PMComanchePeakPEm Resource

From: Monarque, Stephen
Sent: Tuesday, August 13, 2013 9:54 AM
To: ComanchePeakCOL Resource
Subject: FW: Luminant Comments on Ch 9 SE
Attachments: chapter 9 safety evaluation _All Comments_.pdf

From: Conly, John [mailto:John.Conly@luminant.com]
Sent: Tuesday, August 13, 2013 9:44 AM
To: Monarque, Stephen
Cc: Woodlan, Don; 'Michael_Melton@mnes-us.com'; 'nicholas_kellenberger@mnes-us.com'; 'sean_ton@mnes-us.com'; Evans, Todd
Subject: Luminant Comments on Ch 9 SE

Steve, most comments are editorial, but there are a couple of technical as well.

Thanks,

John T. Conly

COLA Project Manager
(254) 897-5256

Hearing Identifier: ComanchePeak_COL_Public
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9.0
AUXILIARY SYSTEMS

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's safety evaluation (SE) for Chapter 9, "Auxiliary Systems," of the Comanche Peak Nuclear Power Plant, Units 3 and 4 (CPNPP3&4) Combined License (COL) Application (COLA), Part 2, Final Safety Analysis Report (FSAR), Revision 3 provides the results of the staff's review for the following sections: Section 9.1, "Fuel Storage and Handling," Section 9.1.2 "New and Spent Fuel Storage," Section 9.1.3, "Spent Fuel Pool Cooling and Cleanup System," Section 9.1.4, "Light Load Handling System (Related to Refueling)," Section 9.1.5, "Overhead Heavy Load Handling Systems," Section 9.2.1, "Station Service Water System," Section 9.2.2, "Reactor Auxiliary Cooling Water Systems," Section 9.2.3, "Demineralized Water Makeup System," Section 9.2.4, "Potable and Sanitary Water Systems," Section 9.2.5, "Ultimate Heat Sink," Section 9.2.6, "Condensate Storage Facilities," Section 9.3.1, "Compressed Air System," Section 9.3.2, "Process and Post-accident Sampling Systems," Section 9.3.3, "Equipment and Floor Drainage System," Section 9.3.4, "Chemical and Volume Control System (PWR) (Including Boron Recovery System)," Section 9.4.1, "Control Room Area Ventilation System," Section 9.4.2, "Spent Fuel Pool Area Ventilation System," Section 9.4.3, "Auxiliary and Radwaste Area Ventilation System," Section 9.4.4, "Turbine Area Ventilation System," Section 9.4.5, "Engineered Safety Feature Ventilation System," Section 9.5.1.1, "Fire Protection Program," Section 9.5.2, "Communications Systems," Section 9.5.3, "Lighting Systems," Section 9.5.4, "Emergency Diesel Engine Fuel Oil Storage and Transfer System," Section 9.5.5, "Emergency Diesel Engine Cooling Water System," Section 9.5.6, "Emergency Diesel Engine Starting System," Section 9.5.7, Emergency Diesel Engine Lubrication System," and Section 9.5.8, "Emergency Diesel Engine Combustion Air Intake and Exhaust System." The COLA, Part 2 FSAR was submitted by Luminant Generation Company, LLC and Comanche Peak Nuclear Power Company, LLC (hereinafter referred to as the applicant).

Comment [JTC1]: Editorial: should read "9.5.1"

procedures related to this subject, discussion relating to an inspection and testing program, a training and qualification program, and quality assurance (QA) measures to satisfy the requirements.

Interface Requirements

The US-APWR DCD Tier 2, Section 1.8, Table 1.8-1, "Significant Site-Specific Interfaces with the Standard US-APWR Design," identifies significant interfaces between the US-APWR standard design and the COLA. This table does not specify any interfaces related to Section 9.1.5 of the DCD.

9.1.5.3 Regulatory Basis

The regulatory basis of the information incorporated by r the FSER related to the DCD.

add "and the associated acceptance criteria, are given in..."

The acceptance criteria associated with the relevant requ 's regulations are given in Section 9.1.5, "Overhead Heavy Load Handling Systems," of NUREG-0800.

In addition, the relevant requirements of the Commission's regulations applying to the overhead heavy load handling system, Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Section C.I.9.1.5, "Overhead Heavy Load Handling System."

9.1.5.4 Technical Evaluation

The staff reviewed Section 9.1.5 of FSAR Revision 3, in which the applicant incorporated by reference Section 9.1.5 of DCD Revision 3, with no departures or supplements, and addressed COL Information Item 9.1(6), as STD COL 9.1(6) in FSAR Section 9.1.5. The staff reviewed the acceptability of the applicant's response to the COL information item against the acceptance criteria in SRP Section 9.1.5, "Overhead Heavy Load Handling System" and Section C.I.9.1.5 of RG 1.206.

The guidelines of SRP Section 9.1.5, RG 1.206, Section C.I.9.1.5, and NUREG-0612, "Control of Heavy Load at Nuclear Power Plants," describe the acceptance criteria for the heavy load handling program.

In accordance with Section C.I.9.1.5 of RG 1.206, "Combined License Applications for Nuclear Power Plants," the COL applicant should describe the program and schedule for implementation of the program governing heavy load handling including the following:

- A listing of all heavy loads and heavy load handling equipment outside the scope of loads described in the referenced certified design and the associated heavy load attributes (load weight and typical load path);
- Heavy load handling safe load paths and routing plans including descriptions of automatic and manual interlocks and safety devices and procedures to assure safe load path compliance;
- Heavy load handling equipment maintenance manuals and procedures;

The COL Applicant is to provide the evaluation of the ESWP at the lowest probable water level of the UHS. The COL Applicant is to develop recovery procedures in the event of approaching low water level of UHS.

- CP COL 9.2(2)

The applicant provided additional information in CP COL 9.2(2) to address COL Information Item 9.2(2), which states:

The COL Applicant is to provide protection of the site-specific portions of the ESWS against adverse environmental, operating, and accident conditions that can occur, such as countermeasures to freezing by safety-related heat tracing, low temperature operation, and thermal overpressurization.

- STD and CP COL 9.2(6)

The applicant provided additional information in CP COL 9.2(6) to address COL Information Item 9.2(6), which states:

The COL Applicant is to provide ESWP design details – required total dynamic head with adequate margin and net positive suction head (NPSH) available, and the mode of cooling the ESWP motor. The COL Applicant is to assure that the sum of the shut-off head of the selected ESW pumps and the static head will not result in system pressure that exceeds the ESWS design pressure at any location within the system. The COL Applicant is responsible for the testing of the potential for vortex formation based on the most limiting assumptions that apply.

- STD and CP COL 9.2(7)

The applicant provided additional information in CP COL 9.2(7) to address COL Information Item 9.2(7), which states:

The COL Applicant is to address the piping, valves, lining material specifications for piping and fittings as applicable, including those at the boundary between the safety-related and nonsafety-related portions with clarifications for their connections locations, and other design of the ESWS related to the site-specific conditions. The COL Applicant is also to design the pipes entering and exiting the pipe tunnel based on the location of the UHSRS.

Comment [JTC3]: Editorial: should read "connecting"

- STD COL 9.2(8)

The applicant provided additional information in CP COL 9.2(8) to address COL Information Item 9.2(8), which states:

The COL Applicant is to specify the following ESW chemistry requirements

- A chemical injection system to provide non-corrosive, non-scale forming conditions to limit biological film formation.
- Type of biocide, algaecide, pH adjuster, corrosion inhibitor, scale inhibitor and silt dispersant based on the site conditions.

The CPNPP3&4 Reference COL Application (RCOLA), Part 4, Technical Specifications *[TS]* and Bases: TS for the ESWS are provided in TS Section 3.7.8, "Essential Service Water System (ESWS)."

The RCOLA Part 10, "Inspection, Tests, Analysis, and Acceptance Criteria (ITAAC)"

US-APWR DCD INTERFACE REQUIREMENTS

Interface requirements addressed in DCD Tier 1, Section 3.2.3," Essential Service Water System," are to be addressed by the COL. These items are as follows:

a. The ESWS piping in the ESWPT that connects to the UHS system is designed, constructed and inspected in accordance with ASME Code Section III.

b. System layout of the ESWS and UHS system is verified to assure that the pressures in the ESWS and UHS system are above saturation conditions during all plant operating conditions including normal plant operations, abnormal and accident conditions.

c. The sum of the ESW pump shutoff head and static head is such that the ESW system design pressure is not exceeded.

d. The ESWS is designed to prevent water hammer.

e. The ESWS can provide cooling water required for the component cooling water (CCW) heat exchangers and the essential chiller units of the essential chilled water system (ECWS) during all plant operating conditions, including normal plant operations, abnormal and accident conditions.

The RCOLA, Part 10, Revision 3, ITAAC, Appendix A.1, "Ultimate Heat Sink System (UHSS) and Essential Service Water system (ESWS) (Portions Outside the Scope of the Certified Design)," describe the site-specific ITAAC for the ESWS and UHS.

The RCOLA, Part 10, ITAAC, Figure A.1-1, "Ultimate Heat Sink System and Essential Service Water system (Portions outside the Scope of the Certified)," provides the ESWS and UHS functional arrangement.

Figure 9.2.1-1R, "Essential Service Water System Piping and Instrumentation Diagram," which was part of Revision 2 of the FSAR, has been removed from FSAR Revision 3. The ESWS diagram of record is the US-APWR DCD, Tier 2, Figure 9.2.1-1, "Essential Service Water System Piping and Instrumentation Diagram," which is incorporated by reference.

should the words "describe the site-specific ITAAC for the ESWS and UHS" be added here?

9.2.1.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission's regulations for this area of review, i.e., pertaining to site-specific information on the ESWS, and the associated acceptance criteria, are specified for the most part in NUREG-0800, Section 9.2.1, "Essential Service Water," Revision 5, and are summarized below. Review interfaces with other SRP sections also can be

The applicant included Figure 9.2.4-1R, "Potable and Sanitary Water System Flow Diagram," and Table 9.2.4-1R, "Potable and Sanitary Water System Component Data," to reflect the COL information that was provided.

9.2.4.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission's regulations applicable to the PSWS site-specific information and the associated acceptance criteria are given in SRP Section 9.2.4 and are as follow:

1. 10 CFR Part 50, Appendix A, GDC 60, as it relates to design provisions provided to control the release of liquid effluents containing radioactive material from contaminating the PSWS.

Acceptance criteria adequate to meet the above requirements are:

1. Information that addresses the requirements of GDC 60 is considered acceptable if the following are met:
   a. There are no interconnections between the PSWS and systems having the potential for containing radioactive material.
   b. The potable water system is protected by an air gap, where necessary.
   c. An evaluation of potential radiological contamination, including accidental, and safety implications of sharing (for multi-unit facilities) indicates that the system will not result in contamination beyond acceptable limits.

9.2.4.4 Technical Evaluation

The NRC staff reviewed FSAR Section 9.2.4 and checked the referenced DCD to ensure that the combined information represents the complete scope of information relating to this review topic. The staff's review confirmed that the information contained in the application and incorporated by reference addresses the regulatory considerations and required information that pertain to the PSWS. Section 9.2.4 of the US-APWR DCD is being reviewed by the staff under Docket Number 52-021. The NRC staff's technical evaluation of the information incorporated by reference for the PSWS will be documented in the corresponding section of the FSER that is issued for the US-APWR DC application

The staff reviewed the information contained in the CPNPP3&4 COL FSAR:

Interface Requirements:

US-APWR DCD Tier 1 Section 2.7.6.12.1, "Design Description" under the paragraph titled, "Interface Requirements," states that the PSWS are interface systems. In accordance with 10 CFR 52.47(a)(26) and 10 CFR 52.80(a) requirements, site-specific ITAAC must be established In order to demonstrate that the specified Tier 1 interface requirements are met. Consequently,

Comment [JTC4]: Editorial: "In" should read "in"

The applicant provided additional information in CP COL 9.2(3) to address COL Information Item 9.2(3), which states:

> The COL Applicant is to determine source and location of the UHS.

- CP COL 9.2(4)

The applicant provided additional information in CP COL 9.2(4) to address COL Information Item 9.2(4), which states:

> The COL Applicant is to determine location and design of the ESW intake structure.

- CP COL 9.2(5)

The applicant provided additional information in CP COL 9.2(5) to address COL Information Item 9.2(5), which states:

> The COL Applicant is to determine location and design of the ESW discharge structure.

- CP COL 9.2(7)

The applicant provided additional information in CP COL 9.2(7) to address COL Information Item 9.2(7), which states:

> The COL Applicant is to address the piping, valves, lining material specifications for piping and fittings as applicable, including those at the boundary between the safety-related and nonsafety-related portions with clarifications for their connections locations, and other design of the ESWS related to the site-specific conditions. The COL Applicant is also to design the pipes entering and exiting the pipe tunnel based on the location of the ultimate heat sink related structure (UHSRS).

Comment [JTC5]: Editorial: should read "connecting"

- CP COL 9.2(8)

The applicant provided additional information in CP COL 9.2(8) to address COL Information Item 9.2(8), which states:

> The COL Applicant is to specify the following ESW chemistry requirements:
>
> - A chemical injection system to provide non-corrosive, non-scale forming conditions to limit biological film formation.
> - Type of biocide, algaecide, pH adjuster, corrosion inhibitor, scale inhibitor and silt dispersant based on the site conditions.

- CP COL 9.2(18)

The applicant provided additional information in CP COL 9.2(18) to address COL Information Item 9.2(18), which states:

Analysis," and Figure 9.2.5-1R, "Ultimate Heat Sink Piping and Instrumentation Diagram," set forth the design basis and a detailed description of the UHS.

The CDI as part of the US-APWR DCD which is outside the scope of the specific ESWS and UHS COL items are not specifically described in the COL FSAR. However, the staff has evaluated the CDI as described in the following subsections.

- DCD 9.2.1.2.2 – strainer mesh
- DCD 9.2.1.2.3.1 – spray header draining
- DCD 9.2.5.5 – instrumentation requirements

The FSAR Section 14.2.12.1.113, "Ultimate Heat Sink (UHS) System Preoperational Test," describe the UHS and ESWS preoperational testing.

The CPNPP 3&4, Part 4 – TS and Bases: Technical specifications for the UHS are provided in TS Section 3.7.9, "Ultimate Heat Sink (UHS)."

The CPNPP 3&4, Part 10, Inspection, Tests, Analysis, and Acceptance Criteria (ITAAC):

should the words "describe the site-specific ITAAC for the ESWS and UHS" be added before the colon?

Interface requirements addressed in Tier 1, DCD Section 3.2.1," Ultimate Heat Sink," are to be addressed by the COL. These items are as follow:

a. The UHS system design meets the divisional separation requirements of the essential service water system (ESWS) and the UHS is capable of performing its safety functions under design basis event conditions and coincident single failure with or without offsite power available.
b. The safety related, pressure retaining components, and their supports, are designed, constructed and inspected in accordance with ASME Code Section III, if applicable to the site-specific design.
c. The maximum supply water temperature is 95 °F under the peak heat loads condition to provide sufficient cooling capacity to ESWS.
d. The UHS water level is maintained such that available net positive suction head (NPSH) is greater than the ESW pump's required NPSH during all plant operating conditions including normal plant operations, abnormal and accident conditions. The ESW pump operation does not cause vortex formation at minimum allowed UHS water level.
e. The UHS system has main control room (MCR) and remote shutdown console (RSC) alarms and displays for UHS water level and water temperature.
f. The UHS system has MCR and RSC controls for UHS components' active safety functions if applicable to the site-specific design.
g. UHS components that have protection and safety monitoring system (PSMS) control (if applicable to the site-specific design) perform an active safety function after receiving a signal from PSMS.
h. The UHS can provide the required cooling for a minimum of 30 days without make-up during accident conditions.
i. The UHS system is designed to prevent water hammer.

The ESWS and the UHS has various overlap areas between Sections 9.2.1 and 9.2.5 of the DCD and CP COL. COL Item 9.2(2) is reviewed under Section 9.2.1 of this report; therefore, this item is considered resolved and no further evaluation is required.

- COL Item 9.2(3): Source/location of the UHS.
- COL Item 9.2(28): Piping, valves, materials specifications, and other design details related to the site-specific UHS.

These COL items are related to NRC Regulatory Bases, GDC 44.

The COL FSAR Section 9.2.5.2.1 states each unit is provided with its own independent UHS, with no sharing between the two units. The UHS for each unit consists of four 50 percent capacity mechanical draft cooling towers, one for each ESWS train, and four 33 one-third percent capacity basins to satisfy the thirty day cooling water supply criteria of RG 1.27.

Each cooling tower consists of two cells with fans and motors, drift eliminators, film fills, risers, and water distribution system all enclosed and supported by a Seismic Category I reinforced concrete structure. Cooling tower components are designed per equipment Class 3 and quality group C requirements. Each basin includes an ESWP intake structure that contains one 50 percent capacity ESWP and one 100 percent capacity UHS transfer pump, and associated piping and components. Tornado missile protection for the cooling tower components, ESWPs and piping is provided by the UHS safety-related Seismic Category I structures and ESW pipe tunnel as discussed in Subsection 3.8.4, "Other Seismic Category 1 Structures. The UHS structural design, including pertinent dimensions, is also discussed in Subsection 3.8.4.

Comment [JTC6]: Editorial: the closing quote mark is missing.

Each cooling tower consists of two cells, each with a motor driven fan driven with a right-angle gear reducer. The fan motors are powered from the Class 1E normal ac power system. On a LOOP, the motors are automatically powered from their respective division emergency power source.

The cooling towers are designed for the following conditions: water flow of 12,000 gpm, hot (inlet) water temperature of 128° F, cold (outlet) water temperature of 95° F, ambient wet bulb temperature of 80° F, and DBA design heat load of 196 x 10^6 Btu/hr.

The COL FSAR Figure 3.8-201, "General Arrangement of the essential service water pipe tunnel (ESWPT), UHSRS, and power source fuel storage vault (PSFSV)," shows the locations of the UHS which are directly south of the nuclear island.

Comment [JTC7]: Technical: should read "north"

The COL Section 3.8.4.1.3.2, "UHSRS," states that the UHS fans, motors and associated equipment are designed with consideration given to the effects of design basis tornado differential pressure.

The COL Figure 3.8-209, "Typical Section Looking West at UHS Basin and Cooling Tower Interface with ESWPT," graphically shows a typical UHS transfer pump with a vaned basket which is used to prevent debris from entering the pump from the UHS basin.

In **RAI 6342, Question 03.03.02-09,** the staff requested that the applicant consider design-basis hurricane and hurricane missiles for the CPNPP3&4 site and their impact on the safety of the site-specific Seismic Category I SSCs.

The applicant responded to **RAI 6342, Question 03.03.02-09,** in letter dated September 14, 2012, and stated that the COLA has been revised to incorporate RG 1.221, Revision 0, guidance to consider the effects of design-basis hurricane winds and hurricane-generated missiles on the analysis and design of CPNPP3&4 site-specific Seismic Category I SSCs.

The staff reviewed the applicant's response to **RAI 6342, Question 03.03.02-09,** and finds the response and the proposed FSAR change acceptable related to the addition of hurricane missile protections to Sections 3.8 and 9.2.5 of the FSAR. Therefore, **RAI 6342**, **Question 03.03.02-09, is resolved.** Confirmation of proper incorporation of the approved change in the next FSAR revision is being tracked as **Confirmatory Item 03.03.02-09.** Protection against wind forces and missiles is further described in Section 3.3 of this SER.

The staff reviewed the supplemental information related to COL Item 9.2(3) and 9.2(28) and finds it unacceptable because the applicant did not provide an evaluation or discussion in the FSAR regarding possible tower interference and recirculation effects with other safety-related air intakes and other cooling towers in the vicinity. Therefore, the staff issued **RAI 6358, Question 09.02.05-18,** in which the staff requested the applicant to address the following:

- UHS cooling tower interference (tower effluent being drawn into the air inlet of a downwind tower) - This should include interference between all cooling towers at the site related to the design performance of the UHS cooling towers.
- Recirculation effects with other safety related air intakes at the site.

The applicant responded to **RAI 6358, Question 09.02.05-18,** by letters dated June 7, 2012, September 10, 2012, and November 12, 2012, with the following responses:

> Cooling tower plume interference and recirculation effects could adversely affect HVAC systems and other cooling tower operation due to potential increased humidity and air temperature. The UHS cooling towers are designed and located to withstand the expected effects without significant compromise of the functions of the other UHS cooling towers of the same unit and the UHS cooling towers of the other unit, the gas turbine generator (GTG) safety-related air intakes for both units, and air intakes for safety-related HVAC systems for both units. The cooling tower shape combined with the cooling tower height is .designed to achieve an air discharge velocity and height that ensures proper dissipation of the plume, which minimizes plume interference and recirculation on the other UHS cooling towers and nearby safety-related air intakes. The temperature of plume exhausted from the cooling tower is higher than the local ambient air temperature, so buoyancy causes the thermal plume to rise under low wind conditions. However, high wind conditions that could direct a plume toward the intakes would result in rapid air dispersion and mixing that cools the plume.
>
> A 2°F recirculation allowance was added to the wet bulb temperature used for cooling tower design to account for possible recirculation of the plume into the cooling tower air intake. These design features reduce the adverse effects of the

Comment [JTC8]: Editorial: stray period should be deleted

to a single failure. When a transfer pump is in operation, fluid velocity in the header is approximately 5.1 feet per second. Operating conditions are approximately 20 psig and 95° F. Therefore, header failures are not considered credible.

The UHS transfer pump is designed to supply 800 gpm flows at a total dynamic head (TDH) of 40 feet. Transfer pump capacity is more than adequate to replenish the maximum water inventory losses from two operating ESWS trains. Minimum available net positive suction head (NPSHA) is approximately 40 feet. This is based on the lowest expected water level of approximately 12 feet in the UHS ESW intake basin and 95° F water temperature. Transfer pump location and submergence level precludes vortex formation. In addition, the transfer pump and the ESW pump from the same basin do not operate simultaneously.

A water line from the transfer pump discharge to the ESWP discharge is installed in each UHS train for recovering ESWS/UHS inventory after drainage for maintenance. The line provides water at a low flow rate to preclude water hammer that could be caused by the full flow operation of the ESWP for water inventory restoration. Normally-closed double isolation valves with administrative control provide isolation between the ESWS and UHS.

The COL FSAR Section 9.2.5.2.3, “System Performance,” states that the wet bulb design temperature was selected to be 80°F based on 30 years (1977-2006) of climatological data obtained from National Climatic Data Center /National Oceanic & Atmospheric Administrator for Dallas/ Fort Worth International Airport Station in accordance with RG 1.27. The worst 30 day period based on the above climatological data was between June 1, 1998, and June 30, 1998, with an average wet bulb temperature of 78.0°F. A 2°F recirculation penalty was added to the maximum average wet bulb temperature.

The 83° F wet bulb temperature as shown in the FSAR Table 2.0-1R, “Key Site Parameters,” corresponds to the 0 percent annual exceedance value (two consecutive hourly peak temperatures on July 12, 1995, at 1500 hours and 1600 hours) in accordance with SRP 2.3.1, “Regional Climatology.” The 0 percent exceedance criterion means that the wet bulb temperature does not exceed the 0 percent exceedance value for more than two consecutive data occurrences, namely two consecutive hours on data recorded hourly. The 83° F wet bulb temperature is used to establish the cooling tower basin water temperature surveillance requirements.

The UHS is analyzed using the heat loads provided in Table 9.2.5-2 for LOCA and safe shutdown conditions with LOOP and a maximum ESW supply temperature of 95°F. Per Subsection 9.2.1.2, each ESWP is designed to provide 13,000 gpm flow. Since cooling water flow is inversely proportional to the cooling tower temperature range, for conservatism, a lower ESW flow of 12,000 gpm to each cooling tower is used in the analysis.

The required total water usage (due to cooling tower drift and evaporation) over the postulated 30 day period is determined using industry standard methodology. Total Evaporation (E) and Drift (D) rates were calculated using the ESW flow rate (GPM) of 12,000 gpm times the temperature rise (CR) and a conservative cooling tower factor of 0.0009, E (total) = GPM x CR x 0.0009.

Based on the above analyses, the governing case for the maximum required 30 days cooling water capacity is two-train operation during LOCA~~safe shutdown with LOOP~~ condition, with a

total required cooling water of approximately 8.40 million gallons. The total required 30 days cooling water capacity with two-train operation during safe shutdown with LOOP~~LOCA~~ condition is approximately ~~8.20~~8.30 million gallons. The safe shutdown conditions with LOOP for two-train operation, requires a peak heat load of 196 million British thermal unit per hour(Btu/hr) to be dissipated. The LOCA case with two train operation peak heat load is ~~158~~ 160 million Btu/hr. Therefore safe shutdown with two train operation peak heat loads are used for cooling tower design.

Comment [NK9]: Note: these changes were made in FSAR Rev 3 UTR R1, TXNB-13015 (ML13154A337)

The staff reviewed the applicant's COL FSAR supplemental information related to COL Item 9.2(18) and determined it to be unacceptable. As a result, the staff issued **RAI 6358, Question-09.02.05-20,** for the following reasons:

- Part 1: The applicant stated in several places (for example FSAR 9.2.5.2.1 and 9.2.5.2.3), that the cooling towers are designed for 12,000 gpm when Table 9.2.5-3R states the design flow rate of the ESWS pumps is 13,000 gpm. This discrepancy needs to be clarified.
- Part 2: COL FSAR Section 9.2.5.2.2 describes that the UHS transfer pump and the ESW pump from the same basin do not operate simultaneously. Describe if during quarterly UHS transfer pump testing (COL FSAR Table 3.9-202, "Site-Specific Pump IST Requirements,") what controls are in place, such as interlocks, that prevent the ESWS pumps from operating simultaneously with the UHS transfer pump, say from an automatic start signal of the ESWS pumps during a ECCS actuation signal, as described in DCD Section 9.2.1.2.3.2, "Emergency Operations."
- Part 3: Also describe in the FSAR if the UHS transfer system remains full of water or placed in 'layup' after UHS transfer pump testing and what chemical controls (to prevent pipe wall thinning) are used if extended wet layup conditions is utilized.

The applicant responded to **RAI 6358, Question 09.02.05-20, part 1,** by letter dated June 7, 2012, with the following response.

> Each ESW pump is designed to provide 13,000 gpm. In general, the efficiency of removing heat from the cooling tower improves if the supply flow rate to the cooling tower is large. Therefore, the supply flow rate to the cooling tower was assumed to be less than the actual flow rate. A flow rate of 12,000 gpm was used to calculate the required capacity of the cooling tower and the ESW pump design flow rate was conservatively specified as 13,000 gpm. This clarification has been added to FSAR Subsection 9.2.5.2.1.

The staff reviewed the applicant's response to **RAI 6358 Question 09.02.05-20, part 1,** and finds the response and the proposed changes to the FSAR acceptable. The applicant clarified that the ESW pump design flow rate is 12,000 gpm but the actual flow rate of the ESW pump is 13,000 gpm. This lower designed flow rate of 12,000 gpm is below actual flow rates of 13,000 gpm which is conservative and provides margin to the design requirements. The change to the COL FSAR clarifies the design flow rate and actual flow rate of the ESWP. **RAI 6358 Question 09.02.05-20, part 1, is resolved.** The staff will confirm that the proposed revision to the FSAR is incorporated into the next revision of the CPNPP, Units 3 and 4 COL FSAR. This is being tracked as **Confirmatory Item 09.02.05-20, part 1**.

consider the effects of design-basis hurricane winds and hurricane-generated missiles on the analysis and design of CPNPP3&4 site-specific Seismic Category I SSCs.

The staff reviewed the applicant's response to **RAI 6342 Question 03.03.02-9,** and finds the response and the applicant's proposed FSAR changes acceptable related to the addition of hurricane missile protections to Section 9.2.5.2.2 of the COL FSAR. **Question 03.03.02-9** is considered a **Confirmatory Item** for COL FSAR Revision 4. The staff will confirm that the proposed revision to the FSAR is incorporated into the next revision of the CPNPP, Units 3 and 4 COL FSAR. Protection against wind forces and missiles is further described in Section 3.3 of this safety evaluation report.

In summary, the applicant's response to COL Item 9.2(18) is found acceptable and this response complies with GDC 44. UHS transfer pumps are not expected to be placed into service until after a few days into the accident since each UHS basin will be at normal water levels at the initiation of the accident which was stated in the applicant's response to **RAI 3762, Question 09.02.05-6** response. Margin for NPSH, vortex formation and consideration for the transfer pumps has been adequately addressed. The UHS transfer pump flow rate of 800 gpm exceeds the required water makeup requirements due to cooling tower evaporative losses expected post-design-basis accident (DBA) out to 30 days. Based on calculations reviewed by the staff, starting at day 2 of a DBA, the cooling tower evaporative losses expected are in the range of less than 100 gpm per tower. Simultaneously operation of the ESW pump with the associated UHS transfer pump from the same UHS basin has no adverse impact. This COL item ensures that the UHS and associated structures support the necessary safety functions to remove heat and reject it to the UHS under all operating and accident conditions.

Comment [JTC10]: Editorial: should read "Simultaneous"

In addition, site meteorological conditions have been adequately addressed related to ambient wet bulb conditions. The worst 30 day period based on the above climatological data was between June 1, 1998, and June 30, 1998, with an average wet bulb temperature of 78.0 °F. A 2 °F recirculation penalty was added to the maximum average wet bulb temperature. Also, an additional 3 °F wet bulb margin (83 °F) corresponds to the 0 percent annual exceedance value. The 0 percent exceedance criterion means that the wet bulb temperature does not exceed the 0 percent exceedance value for more than two consecutive data occurrences, namely two consecutive hours on data recorded hourly. The 83° F wet bulb temperature is used to establish the cooling tower basin water temperature surveillance requirements.

- COL Item 9.2(19): Electrical and onsite emergency power supplies during a LOOP

This COL item is related to NRC Regulatory Bases, GDC 44.

The COL FSAR Table 8.3.1-4R, "Electrical Load Distribution - Class 1E GTG Loading," describes the electrical and GTG loading sequence related to the ESWS and UHS.

The COL FSAR Section 9.2.5.2 states that the UHS receives its electrical power from the safety buses so that the safety functions are maintained during LOOP. The UHS receives its standby electrical power from the onsite emergency power supplies during a LOOP.

The COL FSAR Section 9.2.5.2.1 states that each cooling tower consists of two cells, each with a motor driven fan driven with a right-angle gear reducer. The fan motors are powered from the

The staff reviewed the applicant's response and the COL Part 10 change to **RAI 6403 Question 14.03.07-38, part 3** and finds the response and COL change acceptable. The new drain lines (VLV-521A/B/C/D) have been added to Part 10 ITAAC Figure A.1-1 and will be inspected under ITAAC Table A.1-1, Item 1.a; functional arrangement. Freezing in the ESWPT and the ESWPC will not occur because they are buried below grade and the ambient temperature will not fall below freezing. The tunnel and chase will remain at or above ambient ground temperature. The tunnel is not a closed area so therefore air can pass through it. The tunnel openings are connected to heated areas in the R/B. Power source building (PS/B) and UHSRS and only warm air passes into the tunnel area. Therefore, the water in the piping in the tunnel is not frozen. In addition, an ITAAC is not required for the UHS fans related to freeze protections since the fans do not operate in reverse. **RAI 6403 Question 14.03.07-38, part 3, is resolved.** The staff will confirm that the proposed revision to the FSAR is incorporated into the next revision of the CPNPP, Units 3 and 4 COL FSAR. This is being tracked as **Confirmatory Item 14.03.07-38, part 3**.

Comment [JTC11]: Editorial: should read "R/B, power source building (PS/B) and UHSRS, and only…"

The applicant responded to **RAI 6403, Question 14.03.07-38, part 4,** by letter dated June 21, 2012, with the following response.

> COL FSAR Subsection 3.8.4.1.3.2 has been revised to state that the UHS fans, motors, and associated equipment are designed to withstand the effects of design basis tornado differential pressure. FSAR Subsection 9.2.5.3 has been revised to describe tornado qualification of the UHS basins, cooling towers, fans, motors, and associated equipment. During design and fabrication, the UHS fans (including motors and associated equipment) will be qualified to withstand the effects of tornado loading. ITAAC #19 has been added in COLA Part 10 Table A.1-1 to include qualification of the UHS fans to withstand tornado loads, and as-built inspection and analysis.

As previously stated, the staff asked **in RAI 6342, Question 03.03.02-09,** that the applicant consider design-basis hurricane and hurricane missiles for the CPNPP3&4 site and their impact on the safety of the site-specific Seismic Category I SSCs.

The applicant responded to **RAI 6342, Question 03.03.02-09,** in letter dated September 14, 2012, and stated that the COLA has been revised to incorporate RG 1.221 Revision 0 guidance to consider the effects of design-basis hurricane winds and hurricane-generated missiles on the analysis and design of CPNPP3&4 site-specific Seismic Category I SSCs.

The staff reviewed the applicant's response to **RAI 6342, Question 03.03.02-09,** and finds the response and the proposed changes to the COL acceptable related to the addition of hurricane missile protections to COLA Part 10, ITAA C, Table A.1-1, Item 19. The staff will confirm that the proposed revision to the FSAR is incorporated into the next revision of the CPNPP, Units 3 and 4 COL FSAR. RAI 6342, Question 03.03.02-09, is considered a Confirmatory Item for COL FSAR Revision 4.

The staff reviewed the applicant's response and the proposed changes to the COL FSAR/Part 10 for RAI 6403 Question 14.03.07-38, part 4 and finds the response and the proposed changes to the COL FSAR/Part 10 acceptable. The UHS fans, motors, and associated equipment are designed to withstand the effects of design basis tornado differential pressure. In addition,

operation (LCO) of a nuclear reactor must be established for each item meeting one or more of four listed criteria.

A) *Criterion 1*. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

(B) *Criterion 2*. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

(C) *Criterion 3*. A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

(D) *Criterion 4*. A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The staff finds that the DCD CDI and COL supplemental information was correctly incorporated, addressing the four part criterion above, into TS 3.7.9 Limited Conditions of Operations (LCO) associated with requiring three UHS cooling towers, three transfer pumps, with adequate water basin temperature and UHS volume, MODES 1,2,3 and 4). DCD CDI and COL supplemental information was also added for Surveillance Requirements (SR) for total basin inventory, basin water temperature, fans, fans automatic starts, UHS transfer manual pump starts, valves positions, and valve automatic features.

Comment [JTC12]: Editorial: should read "…volume (Modes…"

Chapter 16 of this SER further addressed the CPNPP3&4 TS and TS Bases.

9.2.5.5 Post-Combined License Activities

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

9.2.5.6 Conclusions

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the site-specific UHS, and there is no outstanding information expected to be addressed in the CPNPP3&4 COL FSAR related to this section.

The staff is reviewing the information in Section 9.2.5 of the US-APWR DCD on Docket Number 52-021. The results of the NRC staff's technical evaluation of the information related to the UHS incorporated by reference in the CPNPP3&4 COL FSAR will be documented in the staff SER on the DC application for the US-APWR design. The SER on the US-APWR is not yet complete, and this is being tracked as part of Open Item [1-1]. The staff will update Section 9.2.5 of this SER to reflect the final disposition of the DC application.

The staff evaluated the information pertaining to the UHS provided in FSAR Revision 3 in accordance with the guidance cited in the Section 9.2.5.3, "Regulatory Basis," of this SER. With the exception to **Open Item 09.02.05**-01, the information showed that the UHS as described in

- STD and CP COL 9.4(4)

The applicant provided additional information in STD/CP COL 9.4(4) to address COL Information Item 9.4(4), which states:

> The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site-specific conditions.

- STD and CP COL 9.4(6)

The applicant provided additional information in STD/CP COL 9.4(6) to address COL Information Item 9.4(6), which states:

> The COL Applicant is to provide a system information and flow diagram on ESW pump area ventilation system if the ESW pump area requires the heating, ventilating, and air conditioning.

For the following subsections:

- 9.4.5.2.2 Class 1E Electrical Room HVAC system;
- 9.4.5.2.3 Safeguard Component Area HVAC system;
- 9.4.5.2.4 Emergency Feedwater Pump Area HVAC system; and
- 9.4.5.2.5 Safety Related Component Area HVAC system.

The COL applicant provided additional information with CP COL 9.4(4) / STD COL 9.4(4). For subsections 9.4.5.2.2, 9.4.5.2.3, 9.4.5.2.4 and 9.4.5.2.5 in the application, the sentence: "*The capacity of heating coils that are affected by site-specific conditions is shown in Table 9.4-201.*" will replace relevant sentence in the DCD subsection that assigns this responsibility to the COL applicant. For the four Class 1E Electrical Room Air Handling Units, the COL applicant listed in Table 9.4-201 "Equipment Design Data," the heating coil capacities of 45 kW for the A and B Trains and of 65 kW for the C and D Trains. These air handling unit (AHU) heaters are supplemented with the following in-duct heaters of capacities specified below and as displayed in Table 9.4-201 "Equipment Design Data":

- For the Class 1E I&C Room In-duct Heaters (2 total), Train A, D – 18kW;
- For the Class 1E I&C Room In-duct Heaters (2 total), Train B, C – 16.3kW;
- For the MCR/Class 1E Electrical HVAC Equipment Room In-duct Heaters (2 total), Train B & Train C – 2.2kW;
- Remote Shutdown Console Room In-duct Heaters (2 total), one from Train A,B and one from Train C,D – 10.9kW; and
- Class 1E Battery Room In-duct Heaters (4 total) – 3.2 kW.

The COL applicant added after DCD subsection 9.4.5.1.1.5 the safety design bases of the ESF Ventilation System, subsection 9.4.5.1.1.6 "UHS ESW Pump House Ventilation System," which reads:

Comment [NK13]: Note, the highlighted values quoted below have been updated in FSAR Rev 3 UTR Rev 0 (TXNB-13003)(ML13074A153)) and response to RAI Question 09.04.05-26

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The RCOLA applicant responded on February 27, 2012 (ML12060A378), with proposed changes to the Tier 2 FSAR and to the Tier 1 ITAAC. In particular, the applicant indicated that FSAR Subsection 9.4.5.1.1.6 would be revised to include normal operations and that ITAAC Table A.2-1 Item 4 would be revised to specify the cooling function of the exhaust fans and heating function of the unit heater. The staff found the applicant's response acceptable since both the relevant ITAAC and FSAR subsection changes are consistent with the intent of satisfying GDC 4 requirements. The staff verified that Revision 3 of the RCOLA FSAR contained the changes proposed in the applicant's response to Question 09.04.05-24. Based on this, **RAI 3232, Question 09.04.05-12; RAI 5585, Question 09.04.05-15 and RAI 6124, Question 09.04.05-24, are resolved and closed.**

Comment [JTC14]: Editorial: the use of "Tier 1 and Tier 2" regarding the COLA is confusing. These terms apply to the DCD, not the COLA.

SRP 9.4.5 – Section III "Review Procedures" – Miscellaneous Guidance

In **RAI 3232, Question 09.04.05-10**, the staff did not find in its review of the COL applicant's FSAR the results of a Failure Modes and Effects Analysis (FMEA) specific to the UHS ESW Pump House Ventilation System as recommended by Item 3.D of SRP section 9.4.5**.** The staff requested that the applicant provide a summary of the FMEA for the ventilation system.

In response to this part of the question, the applicant in a response dated December 16, 2009 (ML093520667), agreed to add to the FSAR, Table 9.4-203 "UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis." The staff verified that FSAR Section 9.4 Revision 2 contained Table 9.4-203. In this FMEA Table, the applicant included the pump house intake and exhaust back draft dampers. The applicant also stated "that the backdraft dampers are Seismic Category I and do not perform an active safety function as shown in revised ITAAC Table A.2-2" *(R*eference: **RAI No. 3532, Question 14.03.07-21** ML093130124)). The applicant went on to note that "…The backdraft dampers are a gravity balance type which open in the direction of air flow, and close due to the counterbalance when no air flow is present. Therefore, the backdraft dampers are not included as active safety mechanical components and are not required to be listed in FSAR Table 3D-201."

The staff disagreed with this statement. The resolution of this issue was addressed under **RAI 5585, Question 09.04.05-14,** as previously discussed in this SER section.

In addition in **RAI 3232, Question 09.04.05-10**, the staff deduced from FSAR subsection 9.4.5.3.6, that all the instrumentation (e.g. TS, TC, FE) and alarms displayed on Figure 9.4-201 "UHS ESW Pump House Ventilation System Flow Diagram" is equipment Class 3 and Seismic Category I. The staff found the following inconsistencies for this grouping of instrumentation:

- COL FSAR subsection 9.4.5.5.6 does not list TS and TCA instruments/alarms for the unit heaters contained in the ESW Pump Room or the UHS Transfer Pump Room;

- Not all the instrumentation displayed on Figure 9.4-201 appears in Table 3D-201 "Site-Specific Environmental Qualification Equipment List." FSAR subsection 3.11.1.1 reads "This table (i.e. Table 3D-201) lists information on site-specific safety-related or important to safety equipment." In addition, Table 3D-201 does not list the tornado resistant back draft dampers for the ESW Pump Rooms and UHS Transfer Pump Rooms (e.g. VRS-BDD-603A, VRS-BDD-601A); and

In addition, the staff concludes that the relevant information presented within FSAR Section 9.4.6 is acceptable and meets the requirements of 10 CFR 52.80(a). The staff based its conclusion on the following:

- STD COL 9.4(4), as related to information on the capacities of cooling and heating coils of the containment purge system as they are affected by site-specific conditions, is acceptable to the staff because from its review, the staff has determined that that the applicant has adequately addressed STD COL 9.4(4) and US APWR COL 9.4(4).

- The staff concludes that FSAR changes as described in subsection 9.4.6.2 "Summary of Application" of this SER affect non safety related SSCs.

9.5 Other Auxiliary Systems

9.5.1 Fire Protection Program

9.5.1.1 Introduction

The primary objectives of the fire protection program (FPP) are: to minimize the potential for fire and explosions to occur; to rapidly detect, control, and extinguish any fire that may occur; and to assure that any fire that may occur will not prevent the performance of necessary safe-shutdown functions and will not significantly increase the risk of radioactive releases to the environment. In addition, the fire protection systems are designed such that any system failure or inadvertent operation does not adversely impact the ability of the SSCs important to safety to perform their safety function.

Section 9.5 describes the staff's evaluation of the applicant's fire protection program for both 10 CFR Part 52, Subpart C, "Combined Licenses," and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

9.5.1.2 Summary of Application

Section 9.5.1 of the CPNPP3&4 COL FSAR, Revision 3, incorporates by reference Section 9.5.1 and associated Appendix 9A of the US-APWR DCD, Revision 3.

In addition, in CPNPP3&4 COL FSAR Section 9.5.1, the applicant provided the following supplemental information:

COL Information Items

- STD and CP COL 9.5(1)

The applicant provided additional information in STD and CP COL 9.5(1) to address COL Information Item 9.5(1), which states:

> The COL Applicant establishes a fire protection program, including organization, training and qualification of personnel, administrative controls of combustibles and ignition sources, firefighting procedures, and quality assurance.

design and fire protection aspects of facilities, buildings, and equipment which are site-specific and not standard features in the US-APWR design of the FPP in CPNPP3&4 COL FSAR Sections 9.5.1.2.1, 9.5.1.2.2, 9.5.1.2.3, 9.5.1.2.4, Tables 9.5.1-1R and 9.5.1-2R, and Figures 9.5-201 and 9.5-202. Interface information concerning essential service water as a source for fire protection water, as required under certain conditions, was provided in CPNPP3&4 COL FSAR Section 9.2.1.2.1.

In addition, the applicant provided fire hazard analysis (FHA) for site-specific plant structures and associated fire areas and/or fire zones in CPNPP3&4 COL FSAR Sections 9A.3.101 through 9A.3.114; Tables 9A-201, 9A-202, and 9A-203; and Figures 9A-201 and 9A-202.

The NRC staff determined that adequate details have been provided by the applicant to ensure conformance with the regulatory positions contained in RG 1.189. In its response to **RAI 2328**, **Question 09.05.01-15,** dated August 11, 2009, (ML092240406), the applicant revised FSAR pages 9.5-2 and 9.5-22 to clarify that the fire protection water storage tank will be designed in accordance with NFPA 22. These proposed FSAR changes were incorporated in the CPNPP3&4 COL FSAR updates found in the CPNPP3&4 COLA, Revision 2.

The CPNPP3&4 cooling towers are of noncombustible construction in accordance with RG 1.189 and are separated from adjacent cooling towers by a 3-hour fire rated wall of reinforced concrete; therefore, it is anticipated that a postulated fire would be confined to one cooling tower and will not affect the other redundant trains.

Comment [NK15]: This paragraph seems out of place. It discusses the cooling towers and this paragraph is positioned between two paragraphs that discuss the fire water storage tanks. Recommend removing/moving this paragraph.

Based on the above, it is concluded that the applicant adequately addressed COL Information Item 9.5(2) and the staff considers **RAI 2328**, **Question 09.05.01-15 to be closed and resolved.**

- CP COL 9.5(3)

The NRC staff reviewed CP COL 9.5(3) related to COL Information Item 9.5(3), included under Section 9.5.1 of the CPNPP3&4 COL FSAR. The applicant provided information regarding site-specific apparatus for plant personnel and fire brigades such as portable fire extinguishers and self-contained breathing apparatus in CPNPP3&4 COL FSAR Section 9.5.1.6.1.8 and Table 9.5.1-2R.

The NRC staff determined that adequate details were provided by the applicant to ensure conformance with the regulatory positions contained in RG 1.189. In its response to **RAI 2328**, **09.05.01-15,** dated August 11, 2009 (ML092240406), the applicant clarified that at least 10 self-contained breathing apparatus are available for fire brigade use and each unit will be provided with an additional 1-hour supply of breathing air in extra bottles. In addition, in its response dated May 1, 2009 (ML091250488), to **RAI 2332**, **Question 14.3-1** the applicant provided that the CPNPP3&4 Fire Protection System Preoperational Test Program will be revised to add a new item to ensure verification that local offsite fire departments utilize hose threads or adapters capable of connecting with onsite hydrants, hose couplings and standpipe risers. These changes were incorporated inCPNPP3&4 COL FSAR, Revision 2. Based on the above, it is concluded that the applicant has adequately addressed COL 9.5(3) and the applicant's response complies with the guidance described in RG 1.189. **RAI 2332, Question 14.3-1 is resolved and closed**.

Job area inspection will be performed and documented at the start of each shift that ignition source activities are being performed.

Fire Hazards Analysis

The Fire Hazards Analysis (FHA) is part of the FPP. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. The FHA is required to be updated, prior to receipt of the new fuel and is as part of the License Condition previously mentioned in Section 7.3.3. The FHA includes the following:

- A summary of the evaluation performed to determine the adequacy of the fire protection features for each fire area; and

- A discussion of the ability to achieve safe shutdown in case of a fire in each fire area. The fire hazards and safe shutdown evaluation were performed by qualified nuclear, mechanical, electrical, and fire protection engineers.

The FHA and Pre-Fire Plans conform to the applicable guidance provided in the National Fire Protection Association (NFPA) 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA, 2008).

Evaluation Findings

The staff concluded that the applicant's capabilities meet the criteria in Chapter 7 of NUREG-1520 (NRC, March 2002). The staff determined that the applicant's equipment, facilities, and procedures provide reasonable assurance that adequate fire protection will be provided and maintained to meet the criteria of 10 CFR 70.23(a)(3) and 10 CFR 70.23(a)(4).

REFERENCES

1. (NRC, 2002) U.S. Nuclear Regulatory Commission (NRC). NUREG-1520, A Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, March 2002.

2. (NFPA, 2008) National Fire Protection Association (NFPA). NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," 2008.

Comment [NK16]: Evaluation Findings and References: The references are listed as (NRC, 2002) and (NFPA, 801) in the References section but in the Evaluation findings, one of the references is identified as (NRC, March 2002). This is also used on Page 9-161, Conclusion. Recommend to revise the references to be consistent. Also, in the order of presentation, the references should be reversed to have (NFPA, 801) as the first reference as it is used in the last paragraph of Fire Hazards Analysis on Page 9-159 which is prior to (NRC, 2002).

9.5.1.6 10 CFR Part 52 and 70 License Conditions

By letter dated January 14, 2011, the NRC staff issued RAI Number 198. In its RAI, the staff requested the applicant to implement applicable portions of the Fire Protection Program prior to initial receipt of byproduct, source, or special nuclear materials onsite (excluding Exempt Quantities as described in 10 CFR 30.18). In its response dated May 6, 2011, the applicant added the following implementation milestone in FSAR Table 13.4-201, "Operational Programs Required by NRC Regulation and program Implementation," item 8 titled 'Fire Protection Program' to the two license conditions provided in COL FSAR, Revision 3, Table 13.4-201.

The COLA, FSAR Revision 3 Table 13.4-201, Item 8, 'Fire Protection Program,' provides the following license conditions and program milestone below:

could affect the storage area) implemented before initial receipt of byproduct or special nuclear materials that are not fuel (excluding exempt quantities as described in 10 CFR 30.18);

2. The fire protection measures in accordance with Regulatory Guide 1.189 for areas containing new fuel (including adjacent areas where a fire could affect the new fuel) implemented before receipt of fuel onsite; and

3. All Fire Protection Program features implemented before the initial fuel load.

9.5.1.8 Conclusion

The NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the FPP, and there is no outstanding information expected to be addressed in the CPNPP3&4 COL FSAR related to this section.

The staff is reviewing the information in Section 9.5.1 of the US-APWR DCD on Docket Number 52-021. The results of the NRC staff's technical evaluation of the information related to the FPP incorporated by reference in the CPNPP3&4 COL FSAR will be documented in the staff SER on the DC application for the US-APWR design. The SER on the US-APWR is not yet complete, and this is being tracked as part of Open Item [1-1]. The staff will update Section 9.5.1 of this SER to reflect the final disposition of the DC application.

The staff concluded that the applicant's capabilities meet the criteria in Chapter 7 of NUREG-1520 (NRC, March 2002). The staff determined that the applicant's equipment, facilities, and procedures provide reasonable assurance that adequate fire protection will be provided and maintained to meet the criteria of 10 CFR 70.23(a)(3) and 10 CFR 70.23(a)(4).

In addition, the staff concludes that the relevant information presented within the CPNPP3&4 COL FSAR is acceptable and meets the requirements of 10 CFR 50.48; GDC 3, GDC 5, GDC 19, and GDC 23; 10 CFR Part 72; and 10 CFR 52.80(a). The staff based its conclusion on the following:

- CP COL 9.5(1), as related to site-specific elements of the FPP such as organization, training and qualification of personnel, administrative procedures, and quality assurance, is acceptable because these CPNPP3&4 site-specific FPP aspects are in conformance with the applicable regulatory positions of RG 1.189, Fire Protection for Nuclear Power Plants, which ensure compliance with the requirements of 10 CFR 50.48, Fire Protection.
- CP COL 9.5(2), as related to the design and fire protection aspects of facilities, buildings, and equipment, which are site-specific and not standard features in the US-APWR, is acceptable because the design of these site-specific fire protection systems and features are in accordance with the regulatory positions of RG 1.189, Fire Protection for Nuclear Power Plants, which ensure compliance with the requirements of 10 CFR 50.48, Fire Protection.
- CP COL 9.5(3), as related to site-specific apparatus for plant personnel and fire brigades such as portable fire extinguishers and self-contained breathing apparatus, is acceptable

the NRC Operations Center and state and local Emergency Operations Centers (EOCs). Telephone service, including an onsite switch, is identified in the application.

The details of multiple communication links provided by the applicant for CPNPP3&4 give sufficient information to confirm compliance with the above mentioned sections of 10 CFR 50.47 and 10 CFR Part 50, Appendix E, by describing communication systems such as the PABX and crisis management radio system which are designed to be used for offsite emergency communications and to continue to operate during a LOOP.

The applicant demonstrated compliance with 10 CFR Part 50.47(b)(8) because the offsite communication system is a component of adequate emergency facilities and equipment. The applicant demonstrated compliance with 10 CFR 50.47(b)(6) because the offsite communication systems allow for prompt communications among response organizations, with emergency personnel, and with the public. The applicant demonstrated compliance with 10 CFR Part 50, Appendix E, Part IV.E(9), by describing at least one offsite communication system with a backup power source. The applicant demonstrated compliance with 10 CFR Part 50, Appendix E, Part IV.D(1), by describing physical means for notifying local, state, and federal officials and agencies.

The applicant committed to ensure that the crisis radio management system will meet the acceptance criteria in NUREG-0654 as discussed in Subsection 9.5.2.2.5.2. NUREG-0654 lists specific criteria necessary for emergency communications. These criteria include, as a minimum, a telephone link and alternate means for initiating and coordinating emergency response actions, as well as provisions for communications between all organizations and entities involved in emergency response.

Accordingly, based on the description provided in FSAR Section 9.5.2 and incorporated by reference to DCD Section 9.5.2, the NRC staff finds that the applicant adequately addressed COL Information Item 9.5(5) and demonstrated compliance with the applicable requirements of 10 CFR 50.47, 10 CFR Part 50, Appendix E, and met the acceptance criteria of NRC IE Bulletin 80-15.

- STD COL 9.5(6) and,STD COL 9.5(8),

The NRC staff reviewed STD~~P~~ COL 9.5(6) and STD COL 9.5(8) included under FSAR Section 9.5.2. In FSAR Revision 3, Section 9.5.2.2.5.2, the applicant replaced the second and third sentence of the second paragraph in DCD Section 9.5.2.2.5.2 with the following:

> *The effectiveness of the overall emergency response plan is in conformance with the requirements of 10 CFR 50.47 (b)(8). Adequate communications equipment are provided and maintained to allow the control room to communicate with offsite personnel and organizations. Pursuant to the emergency response plan, the following equipment is tested.*
>
> - *An inspection and test is performed of the [Technical Support Center] TSC voice communication equipment.*
> - *An inspection and test is performed of the operation support center voice communication equipment.*

- CP COL 9.5(12)

The NRC staff reviewed COL 9.5(12) in FSAR Revision 3, Section 9.5.4.2.2.1, related to COL Information Item 9.5(12). To address this COL item, the applicant replaced the tenth paragraph in DCD Subsection 9.5.4.2.2.1 with the following, in part:

> Insulation and heat tracing on the fuel oil piping in the concrete pipe chase and on a portion of the piping running down into the power source fuel storage vault area are provided to maintain fuel oil temperature within specification during winter. The concrete pipe chases between each fuel oil tank room and each power source building are the areas through which the fuel oil piping through. Within each concrete pipe chase is a 3-hour fire rated wall that separates each power source building from the associated power source fuel storage vault area. The door and penetrations through each wall are all 3-hour fire rated. One side of each concrete pipe chase is part of a power source building, which is a normally heated building.

Comment [NK17]: In response to RAI 265 Question 09.05.04-1, TXNB-12043 (ML12355A029), FSAR Subsection 9.5.4.2.2.1 (CP COL 9.5(12)) was revised. This should be reflected here.

The guidance contained in SRP 9.5.4 states, in part, that the application will be reviewed to ensure each emergency generator has an independent and reliable fuel oil storage and transfer system. The applicant's response to CP COL 9.5(12) meets the guidance described in SRP 9.5.4 as it describes a heating system to maintain a reliable fuel system. As such, the applicant has adequately addressed COL Information Item COL 9.5(12).

9.5.4.5 Post-Combined License Activities

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

9.5.4.6 Conclusions

The staff evaluated the information in FSAR Revision 3, Section 9.5.4, in accordance with the guidance in Section 9.5.4.3, "Regulatory Basis." On the basis of its review and evaluation, the staff concludes that the proposed fuel oil storage and transfer system as described in FSAR Section 9.5.4 meets the guidance described in SRP Section 9.5.4. Therefore, the staff concludes that the information in FSAR Section 9.5.4 is acceptable.

The staff is reviewing the information in DCD Section 9.5.4 on Docket Number 52-021. The results of the NRC staff's technical evaluation of the information related to the GTG fuel oil storage and transfer system incorporated by reference in the CPNPP3&4 COL FSAR will be documented in the staff SER on the DC application for the US-APWR. The SER on the US-APWR is not yet complete, and this is being tracked as part of Open Item [1-1]. The staff will update Section 9.5.4 of this SER to reflect the final disposition of the DC application design.

9.5.5 Not Used