U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

October 2000
Division 1
Draft DG-1102

DRAFT REGULATORY GUIDE

Contact: J.P. Segala (301)415-1858

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(Proposed Revision 3 to Regulatory Guide 1.52)

DESIGN, INSPECTION, AND TESTING CRITERIA FOR AIR FILTRATION AND ADSORPTION UNITS OF POST-ACCIDENT ENGINEERED-SAFETY-FEATURE ATMOSPHERE CLEANUP SYSTEMS IN LIGHT-WATER-COOLED NUCLEAR POWER PLANTS

A. INTRODUCTION

This guide provides methods acceptable to the NRC staff for implementing the NRC's regulations in Appendix A to 10 CFR Part 50 with regard to design, inspection, and testing criteria for air filtration and iodine adsorption units of engineered-safety-feature (ESF) atmosphere cleanup systems in light-water-cooled nuclear power plants. This guide applies only to post-accident ESF atmosphere cleanup systems[1] designed to mitigate the consequences of postulated accidents. It addresses the ESF atmosphere cleanup system, including the various components and ductwork, in the postulated DBA environment.

In Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” General Design Criteria 41, 42, and 43 require that containment atmosphere cleanup systems be provided as necessary to reduce the amount of radioactive material released to the environment following a postulated design basis accident (DBA). They also require that these systems be designed to permit appropriate periodic inspection and testing to ensure their integrity, capability, and operability.

General Design Criterion 61 of Appendix A to 10 CFR Part 50 requires that fuel storage and handling systems, radioactive waste systems, and other systems that may contain radioactivity be designed to ensure adequate safety under normal and postulated accident conditions and that they be designed with appropriate containment, confinement, and filtering systems. General Design Criterion 19 requires that adequate radiation protection be provided to permit access to and occupancy of the control

[1]The current licensing basis of several older plants may not include all of these atmosphere cleanup systems under the plant’s ESF (or safety) systems list. Typically, these systems are credited in the accident analyses and serve safety functions under the environmental conditions generated during and after accidents. Therefore, these systems are subject to the plant’s technical specifications similar to other ESF (or safety) systems. In such cases, this guide is applicable to these non-ESF (or non-safety) atmosphere cleanup systems.

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received complete staff review and does not represent an official NRC staff position.

Public comments are being solicited on the draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rules and Directives Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Comments may be submitted electronically or downloaded through the NRC’s interactive web site at <WWW.NRC.GOV> through Rulemaking. Copies of comments received may be examined at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by **December 29, 2000.**

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room under accident conditions and for the duration of the accident without personnel radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body.

Nuclear power plants are required by 10 CFR Part 100 to be sited so that radiological doses from normal and postulated accidents are kept acceptably low. A footnote to 10 CFR 100.11 states that the fission product release assumed in the plant design should be based on a major accident involving substantial core damage with subsequent release of appreciable quantities of fission product. According to 10 CFR 50.67, an application to revise a licensee's current accident source term must contain an evaluation of the consequences of applicable design basis accidents previously analyzed in the safety analysis report.

This guide does not apply to atmosphere cleanup systems designed to collect airborne radioactive materials during normal plant operation, including anticipated operational occurrences. Guidance for normal ventilation exhaust systems is being developed as DG-1103, a proposed Revision 2 to Regulatory Guide 1.140, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Ventilation Exhaust Systems in Light-Water-Cooled Nuclear Power Plants."

The information collections contained in this draft regulatory guide are covered by the requirements of 10 CFR Part 50, which were approved by the Office of Management and Budget, approval number 3150-3011. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

B. DISCUSSION

Atmosphere cleanup systems are included as engineered safety features in the design of light-water-cooled nuclear power plants to mitigate the radiological consequences of postulated accidents. The mitigating action of ESF atmosphere cleanup systems is limited to the removal of radioactive iodine (both elemental iodine and organic iodides) and particulate matter (aerosols) that may be released into the building or containment during and after the accident; the removal of fission product noble gases by ESF atmosphere cleanup systems is negligible. ESF atmosphere cleanup systems should be designed to operate under the environmental conditions generated during and after design basis accidents.

In this guide, ESF atmosphere cleanup systems that must operate under postulated DBA conditions inside the primary containment are designated as "primary systems." ESF systems required to operate outside the primary containment under postulated DBA conditions that are generally less severe are designated as "secondary systems." Secondary systems include such systems as the standby gas treatment system (SGTS) and the atmosphere cleanup systems for the spent fuel handling building, control room, shield or annulus building, and emergency core cooling system (ECCS) pump leakage. Figures 1 and 2 depict sample ESF atmosphere cleanup systems.

For most currently licensed plants, the characteristics of the fission product release from the core into the containment were set forth in Regulatory Guides 1.3 (Ref. 1) and 1.4 (Ref. 2) and were derived from Technical Information Document (TID) 14844, "Calculation of Distance Factors for Power and Test Reactor Sites" (Ref. 3). This source term has been used in the design basis applications for light-water-cooled nuclear power plants. Since the publication of TID-14844 in 1962, significant advances have been made in understanding the timing,

magnitude, and chemical form of fission product releases from severe nuclear power plant accidents. In 1995, the NRC published NUREG-1465 (Ref. 4), which provides estimates of an alternative accident source term based on insights from severe accident research. The NRC enacted 10 CFR 50.67 to provide a means for operating reactors to change their design basis source terms. Regulatory Guide 1.183 (Ref. 5) was developed to provide guidance to licensees of operating power reactors on acceptable applications of alternative source terms. Regulatory Guide 1.183 establishes an acceptable alternative source term (AST) and identifies the significant attributes of other ASTs that may be found acceptable by the NRC staff. Regulatory Guide 1.183 also identifies acceptable radiological analysis assumptions for use in conjunction with the accepted AST. The NRC staff expects that future plants will use the alternative accident source term in support of safety analyses performed in accordance with 10 CFR 50.34 and 10 CFR 50.90.

The DBA environmental design conditions for a given ESF system (primary and secondary systems) should be determined for each plant. DBA environmental design conditions for typical primary and secondary systems should be based on the radiation source term specified in Regulatory Guides 1.3 (Ref. 1), 1.4 (Ref. 2), 1.25 (Ref. 6), or 1.183 (Ref. 5), as applicable. DBA environmental design conditions such as temperature, relative humidity, and pressure should also be considered. In addition, primary systems should be designed to withstand the radiation dose from water and plateout sources in the containment and the corrosive effects of chemical sprays (if such sprays are included in the plant design).

An ESF atmosphere cleanup system consists of housing, dampers, fans, and associated ductwork, motors, valves, and instrumentation. Typical components within the housing are moisture separators, heaters, prefilters, high-efficiency particulate air (HEPA) filters, and iodine adsorption units.

The housing is the portion of an atmosphere cleanup system that encloses air cleaning components and provides connections to adjacent ductwork. Each of these components may be used for moving, cleaning, heating, cooling, humidifying, or dehumidifying the air or gas stream.

The principal purpose of dampers in an ESF atmosphere cleanup system is to shut off or seal the system components from air or gases flowing in a designated flow path. A typical unit has dampers both upstream and downstream of the "train" of components, i.e., upstream of the moisture separator and downstream of the last HEPA filter or iodine adsorber. The dampers prevent or isolate unwanted flow or circulation of the normal air or gas stream through the system components in order to preserve or extend the useful service life of the filtration and iodine adsorption media. ESF system dampers may also serve secondary functions such as flow control, pressure control, balancing, pressure relief, or backflow prevention. This guide does not address the fire prevention aspect of dampers in ESF atmosphere cleanup systems.

The principal purpose of a moisture separator is to remove entrained water droplets (sensible moisture) from the inlet gas stream, thereby protecting HEPA filters and iodine adsorbers from water damage and plugging. Moisture separators may also function as prefilters in some system designs.

Emergency heaters normally follow the moisture separators in the cleanup train. They are designed to heat the incoming air stream to reduce the stream's relative humidity upstream of the HEPA filters and iodine adsorbers during system operation to minimize adsorption of water vapor from the air by the iodine adsorbers. Such action promotes the long-term retention of radioiodine, minimizing the potential for early desorption and release. Heaters should only be

provided in secondary systems because the use of electrical heaters in primary systems inside containment could result in a spark and possible hydrogen explosion in the event of an accident. In some designs, nonemergency space heaters (or some other mechanism) are used to prevent condensation within the isolated components of the cleanup unit while the cleanup units are not in service.

Prefilters and HEPA filters are installed to remove particulate matter from the gas stream. Prefilters remove the larger airborne particles from the gas stream and prevent excessive loading of the HEPA filters. The HEPA filters remove the fine discrete particulate matter to minimize fouling of the iodine adsorbers, which then remove gaseous iodine (elemental iodine and organic iodides) from the air stream. HEPA filters downstream of the adsorption units collect carbon fines and provide additional protection against particulate matter release in case of failure of the upstream HEPA filter bank.

The location of the fan with respect to the ESF atmosphere cleanup unit is important because fans obtain their air from the path of least resistance. The use of a supply fan (upstream of the ESF atmosphere cleanup unit) or an exhaust fan (downstream of the ESF atmosphere cleanup unit) has tradeoffs that should be accounted for in the design of the system. For example, when the ESF atmosphere cleanup system is located in a radioactively contaminated area and the air is supplied to a given radioactively clean area or exhausted to the environment, it is advantageous to locate the fan in the supply configuration. This minimizes the potential for unfiltered inleakage into the radioactively clean area or inadvertent release of radioactive materials to the environment. When the ESF atmosphere cleanup system is located in a radioactively clean area, it is advantageous to locate the fan in the exhaust configuration. This minimizes the potential for outward leakage of radioactive materials into the radioactively clean area.

The environmental operating conditions preceding a postulated DBA may affect the performance of ESF atmosphere cleanup systems during and following a DBA. Industrial contaminants, pollutants, high temperature, and high relative humidity contribute to the aging and weathering of filters and adsorbers and may reduce their effective capability to perform their intended design functions. Therefore, aging and weathering, both of which will vary according to site-specific conditions, should be considered during design, operation, and maintenance. The potential for condensation of moisture inside ESF atmosphere cleanup systems when in a shutdown or standby mode of operation should also be given design consideration, e.g., provision for space heaters. The effects of these environmental factors on the performance of the ESF atmosphere cleanup system should be determined by scheduled periodic inspection and testing during operation.

All components of ESF atmosphere cleanup systems should be designed for reliable performance under accident conditions. Initial testing, periodic inspection and testing, and proper maintenance are primary factors in ensuring the reliability of the ESF atmosphere cleanup system. Careful attention to problems of ESF system maintenance during the design phase can contribute significantly to the reliability of the system by increasing the ease of such maintenance. Of particular importance in the design is a layout that provides accessibility and sufficient working space so that the required maintenance functions can be performed safely and efficiently. Periodic inspection and testing during operation of the components is another important means of ensuring reliability. It is important to perform periodic inspections and tests of the ESF atmosphere cleanup system in a manner that is consistent with the way the system was intended to operate during an accident. Built-in features that will facilitate convenient access for in-place testing are important in ESF system design.

Standards acceptable to the NRC staff for the design and testing of ESF atmosphere cleanup systems include portions of ASME N509-1989, "Nuclear Power Plant Air-Cleaning Units and Components" (Ref. 7); ASME N510-1989, "Testing of Nuclear Air-Treatment Systems" (Ref. 8); and ASME AG-1-1997, "Code on Nuclear Air and Gas Treatment" (Ref. 9). Other standards referenced in this guide include ASTM D3803-1989, "Standard Test Methods for Nuclear-Grade Activated Carbon" (Ref. 10); and ASTM D4069-81, "Impregnated Activated Carbon Used To Remove Gaseous Radioiodines from Gas Streams" (Ref. 11).

Other standards are available for the construction and testing of certain components of ESF systems. As noted, not all the documents mentioned in this guide have been evaluated by the NRC staff as to their applicability or acceptability. Standards that have been found acceptable are referenced in this guide. If no suitable standard exists or the licensee has used standards not referenced in this guide, approaches will be assessed by the staff on a case-by-case basis.

C. REGULATORY POSITION

1. GENERAL DESIGN AND TESTING CRITERIA

ASME AG-1-1997, “Code on Nuclear Air and Gas Treatment” (Ref. 9), provides methods that are acceptable to the NRC staff for the performance, design, construction, acceptance testing, and quality assurance of equipment used as components in nuclear safety-related or engineered safety featured air and gas treatment systems in nuclear power plants. This code replaces the existing ASME N509-1989, “Nuclear Power Plant Air-Cleaning Units and Components” (Ref. 7). However, atmosphere cleanup systems designed to ASME N509-1989 and tested to earlier versions of ASME N510-1989 (Ref. 8) would be adequate to protect public health and safety. Operating plants licensed under these standards (or no standards at all) would not be required to revise their regulatory requirements under the current licensing bases.

2. ENVIRONMENTAL DESIGN CRITERIA

In addition to environmental design requirements of Section 4.4 of ASME N509-1989 (Ref. 7), components of ESF atmosphere cleanup systems should be designed using the following additional guidelines.

2.1. The design of an ESF atmosphere cleanup system should be based on the anticipated range of operating parameters of temperature, pressure, relative humidity, radiation levels, and airborne iodine concentrations that are likely during and following the postulated DBA.

2.2. The design of each ESF atmosphere cleanup system should be based on the radiation dose to essential services in the vicinity of the adsorber section, integrated over the 30-day period following the postulated DBA. The radiation source term should be consistent with the assumptions found in Regulatory Guides 1.3 (Ref. 1), 1.4 (Ref. 2), 1.25 (Ref. 6), or 1.183 (Ref. 5). Other ESFs, including pertinent components of essential services such as power, air, and control cables, should be adequately shielded from the ESF atmosphere cleanup systems.

2.3. The design of each adsorber should be based on the concentration and relative abundance of the iodine species (elemental, particulate, and organic) and should be consistent

with the assumptions found in Regulatory Guides 1.3 (Ref. 1), 1.4 (Ref. 2), 1.25 (Ref. 6), or 1.183 (Ref. 5).

2.4. The operation of any ESF atmosphere cleanup system should not degrade the operation of other ESFs such as containment spray systems, nor, conversely, should the operation of ESFs such as containment spray systems degrade the operation of any ESF atmosphere cleanup system.

2.5. Components of systems connected to compartments that are unheated during a postulated accident should be designed for the post-accident effects of both the lowest and highest predicted temperatures.

2.6. The design of an ESF atmosphere cleanup system should consider any significant contaminants that may occur during a DBA such as dusts, chemicals, excessive moisture, or other particulate matter that could degrade the cleanup system's operation.

3. SYSTEM DESIGN CRITERIA

ESF atmosphere cleanup systems should be designed in accordance with the requirements of Section 4 of ASME N509-1989 (Ref. 7) as modified and supplemented by the following.

3.1. ESF atmosphere cleanup systems designed and installed for the purpose of mitigating accident doses should have redundant units (trains) to provide assurance that a unit will function during the DBA. Each unit should consist of the following sequential components: (1) moisture separator, (2) prefilter (a moisture separator may serve this function), (3) HEPA filter before the adsorbers, (4) iodine adsorber (impregnated activated carbon), (5) HEPA filter after the adsorbers or postfilter, (6) fan, and (7) interspersed ducts, motors, dampers, valves, and related instrumentation. Humidity control should be provided by safety-related heaters or an NRC-approved analysis that demonstrates that the air entering the charcoal is maintained at less than or equal to 70% relative humidity under all design-basis accident conditions.

3.2. The redundant ESF atmosphere cleanup unit trains should be physically separated so that damage to one unit train does not also cause damage to the other unit train. The generation of missiles from high-pressure equipment rupture, rotating machinery failure, or natural phenomena should be considered in the design for separation and protection.

3.3. All components of an ESF atmosphere cleanup system should be designated as Seismic Category I (see Ref. 12, Regulatory Guide 1.29) if failure of a component would lead to the release of significant quantities of fission products to the working or outdoor environments.

3.4. In the mechanical design of the ESF system, the high radiation levels that may be associated with buildup of radioactive materials on the ESF system components should be given particular consideration. ESF system construction materials should effectively maintain their intended function under the postulated radiation levels. The effects of radiation should be considered not only for moisture separators, heaters, HEPA filters, adsorbers, motors, and fans, but also for any electrical insulation, controls, joining compounds, dampers, gaskets, and other organic materials that are necessary for operation during and after a postulated DBA. In addition to the consideration of high radiation levels, the mechanical design of the ESF system should be based on consideration of other harsh conditions that may occur during a DBA such as high humidity, containment rain-out, chemical sprays, or high temperatures and pressures.

3.5. To ensure reliable in-place testing, the volumetric air-flow rate of each cleanup unit should be limited to approximately 30,000 cubic feet per minute. If a total system air flow in excess of this rate is required, multiple units should be used. For ease of maintenance, a filter layout three HEPA filters high and ten wide is preferred. Each ESF atmosphere cleanup system train should be designed such that at the maximum accident flow rate the adsorber resident time (typically 0.25 seconds per 2 inches of charcoal) is not exceeded. The resident time should be calculated in accordance with Article I-1000 of Sections FD and FE of ASME AG-1-1997 (Ref. 9).

3.6. The ESF atmosphere cleanup system should be instrumented to signal, alarm, and record pertinent pressure drops and flow rates at the control room in accordance with recommendations of Section 5.6 of ERDA 76-21 (Ref. 13).

3.7. The power supply and electrical distribution system for the ESF atmosphere cleanup system should be designed in accordance with Regulatory Guide 1.32 (Ref. 14). All instrumentation and equipment controls should be designed to IEEE Standard 279 (Ref. 15). The ESF system should be qualified and tested under Regulatory Guide 1.89 (Ref. 16). To the extent applicable, Regulatory Guides 1.30 (Ref. 17), 1.100 (Ref. 18), and 1.118 (Ref. 19) and IEEE Standard 334 (Ref. 20) should be considered in the design.

3.8. Unless the applicable ESF atmosphere cleanup system operates continuously during all times that a DBA can be postulated to occur, the system should be automatically activated upon the occurrence of a DBA by (1) a redundant ESF actuation signal (e.g., temperature, pressure) or (2) a signal from redundant Seismic Category I radiation monitors.

3.9. To maintain radiation exposures to operating and maintenance personnel as low as is reasonably achievable (ALARA), ESF atmosphere cleanup systems and components should be designed to control leakage and facilitate maintenance, inspection, and testing in accordance with the guidance of Regulatory Guide 8.8 (Ref. 21). The ESF atmosphere cleanup unit should be totally enclosed. To minimize the potential contamination of the area when maintaining the ESF atmosphere cleanup system, the system should be designed and installed in a manner that permits replacement of an entire unit or a minimum number of segmented sections without removal of individual components.

3.10. Outdoor air intake openings should be equipped with louvers, grills, screens, or similar protective devices to minimize the effects of high winds, rain, snow, ice, trash, and other contaminants on the operation of the system. The outdoor air intake openings should be located to minimize the effects of possible onsite plant contaminants, such as the diesel generator exhaust. If the atmosphere surrounding the plant could contain significant environmental contaminants, such as dusts and residues from smoke cleanup systems from adjacent coal burning power plants or industry, or a salty environment near an ocean, the design of the system should consider these contaminants and prevent them from affecting the operation of any ESF atmosphere cleanup system.

3.11. ESF atmosphere cleanup system housings and ductwork should be designed to exhibit on test a maximum total leakage rate as defined in Section SA of ASME AG-1-1997, Article SA-4500 (Ref. 9). Duct and housing leak tests should be performed in accordance with the provisions of Section TA of ASME AG-1-1997.

4. COMPONENT DESIGN CRITERIA AND QUALIFICATION TESTING

Components of ESF atmosphere cleanup systems should be designed, constructed, and tested in accordance with the requirements of ASME AG-1-1997, Division II (Ref. 9), as modified and supplemented by the following.[2]

4.1. Moisture separators should be designed, constructed, and tested in accordance with the requirements of Section FA of ASME AG-1-1997 (Ref. 9).

4.2. Air heaters should be designed, constructed, and tested in accordance with the requirements of Section CA of ASME AG-1-1997 (Ref. 9).

4.3. Materials used in the prefilters should withstand the radiation levels and environmental conditions prevalent during the postulated DBA. Prefilters should be designed, constructed, and tested in accordance with the provisions of Section FB of ASME AG-1-1997 (Ref. 9).

4.4. HEPA filters used in ESF atmosphere cleanup systems should be designed, constructed, and tested in accordance with Section FC of ASME AG-1-1997 (Ref. 9). HEPA filters should be compatible with the chemical composition and physical conditions of the air stream.

Each HEPA filter should be tested by the manufacturer (or by a qualified filter test facility) for penetration of a challenge aerosol such as dioctyl phthalate (DOP) in accordance with the procedures of Section TA of ASME AG-1-1997 (Ref. 9). Testing and documentation should be in accordance with a quality assurance program consistent with the requirements of Appendix B to 10 CFR Part 50.

4.5. Filter and adsorber mounting frames should be constructed and designed in accordance with the provisions of Section FG of ASME AG-1-1997 (Ref. 9).

4.6. Filter and adsorber banks should be arranged in accordance with the recommendations of Section 4.4 of ERDA 76-21 (Ref. 13) and Section HA, “Housings,” of ASME AG-1a-2000 (Ref. 22).

4.7. System filter housings, including floors and doors, should be constructed and designed in accordance with the provisions of Section HA of ASME AG-1a-2000 (Ref. 22).

4.8. Water drains should be designed in accordance with the recommendations of Section 4.5.8 of ERDA 76-21 (Ref. 13) and Section HA of ASME AG-1a-2000 (Ref. 22). Special design features, such as water traps for each drain, should be incorporated into drain systems to prevent contaminated air bypassing filters or adsorbers through the drain system. Procedures should be in place to routinely verify the water level.

4.9. Adsorption units function most efficiently, with respect to retention of adsorbed iodine, at an input relative humidity of 70% or less. If the relative humidity of the air entering the ESF atmosphere cleanup system is expected to exceed 70% during accident situations, safety-related heaters should be provided in the system design for controlling the relative humidity of the air entering the system. Heaters should be capable of reducing the worst-case relative humidity of

[2] The pertinent quality assurance requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 apply to all activities affecting the safety-related functions of all components of the ESF atmosphere cleanup system.

system influent air to 70% or less in the system space between the system inlet and the prefilter or HEPA stage at the maximum system design flow rate, considering normal and off-normal supply voltages.

4.10. Adsorbers should be designed, constructed, and tested in accordance with the requirements of Section FD for Type II Adsorber cells and Section FE for Type III Adsorber cells of ASME AG-1-1997 (Ref. 9).

The design of the adsorber section should consider possible iodine desorption and adsorbent auto-ignition that may result from radioactivity-induced heat in the adsorbent and concomitant temperature rise. Acceptable designs include a low-flow air bleed system, cooling coils, water sprays for the adsorber section, or other cooling mechanisms. Any cooling mechanism should satisfy the single-failure criterion. A low-flow air bleed system should satisfy the single-failure criterion for providing low humidity (less than 70% relative humidity) cooling airflow.

When a water-based fire suppression/prevention (cooling) system is installed in the ESF atmosphere cleanup system housing, the fire system should be manually actuated unless there is a high probability that the iodine desorption and adsorbent auto-ignition could occur in the housing, in which case the fire system should have both automatic and manual actuation. The fire system should use open spray nozzles or devices of sufficient size, number, and location to provide complete coverage over the entire surface of the combustible filter media. The fire system should be hard piped and supplied with a reliable source of water at adequate pressure and volume. The location of the manual release (or valve) for the fire system should be remote from the cleanup system housing and should be consistent with the ALARA guidance in Regulatory Guide 8.8 (Ref. 21). Automatic fire systems should include a reliable means of thermal detection to actuate the system. Manual fire systems should include a reliable means of internal temperature monitoring for determination on when to manually actuate the fire systems. The temperature monitoring indication should be located remote from the cleanup system housing in accordance with ALARA practices.

4.11. The adsorber section of the ESF atmosphere cleanup system may contain any adsorbent material demonstrated to remove gaseous iodine (elemental iodine and organic iodides) from air at the required efficiency. However, since impregnated activated carbon[3] is used almost exclusively, only impregnated activated carbon is discussed in this guide.

Each original or replacement batch or lot of impregnated activated carbon used in the adsorber section should meet the requirements for adsorbent contained in Section FF of ASME AG-1-1997 (Ref. 9), and in Section 16 of ASTM D4069-81 (Ref. 11).[4, 5] In ASTM D4069-81, a test performed "only for qualification purposes" should be interpreted to mean a test that establishes

[3]Activated carbon is typically impregnated with a chemical compound or compounds to enhance radioiodine retention, particularly under high temperatures and humidity conditions. Typical impregnants include iodides such as potassium iodide and triiodide, amines such as triethylenediamine (TEDA), and combinations thereof.

[4]A “batch of activated carbon” or a “batch of impregnated activated carbon” is a quantity of adsorbent, not to exceed 10 cubic meters (or 350 cubic feet) in size, of the same grade or type that has been produced under the same manufacturer’s production designation using a consistent manufacturing procedure and equipment, and that has been homogenized to exhibit the same physical properties and performance characteristics throughout the mass. (See Article FF-1130 of ASME AG-1-1997, Ref. 9.)

[5]A "lot of activated carbon" or a "lot of impregnated activated carbon" is that quantity of adsorbent consisting of one or more batches of adsorbent that comprise and satisfy a purchase order. (See Article FF-1130 of ASME AG-1-1997, Ref. 9.)

the suitability of a manufacturer's product for a generic application, normally a one-time test establishing typical performance of the product. Tests not specifically identified as being performed only for qualification purposes should be interpreted as "batch tests." Batch tests are tests to be made on each production batch of product to establish suitability for a specific application. Test conditions and acceptance criteria for batch tests should be the same as, or more stringent than, those specified in the plant's technical specifications for the specific application.

If impregnated activated carbon is used as the adsorbent, the adsorber system should be designed for an average atmosphere residence time of 0.25 seconds per 2 inches of adsorbent bed. Sections FD and FE of ASME AG-1-1997 (Ref. 9) should be used to determine the residence time. The adsorption unit should be designed for a maximum loading of 2.5 mg of total iodine (radioactive plus stable) per gram of activated carbon. No more than 5% of impregnant (50 mg of impregnant per gram of carbon) should be used. The radiation stability of the type of carbon specified should be demonstrated and certified (see Regulatory Position 2.2 of this guide for the design source term).

If an adsorbent other than impregnated activated carbon is proposed or if the mesh size distribution or other physical properties of the impregnated activated carbon are different from the specifications above, the proposed adsorbent should have the capability to perform as well as or better than activated carbon satisfying the specifications in Article FF of ASME AG-1-1997 (Ref. 9).

If sample canisters are used, they should be designed in accordance with Appendix A of ASME N509-1989 (Ref. 7)

4.12. Ducts and filter housings should be laid out with a minimum of ledges, protrusions, and crevices that could collect dust and moisture and that could impede personnel or create a hazard to them in the performance of their work. Turning vanes or other air flow distribution devices should be installed where needed to ensure representative air flow measurement and uniform flow distribution through cleanup components.

4.13. Dampers should be designed, constructed, and tested in accordance with the provisions of Section DA of ASME AG-1-1997 (Ref. 9).

4.14. The system fan, its mounting, and the ductwork connections should be designed, constructed, and tested in accordance with the requirements of Section BA for Blowers and Section SA for Ducts in ASME AG-1-1997 (Ref. 9). The fan or blower used on the ESF atmosphere cleanup system should be capable of operating under the environmental conditions postulated, including radiation. Ductwork should be designed, constructed, and tested in accordance with the provisions of Section SA of ASME AG-1-1997 (Ref. 9).

5. MAINTAINABILITY CRITERIA

Provisions for maintaining ESF atmosphere cleanup systems should be incorporated in the system design in accordance with Section 4.8 of ASME N509-1989 (Ref. 7) and Section HA of ASME AG-1a-2000 (Ref. 22) as supplemented by the following:

5.1. Accessibility of components for maintenance should be considered in the design of ESF atmosphere cleanup systems in accordance with Section 2.3.8 of ERDA 76-21 (Ref. 13) and Section HA of ASME AG-1a-2000 (Ref. 22). For ease of maintenance, the system design should

provide for a minimum of 3 feet from mounting frame to mounting frame between banks of components. If components are to be replaced, the dimension to be provided should be the maximum length of the component plus a minimum of 3 feet. The system design should provide for permanent test probes or ports with external connections in accordance with the provisions of Section HA of ASME AG-1a-2000 (Ref. 22).

5.2. The cleanup components (i.e., HEPA filters, prefilters, and adsorbers) should not be installed while active construction of the ventilation systems is still in progress.

6. IN-PLACE TESTING CRITERIA

Initial in-place acceptance testing of ESF atmosphere cleanup systems and components should be performed in accordance with Section TA of ASME AG-1-1997 (Ref. 9). Periodic, in-place testing of ESF atmosphere cleanup systems and components should be performed in accordance with ASME N510-1989 (Ref. 8) as modified and supplemented by the following:

6.1. Each ESF atmosphere cleanup train should be operated at least 10 continuous hours per month, with the emergency heaters on (if so equipped), in order to reduce potential or accumulated buildup of moisture on the adsorbers and HEPA filters. Systems without emergency heaters may operate the ESF atmosphere cleanup train for 15 minutes per month to ensure system functionality.

6.2. A visual inspection of the ESF atmosphere cleanup system and all associated components should be made before each in-place airflow distribution test, aerosol leak test, or activated carbon adsorber section leak test in accordance with the provisions of Section 5 of ASME N510-1989 (Ref. 8).

6.3. In-place aerosol leak test for HEPA filters of ESF atmosphere cleanup systems should be performed (1) initially, (2) at least once per 24 months or once per refueling outage, whichever comes first, (3) after each partial or complete replacement of a HEPA filter bank, (4) following detection of, or evidence of, penetration or intrusion of water or other foreign material into any portion of an ESF atmosphere cleanup system,[6] and (5) following painting, fire, or chemical release in any ventilation zone communicating with the system.[7] The test should be performed in accordance with Section 10 of ASME N510-1989 (Ref. 8). The leak test should confirm a combined penetration and leakage (or bypass)[8] of the ESF atmosphere cleanup system

[6] In 1998, the Department of Energy (DOE) presented the results of its HEPA filter deterioration research at the 25th DOE/NRC Nuclear Air Cleaning and Treatment Conference (Ref. 23). The results of this research demonstrated that wetting of the filter medium significantly reduces its tensile strength which is not fully recovered after drying. In addition, further water exposures resulted in additional losses in filter media tensile strength. (See NRC Information Notice 99-01, Reference 24.)

[7] Painting, fire, or chemical release is "not communicating" with the HEPA filter or adsorber only if the ESF atmosphere cleanup system is not in operation and the isolation dampers for the system are closed and leak-tight, thereby preventing air from passing through the filters and adsorbers. A program should be developed and consistently applied that defines the terms "painting," "fire," and "chemical release" in terms of the potential for degrading the HEPA filters and adsorbers. This program should be based on a well documented, sound and conservative technical basis (i.e., the criteria should overestimate the potential damage to the filters and adsorbers).

[8] In Section FD-1130 of ASME AG-1-1997 (Ref. 9), penetration is defined as the exit concentration of a given gas from an air cleaning device, expressed as a percentage of inlet concentration. In Section 3 of ASME N509-1989 (Ref. 7), bypass is defined as a pathway through which contaminated air can escape treatment by the installed HEPA or adsorber banks. Examples are leaks in filters and filter mounting frames, defective or inefficient isolation dampers that result in uncontrolled flow through adjacent plenums, and unsealed penetrations for electrical conduits, pipes, floor drains, etc.

of less than 0.05% of the challenge aerosol at rated flow ±10%. To be credited with a 99% removal efficiency for particulate matter in accident dose evaluations, a HEPA filter bank in an ESF atmosphere cleanup system must demonstrate an aerosol leak test result of less than 0.05% of the challenge aerosol at rated flow ±10%.

HEPA filter sections in ESF atmosphere cleanup systems that fail to satisfy the appropriate leak-test conditions should be examined to determine the location and cause of leaks. Repairs, such as alignment of filter frames and tightening of filter hold-down bolts, may be made; however, repair of defective, damaged, or torn filter media by patching or using caulking materials is not permissible in ESF atmosphere cleanup systems; such filters should be replaced and not repaired. HEPA filters that fail to satisfy test conditions should be replaced with filters qualified pursuant to Regulatory Position 4.4 of this guide. After repairs or filter replacement, the ESF atmosphere cleanup system should be retested as described above in this Regulatory Position. The above process should be repeated as necessary until combined penetration and leakage (bypass) of the system is less than the acceptance criteria described above in this Regulatory Position.

In accordance with ASME N510-1989 (Ref. 8) and Article TA-1000 of ASME AG-1-1997 (Ref. 9), the standard challenge aerosol used in the in-place leak testing of HEPA filters is polydisperse droplets of dioctyl phthalate (DOP), also known as di-2-ethylhexyl-phthalate (DEHP). The 0.3 micrometer monodisperse DOP aerosol is used for efficiency testing of individual HEPA filters by manufacturers and Filter Test stations. Alternative challenges[9] may be used to perform in-place leak-testing of HEPA filters when their selection is based on the following.

(a) The challenge aerosol has the approximate light scattering droplet size specified in Article TA-1130 of ASME AG-1-1997 (Ref. 9).
(b) The challenge aerosol has the same in-place leak test results as DOP.
(c) The challenge aerosol has a similar lower detection limit, sensitivity, and precision as DOP.
(d) The challenge aerosol causes no degradation of the HEPA filter or the other ESF air cleaning system components under test conditions.
(e) The challenge aerosol is listed in the Environmental Protection Agency's “Toxic Substance Control Act” (TSCA) (Ref. 26) inventory for commercial use.

6.4. In-place adsorber leak testing should be conducted (1) initially, (2) at least once per 24 months or once each refueling outage, whichever comes first, (3) following removal of an adsorber sample for laboratory testing if the integrity of the adsorber section is affected, (4) after each partial or complete replacement of carbon adsorber in an adsorber section, (5) following detection of, or evidence of, penetration or intrusion of water or other foreign material into any portion of an ESF atmosphere cleanup system, and (6) following painting, fire, or chemical release in any ventilation zone communicating with the system.[7] The test should be performed in accordance with Section 11 of ASME N510-1989 (Ref. 8). The leak test should confirm a combined penetration and leakage (or bypass)[8] of the adsorber section of 0.05% or less of the challenge gas at rated flow ±10%.

Adsorber sections that fail to satisfy the appropriate leak-test conditions should be examined to determine the location and cause of leaks. Repairs, such as alignment of adsorber cells, tightening of adsorber cell holddown bolts, or tightening of test canister fixtures, may be made; however, the use of temporary patching material on adsorbers, filters, housings, mounting frames, or ducts should not be allowed. After repairs or adjustments have been made, the

[9]Care must be taken to ensure that the aerosol generator is compatible with the selected alternative challenge aerosol (see NRC Information Notice 99-34 (Ref. 25)).

adsorber sections should be retested as described above in this Regulatory Position. The above process should be repeated as necessary until the combined penetration and leakage (bypass) of the adsorber section is less than the acceptance criteria described above in this Regulatory Position.

In accordance with ASME N510-1989 (Ref. 8) and Section TA of ASME AG-1-1997 (Ref. 9), the standard challenge gas used in the in-place leak testing of adsorbers is Refrigerant-11 (trichloromonofluoromethane). Alternative challenge gases may be used to perform in-place leak testing of adsorbers, when their selection is based on meeting the characteristics specified in Appendix TA-C of ASME AG-1-1997 (Ref. 9).

6.5. If any welding repairs are necessary on, within, or adjacent to the ducts, housing, or mounting frames, the HEPA filters and adsorbers should be removed from the housing prior to performing such repairs. The repairs should be completed prior to re-installation of filters and adsorbers; the system should then be visually inspected and leak tested as in Regulatory Positions 6.2, 6.3, and 6.4.

7. LABORATORY TESTING CRITERIA FOR ACTIVATED CARBON

Laboratory testing of samples of activated carbon adsorber material from ESF atmosphere cleanup systems should be performed in accordance with Section 15 of ASME N510-1989 (Ref. 8), ASTM D3803-1989 (Ref. 10), and Table 1 of this guide as supplemented by the following:

7.1. Representative[10] samples of activated carbon adsorbent should be collected at the time of installation or replacement of adsorber material and submitted for analysis. Test results will provide a base or reference for subsequent sampling and analysis to show the variation of adsorbent condition with time in accordance to Appendix A of N509-1989 (Ref. 7).

7.2. Sampling and analysis should be performed (1) after each 720 hours of system operation, (2) at least once per 24 months or once per refueling outage, whichever comes first, for systems maintained in a standby status, (3) following painting, fire, or chemical release in any ventilation zone communicating with the system,[7] and (4) following detection of, or evidence of, penetration or intrusion of water or other foreign material into any portion of an ESF atmosphere cleanup system.

7.3. For accident dose evaluation purposes, the activated carbon adsorber section of an ESF atmosphere cleanup system should be assigned the appropriate decontamination efficiency given in Table 1 for elemental iodine and organic iodides if the following conditions are met:

1. The adsorber section meets the leak-test conditions given in Regulatory Position 6.4 of this guide.
2. New activated carbon meets the performance and physical property specifications given in Regulatory Position 4.11 of this guide, and
3. Representative samples of new or used activated carbon pass the applicable laboratory tests specified in Table 1 of this guide.

If the new activated carbon fails to meet any of the above conditions, it should not be used in adsorbers in ESF atmosphere cleanup systems.

[10]For the definition of "representative sample" and a description of sampling methods, see Appendix A of ASME N509-1989 (Ref. 7).

7.4. The activated carbon adsorber section should be replaced with new unused activated carbon meeting the performance and physical property specifications of Regulatory Position 4.11 of this guide if (1) testing in accordance with Regulatory Positions 7.1 and 7.2 results in a representative sample failing to pass the applicable test in Table 1 of this guide or if (2) no representative sample is available for testing.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

This proposed revision has been released to encourage public participation in its development. Except in those cases in which an applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the guidance to be described in the active guide reflecting public comments will be used by the NRC staff in its evaluation of the design, inspection, and testing of post-accident ESF atmosphere cleanup systems for the following light-water-cooled nuclear power plants:

1. Plants for which the construction permit application is docketed after the issue date of the final guide;

2. Plants for which the operating license application is docketed 6 months after the issue date of the final guide;

3. Plants for which the licensee voluntarily commits to the provisions of the final guide.

TABLE 1: Laboratory tests and assigned decontamination efficiencies for used activated carbon samples for ESF atmosphere cleanup system units. Laboratory tests are conducted in accordance with ASTM D3803-1989 (Ref. 10). Tests are conducted at a temperature of 30°C and relative humidity of 95%, except a relative humidity of 70% is used when the air entering the carbon adsorber is maintained at less than or equal to 70% relative humidity.

Activated Carbon[a] Total Bed Depth[b]	Maximum Assigned Credit for Activated Carbon Decontamination Efficiencies		Methyl Iodide Penetration Acceptance Criterion for Representative Sample[c]
2 inches	Elemental iodine	95%	Penetration ≤2.5% when tested in accordance with ASTM D-3803-1989.
	Organic iodide	95%	
4 inches or greater	Elemental iodine	99%	Penetration ≤0.5% when tested in accordance with ASTM D-3803-1989.
	Organic iodide	99%	

NOTES:
(1) Credited decontamination efficiencies (a portion of which includes bypass leakage) are based on 0.25 second residence time per 2-inch bed depth.

(2) Organic iodide and elemental iodine are the forms of iodine that will be released during a design basis radiological accident that charcoal filters are designed to absorb. Organic iodide is more difficult for charcoal to adsorb than elemental iodine. Therefore, the laboratory test to determine the performance of the charcoal adsorber is based on organic iodide. Methyl iodide is the organic form of iodine that is used in the laboratory test.

[a]The activated carbon, when new, should meet the specifications of Regulatory Position 4.11 of this guide.

[b]Multiple beds, e.g., two 2-inch beds in series, should be treated as a single bed of aggregate depth.

[c]See Apppendix A to ASME N509-1989 (Ref. 7) for the definition of a representative sample. Testing should be performed at the frequencies specified in Regulatory Position 7.2 of this guide. Testing should be performed in accordance with ASTM D3803-1989 at a temperature of 30°C and a relative humidity of 95% (or 70% with humidity control). Per the following equation from NRC Generic Letter 99-02 (Ref. 27), a safety factor of at least 2 should be applied when determining the appropriate methyl iodide penetration acceptance criterion in the Technical Specifications for the representative sample.

$$\textit{Allowable Penetration} = \frac{[100\% - \textit{Organic Iodide Efficiency for Charcoal Credited In Licensee's Accident Analysis}]}{\textit{Safety Factor}}$$

Humidity control can be provided by emergency heaters or an analysis that demonstrates that the air entering the charcoal will be maintained less than or equal to 70% RH under design-basis conditions (e.g., worst-case relative humidity of system inlet air, maximum system design flow rate, normal and off-normal supply voltages).

FIGURE 1 Sample Control Room ESF Atmosphere Cleanup System[a]

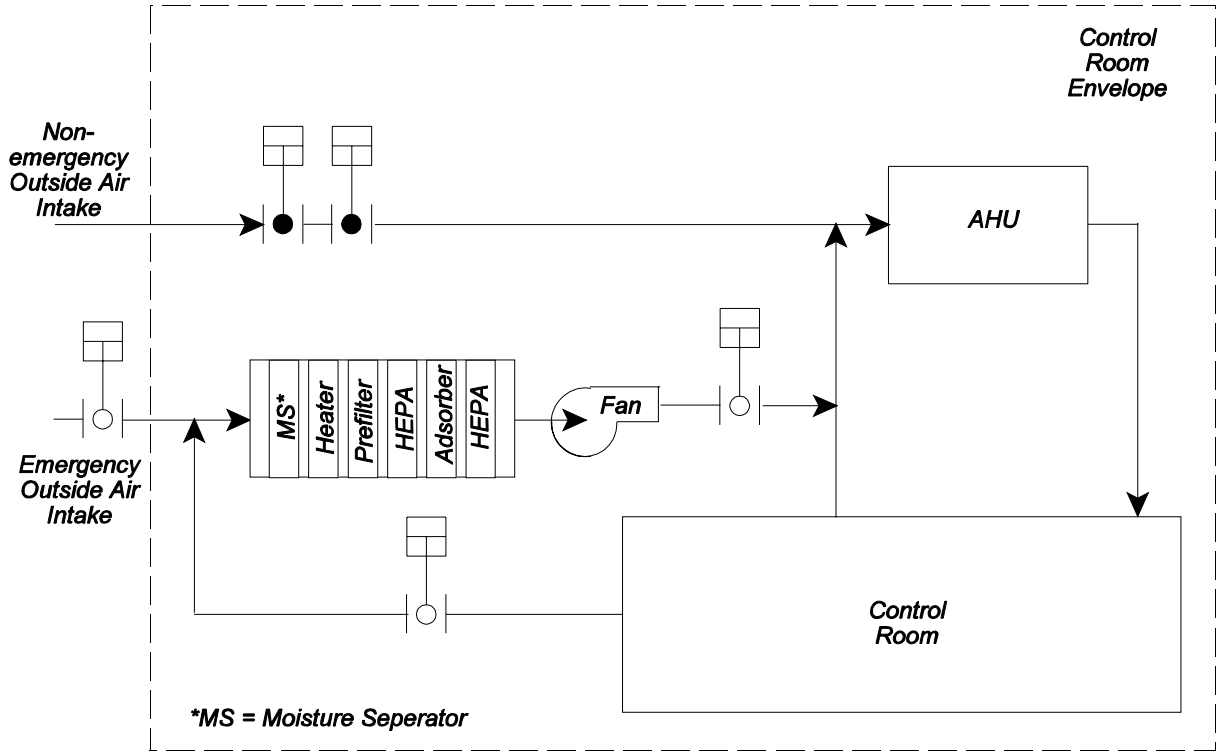
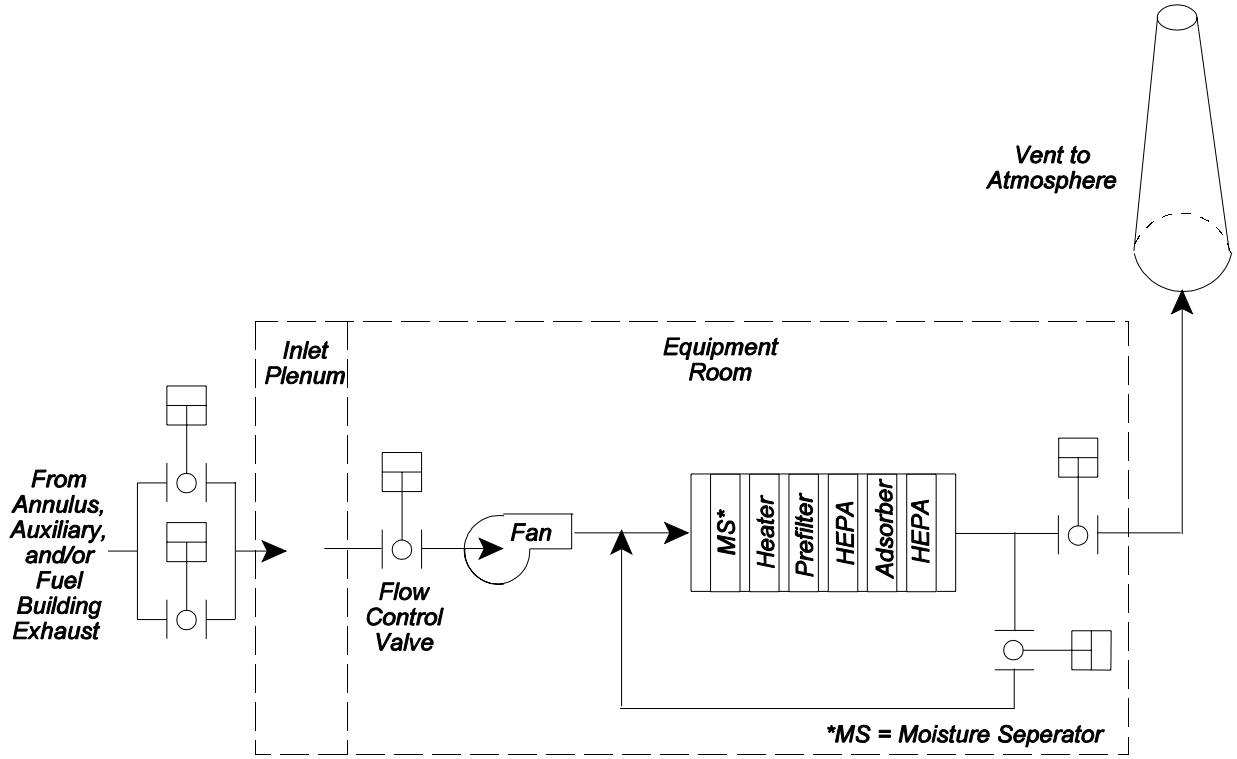


FIGURE 2 Sample Shield, Annulus, and/or Fuel Building ESF Atmosphere Cleanup System[a]



[a] Other acceptable configurations exist; these figures are only provided for conceptual purposes.

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8. American Society of Mechanical Engineers, "Testing of Nuclear Air-Treatment Systems," ASME N510-1989. Reaffirmed 1995.

9. American Society of Mechanical Engineers, "Code on Nuclear Air and Gas Treatment," ASME/ANSI AG-1-1997.

10. American Society for Testing and Materials, "Standard Test Methods for Nuclear-Grade Activated Carbon," ASTM Standard D3803-1989. Reapproved 1995.

11. American Society for Testing and Materials, "Impregnated Activated Carbon Used To Remove Gaseous Radioiodines from Gas Streams," ASTM D4069-95. Reapproved 1998.

[1] Single copies of regulatory guides, both active and draft, and draft NUREG documents may be obtained free of charge by writing the Reproduction and Distribution Services Section, OCIO, USNRC, Washington, DC 20555-0001, or by fax to (301)415-2289, or by email to <DISTRIBUTION@NRC.GOV>. Active guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161; telephone (703)487-4650; online <http://www.ntis.gov/ordernow>. Copies of active and draft guides are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike, Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)4154737 or (800)397-4209; fax (202)634-3343; email <PDR@NRC.GOV>.

[2] Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402-9328 (telephone (202)512-1800); or from the National Technical Information Service at 5285 Port Royal Road, Springfield, VA 22161; telephone (703)487-4650; <http://www.ntis.gov/ordernow>. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike, Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; email is PDR@NRC.GOV.

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22. American Society of Mechanical Engineers, "Code on Nuclear Air and Gas Treatment," Section HA, “Housings,” ASME AG-1a-2000.[3]

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24. NRC Information Notice 99-01, “Deterioration of High-Efficiency Particulate Air Filters in a Pressurized Water Reactor Containment Fan Cooler Unit,” January 20, 1999.[4]

25. NRC Information Notice 99-34, “Potential Fire Hazards in the Use of Polyalphaolefin in Testing of Air Filters,” December 28, 1999.[4]

[3] ASME expects to publish this Addendum, AG-1a-2000, in the near future. A prepublication copy may be obtained from ASME by email to <infocentral@asme.org> .

26. Environmental Protection Agency's "Toxic Substance Control Act" (TSCA), Inventory for Commercial Use.[2]

27. NRC Generic Letter 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal," June 3, 1999.[4]

[4] Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; e-mail <PDR@NRC.GOV>.

VALUE/IMPACT STATEMENT

1. PROPOSED ACTION

1.1 Description

Revision 2 of Regulatory Guide 1.52, issued in March 1978, provides guidance to applicants and licensees on design, inspection, and testing for post-accident engineered-safety-feature (ESF) atmosphere cleanup systems for light-water-cooled nuclear power plants. This proposed action is to develop and issue Revision 3 to Regulatory Guide 1.52, first as a proposed revision for public comment and then in final form.

1.2 Need

Revision 2 of Regulatory Guide 1.52 is the basic document used in commercial nuclear power plant technical specifications for the testing of ESF post-accident air-cleaning systems. However, Revision 2 (issued in March 1978) is considered to be significantly outdated and in error in many significant technical areas. Extensive revisions are needed to incorporate the guidance for testing charcoal issued in Generic Letter (GL) 99-02, "Laboratory Testing of Nuclear-Grade Activated Charcoal." Revision 3 would update guidance on design, inspection, and testing of ESF post-accident air-cleaning systems to be consistent with present policies, recent standards revisions in ASME AG-1 and ASME N510, and the recommendations in GL 99-02.

1.3 Value/Impact

1.3.1 NRC

The primary effect of the proposed action on the NRC staff would be to facilitate implementation of current NRC positions with regard to ESF filter system design, testing, and inspection. It would improve the basis for communication between NRC staff and licensees and would reduce staff effort that might otherwise be spent answering questions about acceptable means for testing ESF filter systems.

1.3.2 Other Government Agencies

The principal effect on other government agencies would be to inform them of NRC's policies on ESF filter system testing and inspection.

1.3.3 Industry

The guide would be useful to industry because it would notify them in a consistent manner of changes in ESF filter system testing and inspection provisions and would thus promote understanding of current NRC positions and prevent any unnecessary costs being applied to meet a provision no longer recommended by the NRC staff. None of the changes is expected to impose significant additional burdens on applicants or licensees. Some of the changes may relax certain guide positions but without compromise to safety, thereby reducing cost and effort. There would be no costs associated with the revised positions related to testing and inspection of new and used charcoal because the revised positions are in accordance with GL 99-02. Also, the adoption of this regulatory guide is voluntary.

1.34 Public

The proposed action would increase public confidence and enhance the protection of the public health and safety by providing that post-accident ESF filter systems would be tested and inspected in accordance with up-to-date technical information, NRC positions, and NRC generic communications.

2. TECHNICAL APPROACH

Major technical questions related to ESF filter system design, inspection, and testing were considered in developing the previous revision of Regulatory Guide 1.52. Revision 3 would address adoption of the recommendations in GL 99-02; endorsement of ASME AG-1-1997, "Code on Nuclear Air and Gas Treatment," and ASME N510-1989, "Testing of Nuclear Air-Treatment Systems"; use of alternatives to DOP and Refrigerant-11 for in-place leak testing of HEPA filters and adsorbers; updated testing of new charcoal; and 24-month surveillance frequencies; as well as providing clarifications.

3. PROCEDURAL APPROACH

3.1 Procedural Alternatives

NRC procedures that may be used for making this information available include the following:

* Regulation
* NUREG-series report
* Branch position paper
* Regulatory guide

A regulation is not suitable for incorporating the degree of detail presented in this guide. As regulatory positions are stated, it would be inappropriate to publish this material as a NUREG-series report. Branch technical positions (BTP) are sometimes prepared for specific guidance, however, it would be most appropriate to update Regulatory Guide 1.52 and prepare clear regulatory guidance for licensees and applicants in a generic format.

3.2 Decision on Procedural Approach

A revision to the regulatory guide should be prepared.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

Authority for the proposed action is derived from the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended, and implemented through the Commission's regulations.

4.2 Need for NEPA Assessment

Issuance or amendment of guides for the implementation of regulations in Title 10, Chapter I, of the Code of Federal Regulations is a categorical exclusion under paragraph 51.22(c)(16) of 10 CFR Part 51. Thus, an environmental impact statement or assessment is not required for this action.

5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

This guide was developed in support of General Design Criteria 41, 42, 43, and 61 of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. These criteria require that containment atmosphere cleanup systems be provided as necessary, be designed to permit appropriate periodic inspection and testing, and be designed to reduce the amount of radioactive material released to the environment following a postulated design basis accident.

6. CONCLUSIONS

Revision 3 of Regulatory Guide 1.52 should be issued to update the current staff positions and to inform its users of the current staff positions.