13.0 CONDUCT OF OPERATIONS

13.1 Organizational Structure of Applicant

13.1.1 Management and Technical Support Organization

In Section 13.1.1 of the United States - Advanced Pressurized Water Reactor (US-APWR) Design Control Document (DCD), the applicant, Mitsubishi Heavy Industries (MHI), stated that the development of the management and technical support organization structure is the responsibility of the combined license (COL) applicant. The COL applicant provides a description of the corporate or home office organization, its functions and responsibilities, and the number and qualifications of personnel. The COL applicant's activities in this area include facility design, design review, design approval, construction management, testing, operation and maintenance of the plant.

The following is a list of COL item numbers and descriptions associated with Section 13.1.1 and Table 1.8-2 of the DCD.

Table 13.1.1-1
US-APWR COL Information Items

Item No.	Description	Section
13.1(1)	The COL applicant is to provide a description of the corporate or home office organization, its functions and responsibilities, and the number and qualifications of personnel. The COL applicant directs attention to activities that include facility design, design review, design approval, construction management, testing, and operation of the plant.	13.1.1
13.1(2)	The COL applicant is to develop a description of past experience in the design, construction, and operation of nuclear power plants and past experience in activities of similar scope and complexity.	13.1.1
13.1(3)	The COL applicant is to describe its management, engineering, and technical support organizations. The description includes organizational charts for the current headquarters and engineering structure and any planned modifications and additions to those organizations that reflect the added functional responsibilities with the nuclear power plant.	13.1.1

Table 13.1.1-1
US-APWR COL Information Items

Item No.	Description	Section
13.1(4)	The COL applicant is to develop a description of the organizational arrangement is designated as the responsibility of the COL applicant. This description shows how the added functional responsibilities associated with the addition of the nuclear power plant to the applicant's power generation capacity are delegated and assigned (or expected to be assigned to each of the working or performance-level organizational units to implement these responsibilities). The description includes organizational charts reflecting the current corporate structure and the specific working or performance-level organizational units that provide technical support for the operation.	13.1.1

13.1.2 Operating Organization

In Section 13.1.2 of the US-APWR DCD, the applicant stated that the development of the operating organizational structure for the plant organization, its personnel responsibilities and authorities, and operating shift crews is the responsibility of the COL applicant.

The following is a COL item number and description associated with Section 13.1.2 and Table 1.8-2 of the DCD

Table 13.1.2-1
US-APWR COL Information Items

Item No.	Description	Section
13.1(6)	The COL applicant is to develop the organizational structure for the plant organization, its personnel responsibilities and authorities, and operating shift crews.	13.1.2

13.1.3 Qualifications of Nuclear Plant Personnel

In Section 13.1.3 of the US-APWR DCD, the applicant stated that the development of the description of education, training, and experience requirements established for management, operating, technical, and maintenance positions for the operating organization is designated as the responsibility of the COL applicant.

The following is a list of COL item numbers and descriptions associated with Section 13.1.3 and Table 1.8-2 of the DCD.

Table 13.1.3-1
US-APWR COL Information Items

Item No.	Description	Section
13.1(5)	The COL applicant is to develop the description of the general qualification requirements in terms of educational background and experience for positions or classes of positions depicted in the organizational arrangement.	13.1.3
13.1(7)	The COL applicant is to develop the description of education, training, and experience requirements established for management, operating, technical, and maintenance positions for the operating organization.	13.1.3

13.2 Training

13.2.1 Plant Staff Training Program

In Section 13.2.1 of the US-APWR DCD, the applicant stated that the development of the plant staff training program is the responsibility of the COL applicant.

The following is a list of COL item numbers and descriptions associated with Section 13.2.1 and Table 1.8-2 of the DCD.

Table 13.2.1-1
US-APWR COL Information Items

Item No.	Description	Section
13.2(1)	The COL applicant is to develop the training program description.	13.2.1
13.2(2)	The COL applicant is to develop training programs for reactor operators in accordance with NUREG-0800, Section 13.2.1.1.3.	13.2.1
13.2(3)	The COL applicant is to develop training programs for non-licensed plant staff in accordance with NUREG-0800, Section 13.2.2.1.3.	13.2.1
13.2(4)	The COL applicant is to develop training programs. These programs include a chart, which shows the schedule of each part of the training program for each functional group of employees in the organization in relation to the schedule for preoperational testing, expected fuel loading, and expected time for examinations prior to plant criticality for licensed operators.	13.2.1

13.2.2 Applicable Nuclear Regulatory Commission Documents

In Section 13.2.2 of the US-APWR DCD, the applicant stated that the extent to which portions of applicable U.S. Nuclear Regulatory Commission (NRC) guidance is used in the facility training program or the justification of exceptions are the responsibilities of the COL applicant.

The following is a COL item number and description associated with Section 13.2.2 and Table 1.8-2 of the DCD.

Table 13.2.2-1
US-APWR COL Information Items

Item No.	Description	Section
13.2(5)	The COL applicant is to determine the extent to which portions of applicable NRC guidance are used in the facility training program or the justification of exceptions.	13.2.2

Based on the COL information item described above, and that in response to RAI 1101, the applicant incorporated the NRC-endorsed Nuclear Energy Institute (NEI) publication, NEI 06-13A, "Template for an Industry Training Program," by reference into Revision 2 of the US-APWR DCD, the staff finds the applicant's approach to a COL applicant's training program development acceptable.

13.3 Emergency Planning

13.3.1 Introduction

Facilities, functions, and equipment, which are not site-specific, but are technically relevant to the design and which affect some aspect of emergency planning or the capability of a COL applicant to cope with plant emergencies are described in this section. Emergency planning is, in large measure, within the scope of a COL application. A COL applicant referencing the US-APWR DC will provide a site-specific emergency plan in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.47, "Emergency Plans," and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities."

13.3.2 Summary of Application

DCD Tier 1: Section 2.10 of the US-APWR DCD addresses features of the plant design that support emergency planning and the capabilities to cope with plant emergencies. The staff's evaluation of DCD Section 2.10 is contained in Section 14.3.4.10 of this safety evaluation report (SER).

DCD Tier 2: Section 13.3 of the US-APWR DCD addresses emergency plan features, facilities, functions, and equipment that are considered in the design bases for the US-APWR DC, that are not site-specific, and which affect some aspect of emergency planning or the capabilities to cope with plant emergencies. In summary, the following emergency planning features are considered in the design bases for the US-APWR DC:

- The Technical Support Center (TSC)

- The Emergency Operations Facility (EOF)
- The Emergency Response Data System (ERDS)
- A data communication system for the TSC, the EOF, and the ERDS
- The Safety Parameter Display System (SPDS)
- The Post Accident Sampling System (PASS)
- Decontamination Facilities

The following summarizes the various design features, facilities, functions, and equipment that are specifically described or referenced by the applicant in DCD Section 13.3 and support emergency planning.

♦ Technical Support Center

The applicant stated that the TSC is an onsite facility that provides plant management and technical support to the plant operations personnel during emergency conditions. The TSC has technical data displays and plant records available to assist in the detailed analysis and diagnosis of abnormal plant conditions and any significant release of radioactivity to the environment. Specifically, the applicant described the following TSC functions:

- The TSC provides telephones and facsimiles, which are utilized by multiple methods of telecommunication, including private and public lines, satellite communications, and ample working areas for all personnel.

- The TSC performs EOF functions for alert emergency class, for site area emergency class, and for general emergency class until the EOF is functional.

- The TSC has facilities to support the plant management and technical personnel who are assigned there during an emergency.

- The TSC facility includes a plant data display system consisting of visual display units and a large display panel. This equipment and its power supplies are redundant. The TSC displays include:

    - Plant system variables
    - In-plant radiological information
    - Meteorological information
    - Offsite radiological information

- The TSC is located close to the main control room (MCR), which is located in the Auxiliary Building. The walking time from the TSC to the MCR does not exceed two minutes. DCD Tier 2 Figure 1.2-6, “Power Block at Elevation 25’-3” - Plan View,” shows the location of the TSC.

- The TSC contains a floor space of at least 1875 square feet (approximately 75 square feet for each of at least 25 personnel).

    - The TSC working space is sized for a minimum of 25 persons including 20 persons designated by the licensee and 5 NRC personnel. The size and layout of the TSC gives the necessary space to maintain and repair

TSC equipment, and is sufficient for storage of plant records and historical data.

- The TSC heating, ventilation, and air conditioning (HVAC) system includes high-efficiency particulate air and charcoal filters.
    - The TSC HVAC system functions in a manner comparable to the MCR HVAC system. The HVAC system is designed to satisfy the following design bases:
        - Support and maintain TSC habitability and permit personnel occupancy following plant emergency conditions.
        - Exclude entry of airborne radioactivity into the TSC envelope and remove radioactive material from the TSC envelope environment, such that radiation doses to personnel are within the requirements of General Design Criterion (GDC) 19 of Appendix A to 10 CFR Part 50, 0.05 Sv (5 rem) total effective dose equivalent, as defined in 10 CFR 50.2, for the duration of the accident.
        - Provide and maintain proper environmental conditions during normal and abnormal conditions that are within the minimum and maximum temperature range and relative humidity percentages as described in Table 9.4-1, "Area Design Temperature and Relative Humidity," of the DCD. This would assure personal comfort and support the operation of the control and instrumentation equipment and components.
        - Provide accessibility to system components for adjustment, maintenance and periodic inspection and testing of the system components to assure proper equipment function and reliability and system availability.

♦ Emergency Operations Facility

The applicant described the EOF as a nearsite or onsite support facility for the management of overall licensee emergency response (including coordination with Federal, State, and local officials), coordination of radiological and environmental assessments, and determination of recommended public protective actions. Additionally, the applicant stated the following:

- The EOF has the appropriate technical data displays and plant records to assist in the diagnosis of plant conditions and to evaluate the potential or actual release of radioactive materials to the environment.
- The EOF computer provides plant data displays to assist in the diagnosis of plant conditions and to evaluate the potential or actual release of radioactive materials to the environment.

- Emergency Response Data System

  The applicant described the ERDS as a system that allows information to be transmitted by providing a data link between the licensee's computer system and the NRC Operations Center. Furthermore, the applicant specifically stated that the ERDS provides for the following:

  - The fulfillment of the ERDS functions as described in Appendix E to 10 CFR Part 50.
  - The automated transmission of data associated with selected plant parameters to facilitate NRC support if an emergency is present.
    - The transmission of this information aids the NRC in its role of providing advice and support to the nuclear power plant licensee, State and local authorities, and other Federal officials.

- Data communication with the TSC, the EOF, and the ERDS

  The applicant described the data communication system as having both voice and data communication capabilities. Furthermore, the applicant stated that the data communication system establishes the interface and link with the TSC, the EOF, and the ERDS and allows data exchange with the plant.

- Safety Parameter Display System

  The applicant explained that the SPDS provides a display of plant parameters from which the safety status of operation may be assessed in the MCR, the TSC, and the EOF. In addition, the applicant stated that SPDS shall provide for the exchange of information between the TSC, EOF, and the MCR and assist corporate and plant management in the decision-making process by providing duplication of SPDS displays in the TSC and EOF facilities.

- Post Accident Sampling System

  In Section 13.3, the applicant stated that the PASS is provided for emergency planning purposes. In addition, the applicant stated that the PASS is described in Section 9.3.2, "Process and Post-Accident Sampling Systems." In part, DCD Section 9.3.2 states that the PASS is required to maintain the capability to draw highly radioactive samples following an accident. Analysis of these samples can provide information regarding the cause of the accident, to quantify certain radionuclides that are indicators of the degree of core damage and to measure the post-accident sampling activities during the accident recovery phase to determine the degree of core damage and general plant contamination.

- Decontamination Facilities

  Personnel and equipment decontamination facilities for normal operation are located in the Access Building and described in Section 12.3.1.1.2, "Common Facility and Layout

Designs for As Low As Reasonably Achievable," of the US-APWR DCD. These facilities would be used in emergency conditions as part of the site emergency plan.

Inspections, Tests, Analyses and Acceptance Criteria (ITAAC): In accordance with the requirements in 10 CFR 52.47(b)(1), the DCD application is to 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 are met, a facility that incorporates the DC has been constructed and will be operated in conformity with the DC and the Commission's rules and regulations. The ITAAC for emergency planning were provided by the applicant pursuant to the above requirement and are delineated in DCD Tier 1, Section 2.10.2, Table 2.10-1, "Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria." The staff's evaluation of the applicant's proposed ITAAC is contained in Section 14.3.4.10 of this SER.

Technical Specifications (TS): TS 5.5.3 discusses the post-accident sampling program.

COL Information or Action Items: Emergency planning COL Action Items and the staff's evaluation of these responsibilities are described and evaluated in Section 13.3.4, "Technical Evaluation," of this SER. These COL Action Items are also delineated in Section 13.3.5, "Combined License Information Items," below.

Cross-cutting Requirements (Three Mile Island (TMI), Unresolved Safety Issue (USI)/Generic Safety Issue (GSI), Op Ex): Information necessary in the DCD to demonstrate compliance with any technically relevant portions of the TMI requirements are identified in 10 CFR 52.47(a)(8). Information necessary in the DCD to demonstrate resolution of any USIs and GSIs related to emergency planning are identified in 10 CFR 52.47(a)(21). Those generic issues and the staff's evaluation regarding their resolution for the US-APWR design are described in Section 13.3.4.1, "Generic Issues," of this SER.

13.3.3 Regulatory Basis

In its review of the US-APWR DCD, Tier 1 and 2, Revision 2, the staff considered the regulations in 10 CFR 52.48, which require, in part, that the application for a standard design be reviewed for compliance with the standards set out in 10 CFR Part 50, and its appendices. Specifically, the staff reviewed the design-related information in DCD Tier 2, Section 13.3, "Emergency Planning," and 14.3.4.10, "ITAAC for Emergency Planning," and DCD Tier 1, Section 2.10, "Emergency Planning," against the applicable requirements in 10 CFR 50.34(f), 10 CFR 50.47(b), 10 CFR 52.47(b)(1), and Section IV.E of Appendix E to 10 CFR Part 50. In addition, the staff considered the requirements in 10 CFR 52.47(a)(8) and 10 CFR 52.47(a)(21) regarding generic safety issues (GSIs) that are technically relevant to the US-APWR design.

The staff determined compliance with these regulations by using the guidance in the 2007 version of SRP Section 13.3 and Section 14.3.10. In addition, the staff used Regulatory Guide (RG) 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors" (Revision 4, issued July 2003), which endorses NUREG-0654/Federal Emergency Management Agency (FEMA)-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (Revision 1, issued November 1980); and NUREG-0696, "Functional Criteria for Emergency Response Facilities," issued February 1981. The staff also used Generic Letter (GL) 82-33, "Supplement 1 to

NUREG-0737—Requirements for Emergency Response Capability (Generic Letter No. 82-33)," issued December 1982.

13.3.4 Technical Evaluation

Section 13.3.4 of the DCD, "Combined License Information," identifies various programmatic responsibilities designated as COL Action Items for COL applicants referencing the US-APWR DC. The staff reviewed these responsibilities and identified the following list of COL Action Items:

- In DCD Section 13.3, the applicant stated that the DCD provides details of the emergency planning features as they relate to the basic design. However, the interfaces of these features with site-specific designs and site parameters are the responsibility of the COL applicant. The description of interface features with site-specific designs and site parameters by the COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(1).

- In DCD Section 13.3.1, "Combined License Application and Emergency Plan Content," the applicant stated that the development of a comprehensive emergency plan as a physically separate document (Section 13.3 of the Final Safety Analysis Report (FSAR)) shall be designated as the responsibility of the COL applicant. The development of a comprehensive emergency plan as a physically separate document by the COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(2).

- In DCD Section 13.3.1, the applicant also stated that the emergency plan incorporates, by reference, State and local emergency plans. It includes copies of letters of agreement from State and local governmental agencies with emergency planning responsibilities. Additionally, the COL FSAR addresses emergency classification and action level schemes. The establishment of an emergency classification and action level scheme by the COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(3).

- In DCD Section 13.3.1, the applicant stated that the submitted plan will also address security-related aspects of emergency planning. The development of security-related aspects of emergency planning by a COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(4).

- In DCD Section 13.3.2 "Emergency Plan Considerations for Multi-Unit Site," the applicant stated that the development of the emergency plan for a multi-unit site is designated as the responsibility of the COL applicant depending on the location of the new reactor on, or near, an operating reactor site with an existing emergency plan. The development of a multi-unit site interface plan by a COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(5).

- In DCD Section 13.3.3, "Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," the applicant designated the development of emergency planning ITAAC as the responsibility of the COL applicant. In DCD Section 14.3.4.10, the applicant also stated that the COL applicant is responsible for providing proposed ITAAC for the facility's emergency planning not addressed in the DCD in accordance with

RG 1.206. The development of emergency planning ITAAC by a COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(6).

- In DCD Section 13.3.4, the applicant stated that the description of the operational support center (OSC) and its communication interfaces is the responsibility of the COL applicant. The description of the OSC (including design of the communication systems), consistent with NUREG-0696, by a COL applicant referencing the US-APWR DC is identified as COL Action Item 13.3(7).

The staff clarified several design features using the RAI process. The associated three RAI questions were identified as RAI 215, Questions 13.3-1 through 13.3-3. The applicant responded to these RAI questions by letter dated August 29, 2008. The staff's evaluations of the RAI responses are discussed below.

In Question 13.3-1, the staff asked the applicant to provide more detail relating to the TSC floor space. In response to Question 13.3-1, the applicant provided additional information relating to the physical size, layout, and contents of the TSC. The staff finds that the information provided by the applicant pertaining to the TSC floor space meets the applicable criteria in NUREG-0696, and is sufficient to accommodate and support NRC and licensee pre-designated personnel, equipment, and documentation. Therefore, the staff finds that Question 13.3-1 is resolved.

In Question 13.3-2, the staff asked the applicant to provide more detail regarding TSC backup-power capabilities. In response to Question 13.3-2, the applicant stated that the components and equipment in the TSC such as Large Display Panels, Computers and Visual Display Panels, are supplied power from the non-Class 1E alternating current (AC) 120-Vac uninterruptable power supply (UPS) units. Each UPS unit has two AC input power sources from non-Class 1E P1 and P2 480-Vac systems. If one AC input power source is lost, the UPS units can keep supplying output power by utilizing the remaining AC input power source without interruption of power to the loads. Even if both AC input power sources are lost, the UPS units can keep supplying output power by direct current backup power from non-Class 1E 125-Vdc systems for 30 minutes without interruption of power to the loads. Also, the applicant stated that each UPS can receive the back-up AC power supply from an alternate AC power source under the loss-of-offsite-power (LOOP) condition. The staff finds the information provided by the applicant meets the applicable criteria in NUREG-0696 and provides sufficient details on the capability to maintain continuity of TSC functions and immediately to resume data acquisition, storage, and display of TSC data in the event of a loss of power. Therefore, the staff finds that Question 13.3-2 is resolved.

In Question 13.3-3, the staff asked the applicant to provide more detail concerning the presence and availability of onsite decontamination facilities. In response to Question 13.3-3, the applicant stated that the Hot Shower Room is used for decontaminating onsite personnel. The Hot Shower Room is located within the personnel contamination monitoring area of the Access Building. The applicant also stated that an equipment decontamination station is placed in the Hot Machine Shop at the basement level of the Access Building. A First Aid Room, located next to the Health Physics Room, also exists for any wounded individuals. Finally, the applicant explained that service water is provided to various areas throughout the plant and is available for decontamination of instruments and small equipment items. Any contaminated water is drained to the Floor Drain Sump and is forwarded to one of the Waste Holdup Tanks for processing. The staff finds that the information provided by the applicant meets the applicable criteria in NUREG-0696 and provides sufficient details as to the presence and availability of an

onsite decontamination facility(s) for personnel, wounds, supplies, instruments, and equipment. Therefore, the staff finds that Question 13.3-3 is resolved.

Following the staff's review of the applicant's responses to the RAIs, the staff determined that supplemental information related to the design features and functions of the TSC was still needed. In Open Item RAI 1515, Question 13.3-2, the staff asked the applicant to describe the capability of the MCR to accommodate the transfer of the TSC plant management function from the TSC, if the TSC becomes uninhabitable. The staff also requested that the applicant identify the impact on the MCR due to the transfer of the TSC plant management function. The applicant's response to the open item and the NRC staff evaluation of the open item response are discussed below.

In response to Open Item RAI 1515, Question 13.3-2, the applicant explained that four operations personnel are expected to be in the MCR under normal circumstances. Allowing for some movement of equipment operators in and out of the MCR, and also for clerical staff and other personnel, the total number of people in the MCR at any given time could reach 10 during a typical day-shift mode. The applicant also stated that the MCR has a total floor area of approximately 2,250 square feet, and there is an adjacent support room of similar size that contains an operator area, shift supervisor's office, clerical space, kitchen, and restrooms.

Section 2.6 of NUREG-0696 states in part that, "If the TSC becomes uninhabitable, the TSC plant management function shall be transferred to the control room." Consistent with this section, the applicant stated that, for a US-APWR, the plant management function would be transferred to the MCR should the TSC become uninhabitable. The applicant also stated that the ultimate details of this contingency would be part of an emergency plan submitted by a COL applicant referencing the US-APWR DC. The applicant estimated that, in terms of manpower, the "plant management function" would consist of three senior licensee plant management personnel, and five NRC personnel. The applicant explained that an additional 17 licensee personnel, representing the technical support function of the TSC, would be transferred to the EOF or possibly the plant simulator facility, at the discretion of the COL applicant referencing the US-APWR DC.

The staff finds that the information provided by the applicant meets the criteria identified in NUREG-0696 in that the TSC plant management function will be transferred to the control room should the TSC become uninhabitable. Additionally, the MCR will preserve all of the required functions of the TSC. The applicant provided sufficient design details of the MCR to show how over-crowding of the MCR can be avoided by the licensee. The applicant has also proposed an approach to the efficient utilization of the work space afforded by the design that would not place an unreasonably large demand on the available work space. With regard to communications, availability of safety data, and availability of reference materials, the staff determined that the transferring of plant management to the MCR and technical support personnel to the EOF (or simulator) would achieve a match between the equipment and information provided at those facilities. Furthermore, it is the staff's determination that it is the responsibility of the COL applicant referencing the US-APWR certified design to discuss in its emergency plan the details pertaining to the designation of the MCR as the alternative TSC location in the event that the primary TSC becomes uninhabitable. Therefore, the staff considers Open Item RAI 1515, Question 13.3-2 is resolved.

13.3.4.1 Generic Issues

Section 13.3, "Emergency Planning," of the SRP (NUREG-0800) states that the majority of emergency planning requirements associated with new reactor applications are programmatic in nature and supplement the physical facilities and equipment. As stated in 10 CFR 52.47(a)(21), the standard design application must include proposed technical resolutions of those USIs and medium- and high-priority GSIs, which are identified in the version of NUREG-0933, "A Prioritization of Generic Safety Issues," current on the date up to 6 months before the docket date of the application (current version is dated December 2007), and which are technically relevant to the design.

Consistent with 10 CFR 52.47(a)(21) and NUREG-0933, emergency planning features addressed in a standard design application must be technically relevant to the design (i.e., facilities and equipment) and usable for a multiple number of units or at a multiple number of sites. In general, programmatic aspects of emergency planning and preparedness are the responsibility of the COL applicant referencing the US-APWR DC.

In addition, 10 CFR 52.47(a)(8) requires information necessary to demonstrate compliance with any technically relevant portions of the TMI requirements set forth in 10 CFR 50.34(f), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v).

The staff reviewed NUREG-0933 and various other requirements contained in applicable generic communications, and identified the generic issues that are relevant to the US-APWR design, in relation to emergency planning. The following addresses those generic issues, and provides the staff's evaluation regarding their resolution for the US-APWR design.

TMI Action Plan Item III.A.1.2

TMI Action Plan Item III.A.1.2, "Upgrade Emergency Support Facilities," addressed the requirements for licensees to upgrade their emergency support facilities by establishing a TSC, an OSC, and a near-site EOF for command and control, support, and coordination of onsite and offsite functions during reactor accident situations.

In Section 13.3 of DCD Tier 2, the applicant stated that the TSC is an onsite facility that provides plant management and technical support to the plant operations personnel during emergency conditions and is included in the US-APWR standard design on the ground floor of the Auxiliary Building. Section 13.3 further states that the COL applicant is responsible for identifying the OSC and the communication interfaces, consistent with NUREG-0696, and that the EOF will function as a nearsite or onsite support facility for the management of overall licensee emergency response coordination of radiological and environmental assessments, and determination of recommended public protective actions. It is the COL applicant's responsibility to identify the OSC and the communication interfaces, consistent with the guidance in NUREG-0696. This is reflected as COL Information Item 13.3(7).

The staff agrees with the above approach for the TSC, OSC, and EOF with the understanding that the extent to which these emergency response facilities are addressed in the US-APWR design is very limited, in regard to meeting the applicable design and functional criteria in NUREG-0696. Further, the COL information item associated with the OSC (identified above) must be supplemented by the COL applicant's emergency plan, which is addressed by COL Information Item 13.3(2). The emergency plan should address all facility design and functional criteria in NUREG-0696, applicable to the TSC, OSC and EOF. This includes following the

guidance in NUREG-0654/FEMA-REP-1 (Revision 1) for design and implementation of the emergency response facilities. Based on the foregoing, TMI Action Plan Item III.A.1.2 is resolved for the US-APWR design.

GL 80-34

GL 80-34, "Clarification of NRC Requirements for Emergency Response Facilities at Each Site," April 25, 1980, provides guidance related to the TSC, OSC, and EOF. The specific requirements for the TSC, OSC, and EOF are addressed in detail in NUREG-0696.

In DCD Tier 2 Section 13.3, the applicant stated that the US-APWR design includes a TSC and EOF, and a provision for an OSC. In Section 13.3, the applicant addressed various aspects of the TSC and EOF. In addition, the applicant stated that the OSC, and communication interfaces for the control room and TSC, are the responsibility of a COL applicant referencing the US-APWR DC, consistent with NUREG-0696.

The staff agrees, and finds that the OSC and communication interfaces are the responsibility of the COL applicant, and that the limited extent to which the applicant has addressed various design-related aspects of the TSC and EOF in Section 13.3 is acceptable consistent with SRP Section 13.3. The staff further agrees that the more detailed facility design and functional criteria in NUREG-0696 are the responsibility of the COL applicant, which is reflected in COL Information Item 13.3(2). Therefore, this generic issue is resolved for the US-APWR design.

GL 81-10

GL 81-10, "Post-TMI Requirements for the Emergency Operations Facility," February 18, 1981, sets forth guidance related to NRC requirements for emergency support facilities, including TMI Action Plan Item III.A.1.2. In addition, GL 81-10 states that NRC expects to issue further guidance for emergency response facilities in connection with finalization of NUREG-0696.

In DCD Tier 2, Table 1.9.2-14 "US-APWR Conformance with Standard Review Plan Chapter 14 Verification Programs," the applicant stated that the DCD is consistent with the applicable generic criteria in NUREG-0696 and Supplement 1 to NUREG-0737, "Clarification of TMI Action Plan Requirements – Requirements for Emergency Response Capability." The staff agrees and finds this approach acceptable, because the guidance in both GL 81-10 and GL 80-34 addresses facility requirements, and was incorporated into NUREG-0696. Therefore, this generic issue is resolved.

GL 82-33

GL 82-33, Supplement 1 to NUREG-0737, provides guidance regarding post-TMI requirements for emergency response capability; including applicability of RG 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4, June, 2006, to emergency response facilities.

RG 1.97 describes acceptable methods for complying with agency regulations relating to criteria for accident monitoring instrumentation. Supplement 1 to NUREG-0737 provides requirements for emergency response facilities, including the applicability of RG 1.97 to the TSC and EOF.

Additional detailed design and functional criteria relating to the TSC, OSC, and EOF are provided in NUREG-0696.[1]

In DCD Tier 2 Table 1.9.2-14, the applicant stated that the guidance of Supplement 1 to NUREG-0737 has been incorporated into RG 1.97, and the US-APWR DCD conforms to the most recent revision of RG 1.97. In addition, in Table 1.9.1-1, "US-APWR Conformance with Division 1 Regulatory Guides," the applicant stated that, in regard to providing instrumentation adequate for monitoring plant conditions following an accident for nuclear power plants, a detailed assessment of RG 1.97 is found in DCD Section 7.5. The staff finds that the applicant adequately described the methods for complying with applicable guidance related to the criteria for accident monitoring instrumentation. A detailed assessment of compliance with RG 1.97 can be found in Section 7.5 of this SER.

As discussed above in TMI Action Plan Item III.A.1.2, the staff addressed the detailed design and functional criteria relating to emergency response facilities. This includes COL Information Items 13.3(1) and 13.3(7). Therefore, this generic issue is resolved to the extent that it relates to emergency response facilities.

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In DCD Tier 2 Section 13.3.1, "Combined License Application and Emergency Plan Content," the applicant stated that the COL applicant referencing the US-APWR DC is responsible for developing an FSAR that addresses an emergency classification and action level scheme, as well as any security-related aspects pertaining to emergency planning. This is reflected as COL Information Item 13.3(4).

The staff agrees and finds this approach acceptable because the issues addressed in Bulletin 2005-02 are site-specific and programmatic (i.e., not design related) in nature. Therefore, this generic issue is resolved.

13.3.5 Combined License Information Items

The following is a list of COL item numbers and descriptions associated with Section 13.3 and Table 1.8-2 of the DCD.

[1] Post-Accident sampling systems are discussed in the *Model Safety Evaluation* published by the NRC on October 31, 2000 (65 *Federal Register* (FR) 65018), which relates to the development of contingency plans for post-accident sampling and analysis of highly radioactive samples from the reactor coolant system, containment sump, and containment atmosphere.

Table 13.3-1
US-APWR COL Information Items

Item No.	Description	Section
13.3(1)	The COL applicant is to develop interfaces of design features with site-specific designs and site parameters.	13.3
13.3(2)	The COL applicant is to develop a comprehensive emergency plan as a physically separate document.	13.3
13.3(3)	The COL applicant is to develop an emergency classification and action level scheme.	13.3
13.3(4)	The COL applicant is to develop the security-related aspects of emergency planning.	13.3
13.3(5)	The COL applicant is to develop a multi-unit site interface plan depending on the location of the new reactor on, or near, an operating reactor site with an existing emergency plan.	13.3
13.3(6)	The COL applicant is to develop emergency planning ITAAC.	13.3
13.3(7)	The COL applicant is to develop the description of the operation support center.	13.3

13.3.6 Conclusions

On the basis of its review, as described above, the staff concludes that the applicant adequately addressed the emergency planning design-related features and generic issues for the US-APWR DC. Therefore, the information is acceptable and meets the applicable requirements in 10 CFR 50.34(f), 10 CFR 50.47(b), 10 CFR 52.47(a)(8), 10 CFR 52.47(a)(21), 10 CFR 52.47(b)(1), and Section IV.E of Appendix E to 10 CFR Part 50.

13.4 Operational Program Implementation

In Section 13.4 of the US-APWR DCD, the applicant stated that the development of operational program descriptions and implementation schedules is the responsibility of the COL applicant.

The following is the COL information item number and description associated with Section 13.4 and Table 1.8-2 of the DCD

Table 13.4-1
US-APWR COL Information Items

Item No.	Description	Section
13.4(1)	The COL applicant is to develop a description and schedule for the implementation of operational programs. The COL applicant is to "fully describe" the operational programs as defined in SECY-05-0197 and provide commitments for the implementation of operational programs required by regulation. In some instances, programs may be implemented in phases. The COL applicant is to include the phased implementation milestones in their submittal.	13.4

In DCD Tier 2, Section 13.4, Revision 2, in addition to identifying COL applicant responsibilities related to operational programs as specified in SECY 05-197 in COL Information Item 13.4(1) the applicant also cited similar provisions in RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," issued June 2007. The staff finds this to be acceptable.

13.5 Plant Procedures

13.5.1 Administrative Procedures

In Section 13.5.1 of the US-APWR DCD, the applicant stated that administrative procedures describing administrative controls over activities that are important to safety for the operation of a facility are to be developed by the COL applicant. Detailed written procedures are not included in the COL FSAR; however, a brief description of the nature and content of the procedures and a schedule for their preparation is developed.

The following is a COL item number and description associated with Section 13.5.1 and Table 1.8-2 of the DCD.

Table 13.5.1-1
US-APWR COL Information Items

Item No.	Description	Section
13.5(1)	The COL applicant is to develop administrative procedures describing administrative controls over activities that are important to safety for the operation of a facility.	13.5.1

13.5.2 Operating and Maintenance Procedures

13.5.2.1 Operating and Emergency Operating Procedures

In Section 13.5.2.1 of the US-APWR DCD, the applicant stated that operating and emergency operating procedures performed by licensed operators in the MCR are developed by the COL applicant. Detailed written procedures are not included in the COL FSAR; however, a brief

description of the nature and content of the procedures and a schedule for their preparation is developed.

The following is a list of COL item numbers and descriptions associated with Section 13.5.2.1 and Table 1.8-2 of the DCD.

Table 13.5.2.1-1
US-APWR COL Information Items

Item No.	Description	Section
13.5(3)	The COL applicant is to develop procedures performed by licensed operators in the MCR. Operating procedures that are used by the operating organization to ensure routine operating, off-normal, and emergency activities are conducted in a safe manner are described. The plan includes the implementation of these procedures.	13.5.2.1
13.5(4)	The COL applicant is to describe the different classifications of procedures the operators will use in the MCR and locally in the plant for operations, the operating organization responsible for maintaining the procedures, and the general format and content of the different classifications.	13.5.2.1
13.5(5)	The COL applicant is to describe the program for developing operating procedures.	13.5.2.1
13.5(6)	The COL applicant is to describe the program for developing and implementing emergency operating procedures.	13.5.2.1

13.5.2.2 Maintenance and Other Operating Procedures

In Section 13.5.2.2 of the US-APWR DCD, the applicant stated that a COL applicant referencing the US-APWR DC is to describe the classifications of maintenance and other operating procedures, the operating organization group or groups responsible for following each class of procedure, and the general objectives and character of each class and subclass. Detailed written procedures are not included in the COL FSAR; however, a brief description of the nature and content of the procedures and a schedule for their preparation is developed.

The following is a COL item number and description associated with Section 13.5.2.2 and Table 1.8-2 of the DCD.

Table 13.5.2.2-1
US-APWR COL Information Items

Item No.	Description	Section
13.5(7)	The COL applicant is to describe the classifications of maintenance and other operating procedures, the operating organization group or groups responsible for following each class of procedure, and the general objectives and character of each class and subclass.	13.5.2.2

The staff has compared the application to the relevant NRC regulations, the acceptance criteria defined in NUREG-0800, Sections 13.5.1.1 and 13.5.2.1, and other NRC regulatory guides. On the basis of this review and that in response to RAI 1102, the applicant incorporated acceptable additional information pertaining to operating and emergency operating procedures into Revision 2 of the US-APWR DCD, the staff concludes that the information within the scope of the US-APWR DC for this area is in compliance with NRC acceptance criteria specified in Sections 13.5.1.1 and 13.5.2.1 of NUREG-0800.

13.6 Security

13.6.1 Introduction

The DCD and referenced technical reports describe the physical protection systems that are within the scope of the US-APWR design, including plant layout and configurations and establish a design standard for detection, assessment, communications, delay, and responses to protect against potential acts of radiological sabotage and theft of special nuclear material.

Specifically, the DCD provides design descriptions addressing the Nuclear Island and structures of the US-APWR standard design, identification of vital equipment and vital area boundaries, and design descriptions of physical protection systems that are within the scope of the DC. The DCD Tier 1 and referenced DCD Tier 2 docketed information, and referenced Technical Report (TR) UAP-SGI-08002, "High Assurance Evaluation Assessment," provide the design bases, consisting of intended functions, design and performance requirements, along with supporting technical bases, that a COL applicant referencing the US-APWR DC will incorporate by reference in its application. The certified design, combined with site-specific descriptions of a physical protection system (engineered and administrative controls), and security organization and programs, must meet the requirements of 10 CFR 73.55, "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors against Radiological Sabotage." TR UAP-SGI-08002, Revision 2, contains safeguards information (SGI) and is protected from public disclosure in accordance with the requirements of 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

In DCD Tier 2, Section 13.6.2, Revision 2, the applicant also referenced TR UAP-SGI-08001, "The US-APWR Design Certification Physical Security Element Review," that describes the vital equipment and vital areas based on the US-APWR standard design and the physical protection systems or features incorporated in the standard design to provide protection of vital equipment.

The physical protection systems that are not within the scope of the certified design are required by 10 CFR Part 73, "Physical Protection of Plants and Materials," and will be addressed by a COL applicant referencing the US-APWR DC by means of COL Information Items 13.6(1)

through 13.6(5). The DCD includes COL Information Item 13.6(1) which states that a COL applicant referencing the US-APWR DC will prepare and submit a security plan to fulfill the requirements of 10 CFR 52.79(a)(35). The security plan will consist of physical protection, contingency, and training and qualification plans.

13.6.2 Summary of Application

DCD Tier 1 (Revision 2): Chapter 2, Section 2.12, "Physical Security Hardware," and Table 2.12-1, "Physical Security Hardware Inspections, Tests, Analyses, and Acceptance Criteria," of the US-APWR DCD describe physical protection design features, systems and related ITAAC. Table 2.12-1 reserves various design commitments and associated inspections, tests, or analyses (ITA) for physical security systems that will be described by a COL applicant in its COL application.

DCD Tier 2 (Revision 2): DCD Tier 2, Section 1.2, "General Plant Description," and Section 1.2.1.7.1, "General Plant Arrangement," and Figure 1.2-1 of the US-APWR DCD provide descriptions of the scope of the US-APWR design (i.e., Reactor Building, Power Source Buildings, Power Source Fuel Storage Vaults, Essential Service Water Pipe Tunnel, Auxiliary Building, Access Building and Turbine Building). COL Information Item COL 1.2(1) requires the COL applicant to develop a complete and detailed site plan.

DCD Tier 2, Section 1.8.1, "Summary of Combined License Information Items," Table 1.8-1, "Significant Site-Specific Interfaces with the Standard US-APWR Design," and Table 1.8-2, "Compilation of All Combined License Applicant Items for Chapters 1-19," include discussions of COL Information Items 13.3(4) and 13.6(1) through (5) that are related to security and physical protection systems. COL Information Item 14.3(3) describes requirements of a COL applicant to propose ITAAC for physical protection systems not addressed in the DCD. In Section 1.9.1, "Conformance with Regulatory Guides," Table 1.9.1- 3, "US-APWR Conformance with Division 5 Regulatory Guides," identifies the Division 5 RGs applicable to physical protection that were considered or incorporated by reference in the US-APWR DCD.

DCD Tier 2, Section 13.6, "Security," describes physical protection system features incorporated in the US-APWR standard design. The design of physical protection systems beyond the scope of the standard DC and elements of a security program are to be described by the COL applicant referencing the US-APWR DC, along with an implementation schedule and milestones for operational programs. Examples of security program elements are: organization structure, training, operational program implementation, plant procedures, credited operator actions for target sets, physical protection system assessments and analyses, protective strategy against the design-basis threat (DBT), design of site-specific features for physical protection systems, access authorization and fitness for duty program. Section 13.6 references TR UAP-SGI-08001 and TR UAP-SGI-08002 to provide details of the design bases for physical protection systems and features incorporated into the US-APWR standard design. TR UAP-SGI-08001 and TR UAP-SGI-08002 contain information that is safeguards- and security-related, and is protected from public disclosure in accordance with 10 CFR 73.21 and 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding." The designs for these physical protection systems or features, which are independent of the physical protection systems for the Nuclear Island and structures, are not included in the scope of the design certification of the US-APWR, and the staff has not reviewed them. The descriptions of site-specific physical protection system designs are to be prepared and submitted by a COL applicant under COL Information Items 13.6(1) through 13.6(5). A COL applicant referencing the US-APWR design will describe

the plans for engineered systems, administrative controls, management control and processes, and programs for the protection of the nuclear power plant in accordance with 10 CFR Part 73.

The physical protection system ITAAC requirements that will be verified to satisfy the acceptance criteria using ITA are described in DCD Tier 2, Chapter 14, "Verification Programs," Section 14.3, "Inspection, Test, Analysis, and Acceptance Criteria," and Section 14.3.4.12, "ITAAC for Physical Security Hardware." Section 14.2.1.1, "Test Program for Nuclear and Balance of Plant Systems," describes the application of initial test program for tests on safety and non safety-related systems.

DCD Tier 2, Section 14.2.10.1, "Initial Fuel Loading," includes requirements for completion of physical protection system ITAAC prior to fuel loading. Other operational tests of systems relied upon for security functions are described in other sections, including the following: Section 14.2.12.1.42, "Emergency Lighting System Preoperational Test," Section 14.2.12.1.43, "Normal Lighting System Preoperational Test," and Section 14.2.12.1.44, "Class 1E Gas Turbine Generator Preoperational Test." COL Information Item 14.3(3) establishes the requirement that the COL applicant provide ITAAC for the facility's physical protection systems not addressed in the DCD.

The descriptions of inspection objectives, test methods, and acceptance criteria (i.e., test abstracts) supporting physical protection systems ITAAC described in DCD Tier 1 are provided in MHI TR MUAP-10003, "US-APWR Physical Security Hardware ITAAC Abstracts," Revision 0, submitted by letter dated March 8, 2010. The ITAAC for site-specific physical protection systems or features that are outside of the scope of the US-APWR DC are addressed by the COL applicant.

DCD Tier 2 and referenced technical reports provide the acceptable methods for conforming with DCD Tier 1 physical protection system designs. The application of methods differing from those described in DCD Tier 2 must satisfy the change process in the US-APWR DC rule.

ITAAC: DCD Tier 1, Table 2.12-1, "Physical Security Hardware Inspections, Tests, Analyses, and Acceptance Criteria," describes the design commitments, ITA, and acceptance criteria for physical protection systems that are within the scope of the US-APWR design.

Technical Specifications (TS): The DCD does not contain TS for physical protection systems, performance or operations. Physical protection systems and hardware are not considered safety-systems and are treated as non-safety systems.

Interface Requirements/Site Parameters: This section of the DCD contains information related to interface requirements that will be addressed by the COL applicant. DCD Tier 2, Table 1.8-1, "Significant Site Specific Interfaces with the Standard US-APWR Design," of the DCD provides a summary of US-APWR site interfaces that must be addressed to meet design and ITAAC required by the DCD. Item 7 on Table 1.8-1 describes system interface for adequate interface of the plant communications systems (e.g., telecommunications) and Item 9 describes interface requirements for the site detection, alarm, assessment, communications, and access control systems for physical protection that must be addressed as site parameters for the US-APWR design. Table 1.8-2, "Compilation of All Combined License Applicant Items for Chapter 1-19," describes the COL information items 13.6(1) through 13.6(5) and 14.3(3) required for physical security.

COL Information or Action Items: See Section 13.6.5 below.

Technical Reports: There are five MHI technical reports associated with this area of review: (1) TR UAP-SGI-08001, Revision 2, “US-APWR Design Certification Physical Security Element Review,” (2) TR UAP-SGI-08002, Revision 1, “High Assurance Evaluation Assessment,” (3) TR MUAP-10003, “US-APWR Physical Security Hardware ITAAC Test Abstracts,” (4) TR UAP-SGI-08002, Appendix A, “Example Protective Strategy for US-APWR Reference Plant,” and (5) TR MUAP-08003-P, “US-APWR Cyber Security Program.” The information found in the referenced TRs is SGI and is protected in accordance with 10 CFR 73.21 or security-related information (SRI) that is protected in accordance with 10 CFR 2.390.

Topical Report(s): There are no topical reports associated with this area of review.

Cross-cutting Requirements (TMI, USI/GSI, Op Ex): There are no cross-cutting requirements for this area of review.

10 CFR 20.1406: There are no issues related to 10 CFR 20.1406 for this area of review.

Conceptual Design Information (CDI): There is no CDI for this area of review.

13.6.3 Regulatory Basis

The relevant requirements of the Commission's regulations for this area of review, and the associated acceptance criteria, are specified in NUREG-0800, Sections 13.6, “Physical Security,” and 13.6.2, “Physical Security − Design Certification,” and are summarized below:

1. 10 CFR Part 73, which specifies performance-based and prescriptive regulatory requirements that, when adequately met and implemented, provide protection of nuclear power reactors against acts of radiological sabotage, prevent the theft or diversion of special nuclear material, and protect safeguards information against unauthorized release.

2. 10 CFR 73.55(b), “General Performance Objective and Requirements,” which requires an applicant to establish and maintain an onsite physical protection program and security organization. The objective is to provide high assurance that activities involving special nuclear material are not inimical to the common defense and security and do not constitute an unreasonable risk to the public health and safety.

3. 10 CFR 73.55(b)(2), which establishes the performance-based regulatory requirement to protect a nuclear power plant against the design-basis threat of radiological sabotage as described in 10 CFR 73.1(a)(1), “Radiological Sabotage.”

Regulatory guidance and acceptance criteria adequate to meet the above requirements include those set forth in:

1. RG 5.7, “Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas,” Revision 1, May 1980.

2. RG 5.12, “General Use of Locks in the Protection and Control of Facilities and Special Nuclear Materials,” November 1973.

3. RG 5.44, “Perimeter Intrusion Alarm Systems,” Revision 3, October 1997.

4. RG 5.65, “Vital Area Access Controls, Protection of Physical Security Equipment and Key and Lock Controls,” September 1986.

5. RG 5.69, “Guidance for the Application of Radiological Sabotage Design Basis Threat in the Design, Development, and Implementation of a Physical Security Protection Program that Meets 10 CFR 73.55 Requirements,” June 2006.

6. RG 5.74, “Managing the Safety/Security Interface,” March 2009.

7. RG 5.75, “Training and Qualification of Security Personnel at Nuclear Power Reactor Facilities,” June 2009.

8. RG 5.76, “Nuclear Power Reactor Physical Security Programs,” July 2009.

9. RG 5.77, “Insider Mitigation Program (IMP),” March 2009.

10. RG 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” June 2007.

13.6.4 Technical Evaluation

The staff reviewed the design descriptions of physical protection systems in the application and the elements considered with respect to physical protection in the design of the SSCs that are within the scope of design certification, as described in the US-APWR DCD, to determine whether they satisfy the requirements of the 10 CFR Part 73. For the physical protection system features that have been incorporated as part of the design certification, the staff’s review consisted of determining whether the applicant has provided adequate and reasonable descriptions of design and technical bases, and has described how the proposed design will facilitate the implementation of a comprehensive physical protection system (i.e., engineered and administrative controls) and physical protection programs that will provide a high assurance of adequate protection against radiological sabotage in accordance with adversarial characteristics of the design basis threat (DBT), as stated in 10 CFR 73.1(a)(1), and meet requirements for physical protection, as specified in 10 CFR 73.55, “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage.”

The staff also reviewed the identified COL information items for the US-APWR design to determine specific actions or design of physical protection systems and programs that will be addressed by all COL applicants referencing the US-APWR as a standard design.

The staff’s review and scope was limited to the adequacy of the design descriptions, technical bases and assumptions, for the physical protection systems and components that are relied on to implement security response functions (i.e., detection, assessment, communications, delays, and neutralization). The COL applicant must demonstrate high assurance of adequate protection against the DBT of radiological sabotage and compliance with programmatic requirements of 10 CFR Part 73. A regulatory determination on the adequacy of programmatic or administrative controls planned for meeting 10 CFR Part 73 will not be made during a design certification review and will be reserved for review of a COL application.

The staff reviewed the applicant’s responses submitted to the NRC RAI Nos. 282-1984, 283-2200, 396-2723, 52-755 (and resulting revisions to DCD or referenced technical reports) on

the design bases and technical assumptions related to physical protection systems incorporated as standard design for certification. Those responses and revisions include:

- MHI Design Control Document Tier 2.
- MHI Technical Report UAP-SGI-08001, "US-APWR Design Certification Physical Security Element Review, Revision 2," December 2009.
- MHI Technical Report UAP-SGI-08002, "The US-APWR High Assurance Evaluation Assessment, Revision 1," January 2010.
- MHI to NRC, "Partial Responses to Request for Additional Information No. 282-1984, Revision 1," April 2009.
- MHI to NRC, "Request for Additional Information RAI No. 283-2200 SRI Supplemental Tier 1, Chapter 2, Tier 2, Chapter 13.6, Revision 1," April 2009.
- Partial Safeguards Information Responses to US-APWR DCD RAI No.282-1984, Revision 1, and Partial Safeguards Information Responses to US-APWR DCD RAI No. 283-2200 - SRI Supplemental," June 2009.
- MHI to NRC, "Response to US-APWR DCD RAI No. 396-2723, Revision 1," submitted by letter dated, July 2009 (UAP-HF-09380).
- MHI to NRC, "Responses to Request for Additional Information No. 52, Revision 0," September 2008 (UAP-HF-08187).
- MHI to NRC, "MHI's Responses to US-APWR DCD RAI No. 481-3756, Revision 0," submitted by letter dated November 10, 2009.
- MHI to NRC, "Transmittal of Technical Report, "US-APWR Physical Security Hardware ITAAC Attachments," (MUAP-10003), submitted by letter dated March 4, 2010.

13.6.4.1 Design Considerations for Physical Protection

The information in DCD Tier 2, Section 13.6.2, "US-APWR Physical Security," described the physical protection features and general design requirements for vital area barriers, alarm systems and detection, security lighting, communications, and secondary power supplies that will be incorporated into the US-APWR standard design. In TR UAP-SGI-08002, Revision 1, Section 5.0, "US-APWR Design Features Related to Security," the applicant described the considerations of the US-APWR standard design of physical protection systems or features that enhance implementation of physical protection against the DBT and implementation of physical protection programs.

In Section 5.1, "US-APWR Standard Plant Design Features," of TR UAP-SGI-08002, the applicant indicated the standard plant physical design (redundant safety trains, and structures) contributes to enhancing protection (or "lessen the plant's vulnerability") against the DBT of radiological sabotage. The applicant described the following design features and configurations of the US-APWR standard design that are intended to enhance physical protection:

- Four-Train Design: The US-APWR is designed with four safety divisions (also referred to as trains) and can operate at full power assuming one train is out of service for maintenance and one train unavailable. The US-APWR design is capable of operating on a single train at reduced power. The applicant states in its assumption that the availability of four trains that are physically separated "… increases the number of targets and the difficulty for the adversary to disable the plant…"

- Standard Plant Structure Design and Construction: The structural members (i.e., walls, floors, and roof) of the US-APWR standard design are credited with channeling the movement of adversaries. The applicant described in Table 5.1, "Walls and Roof Thickness for Various Standard Plant Structures," of TR UAP-SGI-08002, the minimum exterior wall thickness, configuration and specification of reinforced steel bars, roof thickness, and roof heights, of the Nuclear Island and structures (e.g., Reactor Building, Power Sources Building, Auxiliary Building, etc.). The applicant indicated that minimum thickness and specifications for structures in Table 5.1 were based on information found in DCD Tier 2, Sections 3.8.4.4.1 and 3.8.4.4.2 and stated that "[r]einforced concrete walls of thickness and rebar design listed in the above table offer a significant resistance to penetration due to the amount of ordnance and time required to breach of sufficient size to allow human entry." The specific thickness and construction of walls and roofs that were credited with providing security functions for the delay of adversaries, are SGI and SRI and are protected and withheld in accordance with 10 CFR 73.21 and 10 CFR 2.390.

- Exterior Wall Design and Credited Security Functions: In TR UAP-SGI-08002, Section 5.1.2, "Exterior Wall Design," the applicant referenced TR UAP-SGI-08001 for boundaries of the areas of the standard plant that are designated as vital areas. The applicant also indicated that the walls of the vital areas were credited with channeling the movement of adversaries. The applicant referred to NRC contractor-conducted live field tests of reinforced concrete, as described in the Department of Energy SAND 2001-2168, "Technology Transfer Manual – Access Delay, Vol. 1" and SAND 77-0077, "Barrier Technology Handbook," prepared by the Sandia National Laboratories, and MHI Calculation UAP-SGI-10004, "Comparison of the PS/B [Physical Systems/Barrier] Wall to Sandia Report SAND77-0777," as its basis for the delay provided by the exterior walls. The applicant specifically stated that the "...test [NRC contractor's live field tests] supports the acceptable position that the construction of the walls is more than adequate to deter attempts by adversary to breach with hand carried explosives."

- The applicant also concluded that ". . . an overt assault on walls using hand-carried explosives would subject adversaries to prolonged exposure to security forces fire and counter measures, [which] confirms that [it's] more effective [for] adversaries to choose routes identified in the HAE scenarios described in the Appendix, as the most feasible approach." The applicant evaluated these delay capabilities and assumptions in Calculation UAP-SGI-10004, "Comparison of the PS/B Wall to Sandia Report SAND77-0777."

- Floor Design: The applicant assumed that the floors were not accessible from the outside and therefore adversary accessibility (described for the walls) applies equally to the floors. The US-APWR standard design for floor construction was not described in Table 5.1 that addressed the design of the walls and roofs and construction that was credited to provide delay barriers.

- Roof Design: The applicant described in TR UAP-SGI-08002, Section 5.1.3, "Roof Design," the credited delay functions based on a minimum construction of the roof for the vital areas. The applicant assumed the difficulties and time for scaling the walls and referenced RG 5.76, Regulatory Position C.8.7.2 and assumed a constraint of accessibility of roofs to a certain height.

- Exterior Doors: The US-APWR standard design minimizes the number of personnel and vehicle (truck) doors at grade level to a total of three each. The design limits the number of access points into the Nuclear Island structures and designated vital areas, as described in Section 5.1.4, "Exterior Doors."

The applicant indicated that the multiple divisions, reinforced structures, robust external doors, and spatial separation of divisions are design elements of the US-APWR standard design that provide significant protection against external and hostile actions.

On the basis of its review, the staff determined and concludes the following:

- The US-APWR standard design includes the following features to enhance physical protection: hardening of building structures (e.g., reinforced concrete construction); independence and redundancy of dedicated safety equipment; configuration and spatial separation of SSCs (e.g., four independent safety divisions, central alarm station (CAS), redundancy of primary and secondary power for safety and security systems); and design improvements for loss of critical safety systems leading to radiological sabotage and loss of spent fuel pool (SFP) cooling.

- The staff concludes that the independence, redundancies, and spatial separation, inherent in the US-APWR standard design facilitate physical protection by: (a) increasing the number of tasks, sequences of tasks, and task times required for the DBT adversaries to cause failures or loss of safety functions that could lead to radiological sabotage; (b) providing hardened Nuclear Island and structures that can be credited for the physical protection functions of delay, bullet resistance, access controls, and explosive blast protection; (c) providing spatial separations that minimize or prevent a single event or act from causing failure or loss of all safety or security functions; and (d) providing a standard plant configuration that would allow layered defense or defense-in-depth protection within the Nuclear Island and structures to interdict and neutralize adversaries.

- The staff concludes that the applicant has adequately considered in the US-APWR standard design the applicable requirements for the design of a physical protection system as stated in 10 CFR 73.55 for the portion of the design within the scope of the DCD, in accordance with 10 CFR Part 52.

13.6.4.2 Physical Protection System Evaluations and Analyses

13.6.4.2.1 Vital Equipment Identification Process

The applicant described the process to identify a complete and accurate set of vital equipment and designated vital areas of the US-APWR standard design in TR UAP-SGI-08001. In Section 1.0 of this report, the applicant stated the following:

This report identifies vital equipment and vital areas for both the US-APWR standard plant design and the US-APWR reference plant, Comanche Peak 3 and 4 (CPNPP 3 and 4). The report also identifies personnel, vehicles, and equipment access points to the vital areas.

The staff review of TR UAP-SGI-08001 for the US-APWR DC was limited to those portions of the report that addressed the scope of the US-APWR physical security design.

The applicant considered, in TR UAP-SGI-08001, probabilistic risk assessment (PRA) and risk insights from fire and flood assessments in the identification of vital equipment. The applicant stated that they used assumptions in NUREG-1178, "Vital Equipment/Area Guideline Study: Vital Area Committee Report," as the basis for identifying vital equipment. The applicant supplemented the vital equipment identification process with evaluations that identified fire areas and fire zones, results of mechanical systems evaluations for the US-APWR standard plant design, and results from DCD Chapter 19 safe shutdown events.

In Section 2.1, "Assumptions for Vital Equipment Development for Standard Plant (DCD) and Reference Plant," of TR UAP-SGI-08001, the applicant described the following 10 assumptions that provided the framework used to identify a list of vital equipment:

- Assumption 1: Vital equipment is limited to safety-related components; and consists of equipment, components, and devices but does not need to consider structures.

- Assumption 2: For purpose of protection against radiological sabotage, the reactor coolant pressure boundary consists of the reactor vessel and reactor coolant piping up to and including a single, protected, normally-closed isolation valve or protected valve capable of closure in interfacing system.

- Assumption 3: Any transient or event that causes significant core damage will result in a 10 CFR Part 100 [10 CFR 52.47(a)(2)], release.

- Assumption 4: All trains of equipment (with the associated piping, water sources, power supplies, controls, and instrumentation) that provide the capability to perform the functions to achieve and maintain safe shutdown for all modes of operations should be protected as vital.

- Assumption 5: The control room and any remote locations from which vital equipment can be controlled or disabled (such as remote shutdown panels, motor control centers, circuit breakers, local control stations) should be protected as vital.

- Assumption 6: All modes of reactor operations are considered.

- Assumption 7: The spent fuel pit and its cooling and inventory control functions should be protected as vital to ensure that sabotage to the spent fuel cannot result in a 10 CFR Part 100 [10 CFR 52.47(a)(2)] release from the stored spent fuel assemblies.

- Assumption 8: The Vital Equipment List will provide description at the system level for the instrumentation and control system. Individual identifiable components at the subcomponent level (e.g., sensing instrumentation, tubing, cabling, etc.) are vital but are not separately listed in the Vital Equipment List.

- Assumption 9: For electrical power system, the Vital Equipment List will provide description at the major electrical equipment level (i.e., electrical switchgear, electrical buses, or motor control center) for the onsite electrical power system. Individual identifiable components at the subcomponent level (e.g., breakers, relays, cabling, etc.) are vital but are not separately listed in the Vital Equipment List.

- Assumption 10: Piping runs in the vital systems located in the reactor building are identified on the vital equipment list for the purpose of conveying system routing information into the vital area. Piping, and other passive mechanical components such as manual valves, check valves, relief valves are vital but are not separately listed in the Vital Equipment List.

The applicant stated, in Section 2.2, "US-APWR Safe Shutdown Functions," of TR UAP-SGI-08001:

- The first step in identifying vital equipment is to identify the safe shutdown functions of the US-APWR for different initiating events that might lead to significant core damage. Table 19.1-1 identifies different initiating events for which the US-APWR has been analyzed in Chapter 19 of the DCD. For these initiating events, Table 19.1-2 identifies five key safety functions that must be satisfied to accomplish safe shutdown for these initiating events. The five key safety functions are:

  - Reactivity control

  - RCS [reactor coolant system] pressure control

  - RCS inventory control

  - Decay heat removal

  - Containment heat removal and containment isolation (necessary for safe shutdown)

- The applicant indicated that the US-APWR standard design relies on dedicated systems that are considered "the frontline systems used to accomplish the safe shutdown of the plant. Frontline systems rely on other systems to function properly and these systems are the Tier 1 support systems to the frontline systems. The Tier 1 support systems may also, in turn, have dependencies on other systems for the support system itself to function properly to support the frontline systems," which are referred to as Tier 2 support systems.

- The vital equipment determination process applies the results for identified front line systems that provide the key safety functions and relied on the "system dependencies tables in Chapter 19 are a primary source for identifying the Tier 1 and Tier 2 supporting systems." The DCD provides the detailed information on plant system functions, how systems operate to perform their intended functions; and system information. For a broad overview of the different systems employed for performing safe shutdown functions, DCD Section 7.4.1.6 and Tables 7.4.-1 and 7.4-2 provide descriptions of the various systems employed for accomplishing the safe shutdown functions. The applicant indicated that information on safety-related instrumentation and controls (I&C) systems in Chapter 7 of DCD Tier 2 and safety-related Class 1E electrical systems in Chapter 8 of DCD Tier 2 are considered in the evaluation of vital equipment. In

addition, DCD Tier 1, Table 2.2-3, “Main Components Protected against External Floods, Internal Floods and Internal Fires,” provides basic descriptions of the main components employed to accomplish the Safe Shutdown function for internal events.”

The applicant described the following process for identifying vital equipment:

- Identify systems that are part of the reactor coolant pressure boundary.
- Identify frontline systems for ECCS and safe shutdown and the safe shutdown functions performed by the different frontline systems.
- Identify spent fuel pit systems and the functions that are important to maintain the integrity of the spent fuel assemblies stored in the spent fuel pit.
- Identify major equipment and active components for the identified frontline systems necessary to perform the emergency core cooling function and safe shutdown functions. Piping is identified for mechanical systems that reside outside the containment for the purpose of describing the pipe routing.
- Identify major equipment and active components necessary to perform the cooling function for the spent fuel assemblies and inventory control function for the spent fuel pit. Piping is identified for mechanical systems located outside the containment for the purpose of describing the pipe routing.
- Identify the Tier 1 and Tier 2 support systems for the different frontline systems and spent fuel pit cooling and inventory control systems.
- Identify major equipment and active components for the Tier 1 and Tier 2 support systems. Piping is identified for mechanical systems located outside of the containment for the purpose of describing the pipe routing.
- In TR UAP-SGI-08001, Section 2.2, the applicant stated that DCD Tier 2, Table 3.2-2, "Classification of Mechanical and Fluid Systems, Components, and Equipment," was used as a starting point for the vital equipment process for mechanical systems. The applicant used the table to determine the systems and components that are classified as safety-related or nonsafety-related, the description of the intended safety functions, the major system components, and a description of how the system and its system components are designed to operate.
- The applicant used DCD Tier 2, Chapter 19, Tables 19.1-3 through 19.1-6 for the dependencies between the frontline systems and the Tier 1 support systems and the dependencies between the Tier 1 support systems and the Tier 2 support systems. The applicant stated that “[t]hese system dependencies tables provide a means to capture additional information necessary for the development of the Vital Equipment List.” The applicant also used DCD Tier 2, Chapters 4, 5, 6, 9, 10, and 11 mechanical systems descriptions to identify vital mechanical systems.

The applicant described the following steps applied to determine vital equipment for the US-APWR standard design:

- Step 1: Prepare list of mechanical systems from DCD Table 3.2-2.

- Step 2: Vital equipment are to be safety-related; therefore, identify all safety-related systems.

- Step 3: Identify (a) systems that are part of the RCPB [Reactor Coolant Pressure Boundary]; (b) systems that are frontline systems for the ECCS [Emergency Core Cooling System] or safe shutdown functions; (c) systems directly related with cooling of the spent fuel assemblies stored in the spent fuel pit and inventory control function; and (d) systems that support the equipment function associated with ECCS, safe shutdown, and the cooling of the spent fuel assemblies stored in the spent fuel pit and inventory control function.

- Step 4: Identify the system portions (a) that are associated with RCPB; (b) for frontline systems that are associated with ECCS or safe shutdown; (c) for the spent fuel pit cooling system that is associated with the cooling functions and inventory control function; and (d) for support systems that support the equipment function.

- Step 5: Identify systems that are vital. To be a vital system, the system must be determined to be safety-related and the system must fall within at least one of the Step 3 functional capability categories. Those portions of the systems that provide the functional capabilities, which are identified in Step 4, comprise the vital equipment for the US-APWR standard plant design.

- In TR UAP-SGI-08001, Appendix F, "Mechanical Systems Evaluations for the US-APWR Standard Plant Design," the applicant documented results of the vital equipment within mechanical systems for the US-APWR standard design.

On the basis of its review, the staff determined and concludes the following:

- The applicant considered and applied the NUREG-1178 assumptions, which are not specifically intended for identifying vital equipment as defined by 10 CFR 73.2. The study documented in NUREG-1178 was an attempt, in the pre-September 11, 2001, environment, by the NRC staff to establish an approach for determining what safety functions and associated SSCs should be protected against the DBT for radiological sabotage in the 1980s. For example, Assumptions 3, 5, and 9 in NUREG-1178 are contrary to 10 CFR 73.2 that defines vital equipment. The remaining assumptions are related to core damage, protecting the control room, unavailability of offsite power, conditions leading to a 10 CFR Part 100 release, use of explosives by saboteurs in the pre-September 11, 2001, environment, equipment not located in vital areas, protecting the SFP, backup power, and operator or adversary actions. The application of NUREG-1178 does not satisfy regulatory requirements for vital equipment in accordance with its definition in 10 CFR 73.2.

- The applicant identified and applied reasonable assumptions in its process of vital equipment identification using the US-APWR safety-related systems design in order to meet part of the vital equipment definition in 10 CFR 73.2. However, the assumptions for identifying vital equipment do not adequately address that part of the 10 CFR 73.2 definition that identifies vital equipment as equipment or systems that would be required to function to protect public health and safety following a radiological release resulting from a failure or destruction of equipment or systems.

- The staff concludes that the applicant's process for identifying a complete and accurate list of vital equipment for the US-APWR standard design is not in accordance with the definition stated in 10 CFR 73.2. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-19 to request that the applicant provide a complete and accurate list of vital equipment for the US-APWR standard design in accordance with 10 CFR 73.2. This is being tracked as an Open Item.

Vital Equipment List

The applicant identified its vital equipment list in TR UAP-SGI-08001, Section 2.3 and Appendix F. The applicant stated that I&C and site electrical systems that are safety-related, supporting the frontline systems functions of mechanical systems, are identified as vital equipment. The design-specific vital equipment list and associated equipment locations are considered SGI and SRI and protected in accordance with 10 CFR 73.21 and 10 CFR 2.390.

The applicant stated that TR UAP-SGI-08001, Appendix B, provided a list of vital equipment for the US-APWR standard plant design sorted by plant system. Appendix B also identified the impact on the system from the loss of the vital equipment. Appendix C provided the list of vital equipment for the US-APWR standard plant design sorted by fire zone. This information was used to locate the vital equipment within the vital areas, as discussed in Section 4.0 of TR UAP-SGI-08001.

The applicant also described, in TR UAP-SGI-08001, Section 2.4, "Vital Equipment for the US-APWR Reference Plant Design," the development of vital equipment unique to the reference plant, Comanche Peak Nuclear Power Plant (CPNPP), Units 3 and 4, and provided the resulting list of vital equipment in Appendix D and the impact from the loss of vital equipment. The applicant stated that the "US-APWR reference plant design vital equipment information is subject to change by subsequent COL applicants as appropriate to reflect site-specific conditions."

On the basis of its review, the staff determined and concludes that the applicant's list of vital equipment did not adequately address the following:

- All SSCs providing safety functions that directly protect against the release of radioactivity that could endanger the public health and safety by exposure to radiation, as stated in 10 CFR 73.2.

- All SSCs providing safety functions to prevent release of radioactivity that would exceed the radiological exposure threshold, as explained in 10 CFR 100.11(a)(1).

RAI No. 282-1984, in Questions 13.06-64, 13.06-65, and 13.06-75, addresses the concerns of identifying a complete and accurate list of vital equipment for the US-APWR standard design. The revision to TR UAP-SGI-08001 incorporated responses to these questions and revised assumptions. However, the applicant did not revise assumptions that fully address vital equipment as defined by 10 CFR 73.2.

The staff concludes that the applicant's vital equipment list did not include all safety-related systems based on the definition in 10 CFR 73.2. The staff issued follow-up RAI 4912, Question 13.06.02-20 to request that the applicant identify a complete and accurate list of vital equipment as defined in 10 CFR 73.2 for the US-APWR standard design. This is being tracked as an Open Item.

13.6.4.2.2 Vital Areas

The requirements of 10 CFR 73.55(e)(9)(i) state that "[v]ital equipment must be located only within vital areas, which must be located within a protected area so that access to vital equipment requires passage through at least two physical barriers, except as otherwise approved by the Commission and identified in the security plans." The applicant identified in Section 3.1, "Vital Area for the US-APWR Standard Plant Design," of TR UAP-SGI-08001, the vital areas for the US-APWR standard design. These vital areas consist of the various structural boundaries of the Nuclear Island and structures indicated on the footprint of the US-APWR standard design.

The applicant identified vital areas based on the list of vital equipment and locations. TR UAP-SGI-08001, Section 3.1, the applicant identified which parts of the US-APWR Nuclear Island and structures are designated as vital areas. Appendix E, "Plant Layout Drawings for US-APWR Standard and Reference Plant Design," Figures 1 through 10, identified the vital area boundaries. Also, in Appendix E, Figure 11, "Fire Zones, Fire Areas, and Vital Areas [as stated] Tunnel," and Figure 12, "Fire Zones, Fire Areas, and Vital Areas [as stated] Room and [as stated]," the applicant described the additional site-specific designation of vital areas for the referenced plant design (e.g., CPNPP, Units 3 and 4).

The applicant indicated that the vital areas are developed from areas containing the safety-related systems and components identified on the Vital Equipment List and other areas required to be vital areas, such as CAS, Secondary Alarm Station (SAS), and security secondary power supply, as stated in 10 CFR Part 73. The design and performance requirements for control and delay of access to the vital areas are provided in TR UAP-SGI-08002.

In TR UAP-SGI-08002, Section 5.2, "Physical Security Design Features and Systems," the applicant described the following design, performance characteristics, and assumptions for the physical protection systems or features credited for the protection of the vital areas:

- The US-APWR standard design structural walls and roofs establish the boundaries for the vital areas. The MCR and CAS are designated as vital areas by regulation and will be designed with bullet-resistant barriers. The minimum safe standoff distances required are identified in UAP-SGI-10001 to protect the Nuclear Island and structures from DBT vehicle bombs. The design for the CAS, along with security and electrical rooms and locations, is described in Section 5.2.1. The CAS is protected with bullet resistant barriers and protected from blasts of DBT vehicle bombs.

- Personnel and equipment access points are designed with locks and alarms. Hardened doors are provided to protect access openings into the vital areas. Equipment hatches and other penetrations are designed to provide delay of access. Underground pipe penetrations are protected for openings greater than those specified in Section 5.2.2.2, "Penetrations through Standard Plant Vital Area Walls," and also adhere to guidance provided in NRC Information Notice 86-83, "Underground Pathways into Protected Areas, Vital Areas, Material Access Areas and Controlled Access Areas" and Regulatory Issue Summary 2005-04, "Guidance on Protection of Unattended Openings that Intersect a Security Boundary or Area."

- The US-APWR standard design requires that above-ground utilities or pipe chases or other openings penetrating vital areas be secured by grates, doors, covers or other protection intended to maintain the integrity of the vital area barrier. HVAC ducts penetrating structure walls are protected against tornado missiles and as an entryway into the plant by robust structures.

- The vital area structures consist of reinforced concrete walls and roofs. Duct openings for intake or exhaust air on walls and roofs are protected by physical barriers. All HVAC duct and vents are located above grade. Openings for blowout doors are protected as specified in Section 5.2.2.2. The entry point to the vent stack is more than one hundred feet above the roof level.

- Access into vital areas are designed to include positive control for authorized access and are locked and alarmed to detect unauthorized access, consistent with Section 13.6.2.2 of DCD Tier 2. The applicant stated that access control for personnel, vehicle, and material are provided by vehicle barrier access control check points and protected area personnel access controls, and are beyond the scope of the DC.

- The design for the vital areas includes provisions for intrusion detection systems. The vital area doors are designed to lock with intrusion detection and alarmed in the continuously manned alarm stations. The design of the intrusion detection alarms includes standard features that provide tamper indicating and self checking, and annunciates in two separate and continuously manned security alarm stations as described in DCD Tier 2 Section 13.6.2.3. The applicant stated that "[t]he intrusion detection system to detect attempts to penetrate the protected area boundary and the closed circuit television camera and video assessment system providing real time playback are part the site specific design and are beyond the scope of the US-APWR standard plant design."

- The applicant applied RG 5.76, Regulatory Position C.8.7.2 in postulating scenarios for pathways accessible to adversaries into the vital areas. The applicant assumed that vital structures exceeding 2 stories in height would limit adversary pathways and/or access. The Nuclear Island and structures exceed 2 stories in height. The applicant eliminated access to vital areas above this height as credible pathways for postulated scenarios.

On the basis of its review, the staff determined the following:

- The applicant identified in Appendix E, "Plant Layout Drawings for US-APWR Standard and Reference Plant Design," of TR UAP-SGI-08001 (Figures 1 through 10) the areas designated as vital areas for the US-APWR standard design. The results of the applicant evaluation and identification of the vital areas for the US-APWR standard design are documented in TR UAP-SGI-08001, which is referenced by Chapter 13, "Conduct of Operation," Section 13.6, "Security." The vital areas consist of the various structural boundaries of the Nuclear Island and structures indicated on the footprint of the US-APWR standard design.

- The applicant adequately described the design bases for the engineered physical protection systems or features credited for the protection of the vital areas. Specifically, TR UAP-SGI-08002 described: design requirements for physical protection systems and configuration for the separation from the protected area, control of normal access

and protection of emergency exits to detect and delay authorizing access; physical delays and protection of penetrations into the vital area, detection, surveillance, assessment, and communications systems for detection of unauthorized access and initiating security response; backup power supplies to provide continuity of physical protection systems functions; and measures to minimize points of entry and protect pathways into each vital area that limit accessibility to separate safety division (i.e., vital equipment) and channel adversaries to locations of pre-deployed security responders.

- The applicant adequately addressed the requirements of 10 CFR 73.55(e)(9)(v) by design and the designation of vital areas that include the reactor control room, SFP, CAS, and SAS, in accordance with 10 CFR 73.55(i)(4)(iii). In addition, the applicant has also adequately addressed requirements of 10 CFR 73.55(i)(4)(vi), by locating secondary power supply systems for alarm annunciation equipment and the secondary power supply systems for non-portable communications equipment within vital areas.

- The applicant adequately described the design and performance requirements for physical barriers of the Nuclear Island and structures that have been designated as vital areas to address one of two barriers in accordance with requirement of 10 CFR 73.55(e)(9)(i), which requires that the access to vital equipment requires passages through at least two physical barriers.

- The applicant adequately addressed the requirements of 10 CFR 73.55(e)(9)(ii) by providing design and performance requirements that protect all vital area access points and vital area emergency exits with intrusion detection equipment and locking devices, which satisfy the vital area entry control requirements, and meet the 10 CFR 73.55(e)(9)(iii) requirement that unoccupied vital areas must be locked and alarmed.

- The applicant adequately described the design and performance requirements for physical protection systems, components, and features that will be relied upon to implement access controls. Specifically, the applicant design addresses the requirements of 10 CFR 73.55(g), "Access Controls," as it is applied to the access to the Nuclear Island and structures of the US-APWR standard design. The design of physical protection systems include access control systems to meet requirements of 10 CFR 73.55(g)(1) at the vital area boundary to control personnel, protection of openings with physical barriers with locking devices to delay access, intrusion detection system to provide detection of unauthorized access, and surveillance equipment to assess physical conditions to detect unauthorized access for the designated vital areas.

- The applicant adequately described the design and performance of physical protection systems that provide capabilities for surveillance, observations, and monitoring, in accordance with requirements of 10 CFR 73.55(i)(5). The design also includes provisions for control of unattended openings by providing physical barriers and intrusion detection in accordance with 10 CFR 73.55(i)(5)(iii).

- In applying RG 5.76, Regulatory Position C.8.7.2, the applicant did not consider or evaluate all credible pathways and scenarios. Specifically, the applicant's assumption that adversaries are unable to scale walls of a height greater than a typical 2-story building is not a reasonable assumption for the adversarial characteristics described in 10 CFR 73.1(a)(1)(A). The regulation specifically states that the adversaries are "well trained (including military training and skills) and dedicated individuals, willing to kill or

be killed." The applicant must consider all characteristics of the DBT. Therefore, the staff issued follow-up RAI 4912, Question No. 13.06.02-21 to request the applicant provide reasonable assumptions that meet the adversarial characteristics described in 10 CFR 73.1(a)(1)(A) and include evaluations of credible and reasonable above ground level pathways into the vital areas. This is being tracked as an Open Item.

- An incomplete and/or inaccurate list of vital equipment impacts the ability of the applicant to meet regulatory requirements of 10 CFR 73.55(e)(9)(i). An incomplete and/or inaccurate list of vital equipment prevents the applicant from showing that all vital equipment is located in vital areas. As previously noted, the staff issued follow-up RAI 4912, Question 13.06.02-20 for the applicant to provide a complete and accurate list of vital equipment for the US-APWR standard design. Therefore, the staff could not determine: (a) whether designated vital areas currently identified contain all vital equipment for the US-APWR standard design, (b) whether vital equipment not currently identified is located outside of the areas currently designated as vital areas, and (c) whether the applicant has appropriately identified, for Commission consideration, vital equipment that will be located outside of designated vital areas. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-22 to request that the applicant meet the requirements of 10 CFR 73.55(e)(9)(i) and that the designated vital areas include all vital equipment as defined by 10 CFR 73.2. This is being tracked as an Open Item.

- The staff concludes that the applicant has adequately described the design, performance, and assumptions for the engineered physical protection systems credited for the protection of the vital area boundaries. The applicant has adequately considered in the US-APWR standard design the applicable requirements for the design of a physical protection system as stated in 10 CFR 73.55 for the portion of the design within the scope of the certification application, in accordance with 10 CFR Part 52. However, the applicant has not shown that it has met the requirements of 10 CFR 73.55(e)(9)(i).

13.6.4.2.3 Target Sets

In TR UAP-SGI-08002, Revision 1, Section 4.0, "Target Set Identification and Development," the applicant described target sets as the "underlying basis for developing a plant protective strategy. A target set analysis is an evaluation of components or operator actions to be protected. A target set is a minimum combination of equipment or operator actions which, if prevented from performing their intended functions or prevented from being accomplished, would likely result in significant core damage (e.g., non-incipient, non-localized fuel melting and/or core damage) or spent fuel sabotage...." The applicant stated in Section 4.2, "Overall Plant Security Objectives," that target set equipment includes those "SSCs whose failures due to sabotage could lead to significant core damage or spent fuel damage during all modes of operations."

- The applicant discussed, in TR UAP-SGI-08002, the process used to identify and develop target set groups (TSGs) for the US-APWR standard plant design as follows:

- The applicant stated that "this report [TR UAP-SGI-08002] identifies target set groups for the US-APWR standard plant design is based upon the combination of system functions that must be maintained to ensure safe shutdown or otherwise ensure that reactor can be maintained in a safe condition," and "[t]he design of the physical protection system

(PPS) uses target sets and their equipment location to identify and include appropriate features for protection of these areas and equipment from possible adversary attack."

- The target set process began with a team of individuals who are subject matter experts on the US-APWR system design, engineering, probabilistic risk analysis (PRA), plant operations and security, as described in Section 3, "Approach for Performing the High Assurance Evaluation," and Section 4.1, "Establishment of a Qualified Assessment Team."

- The process requires the expert team to use information in the US-APWR DCD, the vital equipment list, the PRA, design drawings, piping and instrumentation diagrams, and electrical diagrams in order to develop a preliminary list of SSCs that, if unavailable due to destruction or failure, could lead to fuel damage. The applicant stated that "...and, based on further evaluation, the expert panel developed and assessed potential attractive target sets based on combination of specific components within these SSCs that, if damaged and taken out of services by an adversary, would result in probable core damage."

- In TR UAP-SGI-08002, Section 4.3, "Methodology for Developing Target Set Groups for the US-APWR Standard Plant," the applicant described the following key assumptions for determining US-APWR Target Set Groups:

  - Assumption 1: Radiological sabotage does not occur coincident with external events (e.g., flood, fire, etc), random failure, or independently initiated design basis events. The applicant assumed that the plant's physical security program would continue to be available to take appropriate actions, including compensatory measures as required, to maintain required security posture to protect the plant against the DBT.

  - Assumption 2: Insider threat (i.e., active insider) is adequately addressed by an insider mitigation program.

  - Assumption 3: The plant is immediately shutdown upon confirmation of a security event (i.e., a confirmed breach of the protected area boundary.

  - Assumption 4: Mitigating actions are available and can be successfully implemented (i.e., viable) for scenarios in which the time to core damage or spent fuel damage exceeds 8 hours and TSGs that include time to core damage or spent fuel damage in excess of 8 hours are eliminated.

  - Assumption 5: Multiple trains of similar equipment at multiple locations throughout the plant must be made inoperable to prevent critical plant shutdown functions (e.g., "…with one train out of service for maintenance during power operations, the US-APWR design has sufficient redundancy to accommodate the protective strategy developed in this report without having to focus on how equipment maintenance or plant configuration needs to be accounted for in the target set analysis.").

  - Assumption 6: Safety-related equipment, including piping and cables, is located within vital areas, and the protection of vital areas protects equipment comprising the standard plant TSGs.

  - Assumption 7: All modes of operations are considered and developed.

- Assumption 8: No target sets or target set equipment are excluded on the basis of achievability using the DBT characteristics.

In TR UAP-SGI-08002, Section 4.3.2, "Approach for Developing Target Set Groups for the US-APWR Standard Plant," and Section 4.4, "Development of the Safe Shutdown Matrix for the US-APWR Standard Plant," the applicant described how the safe shutdown matrix was developed for the US-APWR standard plan design. The applicant indicated that the matrix identified different combinations of system functions that must be maintained to achieve safe shutdown or other safe plant condition for different initiating events in order to prevent significant core damage. The applicant assumed, for the target set process, that initiating events described in the US-APWR PRA are initiated by the DBT adversary.

The applicant identified a TSG that represents a combination of system functions that are necessary for a particular initiating event in order to prevent potential core damage or spent fuel sabotage. Alternatively, a TSG may protect against an initiating event (e.g., a small- or large-break loss-of-coolant accident (LOCA) by protecting the RCPB) so as to prevent potential core damage that could occur as a result of the initiating event.

The applicant indicated that the vital equipment list identifies the equipment and location for different systems needed to perform safe shutdown functions. This list can be used to confirm that equipment in a TSG is located within an area protected by the example protective strategy developed in TR UAP-SGI-08002. Example target sets comprising major system components are identified for each TSG to provide a basis for evaluating the example protective strategy. The resulting combinations of system functions that must be maintained for each initiating event are the standard TSGs for the US-APWR standard design. The following insights were considered by the applicant in its evaluation:

- Use safety-related vital equipment combinations of safe shutdown system functions and support systems unavailability that would lead to significant core damage.

- Use PRA-dominant cutset information to augment and supplement to identify targets and combination of systems whose loss would lead to core damage.

- Eliminate combination of systems for those times to core damage or spent fuel damage that exceed 8 hours.

In TR UAP-SGI-08002, Section 4.4.1, "Overview of the Safe Shutdown Matrix," the applicant described a three-step process to develop the safe shutdown matrix. The steps were: (1) identify and determine the applicable safe shutdown functions for the US-APWR; (2) identify different initiating events that could lead to core damage (or spent fuel sabotage) for performing the analysis; and (3) for each of the initiating events, analyze the different system functions used to accomplish safe shutdown functions so as to avoid core damage (or spent fuel sabotage).

The applicant identified critical safe shutdown functions, in Section 4.4.1, "Applicable US-APWR Safe Shutdown Function," as those related to reactivity control, RCS inventory control, RCS pressure control, decay heat removal, and containment heat removal and containment isolation (necessary to achieve safe shutdown), and the safety functions for ensuring spent fuel cooling. In DCD Tier 1, Table 2.2-3 for internal events and DCD Tier 2, Sections 7.4 and 19.1.4, the applicant provides the technical basis for the identification of safe shutdown functions.

The applicant indicated that it also considered or assumed the following in its evaluation of safe shutdown functions and initiating events:

- Decay heat and containment heat removal serve to cool the core and containment isolation as part of other systems that penetrate the containment structure to perform safe shutdown functions. Reactivity control is achieved by insertion of control rods and immediate shut down occurs upon a confirmed security event. The critical safe shutdown functions, in Section 4.4.1, include assumptions of three critical plant functions to achieve safe shutdown for any of the initiating events.

- DCD Tier 2, Chapter 19, Table 19.1-2, "Initiating Events for the US-APWR," identifies the initiating events (e.g., large- and small-break LOCAs, reactor vessel rupture, and other events caused by intentional or malevolent acts). Initiating events are considered for reactor operating modes 1 through 6 and events for the SFP described in Section 19.1.6.

- Evaluation of initiating events for methods that achieves and maintains safe shutdown includes identification of safety-related systems (frontline systems) and required power and instrumentation control (support systems). PRA and severe accident mitigation analyses are considered in the analysis.

The applicant documented its results from the evaluations described above in Table 4.1, "US-APWR Safe Shutdown Matrix (for Modes 1-3 and Mode 4 with SGs [3 sheets])," and "US-APWR Safe Shutdown Matrix (for Modes 5 and 6)," and "US-APWR Safe Shutdown Matrix (for the SFP)."

The matrix, for each initiating event evaluated, identified the frontline system function combination and support system combination that are required to perform safe shutdown functions, specific safe shutdown functions analyzed (i.e., RCS inventory, pressure, and heat removal), backup capability for performing heat removal function, different system function combinations for maintaining safe shutdown or safe condition that preclude core damage or loss of spent fuel cooling, estimated time to core damage, and TSG identification number. The applicant identified a unique TSG for the combination of system function unavailability that would lead to core damage within 8 hours.

Nine different TSGs were identified for the US-APWR standard design. The applicant stated that "[t]hese target set groups identified either the different system function combination that, if not performed, could lead to core damage or spent fuel damage, or alternatively for large- and small-break LOCA events, the reactor coolant pressure boundary located within the containment, which is protected as a target set in order to prevent the occurrence of a small or large LOCA."

The applicant provided the results of its evaluation using the steps described, which are shown in the US-APWR Safe Shutdown Matrix in Section 4.4, Table 4-1, "US-APWR Safe Shutdown Matrix (for Modes 1-3 and Mode 4 with [steam generators] SGs)." The applicant analyzed the LOOP, small-break LOCA, large-break LOCA, secondary-side pipe break, safe shutdown for Mode 4 using residual heat removal, Modes 5 and 6, and loss of cooling of spent fuel assemblies in Sections 4.4.3 through 4.4.8 of TR UAP-SGI-08002. The detailed discussions included combination of failures to determine: required safety-related system functions, systems interfaces, and operations of required equipment; credited operator actions, the means

for achieving required operator actions; and alternative nonsafety-related means for achieving safety functions and backup capabilities (e.g., decay removal). The detailed discussions in Sections 4.4.3 through 4.4.8, and summary of results in Table 4-1 are considered SGI and SRI that are protected in accordance with 10 CFR 73.21 and 10 CFR 2.390.

The summary of the results for the evaluation of postulated initiating events and the selection of TSGs are described in Table 4-1.

In TR UAP-SGI-08002, Tables 4-2 through 4-7, the applicant identified specific equipment names, components to operate, operations and location of operations that are credited for safe shutdown function evaluations for preventing core damage and maintaining spent fuel cooling. TR UAP-SGI-08002, Section 4.6, "Target Set Groups for the US-APWR," provided the summary of the results from the safe shut down analysis and established nine TSGs for the US-APWR.

The applicant stated that "[t]hese target set groups identify the different function combinations for the US-APWR standard plant design that, if not performed, could lead to significant core damage or sabotage of spent fuel." The applicant also stated that "[d]ifferent combinations of equipment may be lead to the loss of these different system functions. But all such equipment necessary to perform these functions are covered by the example protective strategy developed in this high assurance evaluation for the US-APWR. The standard plant target set groups may be supplemented and modified on a site specific basis to incorporate site specific features and plant specific operator actions."

In TR UAP-SGI-08002, Section 4.7, "Potential Radiological Release Paths," the applicant assumed that all containment penetrations are potential radiological release pathways for radioisotopes resulting from significant core damage to escape the containment and references DCD Tier 2, Chapter 6, Figure 6.2.4-1, "Containment Isolation Configurations." The applicant identified five means of release pathways. The applicant discussed the postulated loss or damage to systems and reconfigurations of systems that would allow for achieving release pathways from the containment. The specific detail of the discussion is considered SGI and SRI and is protected accordingly.

The applicant described considerations of cyber security in TR UAP-SGI-08002. Section 4.3, "Consideration of Cyber Security," and referenced TR MUAP-08003-P, "US-APWR Cyber Security Program," for the protection of safety-related and other plant equipment that may comprise target sets from cyber attacks based on the precepts in RG 5.71.

On the basis of its review, the staff determined and concludes the following:

- The applicant stated that target sets are not considered to be final for a COL applicant referencing the US-APWR standard DC (i.e., may identify operator actions, require equipment, site-specific safety-related or nonsafety-related systems). On the basis that the requirements of 10 CFR 73.55(f), "Target Sets," and 10 CFR 73.55(b)(3) that "the physical protection program must be designed to prevent significant core damage and spent fuel sabotage" include programmatic requirements (management measures and administrative controls) and/or cannot be addressed fully by design certification, the staff determines that the applicant demarcation of the scope between the US-APWR standard DC and that of a reference COL application for meeting regulatory requirements of 10 CFR Part 73 is reasonable and adequate.

- The applicant established a process to develop and identify target sets (i.e., standard target sets based on the US-APWR standard design) to evaluate and consider defensibility of the site and evaluate optimal physical locations for defensive positions. The identified target sets serve as a basis for the COL applicant development of site-specific target sets. The applicant does not anticipate that the COL applicant would reduce or remove the elements within the standard target sets.

- The applicant's process for identifying target sets involves the establishment of a multi-disciplined team consisting of individuals that are subject matter experts on the US-APWR system design, engineering, PRA, plant operations and security. The staff concludes that the applicant's process includes appropriate subject matter experts required for evaluation and determination of target sets (i.e., what must be protected).

- The applicant identified target sets by descriptions of safety functions that bound the systems (frontline systems) and support systems or equipment, including operator actions. The target sets describe the safety functions of a combination of equipment (i.e., safety-related and nonsafety-related) that must be protected by a site-protective strategy to prevent significant core damage. The applicant also describes and identifies safety functions that must be protected for preventing the loss of SFP cooling. However, the applicant has eliminated TSGs based on non-conservative assumptions for limiting the target sets to a specific time to core damage that is contrary to the requirements to protect against significant damage in accordance with 10 CFR 73.1.

- The applicant indicated that the target sets will be further developed by COL applicants referencing the US-APWR standard design. Therefore, the staff concludes that the unresolved issues related to the process for identifying target sets and resulting target sets for the US-APWR standard design will be potential issues for a COL applicant that references the information on target sets as currently provided in TR UAP-SGI-08002.

- The staff concludes that the review of whether the applicant will meet the requirements of 10 CFR 73.55(f), "Target Sets," for a process of identifying target sets and whether the resulting target sets are adequate and are protected by a physical protection program designed to prevent significant core damage and spent fuel sabotage in accordance with performance requirements of 10 CFR 73.55(b)(3) are beyond the scope of the design certification. Compliance with these regulatory requirements must be addressed by the COL applicant referencing the US-APWR DC.

13.6.4.2.4 Physical Protection System Evaluation - Protective Strategy

The applicant described the preparation of a high assurance evaluation in Section 3.0, "Approach for Performing the High Assurance Evaluation." The applicant stated that the overall approach to security utilized for this evaluation is a denial strategy that focuses on denying access to key plant areas that contain critical plant equipment and development of a protective strategy that incorporates a defense-in-depth approach designed to support that strategy. This approach combines design features, safety system redundancy, and a physical security program into an integrated strategy to maintain safe operations of the plant in the face of the current DBT.

The applicant performed an evaluation to determine how it would effectively protect the identified target sets of the US-APWR standard design. The security evaluation (i.e., HAE),

along with the design and performance requirements of physical protection systems (as stated above), provided a proposed standard for the internal security defensive positions for the Nuclear Island and structures. The standard locations of security defensive positions and responder lines of sight were described in Figures 2 through 5 and Figures 6-1 through 6-3, respectively. TR UAP-SGI-08002, Appendix A, "Example Protective Strategy for US-APWR Reference Plant," described a protective strategy for the US-APWR standard plant design with site-specific physical security systems for the Reference COL application (i.e., a two reactor unit plant layout). Appendix A described a method for the design of a physical protection system (detect, assess, delay, and response) that will protect the plant against the DBT, but not intended to prescribe the only acceptable method for a COL applicant referencing the US-APWR DC.

The applicant stated that the US-APWR standard design incorporated a number of physical protection systems, components, or features to facilitate and enhance the implementation of physical protection of the US-APWR Nuclear Island and safety-significant SSCs. Physical protection systems, features, or configurations of the Nuclear Island and structures that will be incorporated in the US-APWR standard design, within the scope of certification, are described in TR UAP-SGI-08002, Section 5.2, "Physical Security Design Features and Systems," and include the following:

- Physical barriers and minimum safe standoff distances
- Personnel and equipment access are locked and alarm
- Access controls points for personnel, vehicle, and material
- Intrusion detection and assessment of unauthorized persons
- Interior security lighting
- Communications systems
- Security power
- Security computer systems

TR UAP-SGI-08002, Section 5.3, "Additional US-APWR Security Features," described the following:

- Protection of doors against blast and delays of vital area access
- Physical barrier to separate and protect redundant safety train equipment
- Defensive fighting positions and blast and bullet resistant enclosures
- Delay barriers to increase adversary tasks and travel times

TR UAP-SGI-08002, Section 6.0, "Capability to Protect the US-APWR Against the Design Basis Threat," described a protective strategy as one that denies DBT adversaries' access to key areas of the US-APWR standard design plant and applies the security features described above. It evaluated and demonstrated, through the HAE report, how it could effectively protect

the identified target sets of the US-APWR standard design. The applicant indicated, in Section 6.2, "Applicability of the Example Protective Strategy," that the internal portion of the denial strategy can be applied to any single unit or multi-unit US-APWR site under two conditions: (a) a minimum delay time (as indicated) is provided from detection of adversaries at the protected areas (PA) to their reaching the exterior entrances of the standard plant; and (b) the number of adversaries that are neutralized in the PA is as specified in each scenario analyzed.

The applicant also stated that "[w]hile the strategy may be used as long as these conditions [as described in Section 6.2] are met, the example protective strategy described in Appendix A is not a part of the certified US-APWR standard plant design." The applicant also assumed that the actual protective strategy for a plant is to be documented in the plant's security implementation procedures, which are not submitted to the Commission for approval but are subject to inspection, in accordance with requirements of 10 CFR Part 73, Appendix B, Section II.B.3.c(v). The applicant also stated as its conclusion, in Section 7.0, "Conclusion," that the US-APWR standard plant design with described physical protection features, in conjunction with security programs, are sufficient to prevent attempts at radiological sabotage.

On the basis of its review, the staff determined the following:

- The applicant provided enhancements for physical protection of the Nuclear Island and structures in the US-APWR standard design. Specifically, the applicant minimized the number of access points into the vital areas and provided spatial separations and delay of access between redundant safety trains. This enhances and allows for implementation of security response to contain and interdict adversaries along pathways and in areas of the Nuclear Island and structures. However, the applicant's inadequate analysis of credible pathways and scenarios for adversaries' attempted access to elevated points of entry into the vital areas, and the design of needed physical protection systems for detection, assessment, delay and response, were identified previously as an open item.

- The applicant incorporated in the US-APWR standard design the locations of defensive positions and engineered delay features, as described in Section 5.3 and Appendix A, as a standard method for physical protection within the Nuclear Island and structures. The locations and design of defensive positions and delay features provide opportunities for (1) interdiction along pathways, which adversaries must travel to reach separated and redundant safety-related systems to initiate events leading to radiological sabotage, (2) protection of security responders during interdiction of adversaries, and (3) delay of adversaries to allow for deployment or re-deployment of security responders to the pre-determined defensive positions. However, the development of a complete security plan employing these defensive positions and engineered delay features for defense-in-depth is the responsibility of the COL applicant.

- The applicant's design and performance requirements of physical protection systems include the systems that will be credited for implementing the insider mitigation program (IMP). The physical protection systems that are relied upon to implement the IMP within the Nuclear Island and structures include: entry and exit access controls features; physical barriers; surveillance and assessment camera; intrusion, detection, and alarm systems described in the TR UAP-SGI-08002. The applicant has considered how these physical protection systems will be relied upon and applied to prevent, control, and/or

detect unauthorized access to vital areas for protection against active and passive insiders.

- The staff determined that a COL applicant referencing the US-APWR DC must provide a design of physical protection systems (i.e., detection, assessment, communications, delays, and response) between the vital area and the protected area boundaries. This design must meet the two conditions identified in Section 6.2 of the HAE report (i.e., a minimum delay time (as indicated) to provide detection of adversaries at the protected area boundary prior to their reaching the exterior of the Nuclear Island and structures, and neutralization of a number of adversaries in the protected area).

- Accordingly, the staff concludes that the applicant has performed an adequate and reasonable assessment of the physical configurations of the standard plant and the requirements for detection, assessment, communications, delay, and response for the protection against the DBT of radiological sabotage. The applicant has incorporated, as part of the US-APWR standard design, the physical protection systems and features, and the design of the Nuclear Island structures and configurations, to enhance and implement physical protection and programs to comply, in part, with the requirements of 10 CFR Part 73.

13.6.4.2.5 Security Computer Design Requirements and Cyber Security Program

The applicant indicated in TR UAP-SGI-08002, Section 5.2.7, “Security Computer Systems [SCS],” that the design of the US-APWR standard design will include a requirement for a dedicated SCS which is used for monitoring and control of the functions related to plant physical security. Redundancies of functions are provided by security computers configured to operate as primary and backup, with automatic transition of functions without loss of systems status and functions.

The applicant stated that “[t]he protection of the SCS is achieved by providing a stand-alone computer system with no continuous external data connections, including network or modem connections. The SCS interfaces with the various other physical security systems and components, such as the intrusion detection system, central and secondary alarm stations, and security primary and backup power supplies.”

In addition, in accordance with the Cyber Security Program for the US-APWR, described in MUAP-08003-P, "US-APWR Cyber Security Program," the SCS and security networks providing security functions are classified as Critical Systems and are treated as Critical Digital Assets (CDAs) as defined by RG 5.71. The applicant referenced TR MUAP-08003-P, "US-APWR Cyber Security Program," to describe the planned protection of safety-related and other plant equipment that may be subject of cyber attacks.

On the basis of its review, the staff determined and concludes the following:

- The applicant has considered and commits to the requirements for physical control and isolation of network for the design of the plant SCS to ensure the reliability and availability of physical protection systems for plant operations.

- The applicant has provided an interface requirement to apply the requirements of TR MUAP-08003-P, “US-APWR Cyber Security Program,” to digital systems providing security functions by designating SCS and networks as Critical Systems that are CDA.

- The applicant has indicated that a COL applicant referencing the US-APWR DC is responsible for meeting the requirements of 10 CFR 73.54 for cyber security program protecting digital computers and communication systems and networks.

- The staff concludes that the review of whether the applicant has met requirements of 10 CFR 73.54 is beyond the scope of the DC. Compliance with regulatory requirements for an adequate cyber security program is to be reviewed as part of the technical review for a COL application referencing the US-APWR DC.

13.6.4.3 Standard Physical Protection Design Features

The applicant's HAE report, TR UAP-SGI-08002 provides details of physical protection system design and performance requirements, along with technical bases and assumptions, for the US-APWR standard design. The details of the design and performance requirements supplement and expand the information described in the DCD Tier 1, Chapter 3, and provide the required design and licensing basis information for conducting inspections, tests, and/or analyses required for verifying construction, installation, and performance of physical protection systems described in Table 2.12-1, "Physical Security Hardware Inspections, Tests, Analyses, and Acceptance Criteria."

Physical protection systems, features, or configurations of the Nuclear Island and structures that will be incorporated in the US-APWR standard design, within the scope of certification, are described in TR UAP-SGI-08002, Section 5.2, "Physical Security Design Features and Systems." The standard design and/or performance of physical protection systems includes: physical barriers; minimum safe standoff distances from effects of DBT vehicle bombs; protection of vital area penetrations with delays locks and alarm; access control systems for detecting unauthorized personnel, vehicle, and material; intrusion detection and assessment of unauthorized personnel access; interior security lighting for assessment and response; security communications systems for assessment and response; security system electrical power for continuity of physical protection systems functions; and security computer systems as previously discussed and in this portions of the safety evaluation.

The applicant provided, in TR UAP-SGI-08002, the descriptions of physical protection systems and features that support the information in DCD Tier 2. TR UAP-SGI-08002, Section 6.0, "Capability to Protect the US-APWR against the Design Basis Threat," described an internal protective strategy applying the engineered physical protection systems and credited structural features of the standard design to protect against the DBT of radiological sabotage. The intended performance and functions of these physical protection systems are described for ITAAC verification. Design-related information, results of evaluations or analyses, and design bases for physical protection systems and features included in the US-APWR standard design are:

- Physical barriers and minimum safe standoff distance

- Physical protection of doors and penetration of vital areas walls

- Access controls for vital areas

- Intrusion detection and assessment systems

- Security lighting

- Security communications
- Security power system (primary and secondary power supply)
- Security computer system
- Special added security features (vault doors, separation walls)
- Defensive positions (internal and access to vital structures)
- Delay features (internal to vital structures)

The specific design descriptions of design bases and technical assumptions are as indicated in Sections 5.2.1 through 5.2.7 and Section 6. The specific details related to physical protection systems are identified as SGI and SRI and are protected in accordance with requirements of 10 CFR 73.21 and withheld under 10 CFR 2.390.

The applicant described the following:

- The US-APWR standard design of the Nuclear Island and structures includes consideration and design for: hardening of the building structure (e.g., reinforced concrete constructions, etc.); independence, redundancy, and dedicated safety equipment; configuration and spatial separations of safety and security SSCs (e.g., four independent safety divisions); protected doors and penetrations; limited access to vital areas; access control systems; intrusion detection and assessment systems' security lighting and communication systems; secondary power supplies; dedicated stand alone SCS; and engineered delay barriers and defensive fighting positions within the Nuclear Island and structures.

- The US-APWR standard design for physical protection includes multiple systems to provide continuous communications between the CAS, the SAS and the MCR; between the CAS and SAS and response personnel, armed security officers, and watchmen; and between the site security organization and the local law enforcement authorities. The following design and performance requirements to Section 9.5.2 of DCD Tier 2 that describe redundancies of communications systems that are a part of the DC: (a) capability for continuous communications for security response; (b) multiple means of communications are available; (c) continuity of communications upon loss of normal power; (d) additional back-up system to protect communications from adversary actions that may disable capabilities of primary security communications, as described; (e) alternate communications for backup capabilities between the MCR and the CAS and SAS (fixed and portable without the need for external power); (f) additional telephone system that interface with off-site commercial telephone system for normal and emergency communications and interface with other telephone network and offsite communications, with backup power supplies; and (g) a hard-wired communications system is provided between predetermined locations.

- The applicant indicated that the design of the interior building lighting is within the scope of the US-APWR standard design. The applicant credited battery-powered emergency lighting that is not specifically related to supporting security but is available for use by security. The emergency lighting may be supplemented by adding additional units to assist with target acquisition for response and adversary detection if the quantity and

locations are deemed insufficient. The applicant also indicated that alternate lighting methods, such as low-light technologies, may be incorporated as part of the site physical security program. External security lighting for the protected area and the isolation zone are beyond the scope of the standard plant design. The security design credits the availability of standard emergency lighting battery packs to support control room operator actions, and to provide illumination for firefighting activities and for emergency access and egress paths (see US-APWR DCD, Section 9.5.3.2.2.3).

- The applicant indicated that backup power capability (as stated in Section 5.2.6, "Security Power," of TR UAP-SGI-08002) is provided for critical security systems. The capacity is supplemented by plant nonsafety- and/or safety-related systems. The design of the systems includes the ability to provide backup power to critical security systems within the standard plant power structure (e.g., security computers, access control systems, cameras and video systems, non-portable communications equipment, and alarm station equipment) and critical security functions beyond the scope of the standard plant design (e.g., intrusion detection systems, protected area camera, access controls, defensive positions, communication equipment and active vehicle barrier systems). The applicant indicated that interior building lighting is a part of the US-APWR standard design and includes emergency lighting for control room operations and emergency egress. The design includes uninterruptable power supply (UPS). During the occurrence of a LOOP, the security systems functions will be maintained by momentary feed of power from UPS batteries prior to power supply from safety-related and nonsafety-related generators as described.

- The applicant identified COL Information Item No. 13.6(2), which requires a COL applicant referencing the US-APWR DC to assure that the design and performance requirements meet 10 CFR 73.55(i)(6), "Illumination," which requires all areas of the facility be provided with illumination necessary to satisfy the design requirements of Section 73.55(b). The minimum design lighting density has been identified in accordance with 10 CFR 73.55(i)(6)(ii) at an illumination level of 0.2 ft-candles (2.15 lux) in the isolation zones, and illumination of appropriate exterior areas within the protected area will be met by the COL applicant's design. The applicant indicated that an alternative facility illumination system by means of low-light technology may be applied by a COL applicant to meet the requirements of this section or otherwise implement the protective strategy. The applicant addressed design requirements for interior lighting for physical protection within the Nuclear Island and structures for assessment and response.

- SCS are stand alone with no continuous external data connections, including network or modem connections. The SCS interface with various other physical security systems.

The applicant described the following additional physical protection systems which are incorporated into the US-APWR standard design to facilitate implementation of a denial protective strategy in TR UAP-SGI-08002, Section 5.3, "Additional US-APWR Security Features":

- Protection of doors against blast and delays of vital area access, as shown in Figures 2 through 5. The door design requirements include a minimum amount of explosive to breach an opening large enough for access.

- Physical barriers to separate and protect redundant safety train equipment as described in Figure 4, and reduction of the number of doors for the US-APWR standard design to limit access to vital areas and provide channeling of adversaries.

- Design requirements and locations of defensive fighting positions (DFP), and blast and bullet resistant enclosures (BBRE) positioned along access pathways to vital areas. The design requirements for DFPs include bullet resistant ratings, swing out operations, and drop pin with floor hole for alignment. The applicant described design requirements for internal BBRE that include the capability to withstand a minimum pulse pressure, communications with CAS and SAS as described in TR UAP-SGI-08002, Section 5.2, and field of fire on access pathways. The locations of the DFPs and BBREs are described in Figures 2, 4, 5, and 6.

- Delay barriers for the US-APWR standard design are provided at access points, as indicated in Figures 2, 4, and 5. The design requirements for manual, remote, and unique operations of delay barriers are described for specific delay barriers. The design of delay barriers also includes the capability to protect against the use of hand-thrown explosives.

The applicant stated that "the above physical security features are provided as part of the US-APWR standard plant design. These features may be adapted, supplemented or modified by the COL applicant or licensee in accordance with the protective strategy adopted for its plant."

On the basis of its review, the staff determined and concludes the following:

- The applicant has adequately described the design and performance requirements for the physical barriers of the Nuclear Island and structures that are within the scope of the US-APWR standard design. The applicant has adequately met 10 CFR 73.55(e), "Physical barriers," which requires that each licensee (DC or COL applicant) shall identify and analyze site-specific conditions to determine the specific use, type, function, and placement of physical barriers needed to satisfy the physical protection program design requirements of 10 CFR 73.55(b).

- The applicant has adequately described the design and performance requirements of physical barriers for controlling access to the vital areas within the scope of the DC and has satisfied the requirement of 10 CFR 73.55(e)(1). The applicant's design includes physical barriers to control access and provide delay of adversaries to allow security response.

- The applicant's descriptions of design and performance requirements for physical barriers, as detailed in TR UAP-SGI-08002, have adequately addressed the design details needed to meet the regulatory requirements to secure openings in accordance with 10 CFR 73.55(e)(4). The monitoring to prevent exploitation of the opening is addressed in design of detection and assessment as described.

- The applicant has adequately addressed and provided descriptions of design and performance requirements for meeting 10 CFR 73.55(i)(1) by providing intrusion detection and assessment systems for the Nuclear Island and structures of the US-APWR standard design to detect and assess unauthorized persons and vital areas,

respectively, to facilitate the implementation security response of the site protective strategy.

- The design of intrusion detection and assessment systems meets the requirements of 10 CFR 73.55(i)(2) by including the capabilities of annunciating intrusion detection equipment and display of video assessment concurrently, in at least two continuously staffed onsite alarm stations. This exceeds the requirement that at least one alarm station must be protected in accordance with the requirements of the central alarm station.

- The applicant identified, as COL Information Item 13.6(4), the requirement for a COL applicant referencing the US-APWR DC to provide design and configuration information on the CAS and SAS that satisfies the requirement of 10 CFR 73.55(i)(4) that both alarm stations must be designed and equipped to ensure that a single act cannot disable both alarm stations. The applicant has described in the US-APWR standard design the specific location of the CAS for meeting the regulatory requirement for the survivability of at least one alarm station (i.e., CAS). This is to maintain the ability to perform the functions of detection, assessment, and capabilities to initiate and coordinate alarm response, request offsite assistance, and provide command and control.

- The applicant's standard design for the location of the CAS meets the requirements of 10 CFR 73.55(ii), which requires that the CAS be within a protected area, the interior of the central alarm station must not be visible from the perimeter of the protected area, and it be capable of assessing and initiating responses to all alarms. However, the applicant has not provided descriptions for the design and performance requirements for the CAS to meet the prescriptive requirements that an alarm station operator cannot change the status of a detection point or deactivate a locking or access control device at a protected or vital area portal, without the knowledge and concurrence of the alarm station operator in the other alarm station; and it provides inter-connection of both alarm stations for knowledge of final disposition of all alarms. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-23 to address the concern for meeting prescriptive regulatory requirements and is being tracked as an Open Item.

- The applicant identified, COL Information Item No. 13.6(4), which requires that a COL applicant referencing the US-APWR DC describe design and performance requirements for the CAS and SAS to meet the requirements of 10 CFR 73.55(i) that the construction, protection, and equipment of both the CAS and SAS be equal and redundant.

- The staff determined that the prescriptive requirements of 10 CFR 73.2 for physical barriers related to fence construction are not applicable to physical barrier systems described for the Nuclear Island and structures.

- The applicant has adequately met the prescriptive requirements in 10 CFR 73.2 that building walls, ceilings, and floors are constructed of brick, cinder block, concrete, steel, or comparable material (openings in which security is provided by use of grates, doors, or covers of construction and fastening with sufficient strength such that the integrity of the wall is not lessened by any opening) in a manner and of material in the description of design and performance requirements for physical barriers in TR UAP-SGI-08002.

- The applicant has adequately described, within the scope of the DC, the design and performance requirements for meeting 10 CFR 73.55(i)(3). To meet these requirements, an applicant must design an intrusion detection and assessment system to: (1) provide visual and audible annunciation of the alarm; (2) ensure that annunciation of an alarm indicates the type and location of the alarm; (3) ensure that alarm devices, to include transmission lines to annunciators, are tamper-indicating and self-checking; (4) provide an automatic indication when the alarm system or a component of the alarm system fails, or when the system is operating on the backup power supply; (5) support the initiation of a timely response in accordance with the physical protection system plans, licensee protective strategy, and associated implementing procedures; and (6) ensure intrusion detection and assessment equipment at the protected area perimeter remains operable from a UPS in the event of the loss of normal power.

- The applicant has adequately described the design and performance requirements for meeting 10 CFR 73.55(e)(5), "Bullet Resisting Physical Barriers." The design satisfied regulatory requirements for protecting the MCR and CAS with bullet-resistant enclosures. The applicant's design basis includes crediting structures of the US-APWR standard design and provision of hardened doors and engineered systems for protecting openings. The design of the last access control point that allows access to the PA is outside the scope of the DC, and is addressed as COL Information Item 13.6(2).

- The applicant's statement, in Section 5.1.2 of TR UAP-SGI-08002, ". . . the fact that an overt assault on walls using hand-carried explosives would subject the adversaries to prolonged exposure to the security force fire and counter measures, confirms that it is more effective for the adversaries to choose the routes identified in the HAE scenarios, described in the Appendix, as the most feasible approach" is not supported by the example design of a physical protection system (i.e., Figure A1 of TR UAP-SGI-08002). TR UAP-SGI-08002, including Appendix A, "Example Protective Strategy for US-APWR Reference Plant" did not describe the design of physical protection systems, technical assumptions, and/or performance requirements that support the applicant's assumptions for "security forces fire" or "counter measures" to interdict or interrupt adversaries attempting to access vital areas through exterior walls or roofs. NRC RAI No. 282-1984, Questions 13.06-17 and 13.06-25, address the staff concerns for adequate design bases and assumptions for the design of physical protection systems or features, and how lines of sight and overlapping fields of fire are provided for interdiction of adversaries attempting to breach or overcome exterior physical barriers of the Nuclear Island and structures. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-24 to request the applicant provide an adequate design of the physical protection systems relied upon to protect security responders and provide overlapping fields of fire (i.e., "security forces fire") to interdict adversaries attempting to access the perimeters of Nuclear Island and structures. The applicant was also requested to clarify and describe the "counter measures." This is being tracked as an Open Item.

- The applicant references NRC Regulatory Information Summary (RIS) 2003-206 that documents NRC contractor demonstrations of explosive breaching of reinforced concrete and other physical barrier systems. RIS 2003-206 characterizes adversary task times for breaching of barriers (i.e., delay) using hand-carried bulk explosives and does not support the applicant's statement, in Section 5.1.2 of TR UAP-SGI-08002, "... results of these live tests support the accepted position that the construction of the walls

is more than adequate to deter attempts by an adversary to breach the wall with hand carried explosives." The staff concludes that the assumption of deterrence is contrary to the adversarial characteristics established by 10 CFR 73.1 (i.e., "a determined adversary"). The applicant's reference and application of information in RIS 2003-206 does not provide a defensible or reasonable technical basis for not determining (i.e., eliminating) credible adversary pathways and the applicant did not evaluate alternative pathways as reasonable and credible scenarios.

- The applicant's assumptions that construction of the US-APWR exterior walls will "deter" (i.e., prevent and not delay) attempts by adversaries to gain access to vital areas by pathways other than through designated normally used access portals (i.e., also a hardened or protected physical barrier) did not provide a defensible technical basis. The staff determined that the applicant has not evaluated all reasonable credible pathways, such that the resulting design of a physical protection system, if implemented adequately, will be adequate to protect against the DBT. RAI No. 282-1984, Questions 13.06-07, 13.06-08, 13.06-17, 13.06-25, 13.06-26, 13.06-27, 13.06-73, and 13.06-93, addresses the subject of adequate design bases, technical assumptions, and evaluations of all reasonable and credible adversarial pathways. The credible pathways include access through walls and roofs (including penetrations such as HVAC, utility penetrations, equipment hatches, etc.). This enables adequate design of physical protection systems to delay adversaries and allow security response to interdict attempted access. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-25 to request the applicant address the stated concerns and is being tracked as an Open Item.

- SAND 77-0077, referenced by the applicant, has been superseded by SAND 2001-2168, which updates and provides information of tests and evaluations of access delays by the U.S. Department of Energy's Sandia National Laboratory. The applicant indicates that it evaluated the delay capabilities and documented its assumptions in Calculation UAP-SGI-10004, "Comparison of the PS/B Wall to Sandia Report SAND 77-0777." However, the applicant did not consider or verify the applicability of the updated information in SAND 2001-2168. Therefore, the staff issued follow-up RAI 4912, Question 13.06.02-26 to request the applicant address the stated concerns. This is being tracked as an Open Item.

- The applicant has adequately described design and performance requirements of the physical protection systems for meeting 10 CFR 73.55(j), "Communication requirements." The applicant's design includes the capabilities for establishing and maintaining continuous communications with onsite and offsite resources for command and control during both normal and emergency situations, the capabilities for all on-duty physical protection system force personnel to maintain continuous communications with an individual in each alarm station, and the capabilities for continuous communications to the CAS and SAS.

- The applicant also adequately addressed prescriptive requirements for providing radio or microwave transmitted two-way voice communications, either directly or through an intermediary system, in addition to conventional telephone service between local law enforcement authorities and the site. The non-portable communications equipment availability and reliability in the event of the loss of normal power is adequately addressed by the provisions for independent power sources as part of the US-APWR standard design.

13.6.4.4 Design Features to Facilitate Security Response

The applicant indicates the following for the design of physical protection systems for enhancing or facilitating the response of security responders:

- Internal defensive positions consisting of a combination of deployable and fixed ballistic- and blast-resistant barriers are as described in TR UAP-SGI-08002 for the US-APWR standard design. The barriers are designed to be bullet resistant to a UL 752 level as described in Section 5.3 of TR UAP-SGI-08002. The design also includes engineered delay barriers and features to protect against hand-thrown explosive or incendiary devices as indicated in TR UAP-SGI-08002. The design of internal defensive positions includes deployable barriers, protection from fragments, and a specific height for protection of security responders. The design locations or placements of delay features provide standoff from deployable explosive barriers to increase survivability of security responders. The fixed defensive positions design (as described in Section 5.3 of TR UAP-SGI-08002) provides fields of fire that cover the access pathways within the vital areas. The locations of defensive positions within the Nuclear Island and structures that are within the scope of the DC are provided in TR UAP-SGI-08002, Figures 2 through 5, and the evaluation of the fields of fire within the Nuclear Island and structures are described in Figures 6-1 through 6-3.

- TR UAP-SGI-08002, Appendix A, also describes the design of external BRE defensive positions. The applicant's evaluation of external protective strategy and defensive analyses does not credit the most effective staffed defensive post in order to conservatively bound equipment failure and low probability neutralization of adversaries. The conceptual design and performance requirements for the engineered defensive positions and their locations are described for the US-APWR standard design in TR UAP-SGI-08002, Appendix A, Figure A1, "High Assurance Evaluation Exterior Defensive Position (BBRE) and Figure A-2, "External Defensive Position Lines of Sight."

- The specifics details related to physical protection systems are SGI and SRI and are protected in accordance with the requirements of 10 CFR 73.21 and withheld under 10 CFR 2.390.

The staff determined and concludes that the applicant has described the design bases for deployable defensive positions and protection barriers that will be relied upon to facilitate the implementation of security responses to interdict adversaries within the Nuclear Island and structures.

13.6.5 Combined License Information Items

The following is a list of COL item numbers and descriptions associated with Section 13.6 and Table 1.8-2 of the DCD.

Table 13.6-1
US-APWR COL Information Items

Item No.	Description	Section
13.6(1)	The COL applicant is to develop and provide plant overall security plan (consisting of the physical security plan, safeguards contingency plan, and the guard training and qualification plan) and the cyber security plan and the implementation schedule for security program.	13.6
13.6(2)	The COL applicant is to develop and provide as part of its physical security plan site specific physical security features and capabilities, such as (i) the physical barrier surrounding the protected area boundary; (ii) the isolation zone in areas adjacent to the protected area boundary, (iii) security lighting, or use of low-light technology, for the isolation zone and protected area; (iv) the vehicle barrier systems, (v) control access points to control entry of personnel, vehicles, and material into the protected area, (vi) the intrusion detection systems, and (vii) the closed circuit television camera and video assessment system to provide monitoring and assessment of the protected area perimeter.	13.6
13.6(3)	The COL applicant is to revise the non-standard plant vital areas and vital equipment information contained in the US-APWR DC, Physical Element Review to be consistent with its site specific design	13.6
13.6(4)	The COL applicant is to make provision for the secondary alarm station in accordance with the requirement of 10 CFR 73.55(i)(4).	13.6
13.6(5)	The COL applicant's physical security plan is to make provision for radio or microwave transmitted two-way voice communication to communicate with local law enforcement agencies.	13.6

The staff finds that the applicant has adequately identified and described COL information items needed to complete the physical protection system design and performance, which includes a description of physical protection programs that are not within the scope of the DC. The applicant has adequately justified and determined the demarcation of actions required of a COL applicant and has identified the COL information items in appropriate chapters of DCD Tier 2 and referenced technical reports UAP-SGI-08001 and UAP SGI 08002.

13.6.6 Conclusions

As described above, and with the exception of identified open items, the staff concludes that the applicant has considered and provided physical protection systems or features in the standard US-APWR design, within the scope of the DC, to facilitate the implementation of a physical protection program to protect against potential acts of radiological sabotage. The US-APWR

proposed standard design has adequately described the plant layout for enhancing physical protection and identified vital equipment and areas for meeting, in part, specified requirements of 10 CFR 73.55. The technical bases, including assumptions, are adequately described and provide supports of ITAAC for physical protection systems and hardware.

With the exceptions of open items, the applicant's proposed design of physical protection systems, including locations and configurations, is adequate to address the Nuclear Island and structures within the scope of the DC with adequate details of technical or design bases, assumptions, and the design and performance requirements to allow for detailed design and inspection verification of construction and installation (ITAAC verification) in accordance with requirements of 10 CFR Part 52. This conclusion is limited to the adequacy of applicant descriptions of the design bases of the physical protection systems that are relied upon to implement security response functions (i.e., detections, assessments, communications, delays, and neutralization) within the scope of the DC. The demonstration of a high assurance of adequate protection against the DBT and compliance with programmatic requirements (including administrative controls such as people and procedures) of the NRC regulation for physical protection are to be addressed by a COL applicant referencing the US-APWR DC.

Except for the issues raised in RAI 4912, Questions 13.06.02-19, 13.06.02-20, 13.06.02-21, 13.06.02-22, 13.06.02-23, 13.06.02-24, 13.06.02-25, and 13.06.02-26 identified above, the staff concludes that the US-APWR physical protection systems design is acceptable in accordance with the applicable requirements of 10 CFR Part 73 within the scope of the US-APWR design certification. RAI 4912, Questions 13.06.02-19, 13.06.02-20, 13.06.02-21, 13.06.02-22, 13.06.02-23, 13.06.02-24, 13.06.02-25, and 13.06.02-26 are being tracked as open items.

13.7 Fitness for Duty

In Section 13.7 of the US-APWR DCD, the applicant stated that the development of the plant's fitness-for-duty program and its implementation for an operating plant is the responsibility of the COL applicant referencing the US-APWR DC. The COL application also includes a description of the applicant's fitness-for-duty programs during the construction of the facility. The regulatory bases for fitness-for-duty programs can be found in 10 CFR Part 26.

The following is the COL information item number and description associated with Section 13.7 and Table 1.8-2 of the DCD.

Table 13.7-1
US-APWR COL Information Items

Item No.	Description	Section
13.7(1)	The COL applicant is to develop the description of the operating and construction plant fitness-for-duty programs.	13.7

The staff determines the above table to be complete and that it adequately describes actions necessary for the COL applicant. No additional COL information items need to be included in DCD Tier 2, Table 1.8-2 for fitness for duty consideration.