U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

9.4.5 ENGINEERED SAFETY FEATURE VENTILATION SYSTEM

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of ventilation and air filtration

I. AREAS OF REVIEW

The function of the engineered safety feature ventilation system (ESFVS) is to provide a suitable and controlled environment for engineered safety feature components following certain anticipated transients and design-basis accidents.

The organization responsible for the review of ventilation and air filtration reviews the ESFVS from the air intake to the point of discharge to the atmosphere to ensure compliance with the requirements of General Design Criteria (GDCs) 2, 4, 5, 17, and 60 and 10 CFR 50.63. The review includes such components as air intakes, ducts, air-conditioning units, flow control devices, isolation dampers, exhaust vents, and exhaust fans.

The review of the ESFVS covers all ventilation systems utilized to maintain a controlled environment in areas containing safety-related equipment, including the service water pump house, diesel generator area, emergency core cooling system pump rooms, component cooling water pump room, auxiliary feedwater pump area, and other areas containing equipment essential for the safe shutdown of the reactor or necessary to prevent or mitigate the consequences of an accident.

The specific areas of review are as follow:

USNRC STANDARD REVIEW PLAN

This Standard Review Plan, NUREG-0800, has been prepared to establish criteria that the U.S. Nuclear Regulatory Commission staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The standard review plan sections are numbered in accordance with corresponding sections in the Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of the standard format have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) will be based on Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," until the SRP itself is updated.

These documents are made available to the public as part of the NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-0800 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments may be submitted electronically by email to NRR_SRP@nrc.gov.

Requests for single copies of draft or active SRP sections (which may be reproduced) should be made to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Reproduction and Distribution Services Section, or by fax to (301) 415-2289; or by email to DISTRIBUTION@nrc.gov. Electronic copies of this section are available through the NRC's public Web site at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0800/, or in the NRC's Agencywide Documents Access and Management System (ADAMS), at http://www.nrc.gov/reading-rm/adams.html, under Accession # MLxxxxxxxxx.

1. ESFVS review determines the safety significance of the various portions and subsystems. Based on this determination, the safety-related portions of the system are reviewed with respect to functional performance requirements associated with engineered safety feature areas during normal operation, during adverse environmental occurrences, and during and subsequent to postulated accidents, including the loss of offsite power. Safety-related portions of the system are reviewed to ensure that:

   A. A single active failure cannot result in loss of the system functional performance capabilities and

   B. Failures of nonseismic Category I equipment or components will not result in damage to essential portions of the ESFVS.

2. Safety-related portions of the ESFVS are also reviewed with respect to the following:

   A. The ability of the heating and cooling systems to maintain a suitable ambient temperature range in the areas serviced, assuming proper performance of equipment contained in these areas;

   B. Provisions to detect the need for isolation and to isolate portions of the system in the event of failures or malfunctions;

   C. The ability of the safety features equipment in the areas being serviced by the ventilation system to function under the worst anticipated degraded ESFVS system performance;

   D. The capability of the system to circulate sufficient air to prevent accumulation of flammable or explosive gas or fuel-vapor mixtures from components such as storage batteries and stored fuel;

   E. The capability of the system to automatically actuate components not operating during normal conditions or to actuate standby components (redundant equipment) in the event of a failure or malfunction as needed; and

   F. The capability of the system to control airborne particulate material accumulation.

3. The ESFVS is also reviewed to ensure that suitable environmental conditions are maintained in areas containing equipment required to function for a station blackout. This review includes verification that failure of nonrequired equipment will not preclude operation of required equipment when preferred and onsite emergency AC power is lost.

4. Inspection, Test, Analysis, and Acceptance Criteria (ITAAC). For design certification (DC) and combined license (COL) reviews, the applicant's proposed information on the ITAAC associated with the systems, structures, and components (SSCs) related to this SRP section is reviewed in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria - Design Certification." The staff recognizes that the review of ITAAC is performed after review of the rest of this portion of the application against acceptance criteria contained in this SRP section. Furthermore, the ITAAC are

reviewed to assure that all SSCs in this area of review are identified and addressed as appropriate in accordance with SRP Section 14.3.

5. COL Action Items and Certification Requirements and Restrictions. COL action items may be identified in the NRC staff's final safety evaluation report (FSER) for each certified design to identify information that COL applicants must address in the application. Additionally, DCs contain requirements and restrictions (e.g., interface requirements) that COL applicants must address in the application. For COL applications referencing a DC, the review performed under this SRP section includes information provided in response to COL action items and certification requirements and restrictions pertaining to this SRP section, as identified in the FSER for the referenced certified design.

Review Interfaces

The listed SRP sections interface with this section as follows:

1. Sections 3.2.1 and 3.2.2: determination of the acceptability of the seismic and quality group classifications for system components.

2. Sections 3.3.1, 3.3.2, 3.5.3, 3.7.1 through 3.7.4, 3.8.4, and 3.8.5: determination of the acceptability of the design analyses, procedures, and criteria establishing the ability of seismic Category I structures housing the system and supporting systems to withstand the effects of natural phenomena such as the safe shutdown earthquake, the probable maximum flood, and tornado missiles.

3. Section 3.4.1: flood protection.

4. Section 3.5.1.1: protection against internally-generated missiles.

5. Section 3.5.2: SSCs to be protected against externally-generated missiles.

6. Section 3.6.1: high-energy and moderate-energy pipe breaks.

7. Sections 3.9.1 through 3.9.3: determination whether components, piping, and structures are designed in accordance with applicable codes and standards.

8. Section 3.9.6: review of the adequacy of the inservice testing program of pumps and valves.

9. Section 6.5.1: effectiveness of ESFVS filters in removing airborne contaminants before discharge to the environment.

10. Section 6.6: verification whether inservice inspection requirements are met for system components.

11. Chapters 7 and 8: determination of the adequacy of the design, environmental ratings, installation, inspection, and testing of instrumentation and electrical components, equipment, and systems (sensing, control, and power).

12. Section 8.4: overall review of compliance with station blackout requirements.

13. Section 9.5.1: fire protection.

14. Section 9.5.8: acceptability of the combustion air supply portions of systems where combustion air for diesel generators is supplied from the ESFVS.

15. Section 11.3: functional performance ensuring that the system meets acceptable limits for radioactive releases during normal operations.

16. Chapter 16: review of proposed technical specifications.

17. Chapter 17: review of quality assurance programs.

18. Inspection, Test, Analysis, and Acceptance Criteria (ITAAC). For design certification (DC) and combined license (COL) reviews, the applicant's proposed information on the ITAAC associated with the systems, structures, and components (SSCs) related to this SRP section is reviewed in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria - Design Certification." The staff recognizes that the review of ITAAC is performed after review of the rest of this portion of the application against acceptance criteria contained in this SRP section. Furthermore, the ITAAC are reviewed to assure that all SSCs in this area of review are identified and addressed as appropriate in accordance with SRP Section 14.3.

19. COL Action Items and Certification Requirements and Restrictions. COL action items may be identified in the NRC staff's final safety evaluation report (FSER) for each certified design to identify information that COL applicants must address in the application. Additionally, DCs contain requirements and restrictions (e.g., interface requirements) that COL applicants must address in the application. For COL applications referencing a DC, the review performed under this SRP section includes information provided in response to COL action items and certification requirements and restrictions pertaining to this SRP section, as identified in the FSER for the referenced certified design.

The specific acceptance criteria and review procedures are contained in the referenced SRP sections.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. GDC 2 as related to the system being capable of withstanding the effects of earthquakes.

2. GDC 4 with respect to the ESFVS being appropriately protected against dynamic effects and being designed to accommodate the effects of and to be compatible with the

environmental conditions associated with normal operation, maintenance, testing, and postulated accidents. The evaluation with respect to GDC 4 also includes evaluation of the adequacy of environmental support provided to structures, systems, and components important to safety located within areas served by the ESFVS.

3. GDC 5 as related to shared systems and components important to safety.

4. GDC 17 as related to ensuring proper functioning of the essential electric power system.

5. GDC 60 as related to the system being capable to suitably control release of gaseous radioactive effluents to the environment.

6. 10 CFR 50.63 as related to necessary support systems providing sufficient capacity and capability for coping with a station blackout event. An analysis to determine capability for withstanding (if an acceptable alternate ac source is provided) or coping with a station blackout event is required. The analysis should address, as appropriate, the potential failures of equipment/systems during the event (e.g., loss of or degraded operability of HVAC systems, including the ESFVS, as appropriate), the expected environmental conditions associated with the event, the operability and reliability of equipment necessary to cope with the event under the expected environmental conditions, and the habitability of plant areas requiring operator access during the event and associated recovery period.

7. 10 CFR 52.47(b)(1), as it relates to ITAAC (for design certification) sufficient to assure that the SSCs in this area of review will operate in accordance with the certification.

8. 10 CFR 52.80(a)(1), as it relates to ITAAC (for combined licenses) sufficient to assure that the SSCs in this area of review have been constructed and will be operated in conformity with the license and the Commission's regulations.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for review described in Subsection I of this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

The design of safety-related portions of the ESFVS is acceptable if the integrated design of the systems is in accordance with the following criteria:

1. For GDC 2, acceptance is based on the guidance of RG 1.29, Position C.1, for safety-related portions and Position C.2 for nonsafety-related portions.

2. For GDC 4, acceptance is based on meeting the acceptance criteria in the following SRP sections, as they apply to the ESFVS: SRP Sections 3.5.1.1, 3.5.1.4, 3.5.2, and SRP Section 3.6.1.

3. For GDC 5, acceptance is based on the determination that the use of the ESFVS in multiple-unit plants during an accident in one unit does not significantly affect the capability to conduct a safe and orderly shutdown and cool-down in the remaining unit(s).

4. For GDC 17, acceptance is based on the guidance of item 2 under Subsection A and item 1 under Subsection C of the NUREG-CR/0660 section "Recommendations" for protection of essential electrical components from failure due to the accumulation of dust and particulate materials.

5. For GDC 60, acceptance is based on the guidance of RGs 1.52 and 1.140 as related to design, inspection, testing, and maintenance criteria for post-accident and normal atmosphere cleanup systems, ventilation exhaust systems, air filtration, and adsorption units of light-water-cooled nuclear power plants. For RG 1.52 rev 2, the applicable regulatory position is C.2. For RG 1.52 rev 3, the applicable regulatory position is C.3. For RG 1.140 rev 1, the applicable regulatory positions are C.1 and C.2. For RG 1.140 rev 2, the applicable regulatory positions are C.2 and C.3.

6. For 10 CFR 50.63, acceptance is based on the applicable guidance of RG 1.155, including Position C.3.2.4.

Technical Rationale

The technical rationale for application of these requirements and/or SRP acceptance criteria to the areas of review addressed by this SRP section is discussed in the following paragraphs:

1. Compliance with GDC 2, as related to the system being capable of withstanding the effects of earthquakes, requires that structures, systems, and components important to safety be designed to withstand the effects of a design basis earthquake without loss of capability to perform their safety functions.

   The function of the ESFVS is to provide a suitable and controlled operating environment for engineered safety feature components during normal operation, during adverse environmental occurrences, and during and subsequent to postulated accidents, including loss of offsite power. GDC 2 ensures that engineered safety features will remain functional during and after a design basis earthquake.

   Meeting this requirement provides assurance that engineered safety features will operate as designed, thus providing protection against loss of core cooling and/or loss of containment integrity.

2. Compliance with GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and be compatible with, environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be protected against dynamic effects (e.g., those of missiles, pipe whipping, and discharging fluids) that may result from equipment failure and from events and conditions outside the nuclear power unit.

The function of the ESFVS is to provide a suitable and controlled operating environment for engineered safety feature components during normal operation, during adverse environmental occurrences, and during and subsequent to postulated accidents, including loss of offsite power. This requirement is imposed to ensure that engineered safety features function through the course of operating and accident events. In addition, the ESFVS design must withstand dynamic effects associated with postulated accidents.

Meeting these requirements provides assurance that engineered safety features will not fail to operate as designed, thus providing protection against loss of core cooling and/or containment integrity.

3. Compliance with GDC 5 requires that structures, systems, and components important to safety shall not be shared between nuclear power units unless it can be shown that such sharing will not significantly impair the ability of each unit to perform its safety function. In the event of an accident in one unit, the remaining units must be able to implement an orderly shutdown and cooldown.

   With regard to the ESFVS, the plant design should provide for essential independence of its components, ensuring that an accident in one part of a multiple-unit facility will not propagate to unaffected units. Therefore, the ESFVS for each unit should be designed to accommodate accident conditions. At the same time, the operating environment of equipment associated with unaffected units must be maintained within specified limits.

   Meeting these requirements provides assurance that a failure will not affect additional units of a multiple-unit facility.

4. Compliance with GDC 17 requires that onsite and offsite electrical power be provided to permit functioning of structures, systems, and components important to safety. Each electric power system must provide sufficient capacity to ensure that specified fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences. In addition, core cooling, containment integrity, and other vital functions must be maintained in the event of postulated accidents.

   With regard to the ESFVS, the plant design should ensure that electrical contacts and relays in diesel generator rooms are protected from dust, dirt, and grit. For example, contacts and relays must be enclosed in dust-tight cabinets with fully gasketed openings and ventilation louvers must be equipped with filters. In addition, air used for ventilation should be filtered and should be taken from a height of at least 7 meters (20 feet) above ground level.

   Meeting these requirements provides assurance that a reliable electric power supply will be available for all facility operating modes, including anticipated operational occurrences and postulated accidents.

5. Compliance with GDC 60 requires that provisions be included in the nuclear power unit design to control the release of radioactive materials in gaseous effluents during normal reactor operation, including anticipated operational occurrences.

RGs 1.140 and 1.52 present methods acceptable to the Commission staff with regard to design, testing, and maintenance criteria for air filtration and adsorption units of normal ventilation exhaust systems and of engineered safety feature atmosphere cleanup systems used in light-water-cooled nuclear power plants. Atmosphere cleanup systems are included in the design to reduce the quantities of radioactive materials in gaseous effluents released to the environment.

Meeting these requirements provides assurance that release of radioactive materials entrained in gaseous effluents will not exceed the limits specified in 10 CFR Part 20 for normal operation and anticipated operational occurrences.

6. Compliance with 10 CFR 50.63 requires a demonstration that the plant has the capability to withstand and recover from a station blackout (i.e., loss of offsite electric power system concurrent with reactor trip and unavailability of the onsite emergency ac electric power system). A station blackout analysis covering a minimum acceptable duration (either to "withstand" the event until an alternate ac source and shutdown systems are lined up for operation or to "cope" with it for its duration, including the associated recovery period) is required. RG 1.155 provides guidance for complying with station blackout requirements.

   Regardless of the extent to which the ESFVS is expected to function to maintain suitable environmental conditions during a station blackout event, equipment that is necessary to accomplish core cooling, maintenance of appropriate containment integrity, and other functions that constitute "withstanding" and/or "coping" during the event should be capable of functioning under the expected environmental conditions associated with the event. The station blackout analysis is therefore verified to appropriately address the potential failures of equipment/systems during the event (e.g., loss of or degraded operability of the ESFVS, as appropriate), the expected environmental conditions associated with the event, the operability and reliability of equipment necessary to cope with the event under the expected environmental conditions, and the habitability of plant areas requiring operator access during the event and associated recovery period.

   Those portions of the ESFVS that are identified in a coping analysis as necessary to support the functioning of equipment required to cope with the event or recovery therefrom are verified to be of sufficient capacity and capability to provide such support.

   Meeting the requirements 10 CFR 50.63 provides assurance that necessary operator actions can be performed and that necessary equipment will be functional under the expected environmental conditions during and following a station blackout, thereby ensuring that the core will be cooled and appropriate containment integrity will be maintained.

III. REVIEW PROCEDURES

The reviewer will select and emphasize material from the procedures described below, as may be appropriate for a particular case.

For each area of review specified in subsection I of this SRP section, the review procedure is identified below. These review procedures are based on the identified SRP acceptance criteria. For deviations from these specific acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives to the SRP criteria provide an acceptable method of complying with the relevant NRC requirements identified in subsection II.

The procedures are used during construction permit review to determine that the design criteria and bases and the preliminary design as set forth in the preliminary SAR meet the acceptance criteria of subsection II of this SRP section. For the review of operating license, standard DC, or COL applications, the procedures are used to verify that the initial design criteria and bases are implemented appropriately in the final design as set forth in the final SAR.

The primary reviewer coordinates this review with other areas of review as stated in subsection I of this SRP section. The primary reviewer uses such inputs as required to ensure that this review procedure is complete.

As a result of various ESFVS designs proposed by applicants, there will be variations in system requirements. For purposes of this SRP section, a typical system is assumed which has fully redundant subsystems, each having an identical essential (safety features) portion.

1. The SAR is reviewed to verify that the system description and piping and instrumentation diagrams (P&IDs) show the ESFVS equipment used for normal operation, and the ambient temperature limits for the areas serviced. The system performance requirements are reviewed to determine that they limit allowable component operational degradation (e.g., loss of function, damper leakage) and describe the procedures that will be followed to detect and correct these conditions. The reviewer, using results from failure modes and effects analyses as appropriate, will determine that the safety-related portion of the system is capable of sustaining the failure of any active component..

2. The system P&IDs, layout drawings, and component descriptions and characteristics are reviewed to determine that:

    A. Essential portions of the ESFVS are correctly identified and are isolatable from nonessential portions of the system. The P&IDs are reviewed to verify that they clearly indicate the physical divisions between such portions and indicate design classification changes. System drawings are also reviewed to verify that they show the means for accomplishing isolation, and the system description is reviewed to identify minimum performance requirements for the isolation dampers. For the typical system, the drawings and description are reviewed to verify that two automatically operated isolation dampers in series separate nonessential from essential portions and components.

    B. Essential portions of the ESFVS, including the isolation dampers separating essential from nonessential portions, are classified seismic Category I. Component and system descriptions in the SAR that identify mechanical and performance characteristics are reviewed to verify that the above classifications have been included, and that the P&IDs indicate points of change in design classification.

C. Design provisions have been made that permit appropriate inservice inspection and functional testing of system components important to safety. It is acceptable if the SAR information delineates a testing and inspection program and if the system drawings show the necessary test recirculation loops around fans or isolation dampers that would be required by this program.

3. The reviewer verifies that the system has been designed so that system function will be maintained as required in the event of adverse environmental phenomena or loss of offsite power. The reviewer evaluates the system, using engineering judgment and the results of failure modes and effects analyses, to determine that:

A. The failure of nonessential portions of the system or of other nonseismic SSCs located close to essential portions of the system will not preclude operation of the essential portions of the ESFVS. Reference to SAR sections describing site features and the general arrangement and layout drawings will be necessary, as well as the SAR tabulation of seismic design classifications for structures and systems.

B. The essential portions of the ESFVS are protected from the effects of floods, hurricanes, tornadoes, and internally- and externally-generated missiles. Flood protection and missile protection criteria are evaluated in detail in SRP Chapter 3. The locations and designs of the system, structures, and fan rooms (cubicles) are reviewed to determine that the degree of protection provided is adequate. A statement to the effect that the system is located in a tornado-, missile-, and flood-protected seismic Category I structure or that system components will be located in individual cubicles or rooms that will withstand the effects of both flooding and missiles is acceptable.

C. The total system has the capability to detect and control leakage of airborne contamination from the system. The design is acceptable if it meets the following conditions:

(i) The P&IDs show the capability for isolating nonessential portions of the ESFVS by two automatically-actuated isolation dampers in series.

(ii) The ESFVS has provisions to actuate ventilation equipment in the engineered safety feature areas before ambient temperatures exceed design-rated temperatures of the components.

D. Essential components and subsystems can function as required in the event of a loss of offsite power. The system design will be acceptable if the ESFVS meets minimum system requirements as stated in the SAR, assuming failure of a single, active component within the system itself or in the auxiliary electric power source which supplies the system. The SAR is reviewed to verify that for each ESFVS component or subsystem affected by the loss of offsite power, the resulting system performance will not affect the capability of any engineered safety feature equipment. Statements in the SAR and results of failure modes and effects analyses are considered in verifying that the system meets these

requirements. This will be an acceptable verification of system functional reliability.

4. The descriptive information, P&IDs, ESFVS drawings, and failure modes and effects analyses in the SAR are reviewed to ensure that essential portions of the system can function following design basis accidents assuming a concurrent single active failure. The reviewer evaluates the analyses presented in the SAR to ensure function of required components, traces the availability of these components on system drawings, and checks that the SAR contains verification that minimum system isolation or filtration requirements are met for each accident situation for the required time spans. For each case, the design will be acceptable if minimum system requirements are met.

5. The ESFVS is reviewed to ensure that adequate means is provided in the system design for control of airborne particulate material (dust) accumulation. The system arrangement is reviewed to verify that a minimum of seven meters (20 feet) exists from the bottom of all fresh air intakes to grade elevation, or that electrical cabinets are provided with suitable seals or gaskets.

6. The reviewer verifies that a suitable environment is demonstrated to be maintained in areas served by the ESFVS for the duration of a station blackout event and the associated recovery period with or without credit for ESFVS operation, as applicable. Where applicable, the functionality of equipment necessary to cope with the event under the expected environmental conditions and the habitability of areas where operator actions are performed should be appropriately addressed during the review as described in Regulatory Guide 1.155, position C.3.2.4. Where portions of the ESFVS are credited to function for station blackout, the reviewer verifies that the ESFVS has been designed so that system functions will be performed as required in the event of a station blackout, that the ESFVS has sufficient capacity and capability to maintain a suitable environment for the duration of a station blackout event and the associated recovery period, and that failure of non-required portions of the ESFVS will not adversely affect the functioning of required equipment. As necessary, the reviewer interfaces with other reviewers as described in subsection I of this SRP section to evaluate the instrumentation and electrical provisions for ESFVS functionality in the event of a station blackout and also to ensure that appropriate instrumentation and electrical equipment environmental limits have been considered.

7. For reviews of DC and COL applications under 10 CFR Part 52, the reviewer should follow the above procedures to verify that the design set forth in the safety analysis report, and if applicable, site interface requirements meet the acceptance criteria. For DC applications, the reviewer should identify necessary COL action items. With respect to COL applications, the scope of the review is dependent on whether the COL applicant references a DC, an ESP, or other NRC-approved material, applications, and/or reports.

   After this review, SRP Section 14.3 should be followed for the review of Tier I information for the design, including the postulated site parameters, interface criteria, and ITAAC.

IV. EVALUATION FINDINGS

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report (SER). The reviewer also states the bases for those conclusions.

The ESFVS includes all components and ducting associated with the system from air intake to the point of discharge to the atmosphere. All portions of the system whose failure may result in release of radioactivity which causes an offsite dose of more than 5 mSv (0.5 rem) to the whole body or its equivalent to any part of the body are classified seismic Category I and safety related. Based on the review of the applicant's proposed design criteria, design bases, and safety classification for the engineered safety feature ventilation system, and the requirements for system performance to preclude equipment malfunction in the engineered safety feature areas due to a failure of the system during normal, abnormal, and accident conditions, the staff concludes that the design of the ESFVS and supporting systems is acceptable and meets NRC regulations as set forth in GDCs 2, 4, 5, 17, and 60 and 10 CFR 50.63. This conclusion is based on the following findings:

1. The applicant has met the requirements of GDC 2 with respect to the system being capable of withstanding the effects of earthquakes by meeting the guidelines of RG 1.29, "Seismic Design Classification," Position C.1, for safety-related portions of the system and Position C.2 for nonsafety-related portions.

2. The applicant has met the environmental requirements of GDC 4 by appropriately addressing adverse environmental conditions and dynamic effects in the design of the system to ensure its capability for maintaining environmental conditions in areas served by the system within the design limits of the equipment important to safety located in these areas for normal, transient, or accident conditions.

3. The applicant has met the requirements of GDC 5 with respect to capability of shared systems and components important to safety to perform required safety functions since no postulated single active failure will prevent the system from performing its safety function.

4. The applicant has met the requirements of GDC 17 as related to ensuring proper functioning of the essential electric power system by meeting the guidelines of NUREG-CR/0660 as related to the accumulation of dust and particulate materials.

5. The applicant has met the requirements of GDC 60, "Control of Releases of Radioactive Materials to the Environment," with respect to the capability of the system to suitably control release of gaseous radioactive effluents to the environment by meeting the guidelines of RGs 1.52 and 1.140 as related to design, inspection, testing, and maintenance criteria for post-accident and normal atmosphere cleanup systems, ventilation exhaust systems, air filtration, and adsorption units of light-water-cooled nuclear power plants. For RG 1.52 rev 2, the applicable regulatory position is C.2. For RG 1.52 rev 3, the applicable regulatory position is C.3. For RG 1.140 rev 1, the applicable regulatory positions are C.1 and C.2. For RG 1.140 rev 2, the applicable regulatory positions are C.2 and C.3.

6. The applicant has met the requirements of 10 CFR 50.63 by demonstrating that suitable environmental conditions to support operator access/egress and equipment functionality will be maintained during a station blackout event and its associated recovery period in those areas which contain equipment whose function is required for the safe shutdown of the plant in the event of a station blackout and by meeting the applicable guidance set forth in RG 1.155.

For DC and COL reviews, the findings will also summarize (to the extent that the review is not discussed in other SER sections) the staff's evaluation of the ITAAC, including design acceptance criteria, as applicable, and interface requirements and combined license action items relevant to this SRP section.

V. IMPLEMENTATION

The staff will use this SRP section in performing safety evaluations of DC applications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 10 CFR Part 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the method described herein to evaluate conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications docketed six months or more after the date of issuance of this SRP section, unless superceded by a later revision.

Implementation schedules for compliance with parts of the method addressed here are in the referenced RGs, NUREG, and in 10 CFR 50.63. Review Procedure 5 under subsection III of this SRP section is for the evaluation of applications docketed on or after July 1981.

VI. REFERENCES

1. 10 CFR 50.63, "Loss of All Alternating Current Power."

2. 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena."

3. 10 CFR Part 50, Appendix A, GDC 4, "Environmental and Dynamic Effects Design Bases."

4. 10 CFR Part 50, Appendix A, GDC 5, "Sharing of Structures, Systems, and Components."

5. 10 CFR Part 50, Appendix A, GDC 17, "Electric Power Systems."

6. 10 CFR Part 50, Appendix A, GDC 60, "Control of Releases of Radioactive Materials to the Environment."

7. RG 1.29, "Seismic Design Classification."

8. RG 1.52, "Design, Testing and Maintenance Criteria for Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

9. RG 1.140, "Design, Testing and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

10. RG 1.155, "Station Blackout."

11. NUREG-CR/0660, "Enhancement of Onsite Emergency Diesel Generator Reliability."

12. NRC Inspection Manual Chapter IMC-2504, “Construction Inspection Program - Non-ITAAC Inspections,” issued April 25, 2006.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the draft Standard Review Plan are covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, which were approved by the Office of Management and Budget, approval number 3150-0011 and 3150-0151.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

SRP Section 9.4.5
Description of Changes

This SRP section affirms the technical accuracy and adequacy of the guidance previously provided in Draft Revision 3, dated April 1996, of this SRP section. See ADAMS accession number ML052070560.

In addition, this SRP section was administratively updated in accordance with NRR Office Instruction LIC-200, Revision 1, "Standard Review Plan (SRP) Process." The revision also adds standard paragraphs to extend application of this updated SRP section to prospective applicant submissions pursuant to 10 CFR Part 52.

Technical changes are incorporated in Revision 3, dated [Month] 2007:

Review Responsibilities - Reflects changes in review branches resulting from reorganization and branch consolidation. Change is reflected throughout the SRP.

I. AREAS OF REVIEW

The area of review describing the other review responsibilities of the primary review organization has been removed.

II. ACCEPTANCE CRITERIA

The acceptance criteria for GDC 60 have been changed to include the 2001 revisions of RGs 1.52 and 1.140.

III. REVIEW PROCEDURES

None

IV. EVALUATION FINDINGS

The finding for GDC 60 has been changed to include the 2001 revisions of RGs 1.52 and 1.140.

V. IMPLEMENTATION

None

VI. REFERENCES

None