14 VERIFICATION PROGRAMS

This chapter describes the U.S. Nuclear Regulatory Commission (NRC) staff's, hereinafter referred to as the staff, review of the information concerning the initial test program (ITP) for structures, systems, and components (SSCs) and design features for both the nuclear portion of the facility and the balance of plant. The information provided in Chapter 14 of the final safety analysis report (FSAR) for the Comanche Peak Nuclear Power Plant (CPNPP), Units 3 and 4, combined license application (COLA), Revision 3, addresses major phases of the ITP, including preoperational tests, initial fuel loading and initial criticality, low-power tests, and power ascension tests. This chapter also describes the bases, processes, and selection criteria used to develop the United States - Advanced Pressurized-Water Reactor (US-APWR) Design Control Document (DCD) Tier 1 material, which is to be verified appropriately by inspections, tests, analyses, and acceptance criteria (ITAAC).

14.1 Specific Information to Be Included in Preliminary/Final Safety Analysis Reports

This section does not contain additional information pertinent to combined license (COL) issuance.

14.2 Initial Plant Test Program

14.2.1 Introduction

This section of the CPNPP, Units 3 and 4 COLA FSAR, hereinafter referred to as the FSAR, addresses Luminant Generation Company, LLC's (Luminant or applicant), ITP. The ITP consists of preoperational and initial startup tests, as described in Regulatory Guide (RG) 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," Revision 4, dated June 2013. Preoperational tests consist of those tests conducted following completion of construction and construction related inspections and tests, but preceding fuel loading. Such tests demonstrate, to the extent practicable, the capability of SSCs to meet performance requirements and design criteria. Initial startup tests include those test activities scheduled to be performed during and following fuel activities. Testing activities include fuel loading, precritical tests, initial criticality, low-power tests, and a power ascension test that confirm the design bases and demonstrate, to the extent practicable, that the plant will operate in accordance with its design and is capable of responding as designed to anticipated transients and postulated accidents.

14.2.2 Summary of Application

Section 14.2 of the FSAR, Revision 3, incorporates by reference, Section 14.2 of the US-APWR DCD, Revision 3.

In addition, in FSAR Section 14.2, the applicant provided the following:

US-APWR COL Information Items

- CP COL 14.2(2)

The applicant provided additional information in Comanche Peak (CP) COL 14.2(2) to address US-APWR COL Information Item 14.2(2), regarding reconciliation of site-specific organization, organizational titles, organizational responsibilities, and reporting relationships to be consistent with US-APWR Test Program Description Technical Report, MUAP-08009, "US-APWR Test Program Description."

- CP COL 14.2(7)

The applicant provided additional information in CP COL 14.2(7) to address US-APWR COL Information Item 14.2(7), regarding an event-based schedule for each major phase of the test program and a schedule for the development of plant procedures that assures required procedures are available for use during the preparation, review and performance of preoperational and startup testing.

- CP COL 14.2(10), STD COL 14.2(10)

The applicant provided additional information in CP COL 14.2(10) and Standard (STD) COL 14.2(10) to address US-APWR COL Information Item 14.2(10), regarding testing outside scope of the certified design in accordance with the test criteria described in Subsection 14.2.1.

- STD COL 14.2(11)

The applicant provided additional information in STD COL 14.2(11) to address US-APWR COL Information Item 14.2(11), regarding first plant only tests and prototype tests.

- STD COL 14.2(12)

The applicant provided additional information in STD COL 14.2(12) to address US-APWR COL Information Item 14.2(12), regarding approved test procedures.

Interface Requirements

The US-APWR DCD Tier 2, Section 1.8, Table 1.8-1, "Significant Site-Specific Interfaces with the Standard US-APWR Design," identifies significant interfaces between the US-APWR standard design and the COLA. This table does not specify any interfaces related to Section 14.2 of the DCD.

14.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the final safety evaluation report (FSER) related to the DCD.

In addition, the relevant requirements of the Commission's regulations for the initial plant test program, and the associated acceptance criteria, are given in Section 14.2, "Initial Plant Test Program - Design Certification and New License Applicants," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR *[light-water reactor]* Edition," the Standard Review Plan (SRP). The applicable regulatory requirements for the COLA-specific items described above are as follows:

1. Section 50.34(b)(6)(iii) of Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), which requires the applicant to provide plans for preoperational testing and initial operations.

2. 10 CFR 30.53(c), as it relates to testing radiation detection and monitoring instruments.

3. Appendix B to 10 CFR Part 50, Criterion XI, as it relates to test programs established to assure that SSCs will perform satisfactorily in service.

4. Appendix J of 10 CFR Part 50, Appendix J, Section III.A.4, as it relates to the preoperational leakage rate testing of the primary reactor containment and related systems and components penetrating the primary containment pressure boundary.

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 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.
6. 10 CFR 52.79(a)(28), which requires COL applicants to provide plans for preoperational testing and initial operations.

7. 10 CFR 52.80(a), which requires that a COLA include 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 Atomic Energy Act of 1954, and the NRC's regulations.

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above can be found in Part II of Section 14.2 of NUREG-0800. The related acceptance criteria are as follows:

1. The post-COL license Information Items also address regulatory positions in NRC Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," Revision 4, issued June 2013, and RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," issued June 2007. RG 1.68, Regulatory Positions C.1, C.2, and C.8, describe prerequisites, milestones and power holds during the test program. RG 1.68, Regulatory Position C.4, "Procedures," and RG 1.206, Regulatory Position C.I.14.2.3, state, in part, that approved test procedures should be made available to the NRC approximately 60 days before their intended use.

2. RG 1.206, Regulatory Position C.III.4.3, "Combined License Information Items That Cannot Be Resolved Before the Issuance of a License," also provides guidance on how COL applicants should handle post-COL license conditions and license commitments. Specific guidance includes the following:

a. Identify a new license condition or an existing license condition (e.g., Technical Specifications) to govern the matter addressed by the COL item (e.g., the license condition on operational programs discussed in Section C.IV.4). The license condition should include implementation schedules, where appropriate.

b. Ensure that the COL applicant describes in the application (e.g., within an appropriate section of the COLA) the proposed approach to addressing a COL Information Item in sufficient detail to support the NRC licensing finding. There should also be a description of how the COL applicant intends to update any affected licensing basis documents (e.g., the FSAR) or to otherwise inform the staff of the final disposition of the COL item. The descriptions should include implementation schedules, where appropriate.

14.2.4 Technical Evaluation

The staff reviewed the conformance of FSAR Section 14.2 to the guidance in RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Section C.III.1, Chapter 14, dated June 2007, and to the guidance and applicable regulatory positions of RG 1.68. The staff reviewed Section 14.2 of the FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the initial plant test program. The staff is reviewing Section 14.2 of the US-APWR DCD under Docket Number 52-021. The staff will document its technical evaluation of the information incorporated by reference related to the initial plant test program in its Safety Evaluation Report (SER) on the design certification application for the US-APWR design.

The staff's review of FSAR Section 14.2 includes the following FSAR Sections and the COL Information Items and supplemental information contained therein:

- Section 14.2.2, "Organization and Staffing."
- Section 14.2.3, "Test Procedures."
- Section 14.2.8, "Preoperational and /or Startup testing for Unique or First of a kind Principal Design Features."
- Section 14.2.9, "Trial Testing of Plant Operating and Emergency Procedures."
- Section 14.2.11, "Test Program Schedule."
- Section 14.2.12, "Individual Test Descriptions."

14.2.4.1 Organization and Staffing

The staff reviewed the following information contained in the FSAR:

- CP COL 14.2(2)

[1] See Chapter 1 for a discussion on the staff's review related to verification of the scope of information to be included within a COL application that references a design certification.

The applicant provided additional information in CP COL 14.2(2) to address US-APWR COL Information Item 14.2(2), which states:

> The COL applicant reconciles the site-specific organization, organizational titles, organizational responsibilities, and reporting relationships to be consistent with US-APWR Test Program Description Technical Report, MUAP-08009.

The staff reviewed CP COL 14.2(2), related to COL Information Item 14.2(2), included under Section 14.2.2, "Organization and Staffing," of the FSAR. The applicant replaced the last sentence of the second paragraph in DCD Section 14.2.2 with the following paragraph in FSAR Section 14.2.2:

> The site specific organization, organizational titles, organization responsibilities, and reporting relationships are consistent with US-APWR Test Program Description Technical Report, MUAP-08009 (Reference 14.2-29) with the following reconciliations.

The applicant also replaced some sections of MUAP-08009 with the following in FSAR Section 14.2.2:

- Fourth bullet in Section 3.4 was replaced with the following:

  Mitsubishi Heavy Industries, Ltd. (MHI) and/or Mitsubishi Nuclear Energy Systems, Inc. (MNES) (for preoperational testing performed on the nuclear steam support system and associated auxiliary systems).

- Second paragraph in Section 3.5 was replaced with the following:

  The test review group functions as a subcommittee of the Station Operations Review Committee (SORC) defined in Subsection 13.1.1.2.1 or initial startup testing matters. The test review group is charged with reviewing initial startup test activities and advising the SORC on the disposition of those items reviewed. The SORC may perform the test review group functions in lieu of the test review group. The primary function of the test review group is the review and approval of initial startup program test procedures, procedure revisions, and test results.

- Fourth bullet of the third paragraph in Section 3.5 was replaced with the following:

  MHI and/or MNES.

- First sentence in Section 8.2 was replaced with the following:

  Test procedures are, at a minimum, reviewed by MHI or MNES engineering, Testing, Operations, Quality Assurance, Maintenance and Licensing.

- Section 11.1 was updated with the following:

In addition, individuals who:

- develop or review testing, operating, and emergency procedures,
- evaluate test deficiencies, propose or review the resolution to test deficiencies, or
- evaluate test results for acceptability

are qualified in accordance with American National Standards Institute (ANSI)/American Nuclear Society (ANS) Standard (Std.) 3.1 as endorsed and amended by RG 1.8. This includes architect-engineer personnel, other contract/vendor staff, and the site organization supporting preoperational and startup testing. Qualification requirements for architect-engineering personnel are consistent with engineering support positions defined in ANSI/ANS-3.1 (i.e., Section 4.4.10 for supervision and Section 4.6.1 for system engineers).

Acceptable qualification of non-supervisory test engineers follow the guidance provided in American Society of Mechanical Engineers (ASME) Std. NQA-1-1994, Appendix 2A-1, "Non-mandatory Guidance on the Qualifications of Inspection and Test Personnel."

14.2.4.2 Trial Testing of Plant Operating and Emergency Procedures and Test Program Schedule

- CP COL 14.2(7), STD COL 14.2(7)

The applicant provided additional information in CP COL 14.2(7) to address US-APWR COL Information Item 14.2(7), which states:

> The COL Applicant provides an event-based schedule, relative to fuel loading, for conducting each major phase of the test program, and a schedule for the development of plant procedures that assures required procedures are available for use during the preparation, review and performance of preoperational and startup testing. For multiunit sites, the COL Applicant discusses the effects of overlapping initial test program schedules on organizations and personnel participating in each ITP. The COL Applicant identifies and cross-references each test or portion of a test required to be completed prior to fuel load which satisfies ITAAC requirements.

The staff reviewed CP COL 14.2(7), related to COL Information Item 14.2(7), included under Section 14.2.9, "Trial Testing of Plant Operating and Emergency Procedures," and Section 14.2.11, "Test Program Schedule" of the FSAR. The applicant replaced the last paragraph in US-APWR DCD Section 14.2.9 with the following paragraph in FSAR Section 14.2.9:

> A schedule for the development of plant procedures required for use during preoperational testing will be provided to the NRC 12 months prior to the start of the corresponding preoperational tests. A schedule for the development of plant procedures required for use during startup testing is provided to the NRC 12 months prior to the start of fuel loading. The schedules provide sufficient detail to

> assure that the procedures required to support testing are available for test procedure preparation, review, and performance.

In addition, the applicant replaced the first and second sentences of the last paragraph in Section 14.2.11 of the US-APWR DCD with the following paragraph in FSAR Section 14.2.11:

> An event-based schedule for conducting each major phase of the test program for the Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4, relative to the start of fuel loading, will be provided to the NRC six months prior to the start of preoperational testing. The schedule will be periodically updated to reflect actual progress. Schedule preparation will include an assessment of overlapping test program schedules between CPNPP Units 3 and 4 and provide assurance that CPNPP Unit 3 will be given priority during the period when testing and plant staff personnel will be working on both units. Periodic reviews of the schedules for CPNPP Units 3 and 4 will ensure that overlapping test program schedules do not result in significant divisions of responsibilities or dilutions of the staff implementing the test program.

Furthermore, the applicant replaced the third sentence of the last paragraph in Section 14.2.11 of the US-APWR DCD with the following paragraph in FSAR Section 14.2.11:

> Preoperational tests which satisfy inspections, tests analyses, and acceptance criteria (ITAAC) test requirements, and ITAAC test requirements which can be incorporated into preoperational tests, are correlated in Table 14.2-202. This correlation is used to assure that ITAAC test requirements are included in the development of preoperational testing procedures.

14.2.4.3 Individual Test Descriptions

- CP COL 14.2(10), STD COL 14.2(10)

The applicant provided additional information in CP COL 14.2(10) and Standard (STD) COL 14.2(10) to address US-APWR DCD COL Information Item 14.2(10), which states:

> The COL Applicant is responsible for the testing outside scope of the certified design in accordance with the test criteria described in Subsection 14.2.1.

The staff reviewed CP COL 14.2(10) and STD COL 14.2 (10), related to COL Information Item 14.2(10), included under FSAR Section 14.2.12, “Individual Test Descriptions.” The applicant replaced the last paragraph and bullet in US-APWR DCD Section 14.2.12 with the following in FSAR Section 14.2.12:

> Testing outside the scope of the certified design is addressed in Subsections 14.2.12.1.113, and 14.2.12.1.114. Additional testing for the Fire Protection System Preoperational Test is identified in Subsection 14.2.12.1.90. Table 14.2-201 shows the comprehensive list for the new added subsections.

In addition, the applicant replaced the sentence in Section 14.2.12.1.83.B.7 of the US-APWR DCD with the following paragraph in FSAR Section 14.2.12.1:

The condenser or existing waste water management Pond C or LWMS is available to receive discharge from the SG blowdown sampling system.

Furthermore, the applicant added the following new item after Item C.7 in US-APWR DCD Section 14.2.12.1.90 in FSAR Section 14.2.12.1.90:

8. Verify that local offsite fire departments utilize hose threads or adapters capable of connecting with onsite hydrants, hose couplings, and standpipe risers.

Furthermore, the applicant added new sections to the FSAR to address testing outside the scope of the certified design after the US-APWR DCD Section 14.2.12.1.111 as follows:

14.2.12.1.113 Ultimate Heat Sink (UHS) System Preoperational Test

A. Objectives

1. To demonstrate operation of the UHS cooling towers and associated fans, essential service water (ESW) pumps, and UHS transfer pumps.

2. With the basin at minimum level (end of the 30 day emergency period), to demonstrate that the ESW pumps and the UHS transfer pumps maintain design flow rates.

3. To demonstrate the operation of the UHS transfer pumps.

4. To demonstrate the operation of the UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, basin water level logic, and associated blowdown equipment.

B. Prerequisites

1. Required construction testing is completed.

2. Component testing and instrument calibration is completed.

3. Test instrumentation is available and calibrated.

4. Required support systems are available.

5. Required system flushing/cleaning is completed.

6. Required electrical power supplies and control circuits are energized and operational.

7. Makeup water to the UHS basins is available.

C. Test Method

1. System component control and interlock circuits and alarms are verified, including cooling tower fan logic, basin water level sensors, makeup water control, basin process chemical sensors, and blowdown control valves.

2. The performance of each ESW pump and UHS transfer pump are monitored as basin water level is decreased to the minimum water level (end of the 30 day emergency period).

3. Basin water level and chemistry controls are monitored during continuous operations in the water level and chemistry control mode using the ESW system (ESWS) blowdown feature.

4. The capability of the ESWS to provide water to the fire protection water supply system (FSS) is demonstrated by opening the isolation valves and obtaining a total flow of at least 150 gpm to the hose stations located in the R/B and ESWS pump house while maintaining required ESWS flows and pressures.

D. Acceptance Criteria

1. With the basin at minimum level (end of the 30 day emergency period), each ESW pump and UHS transfer pump maintain design flow rates.

2. UHS transfer pumps operate as discussed in Subsection 9.2.5.

3. UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, interlocks and associated blowdown equipment operate as discussed in Subsection 9.2.5.

4. ESWS maintains required flows and pressures while water is provided to the FSS as described in Subsection 9.2.1.3.

During its review of FSAR Section 14.2.12.1.113, the staff identified some areas where additional information was needed to assist the staff in reaching a final determination as to the acceptability of the UHS Preoperational Test as written. In its Request for Additional Information (**RAI**) **3790, Question 14.02-16**, dated September 30, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML092740209), the staff asked the applicant to provide more information on the UHS interlocks and their acceptance criteria. In its response to **RAI 3790, Question 14.02-16**, dated November 11, 2009 (ADAMS Accession Number ML093200501), the applicant stated that there are no interlocks associated with the UHS transfer pumps. The following statements described the changes the applicant made in response to the RAI. A test to demonstrate that the UHS transfer pumps maintain the design flow rates at the minimum water level at the end of the 30-day emergency period has been added to FSAR Section 14.2.12.1.113. FSAR Section 9.2.5.2.2, “System Operation,” discusses the automatic opening and closing of the makeup control valves at low UHS basin water level signals. FSAR Section 9.2.5.5 also discusses the operation of the blowdown control valves. A low UHS basin water level signal or emergency core cooling system (ECCS) actuation signal causes the valves to automatically close to preserve the ESWS cooling function during these conditions. Performance testing of

basin water level logic has been specified in Item A.4. As stated above, there are no UHS transfer pump interlocks, and the phrase mentioning the UHS transfer pump interlocks in C.1 and D.2 has been deleted. Performance testing of the UHS transfer pumps has been added as specified in Item C.2 and in the acceptance criteria described in D.1. A proposed change of FSAR Subsection 14.2.12.1.113 incorporated the above-noted changes.

The staff reviewed the applicant's response and found the proposed changes acceptable because the proposed change conforms to the guidance contained in RG 1.68 and RG 1.206. Furthermore, the staff confirmed that the applicant addressed the relevant information in Revisions 2 and 3 of the FSAR. However, the applicant revised its response to **RAI 3790, Question 14.02-16** dated June 7, 2012 (ADAMS Accession Number ML12163A013). As stated in the RAI response, there are no interlocks associated with the UHS transfer pumps, and the part describing interlocks in Objective 3 was deleted. The UHS transfer pumps are manually operated and administratively controlled. However, other interlocks exist within the UHS and ESWS, as described in FSAR Subsection 9.2.5.2.2, and are tested during the preoperational tests described within FSAR Test Abstract 14.2.12.113. As a result, demonstration of the operability of the system interlocks will be added to the test objectives within 14.2.12.1.113 A.4 (now A.3). The original Test Objective A.3 has been deleted, because it is encompassed by Test Objective A.1.

The essential service water (ESW) pump start logic and the ESW pump discharge motor-operated valve (MOV) (ESW-MOV-503 A, B, C, D) operating logic and interlocks are described in FSAR Subsection 9.2.5.2.2 and DCD Subsection 9.2.1.2.3.1. This interlock prevents water hammer from occurring and the pump from starting, if the associated discharge valve is not closed. FSAR Subsections 14.2.12.1.113, A.1, A.3, and D.3, have been revised to state the test objective to demonstrate operation, including interlock of the ESW pump and control logic of the ESW pump discharge valves.

The term "interlocks" used in each of these FSAR sections is not consistent with the typical definition. The position of the valves associated with the blowdown lines does not prevent the operation of the ESW pumps. FSAR Subsections 14.2.12.1.113, A.1, A.3, and D.3 describe the control functions to operate the components identified above and have been revised to remove the inconsistent use of "interlocks."

DCD Tier 2 Table 7.4-1 and FSAR Table 7.4-201 describe the control functions of the UHS and ESWS components for normal and safe shutdown.

Test Objective A.1 has been revised to include operation of associated ESW pump valves and UHS transfer pump valves. Test Objective A.3 has been clarified to test each of the logic and control functions and interlocks discussed in DCD and FSAR Sections 9.2.1 and 9.2.5.

The staff reviewed the applicant's response and found the proposed change conforms to the guidance contained in RG 1.68 and RG 1.206 and, therefore, is acceptable. However, FSAR Subsection 14.2.12.1.113 has not yet been updated to include the information provided in the response to the above question. Therefore, **RAI 3790, Question 14.02-16,** is identified as **Confirmatory Item 14.02-1,** and the staff will confirm that this information is included in FSAR, Revision 4.

In **RAI 6348, Question 09.02.01-6**, dated March 13, 2012 (ADAMS Accession Number ML12073A352) the staff asked the applicant to address specific testing for the ESWS net positive suction head (NPSH) and the pump vortex. In its response to **RAI 6348, Question**

09.02.01-6, dated May 31, 2012 (ADAMS Accession Number ML12153A237), the applicant stated that FSAR Section 14.2.12.1.113 has been revised to include that the ESWS pumps are to be tested to include NPSH verification and testing to verify no vortex formation including the lower water level in the basin at the end of the 30-day emergency period. The staff reviewed the applicant's response and found the proposed change conforms to the guidance contained in RG 1.68 and RG 1.206 and, therefore, is acceptable. However, FSAR Subsection 14.2.12.1.113 has not yet been updated to include the information provided in the response to the above question. Therefore, **RAI 6348, Question 09.02.01-6, is** identified as **Confirmatory Item 14.02-2,** and the staff will confirm that this information is included in FSAR, Revision 4**.**

In **RAI 6456, Question 14.02-20**, dated May 3, 2012 (ADAMS Accession Number ML12124A406), the staff asked the applicant to consider (1) how to verify the ability of the UHS in conjunction with the ESWS, residual heat removal system (RHRS), and the component cooling water system (CCWS) to perform a plant cooldown during hot functional testing and (2) how to verify that the ESWS-UHS has the capacity to remove the UHS peak heat loads. In its response to **RAI 6456, Question 14.02-20**, dated July 20, 2012 (ADAMS Accession Number ML12205A296), the applicant stated that FSAR Section 14.2.12.1.113 has been revised to include (1) the description of the UHS cooling tower heat removal performance test, which demonstrates the ability of the UHS to perform a plant cooldown; and (2) demonstrates that the UHS cooling towers can perform a cooldown function with actual plant loads in conjunction with the RHRS, CCWS, and ESWS, during hot functional testing (HFT) to cooldown the reactor coolant system (RCS). In addition, the UHS cooling towers performance for all conditions, including normal, abnormal, and design-basis accident (DBA) conditions, will be verified by analysis using the pre-operational test results and performance curves of the cooling towers. The staff reviewed the applicant's response and found the proposed change conforms to the guidance contained in RG 1.68 and RG 1.206 and, therefore, is acceptable. However, FSAR Subsection 14.2.12.1.113 has not yet been updated to include the information provided in the response to the above question. Therefore, **RAI 6456, Question 14.02-20,** is identified as **Confirmatory Item 14.02-3,** and the staff will confirm that this information is included in FSAR Revision 4.

In **RAI 6457, Question 14.02-21**, dated May 3, 2012 (ADAMS Accession Number ML12124A408), the staff asked the applicant to better define the performance testing for heat removal capability in the following areas: (1) water hammer, (2) void detection system, (3) UHS operation with various power supplies, (4) freeze protection, (5) UHS transfer pumps NPSH, and (6) speed and direction of the UHS fans. In its response to **RAI 6457, Question 14.02-21**, dated June 21, 2012 (ADAMS Accession Number ML12174A248), the applicant stated that FSAR Section 14.2.12.1.113 has been revised to include testing of the areas identified above. The staff reviewed the applicant's response and found the proposed change conforms to the guidance contained in RG 1.68 and RG 1.206 and, therefore, is acceptable. However, FSAR Subsection 14.2.12.1.113 has not yet been updated to include the information provided in the response to the above question. Therefore, **RAI 6457, Question 14.02-21** is identified as **Confirmatory Item 14.02-4,** and the staff will confirm that this information is included in FSAR Revision 4**.**

14.2.12.1.114 UHS ESW Pump House Ventilation System Preoperational Test

A. Objectives

1. To demonstrate operation of the UHS ESW pump house ventilation system.

B. Prerequisites

1. Required construction testing is completed.

2. Component testing and instrument calibration are completed.

3. Test instrumentation is available and calibrated.

4. Required support systems are available.

C. Test Method

1. Simulate interlock signals for each exhaust fan and unit heater and verify operation and annunciation.

2. Verify that alarms and status indications are functional.

3. Verify design airflow.

4. Verify position of the backdraft dampers with the ventilation system operating and not operating.

D. Acceptance Criteria

1. UHS ESW pump house ventilation system operates on the proper signal (see Subsection 9.4.5).

2. All alarms annunciate properly.

3. The backdraft dampers are closed with no airflow and open with airflow under normal and emergency conditions.

FSAR Subsection 14.2.12.1.114 was evaluated as part of the staff's safety evaluation for FSAR Chapter 9, "Auxiliary Systems," Section 9.4.5, "Engineered Safety Feature Ventilation System," Subsection 9.4.5 "Inspection and Testing Requirements (including Preoperational Testing and ITAAC)." This safety evaluation was issued July 19, 2013 (ADAMS Accession Number ML13199A311).

14.2.4.4 Preoperational and/or Startup Testing for Unique or First-of-a-Kind Principal Design Features and Natural Circulation Testing

- STD COL 14.2(11)

The applicant provided additional information in STD COL 14.2(11) to address US-APWR COL Information Item 14.2(11), which states:

> The COL holder for the first plant is to perform the first plant only test and prototype test. For subsequent plants, either these tests are performed, or the

> COL Applicant provides a justification that the results of the first plant only tests are applicable to the subsequent plant and are not required to be repeated.

The staff reviewed STD COL 14.2(11), related to COL Information Item 14.2(11), included under Section 14.2.8.1, "Preoperational and/or Startup Testing for Unique or First-of-a-Kind Principal Design Features," and Section 14.2.8.2.1, "Natural Circulation Testing" of the FSAR. The applicant replaced the last paragraph in the US-APWR DCD Section 14.2.8.1 with the following paragraph in FSAR Section 14.2.8.1:

> First-plant-only and prototype test are either performed in accordance with Subsection 14.2.8 or a justification is provided prior to initial fuel loading that the results of the First-plant-only test and prototype test are applicable to a subsequent plant and are not required to be repeated.

In addition, the applicant added the following text at the end of US-APWR DCD Section 14.2.8.2.1 in FSAR Section 14.2.8.2.1:

> Natural circulation test is performed in accordance with Subsection 12.2.12.2.3.9 or a justification is provided based on Subsection 14.2.8.2.1 prior to initial fuel load that the results of the US-APWR prototype test are applicable to a subsequent plant and are not required to be repeated.

14.2.4.5 Test Procedures

- STD COL 14.2(12)

The applicant provided additional information in STD COL 14.2(12) to address US-APWR COL Information Item 14.2(12), which states:

> The COL holder makes available approved test procedures for satisfying requirements described in Section 14.2 to the NRC approximately 60 days prior to their intended use.

The staff reviewed STD COL 14.2(12), related to COL Information Item 14.2(12), included under Section 14.2.3, "Test Procedures," of the FSAR. The applicant added the following sentence at the end of US-APWR DCD Section 14.2.3 in FSAR Section 14.2.3:

> Approved test procedures for satisfying testing requirements of Section 14.2 are made available to the NRC approximately 60 days prior to their intended use.

14.2.4.6 Conformance to Regulatory Guides

In FSAR Section 1.9, "Compliance with Regulatory Criteria," the applicant addresses conformance with NRC RGs in Table 1.9-201, "Comanche Peak Nuclear Power Plant Units 3 & 4 Conformance with Division 1 Regulatory Guides." In this table, the applicant states that the CPNPP, Units 3 and 4 designs conforms to the following RGs, with exceptions as noted below:

- RG 1.8, Revision 3. Exception taken: Criterion 2: The minimum qualification requirement of the plant staff conforms to CPNPP, Units 3 and 4, TS and Chapter 13 and QA conforms to quality assurance program description (QAPD).

- RG 1.16, "Reporting of Operating Information-Appendix A Technical Specifications," Revision 4. Exception taken: CPNPP, Units 3 and 4, conform to 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors," and 10 CFR 50.73, "Licensees Event Report System," and TS requirements.

- RG 1.28, "Quality Assurance Program Requirements (Design and Construction)," Revision 3. Exception taken: QAPD conforms to NUREG-0800 (SRP) Section 17.5 and NQA-1, 1994 Edition.

- RG 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment," Revision 0. Exception taken: QAPD conforms to NUREG-0800 (SRP) Section 17.5 and NQA-1, 1994 Edition.

- RG 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems," Revision 0-R. Exception taken: QAPD conforms to NUREG-0800 (SRP) Section 17.5 and Subpart 2.8 of NQA-1, 1994 Edition.

Upon review of the exceptions taken to RGs that are applicable to FSAR Section 14.2, the staff identified the following areas where additional information is needed. The following describes the specific issues identified by the staff:

In **RAI 4681, Question 14.02-18**, dated May 19, 2010 (ADAMS Accession Number ML101390551), the staff asked the applicant to revise and update Table 1.9-201 of the FSAR to include the correct sections of 14.2 and to clearly state and justify the exceptions taken to the RGs applicable to Section 14.2. In its response to **RAI 4681, Question 14.02-18**, dated June 25, 2010 (ADAMS Accession Number ML101810450), the applicant stated that Table 1.9-201 cross-references include DCD sections that are incorporated by reference into the FSAR.

In addition, the applicant justified the exception taken to the RGs applicable to Section 14.2 as follows:

> RG 1.8, Qualification and Training of Personnel for Nuclear Power Plants
>
> The exception to RG 1.8 Revision 3 is not specific to the ITP, but it is addressed in TS [technical specification] 5.3.1, which states that "Licensed Senior Reactor Operators and licensed Reactor Operators shall meet or exceed the minimum qualifications of RG 1.8, Revision 3, May 2000."
>
> RG 1.16, Reporting of Operating Information - Appendix A Technical Specifications (Rev. 4, August 1975)
>
> RG 1.16 was withdrawn by the NRC on August 11, 2009, and the exception taken is no longer applicable to the FSAR.

RG 1.28, Quality Assurance Program Requirements (Design and Construction) (Rev. 3,
August 1985)

RG 1.28 Revision 3 endorses ANSI/ASME NQA-1-1983 and ANSI/ASME NQA-1a-1983 Addenda, subject to additions and modifications as described in RG 1.28. The Quality Assurance Program (QAP) for CPNPP Units 3 and 4 is based on NQA-1 -1994, "Quality Assurance Requirements for Nuclear Facility Applications." The exception to RG 1.28 identified in FSAR Table 1.9-201 reflects the use of more recent standards for the QAPD and is not specific to FSAR Section 14.2.

RG 1.30, Quality Assurance Requirements for the Installation, Inspection, and Testing of
Instrumentation and Electric Equipment (Safety Guide 30) (Rev. 0, August 1972)

RG 1.30 (Safety Guide 30) is based on ANSI N45.2.4-1972 and ANSI N45.2-1971. The QAPD for CPNPP Units 3 and 4 is based on NQA-1 -1994. The exception to Safety Guide 30 identified in FSAR Table 1.9-201 reflects the use of more recent standards for the QAP and is not specific to FSAR Section 14.2.

RG 1.116, Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems (Rev. 0-R, May 1977)

RG 1.116 is based on ANSI N45.2.8-1975. The exception to RG 1.116 identified in FSAR Table 1.9-201 reflects the use of NQA-1 -1994 Subpart 2.8, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for Nuclear Power Plants," which is referenced by NUREG-0800 Section 17.5 Acceptance Criterion II.U.2.e.

The staff reviewed the applicant's response and found the proposed exceptions acceptable because they are consistent with the guidance contained in RG 1.68.

14.2.4.7 Discussion of Operational Program – License Conditions

As stated in FSAR Chapter 13, Table 13.4-201, "Operational Programs Required by NRC Regulation and Program Implementation," the applicant has proposed the following license condition for the ITP:

- **License Condition (14-1)** – The licensee shall implement the initial test program on or before the associated milestones identified below:

    1. Prior to the first construction test for the Construction Test Program.

    2. Prior to the first preoperational test for the Pre-operational Test Program.

    3. Prior to the initial fuel loading for the Startup Test Program.

Operational programs are specific programs required by regulations and are listed in FSAR Chapter 13, Table 13.4-201. The Environmental Qualification program is a fully described program as discussed in SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," dated October 28, 2005. As such, the applicant's proposed license condition above is acceptable.

To address COL Information Items 14.2(2), 14.2(7), 14.2(10), 14.2(11), and 14.2(12), the COL applicant provided supplemental information in Section 14.2.13 of the FSAR. The staff reviewed the applicant's supplemental information and reviewed the proposed commitments. Although the staff agreed that the provision of the documents described in each of the COL Information Items is necessary, it determined that these post-COL items would be more appropriately captured, in part, as license conditions in accordance with RG 1.206 Regulatory Position C.III.4.3, Item (3). In **RAI 4682, Question 14.02-19**, dated August 25, 2010 (ADAMS Accession Number ML102371306), the staff stated that certain post-COL items in FSAR Section 14.2.13, "COL Information Items," would be subject to license conditions and requested the applicant to inform the staff whether or not the proposed standard license conditions are considered appropriate to support the FSAR.

In its response to **RAI 4682, Question 14.02-19**, dated November 24, 2010 (ADAMS Accession Number ML103340109), the applicant provided comments on the staff's proposed license conditions and stated that the appropriate way to establish these items in the FSAR is either to provide them by letter as regulatory commitments or to include them in the FSAR. The staff reviewed the applicant's response and found that including the license conditions as regulatory commitments in a letter or including them in the FSAR does not meet RG 1.206, Regulatory Position C.III.4.3, Item (3). Furthermore, the staff found that, as currently written, COL Information Items 14.2(2), 14.2(7), 14.2(10), 14.2(11), and 14.2(12) do not contain the necessary attributes to achieve sufficient oversight by the licensee management and ensure adequate and timely notification to the NRC. The staff also requested that the applicant include these license conditions in the next revision of its COLA.

Therefore, the staff plans to impose the following license conditions to address COL Information Items 14.2(2), 14.2(7), 14.2(10), 14.2(11), and 14.2(12).

- <u>License Condition for Pre-operational and Startup Test Specifications and Procedures, US-APWR DCD Section 14.2.13, COL Information</u>

  During the post-licensing period, pre-operational and startup test specification and test procedures will be subject to a license condition for NRC inspections to verify that the licensee implements the ITP. This process will allow for the performance of necessary plant as-built inspections and walk downs. The licensee will make available to onsite NRC inspectors preoperational and startup test specifications and test procedures prior to their intended use. Therefore, the staff plans to impose License Condition (14-2) below.

  - **License Condition (14-2) –** No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors (NRO) a schedule that supports planning and conduct of NRC inspections of the approved pre-operational and startup procedures (including the site-specific startup administration manual). The schedule shall be updated every six months until the approved preoperational and startup procedures have been implemented.

Prior to initiating the ITP, the approved pre-operational and startup procedures (including the site-specific startup administration manual) shall be available.

- License Condition for the Power Ascension Test Phase, US-APWR DCD Section 14.2.13, COL License Information, COL Item 14.2,

Certain milestones in the startup testing phase of the ITP should be controlled through this license condition to ensure that the designated licensee management reviews, evaluates, and approves relevant test results before proceeding to the power ascension test phase. As such, the staff plans to impose the following license conditions below.

- **License Condition (14-3)** – Pre-operational Testing

  Following completion of pre-operational testing, the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

Pre-critical and Criticality Testing:

1. Following completion of pre-critical and criticality, the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of pre-critical and criticality testing. Upon submission of this notification, the licensee is authorized to perform low-power testing as described in the FSAR and operate the facility at reactor steady-state core power levels, not in excess of five-percent power in accordance with the conditions specified herein.

Low-Power (<five-percent Rated Thermal Power) Testing:

1. Following completion of low-power testing (<five-percent rated thermal power), the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of low-power testing. Upon submission of this notification, the licensee is authorized to perform power ascension testing as described in the FSAR and operate the facility at reactor steady-state core power levels, not in excess of 100-percent power in accordance with the conditions specified herein.

At-Power (five-percent – 100-percent Rated Thermal Power) Testing

1. Following completion of at-power testing (at or above five-percent rated thermal power up to and including testing at 100-percent rated thermal power), the licensee shall review and evaluate individual test results and confirm the test

results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of at-power testing.

- **License Condition (14-4)** – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the operational program (ITP). The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until this operational program (ITP) has been fully implemented.

- License Condition for Changes to the Initial Startup Test Program

  - **License Condition (14-5)** - Within one month of a change, any changes to the Initial Startup Test Program described In Chapter 14 of the CPNPP, Units 3 and 4, COL FSAR made in accordance with the provisions of 10 CFR 50.59, "Changes, Tests, and Experiments," or Section VIII, "Processes for Changes and Departures," of the Appendix for the US-APWR DCD to 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," shall be reported in accordance with 10 CFR 50.59(d).

As discussed in Secretary of the Commission Paper (SECY)-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," a COL applicant should provide schedules for implementation milestones for operational programs. SECY-05-0197 also states that that maintaining NRC inspection schedules will be critical to ensuring that the Commission has timely information on operational readiness. The staff intends to impose the above license conditions to support its plans to inspect operational programs and their implementation as they are developed to ensure these programs are being implemented consistent with the FSAR. As such, the staff closed **RAI 4682 Question 14.02-19** because the staff's concern is resolved with the imposed License Conditions.

14.2.4.8 Review of Radiation Protection Program

This review was limited to aspects of the radiation protection program. The staff reviewed FSAR Section 14.2.12 "Individual Test Descriptions", including Table 14.2-201 "Comprehensive Listing of Additional Tests." In addition, in FSAR Section 14.2.1, the applicant provided the following:

COL Information Item:

> COL 14.2(10): The COL applicant is responsible for the testing outside the scope of the certified design in accordance with the test criteria described in Subsection 14.2.1 [14.2.12].

The applicant's response to CP COL 14.2(10) site-specific ITAAC abstracts states that this COL Information Item is addressed in FSAR Subsections 14.2.12.1.90.C.8, 14.2.12.1.112, 14.2.12.1.113, and 14.2.12.1.114, Table 14.2-201, and Appendix 14A. The staff noted that as

part of the response to CP COL 14.2(10), Subsection 14.2.12.1.112, "Personnel Monitors and Radiation Survey Instruments Preoperational Test," was added to Table 14.2-201.

The staff reviewed the information provided by the applicant in FSAR Subsection 14.2.12.1.112, "Additional TMI-related requirements." Issues addressed in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," 10 CFR 50.34(f)(2)(xxvii), and NUREG-0737, "Clarification of TMI Action Plan Requirements," Task Action Plan Item II1.D.3.3, require licensees to provide monitoring of in-plant iodine airborne radioactivity. DCD Tier 2, Table 7.5-3, "PAM Variables," notes that portable air sampling instruments with onsite analysis instrumentation should have a range of 1.0E-9 micro Curies per cubic centimeter (uCi/cc) to 1.0E-3 uCi/cc for particulates and radio halogens. This table also notes that portable radiation survey instruments should have ranges of 1.0 E-3 to 1.0 E4 Roentgens/hour (R/h) photon, and 1.0 E-3 to 1.0 E4 rads/h beta and low-energy photons. However, FSAR Subsection 14.2.12.1.112, "Personnel Monitors and Radiation Survey Instruments Preoperational Tests," does not provide any guidance or acceptance criteria regarding the sensitivity and range of portable and laboratory instruments used for radiation protection. Therefore, in **RAI 3593, Question 14.02-9**, the staff asked the applicant to include in Subsection 14.2.12.1.112, acceptance criteria demonstrating that the instruments can accurately respond to the required levels of radioactivity. The applicant's response to **RAI 3593, Question 14.02-9,** dated November 5, 2009, committed to changing FSAR Subsection 14.2.12.1.112 to include acceptance criteria verifying that (1) the range of portable and laboratory instruments used for radiation protection meet the required instrument ranges specified in Table 7.5-3, "Post Accident Monitoring (PAM) Variables" and that (2) calibrations have been performed in accordance with the radiation protection program. However, the applicant's response to **RAI 4209, Question, 14.02.01-1,** dated February 22, 2010, stated that consistent with the actions of other applicants, FSAR Subsection 14.2.12.1.112 has been deleted, and the information regarding the ranges of survey instruments would be addressed as part of the radiation protection program described in FSAR Section 12.5, "Operational Radiation Protection Program." The staff confirmed that, FSAR Revision 2, deleted references to Subsection 14.2.12.1.112. The staff's evaluation of the applicant's response to **RAI 4209, Question 14.02.01-1,** is discussed below. The applicant committed to using NEI 07-03A, "Generic DCD Template Guidance for Radiation Protection Program Description," to describe the radiation protection program elements described in SRP Section 12.5, "Operational Radiation Protection Program." The staff has reviewed NEI 07-03A (ADAMS Accession Number ML091490684) and found it to be acceptable. The staff confirmed that NEI 07-03A adequately describes the ranges of instrumentation described in NUREG-0737,"Clarification of Three Mile Island (TMI) Action Plan Requirements" Task Action Plan Item II1.D.3.3. The staff confirmed that FSAR Revision 2, Section 12.5 includes the commitment to use the radiation protection program described in NEI 07-03A. Therefore, **RAI 3593-86, Question 14.02-9, is resolved and closed**.

10 CFR 50.34(f)(2)(xxvi) [NUREG-0737, III.D.1.1] requires leakage control and detection for systems outside containment that might contain highly radioactive fluids, and requires applicants to submit a leakage control program, including an ITP and a schedule for retesting systems. DCD Tier 2, Chapter 16, Section 5.5.2, "Primary Coolant Sources Outside Containment," notes the requirement for a leakage minimization program for systems outside containment that might contain highly radioactive fluids. Since neither FSAR Section 14.2.12.1, "Preoperational Tests," nor FSAR Table 14A-201, "Conformance Matrix of RG 1.68 Appendix A Guidance versus Added Test Abstracts in the FSAR," discuss testing these systems for leakage in accordance with NUREG-0737, III.D.1.1, in **RAI 3593, Question 14.02-10,** the staff asked the applicant to include pre-operational testing of the systems outside containment that could contain highly radioactive fluids. The applicant's response to **RAI 3593, Question 14.02-10,**

dated November 5, 2009**,** stated that the program described in TS Section 5.5.2, Primary Coolant Sources Outside Containment, will be initiated during Hot Functional Testing to establish the baseline for the periodic leak testing program and that DCD Subsection 14.2.12.1.1, "RCS Hot Functional Preoperational Test" had been revised to include the requested activity. Based on the conformance of the response to the guidance provided in NUREG-0737, the staff finds applicant's response acceptable. The staff confirmed that, US-APWR DCD, Subsection 14.2.12.1.1, Revision 2, has been updated to include the information provided in the response to the above question. Therefore, **RAI 3593, Question 14.02-10, is resolved and closed.**

The guidance contained in RG 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," notes that 10 CFR Part 50, Appendix B, requires a test program to ensure that all SSCs will perform satisfactorily in service. RG 1.68 Position 1(c) notes that tests should be provided for those systems that address limiting conditions for operation (LCOs) included in TS. Radiation monitoring systems are an integral part of the NEI 97-06, "Steam Generator Program Guidelines," program, Electric Power Research Institute (EPRI), implementing documents used to demonstrate compliance with the primary-to-secondary leakage program specifications identified in TS Subsection 3.4.13, and DCD Section 5.4.2.2, "Steam Generator Program." Neither FSAR Section 14.2.12.1, "Preoperational Tests", nor FSAR Table 14A-201, "Conformance Matrix of RG 1.68, Appendix A, Guidance versus Added Test Abstracts in the FSAR," discuss verifying that the systems used to demonstrate compliance with the NEI 97-06 steam generator leakage detection criteria, have the required detection sensitivity described in the implementing EPRI documents. Therefore, in **RAI 3593, Question 14.02-11** the staff asked the applicant to revised FSAR Section 14.2 to require demonstrating that the primary-to-secondary leakage monitoring instruments have the required sensitivity. The applicant's response to **RAI 3593, Question 14.02-11,** dated November 5, 2009, stated that verification that the instrument sensitivities meet the specification is confirmed during the procurement process, and committed to changing US-APWR DCD Subsection 14.2.12.1.78, Item B.3 to verify that calibration of these instruments has been performed. Based on the conformance of the response to the guidance provided in the Steam Generator Program documents, the staff finds applicant's response acceptable. The staff confirmed that, US-APWR DCD Subsection 14.2.12.1.78, Revision 2 has been updated to include the information provided in the response to the above question. Therefore, the staff concludes that **RAI 3593, Question 14.02-11, is resolved and closed.**

The guidance contained in RG 1.206 C.1.12.5(1)(c) states that the applicant should have adequate types of instruments, including supporting laboratory instruments, to meet the requirements of 10 CFR 20.1501 for performing surveys for monitoring and control of personnel radiation exposure. The guidance contained in RG 1.68 (Appendix A, Section 1.k (Preoperational Testing-Radiation Protection Systems)) identifies "laboratory equipment used to analyze or measure radiation levels and radioactivity concentrations" as one of the system types that should receive pre-operational testing to demonstrate proper operation. While DCD Tier 2, Subsection 14.2.12.1.84, addresses the performance of laboratory equipment associated with post-accident sample analysis, neither the DCD nor FSAR Section 14.2.12.1.112 "Personnel Monitors and Radiation Survey Instruments Preoperational Tests", STD COL 14.2(10), addresses testing of radiation protection laboratory equipment, such as whole-body counters, and radiation protection air sample counting instruments. Therefore, in **RAI 3593, Question 14.02-12,** the staff asked the applicant to include site-specific, pre-operational tests for laboratory equipment in FSAR Section 14.2.12.1. The applicant's response to **RAI 3593, Question 14.02-12**, dated November 5, 2009, stated that the changes to the FSAR made in response to **RAI 3593, Question 14.02-9,** dated November 5, 2009, addressed this question.

However, the applicant's response to **RAI 4209 Question 14.02.01-1,** dated February 22, 2010, stated that consistent with the actions of other applicants, FSAR Subsection 14.2.12.1.112 has been deleted, and the information regarding the calibration of radiation protection instruments would be addressed as part of the radiation protection program described in FSAR Section 12.5 "Operational Radiation Protection Program." The staff confirmed that, FSAR Revision 2, deleted references to Subsection 14.2.12.1.112. The staff's evaluation of the applicant's response to **RAI 4209, Question 14.02.01-1,** is discussed below. The applicant committed to using NEI 07-03A "Generic DCD Template Guidance for Radiation Protection Program Description" to describe the radiation protection program elements described in SRP Section 12.5. The staff has reviewed NEI 07-03A (ADAMS Accession Number ML091490684) and found it to be acceptable. The staff confirmed that NEI 07-03A, in conjunction with the response to **RAI 4209 Question, 14.02.01-1,** adequately describes the calibration of radiation protection instrumentation. The staff confirmed that FSAR Revision 2, Section 12.5 includes the commitment to use the radiation protection program described in NEI 07-03A. Therefore, **RAI 3593, Question 14.02-12, is resolved and closed**.

The guidance contained in RG 1.68 "Initial Test Programs for Water-Cooled Nuclear Power Plants" states that 10 CFR 50 Appendix B requires a test program to ensure that all SSCs will perform satisfactorily in service and the guidance in RG 1.206 C.1.14.2.3 states that the COL applicant should describe the types and sources of design performance requirements used to develop the testing procedures. Because FSAR Section 14.2.12.1.112 "Personnel Monitors and Radiation Survey Instruments Preoperational Tests" states that tests verify the operability of the radiation monitoring system, including alarms, where applicable but did not discuss the radiation system sensitivity, as it relates to establishing statistically valid and functionally useful alarms (high confidence of activity present on an alarm, along with a low [e.g. 1/10,000] false alarm rate), under expected field conditions, in **RAI 3593, Question 14.02-13,** the staff asked the applicant to include criteria for verifying that the alarm provisions of the instrument are functionally viable. The applicant's response to **RAI 3593, Question 14.02-13,** dated November 5, 2009, stated that the instrument setpoints are determined during design and adjusted to plant conditions by the operational radiation protection program described in FSAR Section 12.5. The applicant committed to changing FSAR Subsection 14.2.12.1.112 to specify that instrument calibrations be performed in accordance with the radiation protection program. However, the applicant's response to **RAI 4209, Question 14.02.01-1,** dated February 22, 2010, stated that consistent with the actions of other applicants, FSAR Subsection 14.2.12.1.112 has been deleted, and the information regarding the calibration of radiation protection instruments would be addressed as part of the radiation protection program described in FSAR Section 12.5 "Operational Radiation Protection Program." The staff confirmed that, FSAR Revision 2, deleted references to Subsection 14.2.12.1.112. The staff's evaluation of the applicant's response to **RAI 4209, Question 14.02.01-1,** is discussed below. The applicant committed to using NEI 07-03A "Generic DCD Template Guidance for Radiation Protection Program Description" to describe the radiation protection program elements described in SRP Section 12.5. The staff has reviewed NEI 07-03A (ADAMS Accession Number ML091490684) and found it to be acceptable. The staff confirmed that NEI 07-03A, in conjunction with the response to **RAI 4209, Question 14.02.01-1,** adequately describes the calibration of radiation protection instrumentation. The staff confirmed that FSAR Revision 2, Section 12.5 includes the commitment to use the radiation protection program described in NEI 07-03A. Therefore, the staff concludes that **RAI 3593 Question 14.02-13 is resolved and closed**.

10 CFR 20.1501(b) requires that instruments used for radiation measurements be periodically calibrated. The guidance contained in NUREG-1736 "Consolidated Guidance: 10 CFR Part 20 - Standards for Protection against Radiation" notes that this is normally done by adjusting an

instrument response to reflect the value from a known standard. The guidance contained in SRP Section 14.2 “Initial Plant Test Program - Design Certification and New License Applicants,” states that each licensee should perform, or permit the Commission to perform, tests of radiation detection and monitoring instruments. NRC Information Notice No. 93-30: “NRC Requirements for Evaluation of Wipe Test Results; Calibration of Count Rate Survey Instruments” notes that the licensee must demonstrate that the instrument is calibrated to make measurements and sufficiently sensitive to meet the applicable regulatory requirements in 10 CFR Part 20. Information related to calibration methods for instruments can be found in the instrument manufacturer's guidance, however, the licensee, not the instrument manufacturer, is responsible for demonstrating that the instrument and method used are sensitive enough to meet NRC regulatory requirements. The applicant is relying on NEI 07-03A “Generic DCD Template Guidance for Radiation Protection Program Description” to describe the radiation protection program elements described in SRP Section 12.5. While NEI 07-03A discusses radiation protection instrument calibration, NEI 07-03A does not specifically address the process to be used to ensure that calibration of portable and laboratory instruments is performed using national or international standards guidance. Extensive guidance is available in the national and international community regarding the selection and calibration of radiation protection instrumentation. None of these standards or standards organization is referenced as the basis for portable and laboratory radiation protection instrument calibration. FSAR Section 14.2.12.1.112, “Personnel Monitors and Radiation Survey Instruments Preoperational Test', states that instruments would be calibrated in accordance with vendor instructions. Vendor calibration procedures may optimize instrument function and response to conditions that are not representative of the power plant environment. Because the licensee is required to determine the appropriate standards to be used as the basis for instrument calibration, in **RAI 3593 Question 14.02-14** the staff asked the applicant to include the use of consensus standards, in addition to vendor recommendations, as part of the method of calibration of portable and laboratory radiation protection instrumentation. The applicant’s response to **RAI 3593 Question 14.02-14,** dated November 5, 2009, stated that the radiation protection program described in FSAR Section 12.5 references NEI 07-03A, which in turn references the appropriate consensus standards. It was not clear to the Staff which consensus standards the applicant would utilize to define the calibration methods for the following types of radiation protection instrumentation and standards:

- Portable radiation survey instruments;
- Laboratory Proportional detectors;
- Laboratory scintillation detectors;
- High Resolution Gamma spectroscopy systems;
- Whole Body counting systems;
- Portal radiation monitors;
- Portable Continuous Air Monitoring;
- Personnel Contamination Monitors;
- Personnel Electronic dosimeters;
- Portable RP Instrument calibration facility sources and standards.

Because the applicant did not clarify the consensus standards used to define the calibration methods in its response to **RAI 3593 Question 14.02-14,** this question is considered closed. Therefore, the staff issued **RAI 4209, Question 14.02.01-1**, and asked the applicant to provide additional clarification regarding the use of industry consensus standards, in addition to vendors’ recommendations, as the basis for instrument calibrations. The applicant’s response to **RAI 4209, Question 14.02.01-1,** dated February 22, 2010, committed to adding new FSAR Table

12.5-202 “Calibration Guidance for Personnel Monitors, Radiation Survey Instruments and Laboratory Equipment” in order to identify the consensus standards utilized to define the calibration methods for each item listed in this question. In addition, the applicant’s response to this question stated that consistent with the actions of other applicants, FSAR Subsection 14.2.12.1.112 has been deleted, and the information regarding radiation protection instruments would be addressed as part of the radiation protection program described in FSAR Section 12.5 “Operational Radiation Protection Program.” The applicant committed to using NEI 07-03A “Generic DCD Template Guidance for Radiation Protection Program Description” to describe the radiation protection program elements described in SRP Section 12.5. The staff has reviewed NEI 07-03A (ADAMS Accession Number ML091490684) and found it to be acceptable. The staff confirmed that FSAR Revision 2, Section 12.5 includes the commitment to use the radiation protection program described in NEI 07-03A. The staff confirmed that NEI 07-03A, in conjunction with the commitment contained in the response to **RAI 4209, Question 14.02.01-1,** adequately describes the selection and calibration of radiation protection instrumentation. Based on the conformance of the response to the guidance provided in NUREG-1736, the staff finds applicant’s response acceptable. The staff has confirmed that FSAR Section 12.5, Revision 2, includes Table 12.5-202, therefore the staff concludes that **RAI 4209, Question 14.02.01-1,** is resolved and closed.

The staff finds, for the reasons set forth above, that the applicant’s description of their initial plant test programs, conform with the guidance contained in SRP Sections 14.2 “Initial Plant Test Program - Design Certification and New License Applicants” and RG 1.206, Section C.III.1, Chapter 14, C.I.14.2.1, “Summary of Test Program and Objectives.”

14.2.5 Post-Combined License Activities

- **License Condition (14-1)** – The licensee shall implement the initial test program on or before the associated milestones identified below:

1. Prior to the first construction test for the Construction Test Program.

2. Prior to the first preoperational test for the Preoperational Test Program.

3. Prior to the initial fuel loading for the Startup Test Program.

- **License Condition (14-2) –** No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors (NRO) a schedule that supports planning and conduct of NRC inspections of the approved preoperational and startup procedures (including the site-specific startup administration manual). The schedule shall be updated every six months until the approved preoperational and startup procedures have been implemented. Prior to initiating the initial test program, the approved preoperational and startup procedures (including the site-specific startup administration manual) shall be available.

- **License Condition (14-3)** – Pre-operational Testing

  Following completion of pre-operational testing, the licensee shall review and evaluate individual test results and confirm the test results are within the range of

acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

Pre-critical and Criticality Testing:

1. Following completion of pre-critical and criticality, the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of pre-critical and criticality testing. Upon submission of this notification, the licensee is authorized to perform low power testing as described in the FSAR and operate the facility at reactor steady state core power levels, not in excess of five-percent power in accordance with the conditions specified herein.

Low-Power (<five percent Rated Thermal Power) Testing:

1. Following completion of low-power testing (<five percent rated thermal power), the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of low- power testing. Upon submission of this notification, the licensee is authorized to perform power ascension testing as described in the FSAR and operate the facility at reactor steady state core power levels, not in excess of 100-percent power in accordance with the conditions specified herein.

At-Power (five percent – 100 percent rated thermal Power) Testing:

1. Following completion of at-power testing (at or above five-percent rated thermal power up to and including testing at 100 percent rated thermal power), the licensee shall review and evaluate individual test results and confirm the test results are within the range of acceptable values predicted or otherwise confirm that the tested systems perform their specific functions in accordance with the FSAR.

2. The licensee shall provide written notification to the Director of NRO upon completion of at - power testing.

- **License Condition (14-4)** – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of NRO a schedule that supports planning for and conduct of NRC inspections of the operational program (ITP). The schedule shall be updated every six months until 12 months before scheduled fuel loading, and every month thereafter until this operational program (ITP) has been fully implemented.

- **License Condition (14-5)** - Within one month of a change, any changes to the Initial Startup Test Program described In Chapter 14 of the CPNPP, Units 3 and 4, FSAR made in accordance with the provisions of 10 CFR 50.59, "Changes, tests, and experiments," or Section VIII, "Processes for Changes and Departures of the Appendix, for the US-APWR DCD, to 10 CFR Part 52, "Licenses, certifications, and approvals for nuclear power plants," shall be reported in accordance with 10 CFR 50.59(d).

14.2.6 Conclusions

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to the initial plant test program, and that except for the Confirmatory Items, there is no outstanding information expected to be addressed in the FSAR related to this section.

The staff is reviewing the information in DCD Section 14.2 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to the initial plant test program incorporated by reference in the FSAR will be documented in the staff's SER on the Design Certification (DC) application for the US-APWR design. The staff will update Section 14.2 of this SER to reflect the final disposition of the DC application.

Based on the information in the FSAR, Section 14.2, the information incorporated by reference from Section 14.2 of the US-APWR FSAR, Revision 3, and the information proposed by the applicant, the staff determined that the applicant:

1. provided sufficient information related to the objectives of the ITP,

2. provided sufficient information related to organization, staffing, and responsibilities to establish the adequacy of the applicant's plans for personnel participation during the implementation of the ITP,

3. described an acceptable method for activities related to test specifications and test procedures, conduct of the ITP, and review, evaluation, and approval of test results,

4. described an acceptable method for the consideration of reactor operating and testing experience,

5. described an acceptable method for the trial use of plant operating, emergency, and surveillance procedures,

6. described an acceptable method for the development of the initial test program schedule, and

7. provided test abstracts for site-specific SSCs that are consistent with the guidance and applicable regulatory positions of RG 1.26, and RG 1.68.

The staff has concluded that, except for the Confirmatory Items identified in the Technical Evaluation section, the relevant information presented within the FSAR meets the acceptance criteria in Section 14.2 of NUREG-0800, RG 1.26, and RG 1.68 and describes an acceptable ITP that, when successfully completed, will demonstrate the functional adequacy of plant SSCs,

and will meet the requirements of 10 CFR 52.79(a)(28) and Criterion XI of Appendix B to 10 CFR Part 50.

14.3 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

14.3.1 Selection Criteria and Methodology

14.3.1.1 Introduction

This section evaluates the ITAAC for the COLA under 10 CFR Part 52. The overall review approach ensures that the complete facility is verified and that the ITAAC are necessary and sufficient to verify conformance with the applicable regulations (10 CFR 52.97(b)).

The type of information and the level of detail included in ITAAC are based on a graded approach commensurate with the safety significance of the SSCs for the design. The top-level information selected should include the principal performance characteristics and safety functions of the SSCs and should be verified appropriately by ITAAC. Design-specific and unique features of the facility should be considered carefully for inclusion in an ITAAC.

14.3.1.2 Summary of Application

Section 14.3 of the CPNPP, Units 3 and 4, FSAR, Revision 3, incorporates by reference Section 14.3 of the US-APWR DCD, Revision 3.

In addition, in FSAR Section14.3, the COL applicant provided the following:

US-APWR COL Information Items

- CP COL 14.3(1)

The applicant provided additional information in Section 14.3 to address COL Information Item 14.3(1) from DCD Tier 2, Table 1.8-2, as follows:

> The COL applicant provides the ITAAC for the site-specific portion of the plant systems specified in Subsection 14.3.5, Interface Requirements. [14.3.4.6, 14.3.4.7]

- CP COL 14.3(2)

The applicant provided additional information in Section 14.3 to address COL Information Item 14.3(2) from DCD Tier 2, Table 1.8-2 as follows:

> The COL applicant provides proposed ITAAC for the facility's emergency planning not addressed in the DCD in accordance with RG 1.206 (Reference 14.3-1) as appropriate. [14.3.4.10]

- CP COL 14.3(3)

The applicant provided additional information in Section 14.3 to address COL Information Item 14.3(3) from DCD Tier 2, Table 1.8-2 as follows:

> The COL applicant provides ITAAC for the facility's physical security hardware not addressed in the DCD in accordance with RG 1.206 (Reference 14.3-1) as appropriate, and provides abstracts describing the specific inspections, tests and analysis for the facility's physical security hardware ITAAC not addressed in the DCD. [14.3.4.12]

The COL applicant also provided ITAAC for emergency planning, physical security, and plant-specific portions of the facility in Part 10, "ITAAC and Proposed License Conditions," of the COL application (COLA).

ITAAC for Part 10 of the COLA are as follows:

- Design certification ITAAC are contained in DCD Tier 1 and are incorporated by reference.
- Plant-specific ITAAC are provided in COLA Part 10, Appendices A.1, A.2, A.3, and A.4.
- Emergency Planning ITAAC are provided in COLA Part 10, Appendix B.
- Physical security ITAAC contained in DCD Tier 1, are incorporated by reference. Plant-specific security ITAAC are provided in COLA Part 10, Appendix C.

14.3.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference and the supplemental information presented in this application are addressed within the Chapter 14 FSER related to the US-APWR DCD.

In addition, the relevant requirements of the Commission's regulations and the associated guidance for the review of this section are given in the SRP Section 14.3 and RG 1.206.

The specific regulatory requirements for the review of the site-specific ITAAC are contained in:

1. 10 CFR 52.80(a), which requires that a COLA contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee should perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses should will operate in conformity with the combined license, the provisions of the Atomic Energy Act of 1954, and the NRC's regulations.

14.3.1.4 Technical Evaluation

The staff reviewed FSAR Section 14.3 and reviewed the referenced DCD to ensure that the combination of the information in the DCD and the information in the FSAR represented the complete scope of information relating to this review topic. The staff's review confirmed that the information contained in the COLA and incorporated by reference addresses the required

information relating to this section. Section 14.3 of the US-APWR DCD is being reviewed by the staff under Docket No. 52-021. The staff's technical evaluation of the information incorporated by reference related to ITAAC will be documented in the staff SER on the DC application for the US-APWR.

The review of the site-specific ITAAC for the Reference COLA (RCOLA) was performed to determine if the three components of each ITAAC were on the same subject matter, in agreement, complimentary, and parallel with each other. In addition, for each ITAAC, the inspections, tests, and analyses (ITA) were reviewed to determine if they specified the appropriate actions, and if the acceptance criteria are an appropriate standard to evaluate whether the design commitment for that ITAAC was met.

COLA Part 2, the FSAR, indicated that there were no departures or exemptions that were applicable to the DCD Tier 1 and physical security ITAAC of the US-APWR DC application.

COLA Part 10, Appendices A.1, A.2, and A.3 contained information on the site-specific ITAAC. The DCD Tier 1 and physical security ITAAC for the RCOLA, referenced in Sections 1.1 and 1.4 of Part 10 of that application, were incorporated by reference into the RCOLA. Since there were no departures, exemptions, and variances applicable to the DCD Tier 1 information, only the site-specific ITAAC were reviewed for the RCOLA.

ITAAC Item 1.b in Table A.1-1

In **RAI 3293, Question 14.03.07-1,** the staff requested that the applicant in ITAAC Item 1.b Table A.1-1 to revise this ITAAC because (1) the Acceptance Criteria does not identify the same exception noted in the Design Commitment of "except for the header portion of the transfer line piping," and (2) the Acceptance Criteria does not state the name of the "as-built" system. In its response to **RAI 3293, Question 14.03.07-1** (ADAMS Accession ML093210468), dated November 13, 2009, the applicant made the requested change by adding the noted exception to the Acceptance Criteria. The staff agreed with the applicant's response and the revision made by the applicant to this ITAAC. The staff has verified that these proposed changes were implemented in COLA, Revision 2 Part 10. Therefore, **RAI 3293, Question 14.03.07-1,** is **resolved and closed**.

In **RAI 3293, Question 14.03.07-2**, the staff requested the applicant to revise the American Society of Mechanical Engineers (ASME) ITAAC in general because they do not have the same format as the ASME ITAAC for the US-APWR design. The staff provided detailed wording for the ASME ITAAC of the US-APWR DC application, and requested the applicant use those same words for the ASME ITAAC of the CPNPP application. In its response to **RAI 3293, Question 14.03.07-2**, dated November 13, 2009 (ADAMS Accession ML093210468), the applicant made the requested changes to ASME ITAAC Items 2.a, 2.b, 3.a, and 3.b in Table A.1-1 by making them mirror the ASME ITAAC in the APWR DCD. However, the applicant did not change ITAAC Items 4.a and 4.b in Table A.1-1 because they were for hydrostatic tests of components and piping of the ultimate heat sink (UHS) system, and their wording was in agreement with ASME Code Section III. The staff agreed with the applicant's response and the revisions made by the applicant to the affected ITAAC. The staff has verified that these proposed changes were implemented in COLA, Revision 2 Part 10. Therefore, **RAI 3293, Question 14.03.07-2, is resolved and closed**.

ITAAC Item 2.a in Table A.1-1 *ITAAC Item 2.b in Table A.1-1*
ITAAC Item 3.a in Table A.1-1 *ITAAC Item 3.b in Table A.1-1*

ITAAC Item 4.a in Table A.1-1 *ITAAC Item 4.b in Table A.1-1*

In **RAI 3293, Question 14.03.07-3,** the staff requested that the applicant in ITAAC Item 5.a in Table A.1-1 revise this seismic category ITAAC and similar ITAAC so that they are formatted in a similar manner as the current seismic category I ITAAC for the US-APWR certified design. The staff provided detailed wording for the seismic category ITAAC of the US-APWR DC application, and those same words should be used for the seismic category ITAAC of the CPNPP application. The applicant in its response to **RAI 3293, Question 14.03.07-3,** dated November 13, 2009 (ADAMS Accession ML093210468), made the requested changes by modifying the affected ITAAC to conform to similar ITAAC in the US-APWR DCD. The staff agreed with the applicant's response and the revisions made to the affected ITAAC. The staff has verified that these proposed changes were implemented in COLA, Revision 2 Part 10. Therefore, **RAI 3293, Question 14.03.07-3, is resolved and closed**.

ITAAC Item 5.b in Table A.1-1 *ITAAC Item 2 in Table A.2-1*

In **RAI 3293, Question 14.03.07-4,** the staff requested that the applicant in ITAAC Item 6.b in Table A.1-1 revise this ITAAC and similar ones to indicate (1) "that Class 1E electrical cables are separated from cables in other Class 1E divisions and non-Class 1E cables" in general not just in raceways, and (2) that if separation is not obtained that an analysis will be performed to determine if lack of separation is permissible. The separation criteria for cables should be applicable to every component in which the cables are routed, for example, panels, enclosures, switchgear, raceway, etc. In its response to **RAI 3293, Question 14.03.07-4**, dated November 13, 2009 (ADAMS Accession ML093210468), revised the affected ITAAC to allow separation between the cables of Class 1E divisions and the cables of other Class 1E divisions and non-Class 1E divisions where those cables are routed. The applicant also stated that because the revised ITAAC acceptance criteria included separation and isolation, these criteria did not have to address any analyses for deviations. The staff agreed with the applicant's response and the revisions made by the applicant to the affected ITAAC. The staff has verified that these proposed changes were implemented in COLA, Revision 2 Part 10. Therefore, **RAI 3293, Question 14.03.07-4, is resolved and closed**.

ITAAC Item 3.b in Table A.2-1

In **RAI 3293, Question 14.03.07-5,** the staff requested that the applicant in ITAAC Item 7, Table A.1-1, clarify the phrase "heat removal capability transferred design heat load" used in the Design Commitment and Acceptance Criteria, (2) to state what system removes the design heat load from the Emergency Service Water System (ESWS), (3) to indicate that that system has the heat removal capability to transfer the design heat load from the ESWS, and (4) to replace the terms "adequate" in both Design Commitment and Acceptance Criteria with more appropriate quantitative or exacting terms. The applicant in its response to **RAI 3293, Question 14.03.07-5**, dated November 13, 2009 (ADAMS Accession ML093210468), addressed the staff's requested changes by revising the (a) Design Commitment to state that the UHS components referred to in Table A.1-2 are capable of removing the maximum heat load transferred from the ESWS, (b) ITA by performing an inspection for the existence of a report, and (c) the Acceptance Criteria by continuing to refer to "adequate" heat removal capability of the UHS from the ESWS while maintaining a UHS outlet temperature of 95 degrees Fahrenheit (°F) (35 degrees Celsius (°C)) . The staff found that the applicant's response was acceptable except for the part of the response related to the ITA, where the applicant only agreed to perform an inspection. Therefore, the staff closed **RAI 3293, Question 14.03.07-5**.

The staff issued **RAI 5004, Question 14.03-07-29,** as a follow-up RAI to **RAI 3293, Question 14.03.07-5**, which requested the applicant to make the ITA the performance of "tests and analyses" and not the performance of an "inspection" to determine the heat removal capability of the UHS, and revise the Acceptance Criteria to state that analyses and/or test reports exist and conclude that the UHS removes the maximum design heat load of the ESWS while maintaining an outlet temperature of 95 °F (35 °C)without using, the term "adequate" to refer its heat removal capability. In its response to **RAI 5004, Question 14.03-07-29,** dated October 6, 2010 (ADAMS Accession ML102810223), the applicant provided the requested changes, including proposed changes to the COLA Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 5004, Question 14.03-07-29, is resolved and closed**.

In **RAI 3293, Question 14.03.07-6,** the staff requested that the applicant in ITAAC Item 9.b in Table A.1-1, indicate in the Acceptance Criteria what actuation signal the simulated signal represents. For instance, "upon receipt of a simulated Emergency Core Cooling System (ECCS) actuation signal, the as-built blowdown control valve closes automatically." The applicant in its response revised the affected ITAAC to indicate that the fans and valves of the respective equipment tables perform the active safety functions identified in those equipment tables after receiving the appropriate signals from the Protection and Safety Monitoring System (PSMS). The staff agreed with the applicant's response to **RAI 3293, Question 14.03.07-6**, dated November 13, 2009 (ADAMS Accession ML093210468), the proposed changes made to the affected ITAAC in Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 3293, Question 14.03.07-6, is resolved and closed**.

ITAAC Item 10.b in Table A.1-1 ITAAC Item 5.b in Table A.2-1

In **RAI 3293, Question 14.03.07-7,** the staff requested that the applicant in ITAAC Items 11 and 12 in Table A.1-1 revise these ITAAC because (1) Items 11 or 12 do not refer to the alarms in Table A.1-3, (2) Item 11 does not refer to the control functions in that same table, (3) these two ITAAC do not presently require "tests" instead of or in addition to "inspections," and (4) the words used in Item 11 are different from those used in Item 12. Item 11 states that displays can be "retrieved", whereas, Item 12 indicates that displays and controls "exist" at the appropriate panels. The difference being that the term "retrieved" indicates that the functions of the controls, alarms, and displays are tested or checked; whereas, the term "exists" just means that those components are available at the appropriate panels. Table A.1-3 identifies displays for Main Control Room (MCR) and Remote Shutdown Console (RSC). However, the alarms are indicated there as being only for the MCR and neither ITAAC refers to the alarms in that table. The control functions are only identified with the RSC in ITAAC Item 12. The applicant in its response to **RAI 3293, Question 14.03.07-7** dated November 13, 2009 (ADAMS Accession ML093210468), made the following revisions: (a) ITAAC 11 in Table A.1-1 was revised to state that the MCR alarms and displays in Table A.1-3 can be retrieved, (b) ITAAC 12 in Table A.1-1 was revised to state that RSC alarms, displays, and controls identified in Table A.1-3 exist, and (c) Table A.1-3 was revised to correctly indicate all control functions, alarms, and displays in MCR and on RSC. The applicant also indicated that the MCR control functions indicated in Table A.1-3 were already addressed in other ITAAC in Table A.1-1. The staff agreed with the majority of the applicant's response but not that (i) MCR controls, displays, and alarms can be "retrieved", and that RSC controls, displays, and alarms only "exist", and (ii) that the functionality of controls can be verified by inspection rather than by a test. Therefore, the staff found that the majority of the response to **RAI 3293, Question 14.03.07-7,** acceptable and **closed** those issues, but the issues related to (i) and (ii) discussed above to be open.

The staff issued **RAI 5005, Question 14.03-07-30** as a follow-up to **RAI 3293, Question 14.03.07-7**, which requested that ITAAC Item 12 be revised to state that RSC controls, displays, and alarms can be retrieved at the RSC, and that both ITAAC Items 11 and 12 be revised to require the performance of a combination of tests and inspections because inspections alone cannot verify the operation of controls. In its response to **RAI 5005, Question 14.03-07-30**, dated October 6, 2010 (ADAMS Accession ML102810223), the applicant stated that ITAAC Item 12 has been separated into two ITAAC, 12.a and 12.b. The DC for ITAAC Item 12.a has been revised to state that the RSC alarms and displays identified in Table A.1-3 can be retrieved on the RSC. The DC for ITAAC Item 12.b states that controls on the RSC operate the as-built pumps, fans, and valves identified in Table A.1-3. The ITA for ITAAC Item 12 has been separated to state that (a) inspection of the as-built alarms and displays will be performed, and (b) that tests will be performed on the RSC controls identified in Table A.1-3. Separate Acceptance Criteria has been added for the tests in item 12b consistent with those for the MCR functions in ITAAC Items 8 and 1 0.a. Additionally, the applicant stated that the MCR control functions for the equipment identified in Table A.1-2 and repeated in Table A.1-3 are tested through ITAAC Items 8 and 10.a in Table A.1-1. The applicant provided the proposed changes to the COLA Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 5005, Question 14.03-07-30, is resolved and closed**.

ITAAC Items 6 and 7 in Table A.2-1

In **RAI 3293, Question 14.03.07-8,** the staff requested that the applicant in ITAAC Item 13 in Table A.1-1 revise the Acceptance Criteria to refer to the system in which the basins are included. The applicant in its response dated November 13, 2009, revised the ITAAC to refer to the basins as being part of the UHS. The staff agreed with the applicant's response, and the applicant's proposed changes made to the affected ITAAC in Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 3293, Question 14.03.07-8, is resolved and closed.**

In **RAI 3293, Question 14.03.07-9,** the staff requested the applicant in ITAAC Item 1 in Table A.3-1, revise this ITAAC because (1) the wording in the Design Commitment and Acceptance Criteria are confusing, (2) the Design Commitment states that structural configurations are as shown on Figures 3.8-201, "Environmental Temperature Gradients for the Exterior Walls and Roofs of UHSRS, Power Source Fuel Storage Vault (PSFSV), and Essential Service Water Pipe Tunnel (ESWPT)," and Table A.3-2, "Definition of Wall Thickness for Safety-Related Structures: UHS Related Structures (UHSRS)" and (3) the Acceptance Criteria refers to design configurations instead of structural configurations and uses the term descriptions in regard to figures. Terms that are more applicable to what is shown on figures and what is described in tables should be used. The applicant in its response to **RAI 3293, Question 14.03.07-9**, dated November 13, 2009 (ADAMS Accession ML093210468), revised the Design Commitment and Acceptance Criteria to refer to structural configurations as described in a FSAR table and as shown on FSAR figures. The staff agreed with the applicant's response and the proposed revisions made by the applicant to this ITAAC in Part 10. The staff has verified that these proposed changes were implemented in the COLA, Revision 3 Part 10. Therefore, **RAI 3293, Question 14.03.07-9, is resolved and closed**.

In **RAI 3293, Question 14.03.07-10,** the staff requested that the applicant in ITAAC Items 2.a and 2.b in Table A.3-1, revise these ITAAC because the Acceptance Criteria of both of these ITAAC refer to the "appropriate locations" for either flood barriers and water-tight doors instead

of actual locations or locations as shown on figures or as indicated in tables. The applicant in its response to **RAI 3293, Question 14.03.07-10,** dated November 13, 2009 (ADAMS Accession ML093210468), revised both ITAAC to perform an inspection to verify the existence of reports that indicate the locations of the flood barriers and watertight doors. The staff agreed in part with the applicant's response in that the exact locations of the flood barriers and water-tight doors can be identified in a report similarly to using figures and tables for that purpose, but not that the inspections for both ITAAC are for the existence of those reports instead of verifying the as-built installations for the locations and integrity of both the flood barriers and water-tight doors identified in ITAAC Items 2.a and 2.b in Table A.3-1, respectively. The staff closed **RAI 3293, Question 14.03.07-10,** and issued follow-up **RAI 5027, Question 14.03-32,** in which the applicant was requested to conduct as-built inspections for the ITAAC instead of relying on reports.

In its response to **RAI 5027, Question 14.03-32,** dated October 11, 2010 (ADAMS Accession ML102861203), the applicant stated that the ITAAC was revised to state the inspections of the as-built divisional flood barriers and water-tight doors will be performed and also submitted the corresponding proposed changes to COLA Part 10. The staff agreed with the applicant's response because changes were made to the ITAAC in Part 10 which require inspections of the as-built divisional flood barriers and water-tight doors to address the staff's concern. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 5027, Question 14.03.07-32, is resolved and closed.**

In **RAI 3293, Question 14.03.07-11,** the staff requested that the applicant in ITAAC Items 3 and 4 in Table A.3-1, revise these ITAAC because (1) the Acceptance Criteria of both of these ITAAC refer to either "acceptable level" or "adequate thickness" instead of some quantity that can be measured, (2) the Design Commitment for Item 3, uses the confusing phrase "provided appropriately against the internal and external flooding, (3) the Acceptance Criteria for Item 3 does not denote the exception noted in the Design Commitment, and (4) the ITA for Item 4 should be an "analysis" in addition to the "inspection" to determine the necessary thickness that allows water seepage to decrease to a "specified value" or to "zero." A reference to a table or a figure could be appropriate. The applicant in its response to **RAI 3293, Question 14.03.07-11,** dated November 13, 2009 (ADAMS Accession ML093210468), revised ITAAC Item 3 in Table A.3-1 by (a) deleting vague terms, (b) including exception noted in Design Commitment in its Acceptance Criteria, and (c) indicating that all penetrations except the watertight doors are sealed up to internal and external flooding levels. The applicant also revised ITAAC Item 4 in Table A.3-1 by indicating that external walls must have the thicknesses stated in Table A.3-2 to protect against water seepage. The staff agreed with the applicant's response and the proposed revisions made by the applicant to these ITAAC in Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 3293, Question 14.03.07-11, is resolved and closed**.

In **RAI 3293, Question 14.03.07-12,** the staff requested that the applicant in ITAAC Items 6, 7, and 8 in Table A.3-1, revise these ITAAC because the Acceptance Criteria of these three ITAAC are less detailed than their Design Commitments. Since the Acceptance Criteria is what determines if the Design Commitment is met, an Acceptance Criteria should provide similar or more information than its associated Design Commitment. The applicant in its response to **RAI 3293, Question 14.03.07-12** dated November 13, 2009 (ADAMS Accession ML093210468), revised (1) the Design Commitment and Acceptance Criteria of ITAAC Item 6 to indicate that penetrations in external walls are sealed up to the external flood level, and (2) the Acceptance Criteria of ITAAC Items 7 and 8 to provide similar or more information than their respective Design Commitments. The staff agreed with the applicant's response to **RAI 3293, Question**

14.03.07-12, because revisions were made to ITAACs Items 6, 7, and 8 of Table A.3-1 in COLA Part 10 to address the staff's concern. The staff has verified that these proposed changes to Part 10 were implemented in COLA, Revision 3. As such, **RAI 3293, Question 14.03.07-12, is resolved and closed**.

In **RAI 3366, Question 14.03.07-13,** the staff requested that the applicant revise ITAAC Item 6.a in Table A.1-1, because the ITAAC is concerned with powering the equipment in Table A.1-2 by certain Class 1E divisions; however the UHS basin blowdown control valves in Table A.1-2 are not categorized per their respective Class 1E division. In its response to **RAI 3366, Question 14.03.07-13** dated, November 13, 2009 (ADAMS Accession ML093210468), the applicant indicated that the valves in question are numbered the same as its respective instrument controllers, and that Figure A.1-1, "Ultimate Heat Sink System and Essential Service Water System (Portions Outside the Scope of the Certified Design)" indicates that the valves are aligned downstream of the respective (essential service water (ESW)) pumps which have divisional designations. The staff disagreed with the applicant response, but closed **RAI 3366, Question 14.03.07-13,** with the issuance of a follow-up RAI.

In follow-up **RAI 5029, Question 14.03-07-31,** the staff requested that the applicant explain why the hydraulically controlled valves were classified by a Class 1E designation. By letter dated October 6, 2010, the applicant provided its response to **RAI 5029, Question 14.03-07-31.** In its response, the applicant stated that, in part,

> The safety function of the blowdown valve is to isolate essential service water blowdown to prevent the loss of the UHS basin water inventory upon receipt of a low basin water level signal or ECCS actuation signal. To fully address the functions displayed on Table A.1-2, "Ultimate Heat Sink System and Essential Service Water System (Portions Outside the Scope of the Certified Design) Equipment Characteristics" the valves as depicted on Table A.1-2 include both the valves and the controls for the valves. A solenoid valve actuates to operate the pneumatic actuator for the blowdown control valve. Upon receiving the low basin water level signal, ECCS actuation signal, or upon loss of power, the solenoid valve vents the air supply from the actuator, which allows the control valve to shut and preserve basin water level. The blowdown control valve is a fail close valve so that failure of the air supply system or that of the valve itself brings it to its closed position. The loss-of-offsite power (LOOP) sequence (or blackout sequence) signal also actuates the solenoid valve to close the blowdown control valve. The solenoid valve, control circuit, and circuit power supply are classified as Class 1 E to assure valve closure upon demand. As such, it is appropriate to reflect this Class 1E designation in Table A.1-2.

The staff finds that the response to **RAI 5029, Question 14.03-07-31** is acceptable because the applicant explained why the hydraulically controlled valves were classified as Class 1E to address the staff's concern. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 5005, Question 14.03-07-31, is resolved and closed**.

In **RAI 3366, Question 14.03.07-14,** the staff asked the applicant why ITAAC Item 14 in Table A.1-1 Acceptance Criteria does not indicate the pumps for which the NPSH available exceeds required NPSH. The Acceptance Criteria should be sufficiently specific to allow the design requirement stated in the design commitment to be met. In its response, dated November 13, 2009, the applicant stated that it revised Item 14 to be two ITAAC, one for the UHS transfer pumps, and other one for the ESW pumps. Both ITAAC indicated that the respective pumps

had sufficient NPSH, which exceeded the required NPSH of their respective systems as confirmed by analyses. The staff agreed with the applicant's response and the proposed revisions made by the applicant to these ITAAC in COLA Part 10. The staff has verified that these proposed changes to Part 10 were implemented in COLA, Revision 3. Therefore, **RAI 3366, Question 14.03.07-14, is resolved and closed**.

In **RAI 3366, Question 14.03.07-15,** the staff requested that the applicant in ITAAC Item 4, Table A.2-1, revise this ITAAC because the design commitment and Acceptance Criteria refer to the "proper" environmental conditions within the respective room" instead of a value that can be measured. This ITAAC should refer to value or a table where the values are listed; so that this ITAAC can be performed and completed. In its response to **RAI 3366, Question 14.03.07-15** dated November 13, 2009 (ADAMS Accession ML093210468), the applicant revised ITAAC Item 4 to indicate that the UHS ESW ventilation system maintains area design temperature limits in the respective room based on tests and analyses. The staff finds that the response to **RAI 5029, Question 14.03-07-15** is acceptable because the applicant revised ITAAC Item 4 of Table A.2-1 in COLA Part 10, to indicate that the UHS ESW ventilation system maintains area design temperature limits in the respective room based on tests and analyses. The staff has verified that these proposed changes to Part 10 were implemented in COLA, Revision 3. Therefore, **RAI 3366, Question 14.03.07-15, is resolved and closed**.

In **RAI 3366, Question 14.03.07-16,** the staff requested that the applicant in ITAAC Item 5.a in Table A.2-1, revise this ITAAC because the Acceptance Criteria does not refer to the UHS ESW pump house ventilation system exhaust fans and unit heaters" similarly to what is stated in the Design Commitment. The applicant in its response to **RAI 3366, Question 14.03.07-16** dated November 13, 2009 (ADAMS Accession ML093210468), revised ITAAC Item 5.a to indicate in its Acceptance Criteria that controls exists in the MCR to start and stop the UHS ESW pump house ventilation system exhaust fan and unit heaters identified in Table A.2-3. The staff agreed with the applicant's response and the proposed revisions made by the applicant to these ITAAC in Part 10. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 3366, Question 14.03.07-16 is resolved and closed**.

ITAAC Items 5a in Table A.3-1

In **RAI 3366, Question 14.03.07-17,** the staff requested that the applicant in ITAAC Items 5a in Table A.3-1, either delete this ITAAC because the walls referred to in ITAAC Item 4 in Table A.3-1 have the appropriate thicknesses to decrease any water seepage to zero, or to revise it because an analysis may be required in addition to the inspection to determine the appropriate thickness of the flood barriers to decrease the seepage to a certain value. If the water seepage is decreased to zero due to the walls in ITAAC Item 4, it does not seem that there would be a need for Item 5a and its flood barriers. In its response to **RAI 3366, Question 14.03.07-17** dated November 13, 2009 (ADAMS Accession ML093210468), the applicant revised ITAAC Item 5.a to indicate that the flood barriers are installed consistent with the design bases for flood protection, and therefore are required in addition to the walls identified in ITAAC Item 4. An inspection is used to verify the existence of a report that indicates that the flood barriers are installed correctly. The staff agreed in part with the applicant's response in that the exact locations and physicality of the flood barriers can be identified in a report similarly to figures and tables used for that purpose, but not that the inspection for the ITAAC is for the existence of that report instead of verifying the as-built installations for the locations and integrity of those flood barriers. The staff closed **RAI 3366, Question 14.03.07-17** and issued follow-up **RAI 5099, Question 14.03.07-33**. **RAI 5099, Question 14.03.07-33** is discussed in more detail below.

In **RAI 3366, Question 14.03.07-18,** the staff requested that the applicant revise ITAAC Items 5b and 6 in Table A.3-1, to define the flood protection features referred to in the ITAACs. It would seem appropriate for these ITAAC to define what those flood protection features are. The applicant in its response to **RAI 3366, Question 14.03.07-18** dated November 13, 2009 (ADAMS Accession ML093210468), revised ITAAC Item 5.b to indicate that the flood barriers are installed consistent with the design bases for flood protection, and it revised ITAAC Item 6 to indicate that penetrations in the external walls of the UHS-related structure (UHSRS), essential service water pipe tunnel (ESWPT), and power source fuel storage vault (PSFSV) are sealed up to the height of the external flood level. An inspection is used ITAAC Item 5.b to verify the existence of a report that indicates that the flood barriers are installed correctly. The staff agreed with the applicant's response for ITAAC Item 6. However, the staff only agreed in part with the applicant's response for ITAAC Item 5.b in that the exact locations and physicality of the flood barriers can be identified in a report similarly to figures and tables, but not that the inspection for the ITAAC is for the existence of that report instead of verifying the as-built installations for the locations and integrity of the flood barriers. The staff closed **RAI 3366, Question 14.03.07-18**. A new **RAI 5099, Question 14.03.07-33**, was written to address the additional changes requested by the staff. **RAI 5099, Question 14.03.07-33** is discussed in more detail below.

In **RAI 5099, Question 14.03.07-33,** the staff requested that the applicant in ITAAC Items 5a and 5b in Table A.3-1 either delete ITAAC 5a in **RAI 3366, Question 14.03.07-17**, because the walls referred to in ITAAC Item 4 in Table A.3-1 have the appropriate thicknesses to decrease the water seepage to zero and the flood barriers are not required, or to revise it because an analysis may be required in addition to the inspection to determine the appropriate thickness of the flood barriers to decrease the seepage to a certain value. If the water seepage is decreased to zero due to the walls in ITAAC Item 4, it does not seem that there would be a need for Item 5a and its flood barriers. The staff requested the applicant to revise ITAAC 5b in **RAI 3366, Question 14.03.07-18**, to define the flood protection features. In its response to **RAI 5099, Question 14.03.07-33,** dated October 29, 2010 (ADAMS Accession ML103060049), the applicant revised ITAAC Items 5.a and 5.b to indicate that the flood barriers are installed consistent with the design bases for flood protection. Inspections are used for both ITAAC to verify the existence of reports that indicate that the flood barriers are installed correctly. The applicant in response to **RAI 5099** also indicated that ITAAC Items 5.a and 5.b of Table A.3-1 were revised in response to **RAI 5004, Question 14.03.07-29**, dated October 6, 2010. The staff agreed with the applicant's response for both of these ITAAC in that the exact locations and physicality of the flood barriers can be identified in reports similarly to figures and tables. The staff then verified the response to **RAI 5004, Question 14.03.07-29** and found that the ITAACs required verification of the as-built installations for the locations and integrity of the flood barriers as requested by staff. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, the staff considers **RAI 5099, Question 14.03.07-33 resolved and closed.**

In **RAI 3366, Question 14.03.07-19,** the staff requested that the applicant in ITAAC Item 8 in Table A.3-1, revise this ITAAC to indicate the hour ratings of the rated components used to protect penetrations and openings in fire barriers against fire. These hour ratings should be stated in the Acceptance Criteria. The applicant in response to **RAI 3366, Question 14.03.07-19,** dated November 13, 2009 (ADAMS Accession ML093210468), agreed to change the acceptance criteria of ITAAC 8 in Table A.3-1 to specify that the penetrations and openings through the fire barriers of the UHSRS, ESWPT, and PSFSV are protected with 3-hour rated fire barriers. The staff agreed with the applicant's response because of the changes to ITAAC Item

8 to satisfy the staff's concern. Therefore, **RAI 3366, Question 14.03.07-19, is resolved and closed**.

In **RAI 3366, Question 14.03.07-20,** the staff requested that the applicant in ITAAC Item 9 in Table A.3-1, revise this ITAAC because inspections may be required in addition to the analysis to verify that the referred to structures were as-built in accordance with the analysis and the design. The applicant in its response to **RAI 3366, Question 14.03.07-20** dated November 13, 2009 (ADAMS Accession ML093210468), revised the three ITAAC in Item 9 to have inspections performed of the as-built UHSRS, ESWPT, and the PSFSV, and to reconcile by analyses that they can withstand structural design-basis loads. The staff agreed with the applicant's response because of the changes made to the ITAAC 9 in Table A.3-1 requiring inspections, which addressed the staff's concern. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 3366, Question 14.03.07-20, is resolved and closed.**

In previous **RAI 3293, Question 14.03.07-5**, the staff stated that the phrase "heat removal capability transferred design heat load" referred to in the design commitment and acceptance criteria was confusing, and requested the applicant to: (1) indicate what system removes the design heat load from the ESWS, (2) indicate that that system has the heat removal capability to transfer the design heat load from the ESWS, and (3) revise the nebulous term "adequate" referred to in both the design commitment and the acceptance criteria of the ITAAC. In its response to **RAI 3293, Question 14.03.07-5** dated November 13, 2009 (ADAMS Accession ML093210468), the applicant addressed the changes requested by revising the (a) design commitment to state that the UHS components referred to in Table A.1-2 are capable of removing the maximum heat load transferred from the ESWS, (b) ITA by performing an inspection for the existence of a report, and (c) the Acceptance Criteria by continuing to the refer to "adequate" heat removal capability of the UHS from ESWS while maintaining a UHS outlet temperature of 95 °F (35 °C) .

Since the applicant did not fully address the requested changes in ITAAC Item 7, Table A.1-1 in response to **RAI 3293, Question 14.03.07-5**, in **RAI 5004, Question 14.03.07-29,** the staff requested that the applicant make further changes; specifically, (i) the ITA should be the performance of "tests and analyses" not the performance of an "inspection" to determine the heat removal capability of the UHS, and (ii) the Acceptance Criteria should be changed to state that analyses and/or test reports exist and conclude that the UHS removes the maximum design heat load of the ESWS while maintaining an outlet temperature of 95 °F without using the term "adequate" to refer its heat removal capability. In its response to **RAI 5004, Question 14.03.07-29,** dated October 6, 2010 (ADAMS Accession ML102810223), the applicant revised the ITA and Acceptance Criteria for ITAAC Item 7 in Table A.1-1 with the following: (1) To state that a combination of tests and analyses will be performed to determine the heat removal capability of the as-built UHS system; (2) The AC has been clarified to state that a report exists and concludes that the UHS removes the maximum design heat load of the ESWS while maintaining an outlet temperature of 95 degrees Fahrenheit. The staff agreed with the applicant's response because the changes made to ITAAC Item 7 in Table A.1-1 addressed the staff's concern. The staff has verified that these proposed changes were implemented in COLA, Revision 3 Part 10. Therefore, **RAI 5004, Question 14.03.07-29, is resolved and closed**.

14.3.1.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.3.1.6 Conclusions

The staff reviewed the COLA and reviewed the referenced US-APWR DCD. The staff's review confirmed that the COL applicant addressed the required information relating to ITAAC. The staff is reviewing the information in the US-APWR DCD under Docket Number 52-021. The results of the staff's technical evaluation of the information related to ITAAC incorporated by reference in the COLA will be documented in the staff SER on the DC application for the US-APWR. The SER on the US-APWR is not yet complete. The staff will update this report to reflect the final disposition of the DC application.

14.3.2 Structural and Systems Engineering ITAAC

Section 14.3.2 of this SER contains evaluations associated with structural and systems engineering. The staff does not intend to issue an SE with Open Items for Section 14.3.2 of CPNPP, Units 3 and 4. Instead the staff intends to provide this section of the SER at a later time. The staff' review of Section 14.3.2 is currently in progress and its completion is being tracked as **Open Item 14.3.2-1**.

14.3.3 Piping Systems and Components ITAAC

14.3.3.1 Introduction

This section of the FSAR corresponds to SRP Section 14.3.3, which addresses the review of ITAAC for piping systems and components. The staff reviewed the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the ITA are performed and the acceptance criteria met, a plant that incorporates the certified design is built and will operate in accordance with the COL, the Atomic Energy Act of 1954, and NRC regulations. The staff also verifies that the ITAAC contained in the certified design apply to those portions of the facility design that are approved in the DC.

The scope of review for Piping Systems and Components ITAAC includes:

- Piping design and components.
- Issues regarding structural, mechanical, materials, and chemical engineering.
- Treatment of motor-operated valves (MOVs), power-operated valves (POVs), and check valves, as well as dynamic qualification, welding, and safety classification of SSCs.

14.3.3.2 Summary of Application

FSAR Section 14.3 incorporates by reference Section 14.3 of the US-APWR DCD with some supplemental information as described below.

Part 10 of the COLA, "ITAAC and Proposed License Conditions," addresses ITAAC, including those for piping systems and components.

14.3.3.3 Regulatory Basis

The regulatory basis of the information incorporated by reference and the supplemental information presented in this application are addressed within the FSER related to the DCD.

In addition, the relevant requirements of the Commission's regulations and the associated guidance for the review of this section are given in the SRP Section 14.3 and RG 1.206.

The specific regulatory requirements and acceptance criteria for the review of the site-specific ITAAC are contained in:

1. 10 CFR 52.80(a), which requires that a COLA contain the proposed ITA, 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 ITA 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 of 1954, and the NRC's regulations.

14.3.3.4 Technical Evaluation

The staff reviewed the COLA and considered the referenced DCD to ensure that the combination of the DCD and the information in the COLA represent the complete scope of information relating to this review topic. The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to ITAAC for piping systems and components.

The staff reviewed conformance of Section 14.3.4.3 of the FSAR to the guidance in SRP Section 14.3.3 and RG 1.206, Section C.I.14.3 and Section C.III.1., "Inspections, Tests, Analyses, and Acceptance Criteria." The staff finds that FSAR Section 14.3.4.3 appropriately incorporates by reference Section 14.3.4.3 of the US-APWR DCD. Section 14.3.4.3 of the US-APWR DCD is currently being reviewed by staff under Docket Number 52-021. The staff's technical evaluation of the information incorporated by reference related to this section will be documented in the corresponding SER of the DC. The staff also reviewed Part 10, "ITAAC and Proposed License Condition," of the COLA.

The staff found that the ITAAC proposed for the site-specific UHS and essential service water systems regarding ASME Code components and piping were not acceptable. Two activities, fabrication and installation and as-built reconciliation for ASME Code Section III components and piping were not adequately reflected in the proposed ITAAC. In **RAI 2583, Questions 14.03.03-01** and **14.03.03-02**, the staff requested the applicant to include new ITAAC to address these deficiencies.

In its responses to **RAI 2583, Question 14.03.03-01**, dated October 26, 2009 (ADAMS Accession ML093010366), and July 16, 2012 (ADAMS Accession ML12199A291), the applicant revised ITAAC Item 2.b in Table A.1-1 to separate the design commitment into two elements, 2.b.i and 2.b.ii, such that there are two distinct commitments demonstrating that the piping of the UHS system and ESWS (portions outside the scope of the certified design), including supports is (i) fabricated, installed, and inspected in accordance with ASME Code Section III requirements and (ii) reconciled with design requirements.

The applicant addressed the deficiency and the staff finds this response to be acceptable, however the staff discovered two typographical errors in the provided revisions. On March 4, 2013, the applicant submitted a revised response to **Question 14.03.03-01** (ADAMS Accession ML13066A105), which addresses the typographical errors. The staff has verified that these proposed revisions have been incorporated into the FSAR. Therefore, **RAI 2583, Question 14.03.03-01, is resolved and closed**.

In its responses to **RAI 2583, Question 14.03.03-02**, dated October 26, 2009 (ADAMS Accession ML093010366) and July 16, 2012 (ADAMS Accession ML12199A291), the applicant revised ITAAC item 2.a in Table A.1-1 to separate the "Design Commitment" into 2.a.i and 2.a.ii such that there are two distinct commitments demonstrating that the components are (i) fabricated, installed, and inspected in accordance with ASME Code Section III requirements and (ii) reconciled with design requirements.

The applicant addressed the deficiency and the staff finds this response to be acceptable. The staff verified that the revisions have been incorporated into the FSAR. Therefore, **RAI 2583, Question 14.03.03-02, is resolved and closed**.

For pressure boundary welds of components and piping identified as ASME Code Section III, the applicant provided ITAAC items 3.a and 3.b in Part 10, Table A.1-1. The Acceptance Criteria stated that the ASME Code Section III requirements are met for non-destructive examination of the as-built pressure boundary welds. The staff found that the applicant's proposed Acceptance Criteria could not be verified by the ITA. Therefore, the staff requested the applicant in **RAI 2583, Question 14.03.03-03**, to revise the Acceptance Criteria to address this deficiency.

In its response to **RAI 2583, Question 14.03.03-03**, dated October 26, 2009 (ADAMS Accession ML093010366), the applicant stated that acceptable as-built pressure boundary weld inspections will be documented in an ASME Code report to demonstrate that the ASME Code Section III requirements have been met. Items 3.a and 3.b were revised to state "ASME Code report(s) exist and conclude that the ASME Code Section III requirements are met for non-destructive examination of the as-built pressure boundary welds." The applicant addressed the staff's concern and the staff finds this response acceptable. The staff verified that the revisions have been incorporated into the FSAR. Therefore, **RAI 2583, Question 14.03.03-03,** is **resolved and closed**.

In the CPNPP COLA FSAR, Table 3.2-201, seismic Category I piping for the UHS and ESWSs were identified. In Part 10, Table A.1-1, the applicant provided ITAAC item 5.b for seismic category piping. The Design Commitment used the words "seismic category piping" while "as-built seismic category piping" and "as-built piping" were used in the Acceptance Criteria and ITA.

(1) The staff found that the proposed Acceptance Criteria cannot be concluded by the ITA. Revise the Acceptance Criteria to state "Report(s) exist and conclude that each of the as-built seismic category piping identified in FSAR, Table 3.2-201 meets the seismic category requirements."

(2) Seismic Category I is the only seismic classification identified in the section. To bring consistency among all the columns in the ITAAC as well as clarify the seismic category of the piping systems, use the phrases "seismic Category I

piping" in the Design Commitment and "as-built seismic Category I piping" in the Acceptance Criteria and ITA.

In **RAI 2583, Question 14.03.03-04**, the staff requested the applicant to address these deficiencies. In its response to **RAI 2583, Question 14.03.03-04**, dated October 26, 2009 (ADAMS Accession ML093010366), the applicant revised ITAAC item 5.b of Table A.1-1, consistent with changes made to the US-APWR DCD in response to DCD **RAI 452, Question 14.03.03-12**, which was issued on October 1, 2009. The revised ITAAC employs a two-step approach to confirm that the piping system is supported by seismic Category I structure(s), and that report(s) exist and conclude that the as-built seismic Category I piping, including supports, can withstand combined normal and seismic design basis loads without a loss of safety function. The staff concludes that the Acceptance Criteria proposed in this new two-step approach can be met by the proposed ITA and that this sufficiently ensures that as-built piping design is reconciled with design-basis loads, consistent with Regulatory Guide 1.206, Subsection C.II.1.2.2. The staff verified that the revisions have been incorporated into the FSAR. Therefore, **RAI 2583, Question 14.03.03-04**, is **resolved and closed**.

As a follow up to **RAI 2583, Question 14.03.03-04**, in **RAI 5391, Question 14.03.03-05**, the staff requested that the applicant further revise ITAAC item 5.b in Table A.1-1 for consistency between all columns in the ITAAC, as well as to clarify the seismic category of the piping systems, and use the phrases "seismic Category I piping" in the Design Commitment and "as-built seismic Category I piping" in the Acceptance Criteria and ITA.

In its responses to **RAI 5391, Question 14.03.03-05**, dated April 8, 2011 (ADAMS Accession ML111010360) and November 18, 2011 (ADAMS Accession ML11314A045), the applicant revised ITAAC item 5.b in Table A.1-1 to resolve the inconsistent references to seismic Category I piping in the Acceptance Criteria and ITA columns. ITAAC item 5.b in Table A.1-1 and ITAAC item 2.c in Table A.2-1 were also revised to more clearly delineate seismic Category I piping and equipment. The staff concludes that the revised ITAAC resolve the consistency issue and are now clear and unambiguous about which piping and equipment are seismic Category I. The staff verified that the revisions have been incorporated into the FSAR. Therefore, **RAI 5391, Question 14.03.03-05,** is **resolved and closed**.

14.3.3.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.3.3.6 Conclusions

The staff concludes that the information pertaining to the FSAR Section 14.3.4.3 is within scope of the DC and adequately incorporates by reference Section 14.3.4.3 of the US-APWR DCD, and is, thus, acceptable with the exception to the need to review any revisions to the Section following approval of the DCD amendment. Since the review of the US-APWR DCD has not been completed and may affect the contents in the FSAR, this section will be tracked as open pending review of any revisions to the section following approval of the DCD.

The staff is reviewing the information for the US-APWR DCD under Docket Number 52-021. The results of the staff's technical evaluation of the information related to this section to be incorporated by reference in the FSAR will be documented in the staff's SER on the DC application for the US-APWR. The SER for the US-APWR is not yet complete, and this is being

tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.3 of this SER to reflect the final disposition of the DC application for the US-APWR.

14.3.4 ITAAC for Reactor Systems

This section of the FSAR describes the ITAAC for reactor systems which are safety-related and appropriate non-safety systems, and addresses the following reactor systems identified in US-APWR DCD Table 14.3-3, "Reactor Systems": chemical and volume control system, ECCS, loose parts monitoring system, RCS, residual heat removal system, and reactor system.

Section 14.3.4.4, "ITAAC for Reactor Systems", of the FSAR incorporates by reference, with no departures or supplements, Section 14.3.4.4, of the US-APWR DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that there is no outstanding issue related to this section.

The staff is reviewing the information in DCD Section 14.3.4.4 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to the ITAAC for reactor systems incorporated by reference in the FSAR will be documented in the staff's SER for the DC application for the US-APWR. The SER on the US-APWR is not yet complete, and this is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.4 of this SER to reflect the final disposition of the DC application design.

14.3.5 ITAAC for Instrumentation and Controls

This section of the FSAR describes the ITAAC for Instrumentation and Controls (I&C) and addresses the following US-APWR DCD I&C systems: Reactor Trip System and Engineered Safety Feature Systems, System Required for Safe Shutdown, Diverse Actuation System, Information System Important to Safety, Control System not Required for Safety, Data Communication Systems.

Section 14.3.4.5, "ITAAC for Instrumentation and Controls," of the FSAR incorporates by reference, with no departures or supplements, Section 14.3.4.5, of the US-APWR DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The staff's review confirmed that there is no outstanding issue related to this section.

The staff is reviewing the information in DCD Section 14.3.4.5 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to the ITAAC for I&C incorporated by reference in the FSAR will be documented in the staff's SER on the DC application for the US-APWR. The SER on the US-APWR is not yet complete, and this is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.5 of this SER to reflect the final disposition of the DC application for the US-APWR.

14.3.6 ITAAC for Electrical Systems

14.3.6.1 Introduction

The selection criteria and methodology provided in this section of the FSAR from the referenced DCD were utilized as the site-specific selection criteria and methodology for ITAAC. The criteria

and methodology were applied to those site-specific systems that were not evaluated in the referenced DCD.

14.3.6.2 Summary of Application

In the FSAR Section 14.3, “Inspections, Tests, Analyses, and Acceptance Criteria,” the applicant incorporated by reference Section 14.3 of the US-APWR DCD, Revision 2, without any departures and/or supplements.

In addition, in FSAR Section 14.3, the applicant provided the following:

US-APWR COL Information Item

- STD COL 14.3(1) - The site-specific interfaces are the offsite power system and the ITAAC for the interface requirement with the offsite power system.

The site-specific ITAAC were provided in COLA Part 10, “Tier 1-ITAAC.”

14.3.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference will be addressed within the FSER related to the DCD.

In addition, the relevant requirements of the Commission regulations and the associated guidance for the review of this section are given in the SRP Section 14.3 and RG 1.206.

The specific regulatory requirements for the review of the site-specific ITAAC are contained in:

1. 10 CFR 52.79(d) as it relates to electrical systems.

2. 10 CFR 52.80(a), which requires that a COLA contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee should perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses should will operate in conformity with the combined license, the provisions of the Atomic Energy Act of 1954, and the NRC's regulations.

14.3.6.4 Technical Evaluation

The staff reviewed conformance of FSAR Revision 1, Section 14.3, and COLA Part 10 and considered the referenced DCD. The staff’s review determined that the applicant did address site-specific ITAAC in the FSAR.

MHI, the US-APWR DC applicant, stated that a COL applicant referencing the US-APWR certified design shall develop ITAAC to verify that the as-built offsite portion of the preferred power supply (PPS) from the transmission network to the interface with the onsite portions of the PPS will satisfy the applicable provisions of General Design Criterion (GDC) 17, “Electric Power Systems,” in Appendix A, “General Design Criteria for Nuclear Power Plants,” to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities.”

As stated in COLA Part 10, Appendix A.4, Table A.4-1, the ITAAC shall verify the following statements:

- The electrical system has a minimum of two independent offsite transmission circuits from the transmission network (TN) to the safety buses with no intervening non-safety buses (direct connection).

- The offsite TN, during steady-state operation, does not cause voltage variations beyond an acceptable tolerance of the loads' nominal ratings.

- The offsite TN normal steady-state frequency is within an acceptable tolerance of 60Hz during recoverable periods of system instability.

- The offsite transmission circuits have the capacity and capability to power the required loads during steady state, transient, and postulated events and accident conditions.

- Independence between the offsite circuits and the onsite Class 1E electrical system and components is maintained.

- The offsite circuits are physically separated from the onsite Class 1E electrical system and components.

- Lightning protection and grounding features are provided for the offsite circuits from the TN to the safety buses.

MCR alarms and displays for monitoring the switchyard equipment status can be retrieved in the MCR.

- If power through the preferred power supply is not available, the offsite electrical system has the capability to automatic fast transfer to the non-preferred power supply if available.

- The Switchyard agreement and protocols between the Nuclear Power Plant (NPP) and the TN system operator/owner assess the risk and probability of a LOOP due to performing maintenance activities on the electrical system.

- The offsite electrical system (switchyard) design assesses the probability of losing electric power as a result of or coincident with, the loss of power generated by the nuclear unit, the loss of power from the TN, or the loss of the largest load.

The staff finds that the applicant adequately addressed the site-specific ITAAC for the offsite power system, which is consistent with the guidance in RG 1.206. On the basis of its review, the staff finds that the applicant adequately addressed the site-specific ITAAC for the offsite power system, which is consistent with the guidance in RG 1.206, Section C.III.1, Chapter 14, C.I.14.3, "Inspection, Test, Analysis, and Acceptance Criteria."

14.3.6.5 Post Combined License Activities

The staff has not identified any post-combined license activities associated with the site-specific ITAAC for the offsite power system.

14.3.6.6 Conclusion

The staff concludes that the information pertaining to FSAR Section 14.3 is within the scope of the DC and adequately incorporates by reference Section 14.3 of the US-APWR DCD, and is thus acceptable. However, the SER on the US-APWR is not yet complete, and any modification in future revisions will require the update of Section 14.3 of this SER to reflect the disposition of the DC application.

14.3.7 ITAAC for Plant Systems

14.3.7.1 Introduction

FSAR Section 14.3.7 corresponds to Section 14.3.7 of the SRP and addresses ITAAC related to ventilation systems as described in Section 9.4 of the FSAR. The specific areas addressed in this section include:

- New and spent fuel handling systems, power generation systems, air systems, cooling water systems, radioactive waste systems and heating, ventilation and air conditioning (HVAC) systems

- Issues, which affect multiple SSCs, such as equipment qualification and protection from fires, floods and tornado missiles.

The staff reviewed the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the ITA are performed and the acceptance criteria met, a plant that incorporates the certified design is built and will operate in accordance with the COL, the Atomic Energy Act of 1954, and the NRC's regulations. In addition, the staff reviewed the justification that compliance with the interface requirements is verifiable through ITAAC, and also reviewed the method that is to be used for verification of the interface requirements.

SRP 14.3.7 addresses the review of ITAAC for Plant Systems for CPNPP, Unit 3 and 4. The staff reviews the proposed ITAAC to determine whether, if the ITA is performed and the acceptance criteria met, the facility has been constructed and will operate in accordance with the COL and NRC regulations. The staff also verified that the ITAAC contained in the certified design apply to those portions of the facility design that are approved in the DC.

The scope of plant systems ITAAC includes FSAR Tier 1 information on new and spent fuel handling systems, power generation systems, air systems, cooling water systems, emergency diesel generator support systems, radioactive waste systems, and HVAC systems. The scope of review also includes issues which affect multiple SSCs such as equipment qualification, and protection from fires, floods, and tornado missiles.

14.3.7.2 Summary of Application

Section 14.3.4.7 of the FSAR, Revision 3, incorporates by reference Section 14.3.4.7 of the US-APWR DCD, Revision 3.

In addition, in FSAR Section 14.3.4.7, the applicant provided the following:

US-APWR COL Information Item

- CP COL 14.3(1)

The applicant provided additional information in CP COL 14.3(1) to address COL Information Item 14.3(1), regarding ITAAC for the site-specific portion of the plant systems.

14.3.7.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the FSER related to the DCD.

In addition, the relevant requirements of the Commission's regulations for the ITAAC related to the plant systems, and the associated acceptance criteria, are given in Section 14.3.7, "Plant Systems – Inspections, Tests, Analyses, and Acceptance Criteria," of NUREG-0800. The applicable regulatory requirement for the COL-specific item described above is as follows:

> 10 CFR 52.80(a), which requires that a COL application include the proposed ITA, 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 ITA are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act of 1954, and the NRC's rules and regulations.

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulation identified above can be found in Part II of Section 14.3.7 of NUREG-0800.

14.3.7.4 Technical Evaluation

The staff reviewed the design description, system ITAAC, and functional arrangement to confirm completeness and consistency with the plant system's design bases as described in DCD Tier 2 sections. The staff verified that key performance characteristics and safety functions of SSCs were based on their safety significance. ASME Code III-related ITAAC and equipment qualifications are discussed in Sections 14.3.3 and 14.3.6 of this report, respectively.

The staff's review of the site-specific plant systems ITAAC relate to the systems and FSAR sections indicated in Table 14.3.7-1 below. Site-specific plant systems ITAAC related to Ultimate Heat Sink (UHS), Essential Service Water (ESW), UHS Pump House Ventilation System, and Fire Protection systems are discussed in sections 9.2.1, 9.2.5, and 9.5.1 of this report. The reviews of the ITAAC, including discussions of noteworthy RAI questions, and applicant RAI responses, are included in the section of this report corresponding to the applicable FSAR sections for that system.

Table 14.3.7-1 Plant Systems ITAAC

Description of DCD Tier 1 Sections	Part 10: ITAAC Table Number	Related FSAR Sections
UHS System	A.1-1	9.2.5
ESW System	A.1-1	9.2.1
UHS and ESW Pump House Ventilation System	A.2-1	9.2.1 and 9.2.5

Fire Protection System	A.6-1	9.5.1

The staff reviewed Section 14.3.4.7 of the FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to the plant system ITAAC. The staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the ITAAC for plant systems. Section 14.3.4.7 of the US-APWR DCD is being reviewed by the staff under Docket Number 52-021. The staff's technical evaluation of the information incorporated by reference related to the ITAAC for plant systems will be documented in the staff's SER on the DC application for the US-APWR design. The SER for the US-APWR is not yet complete, and the completion of the US-APWR DCD SER is being tracked as part of **Open Item [1-1]**.

Background:

The ITAAC contained in the DCD and incorporated by reference in the FSAR is still under review and the staff has issued RAIs to the DCD applicant to resolve all residual issues. The RAIs were issued for Sections 6.4, 6.5, 9.4 and 14.3.7 and are documented in those sections.

The staff's scope of this SER review includes the plant-specific ITAAC provided in the RCOLA, Part 10, "ITAAC and Proposed License Conditions," Appendix A.2, "UHS ESW Pump House Ventilation System."

Technical Information -- UHS ESW Pump House Ventilation System ITAAC:

US-APWR COL 9.4(6): "*The COL Applicant is to provide a system information and flow diagram of ESW pump area ventilation system if the ESW pump area requires heating, ventilating and air conditioning."*

The COL applicant provided the requisite DCD Tier 2 information with CP COL 9.4(6). FSAR Subsections 9.4.5, "Engineered Safety Feature Ventilation System;" 9.4.5.1.1.6, "UHS ESW Pump House Ventilation System;" 9.4.5.2.6, "UHS ESW Pump House Ventilation System;" 9.4.5.3.6, "UHS ESW Pump House Ventilation System;" 9.4.5.4.6, "UHS ESW Pump House Ventilation System;" 9.4.5.5.6, "UHS ESW Pump House Ventilation System;" Table 9.4-202, "UHS ESW Pump House Ventilation System Equipment Design Data;" Table 9.4-203, "UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis;" and Figure 9.4-201, "Equipment Design Data;" address this COL item.

US-APWR COL Information Items

- CP COL 14.3(1)

The applicant provided additional information in CP COL 14.3(1) to address COL Information Item 14.3(1), which states:

> The COL applicant provides the ITAAC for the site specific portion of the plant systems specified in DCD Subsection 14.3.5, Interface Requirements [14.3.4.6, 14.3.4.7].

The US-APWR DCD Revision 3 subsection 14.3.6, "Combined License Information" contains the following COL applicant requirement:

> COL 14.3(1): The COL applicant provides the ITAAC for the site specific portion of the plant systems specified in Subsection 14.3.5, Interface Requirements [14.3.4.6, 14.3.4.7].

The staff reviewed STD COL 14.3(1) included under Section 14.3.4.7 of the FSAR. To resolve STD COL 14.3(1), the applicant replaced the last paragraph in DCD Section 14.3.4.7 with the following paragraph in FSAR Section 14.3.4.7, "ITAAC for Plant Systems":

> The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for ITAAC for site-specific systems. In general, the ITAAC for site-specific systems are developed to correspond to the interface requirements in Tier 1 of the referenced DCD. For those site-specific systems that do not have a safety function sufficiently significant to meet the selection criteria for ITAAC, the system is identified with the designation "No entry for this system". ITAAC for the site-specific portion of the plant systems are provided in Part 10 of the Combined License Application (COLA).

In accordance with STD COL 14.3(1) the applicant submitted COLA Part 10, Appendix A.2, "UHS ESW Pump House Ventilation System."

The staff reviewed the following FSAR, sections and subsections:

- 9.4, "Air Conditioning, Heating, Cooling, and Ventilation Systems;"
- 9.4.5, "Engineered Safety Feature Ventilation System;"
- Subsections 9.4.5.1.1.6, 9.4.5.2.6, 9.4.5.3.6 , 9.4.5.4.6 & 9.4.5.5.6, "UHS ESW Pump House Ventilation System;"
- 9.4.7, "Combined Licensing Information;"
- FSAR Table 9.4-202, "UHS ESW Pump House Ventilation System Equipment Design Data;"
- FSAR Table 9.4-203, "UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis"
- FSAR Figure 9.4.-201, "UHS ESW Pump House Ventilation System Flow Diagram;"
- Subsection 14.2.12.1.114, "UHS ESW Pump House Ventilation System Preoperational Test;" and
- COLA Part 10, Appendix A.2, "UHS ESW Pump House Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria."

The staff reviewed the UHS ESW pump house ventilation system to ensure that the relevant requirements of 10 CFR 52.80(a) are met. The staff reviewed the UHS ESW pump house ventilation system ITAAC for the FSAR in accordance with SRP Section 14.3.7.

Relevant staff/applicant correspondence as invoked in this SER includes:

- Luminant's Response to RAI 3293 and RAI 3532 dated November 13, 2009 (ADAMS Accession Number ML093210468).

- Luminant's Response to RAI 5755 dated June 23, 2011 (ADAMS Accession Number ML11178A072).

- Luminant's Response to RAI 6265 dated February 27, 2012 (ADAMS Accession Number ML12060A378).

SRP Section 14.3.7, Acceptance Criterion 1, reads in part "The reviewer should utilize the SRP in its review of Tier 1 to determine the safety significance of SSCs." In **RAI 3532, Question 14.03.07-21**, the staff noted that RCOL FSAR Subsection 9.4.5.3.6, "UHS ESW Pump House Ventilation System," states, in part, "…All ventilation system equipment and components are classified as equipment class 3, seismic category I." The staff observed that this indicates that all of the SSCs (instrumentation, ductwork, tornado dampers, *etc.*) displayed in FSAR Figure 9.4-201, "UHS ESW Pump House Ventilation Systems Flow Diagram," are classified as Equipment Class 3, Seismic Category I and just as important to system operability and to plant safety as are the heaters and exhaust fans.

The staff requested that these other SSCs be added to Table A.2-2 and be subjected to the same type tests and inspections as described in ITA 2.a of Table A.2-1.

In its response to **RAI 3532, Question 14.03.07-21** (ADAMS Accession Number ML093210468), dated November 13, 2009, the applicant stated that the ESW pump house ventilation system contains no ductwork as the back-draft dampers (i.e., both supply and exhaust) and the exhaust fans are wall mounted. The applicant noted that FSAR Table 3.2-201 lists the back-draft dampers as equipment class 3 and seismic category I and agreed to include these in Table A.2-2. The applicant's response failed to discuss the issue of instrumentation, but did provide an amendment to FSAR Table A.2-2 that included the temperature switches for exhaust fan and unit heater operation (e.g., VRS-TS-803, 804, 805, 806, etc.).

Upon evaluation of the applicant's response, the staff had additional concerns with respect to the issue of pump house instrumentation. In particular, in follow-up **RAI 220-5755, Question 14.03.07-34,** and **RAI 6265, Question 14.03.07-37,** the staff inquired: (a) as to why the safety-related temperature controllers (e.g., TC-803, TC-804, TC-805, TC-806, etc.) were not listed in Table A.2-2, and (b) about the seismic classification of residual non-safety-related instrumentation displayed on Figure 9.4-201. In its response to **RAI 220-5755, Question 14.03.07-34** (ADAMS Accession Number ML11178A072), dated June 23, 2011, and **RAI 6265, Question 14.03.07-37** (ADAMS Accession Number ML12060A378)**,** dated February 27, 2012, the applicant stated, (a) "…the temperature controllers are part of the Protection and Safety Monitoring System, which is a basic software program described in DCD Chapter 7, incorporated by reference into the R-COLA." Table A.2-2 only includes physical equipment and not software; and (b) "The non-safety-related temperature and flow instrumentation attached to the unit heaters and exhaust fans is classified as seismic category II…". The applicant agreed

to amend Figure 9.4-201 with Note 5 indicating that "The non-safety-related instrumentation is seismic category II."

The staff found the applicant's response to both parts of the questions acceptable since it satisfies the intent of SRP Section 14.3.7, Acceptance Criterion 1. The staff verified that in Revision 3 of the FSAR, Figure 9.4-201 contained the requisite changes. Based on this, **RAI 3532, Question 14.03.07-21, RAI 220-5755, Question 14.03.07-34,** and **RAI 6265, Question 14.03.07-37, are resolved and closed**.

SRP Section 14.3.7, Acceptance Criterion 5, reads in part *"The design features in Tier 1 should be selected to ensure the integrity of the analyses is preserved in an as-built facility.…"*

In **RAI 3532, Question 14.03.07-23**, the staff noted that the wording of the acceptance criterion for ITAAC Item 3.b of Table A.2-1 was confusing; was not consistent with the design commitment; and did not preclude the acceptability of having non-Class 1E cables routed in Class 1E divisional cable trays. The staff requested that the applicant reword the acceptance criteria in Item 3.b to eliminate these deficiencies.

In its response to **RAI 3532, Question 14.03.07-23** (ADAMS Accession Number ML093210468), dated November 13, 2009, the applicant stated that ITAAC Item 3.b in Table A.2-1 would be revised consistent with their response to **RAI 3293, Question 14.03.07-4**. The staff reviewed the response to **Question 14.03.07-4** against the design commitment and acceptance criterion wording contained in FSAR Revision 3, ITAAC Item 3.b. Since the wording of Item 3.b is comprehensive and no longer ambiguous, the staff found that the wording satisfies the intent of SRP Section 14.3.7, Acceptance Criterion 5. Based on this, the staff found the resolution acceptable and **RAI 3532, Question 14.03.07-23, is resolved and closed.**

From the review of the ITAAC, the staff noted that there were no ITAAC to demonstrate that the installed air intake and exhaust dampers of the UHS ESW Pump House Ventilation System are capable of withstanding differential loading due to a design-basis tornado. The staff also noted that there were no ITAAC that inspects the tornado missile shields described in FSAR Subsection 3.8.4.1.3.2. In **RAI 273-7006, Question 14.03.07-39**, the staff requested that the applicant amend ITAAC Table A.2-1 to verify that (1) the backdraft dampers are capable of withstanding the effects of tornado wind and atmospheric differential pressure loading and (2) UHS ESW pump house air intakes and air outlets are protected from tornado missiles as described in FSAR Subsection 3.8.4.1.3.2.

In its response to **RAI 273-7006, Question 14.03.07-39** (ADAMS Accession Number ML31308A174), dated April 16, 2013, the applicant provided a comprehensive change to Item 5.c of ITAAC Table A.2-1 that will demonstrate that the installed air intake and exhaust dampers of the UHS ESW Pump House Ventilation System are capable of withstanding differential loading due to a design-basis tornado. In addition, the response provided a new ITAAC Item 8 that will verify that the UHS pump house air intakes and air outlets are protected from tornado missiles and hurricane missiles. The staff found both of these changes acceptable since the integrity of the analyses will be preserved in the as-built facility in conformance with Acceptance Criterion 5 of NUREG-0800 SRP 14.3.7. Therefore, **RAI 273-7006, Question 14.03.07-39,** is being tracked as **Confirmatory Item 14.03.07-1,** pending the review of FSAR Revision 4.

SRP Section 14.3.7, Acceptance Criterion 6, reads in part "Other specific issues that should be addressed include heat removal capabilities for design-basis accidents and …." In **RAI 3532, Question 14.03.07-24,** the staff noted that the design commitment and acceptance criteria in

Item 4 of Appendix A-2, ITAAC Table A.2-1, both fail to define what is meant by the phrase *"… maintains the proper environmental conditions.*" The staff went on to state that consistent with words found in 10 CFR Part 50, Appendix B, Criterion III, "Design Control," the applicant must demonstrate the capability of the UHS ESW ventilation system to maintain the UHS ESW pump house within design-basis limits under the most adverse design conditions. The staff requested that the applicant amend Item 4 of ITAAC Table A.2-1 to demonstrate the system's capability of maintaining the UHS ESW pump house within design-basis limits under the most adverse design conditions (e.g., winter/summer environmental extremes, design-basis accidents, etc.) through a combination of testing and scientific analyses.

In its response to **RAI 3532, Question 14.03.07-24** (ADAMS Accession Number ML093210468)**,** dated November 13, 2009, the applicant stated that COLA Part 10 Table A.2-1, ITAAC Item 4 has been revised to be consistent with similar DCD ITAAC concerning proper environmental conditions to support equipment and instrumentation operability during normal operation, abnormal and accident conditions but the staff still had residual concerns pertaining to ITAAC Item 4 of Table A.2-1. The staff found that the acceptance criterion should be expanded to show that the as-built UHS ESW pump house ventilation system is capable of maintaining design temperature limits within the respective room during all plant operating conditions, including normal plant operations, abnormal and accident conditions. Therefore, **RAI 220-5755, Question 14.03.07-35** (ADAMS Accession Number ML11178A072), was issued to the applicant and the staff agreed to the applicant's final acceptance criterion in the response which stated the following:

> A report exists and concludes that the as-built UHS ESW pump house ventilation system is capable of providing heated air via unit heaters and cooled air via exhaust fans to maintain area temperature within design limits in the UHS ESW pump houses during all plant operating conditions including normal plant operations, abnormal and accident conditions of the plant with outside ambient design temperature condition (i.e., -5°F - 115 °F).

The staff verified that in FSAR Revision 3, ITAAC Item 4 contained the above words for its acceptance criterion. The associated design commitment was also clarified in a similar manner. Based on these changes, the staff found that Item 4 satisfied the intent of SRP Section 14.3.7, Acceptance Criterion 6. Therefore, **RAI 3532, Question 14.03.07-24,** and **RAI 220-5755, Question 14.03.07-35, are resolved and closed.**

SRP Section 14.3.7, Acceptance Criterion 9, reads in part "*Tier 1 should address and verify at least the minimum inventory of alarms, controls and indications as derived from the Emergency Procedure Guidelines, the requirements of RG 1.97, and probabilistic risk assessment insights*. … *Other controls, indications and alarms should be identified in the system ITAAC based on their safety significance…. The ability of these controls, indications, and alarms to function should be checked during operation of the system for the functional tests required by the system ITAAC…."*

In **RAI 3532, Question 14.03.07-22**, the staff identified two concerns with line item 3.a of Appendix A-2 ITAAC Table A.2-1. In particular, the staff noted that:

a) ITA 3.a and Acceptance Criterion 3.a did not indicate what actuation signal the simulated signal represented. The staff requested that the COL applicant amend the ITA and acceptance criterion with more definitive words that are consistent with the system's safety function.

b) Acceptance Criterion 3.a reads, "The simulated test signal exists only at the as-built Class 1E equipment identified in Table A.2-2 under test…." The staff noted that verifying the non-existence of this test signal everywhere else in the plant is an impossible task. The staff requested that the applicant reword Acceptance Criterion 3.a to provide an acceptance criterion that is verifiable.

In its response to **RAI 3532, Question 14.03.07-22** (ADAMS Accession Number ML093210468), dated November 13, 2009, the applicant proposed an amendment to the ITAAC design commitment, ITA and acceptance criterion of Line Item 3.a that addressed both staff concerns. The applicant noted in their response that the design commitment for this ITAAC requires that the Class 1E components of Table A.2-2 be powered from their respective Class 1E divisional power source. This design commitment will be demonstrated by verifying that a simulated test signal that is injected only in the division under test is detected at the equipment under test (in the same division as the simulated test signal). The applicant justified the use of the words "simulated test signal" in the ITAAC by replying that the success of the test does not depend on the source of the signal with respect to actuation logic.

After reviewing the proposed changes to line item 3.a of Table A.2-1, the staff found the applicant's resolution to both issues of **RAI 3532, Question 14.03.07-22,** acceptable since the amended design commitment, ITA and acceptance criterion of Item 3.a are consistent and sufficiently clear to avoid ambiguity. The staff found that the revised ITAAC satisfied the intent of SRP Section 14.3.7, Acceptance Criterion 9. The staff verified that in FSAR Revision 3, ITAAC Item 3.a contained the requisite amendments consistent with the applicant's response. Based on this, **RAI 3532, Question 14.03.07-22, is resolved and closed**.

In **RAI 3532, Question 14.03.07-25,** the staff referred to the acceptance criterion in Item 7 of ITAAC Table A.2-1 and requested that the applicant clarify which control functions would exist at the RSC. In its response to **RAI 3293, Question 14.03.07-7** (ADAMS Accession Number ML093210468)**,** the applicant agreed to revise Item #7 of Table A.2-1 to provide greater clarity.

The staff also noted in **RAI 3532, Question 14.03.07-25,** that in FSAR Figure 9.4-201, it appeared that the equipment numbers for the temperature switches contained in the bottom two rows of Table A.2-3 were associated with a control function and not an alarm function. The applicant responded that the RSC has the same functional controls and monitoring capabilities as the MCR. In its response to **RAI 3293, Question 14.03.07-7**, dated November 13, 2009, the applicant proposed to amend Table A.2-3 to indicate that the control functions, displays and alarms capabilities are the same for the Main Control Room (MCR) and the Remote Shutdown Console (RSC). The applicant concluded their response by referring to its response to **RAI 3293, Question 14.03.07-7,** for more information concerning the temperature switches and the alarms controls and displays associated with the temperature switches.

The staff reviewed the proposed changes to Item #7 of Table A.2-1 and Table A.2-3 and found that the applicant resolved the two issues since the amended Table A.2-3 will indicate for the system's unit heaters and exhaust fans, that the control functions, displays and alarms capabilities are the same for the MCR and the RSC. In addition, the equipment numbers for the subject temperature switches will be removed from Table A.2-3 and transferred to Table A.2-2. The staff verified that in FSAR Revision 3, ITAAC Table A.2-1 and Table A.2-3 contained the requisite changes. The staff found the applicant's response acceptable since the control functions located on the RSC are now accurately defined. The staff concluded that the revised

ITAAC satisfied the intent of SRP Section 14.3.7, Acceptance Criterion 9. Based on this, **RAI 3532, Question 14.03.07-25, is resolved and closed**.

In **RAI 3532, Question 14.03.07-26,** the staff noted that the ITA for ITAAC Item 5.b of Table A.2-1, and the acceptance criterion for Item 3.a did not indicate what actuation signal the simulated signal represents. The staff requested that the applicant amend the ITA and acceptance criterion with more definitive words that are consistent with the system's safety function.

In its response to **RAI 3532, Question 14.03.07-26** (ADAMS Accession Number ML093210468), dated November 13, 2009, the applicant referred to the resolution of **RAI 3293, Question 14.03.07-6,** in which the applicant proposed to revise ITAAC Item 5.b to be consistent with the DCD template for protection and safety monitoring system (PSMS) Control. Similarly, the applicant proposed to revise ITAAC Item 3.a to be consistent with similar DCD ITAAC and cited a similar approach taken in RAI 3532, **Question 14.03.07-22** in its explanation of "simulated test signal" as used in these ITAAC.

Upon review of the proposed changes to the acceptance criterion for 3.a and the ITA for Item 5.b, the staff found that the revised ITAAC were clear and understandable. Based on this, the staff found these changes to the ITAAC as acceptable pending the revision of ITAAC Items 3.a and 5.b.

In addition, the staff requested additional information about how the system's exhaust fans and heaters respond to the presence of an ECCS signal in the absence of a closed switch from the temperature switches of Table A.2-3 (e.g., VRS-TS-803, -804, -805, -806, etc.) and the design basis behind the logic of this equipment response. The applicant responded that the UHS ESW pump house ventilation system exhaust fans and heater operation will not be initiated in response to an ECCS signal. Operation of the exhaust fans will be initiated upon high area temperature and operation of the heaters will be initiated upon low area temperature, as reflected in Table A.2-2. Controls will also be located in the MCR and on the RSC for manually starting the exhaust fans and unit heaters as shown Table A.2-3.

The staff confirmed that Table A.2-2 indicates that ESW pump room and UHS transfer pump room heaters and exhaust fans are controlled by the PSMS and not an ECCS signal as suggested by the staff in **RAI 3532, Question 14.03.07-26**. This, when taken in conjunction with the applicant's response, clarifies the design and basis for the operational logic. Based on this, the staff found the applicant's response to both parts of the question acceptable since the revised ITAAC satisfied the intent of SRP Section 14.3.7, Acceptance Criterion 9. The staff verified that in FSAR Revision 3, ITAAC Table A.2-1, Items 3.a and 5.b, are consistent with the proposed changes of **RAI 3293, Question 14.03.07-6**. Based on this, **RAI 3532, Question 14.03.07-26, is resolved and closed.**

In **RAI 3532, Question 14.03.07-27,** the staff inquired about the "Design Commitment" and the Acceptance Criteria of item 6 of ITAAC Table A.2-1. Both the Design Commitment and the Acceptance Criteria refer to Table A.2-3. In particular, the staff requested additional information about temperature controllers of the temperature control instrument loop for the "B" UHS Transfer Pump Room Unit Heater. This control loop is shown on FSAR Figure 9.4-201. The staff noted that the last two rows of Table A.2-3 are designated as the room temperatures of ESW Pump Room and the UHS Transfer Pump Room. The "MCR Display" column of Table A.2-3 for these two rows is designated as "No". The staff requested additional information about

these parallel temperature control loops and in particular whether the temperature controllers have a visual display of temperature in the MCR.

The staff also noted that an excerpt from SRP Acceptance Criteria #9 of NUREG-0800, SRP 14.3.7 reads: "*Tier 1 should address and verify at least the minimum inventory of alarms, controls and indications as derived from the Emergency Procedure Guidelines, the requirements of RG 1.97, and probabilistic risk assessment insights*." The staff requested additional information about how the applicant used these three sources of guidance to ensure that the listing of alarms, parameters and displays contained in Table A.2-3 fulfilled the intent of this excerpt.

In its response to **RAI 3532, Question 14.03.07-27**, dated November 13, 2009, the applicant responded (ADAMS Accession Number ML093210468) with appropriate amendments to the ITAAC that transferred the safety related temperature switches from Table A.2-3 to Table A.2-2. The staff verified that Revision 3 of the R-COLA contained these amendments to the Tier 1 tables. However, the response did not include a discussion of how the applicant followed the guidance of SRP 14.3.7 Acceptance Criteria #9. In follow-up **RAI 5755, Question 14.03.07-36,** the staff again asked this information be provided. The applicant responded (ADAMS Accession Number ML11178A072) in part:

> "… the UHS ESW pump house ventilation system fans (unit heaters) operating status is displayed in the MCR and at the RSC. This provides the operator with safety related equipment status indication that is verified to be operable through pre-operational testing described in FSAR Subsection 14.2.12.1.114 and through functional testing during the plant operating lifetime. The Emergency Procedure Guidelines confirm acceptable performance of the ESW pumps and UHS transfer pumps through confirmation of system parameters rather than pump house ventilation status. The ESWS and UHS related post-accident monitoring variables for RG 1.97 requirements are UHS basin water level, ESW header pressure, and UHS basin water temperature, as indicated in FSAR Table 7.5-201. The monitoring variables do not include the ventilation-related parameters. In addition, the PRA does not credit UHS ESW pump house ventilation specifically in the model. Therefore, the indication of fan (unit heater) operating status is consistent with the intent of SRP 14.3.7 Acceptance Criterion #9."

With this explanation, the staff found the applicant's composite responses to be complete and acceptable since the applicant did demonstrate how the acceptance criteria of SRP Section 14.3.7 were used to determine the minimum inventory of alarms, controls and indications for ITAAC inclusion. Based on this, **RAI 3532, Question 14.03.07-27,** and **RAI 5755, Question 14.03.07-36, are resolved and closed.**

The staff reviewed the US-APWR UHS ESW Pump House Ventilation System ITAAC in accordance with SRP Section 14.3.7 to ensure that the relevant requirements of 10 CFR 52.80(a), are met. The staff verified that sufficient information has been provided to satisfy the applicable Acceptance Criteria of SRP Section 14.3 and SRP Section 14.3.7. As discussed above, the satisfied Acceptance Criteria includes (but is not limited to) Acceptance Criteria 1, 5, 6, and 9 of SRP 14.3.7. In summary, the US-APWR UHS ESW Pump House Ventilation System ITAAC satisfies all applicable Acceptance Criteria of NUREG-0800 SRP Section 14.3 and SRP Section 14.3.7. However, as a result of **Open Item 1-1** and **Confirmatory Item 14.03.07-1,** for **RAI 7006, Question 14.03.07-39**, the staff is unable to finalize its conclusions on the ITAAC for Plant Systems in accordance with the requirements of 10 CFR 52.80(a).

14.3.7.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.3.7.6 Conclusions

The staff is reviewing the information in DCD Section 14.3.4.7 on Docket Number 52-021. The results of the staff's technical evaluation of the information related to ITAAC for plant systems incorporated by reference in the FSAR will be documented in the staff SER on the DC application for the US-APWR design. The SER on the US-APWR is not yet complete, and this is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.7 of this SER to reflect the final disposition of the DC application.

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to ITAAC for plant systems. **Confirmatory Item 14.03.07-1,** associated with **RAI 7006, Question 14.03.07-39,** will be verified in the next revision of the FSAR.

The staff concludes that the applicant has fulfilled the requirements of CP COL 14.3(1) and US-APWR COL 14.3(1). With the exception of the sole confirmatory item noted above, the staff concludes that the ITAAC for plant systems are acceptable.

The staff reviewed plant systems ITAAC which include information on new and spent fuel handling systems, power generation systems, air systems, cooling water systems, emergency diesel generator support systems, radioactive waste systems, and HVAC systems. The staff concludes that the requirements of 10 CFR 52.80(a) have been met with regard to plant systems and that the proposed plant systems ITAAC provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the plant systems of a facility that incorporates the DC have been constructed and will be operated in accordance with the DC, the provisions of the Atomic Energy Act of 1954, and NRC regulations.

14.3.8 ITAAC for Radiation Protection

This section of the FSAR describes the ITAAC for Radiation Protection as addressed in US-APWR DCD.

Section 14.3.4.8, "ITAAC for Radiation Protection", of the FSAR incorporates by reference, with no departures or supplements, Section 14.3.4.8, of the US-APWR DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The staff's review confirmed that there is no outstanding issue related to this section.

The staff is reviewing the information in DCD Section 14.3.4.8 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to the ITAAC for Radiation Protection incorporated by reference in the FSAR will be documented in the staff SER on the DC application for the US-APWR. The SER on the US-APWR is not yet complete, and this is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.8 of this SER to reflect the final disposition of the DC application design.

14.3.4.9 Human Factors Engineering ITAAC

Section 4.3.9 of this SER contains evaluations associated with human factors engineering. The staff does not intend to issue an SE with Open Items for Section 14.3.9 of CPNPP, Units 3 and 4. Instead the staff intends to provide this section of the SER at a later time. The staff's review of FSAR Section 14.3.4.9 is currently in progress and its completion is being tracked **as Open Item 14.3.9-1.**

14.3.10 ITAAC for Emergency Planning

14.3.10.1 Introduction

This section of the FSAR addresses ITAAC related to emergency planning (EP). EP covers plans for emergency response activities, which may address such areas as EP zones (EPZs), emergency action levels (EALs), evacuation time estimates (ETEs), and emergency response facilities.

The staff reviewed the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the ITA are performed and the acceptance criteria met, a plant that incorporates the DC is built and will operate in accordance with the DC, the Atomic Energy Act of 1954, and the NRC's regulations. In addition, the staff reviewed the justification that compliance with the interface requirements is verifiable through ITAAC, and also reviewed the method that is to be used for verification of the interface requirements.

14.3.10.2 Summary of Application

Section 14.3.4.10 of the FSAR, Revision 3, incorporates by reference Section 14.3.4.10 of the US-APWR DCD, Revision 3.

In addition, in FSAR Section 14.3.4.10, the applicant provided the following:

US-APWR COL Information Item

- STD COL 14.3(2)

The applicant provided additional information in Standard (STD) COL 14.3(2) to address COL Information Item 14.3(2), for the facility EP not addressed in the DCD in accordance with RG 1.206 as appropriate.

Interface Requirements

DCD Tier 2, Section 1.8, Table 1.8-1, "Significant Site-Specific Interfaces with the Standard US-APWR Design," identifies significant interfaces between the US-APWR standard design and the COLA. This table does not specify any interfaces related to Section 14.3.10 of the DCD.

14.3.10.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the FSER related to the DCD.

In addition, the relevant requirements of the Commission's regulations for the ITAAC related to EP, and the associated acceptance criteria, are given in Section 14.3.10, “Emergency Planning – Inspections, Tests, Analyses, and Acceptance Criteria,” of NUREG-0800, the SRP.

The applicable regulatory requirement for the COL-specific item described above is as follows:

1. 10 CFR 52.77, 10 CFR 52.79, 10 CFR 52.80, 10 CFR 52.81, and 10 CFR 52.83, as they relate to EP and preparedness associated with a COLA.

2. 10 CFR 52.80(a), which requires that a COLA include the proposed ITA, including those applicable to EP, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the ITA are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Atomic Energy Act of 1954, and the NRC's regulations.

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above can be found in Part II of Section 14.3.10 of NUREG-0800.

14.3.10.4 Technical Evaluation

The staff reviewed Section 14.3.4.10 of the FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic. The staff’s review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the ITAAC for EP. Section 14.3.4.10 of the US-APWR DCD is being reviewed by the staff under Docket Number 52-021. The staff’s technical evaluation of the information incorporated by reference related to the ITAAC for EP will be documented in the staff’s SER on the DC application for the US-APWR design.

The staff reviewed the information contained in the FSAR:

US-APWR COL Information Item

- STD COL 14.3(2)

The applicant provided additional information in STD COL 14.3(2) to address COL Information Item 14.3(2), which states:

> The COL applicant provides proposed ITAAC for the facility’s emergency planning not addressed in the DCD in accordance with RG 1.206 as appropriate.

The staff reviewed STD COL 14.3(2), related to COL Information Item 14.3(2), included under Section 14.3.4.10 of the FSAR. The applicant replaced the last paragraph in DCD Section 14.3.4.10 with the following paragraph in CPNPP, Units 3 and 4, FSAR Section 14.3.4.10, “ITAAC for Emergency Planning”:

> The selection criteria and methodology provided in Section 14.3 of the referenced DCD are utilized as the site-specific selection criteria and methodology for the facility’s emergency planning ITAAC. The ITAAC conform to the guidance in this subsection, as modified to reflect the design and specific

emergency planning program requirements. The ITAAC for the facility's emergency planning are provided in Part 10 of the COLA.

EP-ITAAC are discussed in the application as required for inclusion in accordance with 10 CFR 52.80(a). The site-specific EP-ITAAC is based on the generic ITAAC provided in Appendix C.II.1-B of RG 1.206. The staff's review of the current set of EP-ITAAC is contained in Chapter 13.3, "Emergency Planning," of the SER.

14.3.10.5 Post Combined License Activities

There are no post-COL activities related to this section.

14.3.10.6 Conclusions

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant addressed the required information relating to ITAAC for EP, and there is no outstanding information expected to be addressed in the FSAR related to this section.

The staff is reviewing the information in DCD Section 14.3.4.10 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to ITAAC for EP incorporated by reference in the FSAR will be documented in the staff's SER on the DC application for the US-APWR design. The SER for the US-APWR is not yet complete, and the SER completion is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.10 of this SER to reflect the final disposition of the DC application.

14.3.11 ITAAC for Containment Systems

This section of the FSAR describes the ITAAC for Containment Systems addressed in US-APWR DCD related to containment heat removal, fission product removal and control functions.

Section 14.3.4.11, "ITAAC for Containment Systems", of the FSAR incorporates by reference, with no departures or supplements, Section 14.3.4.11, of the US-APWR DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The staff's review confirmed that there is no outstanding issue related to this section.

The staff is reviewing the information in DCD Section 14.3.4.11 under Docket Number 52-021. The results of the staff's technical evaluation of the information related to the ITAAC for Instrumentation and Controls incorporated by reference in the FSAR will be documented in the staff SER on the DC application for the US-APWR. The SER for the US-APWR is not yet complete, and this is being tracked as part of **Open Item [1-1]**. The staff will update Section 14.3.11 of this SER to reflect the final disposition of the DC application design.

14.3.12 Physical Security Hardware ITAAC

14.3.12.1 Introduction

COLA Part 10, , Appendix C, "Plant-Specific Security ITAAC," describes the ITAAC for engineered physical security systems (PSS), hardware, and features provided to facilitate and implement the CPNPP, Units 3 and 4, physical protection program. The COL applicant

provided the site-specific security ITAAC, which supplement the physical security ITAAC within the scope of the US-APWR DC, to complete the verification of PSS to meet the design and intended security functions (i.e., detection, assessment, communications, delay, and response) for a physical protection system and physical protection program.

14.3.12.2 Summary of Application

FSAR Chapter 14 incorporates by reference the pertinent information in DCD Tier 1 and Tier 2 and provides both a supplement and a departure for the initial plant test program related to the CPNPP, Units 3 and 4, PSS.

In COLA, Part 2 (FSAR) and Part 8, "Safeguards/Security Plans," the applicant provides the site-specific design descriptions for PSS (e.g., physical barriers, protected openings, isolation zones, intrusion detection, video assessment, alarm stations, vehicle barriers, access control systems, communications, power supply, etc.), descriptions of the intended security functions and performance requirements, assumptions for detailed design, and supporting technical bases for the COL applicant's design and licensing bases for physical protection of CPNPP, Units 3 and 4.

The site-specific information, along with the referenced DCD for a physical protection system, the physical protection program, and a security organization, establish how the COL applicant will meet the performance and prescriptive requirements of 10 CFR Part 73, "Physical Protection of Plants and Materials." In COLA Part 10, Appendix C, "Plant-Specific Security ITAAC," the COL applicant describes the generic standard physical security ITAAC for verifying the design commitments for PSS that had been reserved for a COL applicant in DCD Tier 1, Section 2.12, for meeting COL Information Items 14.3(1) and 14.3(3).

The following portions of the COLA and referenced technical reviews contained the applicant's design descriptions and information related to PSS meeting regulatory requirements:

FSAR Section 13.6

FSAR Section 13.6, "Security," incorporated by reference the corresponding DCD Tier 1 and Tier 2 information. DCD Chapter 13, "Conduct of Operations," Section 13.6, "Security," and Subsection 13.6.2, "US-APWR Physical Security," describe engineered PSS of the US-APWR standard design that are incorporated by reference. The applicant described the site-specific PSS that are outside the scope of the DC and provided the design of a physical protection system (i.e., detection, assessment, communication, and response) for the protection of the CPNPP Units 3 and 4. The applicant referenced MHI Technical Report UAP-SGI-08002, "US-APWR High Assurance Evaluation Assessment," and MHI Technical Report UAP-SGI-08001, "US-APWR Design Certification Physical Security Element Review," that described the design bases and performance requirements for constructions and installations of PSS that are credited for physical protection. The design bases support the acceptance criteria verified through ITA of identified physical security ITAAC.

FSAR Chapter 14, Verification Programs

FSAR, Chapter 14, describes the applicant's verification program that includes descriptions of the initial plant test program (IPT), ITAAC, comparison of RG 1.68 and US-APWR test abstracts, test programs, listing of additional tests, and comparison of DCD Tier 2 pre-operational test and Tier 1 test requirements. The COL applicant provides site-specific

information in Appendix 14AA on the test program descriptions (such as organization and responsibilities, jurisdictional controls, work control, test specifications, procedures, conduct of testing, test results, and certification and qualification) that are applicable to conducting ITAAC verification, preoperational testing, acceptance testing, and test administration.

COLA Part 10, ITAAC and Proposed License Conditions

COLA Part 10, Appendix C, "Plant Specific Security ITAAC," describes the site-specific physical security ITAAC. The site-specific ITAAC, combined with those contained in the US-APWR DCD Tier 1, established the required ITAAC for PSS that are verified for meeting the requirements for 10 CFR 103(g). Table C–1, "Physical Security Hardware Inspections, Tests, Analyses, and Acceptance Criteria [6 sheets]," provides the design commitments, ITAs, and acceptance criteria of PSS.

Referenced Technical Reports or Safeguards Information Related Submittals

The applicant's document "Comanche Peak, Units 3 and 4-Physical Security Hardware ITAAC Abstracts," was submitted by letter, dated December 9, 2010, and was subsequently revised and incorporated by reference in FSAR Section 14.3.4.12, "ITAAC for Physical Security Hardware," (Reference 14.3-201) and in COLA Part 10, Appendix C, Table C—1. The ITAAC abstracts provided the framework to develop detailed test procedures for conducting the ITAs. If met, the acceptance criteria will demonstrate that the plant incorporates the design, and the construction and installations are such that the identified PSS will operate in accordance with the design requirements and perform the intended security functions. MHI Technical Report MUAP-08009, "US-APWR Test Program Description," which supports the Tier 2 Chapter 14, "Verification Programs," is incorporated by reference. MHI Technical Report MUAP-10003, "Physical Security Hardware TAAC Abstracts," described the ITAAC abstracts for the ITA to be performed for the closing of US -APWR physical security hardware ITAAC.

MHI Technical Report UAP-SGI-08001 and MHI Technical Report UAP-SGI-08002 contain safeguards information (SGI), security-related, or proprietary information on physical security design basis and performance requirements for PSS and, therefore, are protected in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements," and 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," respectively.

14.3.12.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the FSER related to the DCD.

In addition, the relevant requirements of the Commission's regulations for the PSS and related ITAAC, and the associated acceptance criteria, are given in Section 14.3.12, "Physical Security Hardware – Inspections, Tests, Analyses, and Acceptance Criteria," of NUREG-0800, the SRP.

The applicable regulatory requirement for the COL-specific item described above is as follows:

1. 10 CFR 52.79(a)(35)(i) and 10 CFR 52.79(a)(35)(ii) relate to the requirement that information submitted for a COLA must include a description of how the COL applicant will meet the requirements of 10 CFR Part 73 and a description of implementation of the physical security plan. Also, 10 CFR 73.55(b)(3)(i)

requires that the COL applicant provide capabilities to detect, assess, interdict, and neutralize threats up to and including the design-basis threat (DBT) and maintain such capabilities at all times. The design of the PSS that is beyond the scope of the DC is required as a part of COL Information Items 14.3(1) and 14.3(3).

2. 10 CFR 52.80(a) relates to the requirement that the COLA contain proposed ITAAC and the acceptance criteria necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformance to the COL, the provisions of the Atomic Energy Act of 1954, and NRC regulations. A COL applicant that references the US-APWR DC addresses interfaces with the US-APWR FSAR and must comply with COL Information Item 14.3(1) and No. 14.3(3) for descriptions of physical security ITAAC that are not included in descriptions of physical security ITAAC within the scope of the US-APWR certified design.

3. 10 CFR 73.55(b) relates to the requirement that the COL applicant establishes and maintains a physical protection program and security organization. The objective of the physical protection program and security organization will be to provide high assurance that activities involving special nuclear material are not harmful to the common defense and security and do not constitute an unreasonable risk to public health and safety. The physical protection program, consisting of engineered and administrative controls and a management system, shall be designed to protect against the acts of radiological sabotage, as stated in 10 CFR 73.1, "Purpose and Scope." The physical security ITAAC provides verification of engineered PSS that are relied on for meeting performance and prescriptive regulatory requirements.

The RGs, technical reports, accepted industry codes, or standard that an applicant may apply to meet regulatory requirements are set forth in, but not limited to, the following:

1. RG 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants, Revision 4, issued June 2013.

2. RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Revision 0, issued June 2007.

The NRC guidance, approaches, and examples described above and other guidance for physical security provide methods of compliance but are not intended to be all inclusive. The applicant may employ alternative methods or approaches for implementing NRC regulations other than the approaches discussed in NRC guidance, provided that such measures satisfy the relevant NRC regulatory requirements.

14.3.12.4 Technical Evaluation

The staff's technical review consists of determining whether the COL applicant adequately met the requirements of 10 CFR 52.80(a), which required that the COLA contain information for proposed ITAAC and the acceptance criteria necessary and sufficient to provide reasonable assurance that the facility was constructed and will operate in conformance to the COL, the provisions of the Atomic Energy Act of 1954, and NRC regulations. The staff review determined whether the proposed physical security ITAAC provide reasonable assurance that if the ITAs

are performed and the acceptance criteria are met a plant that incorporates the US-APWR standard design and site-specific design will be built and will operate in accordance with applicable regulatory requirements. The staff also reviews whether the COL applicant adequately described the management system (processes, procedures, and controls) for the framework to conduct ITAs required with reasonable assurance to verify design and performance requirements and intended security functions of PSS, for ITAAC and closure supporting the requirements of the 10 CFR 52.103(g) finding.

The staff reviewed the information provided by the COL applicant to meet the requirements of 10 CFR 52.47(b)(1), which states that a design certification application must contain the proposed ITAAC that, if met, ensure that a facility that incorporates the design certification and has been constructed and will be operated in conformity with the design certification and the Commission's regulations.

The PSS in the US-APWR standard design and the site-specific information in the COLA must be reliable and available to provide high assurance of performances and the intended security functions. The PSS are required to meet the performance and prescriptive requirements of 10 CFR Part 73. The staff notes that, within this context, the COL applicant addressed portions of PSS that are outside the scope of the US-APWR standard design. The design bases for PSS within the scope of the COL are described in the Part 2, COLA FSAR, Section 13.6, "Physical Security," COLA Part 8, "Physical Security Plans," and MHI Technical Report UAP-SGI-08002 and Technical Report UAP-SGI-08002, and established the design bases and the design performance and requirements for the identified ITAAC design commitments and acceptance criteria. The information contained in the Technical Report UAP-SGI-08002 and security plans are SGI or security-related information, protected in accordance with 10 CFR 73.21 and 10 CFR 2.390, respectively.

The staff also reviewed the applicant responses submitted to address the staff's RAI (and resulting revision to the FSAR or referenced technical reports) related to physical security ITAAC.

14.3.12.4.1 Conformance with Regulatory Guides and Standard Review Plans

The applicant conformance with NUREG-0800 SRP is described in FSAR, Section 1.9, "Conformance with Regulatory Criteria," Tables 1.9.201 through 1.9.281. Section 1.9.1, Table 1.9–214, identified the conformance with SRP 13.6.1, "Physical Security—Combined License," issued March 2007. Table 1.9–215, "Comanche Peak Nuclear Power Plant Units 3 & 4 Conformance with Standard Review Plan, Chapter 14 Verification Program," indicated conformance to NUREG 0800, Section 14.3.12. In Section 1.9.1, the applicant indicated that "Division 5 of the RGs applies to the Physical Security Plan, and those topics are addressed in the COLA Part 8." The applicant revision to Section 1.9.1 and additional of Table 1.9-221, included identification of RGs in effect six months before the COLA submittal (September 2008), conforming to guidance in RG 1.206, Section C.1.1.9.1. The applicant indicated that guidance contained in RGs 5.75 and 5.76 was considered in the development of the CPNPP, Units 3 and 4, Physical Protection Program.

14.3.12.4.2 Design Commitments, Inspections, Tests, Analyses, and Acceptance Criteria

The physical security ITAAC contained in the US-APWR DCD Tier 1, Section 2.12, "Physical Security Hardware," are incorporated by reference in FSAR Section 14.3.12. In COLA Part 10, Appendix C, the applicant addressed the site-specific physical security ITAAC for CPNPP, Units

3 and 4. Specifically, in FSAR Section 14.3.4.12, "ITAAC for Physical Security Hardware," the applicant stated, "The site-specific physical security hardware ITAAC are provided in Part 10 of the COLA." Physical security ITAAC abstracts supporting the site-specific physical security ITAAC are provided in the CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Abstract (Reference 14.3-201).

DCD, Tier 1, Table 2.12.1, and Technical Report MHI UAP-10003, list the physical security ITAAC that a US-APWR COL applicant will provide. The following is a summary of the ITAAC that are reserved as site-specific information that a COL applicant referencing the US-APWR standard design will provide:

- ITAAC No. 1.b, Two Barriers for Access to Vital Equipment.
- ITAAC Nos. 2.a, 2.b, and 2.c, Protected Area Barriers.
- ITAAC Nos. 3.a, 3.b, and 3c, Isolation Zone.
- ITAAC No. 4.a, 4.b, and 4.c, Protected Area Perimeter Intrusion Detection System.
- ITAAC No. 5, Isolation Zones and Exterior Protected Area Illumination.
- ITAAC No. 6.b, Bullet Resistant Barriers for Secondary Alarm Station (SAS) and Last Access Control Function.
- ITAAC No. 7, Vehicle Barrier System.
- ITAAC Nos. 8.a and 8.b, Access Control Points.
- ITAAC No. 9, Picture Badge Identification System.
- ITAAC Nos. 11.a.11 and 11.b.ii, SAS Alarm Annunciation and Location.
- ITAAC No. 11.c, Single DBT Act Does Not Disable Both Central Alarm Station (CAS) and SAS.
- ITAAC No. 11.d, Functional Redundancy of the CAS and SAS.
- ITAAC No. 13.b.ii, Alarm Annunciation in SAS.
- ITAAC No. 15.b, Protected Area Emergency Exits.
- ITAAC Nos. 16.a.ii, and 16.b.ii, and 15.c.ii, SAS Communications.

COL Information Item 14.3(3) in the US-APWR DCD established the requirement for a COL applicant that references the US-APWR standard design to provide the physical security ITAAC listed above. The US-APWR standard design physical security ITAAC and associated ITAAC abstracts (or test protocols) have been reviewed, and are not subject to further technical reviews.

The applicant, in COLA Part 10, Section 1, stated, "[p]hysical security ITAAC are contained in the DCD Tier 1 and are incorporated by reference." COLA Part 10 consists of those ITAAC contained in the US-APWR DCD Tier 1 and the site-specific ITAAC provided in Appendix C, Table C-1, which list the site-specific Physical Security ITAAC as indicated in the DCD.

In COLA Part 10, Appendix C, Table C–1, the applicant describes the arrangement of ITAAC tables applicable to PSS. Consistent with the DCD and other safety-related ITAAC, the first column proposes design requirements and commitments extracted from the design description that must be verified. The second and third columns identify proposed methods of verifications and objective criteria, respectively, that demonstrate that the design requirements/commitments are met.

The design commitments related to the PSS are credited to provide security functions and the design requirements and performances, including locations and configurations, for physical

barriers, isolation zone, protected area (PA) intrusion detection and illumination, bullet resistant barriers, vehicle barrier system, physical access controls, central alarm station (CAS) and secondary alarm station (SAS), and communications, in accordance with the requirements of 10 CFR 73. The design descriptions for PSS that are within the scope of the COLA provide the security functions to detect, delay, interdict, and respond to protect against the threats up to and including DBT for radiological sabotage and meeting prescriptive regulatory requirements.

The staff finds the following:

- The applicant described site-specific physical security ITAAC to verify attributes of systems and associated components, hardware, or configurations to meet design bases and security functions of providing detection, assessment, communications, delays, and facilitating response. The identified site-specific design commitments, and ITAAC conform to the guidance in NUREG-0800, Section 14.3.12, which included physical barriers, isolation zone, PA intrusion detection and illumination, bullet resistance barriers, vehicle barrier system, physical access controls, CAS and SAS, and communications.

- The list of site-specific physical security ITAAC is in Part 10 of the COLA, Appendix C, Table C-1. The list addresses ITAAC Nos. 1(b), 2(a), 2(b), 2(c), 3(a), 3(b), 3(c), 4(a), 4(b), 4(c), 5, 6(b), 7, 8(a), 8(b), 9, 10(b), 11(a), 11(c), 11(d), 11(e), 13(b), 15, and 16(c) for site-specific PSS and adequately captured design commitments. The site-specific physical security ITAAC and conforms to the guidance identified in NUREG-0800, Section 14.3.12.

- The applicant identified site-specific PSS for ITAAC verification within the scope of the COL. The combination of the site-specific ITAAC and the US-APWR standard design ITAAC that are incorporated by reference establish a set of physical security ITAAC that conform to the guidance in NUREG-0800, Section 14.3.12 and are adequate to verify that the construction, installations, or configurations will operate or meet the intended security functions in accordance with the design and licensing bases for the physical protection of the CPNPP, Units 3 and 4, in accordance with 10 CFR 52.80(a).

14.3.12.4.3 Verification Programs and Acceptance Process

In FSAR Chapter 14, “Verification Programs,” the applicant indicated that the reference US-APWR DCD is incorporated by reference and is supplemented with site-specific information to address both US-APWR standard design and site-specific systems and hardware verification. The US-APWR DCD Tier 2, Chapter 14, supplemented by MHI Technical Report MUAP-08009, “US-APWR Test Program Description,” that is incorporated by reference, established the requirements for the management system (i.e., administrative controls, processes, and program) for an ITP for SSCs, and design features for both the nuclear portion of the facility and the balance of the plant. The program must also verify that the as-built facility configurations and operations comply with the approved plant design and applicable regulations.

MHI Technical Report MUAP-08009 described the management system for the test program that included the following:

- test specifications describing test objectives, prerequisites, initial conditions and plant configuration, special considerations, acceptance criteria, test methods,

data collection, result evaluations, and restoring requirements, along with a process for preparation and approval procedures,

- tests that include configuration management, coordinating tests, controls of procedures and changes, documenting performance and conduct of tests, and management of test deficiencies,

- review, approval, closure, and documentation of test activities that satisfies ITAAC test requirements, managing unresolved test deficiencies, test closure, and records,

- certification and qualification of test personnel, including the supervisor's training and qualifications.

The verification processes, in accordance with the US-APWR DCD Tier 2, which is incorporated by reference, included the following:

(a) construction acceptance tests to verify proper installation and code compliance,

(b) installation tests that immediately follow turnover from construction that includes system walkdowns, component-level testing to verify functions and controls interfaces and energization, and system readiness,

(c) preoperational tests that are procedurally controlled in the test administrative manual, including controls for the preparation, review, approval, closeout, and records retention of test procedures and verifications,

(d) acceptance testing program addresses system-level and integrated tests performed on systems and components that are outside the scope of the ITP, which satisfy ITAAC requirements.

MHI Technical Report MUAP-08009 provided descriptions of the administrative control program used to develop and administer the ITP as defined by DCD Section 14.2. The technical report supplements the program descriptions in DCD Section 14.2. However, the scope of the test program described in MUAP-08009 is not limited to the ITP and described the inspections and testing of non-nuclear and non-safety systems and components, including PSS credited to satisfy physical security requirements. MHI Technical Report MUAP-08009 is incorporated by reference for the testing of PSS.

FSAR, Appendix 14AA to Chapter 14, describes the supplemental site-specific information on the structure of the test organization, the organizational interfaces and test review groups, the organizational responsibilities for testing, transfer of jurisdictional controls from construction to operations, the use of test specifications, the development, review, approval, and closure of test procedures, and the controls related to performance of testing, test results reports, records, and qualification or certification of test personnel. The applicant, in Section 14.2.9, indicated that plant procedures for preoperational testing are to be provided to the NRC 12 months before the start of preoperational tests.

The descriptions of ITA for the PSS provided in Table 2.12-1 of DCD Tier 1 are specified in MHI Technical Report MUAP-10003, "US-APWR Physical Hardware ITAAC Abstracts." The site-specific physical security ITAAC, as described in the FSAR and Part 10 of the COLA addressed

COL Information Item 14.3(3). Luminant's CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Abstract (Reference 14.3-201) describes the ITAAC abstracts for the site-specific physical security ITAAC.

The staff finds the following:

- The applicant incorporated by reference the US-APWR DCD (Tier 1 and Tier 2) information related to physical security ITAAC, including referenced Technical Report MUAP-08009, which described the test organizations and management system (controls and processes) for the systems acceptance testing program. Technical Report MUAP-08009 included systems-level and integrated testing performed on PSS that are outside the scope of the ITP. COLA Part 2 FSAR, Appendix 14AA of Chapter 14, supplemented the physical security ITAAC and verification program with site-specific information. The applicant adequately established requirements in this appendix of the FSAR that acceptance tests are procedurally controlled, documented in test administrative manual, and include controls for the preparations, reviews, approvals, closeouts, and records. The applicant adequately identified the framework for a management system to verify physical security ITAAC.

- The applicant has incorporated by reference the ITA requirements that installed PSS are properly constructed or installed and that functions of security hardware components are performed as construction and installation tests as specified in MHI Technical Report MUAP 08009. The organization processes and controls for system acceptance tests, construction tests, and installation tests are specified by MHI Technical Report MUAP-08009 as supplemented with site-specific information in FSAR, Chapter 14, Appendix 14AA.

- The applicant has established a management system (e.g., processes and controls) that verify PSS construction, installations, and performance that are identified for ITAAC verifications. Through these acceptance and installation tests that verify the construction, installation, and performance of PSS credited to perform physical protection functions, if adequately implemented, the applicant will demonstrate through acceptance testing that all engineered systems, structures, or components credited to perform physical protection functions will be available and reliable.

- The applicant has appropriately established in the COLA the processes that verify that the construction, installation, and performance of the PSS are identified for ITAAC verification or ITP. The PSS that are not specifically identified as ITAAC also are addressed through appropriate construction acceptance and installation tests and verifications.

14.3.12.4.4 ITAAC Abstracts for Physical Security ITAAC

The applicant incorporated by reference the descriptions of ITAAC abstracts in MHI Technical Report MUAP -10003 to support ITA for verifying identified physical security ITAAC in US -APWR DCD Tier 1. The ITAAC abstracts for the site-specific PSS are provided by the applicant in Luminant's CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Abstract (FSAR Reference 14.3-201). The physical security ITAAC abstracts are provided in the same

format and content applied to safety-related and plant-system preoperational tests described in the US-APWR DCD Tier 2, Chapter 14. These ITAAC abstracts provided the framework for developing detailed procedures to conduct ITAs to verify that the acceptance criteria based on detailed design that, if met, will demonstrate that the plant incorporated the designs and identified PSS as-built will operate in accordance with the designs for the PSS.

The site-specific ITAAC abstracts consisted of objectives, prerequisites, test methods, data required, and acceptance criteria for the verification of the following PSS:

- physical barriers controlling access to vital equipment,
- PA barriers,
- isolation zone,
- PA perimeter intrusion detection system,
- illumination of isolation zones and exterior PA,
- bullet resistant barriers for SAS and last access control,
- vehicle barrier system,
- PA access control points,
- picture badge identification system,
- SAS alarm annunciation and location,
- protection against single act disabling both CAS and SAS,
- redundancy of CAS and SAS,
- alarm functions in SAS,
- PA emergency exits controls,
- SAS Communications.

The staff finds the following:

- The applicant incorporated by reference the MHI Technical Report MUAP-10003, which contained the details of ITAAC abstracts for the US-APWR standard design physical security ITAAC. The ITAAC abstracts supporting the verification of the CPNPP, Units 3 and 4, site-specific physical security ITAAC are provided in Luminant's CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Abstract. The applicant incorporated by reference the US-APWR FSAR Tier 1 and Tier 2, along with MHI Technical Report UAP-SGI-08001 and Technical Report UAP-SGI-08002, and adequately established the design and performance requirements for verifying site-specific and US-APWR standard design physical security ITAAC.

- The applicant adequately described that the ITAAC abstracts (i.e., objectives, prerequisites, test methods, data required, and acceptance criteria) for PSS are adequate and support descriptions of ITAAC to meet the regulatory requirement of 10 CFR 52.80(a), which requires the COLA to contain proposed ITAAC that provide reasonable assurance that the facility has been constructed and will operate in conformance to the COL, the provisions of the Atomic Energy Act of 1954, and NRC regulations.

14.3.12.4.5 Inspections, Tests, and Analyses for Physical Barriers for Access to Vital Equipment, Protected Area, and Isolation Zone

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.2, "ITAAC #1.b (Two Barriers for Access to Vital Equipment)," the applicant described the test

abstract for two barrier for access to vital equipment, and the ITA for verifying design requirements meeting the design and performance requirements for the physical barriers. The applicant indicated that the objectives are to demonstrate that the access to vital equipment required passage through at least two physical barriers, in accordance with 10 CFR 73.55(e)(9)(i). The applicant stated that the verification method included inspections to confirm that two physical continuous barriers exists between areas outside of PA and the location of vital equipment listed in the MHI Technical Report UAP-SGI-08001, "US-APWR Design Certification Physical Security Element Review." The prerequisites identified included complete installation of vital equipment, physically credited as vital area barriers are constructed, and required construction testing is complete. The verification method is inspections to affirm that there are two physical continuous barriers between the areas outside the PA and the locations of vital equipment listed in Technical Report -UAP-SGI-08001.

In Section 3.3, "ITAAC #2.a, 2.b and 2.c (Protected Area Barrier)," the applicant provided the ITAAC abstracts for the protected area barriers. The applicant indicated that the objectives are to demonstrate that the PA barrier does not constitute any part of the vital area barrier; the penetrations through the PA are secured and monitored by intrusion detection systems (IDS), and unattended openings that intersect the PA are protected by physical barrier and IDS. The prerequisites included completion of construction of barriers and completion of construction testing of installed barrier systems and their functions. The verification methods included inspections of physical barriers and openings penetrating barriers and testing of IDS alarms and indications at CAS and SAS that are intended to satisfy the acceptance criteria that the requirements of 10 CFR 73.55(e)(8)(i)(C), 73.55(e)(8)(ii), and 73.55(i)(5)(iii).

In Section 3.4, "ITAAC #3.a, 3.b and 3c (Isolation Zone)," the applicant described the abstracts for the isolation zone. The applicant identified the objectives to demonstrate that the configuration of the zone adjacent to the PA barrier allows for observations and assessments. There is a minimum distance adjacent to the PA as the isolation zone, and where buildings are adjacent to the PA, the structure walls form an integral part of the PA barriers. The objectives and acceptance criteria established are intended to verify that the configurations of the physical barriers comply with the requirements of 10 CFR 73.55(e)(7)i)(A) and 73.55(e)(8)(iv). Prerequisites identified included completion of construction of the isolation zone, structures that may be integral to the PA barrier and construction testing. The verification methods included inspections of physical barriers and their constructed and install configurations, along with measuring the width of the isolation zone adjacent to the PA barrier. The ITAAC abstract also addressed the verification of physical security ITAAC No. 3.c., which establishes design commitments, ITA, and acceptance criteria for areas where permanent buildings do not allow sufficient observation distance between the IDS and the PA barrier.

The staff finds that the applicant provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for the identified ITAAC related to the physical barriers for access to vital equipment, PA, and isolation zone. The ITAAC abstracts adequately support the verification of ITAAC Nos. 1.b, 2.a, 2.b, 2.c, 3.a, 3.b, and 3.c in COLA Part 10, Appendix C, Table C-1.

14.3.12.4.6 Inspections, Tests, and Analyses for Perimeter Intrusion Detection System and Illumination of PA and Isolation Zone

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.5, "ITAAC #4, a., 4.b, and 4.c (Protected Area Perimeter Intrusion Detection System)," the applicant described the ITAAC abstract for protected area perimeter intrusion detection System.

The objectives to demonstrate that (a) the PA perimeter IDS ability to detect penetrations of the PA boundary, (b) IDS alarms annunciate at the CAS and SAS, (c) capabilities are provided for real-time video playback with alarms at the CAS and SAS, and (d) the continuity of IDS and video playback system operates upon loss of normal power. The objectives and acceptance criteria established are to verify that reliability and availability of PA perimeter IDS and video capture capabilities for detection and assessment, in accordance with 10 CFR 73.55(e)(7)(i)(C), 73.55(i)(1), 73.55(i)(2), and 73.55(i)(3)(vii). The applicant identified prerequisites that included completion of construction and installation of systems. The test methods identified included performance testing of IDS by zones under normal and backup power. The test abstract includes the test method(s) for verifying the capabilities of video playback system as a part of physical security ITAAC No. 4 in COLA Part 10, Appendix C, Table C-1.

In Section 3.6, "ITAAC #5 (Isolation Zone and Exterior Protected Area Illumination," the applicant identified the objective to demonstrate that the isolation zone and exterior PA areas are illuminated to observe individuals and vehicles (e.g., for assessment, response, and neutralization). The acceptance criteria established are to verify that illumination level of a minimum of 0.2 ft-candles (2.15 lumens per square meter) at ground level) is in accordance with 10 CFR 73.55(i)(6)(ii). The applicant did not request approval of alternative method to meet 10 CFR 73.55(i)(6)(ii). The prerequisites included completion of construction and installation of the exterior lighting system and construction tests. The verification method included measuring illumination at ground level to ensure that the illumination required is met.

The staff finds that the applicant provided adequate and reasonable descriptions of test objectives, prerequisites, test methods, and acceptance criteria for verifying ITAAC related to the PA IDS to detect intrusion or attempted intrusion, video capture capabilities for assessment, and exterior lighting system to illuminate areas of the PA and isolation zones for the security functions of detection, assessment, response, and neutralization. The ITAAC abstracts adequately support the verification of physical security ITAAC Nos. 4.a, 4.b, 4.c, and 5 in COLA Part 10, Appendix C, Table C-1.

14.3.12.4.7 Inspections, Tests, and Analyses for Physical Barriers

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.8, "ITAAC #6.b (Bullet Resistant Barriers for SAS and Last Access Control Function)," the applicant described the test abstract for bullet resistant barriers for SAS and last access control function." The applicant stated that the objectives are "to demonstrate that the exterior walls, ceiling, doors and floors in the SAS and the last access control function for access to the protected area are bullet resistant" and to demonstrate that "penetrations and other openings in the SAS and the last control function for access to the protected area are bullet resistant." The prerequisites identified included the completion of construction of the structural and availability of analysis, engineering documents, vendor documents, and type tests for minimum concrete thickness, door assemblies, penetrations and other structural components. The verification methods required physical inspections and reviews of engineering and vendor documents, analyses and "type tests for exterior walls, ceiling, doors, floors, penetrations and other openings in the SAS and the last access control function for access." The applicant described the acceptance criteria as the exterior walls, ceiling, doors and floors and penetration and other openings are bullet resistant and protected to meet the requirements of 10 CFR 73.55(e)(5) and the penetrations and other openings in the CAS and the MCR are of bullet resistant materials and construction to meet the requirements of 10 CFR 73.55(e)(5).

In Section 3.9, “ITAAC #7 (Vehicle Barrier System),” the applicant described the test abstract for the vehicle barrier system. The applicant indicated that the objective and acceptance criteria are to demonstrate that the vehicle barrier system (VBS) is installed and located at the required standoff distance to protect against the DBT land-based vehicle bomb threats. The prerequisites required the completion of construction of the VBS, construction testing, final blast analysis that includes update of required standoff distance (RSD) for the final design and configuration of the plant, and vendor documentations and analyses of the VBS. The applicant indicated that the verification methods included a review of analysis and engineering document to determine the minimum RSD for installing the VBS, but did not identify physical inspection and measurement of as-built location of the VBS (passive and active barrier systems) to verify meeting or exceeding the minimum RSD. The applicant described the appropriate test method(s) for confirming that the physical location of the continuous VBS meets or exceeds the minimum RSD.

The staff finds that the applicant provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for the verification of ITAAC related to bullet resistant barriers that protect the SAS, the last access control function. The ITAAC abstract also addresses verification of the ITAAC related to the VBS and its configuration to protect against bounding vehicle explosive threat. The ITAAC abstracts adequately support the verification of physical security ITAAC Nos. 6.b and 7 in FSAR Part 10, Appendix C, Table C-1.

14.3.12.4.8 Inspections, Tests, and Analyses for Access Controls and PA Emergency Exits

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.10, “ITAAC #8.a and 8.b (Access Control Points),” the applicant described the ITAAC abstracts access control point. The applicant indicated that the test objectives are to demonstrate that access control points are established for controlling personnel and vehicles into the PA and to demonstrate that detection equipment at personnel access points are capable of detecting firearms, explosives, and incendiary devices. The prerequisites identified included the completion of construction of access control points, construction testing, component testing and instrument calibration, connectivity to power supplies and control circuits, and completion of vendor documentation and analysis. The verification methods described included physical inspection and reviews of engineering and vendor documents of locations and configurations of personnel and vehicle access control into the PA and physical inspection and review of engineering and vendor documents and analysis for equipment and equipment specifications for detecting firearms, explosives, incendiary devices, and the testing of detection equipment. The acceptance criteria for ITAAC are to verify that access controls are provided and configured to meet the requirement of 10 CFR 73.55(g)(1)(i)(A) and (B) and the detection systems are capable of detecting firearms, explosives, and incendiary devices to meet the requirement of 10 CFR 73.55(h)(3)(i) at the PA personnel access points.

In Section 3.11, “ITAAC #9 (Picture Badge Identification System),” the applicant described the ITAAC abstract for the picture badge identification system.” The identified objective is to verify that numbered picture badge systems control access to the PA. The applicant described prerequisites that numbered picture badge system and physical barriers (including doors and turnstiles) for controls of access are installed, and that construction and component testing and system calibration have been completed. The ITAAC abstract included physical inspections and system testing for ITAAC verification. The acceptance criteria identified are the access

authorization system that uses numbered picture badge and authorizes access to PA in accordance with the requirements of 10 CFR 73.55(g)(6)(ii).

In Section 3.25, "ITAAC #15.b (Protected Areas Emergency Exits)," the applicant described the test abstract for protected area emergency exits. The applicant identified that the objectives are to demonstrate that emergency exits through the PA boundaries are alarmed and secured by locking devices that allow emergency exit. The prerequisites described included completion of PA and emergency exits, and construction and system component testing. The verification methods included inspections and testing to confirm the acceptance criteria that emergency exits through the PA boundary are secured by locking devices and alarmed in accordance with the requirements of 10 CFR 73.55(e)(8)(iii).

The staff finds that the applicant has provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for verifying that the access control points are established for controlling personnel and vehicles into the PA, the detection equipment at personnel access points are capable of detecting firearms, explosives and incendiary devices, a picture badge identification system control, access into the PA, and the emergency exits at the PA boundaries are secured and alarmed. The ITAAC abstracts adequately support the verification of ITAAC Nos. 8.a, 8.b, 9, and 15.b, in Part 10, Appendix C, Table C-1.

14.3.12.4.9 Inspections, Tests, and Analyses for Unoccupied Vital Areas

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.13, "ITAAC #10.b (Unoccupied Vital Area)," the applicant described the ITAAC abstract for unoccupied vital areas." The objectives are to demonstrate that unoccupied vital areas are locked with intrusion detection and alarms that annunciate at the SAS. The prerequisites identified included the completion of construction and installation of security doors and, access control systems, and system testing. The verification methods included the testing of locking devices on doors and other means of access into the unoccupied vital areas, testing to verify detection of intrusion, and verification of alarm indications at the SAS. The acceptance criteria for verifying ITAAC are that the unoccupied vital areas are locked and alarmed and that the IDS detect attempted breach of unoccupied vital areas with alarm indications at the SAS to meet the requirements of 10 CFR 73.55(e)(9)(iii).

The staff finds that the applicant has provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for verifying that unoccupied vital areas are locked and that the IDS provide intrusion detection and alarm indication. The test abstract adequately supports the verification of ITAAC No. 10.b in Part 10, Appendix C, Table C-1.

14.3.12.4.10 Inspections, Tests, and Analyses for SAS Alarm Indications

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.15, "ITAAC #11.a.ii and 11.b.ii (SAS Alarm Annunciation and Location)," the applicant described ITAAC abstract for SAS alarm annunciation and location. The objectives are to demonstrate that (a) the security alarm annunciation is available in the SAS, (b) the video assessment information is available in the SAS, and (c) the SAS is within the PA and the interior of the SAS is not visible from the PA boundary. The prerequisites identified included the completion of the construction and installation of equipment in the SAS and completion of construction and system component testing. The verification methods included testing of IDS, security alarm

annunciation, and video assessment capabilities in the SAS and inspection to verify that the location of the SAS and the interior is not visible from the perimeter of the PA. The acceptance criteria identified for the ITAAC related to the SAS are the successful inspections and tests that verify alarm indications and video assessment capabilities in accordance with prescriptive requirements of 10 CFF 73.55(i)(2) and location of SAS is inside the protected area and the interior of the SAS is not visible from the perimeter of the protected area.

In Section 3.22, "ITAAC #13.b.ii (Alarm Annunciation in SAS)," the applicant described the test abstract for alarm annunciation in SAS." The test objectives are to demonstrate that security alarms annunciate the types and locations of alarms in the SAS and that IDS alarms are displayed and audible. The identified prerequisites included installation of security alarm systems, completion of construction and system component testing. Testing of the IDS is performed to verify types, locations, visual and audible alarm indications in the SAS. The acceptance criteria identified are the security alarm annunciation in the SAS indicates the types of alarms and locations and IDS provide visual display and audible annunciations in accordance with 10 CFR 73.55(i)(3)(i), 73.55(i)(3)(ii) and 73.55(i)(3)(iii).

The staff finds that the applicant has provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for verifying the SAS alarm indication and video assessment capabilities, and that the location is within the PA and not visible from the PA boundary. The ITAAC abstracts adequately support the verification of ITAAC Nos. 11.a.ii, 11.b.ii, and 13.biii in Part 10, Appendix C, Table C-1.

14.3.12.4.11 Inspections, Tests, and Analyses for Single DBT Act Does Not Disable Both CAS and SAS

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Sections 3.17, "ITAAC #11.d (Single DBT Act Does Not Disable both CAS and SAS)," the applicant described the ITAAC abstract for ensuring that single DBT act does not disable both CAS and SAS." The objective identified is to ensure that a DBT act does not simultaneously eliminate the functional capabilities of both the CAS and SAS to detect and assess alarms, initiate and coordinate security response, request offsite assistance, and provide capabilities for command and control. The prerequisites identified included the completion of construction and equipment installation for the CAS and SAS as well as construction and system component testing. The verification methods included an analysis (i.e., review) of design documents, drawings, and analysis to determine whether a single DBT act would simultaneously lose both CAS and SAS capability to perform their intended functions as indicated in the objectives. The applicant described the acceptance criteria as the CAS and SAS as designed, equipped, and constructed, are such that no single DBT act would simultaneously disable the functional capabilities of both of them to provide (a) detection and assessment of alarms, (b) initiate security response, (c) request offsite assistance, and (d) perform control and command in accordance with requirements of 10 CFR 73.55(i)(4)(i).

The staff finds that the applicant has provided an adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for the verification of ITAAC that required affirmation that the as-built CAS and SAS meet the requirement of 10 CFR 73.55(i)(4)(i). The test method, analysis or review of as-built drawings, engineering documentation and analyses, is an acceptable method to verify that the locations of the CAS and SAS, and the physical security systems(e.g., including power supplies) are protected against potential that a single act would disable a single CAS or SAS, which conforms with guidance provided in RG 5.69, "Guidance for the Application of the Radiological Sabotage

Design-Basis Threat in the Design, Development and Implementation of a Physical Security Program That Meets 10 CFR 73.55 Requirements." The test abstract adequately supports the verification of ITAAC No. 11.c in Part 10, Appendix C, Table C-1.

14.3.12.4.12 Inspections, Tests, and Analyses for Functional Redundancy of the CAS and SAS

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Sections 3.18, "ITAAC #11e (Function Redundancy of the CAS and SAS)," the applicant described the test abstract for functional redundancy of the CAS and SAS." The identified objective is to demonstrate that the SAS is constructed and equipped to the same standard for functional redundancy as the CAS. The prerequisites identified included the completion of construction and equipment installation for the CAS and SAS as well as construction and system component testing. The verification methods were analysis (i.e., review) of engineering and vendor systems documents and testing of the capabilities to verify that both the CAS and SAS are capable of providing intended alarm station functions (i.e., redundant). The applicant described acceptance criteria as "the SAS and CAS are constructed, protected, and equipped to the same standard so as to provide functional redundancy," in accordance with the requirements of 10 CFR 73.55(i)(4)(iii).

The staff finds that the applicant has provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria for the verification of ITAAC that the CAS and SAS provide equal and redundant security alarm station functions in accordance with the requirements of 10 CFR 73.55ii)(4)(iii). The staff determined that other physical security ITAAC, and site specific physical security ITAAC, addressed the verification of functions and capabilities of the PSS in the CAS and SAS [and verification does not need to be repeated to demonstrate that systems functions of the PSS in the CAS and SAS are equal and redundant. The test abstract adequately supports the verification of physical security ITAAC No. 11.e, in Part 10, Appendix C, Table C-1.

14.3.12.4.13 Inspections, Tests, and Analyses for SAS Communications

In CPNPP, Units 3 and 4, Physical Security Hardware ITAAC Test Abstract, Section 3.27, "ITAAC #16.1.ii, #16.b.ii, and #16.c.ii (SAS Communications)," the applicant described the ITAAC abstracts for SAS communications." The objectives are as follows:

(a) "to demonstrate that SAS has conventional (landline) telephone service with local law enforcement authorities;"

(b) "to demonstrate that the SAS has the capability of continuous communication with the main control room;"

(c) "to demonstrate that the SAS has the capability of continuous communication with security personnel."

The verification methods included performance test of communications systems to confirm availability of voice communications with offsite local law enforcement agency (LLEA) test to verify communications between CAS and MCR, test of portable radio system and backup plant system between CAS and security personnel/defensive positions, and test to verify continuity of communications capabilities on loss of normal power. The identified prerequisites included the complete installation of plant communication systems and components for assuring availability

and reliability of security communications. The verification methods included testing of all communications systems and components (e.g., landlines, plant intercom, portable radios, etc.) and capabilities of maintaining communications upon loss of power. The acceptance criteria identified included the following:

(a) SAS has conventional telephone service to provide open and clear communications with LLEA to meet the applicable portion of 10 CFR 73.55(j)(4)(i);

(b) portable radio system is available and reliable for effective communication between SAS and security personnel to meet the requirements of 10 CFR 73.55(j)(3);

(c) plant intercom system for communication with SAS and between SAS and MCR in accordance with the requirements of 10 CFR 73.55(j)(4)(ii);

(d) security only plant communication system for communications between the SAS and defensive positions to meet the requirements of 10 CFR 73.55(j)(3);

(e) nonportable base station retain power at all times upon loss of normal power to meet the requirements of 10 CFR 73.55(j)(5).

The descriptions of the test abstract objectives and test methods included the verification of both the CAS and SAS capability of continuous communications with security personnel and remain functional when operating on uninterruptible backup power supply upon loss of normal power. Appendix C, Table C-1, identifies the specific design commitment as a site-specific physical security ITAAC, conforming to ITAAC No. 16(c) of SRP 14.3.12. The applicant to identified the appropriate ITAAC in Table C-1 for the SAS capability to provide continuous communications with security personnel and remain functional when operating on uninterruptible backup power supply upon loss of normal power and provided description of supporting ITAAC abstract.

The staff finds that the applicant has provided adequate and reasonable descriptions of the test objectives, prerequisites, test methods, and acceptance criteria to verify communications required for physical security. The ITAAC abstracts support the verification of physical security ITAAC Nos. 16.a.ii and No. 16.b.ii in Part 10, Appendix C, Table C-1.

14.3.12.5 Combined License Information Items

The US-APWR DCD Tier 2 established COL Information Item 14.3(1) that requires a COL applicant that references the US-APWR standard design to provide ITAAC for site-specific portion of the plant systems specified in the US-APWR DCD Tier 2, Section 14.3.5, “Interface Requirements.” COL Information Item 14.3(3) required that the COL applicant provide ITAAC for the facility’s physical security hardware not addressed in the DCD, in accordance with RG 1.206 and provide ITAAC abstracts for specific ITA.

The staff finds that the applicant adequately addressed the COL Information Items 14.3(1) and 14.3(3) by describing site-specific physical security ITAAC. The staff finds that the applicant satisfied and met COL Information Item 14.3(3) by providing site-specific ITAAC not addressed in the US-APWR DCD (Tier 1 and Tier 2) and associated ITAAC abstracts.

14.3.12.6 Conclusions

The staff concludes the following:

- The applicant has proposed and adequately described the attributes for site-specific physical security ITAAC for verification that conforms to staff guidance in NUREG-0800, Section 14.3.12, and has satisfied COL Information Item COL 14.3(1) that requires a COL applicant that references the US-APWR certified design to provide site-specific physical security ITAAC.

- The applicant adequately identified appropriate and reasonable descriptions of ITAAC abstracts for physical protection systems (e.g., objectives, prerequisites, test methods, data required, and acceptance criteria) that support the site-specific physical security ITAAC for meeting the regulatory requirement of 10 CFR 52.80(a).

- The applicant incorporated by reference the requirements of the US-APWR DC that meet 10 CFR 52.47(b)(1), which established ITAs and acceptance criteria necessary and sufficient to provide reasonable assurance that if the ITAs are performed and the acceptance criterion are met, a plant that incorporates the DC is built and will operate in accordance with the DC.

- The applicant adequately established the management system (i.e., processes and controls) that verify the construction, installations, and performance of PSS that are identified for physical security ITAAC verification and those PSS that are not specifically identified as ITAAC are verified through appropriate system construction confirmations.

- The applicant has satisfied COL Information Item 14.3(3) established in the DC that a COL applicant that references the US-APWR certified design would establish processes that will identify requirements, construction verifications that review the as-built systems and conditions, and compliance determination for PSS performance and acceptance tests that are not specifically identified as ITAAC.

- The applicant has incorporated by reference the requirements of the US-APWR DC that met 10 CFR 52.47(b)(1), which established ITA and acceptance criteria that are necessary and sufficient to provide reasonable assurance that if the ITAs are performed and the acceptance criterion are met, a plant that incorporates the DC is built and will operate in accordance with the DC.

The staff further concludes that the applicant provided the following:

(a) the commitments and descriptions of an adequate and reasonable set of ITAAC for PSS within the scope of the DC;

(b) the required ITAAC abstracts describing ITA and acceptance criteria supporting the verification of ITAAC;

(c) the requirements for verifying performances (i.e., construction and installation testing) of PSS not specifically identified as ITAAC design commitments;

(d) the descriptions of adequate and reasonable management systems, controls, and processes for developing and implementing the verification of ITAAC;

(e) the site-specific physical security ITAAC meeting COL Information Item COL 14.3(3) of the US-APWR DCD.

Therefore, the staff concludes that the COL applicant has met the requirement of 10 CFR 52.80(a), which requires the COLA to contain ITAAC necessary and sufficient to provide reasonable assurance that the facility has been constructed and will operate in conformance with the COL, the provisions of the Atomic Energy Act of 1954, and NRC regulations.