon leakage tests for the charcoal adsorber bank shall be performed:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every 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.

8. The procedure for in-place halogenated hydrocarbon leakage tests shall be in accordance with ANSI-N510-1975, Section 12.5.

9. Laboratory analysis on charcoal samples shall be performed:
 - a. Initially, whenever a new batch of charcoal is used to fill adsorbers trays,
 - b. At least once per refueling cycle, i.e., approximately every eighteen months,
 - c. After 720 hours of system operation, and
 - d. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation or after and structural maintenance on the HEPA filter or charcoal adsorber housings.

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10. The procedure for iodine removal efficiency tests shall follow ASTM 3803. Charcoal samples for retest shall be taken from the test canisters.
11. The pressure drop across the HEPA filter and adsorber banks shall be checked:
 - a. Initially,
 - b. At least once per refueling cycle thereafter for systems maintained in a standby status and after 720 hours of system operation, and
 - c. After each complete or partial replacement of filters or adsorbers.
12. Each redundant filter train circuit shall be operated every month if it has not already been in operation.
13. At least once per refueling cycle, the operability of the entire safety-related portion of the auxiliary ventilation system shall be demonstrated.
14. When one circuit of the filter train system becomes inoperable, the operability of the other train shall be demonstrated immediately and daily thereafter. If refueling operations are occurring the operable train must be operating.
15. A visual inspection of the filter train and its associated components shall be conducted before each in-place air flow distribution test, DOP test, or activated charcoal adsorber leak

test in accordance with the intent of Section 5 of ANSI N510-1975.

B. Acceptance Criteria

1. The exhaust air flow rate determined in Specifications 4.12.A.1 and 4.12.A.2 shall be within the limits specified in Specification 3.22.A.1. The ventilation system shall be adjusted until the specified limits are met.
2. The results of air distribution tests described in Specifications 4.12.A.3 and 4.12.A.4 shall be within the specified limits of Specification 3.22.A.2. The ventilation system shall be adjusted until the specified limits are met.
3. The results of the in-place DOP test described in Specifications 4.12.A.5 and 4.12.A.6 shall be within the limits of Specification 3.22.A.3. Leakage sources shall be identified, repaired, and retested. Any HEPA filters found defective shall be replaced.
4. The results of the in-place halogenated hydrocarbon leak test described in Specifications 4.12.A.7 and 4.12.A.8 shall be within the limits of Specification 3.22.A.4. Leakage sources shall be identified, repaired, and retested.

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5. The results of laboratory analysis of charcoal samples described in Specifications 4.12.A.9 and 4.12.A.10 shall be within the limits of Specification 3.22.A.5. If the test results are unacceptable, all adsorbent in the system shall be replaced with new adsorbent qualified in accordance with Table 5.1 of ANSI N509-1976 except that the acceptance criterion of Test 5.a for methyl iodide removal efficiency is 98 percent at a residence time of 0.125 seconds.
6. The pressure drop across the HEPA filters and charcoal adsorber banks measured in Specification 4.12.A.11 shall be within the limits of Specification 3.22.A.6. If this condition cannot be met, new filter cells shall be installed.
7. The minimum period of air flow through the filters shall be 15 minutes per month.
8. The system operability test of Specification 4.12.A.13 shall demonstrate automatic start-up, shutdown and flow path alignment.
9. The filter train operability test of Specification 4.12.A.14 shall demonstrate proper equipment start-up and shutdown and flow path alignment.

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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.

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.

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4.20 CONTROL ROOM AIR FILTRATION SYSTEM

APPLICABILITY

Applies to the testing of safety-related air filtration systems of the control room and relay room.

OBJECTIVE

To verify that leakage efficiency and iodine removal efficiency are within acceptable limits.

SPECIFICATION

A. Tests and Frequency

1. The control room air filtration system flow rate test shall be performed:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every 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 the HEPA filter or charcoal adsorbers and
 - e. After any structural maintenance the HEPA filter or charcoal adsorber housings.

- f. After any major modification or repair of the air cleaning system.
- 2. The procedure for determining the air flow rate shall be in accordance with Section 9 of the ACGIH Industrial Ventilation document and Section 8 of ANSI N510-1975. A visual inspection of the filter train and its associated components shall be conducted before each in-place airflow distribution test, DOP test, or activated charcoal adsorber leak test in accordance with the intent of Section 5 of ANSI N510-1975.
- 3. In-place cold DOP tests for HEPA filter banks shall be performed:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every 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 the HEPA filter cells, and
 - e. After any structural maintenance of the filter housing.
- 4. 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 this test shall be within the range specified in Section 3.23.A.1.
- 5. In-place halogenated hydrocarbon leakage tests for the charcoal adsorber bank shall be performed:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every 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 adsorbers 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 within the range specified in Section 3.23.A.1.
7. Laboratory analysis on charcoal samples shall be performed:
 - a. Initially, whenever a new batch of charcoal is used to fill adsorber trays,
 - b. At least once per refueling cycle, i.e., approximately every eighteen months,
 - c. After 720 hours of system operation, and
 - d. Following painting, fire, or chemical release in any ventilation zone communicating with the system during system operation.
8. The procedure for iodine removal efficiency tests shall follow ASTM 3803.
9. The pressure drop across the HEPA filter and adsorber banks shall be checked:
 - a. Initially,
 - b. At least once per refueling cycle, i.e., approximately every eighteen months, and

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- c. After each complete or partial replacement of filters or adsorbers
- 10. Each filter train circuit shall be operated every month. Filter Train Operation shall be initiated manually from the control room.

B. Acceptance Criteria

- 1. The air flow rate determined in Specifications 4.20.A.1 and 4.20.A.2 shall meet the requirement specified in Specification 3.23.A.1. The air filtration system shall be adjusted until the requirement is met.
- 2. The results of the in-place cold DOP test described in Specifications 4.20.A.3 and 4.20.A.4 shall be within the limits of Specification 3.23.A.2. Leakage sources shall be identified, repaired, and retested. Any HEPA filters found defective shall be replaced.
- 3. The results of the in-place halogenated hydrocarbon leak test described in Specifications 4.20.A.5 and 4.20.A.6 shall be within the limits of Specification 3.23.A.3. Leakage sources shall be identified, repaired, and retested.
- 4. The results of laboratory analysis of charcoal samples described in Specifications 4.20.A.7 and 4.20.A.8 shall be within the limits of Specification 3.23.A.4. If the test results are unacceptable, all adsorbent in the system shall be replaced with new adsorbent qualified in accordance with Table 5.1 of ANSI N509-1976 except that the acceptance criterion of Test 5.a for methyl iodide removal efficiency is 98 percent at a residence time of 0.125 seconds.
- 5. The pressure drop across the HEPA filters and charcoal adsorber banks measured in Specification 4.20.A.9 shall be within the limits of Specification 3.23.A.5. If this condition cannot be met, new filter cells shall be installed.

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6. The minimum period of air flow through the filter shall be 15 minutes per month.

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BASIS

Ventilation 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.

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 same tests and sample analysis are performed as required for operational use.