U.S. NUCLEAR REGULATORY COMMISSION

DESIGN-SPECIFIC REVIEW STANDARD FOR mPOWER^{TM} iPWR DESIGN

9.4.4 TURBINE AREA VENTILATION SYSTEM

REVIEW RESPONSIBILITIES

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

I. AREAS OF REVIEW

The turbine area ventilation system (TAVS) is a nonsafety-related and nonrisk-significant system whose function is to provide heating, cooling, and ventilation in the turbine building during normal operation when alternating current (AC) power is available.

The staff reviews the TAVS from the air intake to the point of discharge to ensure compliance with the requirements of General Design Criteria (GDCs) 2, 5, and 60. The review includes components such as air intakes, ducts, air-conditioning units, blowers, isolation dampers, filters, exhaust fans, and associated instrumentation and control systems used to govern operation of the system. The review of the TAVS includes its relationships, if any, to safety-related or risk-significant equipment or areas in the turbine building.

The specific areas of review are as follows:

1. The functional performance requirements and the methods and equipment provided for air treatment equipment for the TAVS will be reviewed to determine whether the ventilation system or portions of the system have been designed or need to be designed as a safety-related or risk-significant system. In making this determination, systems provided for heating, ventilating, and air conditioning of the turbine area, designed to normal industrial standards, and those systems that provide for control and filtration of small quantities of radioactive gas leakage in the turbine area during normal plant operation, are not considered safety-related for the purpose of this design-specific review standard (DSRS) section.

   Based on this determination, any safety-related or risk-significant portions of the system are reviewed with respect to functional performance requirements during adverse environmental occurrences, normal operation, anticipated operational occurrences (AOOs), and subsequent to postulated accidents, including the loss of offsite power (LOOP). Safety-related portions of the system are reviewed to ensure:

   A. A single, active failure can not result in loss of system functional performance capability.

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

ADAMS Accession No. ML12221A117

2. Safety-related or risk-significant portions of the TAVS, if any, are also reviewed with respect to the following:

   A. The capability to direct ventilation air from areas of low radioactivity to areas of higher radioactivity.

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

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

3. 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 DSRS section in accordance with Standard Review Plan (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 DSRS 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.

4. 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 and DSRS sections interface with this section as follows:

1. Section 2.2.1-2.2.2: review to evaluate potential plant site external hazards or hazardous materials.

2. Section 2.2.3: review to consider an applicant’s probability analysis of potential accidents involving hazardous materials or activities at the plant site.

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

4. Sections 3.3.1, 3.3.2, 3.5.1.4, 3.5.1.5, 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 that establish the ability 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.

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

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

7. Section 3.10: review of the seismic qualification of Category I instrumentation and electrical equipment.

8. Section 3.11: review of the environmental qualification of mechanical and electrical equipment.

9. Section 6.6: verification that inservice inspection requirements are met for system components.

10. Sections 7.7 and 8.3.1: determination of the adequacy of the design, installation, inspection, and testing of all essential electrical components (sensing, control, and power) required for proper operation.

11. Section 11.5: evaluation of the capability of the system to detect and control leakage of radioactive contamination.

12. Section 12.3-12-4: evaluation of the capability of the system to meet radiation protection criteria.

13. Section 16.0: review of proposed technical specifications.

14. Chapter 17: review of the reliability assurance and quality assurance program.

15. Chapter 19: review of SSCs for risk significance.

II. ACCEPTANCE CRITERIA

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 related to the system being capable of withstanding the effects of earthquakes.

2. GDC 5, "Sharing of Structures, Systems, and Components," as related to shared systems and components important to safety.

3. GDC 60, "Control of Release of Radioactive Materials to the Environment," as related to the system's capability to suitably control release of gaseous radioactive effluents to the environment.

4. Title 10 of the *Code of Federal Regulations* (CFR), Section 20.1406, as related to the design and operational procedures to minimize contamination, minimize the generation of radioactive waste, and facilitate eventual decommissioning.

5. 10 CFR 52.47(b)(1), which requires that a DC application contain the proposed 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 facility that incorporates the DC has been constructed and will be operated in conformity with the DC, the provisions of the Atomic Energy Act (AEA), and the U.S. Nuclear Regulatory Commission's (NRC's) regulations.

6. 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 COL, the provisions of the AEA, and the NRC's regulations.

DSRS Acceptance Criteria

Specific DSRS acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are set forth below. The DSRS is not a substitute for the NRC's regulations, and compliance with it is not required. Identifying the differences between this DSRS section and the design features, analytical techniques, and procedural measures proposed for the facility, and discussing how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria, is sufficient to meet the intent of 10 CFR 52.47(a)(9), "Contents of applications; technical information." The same approach may be used to meet the requirements of 10 CFR 52.79(a)(41) for COL applications.

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

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

3. For GDC 60, acceptance is based on 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, Revision 2, the applicable regulatory position is C.2. For RG 1.52, Revision 3, the applicable regulatory position is C.3. For RG 1.140, Revision 1, the applicable regulatory positions are C.1 and C.2. For RG 1.140, Revision 2, the applicable regulatory positions are C.2 and C.3.

4. 10 CFR 20.1406. Minimization of contamination to the facility and the environment, and designs to facilitate eventual decommissioning, will be considered acceptable if the design identifies provisions to detect contamination that may enter as in-leakage from other systems, identifies potential collection points such as water treatment systems or system low points, and addresses the long term control of radioactive material in the system. Interim Staff Guidance DC/COL-ISG-06 and RG 4.21 relate to acceptable levels of detail and content required to demonstrate compliance with 10 CFR 20.1406. NEI 08-08A, Revision 0, "Generic FSAR Template Guidance for Life Cycle Minimization

of Contamination," also provides NRC-endorsed industry guidance on life-cycle minimization of contamination.

5. 10 CFR 52.47(b)(1) specifies that the application of a DC should contain proposed ITAAC for SSCs necessary and sufficient to assure the plant is built and will operate in accordance with the DC. 10 CFR 52.97(b) specifies that the COL identifies the ITAAC for SSCs necessary and sufficient to assure that the facility has been constructed and will be operated in conformity with the license. SRP Section 14.3 provides guidance for reviewing the ITAAC. The requirements of 10 CFR 52.47(b)(1) and 10 CFR 52.97(b) will be met, in part, by identifying inspections, tests, analyses, and acceptance criteria of the top-level design features of the TAVS in the DC application and the COL, respectively.

Technical Rationale

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

1. GDC 2, as related to the system being capable of withstanding 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 their safety functions.

   The function of the TAVS is to maintain ventilation, to permit personnel access, and to control airborne radioactivity in the turbine area during normal operation and AOOs and during and after postulated accidents, including LOOP. This requirement ensures that, during and after a design-basis earthquake, essential portions of the TAVS will remain functional and that the failure of nonessential portions of the system or of other systems not designed to seismic Category I standards will not result in offsite doses in excess of 5 mSv (0.5 rem) to the whole body or an equivalent dose to any part of the body.

   Meeting the GDC 2 requirements ensures that the TAVS will operate as designed, thus, providing protection against release of radioactivity exceeding regulatory limits.

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

   For the TAVS, GDC 5 requires that the component parts of the TAVS be essentially independent to ensure that an accident in one unit of a multiple-unit facility will not propagate to other units. Therefore, the TAVS for each unit should be designed to accommodate the loads resulting from accident conditions. At the same time, the operating environment of equipment associated with unaffected units must be maintained within specified limits.

   Meeting the GDC 5 requirements adds assurance that a failure or accident in one unit will not affect additional units of a multiple-unit site.

3. GDC 60 requires provisions to be included in the nuclear power unit design to ensure suitable controls on the release of radioactive materials in gaseous effluents during normal reactor operation, including AOOs.

GDC 60 requirements apply to the design of the TAVS because its function is to control the quantities of radioactive materials in gaseous effluents released to the environment from normal ventilation systems. RGs 1.140 and 1.52 offer design, testing, and maintenance criteria acceptable to the staff for air filtration and adsorption units of normal ventilation exhaust systems and for engineered safety-feature atmospheric cleanup systems in light-water-cooled nuclear power plants.

Meeting the GDC 60 requirements adds 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 AOOs. 10 CFR 20.1406 requires the design of a nuclear power unit to address minimization of contamination of the facility and the environment, and to facilitate eventual decommissioning. 10 CFR 20.1406 applies to this DSRS section because the TAVS could interface with contaminated structures or systems. DC/COL-ISG-06 and RG 4.21 provide guidance to meet 10 CFR 20.1406. Specific guidance to meet 10 CFR 20.1406 is identified in RG 4.21, Positions C.1 through C.4. Nuclear Energy Institute (NEI) 08-08A also provides NRC-endorsed industry guidance on life-cycle minimization of contamination

III. REVIEW PROCEDURES

These review procedures are based on the identified DSRS 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.

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

The procedures for COL reviews include a determination that the proposed technical specifications agree with the requirements for testing, minimum performance, and surveillance developed by the staff.

The primary reviewer coordinates this review with other reviewers for their particular areas of responsibility. The primary reviewer uses such inputs as required to complete this review procedure.

1. Programmatic Requirements ─ In accordance with the guidance in NUREG-0800 "Introduction," Part 2 as applied to this DSRS section, the staff will review the programs proposed by the applicant to satisfy the following programmatic requirements. If any of the proposed programs satisfies the acceptance criteria described in Subsection II, it can be used to augment or replace some of the review procedures. It should be noted that the wording of "to augment or replace" applies to nonsafety-related risk-significant SSCs, but "to replace" applies to nonsafety-related nonrisk-significant SSCs according to the "graded approach" discussion in NUREG-0800 "Introduction," Part 2. Commission regulations and policy mandate programs applicable to SSCs that include:

    A. Maintenance rule, SRP Section 17.6 (DSRS Section 13.4, Table 13.4, Item 17, RG 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and RG 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants."

B. Quality Assurance Program, SRP Sections 17.3 and 17.5 (DSRS Section 13.4, Table 13.4, Item 16).

C. Technical Specifications (DSRS Section 16.0 and SRP Section 16.1) – including brackets value for DC and COL. Brackets are used to identify information or characteristics that are plant specific or are based on preliminary design information.

D. Reliability Assurance Program (SRP Section 17.4).

E. Initial Plant Test Program (RG 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," DSRS Section 14.2, and DSRS Section 13.4, Table 13.4, Item 19).

F. ITAAC (DSRS Chapter 14).

2. In accordance with 10 CFR 52.47(a)(8),(21), and (22), for new reactor license applications submitted under Part 52, the applicant is required to (1) address the proposed technical resolution of unresolved safety issues and medium- and high-priority generic safety issues that are identified in the version of NUREG-0933 current on the date 6 months before application and that are technically relevant to the design; (2) demonstrate how the operating experience insights have been incorporated into the plant design; and, (3) provide information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v). These cross-cutting review areas should be addressed by the reviewer for each technical subsection and relevant conclusions documented in the corresponding safety evaluation report (SER) section.

3. The SAR is reviewed to verify that the system description and schematics or piping and instrumentation drawings (P&IDs), if applicable, show the TAVS equipment used for normal and emergency operations, and the ambient temperature limits for the areas serviced. The system performance requirements are reviewed to determine that it describes allowable component operational degradation (e.g., loss of 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. Typically, redundancy, if required, is provided by separate, independent subsystems for safety-related or risk-significant functions.

   The system review also should demonstrate compliance with applicable industry standards: American National Standards Institute/American Nuclear Society (ANSI/ANS) 59.2-1985, "Safety Criteria for Nuclear Power Plant HVAC Systems Located Outside Primary Containment," and American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME) AG-1-2009, "Code on Nuclear Air and Gas Treatment."

4. The system schematics or P&IDs, if applicable, and component descriptions and characteristics are then reviewed to determine that:

A. Essential portions of the TAVS are correctly identified and are isolable from nonessential portions of the system. The system description and schematics or P&IDs, if applicable, are reviewed to verify that they clearly indicate the physical divisions between each portion 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 TAVS, including the isolation dampers separating essential from nonessential portions, are classified seismic Category I. Component and system descriptions in the safety analysis report (SAR) that identify mechanical and performance characteristics are reviewed to verify that the above seismic classifications have been included, and that the system description and schematics or P&IDs, if applicable 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. Compliance with the industry standard American Society for Testing and Materials (ASTM) D3803-91, "Standard Test Method for Nuclear-Grade Activated Carbon," should be demonstrated. 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.

5. The TAVS is reviewed to ensure that it meets the requirements of 10 CFR 20.1406 for which guidance is provided in DC/COL-ISG-06, RG 4.21, and NEI 08-08A.

6. The reviewer verifies that the system has been designed so that system function will be maintained as required, in the event of an earthquake or LOOP. 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 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 TAVS, will not preclude their operation. Reference to SAR sections describing site features and the general arrangement and layout drawings and to the SAR tabulation of seismic design classifications for structures and systems will be necessary. Statements in the SAR verifying that the above conditions are met are acceptable.

B. Components and subsystems necessary for preventing releases of radioactive contaminants can function as required in the event of LOOP. The system design will be acceptable if the TAVS 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 verify that, for each TAVS component or subsystem affected by the LOOP, the resulting system flow capacity will not cause the loss of preferred direction of air flow from areas of low potential radioactivity to areas of higher potential radioactivity. 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.

7. The descriptive information, schematics or P&IDs, if applicable, TAVS drawings, and failure modes and effects analyses (or other appropriate 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.

8. 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).

   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 staff's technical review and analysis, as augmented by the application of programmatic requirements in accordance with the staff's technical review approach in the DSRS Introduction, support conclusions of the following type to be included in the staff's SER. The reviewer also states the bases for those conclusions.

The TAVS includes all components and ducting from air intake to the point of discharge. 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 an equivalent dose to any part of the body shall be classified seismic Category I and safety-related. Based on the review of the applicant's proposed design criteria, the design bases and safety classification for the TAVS and the requirements (if any) for system performance to preclude any adverse effect on safety-related functions during all conditions of plant operation, the staff concludes that the design of the turbine area ventilation system and supporting systems complies with NRC

regulations as set forth in GDC 2, "Design Bases for Protection Against Natural Phenomena," GDC 5, "Sharing of Structures, Systems, and Components," and GDC 60, "Control of Releases of Radioactive Materials to the Environment." This conclusion is based on the following findings:

1. The applicant has met the requirements of GDC 2, "Design Bases for Protection Against Natural Phenomena," 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 of the system.

2. The applicant has met the requirements of GDC 5, "Sharing of Structures, Systems, and Components Important to Safety to Perform Required Safety Function," with respect to capability of shared systems and components important to safety to perform required safety functions.

3. The applicant has met the requirements of GDC 60, "Control of Releases of Radioactive Materials to the Environment," and 10 CFR 20.1406 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, Revision 2, the applicable regulatory position is C.2. For RG 1.52, Revision 3, the applicable regulatory position is C.3. For RG 1.140, Revision 1, the applicable regulatory positions are C.1 and C.2. For RG 1.140, Revision 2, the applicable regulatory positions are C.2 and C.3.

The staff concludes that the TAVS design complies with all applicable GDCs and RG positions cited and is, therefore, acceptable.

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 DSRS 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 DSRS section in performing safety evaluations of mPower^{TM}-specific DC, or COL, applications submitted by applicants pursuant to 10 CFR Part 52. The staff will use the method described herein to evaluate conformance with Commission regulations.

Because of the numerous design differences between the mPower^{TM} and large light-water nuclear reactor power plants, and in accordance with the direction given by the Commission in SRM-COMGBJ-10-0004/COMGEA-10-0001, "Use of Risk Insights to Enhance the Safety Focus of Small Modular Reactor Reviews," dated August 31, 2010 (Agencywide Documents Access and Management System Accession No. ML102510405), to develop risk-informed licensing review plans for each of the small modular reactor reviews, including the associated pre-application activities, the staff has developed the content of this DSRS section as an

alternative method for mPower™-specific DC, or COL submitted pursuant to 10 CFR Part 52 to comply with 10 CFR 52.47(a)(9), “Contents of applications; technical information.”

This regulation states, in part, that the application must contain “an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application.” The content of this DSRS section has been accepted as an alternative method for complying with 10 CFR 52.47(a)(9), as long as the mPower™ DCD FSAR does not deviate significantly from the design assumptions made by the NRC staff while preparing this DSRS section. The application must identify and describe all differences between the standard plant design and this DSRS section, and discuss how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria. If the design assumptions in the DC application deviate significantly from the DSRS, the staff will use the SRP as specified in 10 CFR 52.47(a)(9). Alternatively, the staff may supplement the DSRS section by adding appropriate criteria in order to address new design assumptions. The same approach may be used to meet the requirements of 10 CFR 52.79(a)(41) for COL applications.

VI. REFERENCES

1. 10 CFR 20.1406, “Minimization of Contamination.”

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

3. 10 CFR Part 50, Appendix A, GDC 5, "Sharing of Structures, Systems, and Components."

4. 10 CFR Part 50, Appendix A, GDC 60, "Control of Releases of Radioactive Materials to the Environment."

5. RG 1.29, "Seismic Design Classification."

6. RG 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmospheric Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants."

7. RG 1.68, “Initial Test Programs for Water-Cooled Nuclear Power Plants.”

8. 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."

9. RG 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.”

10. RG 1.182, “Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants.”

11. RG 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition).”

12. RG 1.215, “Guidance for ITAAC Closure Under 10 CFR Part 52.”

13. ASME Code AG-1, ”Code for Nuclear Air and Gas Treatment,” 2009.

14. ASTM D3803-91, ”Standard Test Method for Nuclear-Grade Activated Carbon,” Reapproved 2009.

15. DC/COL-ISG-06, “Final Interim Staff Guidance Evaluation and Acceptance Criteria for 10 CFR 20.1406 to Support Design Certification and Combined License Applications.”

16. NEI 08-8A, Revision 0, “Generic FSAR Template Guidance for Life Cycle Minimization of Contamination.