U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

9.4.1 CONTROL ROOM AREA VENTILATION SYSTEM

REVIEW RESPONSIBILITIES

Primary - Organization responsible for review of ventilation and air filtration

Secondary - None

I. AREAS OF REVIEW

The control room area ventilation system (CRAVS) provides a controlled environment for the comfort and safety of control room personnel and assures the operability of control room components during normal operating, anticipated operational transient, and design-basis accident conditions. Portions of the CRAVS also may be relied upon to ensure coping with and recovering from a station blackout event.

The organization responsible for the review of ventilation and air filtration reviews the CRAVS from the air intake to the point of discharge where the system connects to the gaseous cleanup and treatment system or station vents to ensure compliance with General Design Criteria (GDCs) 2, 4, 5, 19, and 60 and 10 CFR 50.63. The review includes such components as air intakes, ducts, air conditioning units, filters, blowers, isolation dampers, and exhaust fans. CRAVS review covers the control room, switchgear and battery room, access control area, control building heating, ventilating, and air conditioning equipment room, and computer room.

The specific areas of review are as follows:

1. The organization responsible for the review of ventilation and air filtration reviews the CRAVS to determine the safety significance of the system. Based on this determination, the safety-related portions of the system are reviewed with respect to the functional performance requirements to maintain the habitability of the control room area and other safety-related areas served by the CRAVS during adverse environmental occurrences, normal operation, anticipated operational occurrences, and subsequent to postulated accidents. The review includes the effects of radiation, combustion, other

toxic products, and the coincidental loss of offsite power. The review of this Standard Review Plan (SRP) section interfaces with the review for SRP Section 6.4, "Control Room Habitability." The organization responsible for the review of ventilation and air filtration reviews safety-related portions of the system to assure that:

A. A single active failure cannot result in loss of system functional performance capability.

B. Failures of nonseismic Category I equipment or components will not affect the CRAVS.

2. The ability of the control room heating and cooling subsystems to maintain a suitable ambient temperature for control room personnel and equipment.

3. The ability to detect, filter, or expedite safe discharge of airborne contaminants inside the control room.

4. The capability to detect the need for isolation and to isolate portions of the system in the event of fires, failures, or malfunctions, and the capability of the system to function under such conditions.

5. The ability of essential equipment serviced by the ventilation system to function under the worst anticipated degraded CRAVS performance.

6. The capability to actuate components not normally operating that are required to operate during accident conditions and to provide necessary isolation.

7. The expected environmental conditions in areas served by the CRAVS and the extent, if any, to which the CRAVS is relied upon to function for a station blackout event.

8. Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC). For design certification (DC) and combined license (COL) reviews, the staff reviews the applicant's proposed ITAAC associated with the structures, systems, and components (SSCs) related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria." The staff recognizes that the review of ITAAC cannot be completed until after the rest of this portion of the application has been reviewed against acceptance criteria contained in this SRP section. Furthermore, the staff reviews the ITAAC to ensure that all SSCs in this area of review are identified and addressed as appropriate in accordance with SRP Section 14.3.

9. COL Action Items and Certification Requirements and Restrictions. For a DC application, the review will also address COL action items and requirements and restrictions (e.g., interface requirements and site parameters).

   For a COL application referencing a DC, a COL applicant must address COL action items (referred to as COL license information in certain DCs) included in the referenced DC. Additionally, a COL applicant must address requirements and restrictions (e.g., interface requirements and site parameters) included in the referenced DC.

Review Interfaces

Other SRP sections interface with this section as follows:

1. Sections 3.2.1 and 3.2.2: review to determine 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: review of the acceptability of the design analyses, procedures, and criteria establishing the capability of seismic Category I structures housing the system and supporting systems to withstand the effects of natural phenomena like the safe shutdown earthquake, the probable maximum flood, and tornado missiles.

3. Section 3.4.1: review of flood protection.

4. Section 3.5.1.1: review of the protection against internally-generated missiles.

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

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

7. Sections 3.9.1 through 3.9.3: review to determine that 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 3.10: review of the seismic qualification of Category I instrumentation and electrical equipment as part of their primary and secondary review responsibilities, respectively.

10. Section 3.11: review of the environmental qualification of mechanical and electrical components.

11. Section 6.4: review of the concentrations of airborne contaminants in the vicinity of the intake and exhaust vents resulting from accidental release on the plant site and system capability to maintain control room habitability.

12. Section 6.5.1: review of the effectiveness of CRAVS filters to remove airborne contaminants prior to discharge to the environment.

13. Section 6.6: review to verify that inservice inspection requirements are met for system components.

14. Sections 7.3 and 8.3.1: review to determine the adequacy of the design, environmental ratings, installation, inspection, and testing of all essential instrumentation and electrical components (sensing, control, and power) required for proper operation and review for overall compliance with the station blackout requirements.

15. Section 9.5.1: review of fire protection.

16. Section 12.3-12.4: review of radiation protection criteria.

17. Section 16.0: review of technical specifications.

18. Chapter 17: review of quality assurance programs.

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

II. ACCEPTANCE CRITERIA

Acceptability of the CRAVS design, as described in the applicant's safety analysis report (SAR) is based on relevant regulations, specific general design criteria, and regulatory guides.

The design of safety-related portions of the CRAVS is acceptable if the integrated design of the system is in accordance with the requirements and SRP acceptance criteria presented in this section.

Requirements

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

1. GDC 2, "Design Bases for Protection Against Natural Phenomena," as it relates to system capability to withstand the effects of earthquakes.

2. GDC 4, "Environmental and Dynamic Effects Design Bases," as it relates to the CRAVS being appropriately protected against dynamic effects and being designed to accommodate the effects of, and to be compatible with, the environmental conditions of normal operation, maintenance, testing, and postulated accidents. The GDC 4 evaluation includes the adequacy of environmental support for safety-related SSCs within areas served by the CRAVS.

3. GDC 5, "Sharing of Structures, Systems, and Components," as it relates to shared SSCs among nuclear power units.

4. GDC 19, "Control Room," as it relates to providing adequate protection to permit access to and occupancy of the control room under accident conditions.

5. GDC 60, "Control of Release of Radioactive Materials to the Environment," as it relates to system capability to suitably control release of gaseous radioactive effluents to the environment.

6. 10 CFR 50.63, as it relates to necessary support systems providing sufficient capacity and capability to ensure the capability for cope 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 or degraded operability of heating, ventilating, and air conditioning systems, including the CRAVS, 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), which requires that a DC application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's regulations.

8. 10 CFR 52.80(a), which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC'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 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 CRAVS is acceptable if its integrated design is in accordance with the following criteria:

1. Protection Against Natural Phenomena. Information that addresses the requirements of GDC 2 regarding the capability of structures housing the CRAVS and the CRAVS itself to withstand the effects of natural phenomena will be considered acceptable if the guidance of Regulatory Guide (RG) 1.29, Position C.1 for safety-related portions of the CRAVS and Position C.2 for nonsafety-related portions of the CRAVS are appropriately addressed.

2. Environmental and Dynamic Effects. Information that addresses the requirements of GDC 4 regarding consideration of environmental and dynamic effects will be considered acceptable if the acceptance criteria in the following SRP sections, as they apply to the CRAVS, are met: SRP Sections 3.5.1.1, 3.5.2, and 3.6.1.

3. Sharing of Structures, Systems, and Components. Information that addresses the requirements of GDC 5 regarding the capability of shared systems and components important to safety to perform required safety functions will be considered acceptable if the use of the CRAVS 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. Control Room. Information that addresses the requirements of GDC 19 regarding the capability of the control room to remain functional to the degree that actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain the plant in a safe condition under accident conditions, including loss-of-coolant accidents will be considered acceptable if adequate protection against radiation and hazardous chemical releases are provided to permit access to and occupancy of the control room under accident conditions. RG 1.78 provide guidance acceptable to the staff for meeting these control room occupancy protection requirements.

5. Control of Releases of Radioactive Material to the Environment. Information that addresses the requirements of GDC 60 regarding the suitable control of the release of gaseous radioactive effluents to the environment will be considered acceptable if 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 are appropriately addressed. 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. Loss of All Alternating Current Power. Information that addresses the requirements of 10 CFR 50.63 regarding the necessary support systems providing sufficient capacity and capability for coping with a station blackout event will be considered acceptable if the guidance of RG1.155, including position C.3.2.4 is applied appropriately.

Technical Rationale

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

1. GDC 2, as to system capability to withstand the effects of earthquakes, requires that SSCs important to safety be designed to withstand the effects of a design-basis earthquake without loss of capability to perform safety functions.

   The function of the CRAVS is to provide a controlled environment for the comfort and safety of control room personnel during normal operation, anticipated operational occurrences, and during and after postulated accidents, including the coincidental loss of offsite power. This requirement ensures that the control room will remain functional in the event of a design basis earthquake. Regulatory Guide 1.29 provides guidance acceptable to the staff for meeting these control room occupancy protection requirements.

   Meeting the requirement of GDC 2 provides assurance that the habitability of the control room area will be maintained and that equipment in the control room will operate as designed, thereby minimizing the potential for loss of function.

2. GDC 4 requires that SSCs important to safety be designed to accommodate the effects of, and to be compatible with, environmental conditions of normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. GDC 4 also requires that SSCs important to safety be appropriately protected against dynamic effects (including those of missiles, pipe whipping, and discharging fluids) that could result from equipment failures or from events and conditions outside the nuclear power unit.

   The function of the CRAVS is to provide a suitable and controlled environment for the control room during normal operation, anticipated operational occurrences, and during and after postulated accidents, including loss of offsite power. To ensure performance of these functions under accident conditions, portions of the CRAVS must be designed to accommodate accident environmental effects and be appropriately protected from dynamic effects associated with postulated accidents. The requirements of GDC 4 ensure that control room area systems and components important to safety (with environmental support from the CRAVS) and safety-related portions of the CRAVS are designed to address the expected environmental conditions and dynamic effects associated with the specified events and conditions for which they are required to function.

   GDC 4 requirements provide assurance that the CRAVS will support the functioning of systems and components important to safety by maintaining suitable environmental conditions for performance of safety functions.

3. GDC 5 requires that SSCs important to safety not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

   With regard to the CRAVS, GDC 5 requires the component parts of the CRAVS be essentially independent in order to ensure that an accident in one unit of a multiple-unit facility will not propagate to other units. Therefore the CRAVS for each unit should be designed to accommodate the load resulting from accident conditions. At the same time, the operating environment of equipment in the control room(s) of the unaffected unit(s) must be maintained within specified limits.

   GDC 5 requirements provide assurance that a failure or accident in one unit will not affect additional units of a multi-unit site.

4. Compliance with GDC 19 requires that the control room remain functional to the degree that actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain the plant in a safe condition under accident conditions, including loss-of-coolant accidents.

   With regard to the CRAVS, GDC 19 requires that adequate protection against radiation and hazardous chemical releases be provided to permit access to and occupancy of the control room under accident conditions. Regulatory Guide 1.78 provide guidance acceptable to the staff for meeting these control room occupancy protection requirements.

   GDC 19 requirements provide assurance that access to and occupancy of the control room will be protected under accident conditions.

5. GDC 60 requires nuclear power unit designs to include provisions to control the release of radioactive materials entrained in gaseous effluents during normal reactor operation, including anticipated operational occurrences.

   RGs 1.140 and 1.52 offer design, testing, and inspection criteria acceptable to the staff for air filtration and adsorption units of normal ventilation systems and for post-accident engineered-safety-feature atmosphere cleanup systems in light-water-cooled nuclear power plants. Atmosphere cleanup systems are included in the design to reduce the quantities of radioactive materials entrained in gaseous effluents released to the environment.

   GDC 60 requirements provide assurance that release of radioactive materials entrained in gaseous effluents will not exceed specified 10 CFR Part 20 limits for normal operation and anticipated operational occurrences.

6. 10 CFR 50.63 requires a demonstration of the capability of a nuclear power plant 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 recovery period) is required. RG 1.155 provides guidance for compliance with station blackout requirements.

   Regardless of the extent, if any, to which the CRAVS is expected to function to maintain suitable environmental conditions during a station blackout event, control room-area equipment necessary for core cooling, maintenance of appropriate containment integrity, and other functions for withstanding or coping with the event, should be able to function under the expected environmental conditions of the event. The reviewer therefore verifies that the station blackout analysis appropriately addresses the potential failures of equipment/systems during the event (e.g., loss or degraded operability of the CRAVS, as appropriate), the expected environmental conditions of 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 recovery period.

   Those portions of the CRAVS, if any, 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 for such support.

   10 CFR 50.63 requirements provide assurance that necessary operator actions can be performed and that necessary control room-area 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 material from the procedures described below, as may be appropriate for a particular case.

These review procedures are based on the identified SRP acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II.

The procedures are used during the 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 (OL) application, 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.

These procedures should be followed for the review of a DC and a COL application.

The procedures for standard DC reviews of designs for which new standard technical specifications are required and for OL or combined licenses include a determination that the proposed technical specifications agree with the requirements for system testing, minimum performance, and surveillance developed in the staff's review.

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

With the various CRAVS designs proposed by applicants, there are variations in system requirements. For the purposes of this SRP section, a typical system with redundant subsystems is assumed with each subsystem 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 CRAVS equipment used for normal and emergency operations, and the ambient temperature limits for the areas serviced. The system performance requirements section is reviewed to determine that it describes allowable component operational degradation (e.g., loss of cooling function, damper leakage) and describes the procedures that will be followed to detect and correct these conditions. The reviewer, using results from failure modes and effects analyses as appropriate, determines that the safety-related portion of the system is capable of functioning in spite of the loss of any active component.

   For new applications, the system review should also verify conformance with ASME Code AG-1, "Code on Nuclear Air and Gas Treatment" including the AG-1a-92 Addenda.

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

   A. Essential portions of the CRAVS are correctly identified and are isolable 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 portions and components from the essential portions

B. Essential portions of the CRAVS, including the isolation dampers separating essential from nonessential portions, are classified seismic Category I. SAR component and system descriptions of mechanical and performance characteristics are reviewed to verify that the classifications are included and that the P&IDs indicate any 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 pumps or isolation valves 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, hazardous chemical release in the plant vicinity, 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 systems or of other systems not designed to seismic Category I standards and located close to essential portions of the system, or of nonseismic Category I structures that house, support, or are close to essential portions of the CRAVS, will not preclude operation of the essential portions of the CRAVS. 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. Statements in the SAR that verify that the above conditions will be met are acceptable.

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

C. The CRAVS will maintain control room habitability in the event of release of airborne contamination that may enter the control room via the intake vents. Final determination of the identification and the concentration of the contaminants will be completed at the OL or COL stage of review.

D. The total system has the capability to detect and control leakage of airborne contamination into the system. It is acceptable if the following conditions are met:

i. The system P&IDs show monitors located in the system intakes that are capable of detecting radiation, smoke, and toxic chemicals. The monitors should actuate alarms in the control room.

ii. The capability for isolation of nonessential portions of the CRAVS by two automatically actuated dampers in series is shown on the P&IDs.

iii. The CRAVS has provisions for an internal recirculation filtering mode of operation or can discharge airborne contaminants from the control room area using a once-through ventilation mode, as applicable.

iv. Provisions for isolation of the control room upon smoke detection at the air intakes are shown on the P&IDs. The isolation may be actuated manually for most cases. Automatic isolation may be required in special cases such as for fires resulting from aircraft crashes.

E. Essential components and subsystems can function as required in the event of loss of offsite power. The system design will be acceptable if the CRAVS meets minimum system requirements as stated in the SAR assuming a 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 see that for each CRAVS component or subsystem affected by the loss of offsite power, the resulting system operation will not affect safety of control room personnel or the performance of any essential equipment. Statements in the SAR and the 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, CRAVS 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 reviewer verifies that a suitable environment is demonstrated to be maintained in areas served by the CRAVS for the duration of a station blackout event and the associated recovery period with or without credit for CRAVS 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 RG1.155, position C.3.2.4. Where the CRAVS (or portions thereof) is credited to function for coping with a station blackout, the reviewer verifies that the CRAVS has been designed so that system functions will be performed as required in the event of a station blackout, that the CRAVS 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 CRAVS will not adversely affect the functioning of required equipment. As necessary, the reviewer interfaces with other reviewers responsible for SRP Sections 7.3.1 and 8.3.1 as described in subsection I to evaluate the instrumentation and electrical provisions for CRAVS functionality in the event of a station blackout and also to ensure that appropriate control room-area instrumentation and electrical equipment environmental limits have been considered.

6. For review of a DC application, the reviewer should follow the above procedures to verify that the design, including requirements and restrictions (e.g., interface requirements and site parameters), set forth in the final safety analysis report (FSAR) meets the acceptance criteria. DCs have referred to the FSAR as the design control document (DCD). The reviewer should also consider the appropriateness of identified COL action items. The reviewer may identify additional COL action items; however, to ensure these COL action items are addressed during a COL application, they should be added to the DC FSAR.

For review of a COL application, the scope of the review is dependent on whether the COL applicant references a DC, an early site permit (ESP) or other NRC approvals (e.g., manufacturing license, site suitability report or topical report).

7. For review of both DC and COL applications, SRP Section 14.3 should be followed for the review of ITAAC. The review of ITAAC cannot be completed until after the completion of this section.

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. The reviewer also states the bases for those conclusions.

The staff concludes that the design and expected performance of the CRAVS is acceptable and meet the requirements of GDCs 2, 4, 5, 19, and 60 and 10 CFR 50.63. These conclusions are based on the following findings:

1. The applicant meets the requirements of [regulation] for [limits of review for regulation] by [for each item applicable to the review, how met and why acceptable under the regulation]:

   A. Meeting the regulatory positions in RG(s).

   B. Providing and meeting an alternative method to regulatory positions in RG _____, reviewed by the staff and found acceptable.

   C. Using calculational methods for [what was evaluated] that have been previously reviewed by the staff and found acceptable; the staff has reviewed the impact parameters in this case and found them suitably conservative or has performed independent calculations to verify acceptability of their analysis.

   D. Meeting the provisions of [industry standard number and title] reviewed by the staff and determined to be appropriate for this application.

2. Repeat the discussion for each regulation cited based on the following:

   A. The CRAVS includes all components and ducting from the intake vents to the exhaust structure. 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.

   B. The applicant meets the requirements of GDC 2, "Design Bases for Protection Against Natural Phenomena," with respect to system capability to withstand 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 of the system.

   C. The applicant meets the requirements of GDC 4, "Environmental and Dynamic Effects Design Basis," by appropriately addressing adverse environmental conditions and dynamic effects in the design of the system to ensure its capability for maintaining environmental conditions in the control room within the design limits of equipment important to safety located therein for normal, transient, or accident conditions.

   D. The applicant meets the requirements of GDC 5, "Sharing of Structures, Systems, and Components," with respect to capability of shared systems and components important to safety to perform required safety functions.

E. The applicant meets the requirements of GDC 19, "Control Room," with respect to the capability of the system to maintain a suitable environment in the control room for occupancy during normal and accident conditions by meeting the guidelines of RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."

F. 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 RG 1.52, "Design, Testing, and Inspection Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," and RG 1.140, "Design, Testing, and Inspection Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems of Light-Water-Cooled Nuclear Power Plants," 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.

G. 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 of the control room 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 of RG 1.155, "Station Blackout."

For DC and COL reviews, the findings will also summarize the staff's evaluation of requirements and restrictions (e.g., interface requirements and site parameters) and COL action items relevant to this SRP section.

In addition, to the extent that the review is not discussed in other SER sections, the findings will summarize the staff's evaluation of the ITAAC, including design acceptance criteria, as applicable.

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 submitted six months or more after the date of issuance of this SRP section, unless superseded by a later revision.

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 19, “Control Room.”

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 Inspection Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants,” Revision 3, June 2001.

9. RG 1.78, “Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release,” Revision 1, December 2001.

10. RG 1.140, “Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants,” Revision 2, June 2001.

11. RG 1.155, “Station Blackout,” August 1988.

12. ASME Code AG-1, “Code for Nuclear Air and Gas Treatment,” 1991 (including the AG-1a-92 Addenda thereto).