

### 3.16 REACTOR BUILDING PURGE FILTRATION SYSTEM

#### Applicability

Applies to the operability of the reactor building purge filtration system.

#### Objective

To ensure that the reactor building purge filtration system will perform within acceptable levels of efficiency and reliability.

#### Specification

3.16.1 The reactor building purge filtration system shall be operable whenever irradiated fuel handling operations are in progress in the reactor building and shall have the following performance capabilities:

- a. The results of the in-place cold DOP and halogenated hydrocarbon tests at design flows ( $\pm 10\%$ ) on HEPA filters and charcoal adsorber banks shall show  $> 99\%$  DOP removal and  $\geq 99\%$  halogenated hydrocarbon removal.
- b. The results of laboratory carbon sample analysis shall show  $\geq 90\%$  radioactive methyl iodide removal at a velocity within  $\pm 20\%$  of system design,  $0.05$  to  $0.15 \text{ mg/m}^3$  inlet methyl iodide concentration,  $\geq 70\%$  R. H. and  $\geq 125\text{F}$ .
- c. Fans shall be shown to operate within  $\pm 10\%$  design flow.
- d. The pressure drop across the combined HEPA filters and charcoal adsorber banks shall be less than 6 inches of water at system design flow rate ( $\pm 10\%$ ).
- e. Air distribution shall be uniform within  $\pm 20\%$  across HEPA filters and charcoal adsorbers when tested initially and after any maintenance or testing that could affect the air distribution within the reactor building purge filtration system.

3.16.2 If the requirements of Specification 3.16.1 cannot be met, either:

- a. Irradiated fuel movement shall not be started (any irradiated fuel assembly movement in progress may be completed); or,
- b. Isolate the reactor building purge system.

#### Bases

The reactor building purge filtration system is designed to filter the reactor building atmosphere during normal operations for ease of personnel entry into the reactor building. This specification is intended to require the system operable during fuel handling operations, if the system

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is to be used, to limit the release of activity should a fuel handling accident occur. The system consists of one circuit containing a supply and an exhaust fan and a filter train. The filter train consists of a pre-filter, a HEPA filter and a charcoal adsorber in series.

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 a radioactive methyl iodide removal efficiency of at least 90 percent for expected accident conditions. 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.

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#### 4.18 REACTOR BUILDING PURGE FILTRATION SYSTEM

##### Applicability

Applies to the surveillance of the reactor building purge filtration system.

##### Objective

To verify an acceptable level of efficiency and operability of the reactor building purge filtration system.

##### Specification

- 4.18.1 The pressure drop across the combined HEPA filters and charcoal adsorber banks shall be demonstrated to be less than 6 inches of water at system design flow rate (+10%) within 720 system operating hours prior to initial irradiated fuel handling operations.
- 4.18.2 Initially and after any maintenance or testing that could affect the air distribution within the reactor building purge system, air distribution shall be demonstrated to be uniform within  $\pm 20\%$  across HEPA filters and charcoal adsorbers.
- 4.18.3a. The tests and sample analysis of Specification 3.16.1.a,b, & c. shall be performed within 720 system operating hours prior to initial irradiated fuel handling operations in the reactor building, and prior to irradiated fuel handling in the reactor building following significant painting, fire or chemical release in any ventilation zone communicating with the system.
  - b. Cold DOP testing shall also be performed prior to irradiated fuel handling in the reactor building after each complete or partial replacement of a HEPA filter bank or after any structural maintenance on the system housing.
  - c. Halogenated hydrocarbon testing shall also be performed prior to irradiated fuel handling in the reactor building after each complete or partial replacement of a charcoal adsorber bank or after any structural maintenance on the system housing.

##### Bases

Since the reactor building purge filtration system may be in operation when the reactor is operating its operability must be verified before handling of irradiated fuel.

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 refueling period to show system performance capability.

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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. 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 NS10 (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 RDT Standard M16-IT. 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.

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