9.0 AUXILIARY SYSTEMS

The auxiliary systems provide support systems that support the safe shutdown of the plant or the protection of the health and safety of the public. This area covers a wide range of systems including fuel storage and handling, water systems, compressed air, process sampling, drains, heating, ventilation, and air conditioning (HVAC), fire protection (FP), communications, lighting, and emergency diesel generator support systems.

9.1 Fuel Storage and Handling

9.1.1 New Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," and C.I.9.1.2, "New and Spent Fuel Storage")

The new fuel storage facilities include the fuel assembly storage racks, the concrete storage pit that contains the storage racks, and auxiliary components including the spent fuel handling crane and pit cover. The storage facilities must maintain the new fuel in subcritical arrays during all credible storage conditions. In addition, new fuel must remain subcritical during fuel handling.

Section 9.1 of the Turkey Point Units 6 and 7 Combined License (COL) Final Safety Analysis Report (FSAR) incorporates by reference, with no departures (DEPs) or supplements, Section 9.1.1, "New Fuel Storage," of the AP1000 Design Control Document (DCD). The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," and its supplements.

9.1.2 Spent Fuel Storage (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.1, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," and C.I.9.1.2, "New and Spent Fuel Storage")

9.1.2.1 *Introduction*

The spent fuel storage facilities include the spent fuel storage racks, the spent fuel storage pool that contains the storage racks, and the associated equipment storage pits. The storage

[1] See "*Finality of Referenced NRC Approvals*" in Section 1.2.2 which contains a discussion of the staff's review related to verification of the scope of information to be included in a COL application that references a design certiffction (DC). This SER refers to the Turkey Point Units 6 and 7 COL FSAR, Revision 8, and AP1000 DCD, Revision 19, unless otherwise specified. This footnote will be referenced in several places throughout the chapter of this Safety Evaluation.

facilities must maintain the spent fuel in subcritical arrays during all credible storage conditions. In addition, spent fuel must remain subcritical during fuel handling.

9.1.2.2 Summary of Application

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.2.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.6, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.1-7

The applicant provided additional information in standard (STD) COL 9.1-7 to address COL Information Item 9.1-7.

License Condition

- Part 10, License Condition 2, Item 9.1-7

The applicant proposed a license condition related to STD COL 9.1-7 that sets the implementation milestone for the Metamic Coupon Monitoring Program.

- Part 10, License Condition 6

The applicant proposed a license condition to provide a schedule to support the staff's inspection of operational programs and proposed to add the Metamic Coupon Monitoring Program to this list.

The Turkey Point Units 6 and 7 applicant proposed these license conditions through its endorsement, in a letter dated November 15, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103210407), of the letter dated April 23, 2010, from the Vogtle Electric Generating Plant (VEGP), Units 3 and 4, applicant on this issue.

9.1.2.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the fuel storage and handling are given in Sections 9.1.1 and 9.1.2 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)."

The regulatory basis for acceptance of the COL information and supplementary information items is established in:

- Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases"

- GDC 61, "Fuel Storage and Handling and Radioactivity Control"

- GDC 62, "Prevention of Criticality in Fuel Storage and Handling"

- 10 CFR 50.68, "Criticality Accident Requirements"

9.1.2.4 *Technical Evaluation*

The staff reviewed Section 9.1.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to spent fuel storage. The results of the staff's evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this safety evaluation report (SER) provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the Design Certification (DC) and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (Vogtle Electric Generating Plant (VEGP), Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from requests for additional information (RAIs).

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the Bellefonte Nuclear Plant (BLN), Units 3 and 4, COL application. Any confirmatory items in the standard content material retain the numbers assigned in the VEGP SER. Confirmatory items that are first identified in this SER section have a Turkey Point Units 6 and 7 designation (e.g., Confirmatory Item 9.1-1).

The following portion of this technical evaluation section is reproduced from Section 9.1.2.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.1-7*

COL Information Item 9.1-7 states:

> *The Combined License holder will implement a spent fuel rack Metamic coupon monitoring program when the plant is placed into commercial operation. This program will include tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination.*

STD COL 9.1-7 states:

> *A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination.*

The NRC staff reviewed STD COL 9.1-7 related to the Metamic coupon monitoring program included under Section 9.1 of the BLN COL FSAR. No additional details on the Metamic Coupon Monitoring Program are provided in Section 9.1 of the FSAR.

Since the applicant's proposed resolution of COL Information Item 9.1-7 was a restatement of the text of the COL information item from the DCD, the staff required additional information to be able to evaluate the applicant's closure of the item. An additional Request for Additional Information (RAI) response related to AP1000 DCD Section 9.1.2 (ML091120720) proposed a modification to the text of COL Information Item 9.1-7. The modified wording added neutron attenuation and thickness testing to the list of tests to be included in the Metamic monitoring program to be implemented by the COL holder. In RAI 9.1.2-1, the NRC staff requested that the applicant describe in detail the implementation of the aspects of the Metamic coupon monitoring program that are listed in STD COL 9.1-7, as modified by the additional AP1000 RAI response. In response to RAI 9.1.2-1, the applicant proposed modified wording for STD COL 9.1-7 as follows:

> *STD COL 9.1-7*
>
> *A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss*

measurements and / or visual examination. The program will also include tests to monitor changes in physical properties of the absorber material, including neutron attenuation and thickness measurements.

This proposed wording matches the proposed revised text for AP1000 COL Information Item 9.1-7. However, the proposed wording is still a restatement of the COL information item and does not contain the level of detail needed by the staff to evaluate the adequacy of the Metamic monitoring program. Therefore, in RAI 9.1.2-2, the staff requested that the applicant describe the methodology and acceptance criteria for the tests listed, provide the corrective action requirements and provide the administrative controls applicable to the program. Additionally, the applicant should confirm the number of coupons and the withdrawal schedule will be the same as recommended in the DCD or provide an alternative. The staff has identified this as ***Open Item 9.1-1*** *to track resolution of this issue and to ensure that the additional details are included in the BLN COL FSAR.*

Resolution of Standard Content Open Item 9.1-1

To resolve Open Item 9.1-1, the VEGP applicant provided additional information in a letter dated April 23, 2010, which superseded the original response to Open Item 9.1-1 provided in a letter dated December 30, 2009.

With respect to the number of coupons and the withdrawal schedule, the applicant confirmed that the number of coupons and the withdrawal schedule will be the same as stated in AP1000 DCD, Section 9.1.2.2.1. The applicant further stated that since AP1000 DCD Section 9.1 is incorporated by reference into the FSAR, no additional FSAR change would be required. The staff finds the applicant's response regarding the number of coupons and withdrawal schedule acceptable, because the applicant has confirmed the number of coupons and schedule will be the same as described in the AP1000 DCD.

With respect to methodology and acceptance criteria, corrective actions and administrative controls, the applicant stated that since the Metamic Coupon Monitoring Program has not yet been established, the level of detail requested is not completely available. The applicant further stated, "As stated in FSAR Subsection 9.1.6, a Metamic monitoring program will be implemented when the plant is placed into commercial operation. This program will include methodology to be employed, acceptance criteria, corrective actions and a description of administrative controls based on vendor recommendations and industry operating experience."

The applicant additionally stated that the VEGP COL FSAR will be revised to add the following to the end of the STD COL 9.1-7 discussion:

> *The program will include the methodology and acceptance criteria for the tests listed and provide corrective action requirements based on vendor recommendations and industry operating experience. The program will be implemented through plant procedures.*

Metamic Monitoring Acceptance Criteria:

- *Verification of continued presence of the boron is performed by neutron attenuation measurement. A decrease of no more than 5 percent in Boron-10 content, as determined by neutron attenuation, is acceptable. This is equivalent to a requirement for no loss in boron within the accuracy of the measurement.*

- *Coupons are monitored for unacceptable swelling by measuring coupon thickness. An increase in coupon thickness at any point of no more than 10 percent of the initial thickness at that point is acceptable.*

Changes in excess of either of the above two acceptance criteria are investigated under the corrective action program and may require early retrieval and measurement of one or more of the remaining coupons to provide validation that the indicated changes are real. If the deviation is determined to be real, an engineering evaluation is performed to identify further testing or any corrective action that may be necessary.

Additional parameters are examined for early indications of the potential onset of Metamic degradation that would suggest a need for further attention and possibly a change in the coupon withdrawal schedule. These include visual inspection for surface pitting, blistering, cracking, corrosion or edge deterioration, or unaccountable weight loss in excess of the measurement accuracy.

The NRC staff concludes that the above information to be added to the VEGP COL FSAR provides the necessary level of detail for the Metamic Monitoring Program, including the methodology and acceptance criteria for the tests listed, the corrective action requirements, and the administrative controls applicable to the program.

The applicant proposed a markup of the VEGP COL application, Part 10, License Condition 6, adding a line item for the Metamic Monitoring Program. After the addition of this line item, the version of License Condition 6 included in Part 10 of the COL application, Revision 2, would be:

> *The licensee shall develop a schedule that supports planning for and conduct of NRC inspection of the operational program listed in VEGP COL FSAR Table 13.4-201, "Operational Program Required by NRC Regulations." This schedule must be available to the NRC staff no later than 12 months after issuance of the COL. The schedule shall be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until the operational programs listed in VEGP COL FSAR Table 13.4-201 have been fully implemented or the plant has been*

placed in commercial service, whichever comes first. This schedule shall address:

a. the implementation of site-specific Severe Accident Management Guidance.

b. the reactor vessel pressurized thermal shock evaluation at least 18 months prior to initial fuel load.

c. the approved preoperational and startup test procedures in accordance with FSAR Section 14.2.3.

d. the flow accelerated corrosion (FAC) program implementation, including the construction phase activities.

#. the spent fuel rack Metamic coupon monitoring program implementation.

(Where # will be replaced with the next sequential number in the final version of this license condition.)

The inclusion of the Metamic Coupon Monitoring Program in License Condition 6 ensures that the program will be treated as an operational program with respect to providing a schedule to support the NRC's inspection; thus, the applicant must submit and update the schedule for program implementation following the issuance of the COL, in order to support planning of NRC inspections. The staff, therefore, finds the applicant's proposed resolution of ***Open Item 9.1-1*** *acceptable because the applicant will modify proposed License Condition 6 to ensure the appropriate information is available for the staff's review of the details of the Metamic Monitoring Program prior to the start of plant operation.* ***Open Item 9.1-1*** *is, therefore, resolved. Incorporation of the proposed revision to Chapter 9 of the VEGP COL FSAR and to License Condition 6 in the VEGP COL application is being tracked as* ***Confirmatory Item 9.1-1****.*

Resolution of Standard Content Confirmatory Item 9.1-1

Confirmatory Item 9.1-1 is an applicant commitment to revise its FSAR Section 9.1.6 to include a requirement for inclusion of methodology, acceptance criteria and corrective action in the Metamic Coupon Monitoring Program. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-1 is now closed.

9.1.2.5 *Post-Combined License Activities*

For the reasons discussed in the technical evaluation section above, the staff finds the following license condition acceptable:

- License Condition (9-1) - Prior to initial fuel load, the licensee shall implement the spent fuel rack Metamic Coupon Monitoring Program. No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the Office of New Reactors

(NRO) a schedule that supports planning for and conduct of NRC inspections of the spent fuel rack Metamic Coupon Monitoring Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the spent fuel rack Metamic Coupon Monitoring Program has been fully implemented.

9.1.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.1.2 of NUREG–0800. The staff based its conclusion on the following:

- STD COL 9.1-7 is acceptable because the necessary level of detail for the Metamic Coupon Monitoring Program has been provided by the applicant, including the methodology and acceptance criteria for the tests listed, the corrective action requirements, and the administrative controls applicable to the program.

9.1.3 Spent Fuel Pool Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.3, "Spent Fuel Pool Cooling and Cleanup System")

9.1.3.1 *Introduction*

The spent fuel pool cooling system (SFS) is designed to remove decay heat, which is generated by stored fuel assemblies from the water in the spent fuel pool (SFP). The safety-related portion of the SFS credits the water inventory in the pool and safety-related makeup water to remove the decay heat. The nonsafety-related portion of the system is an active system during normal operations that pumps the high-temperature water from within the fuel pool through a heat exchanger (HX) and then returns the water to the pool. The SFS HXs are cooled by the component cooling water system (CCS). A secondary function of the SFS is clarification and purification of the refueling water and the SFP.

9.1.3.2 *Summary of Application*

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.3. Units 6 and 7 COL FSAR, Section 9.1.3 includes one departure request and one item of supplemental (SUP) information.

Tier 1 and Tier 2 Exemption and Departure Request

The applicant proposed the following Tier 1 and Tier 2 DEP from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 DEP request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is currently specified as 30.1 °Celsius (C) (86.1 °Fahrenheit (F)). The Tier 2 DEP was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

The applicant proposed to add the following information as part of PTN DEP 2.0-3, at the end of the third bullet in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.3.1.3.1:

> SFS performance following restart after a normal refueling is affected by a change in maximum safety wet-bulb temperature. Calculations confirm that spent fuel pool temperature remains below 46.1 °C (115 °F) with a CCS supply temperature of 36.1 °C (97 °F) at the specified SFP loading condition and decay time on the fuel fraction just replaced during the previous 17 day refueling outage.
>
> While the maximum CCS temperature expected for Turkey Point Units 6 and 7 is 36.3 °C (97.4 °F), an increase of 0.2 °C (0.4 °F) in CCS supply temperature will produce a similar increase in the SFP maximum temperature; therefore, the requirement to maintain SFP temperature below 48.9 °C (120 °F) is met with margin.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Appendix D, "Design Certification Rule for the AP1000 Design," Section IV.A.2.d. Specifically, the Turkey Point Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 2.0.4 of this SER.

The applicant proposed to add the following information as part of the response to NRC Orders EA-12-051 and EA-12-063, following the first paragraph of DCD Subsection 9.1.3.7.D:

> All three safety-related spent fuel pool level instruments and associated instrument tubing lines are located below the fuel handling area operating deck and the cask washdown pit. This location provides protection from missiles that may result from damage to the structure over the spent fuel pool. The SFP level instruments associated with PMS divisions A and C are physically separated from the SFP level instrument associated with PMS division B. The safety-related spent fuel pool level instruments measure the water level from the top of the spent fuel pool to the top of the fuel racks. These instruments are conservatively calibrated at a reference temperature suitable for normal spent

fuel pool operation on a regular basis and accuracy is not affected by power interruptions.

The evaluation of the proposed supplemental information is included in Section 20.3 of this SER.

Supplemental Information

- PTN SUP 9.1-1

The applicant provided supplemental information in Section 9.1.3.7, "Instrumentation Requirements," describing the location of safety-related SFP level instruments and instrument tubing lines.

9.1.3.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the SFS are given in Section 9.1.3 of NUREG–0800.

9.1.3.4 *Technical Evaluation*

The staff reviewed Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 and Tier 2 Departure

- PTN DEP 2.0-3

PTN DEP 2.0-3 proposes to increase the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F). This change impacts the performance of various systems, structures, and components (SSCs) described in the AP1000 DCD. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 5.4, 6.2, 6.4, 9.2.2, and 9.2.7 of this SER.

The nonsafety portion of the SFS is designed to remove decay heat generated by the stored fuel assemblies from the water in the SFP and transfer it to the CCS. The site temperature (wet and dry bulb) impacts the cooling tower performance, which affects the temperature of the CCS. The SFS heat exchanger is cooled by the CCS, and a change in the CCS temperature affects the performance of the SFS. The impact of the proposed change on the CCS system is

evaluated in Section 9.2.2 of this SER. Since the safety-related portion of the SFS does not credit the use of the CCS, it remains unaffected by the proposed change.

The performance of the SFS is evaluated in the AP1000 DCD for several limiting offload scenarios. Of all the evaluated scenarios, only one scenario uses the maximum safety wet-bulb (noncoincident) air temperature as the basis to determine the system's heat removal performance. In this scenario, the analysis must demonstrate that the SFS is capable of maintaining the temperature of the SFP water below 48.9 °C (120 °F) following a partial core fuel shuffle refueling, with the wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature (most limiting case).

In letters dated June 24, 2011, the applicant responded to staff's RAI 9.2.2-1 and -2 (ADAMS Accession Nos. ML11178A231 and ML11178A232) and made reference to Calculation APP-SFS-M3C-042, Revision 0, "SFS HX Sizing Calculation Using Florida Power and Light (Turkey Point) Increased Wet-bulb Temperatures," as a demonstration that the Turkey Point Units 6 and 7 SFS still meets its design basis with the new wet-bulb temperature. Calculation APP-SFS-M3C-042 shows that, with a CCS temperature of 36.1 °C (97 °F), the SFP temperature remains below 46.1 °C (115 °F). The calculation in this report followed the same methodology used in Westinghouse Technical Report (TR)-36 (APP-GW-GLE-036), "Impact of a Revision to the Current Wet-bulb Temperature Identified in Table 5.0-1 (Tier 1) and Table 2-1 (Sheet 1 of 3) of the DCD (Revision 16)" for the AP1000 DC. The staff had evaluated this Westinghouse methodology as part of its AP1000 DCD review and found it acceptable in Supplement 2 of NUREG–1793. The staff has previously reviewed APP-SFS-M3C-042 while reviewing the V.C. Summer site-specific DEP 2.0-2 and found APP-SFS-M3C-042 acceptable as reference calculation.

As described in the markup for Turkey Point Units 6 and 7 COL FSAR, Section 9.2, the maximum design temperature for the CCS is 36.3 °C (97.4 °F). The Turkey Point Units 6 and 7 CCS maximum temperature is 0.2 °C (0.4 °F) higher than the temperature assumed for Turkey Point CCS in APP-SFS-M3C-042. The applicant stated that an increase in the CCS temperature will cause a proportional increase in the SFP temperature of approximately 0.2 °C (0.4 °F). This would result in a Turkey Point Units 6 and 7 SFP water temperature of approximately 46.3 °C (115.4 °F). Therefore, the staff finds that the Turkey Point Units 6 and 7 SFS is capable of maintaining the SFP water temperature below 48.9 °C (120 °F) following a partial core fuel shuffle refueling at the maximum safety wet-bulb (noncoincident) air temperature.

The applicant's departure request also proposed to revise Turkey Point Units 6 and 7 COL FSAR, Section 9.1.3.1.3.1 to reflect the impact of the change in the maximum safety wet-bulb (noncoincident) air temperature. Since the modification clarifies that only the refueling scenario discussed in this section (following a restart after a normal refueling, while the reactor is at power) has been impacted by the change in the maximum safety wet-bulb (noncoincident) air temperature, and that the Turkey Point Units 6 and 7 SFS is still capable of maintaining the SFP water temperature below the limit of 48.9 °C (120 °F), the staff finds the proposed departure with proposed Turkey Point Units 6 and 7 COL FSAR changes acceptable. The staff verified that the necessary changes were incorporated in the revised version of the Turkey Point Units 6 and 7 COL FSAR.

Supplemental Information

- PTN SUP 9.1-1

The applicant added supplemental regarding the location of safety-related SFP level instruments and instrument tubing lines. This supplemental information is reviewed above in this SER section.

9.1.3.5 *Post-Combined License Activities*

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

9.1.3.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in NUREG–0800, Section 9.1.3. The staff based its conclusion on the following:

- PTN DEP 2.0-3 is acceptable because the staff determined that the SFS is capable of maintaining the SFP water temperature below 48.9 °C (120 °F) following a partial core fuel shuffle refueling, with the wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature of 30.8 °C (87.4 °F). Therefore, the staff concludes that the Turkey Point Units 6 and 7 SFS is acceptable.

9.1.4 Light Load Handling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.4, "Light Load Handling System (Related to Refueling)")

9.1.4.1 *Introduction*

The light load handling system (LLHS) consists of the equipment and structures needed for the refueling operation. This equipment comprises fuel assemblies, core component and reactor component hoisting equipment, handling equipment, and a dual basket fuel transfer system. The structures associated with the fuel handling equipment are the refueling cavity, the transfer canal, the fuel transfer tube, the SFP, the cask loading area, the new fuel storage area, and the new fuel receiving and inspection area.

9.1.4.2 *Summary of Application*

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the DCD includes Section 9.1.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.4, the applicant provided the following:

AP1000 COL Information Items

- STD COL 9.1-5

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5 (COL Action Item 9.1.6-5).

- STD COL 9.1-6

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6 (COL Action Item 9.1.6-6).

9.1.4.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the LLHS are given in Section 9.1.4 of NUREG–0800.

The regulatory basis for acceptance of the COL information items is established in:

- 10 CFR Part 50, Appendix A, GDC 61

- American National Standards Institute/American Nuclear Society (ANSI/ANS) 57.1-1992, “Design Requirements for LWR Fuel Handling Systems”

9.1.4.4 *Technical Evaluation*

The staff reviewed Section 9.1.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the LLHS. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL FSAR are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff’s findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3

and 4) were equally applicable to the Turkey Point Units 6 and 7 COL FSAR, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.1.4.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 9.1-5*

COL Information Item 9.1-5 states:

> *The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in subsection 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME [American Society of Mechanical Engineers] NOG-1 as specified in subsection 9.1.5.4.*

The commitment was also captured as COL Action Item 9.1.6-5 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in DCD Tier 2, Section 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in DCD Tier 2, Section 9.1.5.4.*

STD COL 9.1-5 states:

> *The above requirements are part of the plant inspection program for the light load handling system, which is implemented through procedures. In addition to the above inspections, the procedures reflect the manufacturers' recommendations for inspection.*

The staff reviewed STD COL 9.1-5, which addresses COL Information Item 9.1-5 on the inservice inspection (ISI) program for the LLHS. The applicant stated that the inspection program for the LLHS is implemented through procedures and reflect the manufacturer's recommendations. RAI 9.1.4-1 requested that the applicant provide a copy of the procedures for verification by the staff or provide the schedule in relation to fuel loading for issuance of the procedures.

The applicant stated in its response to RAI 9.1.4-1, that an inspection and testing program will be developed to address the LLHS. Procedures defining the program will address the testing and inspection requirements outlined in Section 9.1.4.4, "Inspection and Test Requirements," of the AP1000 DCD and the procedures will include applicable manufacturer's recommendations and industry standards. The applicant stated that procedure development is tracked by the overall plant construction and test schedule. The applicant further stated that details of the implementation milestones for development of procedures are not currently available and are not expected to be available until a detailed construction schedule has been developed. When it becomes available, scheduling information will be provided to the NRC as necessary to support timely completion of NRC inspection and audit functions.

Although the response to RAI 9.1.4-1 states that the plant inspection program schedule information will be provided when available, BLN COL FSAR Table 1.8-202 lists STD COL 9.1-5 as having been completed by the applicant. The staff notes that STD COL 9.1-5 has not been fully addressed. The applicant is asked to revise BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the plant inspection program for the LLHS before receipt of fuel. This is ***Open Item 9.1-2****.*

- *STD COL 9.1-6*

COL Information Item 9.1-6 states:

> *The Combined License applicant is responsible to ensure an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.*

The commitment was also captured as COL Action Item 9.1.6-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant/holder will ensure that an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.*

STD COL 9.1-6 states:

> *Plant procedures require that an operating radiation monitor is mounted on any machine when it is handling fuel. Refer to DCD Subsection 11.5.6.4, "Fuel Handling Area Criticality Monitors," for a discussion of augmented radiation monitoring during fuel handling operations.*

The NRC staff reviewed STD COL 9.1-6, which addresses COL Information Item 9.1-6 related to radiation monitoring included under Section 9.1.4 of the BLN COL FSAR. The proposed mounting of an operating radiation monitor on any crane or fuel handling machine during fuel handling is included under Section 9.1.4.3.8 of the BLN COL FSAR. The applicant committed to develop plant procedures that will specify that an operating radiation monitor be mounted on any fuel handling machine when it is handling fuel. DCD Section 11.5.6.4 specifies the need to augment area radiation monitoring during fuel handling operations by a portable radiation monitor on the machine handling fuel. The staff finds that with the addition of the portable radiation monitor to any fuel handling machine when it is handling fuel, the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61 for the prevention of unacceptable radiation exposure.

The staff finds that the applicant has adequately addressed COL Information Item 9.1-6 which would ensure that an operating portable radiation monitor is mounted on any fuel handling machine in the LLHS when it is handling fuel.

Resolution of Standard Content Open Item 9.1-2

*To resolve **Open Item 9.1-2**, in a letter dated December 30, 2009, the applicant proposed a change to VEGP COL FSAR Section 9.1.4.4 in response to this open item instead of a revision to Table 1.8-202. The applicant proposed a revision to FSAR Section 9.1.4.4 to clarify that the LLHS, including system inspections, is implemented prior to receipt of fuel onsite. The staff finds this acceptable since the commitment provided will ensure that these procedures will be in place prior to fuel movement. Therefore, **Open Item 9.1-2** is resolved. Incorporation of the proposed revision in the VEGP COL FSAR is being tracked as **Confirmatory Item 9.1-2**.*

Resolution of Standard Content Confirmatory Item 9.1-2

Confirmatory Item 9.1-2 is an applicant commitment to revise its FSAR Section 9.1.4.4 to include an inspection of the LLHS prior to receipt of fuel. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-2 is now closed.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.1.4.4 of the BLN SER that requires correction. The BLN SER provides quoted material for COL Action Item 9.1.6-5, citing Appendix F of NUREG-1793

as the source. The source of the quoted material for COL Action Item 9.1.6-5 is in fact from Chapter 9 (Section 9.1.6) of NUREG-1793.

9.1.4.5 Post-Combined License Activities

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee and is identified in Section 9.1.4.4 of the Turkey Point Units 6 and 7 COL FSAR:

- The light-load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.

9.1.4.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable because it meets the requirements of the NRC's regulations and the acceptance criteria given in the guidelines found in Section 9.1.4 of NUREG–0800. The staff based its conclusion on the following:

- STD COL 9.1-5 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR provided information that ISI of the LLHS is part of the plant inspection program for the LLHS, which is implemented through procedures.

- STD COL 9.1-6 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

9.1.5 Overhead Heavy Load Handling Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.1.5, "Overhead Load Handling System")

9.1.5.1 *Introduction*

The overhead heavy load handling systems (OHLHS) are used to lift loads whose weight is greater than the combined weight of a single spent fuel assembly and its handling device. The principal equipment is the containment polar crane, equipment hatch hoist, maintenance hatch hoist, and the cask handling crane. The OHLHS are designed to ensure that inadvertent operations or equipment malfunctions, separately or in combination, will not cause a release of radioactivity, a criticality accident, an inability to cool fuel within the reactor vessel or SFP, or prevent safe shutdown of the reactor.

9.1.5.2 *Summary of Application*

Section 9.1 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.1 of the AP1000 DCD. Section 9.1 of the AP1000 DCD includes Section 9.1.5.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.5, the applicant provided the following:

Supplemental Information

- STD SUP 9.1-1

The applicant provided supplemental (SUP) information in Section 9.1.5.3, "Safety Evaluation," describing heavy-load lifts outside those already described in the AP1000 DCD.

- STD SUP 9.1-2

The applicant provided supplemental information in Section 9.1.5, "Overhead Heavy Load Handling Systems," describing key elements of the heavy-loads handling program and a quality assurance (QA) program.

- STD SUP 9.1-3

The applicant provided supplemental information in Section 9.1.5.5, "Load Handling Procedures," describing load handling operations for heavy loads in the vicinity of irradiated fuel and safe shutdown equipment.

AP1000 COL Information Items

- STD COL 9.1-5

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5 (COL Action Item 9.1.6-5).

- STD COL 9.1-6

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6 (COL Action Item 9.1.6-6).

9.1.5.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the OHLHS are given in Section 9.1.5 of NUREG–0800.

The regulatory basis for acceptance of STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3 addressing planned heavy-load lift programs includes the following:

- 10 CFR Part 50, Appendix A, GDC 4
- 10 CFR Part 50, Appendix A, GDC 61
- NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants"

The regulatory basis for acceptance of STD COL 9.1-5, addressing the ISI program for the OHLHS, is based on GDC 4 and the guidelines of NUREG–0612, which references ANSI B30.2, "Overhead and Gantry Cranes," ANSI N14.6, "Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More," ASME NOG-1, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)," and ANSI B30.9, "Slings."

The regulatory basis for acceptance of STD COL 9.1-6, addressing operating radiation monitor on any crane handling fuel, is based on the requirements of GDC 61.

9.1.5.4 *Technical Evaluation*

The staff reviewed Section 9.1.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to OHLHS. The results of the staff's evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.1.5.4 of the VEGP SER:

Supplemental Information

- *STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3*

The staff reviewed the information provided by the applicant for STD SUP 9.1-1. The applicant stated that it did not provide an itemized list of heavy load lifts outside the scope of heavy loads described in the AP1000 DCD because no such heavy load lifts are currently planned. The applicant provided a general description for addressing heavy load movements outside the planned scope if needed in the future. However, the applicant did not address all the program elements and detail listed in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, nor did it provide a schedule for implementation of the heavy load handling program. A heavy load handling program that meets the guidelines of NUREG-0612 and NUREG-0800 Section 9.1.5, needs to be in place at a time before there is a possibility that a load drop could cause a release of radioactivity, a criticality accident, inability to cool fuel within the reactor vessel or spent fuel pool, or prevent safe shutdown of the reactor. The staff asked the applicant in RAI 9.1.5-1 to provide the program elements specified in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, and a schedule for implementation.

In BLN COL FSAR, Revision 1, the applicant provided the missing and necessary information specified in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5. The applicant provided a description of the key elements of the heavy load handling system program in BLN COL FSAR Section 9.1.5. The key elements are: 1) Listing of heavy loads; 2) Listing of handling equipment; 3) Safe load paths definition, location and evaluation; 4) Procedures and maintenance manuals; 5) Inspection and testing; 6) Personnel qualification and training; and 7) Quality Assurance (QA) program to monitor and implement the heavy loads program. Also, the BLN COL FSAR, Revision 1 Section 9.1.5 describes the heavy loads handling system procedures. Because Section 9.1.5 of the BLN COL FSAR includes the key elements identified in NUREG-0612, the staff finds the aspects of RAI 9.1.5-1 regarding the key elements of the heavy loads program resolved. Therefore, the staff finds the applicant meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 4.

In its response to RAI 9.1.5-1, the applicant stated that details of the implementation milestones for the development of heavy load handling procedures and related engineering documents are not currently available, nor are the implementation milestones expected to be available until after a detailed construction schedule has been developed. The applicant stated that appropriate scheduling information will be provided, when available, to the NRC as necessary to support timely completion of inspection and audit functions. The applicant did not provide any schedule for when the heavy load handling program will be completed for the implementation of an approved heavy load handling program (including OHLHS procedures). The applicant is asked to revise

BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the heavy load handling program before receipt of fuel. This is ***Open Item 9.1-3****.*

AP1000 COL Information Items

- *STD COL 9.1-5*

The applicant provided additional information in STD COL 9.1-5 to address COL Information Item 9.1-5. COL Information Item 9.1-5 states:

> *The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in subsection 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in subsection 9.1.5.4.*

The commitment was also captured as COL Action Item 9.1.6-5 in Chapter 9 of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The Combined License applicant is responsible for a program for inservice inspection of the light load handling system as specified in DCD Tier 2, Section 9.1.4.4 and the overhead heavy load handling system in accordance with ANSI B30.2, ANSI B30.9, ANSI N14.6, and ASME NOG-1 as specified in DCD Tier 2, Section 9.1.5.4.*

The staff reviewed STD COL 9.1-5, which addresses COL Information Item 9.1-5 on the plant inspection program for the OHLHS. The applicant stated that the inspection program for the OHLHS is implemented through procedures and reflect the manufacturer's recommendations and the recommendations of NUREG-0612. The staff asked the applicant in RAI 9.1.5-2 to provide a copy of the procedures for verification by the staff.

In its response to RAI 9.1.5-2, the applicant stated that a plant inspection program for the OHLHS will be created using the manufacturer's recommendations and will meet the requirements outlined in applicable industry standards. The staff confirmed that BLN COL FSAR Section 9.1.5.4 was revised to provide additional information related to the description of implementing procedures. On the basis of its review, the staff finds the applicant adequately addressed that the OHLHS plant inspection program procedures will follow the equipment manufacturer's recommendations and will meet the requirements in applicable industry standards. With the addition to BLN COL FSAR Section 9.1.5.4 of a descriptive list of the minimum elements required to be addressed in the overhead heavy load handling equipment plant inspection program procedures, in addition to the other guidelines specified in Section 9.1.5 of NUREG-0800, the staff finds the applicant meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 4.

In the RAI response, the applicant stated that the schedule for issuing the procedures that implement the plant inspection program for the OHLHS are not

yet available. The applicant also stated that implementation milestones are not expected to be available until after a detailed construction schedule has been developed, but will be provided to the NRC when available to support timely completion of inspection and audit functions. Although the response to RAI 9.1.5-2 states that the plant inspection program schedule information will be provided when available, BLN COL FSAR Table 1.8-202 lists STD COL 9.1-5 as having been completed by the applicant. The staff notes that STD COL 9.1-5 has not been fully addressed. The applicant is asked to revise BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the plant inspection program for the OHLHS before receipt of fuel. This is ***Open Item 9.1-4****.*

- *STD COL 9.1-6*

The applicant provided additional information in STD COL 9.1-6 to address COL Information Item 9.1-6. COL Information Item 9.1-6 states:

> *The Combined License applicant is responsible to ensure an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.*

The commitment was also captured as COL Action Item 9.1.6-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant/holder will ensure that an operating radiation monitor is mounted on any crane or fuel handling machine when it is handling fuel.*

The NRC staff reviewed STD COL 9.1-6, which addresses COL Information Item 9.1-6 related to radiation monitoring included under Section 9.1.5 of the BLN COL FSAR. The proposed mounting of an operating radiation monitor on any crane or fuel handling machine during fuel handling is included under Section 9.1.5.3 of the BLN COL FSAR. The applicant committed to develop plant procedures that will specify that an operating radiation monitor be mounted on any fuel handling machine when it is handling fuel. DCD Section 11.5.6.4 specifies the need to augment area radiation monitoring during fuel handling operations by a portable radiation monitor on the machine handling fuel. The staff finds that with the addition of the portable radiation monitor to any fuel handling machine when it is handling fuel, the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61 for the prevention of unacceptable radiation exposure.

The staff finds that the applicant has adequately addressed COL Information Item 9.1-6 which would ensure that an operating portable radiation monitor is mounted on any crane when it is handling fuel.

<u>Resolution of Standard Content Open Items 9.1-3 and 9.1-4</u>

The VEGP applicant responded to ***Open Items 9.1-3 and 9.1-4*** *in a letter dated December 30, 2009. The letter proposed a change to VEGP COL FSAR*

Section 9.1.5.4 in response to these open items instead of revising Table 1.8-202. The applicant proposed a revision to FSAR Section 9.1.5.4 to clarify that the OHLHS, including system inspections, will be implemented prior to receipt of fuel onsite. The staff finds this acceptable since the commitment provided will ensure that the procedures will be in place and the plant inspection program will be implemented for the OHLHS prior to fuel movement. Therefore, ***Open Items 9.1-3 and 9.1-4*** *are resolved. Incorporation of the proposed revision in the FSAR is being tracked as* ***Confirmatory Item 9.1-3****.*

Resolution of Standard Content Confirmatory Item 9.1-3

Confirmatory Item 9.1-3 is an applicant commitment to revise its FSAR Section 9.1.5.4 to include an inspection of the OHLHS prior to receipt of fuel. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.1-3 is now closed.

9.1.5.5 *Post-Combined License Activities*

For the reasons discussed in the technical evaluation above, the following FSAR commitment is identified as the responsibility of the licensee in Turkey Point Units 6 and 7 COL FSAR, Section 9.1.5:

- The overhead heavy-load handling program, including system inspections, will be implemented prior to receipt of fuel onsite.

9.1.5.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria given in Section 9.1.5 of NUREG–0800. The staff based its conclusion on the following:

- STD SUP 9.1-1, STD SUP 9.1-2, and STD SUP 9.1-3 are acceptable because the staff finds that the applicant provided supplemental information in accordance with NUREG-0612, NUREG–0800, Section 9.1.5, and RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Section C.I.9.1.5, to describe the program and schedule for the implementation of the program governing heavy-load handling.

- STD COL 9.1-5 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR provided information that ISI of the OHLHS is part of the plant inspection

program for the OHLHS, which is implemented through procedures, in accordance with referenced national standards.

- STD COL 9.1-6 is acceptable because the staff finds that the Turkey Point Units 6 and 7 COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

9.2 Water Systems

9.2.1 Service Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.1, "Station Service Water System (Open, Raw Water Cooling Systems)")

9.2.1.1 *Introduction*

The service water system (SWS) is a nonsafety-related system that supplies cooling water to remove heat from the nonsafety-related CCS HXs in the turbine building. The SWS is arranged into two trains of components and piping. Each train includes one service water pump, one strainer, and a cooling tower cell as its heat sink. The heat sink for both trains is provided by a single cooling tower with two cells and a divided basin. Each train is capable of providing 100-percent of the required SWS flow for normal full-power operation.

9.2.1.2 *Summary of Application*

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1, the applicant provided the following:

Supplemental Information

- PTN SUP 9.2-1

The applicant provided supplemental information in Section 9.2.1.2.2, "Component Description," by adding additional text to address the SWS cooling tower potential interactions.

> The SWS cooling tower was evaluated for potential impacts from interference and air restriction effects due to yard equipment layout and tower operation in an adjacent unit. Based on unit spacing, yard equipment layout, and the margins inherent in the performance requirements and design conditions of the towers, no adverse impacts were determined.

Tier 2 Departure

- PTN DEP 2.0-2

This Tier 2 departure (request is from a site parameter value provided in AP1000 DCD Tier 2, Table 2-1, for the maximum normal wet-bulb (noncoincident) air temperature. AP1000 DCD Tier 2, Table 2-1, identified this value as 26.72 °C (80.1 °F). The proposed revised value is

27.5 °C (81.5 °F). The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.78 °C (1.4 °F). This change requires an evaluation of the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000 DCD. The SWS is one system affected; therefore, the departure was reflected in Revision 3 of the Turkey Point Units 6 and 7 COL FSAR and in Turkey Point Units 6 and 7 COL Part 7. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, 9.1.3, 9.2.2, and 9.2.7.

Replace the paragraph in DCD Section 9.2.1.2.3.4, "Plant Cooldown/Shutdown," with the following paragraph:

> During the plant cooldown phase in which the normal residual heal removal system has been placed in service and is providing shutdown cooling, the service water cooling tower provides cooling water at a temperature of 89.8 °F or less when operating at design heat load and at an ambient wet-bulb temperature of no greater than the maximum normal wet-bulb temperature as defined in Chapter 2, Table 2.0-201. Two service water pumps and two cooling tower cells are normally used for plant cooldown, and the cross-connection valves between trains are normally closed. The service water system heat load and flow rate are shown in DCD Table 9.2.1-1. During these modes of operation the normal residual heat removal system and the component cooling water system remove sensible and decay heat from the reactor coolant system. The service water system cooling towers are designed with sufficient margin so that normal time-related degradation of tower performance will not prohibit their support of this heat removal function. In the event of failure of a service water system pump or cooling tower fan, the cooldown time is extended.

9.2.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

Although the SWS (including heat sink) is not safety related, it supports the normal (defense-in-depth) capability of removing reactor and spent fuel decay heat, it is part of the first line of defense for reducing challenges to passive safety systems in the event of transients and plant upsets, and its cooling function is important for reducing shutdown risk when the reactor coolant system (RCS) is open (e.g., during midloop conditions). The risk importance of the SWS makes it subject to regulatory treatment of nonsafety-related systems (RTNSS) in accordance with the Commission's policy for passive reactor plant designs in SECY-94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs."

The staff's evaluation of the SWS focuses primarily on confirming that the SWS is capable of performing its defense-in-depth and RTNSS functions; that it will not adversely impact safety-related structures, systems, and components (SSCs); and that inspections, tests, analyses, and acceptance criteria (ITAAC), test program specifications, and RTNSS availability controls for the SWS are appropriate.

The regulatory basis for acceptance of PTN SUP 9.2-1 and DEP 2.0-2, addressing the SWS cooling tower and the maximum normal wet-bulb revision, is the acceptance criteria in Sections 9.2.1 and 9.2.5 of NUREG–0800.

9.2.1.4 *Technical Evaluation*

The staff reviewed Section 9.2.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the SWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 9.2-1

The applicant provided supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2.2 by adding additional text to address the SWS cooling tower potential interactions.

The cooling capability of the SWS cooling towers for the Turkey Point Units 6 and 7 units can be adversely affected by interactions that exist between the SWS two mechanical draft cooling towers between units. In addition, interactions between cooling towers (circulating water system (CWS) versus SWS) may adversely affect the cooling capacity of the SWS. Since the Turkey Point Units 6 and 7 units utilize mechanical induced-draft towers for the CWS verses natural draft cooling towers as submitted by other COL applicants, interactions with the SWS cooling towers are now more likely due to the difference in height of the discharge plume. Adverse interactions can occur due to localized atmospheric influences caused by siting considerations, the locations of major structures, the locations of the mechanical draft cooling towers, mechanical draft cooling tower fan speed, and wind effects. Because AP1000 utilizes only one SWS mechanical draft cooling tower in its design, interaction effects between the mechanical draft cooling towers of multi-unit sites was not evaluated by the staff for AP1000. Therefore, the staff requested in RAI 28, Question 09.02.01-1 that the applicant provide analysis and additional information to address potential adverse interactions between the Turkey Point Units 6 and 7 mechanical draft SWS cooling towers and mechanical draft CWS cooling towers for the two Turkey Point Units 6 and 7 units and adjacent units to justify PTN SUP 9.2-1.

Based on its response dated August 17, 2011 (ADAMS Accession No. ML11231A983), the applicant addressed cooling tower interaction considerations as shown below.

> Greater than 800 feet of separation will exist between the SWS cooling towers of adjacent Turkey Point Units 6 and 7 units and that the large turbine building structure is located between these two cooling towers. Also indicated that greater than 1,000 feet of separation will exist between each unit's SWS cooling towers and each unit's mechanical induced-draft towers for the CWS. Further, location of the Unit 5 cooling

tower is over 2,500 feet for the Turkey Point Units 6 and 7 SWS and over 3,000 ft for the CWS, respectively.

In addition, the CWS cooling towers for each Turkey Point Units 6 and 7 unit are mechanical induced draft towers. The plumes from the CWS cooling towers are directed upward by their fans and the buoyant effect of warm air. During normal power operation, the stack exit velocity is expected to be approximately 22.5 miles per hour. Based on the site arrangement (Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201), interactions of the CWS cooling towers with the SWS cooling towers may potentially result from winds from the south-southwest through south-southeast directions. The proposed design of the CWS cooling towers, including the circular shape and high stack exit velocity, in conjunction with the buoyant effect of the warm stack exhaust air, will tend to elevate and disperse the plume at elevations greater than the intakes of the SWS cooling towers, making it unlikely any significant interaction would occur. Strong SSW-SSE winds with velocities equal to or greater than the CWS cooling tower stack exit velocity would be necessary to have potential for interaction, but these winds occur less than 0.09 percent of the time based on site meteorological data (Turkey Point Units 6 and 7 COL FSAR, Table 2.3.2-205). Further, the SWS cooling towers are shielded by the larger and higher plant structures from winds from the south-southwest creating higher likelihood of dispersion of a plume from that direction. The low occurrence of winds from these directions and the large separation distances make any significant interaction unlikely under lower wind conditions; with higher wind velocities, greater dispersion is affected.

During conditions where the SWS cooling tower is subject to RTNSS requirements, the cooling tower is only operating at a small fraction of its operational heat load, leaving a substantial margin available to accommodate site specific adverse interactions, if they were to exist. Therefore, site specific performance degradation resulting from an interaction with a second unit would be minimal and would be readily accommodated by the design margins available to support RTNSS capability.

Based on the information that was provided in the response to RAI 28, Question 09.02.01-1, the staff finds the applicant's resolution of this issue to be acceptable since the SWS cooling tower interactions have been adequately addressed by at least 243 m (800 ft) of building separation and the large structure, the turbine building, being placed between the two SWS cooling towers. It is unlikely that an SWS cooling tower plume could travel to the vicinity of an SWS cooling tower on an adjacent unit. Distance and interfering structures in the path of the plume will disperse the plume, greatly minimizing any adverse effect on cooling tower performance. There is a minimal probability that a cooling tower plume will interact such that a significant degradation in performance would occur. Therefore, RAI 28, Question 09.02.01-1, is resolved.

Tier 2 Departure

- PTN DEP 2.0-2

The applicant, in PTN DEP 2.0-2, evaluated the DCD site parameter value for the maximum normal air temperature wet-bulb (noncoincident) in DCD Tier 2, Table 2-1, and proposed to increase the corresponding site characteristic value from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) to

reflect expected site conditions. The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.8 °C (1.4 °F).

This increase in maximum normal wet-bulb air temperature impacts the SWS maximum cooling water temperature at design peak SWS heat duty, which occurs during plant cooldown. During plant cooldown, the SWS cooling tower provides cooling water to the CCS heat exchangers which in turn cool the normal residual heat removal system (RNS) heat exchangers while in shutdown cooling mode.

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2 and Units 6 and 7 COL Application Part 7, "Departures and Exemption Requests," state that, with this change in ambient wet-bulb temperature to 27.5 °C (81.5 °F), the SWS cold water temperature would rise to 32.1 °C (89.8 °F) (in lieu of 88.5 °F) during peak CCS/SWS heat duty 4 hours after reactor shutdown (beginning of cooldown), and that the change would not adversely affect the SWS function to provide adequate cooldown during maximum heat load conditions.

The applicant identified that multiple areas in the Turkey Point Units 6 and 7 COL FSAR are affected by the departure which includes Sections 2.0, 2.3.1.5, 9.2.1.2, and 9.2.7.2, as indicated in system tables for those systems affected. Additionally, the effects of the departure are discussed in Turkey Point Units 6 and 7 Application Part 7.

The staff evaluated this departure and determined there was a lack of information to support the proposed departure's effects on the maximum SWS cooling water tower outlet temperature of 32.1 °C (89.8 °F) to the CCS heat exchangers. Although the proposed change has been evaluated in Turkey Point Units 6 and 7 COL Part 7, it is not clear what aggregate effects there may be on other affected systems. Therefore, the staff, in RAI 23, Question 09.02.02-2, requested that the applicant provide analyses of the aggregate effects on integrated plant operation due to the implementation of PTN DEP 2.0-2.

In its response to RAI 23, Question 09.02.02-2, dated June 24, 2011 (ADAMS Accession No. ML11178A232), the applicant included all possible system effects, which included CCS and SWS related to the increase to maximum normal wet-bulb (noncoincidental) temperature. For completeness, systems outside the scope of the SWS that are affected by the rise in the maximum normal wet-bulb (noncoincident) air temperature are provided in the applicant's response. The applicant stated the following:

- The maximum normal wet-bulb (noncoincident) air temperature for the Turkey Point Unit 6 and 7 site was calculated for expected conditions at the site and increased from the standard value of 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F).

- These changes required an evaluation of the various plant performance requirements and commitments affected by each parameter to confirm that the performance for the plant's safety and nonsafety systems remain within the bounds described in the AP1000 DCD, and if necessary, identify changes to the design that are needed to ensure that performance is restored to within acceptable bounds.

- The following sections in the AP1000 DCD describe areas that could be affected by an increase in the maximum normal wet-bulb (noncoincident) air temperature.
    - DCD Section 5.4.7.1.2.1, “Normal Residual Heat removal System – Shutdown Heat Removal”
    - DCD Section 9.1.3.1.3.1, “Spent Fuel Pool Cooling - Partial Core – Plant Shutdown”
    - DCD Section 9.1.3.1.3.2, “Spent Fuel Pool Cooling – Full Core Off-load at 120 hours”
    - DCD Section 9.2.1.2.3.4, “Service Water System – Plant Cooldown/Shutdown”
    - DCD Section 9.2.2.1.2.2, “Component Cooling Water – Normal Plant Cooldown”
    - DCD Section 9.2.2.1.2.3, “Component Cooling Water – Refueling”
    - DCD Section 9.2.7.2.4, “Central Chilled Water System – Normal Operation”
- Each of these areas has been reviewed in detail and quantitative evaluations have been performed to determine the impact of the increases in the value of maximum normal wet-bulb (noncoincident) air temperature on the aggregate performance of all affected AP1000 systems. The increase in maximum normal wet-bulb (noncoincident) air temperature requires a modification to the design of the certified AP1000 central chilled water system (VWS) design to augment the total refrigeration capacity per train in the high capacity portion of the system by 351 kilowatts (kW) (100 tons). This will be accomplished by increasing the capacity of the two air-cooled chiller units in the high capacity portion of the VWS from 1055 kW (300 tons) to 1407 kW (400 tons).
- The impacts of the increase in the value of the maximum normal wet-bulb (noncoincident) air temperature were evaluated on a system by system basis. The same type of analyses have been performed twice previously for two required increases in AP1000 standard site temperature conditions, and once to justify a departure for a specific site whose site temperature conditions exceeded standard site temperature conditions documented in the DCD.
- Performance areas discussed in the DCD that can be affected by the increase in the maximum normal wet-bulb (noncoincident) air temperature include:
    - Plant cooldown with the RNS from 176.7 °C (350 °F) to 51.7 °C (125 °F) within 96 hours
    - Maximum SWS cold water temperature at peak system heat load conditions associated with the beginning of RNS cooldown

- Normal high capacity chilled water system design and performance
- Spent fuel pool cooling and design for maximum normal wet-bulb temperature cases (full core off-loading and normal refueling cases 150 hours after shutdown)
- Steam and power conversion systems performance

Plant Cooldown with the Normal Residual Heat Removal System (RNS) (Units 6 and 7 COL FSAR, Sections 5.4.7.1.2.1, 9.2.2.1.2.2, and 9.2.2.1.2.3)

Cooldown from 176.7 °C (350 °F) to 51.7 °C (125 °F) must be accomplished within 96 hours after reactor shutdown, using both trains of RNS, CCS, and SWS. This evolution produces the peak heat duty on the cooling water systems. The basis temperature for plant cooldown performance is the maximum normal wet-bulb (noncoincident) air temperature.

Calculation Note APP-RNS-M3C-093, Revision 0, "AP1000 Plant Cooldown Performance Calculation Considering the Higher Florida Power & Light Wet-bulb Temperature," demonstrates that the Turkey Point Units 6 and 7 plants can achieve a reactor coolant temperature of 48.9 °C (120 °F) within 83.5 hours after plant shutdown, with constant wet-bulb temperature of 27.5 °C (81.5 °F).

This performance satisfies the DCD requirement to reach 51.7 °C (125 °F) within 96 hours at an ambient wet-bulb temperature equal to the maximum normal wet-bulb (noncoincident) air temperature for the site.

SWS Cold Water Temperature at Beginning of Cool down (Turkey Point Units 6 and 7 COL FSAR, Section 9.2.1.2.3.4)

The DCD states that the maximum value of SWS cold water temperature (supply temperature to CCS heat exchangers) will be equal to or less than 31.4 °C (88.5 °F) at the beginning of cooldown, 4 hours after reactor shutdown. This performance is based on the use of the maximum normal wet-bulb (noncoincident) air temperature as the basis for determining SWS cooling tower performance.

Calculation Note APP-SWS-M3C-009, Revision 1, "Service Water Temperature Variation during RNS Cooldown," provides a detailed analysis of the time dependence of SWS cold water temperature for several different ambient wet-bulb temperatures at the expected cooldown peak heat duty. The calculated cold water temperature at 4 hours after reactor shutdown, for an ambient wet-bulb temperature of 27.5 °C (81.5 °F), is 31.1 °C (87.9 °F). This value satisfies the DCD commitment.

No design changes are necessary for Units 6 and 7 to allow the SWS to produce a cold water temperature of 31.4 °C (88.5 °F) or less at the beginning of cool down, with a wet-bulb temperature of 27.5 °C (81.5 °F).

Normal HVAC and High-Capacity Chilled Water System (HCCWS) Design and Performance (Turkey Point Units 6 and 7 COL FSAR, Section 9.2.7.2.4)

The high-capacity chilled water system (HCCWS) supplies chilled water to nonsafety-related HVAC cooling components throughout the plant, including the containment recirculation cooling system (VCS).

Calculation Note APP-GW-M1C-002, Revision A, "AP1000 High Humidity HVAC Systems Design Evaluation," assesses the impact of an increase in the value of the maximum normal wet-bulb (noncoincident) air temperature on the design and performance of the HCCWS. The performance of the HCCWS is affected by the increased humidity and temperature associated with an increase in the value of this wet-bulb temperature parameter from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) at the Turkey Point site. The calculation note demonstrates that an increase in the refrigeration capacity of the HCCWS of approximately 352 kW (100 t) per train will be required to restore HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design-basis wet-bulb temperature of 26.7 °C (80.1 °F). This increased capacity will be obtained by changing the design capacity of the air-cooled chillers in the HCCWS from 1,055 to 1,407 kW (300 to 400 t).

Spent Fuel Pool Cooling Design and Performance for Maximum Normal Wet-bulb Temperature Cases (Turkey Point Units 6 and 7 COL FSAR, Sections 9.1.3.1.3.1 and 9.1.3.1.3.2)

Calculation Note APP-SFS-M3C-042, Revision 0, "SFS HX Sizing Calculation Using Florida Power and Light (Turkey Point) Increased Wet-bulb Temperatures," documents the anticipated SFS performance for these cases, which use maximum normal wet-bulb (noncoincident) air temperature as the basis for evaluation. They include a full core offloading case at 150 hours after shutdown, and a normal (fuel shuffle) refueling 120 hours after shutdown.

The calculations assume that the SFP holds 15 years (10 cycles) of spent fuel assemblies from operation of the plant with an 18-month refueling cycle, as well as the freshly discharged assemblies consistent with the respective type(s) of refueling operations just completed. For the full core offloading case, the performance requirement is to maintain SFS pool water temperature below 60 °C (140 °F) with a single train of SFS cooling and a CCS supply temperature consistent with wet-bulb temperature at the maximum normal (noncoincident) value. The calculation demonstrates that SFS pool temperature remains below 54.4 °C (130 °F) for this case. For the partial core offloading case at 120 hours, the requirement is that SFS pool temperature remain below 48.9 °C (120 °F) with two trains of SFS heat removal operating and CCS temperature consistent with maximum normal wet-bulb temperature. In this case, SFS temperature remains below 45.6 °C (114 °F).

All DCD case SFS performance requirements are satisfied with ambient wet-bulb temperature at the Turkey Point site elevated value of 27.5 °C (81.5 °F). Therefore, no changes to the plant design are required.

Steam and Power Systems Design and Performance

Westinghouse and the NuStart utilities have undertaken an effort to optimize the turbine generator and condenser designs and evaluate their performance over a range of CWS flow rates and inlet temperatures. The optimized standard condenser that has been developed for

the AP1000 will adequately accommodate the site conditions for Units 6 and 7 because the design cold water inlet temperature used for condenser and cooling tower sizing and CWS design was chosen to be 32.8 °C (91 °F). This cold water temperature is equivalent to an ambient wet-bulb temperature of between 25 °C (77 °F) and 28.9 °C (84 °F) for most cooling tower designs that are compatible with potential AP1000 sites.

Therefore, no changes to the standard AP1000 steam and power conversion systems are anticipated as a result of the increased value of the maximum normal wet-bulb (noncoincident) air temperature at the Turkey Point site.

The staff reviewed the applicant's response to RAI 23, Question 09.02.02-2, and finds it to be acceptable for the SWS as discussed below.

The applicant explained that the increase in maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) affects the RNS cooldown, maximum SWS cold water temperature at peak system heat load conditions associated with the beginning of RNS cooldown, normal high-capacity chilled water system design and performance, spent fuel pool cooling, and steam and power conversion systems performance. The staff's evaluation of these proposed changes outside the scope of the SWS is discussed in the corresponding SER sections.

Specifically for the SWS, the calculated cold water temperature at 4 hours after reactor shutdown, for an ambient wet-bulb temperature of 27.5 °C (81.5 °F), is 31.1 °C (87.9 °F). The staff finds that this value satisfies the AP1000 DCD Section 9.2.1.2.3.4 temperature value of 31.4 °C (88.5 °F) for plant cooldown/shutdown, which is the peak heat load condition.

Related to the SWS, the RNS cooldown from 176.7 °C (350 °F) to 51.7 °C (125 °F) must be accomplished within 96 hours after reactor shutdown, using both trains of RNS, CCS, and SWS. The Units 6 and 7 plants can achieve a reactor coolant temperature of 48.9 °C (120 °F) within 83.5 hours after plant shutdown, with constant wet-bulb temperature of 27.5 °C (81.5 °F). The staff finds that the 96-hour cooldown requirement is satisfied with the increased maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F).

In summary, the staff's evaluation determined that the change in the maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) is acceptable because the 96-hour cooldown requirement is satisfied. Therefore, RAI 23, Question 09.02.02-2, as it relates to SWS which supports CCS and RNS, is considered resolved.

PTN DEP 2.0-3, which increases the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) and affects SWS, CCS, and nuclear island nonradioactive ventilation system (VBS) for normal power operations, is described in detail in Sections 9.2.2 and 9.2.7 of this report. Specifically, the SWS in the AP1000 is impacted because it used cooling towers that rely on evaporative cooling. With the 0.7 °C (1.3 °F) higher safety noncoincident wet-bulb temperature, there is slightly less evaporative cooling, so the systems and components directly or indirectly cooled by the SWS will have cooling water at a slightly higher temperature.

9.2.1.5 *Post-Combined License Activities*

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

9.2.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Sections 9.2.1 and 9.2.5 of NUREG–0800. The staff based its conclusion on the following:

- PTN SUP 9.2-1 is acceptable because the staff finds that the design of the SWS cooling towers meets the requirements of NRC regulations and the acceptance criteria in Sections 9.2.1 and 9.2.5 of NUREG–0800 regarding adverse interactions between the SWS cooling towers on the Turkey Point Units 6 and 7 site.

- PTN DEP 2.0-1 is acceptable because the staff finds that that the staff's RAI related to the increase in normal safety wet-bulb (noncoincidental) air temperature has been adequately resolved. Therefore, the staff concludes that the Turkey Point Units 6 and 7 SWS, as described in Section 9.2.1 of the Turkey Point Units 6 and 7 COL FSAR, is in accordance with regulatory requirements, and is acceptable.

9.2.2 Component Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.2, "Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)")

9.2.2.1 *Introduction*

The CCS is a nonsafety-related (except for containment isolation functions), closed-loop cooling system that transfers heat from various plant components to the SWS during normal phases of operation. It removes heat from various components needed for plant operation and removes core decay heat and sensible heat for normal reactor shutdown and cooldown.

The CCS is arranged into two trains of components and piping. Each train includes one component cooling water pump and one component cooling water HX, with the two trains taking suction from a single return header. The CCS includes a single surge tank, which accommodates thermal expansion and contraction. Component cooling water is distributed to the components by a single supply/return header with components being grouped in branch lines according to plant arrangement, with one branch line cooling the components inside containment. Loads inside containment are remotely isolated in response to a safety injection signal, which also trips the reactor coolant pumps (RCPs).

The CCS pumps are within the scope of the AP1000 Design Reliability Assurance Program (D-RAP) as described in AP1000 DCD, Table 17.4-1, "Risk Significant SSCs within the Scope of D-RAP," since these pumps provide cooling for the RNS and spent fuel pool (SFP) heat exchangers. In addition, CCS is discussed in AP1000 DCD, Table 16.3-2, "Investment

Protection Short-Term Availability Controls," for Modes 5 and 6 to support RNS cooling with the RCS open (SER Section 2.3).

9.2.2.2 *Summary of Application*

The Turkey Point Units 6 and 7 COL FSAR, Section 9.2 incorporates by reference Section 9.2 of the AP1000 DCD.[1] Section 9.2 of the DCD includes Section 9.2.2. In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2 and in Turkey Point Units 6 and 7 COL Part 7, the applicant provided the following:

Tier 1 and Tier 2 Departure and Exemption Request

- PTN DEP 2.0-3

The Tier 1 departure (DEP) request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.1 °C (86.1 °F). The Tier 2 departure was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

In Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2.1, the applicant stated that the first bulleted item in the criteria for normal operation in AP1000 DCD Section 9.2.2.1.2.1 would be replaced with the following information:

> The component cooling water supply temperature to plant components is not more than 100 °F assuming a 100-year return estimate of 2-hour duration wet-bulb temperature of 87.4 °F for service water cooling (per Table 2.0-201).

In addition, the applicant proposed to add the following to Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2.1 in a letter dated April 23, 2013 (ADAMS Accession No. ML13115A176):

> The most limiting component cooled by the CCS, the RCP motor cooling system, has been designed to operate for at least 6 hours continually with cooling water supplied at temperatures up to 100 °F.
>
> The performance of the standard AP1000 CCS and SWS for single cooling water train, full power operation at a maximum safety wet-bulb temperature of 87.4 °F has demonstrated the highest CCS temperature achieved at these conditions is 97.4 °F, for a period of less than 2 hours. As ambient wet-bulb temperature decreases, the CCS temperature follows and will return to below 95 °F with ambient wet-bulb temperature slightly lower than 84 °F, assuming nominal performance of both the CCS and SWS. Since the definition of the maximum normal wet-bulb temperature value is the seasonal 1 percent exceedance value observed at the site, the annual total operating time for which CCS temperature could exceed 95 °F is less than 30 hours per year, for periods of a few hours at most. The maximum CCS temperature of 97.4 °F is bounded by the maximum allowable cooling water temperature for Reactor Coolant Pumps (the most limiting component) and the increase in maximum safety wet-bulb temperature is therefore acceptable on this basis.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.d. Specifically, the Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is evaluated in Section 2.0.4 of this SER.

9.2.2.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

While the CCS is a nonsafety-related system, it supports the normal (defense-in-depth) capability of removing reactor and spent fuel decay heat, it is part of the first line of defense for reducing challenges to passive safety systems in the event of transients and plant upsets, and its cooling function is important for reducing shutdown risk when the RCS is open (e.g., midloop condition). The risk importance of the CCS makes it subject to RTNSS in accordance with the Commission's policy for passive reactor plant designs.

The staff's evaluation of the changes that are proposed focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for RTNSS; the capability of the CCS to perform its defense-in-depth and RTNSS functions; and the adequacy of ITAAC, test program specifications, and availability controls that have been established for the CCS.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the CCS are given in Section 9.2.2 of NUREG–0800.

9.2.2.4 *Technical Evaluation*

The staff reviewed Section 9.2.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 and Tier 2 Departure and Exemption Request

- PTN DEP 2.0-3

Turkey Point Units 6 and 7 COL FSAR, Section 9.2.2 and Turkey Point Units 6 and 7 COL Application Part 7 state that the maximum safety wet-bulb (noncoincident) air temperature for the Turkey Point Units 6 and 7 site was re-evaluated and increased from the standard AP1000 DCD value of 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) to reflect expected site maximum temperature conditions. This change requires that an evaluation be performed for the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000

DCD. The CCS was one of those systems that were affected; therefore, the departure was reflected in both the FSAR and Part 7 of the Turkey Point Units 6 and 7 COL application. The staff's evaluation of this proposed change is also discussed in Sections 2.0, 2.3.1, and 9.2.7 of this SER.

The AP1000 is impacted because it used cooling towers that rely on evaporative cooling. With the 0.7 °C (1.3 °F) higher safety noncoincident wet-bulb temperature, there is slightly less evaporative cooling, so the systems and components directly or indirectly cooled by the SWS will have cooling water at a slightly higher temperature.

The staff evaluated this departure and determined there was a lack of information to support this change to the CCS bounding temperature of 37.8 °C (100 °F). Therefore, the staff, in Letter No. 22, RAI 5403, Question 09.02.02-1, requested additional information related to this change in the maximum safety wet-bulb (noncoincident) temperature and the overall effects to various systems including CCS and SWS.

The applicant's response to RAI 5403, Question 09.02.01-1, dated June 24, 2011 (ADAMS Accession No. ML11178A231), included details related to all possible system effects, which included CCS and SWS with the increase to maximum safety wet-bulb (noncoincident) air temperature. The applicant in its response stated the following:

- The maximum safety wet-bulb (noncoincident) air temperature for the Turkey Point Units 6 and 7 site was calculated for expected conditions at the site and increased from the standard value of 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F).

- The limiting temperature performance for the CCS and SWS occurs during normal power operation, with the site ambient wet-bulb temperature assumed to be at the maximum safety wet-bulb (noncoincident) value. The AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature was originally defined to be the annual "0% exceedance" value measured at or calculated for the site. This measure of temperature is based on the maximum observed wet-bulb temperature value reached at a site, excluding periods of higher temperature extending less than 2 hours duration. For Turkey Point Units 6 and 7, the site maximum safety wet-bulb (noncoincident) air temperature value is defined as the 100-year return value for this parameter, excluding peaks of less than 2 hours duration.

- The original AP1000 design criterion for CCS and SWS performance was that the maximum CCS supply temperature should not exceed 35 °C (95 °F) for normal plant power operation with a single train of cooling water systems in service and ambient wet-bulb temperature at the maximum safety wet-bulb (noncoincident) air temperature value. Increases in the value of the standard site maximum safety wet-bulb (noncoincident) air temperature from 27.2 °C (81 °F) to 29.7 °C (85.5 °F) and finally (in DCD Revision 17) to 30.1 °C (86.1 °F) have been made to include a larger number of candidate sites within the standard site temperature envelope for AP1000 and are reflected in the current revision of the AP1000 DCD (Revision 19). The most limiting component cooled by the CCS, the RCP motor cooling system, has been designed to operate for at least 6 hours continuously with cooling water supplied at temperatures up to 37.8 °C (100 °F),

as a result of the increases in CCS temperature above 35 °C (95 °F) associated with the previous increases in limiting wet-bulb temperature. Each RCP is provided with four safety-related temperature sensors to monitor the stator cooling water temperature. These sensors generate a high temperature alarm when stator cooling water temperature rises above the normally expected operating range, and produce a reactor trip and RCP trip to protect the pumps if stator water temperature continues to rise beyond the trip setpoint. Operators monitor the cooling water temperature to verify that the RCPs are operating within normal temperature bounds at high ambient wet-bulb air temperature conditions.

- Calculation note TPG-CCS-M3C-001, Revision 0, *Turkey Point Units 6 and 7 Performance Evaluation using Elevated Maximum Non-Coincident Safety Wet-bulbTemperature* documents the performance of the standard AP1000 CCS and SWS for single cooling water train, full power operation at the higher maximum safety wet-bulb (noncoincident) air temperature of 37.8 °C (87.4 °F). The highest CCS temperature achieved at these conditions is 36.3 °C (97.4 °F) consistent with the maximum duration of the highest site ambient wet-bulb temperature. The SWS cooling water supply temperature assumed for this evaluation was determined in calculation note TPG-SWS-M3C-001, Revision 0, *Turkey Point Units 6 and 7 Cooling Tower Performance Evaluation Using Elevated Maximum Normal and Maximum Safety Wet-bulb Temperatures.* At the highest assumed value of wet-bulb temperature 37.8 °C (87.4 °F) the predicted value of SWS cold water temperature with the plant operating at full power is 33.2 °C (91.8 °F), which is lower than the DCD required upper limit of 34.2 °C (93.5 °F) for this value.

- As ambient wet-bulb temperature decreases, the SWS and CCS temperatures follow. CCS supply temperature will fall below 35 °C (95 °F) with ambient wet-bulb temperatures slightly lower than 28.9 °C (84 °F), assuming nominal performance of both the CCS and SWS. Since the definition of the maximum normal wet-bulb (noncoincident) air temperature value is the seasonal 1% exceedance wet-bulb temperature value observed at the site, the annual total operating time for which CCS temperatures could exceed 35 °C (95 °F) is less than 30 hours per year, for periods of a few hours at most. The maximum CCS temperature of 36.3 °C (97.4 °F) expected for Turkey Point Units 6 and 7 is well below the maximum allowable cooling water temperature of 37.8 °C (100 °F) for Reactor Coolant Pumps (the most limiting component) and the increase in maximum safety wet-bulb (noncoincident) air temperature for Turkey Point Units 6 and 7 is therefore acceptable on this basis.

- No changes to the design of the CCS or SWS are required for Turkey Point Units 6 and 7 to meet the DCD requirement that CCS temperature remains below 38 °C (100 °F for normal power operation.

- The RTNSS function of the CCS and SWS is to remove decay heat during Mode 5 (cold shutdown) and Mode 6 (refueling) with reduced RCS inventory operations. Heat removal performance is reduced by increases in ambient wet-bulb temperature that cause increases in SWS cold water temperature and CCS

supply temperature. However, the total heat duty of the CCS and SWS is significantly lower during this mode of operation, as compared to the normal power or cooldown modes, because there is essentially no sensible heat to remove from the RCS and the core decay heat level is low. Primary plant component heat loads are also very small because no RCPs are in operation. Any slight increase in ambient wet-bulb temperature will not compromise the heat removal capability of the CCS and SWS. The impact of an increase in the applicant's maximum safety wet-bulb temperature from 30.1 °C (86.1 °F) to 30.8 °C (87.4 °F) on the RTNSS performance of the CCS and SWS is therefore acceptable. No changes are needed to the SWS or CCS Investment Protection Short Term Availability Control (IPSAC) requirements for the Turkey Point Units 6 and 7 as a result of the increased value of maximum safety ambient wet-bulb (noncoincident) air temperature.

- RCS cooldown from 176.6 °C to 51.7 °C (350 °F to 125 °F) must be accomplished within 96 hours after reactor shutdown, as addressed under RAI 5492, Question 09.02.02-2.

The staff reviewed the applicant's response to RAI 5403, Question 09.02.02-1, and finds it to be acceptable for the CCS as discussed below.

The increase of maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) is seasonal and affects the CCS only during normal operations. This results in the highest CCS temperature of 36.3 °C (97.4 °F), for a period of less than 2 hours and, at the most, estimated to occur 30 hours per year. In addition, as ambient wet-bulb temperature decreases, the CCS temperature follows and will return to below 35 °C (95 °F), which is well below the normal operational temperature of the CCS in AP1000 DCD, Section 9.2.2.1.2.1, which states that the normal CCS supply temperature to plant components is not more than 37.8 °C (100 °F). Also, the most limited components cooled by CCS are the RCP's motor coolers, and they have been designed to operate for at least 6 hours continually with cooling water supplied at temperatures up to 37.8 °C (100 °F). Each RCP is provided with four sensors to monitor the stator cooling water temperature. These sensors generate a high-temperature alarm when stator cooling water temperature rises above the normally expected operating range, and produce trips to protect the pumps if stator water temperature continues to rise beyond the trip setpoint.

Related to CCS and its ability to support defense in depth, RTNSS, and cooldown of the reactor using RNS, the change to the maximum safety wet-bulb (noncoincident) air temperature affects only normal operations (at power). RNS cooldown does not utilize the maximum safety wet-bulb temperature but uses maximum normal wet-bulb air temperature. The RNS cooldown related to maximum normal wet-bulb (noncoincident) air is discussed in Section 9.2.1 of this report.

In summary, the staff's evaluation determined that the change in the maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) is acceptable; therefore, Question 09.02.02-1, as it relates to CCS and SWS, is considered resolved. The staff has confirmed that the described changes appear in the revised version of the Turkey Point Units 6 and 7 COL FSAR and Part 7 of the application. No further changes to the Units 6 and 7 COL application text are required for PTN DEP 2.0-3.

The staff also confirmed that the applicant updated these figures on the revised Turkey Point Units 6 and 7 COL FSAR.

The staff's evaluation of the appropriateness of the 30.8 °C (87.4 °F) value for the Turkey Point Units 6 and 7 site is in Section 2.3 of this SER. The staff's evaluation of the effects that this higher temperature has on the operation of the AP1000 design is addressed in Sections 2.0, 2.3.1, 5.4, 6.2, 6.4, 9.1.3, and 9.2.7 of this SER.

Related information for PTN DEP 2.0-2, which increases the maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F), and affects SWS, CCS, and RNS performance for plant cooldown/shutdown, is described in detail in SER Section 9.2.1.

9.2.2.5 *Post-Combined License Activities*

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

9.2.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR meets the relevant acceptance criteria provided in Section 9.2.2 of NUREG–0800. The staff based its conclusion on the following:

- PTN DEP 2.0-3 is acceptable because the staff determined that the applicant's RAI response related to the increase in maximum safety wet-bulb (noncoincident) air temperature has been adequately resolved. Therefore, the staff concludes that the Turkey Point Units 6 and 7 CCS, as described in Section 9.2.2 of the Turkey Point Units 6 and 7 COL FSAR, is acceptable. In addition, the staff concludes that the exemption meets the requirements in 10 CFR Part 52, Appendix D, VIII.A.4, and is therefore acceptable.

9.2.3 Demineralized Water Treatment System

The demineralized water treatment system (DTS) provides the required supply of reactor coolant purity water to the demineralized water transfer and storage system. This system does not perform any safety-related function or accident mitigation, and its failure would not reduce the safety of the plant.

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.2.3, "Demineralized Water Treatment System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding

information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.2.4 Demineralized Water Transfer and Storage System

The demineralized water transfer and storage system supplies demineralized water to fill the condensate storage tank and to the plant systems that demand a demineralized water supply. This system has no safety-related function other than containment isolation, and its failure does not affect the ability of safety-related systems to perform their safety-related functions.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.2 incorporates by reference, with no departures or supplements, Section 9.2.4, "Demineralized Water Transfer and Storage System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.2.5 Potable Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, "Potable and Sanitary Water Systems")

9.2.5.1 *Introduction*

The potable water system (PWS) supplies clean water from a site-specific water system for domestic use and human consumption. The site-specific water system for Turkey Point Units 6 and 7 is the Miami-Dade Water and Sewer Department (MDWASD) potable water supply, which is further described below under PTN COL 9.2-1. This is a nonsafety-related system, with the exception of the main control room (MCR) boundary penetration, which includes design provisions for controlling the release of water containing radioactive material and preventing contamination of the PWS. A loop seal in the safety-related PWS piping that penetrates the MCR envelope boundary prevents unfiltered air in-leakage into the MCR envelope.

9.2.5.2 *Summary of Application*

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.5, "Potable Water System," which addresses Section 9.2.4, "Potable and Sanitary Water Systems," of NUREG-0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 9.2-1

The applicant provided additional information in PTN COL 9.2-1 to address COL Information Item 9.2-1 identified in Table 1.8-202, "COL Item Tabulation."

Turkey Point Units 6 and 7 COL FSAR, Sections 9.2.5.2.1, "General Description," and 9.2.5.3, "System Operation," provided additional information concerning the source of water for the PWS.

> Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5.2.1 was modified to state that the source of water for the potable water system is the MDWASD potable water supply.
>
> Turkey Point Units 6 and 7 COL FSAR, Section 9.2.5.3 was modified to state that the Miami-Dade Water and Sewer Department (MDWASD) potable water supply system provides filtered and disinfected water to the potable water distribution system. The MDWASD potable water supply system maintains the required pressure throughout the potable water distribution system. The source of potable water meets the [U.S. Environmental Protection Agency] EPA drinking water standards. No biocide or other water treatment is required.

9.2.5.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the PWS are given in Section 9.2.4 of NUREG–0800.

The regulatory basis for the review of the COL information item is established in 10 CFR Part 50, Appendix A, GDC 60, "Control of Releases of Radioactive Materials to the Environment."

9.2.5.4 *Technical Evaluation*

The staff reviewed Section 9.2.5 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the PWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 9.2-1

The applicant provided additional information in PTN COL 9.2-1 to resolve COL Information Item 9.2-1. COL Information Item 9.2-1 states:

> The Combined License applicant will address the components of the potable water system outside of the power block, including supply source required to meet design pressure and capacity requirements, specific chemical selected for use as a biocide, and any storage requirements deemed necessary. A biocide such as sodium hypochlorite is recommended. Toxic gases such as chlorine are not recommended. The impact of toxic gases on the main control room habitability is addressed in Section 6.4.

The staff reviewed the information provided by the applicant to address COL Information Item 9.2-1 on the source of water for the PWS included under Sections 9.2.5.2.1, 9.2.5.3, and 9.2.12.1 of the Turkey Point Units 6 and 7 COL FSAR.

The staff finds that the MDWASD potable water supply system provides filtered and disinfected water to the potable water distribution system. Since the source of potable water meets EPA standards, no biocide or other water treatment is required. Since there is no chemical treatment of the PWS on site, there are no toxic gases of concern related to the MCR habitability.

In addition, the MDWASD potable water supply source maintains the required pressure for the Turkey Point Units 6 and 7 PWS distribution system and capacity requirements from the AP1000 DCD, Section 9.2.5.1.2 are met. The PWS supply is not interconnected with any potentially radioactive system; therefore, the staff finds that GDC 60 is satisfied with respect to preventing contamination of the PWS by radioactive water.

As discussed above, the staff finds this an acceptable resolution of COL Information Item 9.2-1 because the applicant has adequately addressed the Turkey Point Units 6 and 7 potable water supply source.

9.2.5.5 *Post-Combined License Activities*

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

9.2.5.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in Section 9.2.4 of NUREG–0800. The staff based its conclusion on the following:

- PTN COL 9.2-1 is acceptable because the applicant has provided sufficient information on the source of water for the PWS to satisfy GDC 60, with respect to preventing contamination by radioactive water.

9.2.6 Sanitary Drains (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.2.4, "Potable and Sanitary Water Systems")

9.2.6.1 *Introduction*

The sanitary drain is a nonsafety-related system that collects sanitary wastes from plant restrooms and locker room facilities. The system design ensures that there is no possibility for radioactive contamination of the sanitary drains.

9.2.6.2 *Summary of Application*

Section 9.2 of the Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.6, "Sanitary Drains," which addresses Section 9.2.4, "Potable and Sanitary Water Systems," of NUREG–0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.6, the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 9.2.6 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR, is reviewed in Section 21.2 of this SER.

Supplemental Information

- PTN SUP 9.2-3

The applicant provided supplemental information by adding text to the end of Section 9.2.6.2.1, "General Description," to state that sanitary waste is treated on the Units 6 and 7 plant area. The treatment facility has the capacity to treat the waste from Units 1 through 7. The liquid effluent from the sanitary treatment facility is pumped to the blowdown sump where it combines with other effluent streams.

9.2.6.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for PTN SUP 9.2-3 are given in Section 9.2.4 of NUREG–0800.

The regulatory basis for the review of the COL information item is established in 10 CFR Part 50, Appendix A, GDC 60.

9.2.6.4 *Technical Evaluation*

The staff reviewed Section 9.2.6 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to sanitary drains. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Supplemental Information

- PTN SUP 9.2-3

The staff reviewed the location of the waste treatment plant included under Section 9.2.6.2.1 of the Turkey Point Units 6 and 7 COL FSAR. In Section 9.2.6.2.1 of the Turkey Point Units 6 and 7 COL FSAR, the applicant proposes an onsite sewage treatment plant for the treatment of sanitary waste. Treated effluent from the sanitary waste system is discharged to the blowdown sump where it combines with other effluent streams. The AP1000 DCD states that there are no interconnections between the sanitary drainage system and systems having the potential for containing radioactive material, and the sanitary drainage system does not service facilities in radiologically controlled areas. Therefore, the staff finds the proposed location of the waste treatment plant acceptable as it satisfies the requirements of GDC 60, with respect to preventing contamination by radioactive water.

9.2.6.5 *Post-Combined License Activities*

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

9.2.6.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the requirements of NRC regulations and the acceptance criteria in NUREG–0800, Section 9.2.4. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.

- PTN SUP 9.2-3 is acceptable because the applicant has provided sufficient information on the location of the waste treatment plant to satisfy GDC 60, with respect to preventing contamination by radioactive water.

9.2.7 Central Chilled Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.2.2, "Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)")

9.2.7.1 *Introduction*

The plant's HVAC systems require chilled water as a cooling medium to satisfy the ambient air temperature requirements for the plant. The VWS supplies chilled water to the HVAC systems and is functional during reactor full-power and shutdown operation. The VWS provides chilled water to the cooling coils of the supply air handling units and unit coolers of the plant HVAC systems. It also supplies chilled water to the liquid radwaste system (WLS), gaseous radwaste system, secondary sampling system, and the temporary air supply units of the containment leak rate test system. The VWS is nonsafety related (except that the containment isolation interface is safety related).

The VWS consists of two closed loop subsystems: a high cooling capacity subsystem and a low cooling capacity subsystem. The HCCWS is the primary system used to provide chilled water to the majority of plant HVAC systems and other plant equipment requiring chilled water cooling. The low capacity chilled water subsystem (LCCWS) is dedicated to the nuclear island VBS, which includes the MCR, and the chemical and volume control system (CVS) makeup pump and normal residual heat removal pump compartment unit coolers.

The HCCWS consists of chilled water pumps, water-cooled chillers, air-cooled chillers, a chemical feed tank, an expansion tank, and associated valves, piping, and instrumentation. The LCCWS consists of two 100-percent-capacity chilled water loops. Each loop consists of a chilled water pump, an air-cooled chiller, an expansion tank, and associated valves, piping, and instrumentation.

The VWS pumps and chillers for the low capacity subsystem are within the scope of the AP1000 D-RAP as described in AP1000 DCD, Table 17.4-1, "Risk Significant SSCs within the Scope of D-RAP," since these pumps and chillers provide cooling to the CVS makeup pump room. The pumps and chillers are important components of the VWS.

9.2.7.2 *Summary of Application*

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.7. In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2 and in Turkey Point Units 6 and 7 COL Part 7, the applicant provided the following:

Tier 1 and Tier 2 Departures and Exemption Request

The applicant proposed the following Tier 1 and Tier 2 departures from the AP1000 DCD:

- PTN DEP 2.0-3

The Tier 1 departure request is from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature, which is 30.6 °C (86.1 °F). The Tier 2 DEP was requested because this site parameter value is also listed as the maximum safety wet-bulb (noncoincident) air temperature in AP1000 DCD Tier 2, Table 2-1.

For Section 9.2.7, no departures or supplements were identified in Revision 3 of the Turkey Point Units 6 and 7 COL FSAR; however, based on its response to RAI 22, Question 09.02.02-1, dated June 24, 2011, additional information was provided by the applicant as part of PTN DEP 2.0-3 which is related to the LCCWS.

The exemption request related to the AP1000 DCD maximum safety wet-bulb (noncoincident) air temperature involves an exemption to 10 CFR Part 52, Appendix D, Section IV.A.2.d. Specifically, the Units 6 and 7 applicant requested an exemption from a site parameter value provided in AP1000 DCD Tier 1, Table 5.0-1, for the maximum safety wet-bulb (noncoincident) air temperature. The exemption request is discussed in SER Section 2.0.4.

Tier 2 Departure

- PTN DEP 2.0-2

The Tier 2 DEP request is from a site parameter value provided in AP1000 DCD Tier 2, Table 2-1, for the maximum normal wet-bulb (noncoincident) air temperature. AP1000 DCD Tier 2, Table 2-1, identified this value as 26.72 °C (80.1 °F). The proposed revised value is 27.5 °C (81.5 °F). The corresponding site characteristic value is 27.5 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.78 °C (1.4 °F). This change requires an evaluation of the various plant performance requirements and commitments affected by this parameter to confirm that the performance of the plant's safety systems remains within the bounds described in the AP1000 DCD. The VWS is one system affected; therefore, the departure was reflected in both the Turkey Point Units 6 and 7 COL FSAR and Part 7 of the Turkey Point Units 6 and 7 COL application. The staff's evaluation of this proposed change is also discussed in Sections 5.4.7, 9.1.3, and 9.2.7.

Replace the paragraph in DCD Section 9.2.7.2.1, "General Description," with the following paragraph:

> The high capacity subsystem consists of two 80-percent capacity chilled water pumps, two 20-percent capacity chilled water pumps, two 80-percent capacity water-cooled chillers, two 20 percent air-cooled chillers, a chemical feed tank, an expansion tank, and associated valves, piping, and instrumentation. The subsystem is arranged in two parallel mechanical trains with common supply and return headers. Each train includes one 20-percent capacity pump, one 80-percent capacity pump, one 20-percent capacity chiller, and one 80-percent capacity chiller. A cross-connection at the discharge of each pump allows for each to feed a given chiller of matching capacity.

Based on a letter dated April 23, 2013 (ADAMS Accession No. ML13115A176), additional information was added by the applicant as part of PTN DEP 2.0-2, as described below:

> Add the following information at the end of the first paragraph under "Normal Operation" in DCD Subsection 9.2.7.2.4.
>
> The increased heat load produced by operation at the higher Turkey Point Units 6 and 7 maximum safety ambient wet-bulb temperature of 87.4 °F can be accommodated within the available capacity margin of the chiller units, without impacting the VWS low capacity subsystem or supporting systems design or plant operation. Cooling coil design calculations indicate that during operation at the standard plant design temperatures (115 °F dry bulb, 86.1 °F wet-bulb), the VBS air handling unit has cooling coil and system margin.

Modify Table 9.2.7-1R, "Component Data- Central Chilled Water System," with the following information:

> Air-Cooled Chillers: Capacity 400 nominal tons, Maximum power input 500 kW

9.2.7.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

Although the VWS is nonsafety-related, the LCCWS provides chilled water for cooling safety-related and defense-in-depth equipment rooms. The staff's evaluation of the changes that are proposed focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for RTNSS, the capability of the VWS to perform its RTNSS and defense-in-depth cooling functions, and the adequacy of ITAAC, test program specifications, and RTNSS availability controls that have been established for the VWS.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the CCS are given in Section 9.2.2 of NUREG–0800.

9.2.7.4 *Technical Evaluation*

The staff reviewed Section 9.2 of the Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff

confirms that the information in the application and incorporated by reference addresses the required information relating to the CCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Tier 1 Departure

Related to PTN DEP 2.0-3, maximum safety wet-bulb (noncoincident) air temperature increased from the standard AP1000 DCD value of 30.06 °C (86.1 °F) to 30.78 °C (87.4 °F), the staff evaluated this departure for the VWS and determined there was a lack of information to support this change. Therefore, in RAI 22, Question 09.02.02-1, the staff requested additional information related to this change in the maximum normal wet-bulb (noncoincident) air temperature and the overall effects to various systems, including the CCS, SWS, and VWS.

In its response to RAI 22, Question 09.02.02-1, dated June 24, 2011 (ADAMS Accession No. ML11178A231), the applicant included all possible system effects, which included CCS, SWS, and VWS, related to the increase to maximum safety wet-bulb (noncoincident) air temperature.

- The nuclear island non-radioactive VBS is the only HVAC system that is designed to accommodate the maximum safety temperature limits. The LCCWS also uses the maximum safety temperature limits (dry and wet-bulb) as its design basis temperatures. The remainder of the HVAC systems are designed to accommodate the maximum normal temperature limits (1% exceedance values), including the HCCWS.

- The VBS maintains the safety-related heat sink temperatures and is designed with two 100 percent capacity subsystems. The VBS is served by the LCCWS exclusively. The LCCWS also serves the RNS and CVS pump room coolers. The nominal refrigeration capacity of each of the air-cooled chillers used in the LCCWS is 1055 kW (300 tons) at an ambient dry bulb temperature of 46.1 °C (115 °F).

- Calculation assesses the impact of changes in both maximum safety and maximum normal ambient wet-bulb temperature on the design and performance of the HCCWS and LCCWS. It assumes that maximum ambient wet-bulb temperature increases to 30.8 °C (87.4 °F) and maximum normal ambient wet-bulb temperature increases to 27.5 °C (81.5 °F).

- The increased heat load produced by operation at the higher Turkey Point Units 6 and 7 maximum safety ambient wet-bulb temperature of 30.8 °C (87.4 °F) can be accommodated within the available capacity margin of the chiller units, without impacting the LCCWS or supporting systems' design or plant operation. Since the LCCWS chillers are air-cooled, their performance is not affected by changes in wet-bulb temperature. Cooling coil design calculations indicate that during operation at the standard plant design temperatures 46.1 °C (115 °F) dry bulb, 30.1 °C (86.1 °F) wet-bulb, the VBS air handling unit has cooling coil and system margin.

- At the Turkey Point Units 6 and 7 site design temperatures of 44.4 °C (112 °F) dry bulb, 30.8 °C (87.4 °F) wet-bulb, the off coil temperatures for VBS do not change, based on the results of supplier coil performance calculations. Therefore, the MCR temperature and humidity at the higher site outside air wet-bulb temperature will remain at or below their desired design points during normal operation.

- No changes are needed in the AP1000 LCCWS design. Since these chillers are also air-cooled, their performance is not affected by changes in wet-bulb temperature. Therefore, the existing, standard air-cooled chillers and the associated VBS both perform acceptably at the increased Turkey Point Units 6 and 7 site maximum safety ambient wet-bulb temperature of 30.8 °C (87.4 °F).

The nuclear island nonradioactive VBS provides normal ventilation to the nuclear island including the control room and safety-related battery rooms. Although the system cools areas that contain safety-related components during normal operation, it is a nonsafety system. The associated safety-related habitability system, which relies on passive features, is designed to the maximum safety dry-bulb temperature, so it is unaffected by this exemption. The nuclear island nonradioactive VBS is affected because the higher wet-bulb temperature results in the higher heat load for the chillers.

The staff finds the applicant's response to RAI 22, Question 09.02.02-1, with respect to the VWS (HCCWS) because the increase of maximum safety wet-bulb (noncoincident) air temperature from 30.06 °C (86.1 °F) to 30.8 °C (87.4 °F) affects only the LCCWS air-cooled chillers.

Based on an audit of Turkey Point Units 6 and 7 HVAC calculations, the original chiller size based on the previous design wet-bulb air temperature resulted in a required rating of 577 kW (164 t). The revised calculated value including the revised wet-bulb air temperature resulted in a required rating of 641 kW (182 t). Based on calculations, no modifications are required to the existing specified chiller tonnage since the nominal refrigeration capacity of each of the LCCWS is 1,055 kW (300 t) at an ambient dry-bulb air temperature of 46.1 °C (115 °F); therefore, adequate margin is still maintained. Also, the MCR temperature and humidity at the higher Turkey Point Units 6 and 7 site outside air wet-bulb temperature will remain at or below their desired design points during normal operation. In addition, the VBS air handling unit has a cooling coil and system margin.

As previously stated, the LCCWS is within the scope of the AP1000 D-RAP because these pumps and chillers provide cooling to the CVS makeup pump room. The pumps and chillers are important components of the VWS. The increase in the maximum safety wet-bulb (noncoincident) air temperature of 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) will not negatively affect or compromise the heat removal capability of the VWS since adequate margin remains between the capacity of each chiller and the calculated heat load.

In summary, the staff's evaluation determined that the change in the increase of maximum safety wet-bulb (noncoincident) air temperature from 30.1 °C to 30.8 °C (86.1 °F to 87.4 °F) affecting the LCCWS is acceptable; therefore, RAI 22, Question 09.02.02-1, as it relates to the

VWS, is considered resolved. The staff confirmed that the revised Turkey Point Units 6 and 7 COL FSAR has made the changes described in the April 23, 2013, letter.

Tier 2 Departure

- PTN DEP 2.0-2

The applicant, in PTN DEP 2.0-2, evaluated the DCD site parameter value for the maximum normal air temperature wet-bulb (noncoincident) in DCD Tier 2, Table 2-1, and proposed to increase the corresponding site characteristic value from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) to reflect expected site conditions. The corresponding site characteristic value is 27.4 °C (81.5 °F) as reported in Turkey Point Units 6 and 7 COL FSAR, Section 2.3.1.5. This site characteristic exceeds the DCD site parameter by 0.7 °C (1.4 °F).

The increase in wet-bulb temperature will impact the standard plant design of the HCCWS. To accommodate the impact of the higher wet-bulb temperature on HVAC margins, the size of the air-cooled chillers in the HCCWS will be increased. The current HCCWS has two 5,982-kW (1,700-t) water-cooled chillers coupled with two 300-t (1,055-kW) air-cooled chillers. Replacing the two 300-t (1,055-kW) air-cooled chillers with 400-t (1,407-kW) air-cooled chillers will maintain adequate HVAC design margins and allow the HCCWS to meet the increased load due to higher wet-bulb design basis. There is no impact on the performance of SSCs important to safety or to analysis methods as a result of the increase in maximum normal wet-bulb temperature.

The applicant identified that multiple areas in the Turkey Point Units 6 and 7 FSAR are affected by the departure, which includes Sections 2.0, 2.3.1.5, 9.2.1.2, and 9.2.7.2, as indicated in system tables for those systems affected. Additionally, the effects of the departure are discussed in Turkey Point Units 6 and 7 COL Application, Part 7, “Departures and Exemption Requests.”

The staff evaluated DEP 2.0-2 for the VWS and determined there was a lack of information to support this change. Therefore, the staff, in RAI 23, Question 09.02.02-2, requested additional information related to this change in the maximum normal wet-bulb (noncoincident) air temperature and the overall effects to various systems including the CCS, SWS, and VWS.

In its response to RAI 23, Question 09.02.02-2, dated June 24, 2011 (ADAMS Accession No. ML11178A232), the applicant included all possible system effects, which included CCS, SWS, and VWS, related to the increase to maximum normal wet-bulb (noncoincidental) temperature. The applicant stated the following, which is related to the VWS. The complete RAI response, including effects to other systems, is described in Section 9.2.1 of this report.

- Each of these areas has been reviewed in detail and quantitative evaluations have been performed to determine the impact of the increases in the value of maximum normal wet-bulb (noncoincident) air temperature on the aggregate performance of all affected AP1000 systems. The increase in maximum normal wet-bulb (noncoincident) air temperature requires a modification to the design of the certified AP1000 central chilled water system (VWS) design to augment the total refrigeration capacity per train in the high capacity portion of the system by 100 tons (352 kW). This will be accomplished by

increasing the capacity of the two air-cooled chiller units in the high capacity portion of the VWS from 300 tons (1055 kW) to 400 tons (1407 kW).

- The High Capacity Chilled Water System supplies chilled water to non-safety related HVAC cooling components throughout the plant, including the Containment Recirculation Cooling System (VCS).

  Calculation note APP-GW-M1C-002 Revision A, *AP1000 High Humidity HVAC Systems Design Evaluation* assesses the impact of an increase in the value of the maximum normal wet-bulb (noncoincident) air temperature on the design and performance of the HCCWS. The performance of the HCCWS is affected by the increased humidity and temperature associated with an increase in the value of this wet-bulb temperature parameter from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F) at the Turkey Point site. The calculation note demonstrates that an increase in the refrigeration capacity of the HCCWS of approximately 100 tons (1055 kW) per train will be required to restore HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design basis wet-bulb temperature of 26.7 °C (80.1 °F). This increased capacity will be obtained by changing the design capacity of the air-cooled chillers in the HCCWS from 300 (1055 kW) tons to 400 tons (1407 kW).

- Conclusion: Each of the areas discussed in departure PTN DEP 2.0-2 has been reviewed in detail, and the results of the individual evaluations are described above.

  The analyses indicate that one change to the certified AP1000 design is required to ensure that Turkey Point Units 6 and 7 meet the performance requirements and commitments potentially affected by an increase in the value of the site maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.5 °C (81.5 °F). This change is an increase in the refrigeration capacity per train for each of the two high capacity trains of the VWS. Each train's chiller capacity must be increased by 100 tons (352 kW). This capacity increase will be implemented by increasing the size of each of the two air-cooled chillers in the HCCWS from 300 (1055 kW) tons to 400 tons (1407 kW).

The increase of maximum normal wet-bulb (noncoincident) air temperature from 26.7 °C (80.1 °F) to 27.4 °C (81.5 °F) affects only the HCCWS air-cooled chillers. Therefore, the staff finds the applicant's response to RAI 23, Question 09.02.02-2, with respect to the VWS and DEP 2.0-2, acceptable.

Based on an audit of Turkey Point Units 6 and 7 HVAC calculations, the original HCCWS chiller heat load was calculated to be 7,034 kW (1,999 t). Based on the increase of normal wet-bulb air temperatures, the new HCCWS heat load was calculated to be 7,594 kW (2,158 t), an approximate 8-percent increase in system load.

The AP1000 DCD chillers were rated for only 1,738 kW (2,000 t), a 5,982-kW (1,700-t) water-cooled chiller with a 1,055-kW (300-t) air-cooled chiller. Based on calculations, a modification to increase the capacity of the existing specified chiller tonnage in the nominal air-cooled refrigeration capacity of each of the HCCWSs, from 1,055 kW (300 t) to 1,407 kW

(400 t) at an ambient dry-bulb air temperature of 46.1 °C (115 °F), is required to ensure adequate HCCWS performance to the same level as achieved by the standard AP1000 HCCWS with a design-basis wet-bulb of 26.7 °C (80.1 °F). Therefore, RAI 23, Question 09.02.02-2, is considered resolved. The staff confirms that the changes described in the applicant's April 23, 2013, letter have been made in the Turkey Point Units 6 and 7 COL FSAR.

9.2.7.5 *Post-Combined License Activities*

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

9.2.7.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria in NUREG–0800, Section 9.2.2. The staff based its conclusion on the following:

- PTN DEP 2.0-2 is acceptable because the staff determined that the applicant's information related to the increase in maximum normal wet-bulb (noncoincident) air temperature meets NRC regulatory requirements. Therefore, the staff concludes that the Units 6 and 7 VWS is acceptable.

- PTN DEP 2.0-3 is acceptable because the staff determined that the applicant's information related to the increase in maximum safety wet-bulb (noncoincident) air temperature meets regulatory requirements. Therefore, the staff concludes that the Turkey Point Units 6 and 7 VWS is acceptable.

9.2.8 Turbine Building Closed Cooling Water System

9.2.8.1 *Introduction*

The turbine building closed cooling water system (TCS) is a nonsafety-related system that provides closed-loop cooling for the removal of heat from heat exchangers in the turbine building and rejects the heat to the CWS. The system consists of two 100-percent capacity pumps, three 40-percent capacity HXs (connected in parallel), one surge tank, one chemical addition tank, and associated piping, valves, controls, and instrumentation. Backwashable strainers are provided upstream of each TCS HX. System piping is made of carbon steel, except that nonmetallic piping may be used in accordance with ASME B31.1, if justified by evaluation.

9.2.8.2 *Summary of Application*

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the DCD includes Section 9.2.8.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.8, the applicant provided the following:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The applicant provided additional information to replace conceptual design information (CDI) in Section 9.2.8 of the AP1000 DCD with information identifying the source of cooling water for the Turkey Point Units 6 and 7 TCS heat exchangers.

9.2.8.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the TCS are given in Section 9.2.2 of NUREG–0800.

9.2.8.4 *Technical Evaluation*

The staff reviewed Section 9.2.8 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the TCS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

Site-Specific Information Replacing Conceptual Design Information

- PTN CDI

The AP1000 standard plant allows the use of circulating water for removing heat from the TCS HXs. Circulating water is bracketed, which means conceptual design in the AP1000 DCD. The AP1000 DCD leaves it up to the COL applicant to specify a specific source of cooling water for plant-specific applications.

In its site-specific information, the applicant identified CWS as the source of cooling for the TCS. The staff's evaluation of the supplementary information that is provided in place of the CDI confirms that the plant-specific information is consistent with AP1000 DCD, Section 9.2.8, as approved by the staff, and is consistent with guidance in NUREG–0800, Section 9.2.2.

Therefore, the CDI that was provided for the Turkey Point Units 6 and 7 TCS is acceptable because circulating water provides an adequate water supply, which is less than 37.8 °C (100 °F), in order for the TCS to perform its intended function.

9.2.8.5 *Post-Combined License Activities*

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

9.2.8.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the acceptance criteria given in Section 9.2.2 of NUREG–0800. The staff based its conclusion on the following:

- PTN CDI is acceptable because the design of the TCS meets the guidance in Section 9.2.2 of NUREG–0800 with respect to the source of cooling water for removing heat from the TCS heat exchangers.

9.2.9 Waste Water System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.3, "Equipment and Floor Drainage System)

9.2.9.1 *Introduction*

The waste water system (WWS) collects and processes the waste water from the equipment and floor drains in the nonradioactive building areas during plant operations and outages. The WWS has no safety-related function other than MCR envelope isolation. The waste water from the turbine building sumps flows to a waste water retention basin (WWRB), if required, for settling of suspended solids and treatment before discharge. The WWRB transfer pumps discharge the basin effluent to a blowdown sump prior to discharge into deep injection wells. The design of the system precludes inadvertent discharge of radioactively contaminated drainage.

9.2.9.2 *Summary of Application*

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD. Section 9.2 of the AP1000 DCD includes Section 9.2.9, "Waste Water System," which is reviewed in accordance with Section 9.3.3, "Equipment and Floor Drainage System," of NUREG–0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2, the applicant provided the following:

AP1000 COL Information Item

- PTN COL 9.2-2

The applicant provided additional information in Turkey Point Units 6 and 7 FSAR Section 9.2-2 to address COL Information Item 9.2-2 by including additional design information to the waste water system of AP1000 DCD Section 9.2.9.2.2 and 9.2.9.5.

Supplemental Information

- PTN SUP 9.2-4

The applicant added supplemental information regarding the blowdown sump in AP1000 DCD Sections 9.2.9.2.2 and 9.2.9.5.

- PTN SUP 9.2-5

The applicant added supplemental information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2 regarding the operation of pumps discharging to the deep injection wells.

9.2.9.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the WWS are given in Section 9.3.3 of NUREG–0800.

The regulatory basis for acceptance of the COL information item is established in the following GDC of 10 CFR Part 50, Appendix A:

- GDC 4
- GDC 60

9.2.9.4 *Technical Evaluation*

The staff reviewed Section 9.2.9 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the WWS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The staff reviewed the information in the Turkey Point Units 6 and 7 COL FSAR:

AP1000 COL Information Item

- PTN COL 9.2-2

The applicant provided additional information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2-2 to resolve COL Information Item 9.2-2. COL Information Item 9.2-2 states:

> The combined license applicant will address the final design and configuration of the plant waste water retention basins and associated discharge piping, including piping design pressure, basin transfer pump size, basin size, and location of the retention basins.

The staff reviewed the resolution to Turkey Point Units 6 and 7 COL Information Item 9.2-2 with respect to the design of the plant WWRB and associated components included under Section 9.2.9.2.2, "Component Description" of the Turkey Point Units 6 and 7 COL FSAR. To address Turkey Point Units 6 and 7 COL Information Item 9.2-2, details were provided in the Turkey Point Units 6 and 7 COL FSAR for the location of the WWRB and routing configuration.

The wastewater from the WWRB is discharged into deep injection wells through a blowdown sump. The method for forwarding the wastewater from the basin to the blowdown sump is by use of two 100-percent transfer pumps. The blowdown sump inventory is then pumped to the deep injection wells. The blowdown sump pumps, downstream piping, and injection wells are part of the deep well injection system (DIS) described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.12.

In order to meet GDC 60, the applicant must demonstrate suitable control of the release of radioactive materials in liquid effluent. Upon review of PTN COL Information Item 9.2-2, the staff requested the applicant, in RAI Question 09.03.03-1 (eRAI 5080), to provide a discussion on whether all site-specific potentially radioactive fluid draining into and downstream of the water basin will be monitored prior to disposition or provide a justification for not providing radiation monitoring. The staff also requested that the applicant provide the additional details of the associated components (i.e., transfer pumps, size of basin, etc.) as requested in the COL information item.

The applicant responded to RAI Question 09.03.03-1 in a letter dated November 5, 2010 (ADAMS Accession No. ML103130131). The staff reviewed the RAI response and determined sufficient information was provided and RAI Question 09.03.03-01 is resolved, as discussed below. The response provided detailed information on radiation monitoring, level instrumentation, and components for the WWS. The applicant confirmed that the potentially contaminated fluids entering the WWRB from the turbine building sumps are monitored with a radiation monitor on common discharge piping. As indicated in the RAI response, there are several effluent lines within the scope of the certified design that bypass this radiation monitor. The RAI response clarifies that these lines do not come in contact with radioactive sources or contain radiation monitoring prior to discharge into WWRB. For Turkey Point Units 6 and 7, there are no additional site-specific system influent streams to the WWRB outside of those associated with the certified design. Wastewater can also be sampled prior to discharge from the WWRB.

The wastewater retention basin WWRB, located west of the turbine building for each unit, is a lined basin with two compartments constructed such that its contents (dissolved or suspended) do not penetrate the liner and leach into the ground. The configuration and sizing of the WWRB is to allow settling of solids larger than 10 microns that may be suspended in the wastewater stream. Each WWRB is divided into two separate compartments, which allows one compartment to be out of service while the other compartment is available. A level transmitter located in each WWRB is used to control operation of the basin transfer pumps.

The WWRB contains two 100-percent capacity transfer pumps (one per compartment). The transfer pumps are sized to meet the maximum expected influent flow and prevent overflow of the basin. In the event of oily waste leakage into the WWRB, a recirculation line is provided to recycle the oil waste and water waste from the basin to the oil separator. In the event of radioactive contamination, this same line can be used to send the contents of the basin to the WLS.

The blowdown sump accepts wastewater from both Turkey Point Units 6 and 7 units, CWS cooling tower blowdown from both units, and sanitary treatment facility. The blowdown sump is located southeast of the units near the makeup water reservoir (MWR). In the absence of CWS cooling tower blowdown, RWS supplies an alternate source of dilution water. The blowdown sump is sized and equipped with controls and instrumentation as necessary to manage the blowdown sump level without overflowing.

The locations of the WWRBs, blowdown sump, and deep injection wells are shown on Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201. The locations of the WWRBs and the blowdown sump along with site grading ensure there will be no adverse impact on safety-related or RTNSS structures, systems, or components in the event of an overflow, as indicated in PTN SUP 9.2-5.

Based on the content in the Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the RAI Question 09.03.03-01 response, the staff concludes that the design of the WWS complies with GDC 60, with respect to control of radiation release to environment.

To protect against flooding, level instrumentation is provided at the WWRB, and controls are provided for automatic or manual operation of the basin transfer pumps based on the level of the WWRB. Each unit's WWRB is located in the yard area outside of each unit's respective turbine building.

The blowdown sump, injection pumping station and associated piping to the injection wells is sized with adequate capacity to accommodate the highest expected influent flow rate to the blowdown sump without overflowing of the sump. An alarm is provided to alert operators when the water level reaches a predetermined setpoint. The blowdown sump is located southeast of the units near the MWR.

Based on the content in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the RAI Question 09.03.03-01 response, the staff concludes that the design of the WWS complies with GDC 4 with respect to flood protection. Based on the information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.9 and the response to RAI Question 09.03.03-01, the staff finds that the Turkey Point Units 6 and 7 COL FSAR adequately addresses PTN COL Information Item 9.2-2. The staff finds that GDC 4 is met based on the WWS design to prevent flooding that could affect safety-related SSCs adversely, and that GDC 60 is met, based

on the requirements for controlling the release of radioactive materials by preventing the inadvertent transfer of contaminated fluids to system portions for noncontaminated drainage. Therefore, RAI 8, Question 09.03.03-1, is closed.

Supplemental Information

- PTN SUP 9.2-4

The applicant added supplemental information regarding the blowdown sump and instrumentation in AP1000 DCD Sections 9.2.9.2.2 and 9.2.9.5. The additional content describes components in the final site design and configuration. This supplemental information is reviewed above in this SER section.

- PTN SUP 9.2-5

The applicant added supplemental information regarding the operation of pumps discharging to the deep injection wells. This supplemental information is reviewed above in this SER section.

9.2.9.5 *Post-Combined License Activities*

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

9.2.9.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the applicable guidelines of the associated acceptance criteria given in Section 9.3.3 of NUREG–0800 with respect to the WWS.

9.2.10 Hot Water Heating System

The hot water heating system is a nonsafety-related system that supplies heated water to selected nonsafety-related air handling units and unit heater in the plant during cold weather operation, and to the containment recirculation fan coil units during plant outages in cold weather.

Section 9.2 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.2.10 of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of

the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.2.11 Raw Water System

9.2.11.1 *Introduction*

Section 9.2.11, "Raw Water System," of the Turkey Point Units 6 and 7 COL FSAR describes the raw water system (RWS). The RWS provides makeup to the circulating water system (CWS) mechanical draft cooling towers, demineralized water treatment system (DTS), raw water storage tank, the fire protection system (FPS) water storage tanks, service water system (SWS) cooling tower basins, miscellaneous plant uses such as backwash, and provides dilution flow for liquid radwaste discharge. The RWS is a nonsafety-related system that provides a continuous supply of makeup water from three separate sources:

- reclaimed water supplied to the Florida Power and Light Company (FPL) reclaimed water treatment facility and MWR from the MDWASD potable water supply
- saltwater supplied from substratum radial collector wells recharged from the Biscayne Bay
- MDWASD potable water supply to the RWS storage tank

The RWS reclaimed water subsystem draws water from the makeup water reservoir for makeup to the CWS mechanical draft cooling tower basins, for filling the CWS, and for diluting liquid MWR radwaste. Major components include the FPL reclaimed water treatment facility (pumps, filters, clarifiers, and solid handling equipment), the MWR, the reclaimed makeup water pumps, piping, and screens. Each unit has three 50-percent-capacity reclaimed makeup water pumps that draw from the MWR. The reclaimed water subsystem at the pump discharge header can be cross-connected between the Turkey Point Units 6 and 7 units.

The RWS saltwater subsystem pumps water from four radial collector wells to supply water for makeup to the CWS mechanical draft cooling tower basins, for filling CWS, and for liquid radwaste dilution through the waste water system. Each unit consists of major components that include four radial collector wells, four 33-1/3-percent saltwater makeup pumps, piping, and valves. The saltwater subsystem at the pump discharge header can be cross-connected between the Units 6 and 7 units.

Finally, four RWS ancillary pumps provide MDWASD potable water from the RWS storage tank for normal makeup to the SWS cooling tower basins, supply the DTS, provide primary and secondary fire water tank fill for the FPS, and supply miscellaneous users to the Units 6 and 7 units. Major components include the one shared raw water storage tank, two 100-percent raw water ancillary pumps per unit, and associated piping. The SWS cooling tower basins rely upon makeup from the RWS storage tank in order to achieve and maintain cold shutdown conditions.

9.2.11.2 *Summary of Application*

Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR provides information concerning the RWS design basis, system description, system operation, safety evaluation, tests and

inspections, and instrumentation. The RWS was referred to in the AP1000 DCD in relation to the CWS, SWS, DTS, and FPS, but an RWS section was not included in the AP1000 DCD for the staff to evaluate.

In addition, AP1000 DCD, Table 1.7-2, "AP1000 System Designators and System Diagrams," indicates that the RWS is "wholly out of scope." The RWS is needed in order to operate the Turkey Point Units 6 and 7 units; therefore, the applicant has provided a complete description of this system in the COL FSAR.

In Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11, the applicant provided the following:

Interface Requirements

The plant interfaces for the RWS are identified in Table 1.8-203, "Summary of FSAR Discussions of AP1000 Plant Interfaces," of the Turkey Point Units 6 and 7 COL FSAR as Item 9.4, "Plant makeup water quality limits," and Item 9.5, "Requirements for location and arrangement of raw and sanitary water systems." These items are identified as "non-nuclear safety (NNS)" interfaces.

Supplemental Information

- PTN SUP 9.2-2

The applicant provided supplemental information by adding the new Section 9.2.11 after AP1000 DCD Section 9.2.10.

9.2.11.3 *Regulatory Basis*

Because the RWS was not considered within the scope of the AP1000 DCD, a regulatory basis for this system was not established for the standard plant design. The regulatory basis of the RWS for the Turkey Point Units 6 and 7 units is provided in this section.

The acceptance criteria that pertain to CWS and RWS evaluations are given in NUREG–0800, Sections 10.4.5, "Circulating Water System," 9.2.1, "Station Service Water System," 9.2.5, "Ultimate Heat Sink," 3.4.1, "Flood Protection," and 3.5, "Barrier Design for Missile Protection."

The regulatory bases and guidance for acceptance of the SUP information and interface items are established in:

- 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection against Natural Phenomena"
- 10 CFR Part 50, Appendix A, GDC 4
- RG 1.29, "Seismic Design Classification," Revision 4, Position C.2
- 10 CFR 20.1406, "Minimization of Contamination"

- SECY-94-084

9.2.11.4 ***Technical Evaluation***

The staff reviewed the information provided in Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR that describes the RWS, including the information provided by Figure 9.2-201, "Raw Water System Flow Diagram." The staff's evaluation in this section focuses primarily on RWS failure considerations and on the capability and reliability of the RWS to perform its cooldown function. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The remainder of this SER section evaluates both PTN SUP 9.2-2 and Interface Items 9.4 and 9.5.

A. GDC 2, GDC 4, and RG 1.29

The staff reviewed the information in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to confirm that RWS failures will not adversely impact the control room occupants or adversely affect SSCs that are safety-related or designated for RTNSS. Although Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.1.1, "Safety Design Basis," states that failures of the RWS or its components will not affect the ability of safety-related systems to perform their intended functions, it did not include sufficient information to adequately describe the consequences of RWS failures and to explain why safety-related SSCs are not affected. Likewise, it did not include sufficient information to explain why a failure of the RWS will not adversely affect RTNSS systems and components or impact the control room, or result in an unacceptable release of radioactive material to the environment. Because the applicant did not identify and address these considerations, the staff was unable to confirm compliance with GDC 2, GDC 4, and passive plant policy considerations, as described in SECY-94-084. Consequently, the staff requested, in RAI 5491, Question 09.02.01-2, that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to address the impact of RWS failures, including development of plant-specific ITAAC and test program specifications, as appropriate.

In a letter dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant provided a detailed response to the GDC 2, GDC 4, and ITAAC and testing questions. In its response, the applicant stated that the potential failures of the RWS and the corresponding impact on SSCs that are safety-related or AP1000 equipment Class D were considered. A summary of the applicant's response is described below.

- The RWS does not directly interface with any safety-related system as described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 and shown on Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201. The RWS storage tank is located more than 200 ft east of the nearest building or structure within the scope of the AP1000 DCD certification (DCD Figure 1.2.2 and Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201) and therefore is distant to any safety-related or RTNSS SSCs. Also, RWS piping is not routed in close proximity to any safety-related SSCs. The only RTNSS system that RWS piping is in close proximity to is the SWS.

- A resultant flood from a break in the RWS piping is bounded by the analysis for a break in the CWS piping. DCD Section 3.4.1.1.1 indicates that a failure of the CWS cooling tower, the SWS piping, or the CWS piping could result in a potential flood source. However, these potential sources are not located in close proximity to safety-related structures and the consequences of a failure in the yard would be enveloped by the analysis described in DCD Section 10.4.5 for failure of the CWS. Likewise, because the RWS storage tank is not located in close proximity to safety-related or RTNSS SSCs, including the control room, the consequences of a failure would be enveloped by the analysis described in DCD Section 10.4.5. Site grading is designed to carry water away from safety-related or AP1000 Class D SSCs.

- RWS piping, which supplies water from the RWS storage tank to RWS interface points, is routed in the yard area and inside the turbine building. Water that discharges from a break in the RWS piping prior to securing the ancillary RWS pumps could be a source of flooding in the turbine building. A break in the RWS is bounded by a break in the CWS piping. As discussed in DCD Section 3.4.1.2.2.3, the bounding flooding source inside the turbine building is a break in the CWS piping. Flow from any postulated pipe failures above DCD elevation 100’-0" (Turkey Point Units 6 and 7 equivalent plant NAVD88 elevation is 26'-0") would travel down to DCD elevation 100'-0" via floor gratings and stairwells. There is no safety-related equipment in the turbine building. The CCS and SWS components on DCD elevation 100'-0", which provides RTNSS support for the RNS, is expected to remain functional following a flooding event in the turbine building because the pump motors and valve operators are above the expected flood level. Therefore, failures of the RWS piping within the turbine building will not adversely impact any safety-related or RTNSS SSCs.

- The RWS-to-SWS interface is at the SWS makeup control valve V009, as shown in DCD Figure 9.2.1-1. The SWS piping is routed from the control valve V009 to the top of the SWS cooling tower basin. There is an air gap between the SWS cooling tower basin water level and the discharge into the basin. The air gap ensures any break upstream of the raw water makeup control valve will not result in the draining of the SWS cooling tower basin.

- The RWS provides an alternate dilution source for the WLS discharge. The RWS does not have the potential to be a flow path for radioactive fluids due to system interfaces. The liquid radwaste effluent interface is at a point in the wastewater discharge system to the deep injection wells that prevents the effluent from entering the RWS.

- In summary, failure of the RWS or its components will not affect the ability of any safety-related systems to perform their intended safety functions nor will it adversely affect any RTNSS systems. Postulated breaks in the RWS piping will not impact safety-related components, because the RWS is not located in the vicinity of any safety-related equipment and the water from the postulated break will not reach any safety-related equipment, result in physical impact to the control room, or result in a release of radioactivity to the environment.

- Because the RWS is not safety-related and its failure does not lead to the failure of any safety-related systems, the requirements of GDC 2 and GDC 4 and the guidance of NUREG–0800 Section 9.2.1, regarding safety-related systems, do not apply.

- RWS piping and structures are designed and constructed in accordance with nationally recognized codes and standards (such as American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) B31.1, "Power Piping," and American Water Works Association). Design features have been included (such as the use of material not susceptible to corrosion for buried piping, redundant pumps, and alternate power supplies) to ensure RWS is reliable and will be available to support normal plant operation and shutdown functions.

- As noted in Turkey Point Units 6 and 7 COL FSAR, Section 14.3.2.3.3, this site-specific system RWS does not meet the ITAAC selection criteria. ITAAC screening was performed for the RWS, using the screening criteria of Turkey Point Units 6 and 7 COL FSAR, Section 14.3.2.3, which concluded that ITAAC is not applicable, as indicated in Turkey Point Units 6 and 7 COL FSAR, Table 14.3-201.

- No specific technical specifications (TSs) are required for the RWS and none are applicable. TSs for the AP1000 are discussed in Units 6 and 7 COL FSAR Chapter 16 and AP1000 DCD Chapter 16, and were evaluated by the staff in NUREG–1793, Chapter 16.

- There are no availability controls for the RWS, and they are not required based on the RTNSS evaluation discussed in NUREG–1793, Chapter 22, and Westinghouse Commercial Atomic Power (WCAP)-15985, "AP1000 Implementation of the Regulatory Treatment of Nonsafety-Related Systems Process," Revision 2. Also, Turkey Point Units 6 and 7 COL FSAR, Chapter 16, and AP1000 DCD, Chapter 16, do not identify any availability requirements for RWS.

The staff finds the applicant's response to RAI Question 09.02.01-2 addresses the staff's concerns because it clarifies the design features of the RWS that prevent adverse effects and interactions with safety-related and RTNSS systems. The staff determined that failure of the RWS will not affect the ability of any safety-related systems to perform their intended safety functions nor will it adversely affect any RTNSS. Postulated breaks in the RWS piping will not impact safety-related components, because the RWS is not located in the vicinity of any safety-related equipment and water from a postulated pipe break will not reach any safety-related equipment or result in injury to occupants of the control room nor will it result in a release of radioactivity to the environment. Testing of the RWS has been properly addressed. Since the RWS is not safety related and its failure does not lead to the failure of any safety-related systems, the staff concludes that the requirements of GDC 2, GDC 4, and RG 1.29 have been satisfied; therefore, RAI Question 09.02.01-2 is resolved.

B. Cold Shutdown

The RWS is relied upon for achieving and maintaining cold shutdown conditions, which (in addition to the passive plant policy considerations discussed above in the Regulatory Basis section) is necessary for satisfying TS requirements. In particular, the RWS is relied upon for cooling the RCS from Mode 4 to Mode 5 conditions within 36 hours. The staff finds that Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 does not provide a clearly defined design basis with respect to the RWS cooldown function, and the reliability and capability of the RWS to perform this function for the most limiting situations have not been described and addressed in

this regard. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two Turkey Point Units 6 and 7 units were not described. Also, the suitability of RWS materials for the plant-specific application and measures being implemented to resolve vulnerabilities and degradation mechanisms to ensure RWS functionality over time were not addressed. Because the applicant did not adequately define and address RWS design-basis considerations with respect to its cool-down function, the staff was unable to confirm that the cool-down and policy considerations that apply to passive plant designs, as discussed in SECY-94-084, were satisfied. The staff requested, in RAI 5491, Question 09.02.01-3, that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to address the design basis regarding the reliability and capability of the RWS cool-down function, including the capability of the RWS system to supply makeup during a loss of power.

In its response dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant stated that the following was related to achieving and maintaining cold shutdown conditions:

- As described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 and shown on Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201 (Sheet 3 of 3), the RWS interfaces with the SWS. The other functions performed by RWS, as described in Section 9.2.11, do not have a direct interface with any system identified in the AP1000 DCD as safety related, designated for RTNSS, or designated as AP1000 Class D. Therefore, this response specifically focuses on the RWS interface with the SWS.

- The RWS provides a water fill/makeup function for the SWS. SWS has investment protection short-term availability controls, as described in AP1000 DCD, Table 16.3-2, which are applicable in Mode 5 with the RCS pressure boundary open and in Mode 6 with the upper internals in place or cavity level less than full. Under these conditions, the SWS is directly providing active core cooling and was evaluated by Westinghouse and determined to meet the RTNSS criteria as documented in NUREG–1793 and WCAP-15985. Unlike the SWS, the RWS does not directly provide core cooling and, as discussed in response to RAI Question 09.02.01-2, was evaluated in WCAP-15985 and determined not to meet the RTNSS criteria and not to require investment protection short-term availability controls.

- It is unlikely that a failure of RWS to provide adequate makeup flow to the SWS cooling tower basins would occur during the short time period in which the SWS is performing an RTNSS function, as described above. However, if a failure were to occur, the remaining available inventory in the service water cooling tower basins and the stored water, which is available in the additional excess volume of the secondary fire water tank, would provide ample time (more than 24 hours) to restore the RWS makeup flow or take the procedural actions necessary to exit the conditions for RTNSS applicability. Therefore, the RWS is not required to be an RTNSS system or subject to IPSAC. The RWS is designed to be a highly reliable and robust system capable of operating during a loss of normal alternating current (AC) power to provide makeup flow to the SWS under normal and abnormal conditions. Procedural controls, which provide for continued operation of the RWS or re-establishment of operations under off-normal conditions, will be described in the operating procedures, where appropriate.

- As defined in AP1000 DCD, Section 3.2.2.6, an SSC is classified as Class D when either of the following occurs:

    - The SSC directly acts to prevent unnecessary actuation of the passive safety systems.

    - The SSC supports those SSCs that directly act to prevent the actuation of passive safety systems.

  Class D has normally been applied to AP1000 SSCs that perform defense-in-depth functions. While the SWS is designated in the AP1000 DCD as a defense-in-depth, Class D system, the RWS is designated as a Class E system (DCD Table 3.2-3). The basis for this classification is:

    - A failure of the RWS will not directly cause an actuation of a passive system nor will it initiate the failure of an SSC that directly acts to prevent the actuation of a passive safety system.

    - In the unlikely event of a failure of the RWS, the inventory in the service water cooling tower basin and available stored inventory in the additional excess volume of the secondary fire water tank ensure that the SWS can maintain the required defense-in-depth cooling functions for an extended period of time.

- As described in AP1000 DCD Section 5.4.7.1.2.1, the RNS in conjunction with its associated support systems, CCS and SWS (as a support system for CCS), are used for shutdown heat removal. The RWS provides indirect support for this function by providing a source of makeup water to the SWS cooling tower basins to compensate for evaporation, drift, and blowdown.

- The RWS provides this makeup water to support the cooling requirements for the SWS. During a normal plant cooldown, the RNS and CCS reduce the temperature of the RCS from approximately 177 °C (350 °F) to approximately 52 °C (125 °F) within 96 hours after shutdown. Each unit's RWS is designed to provide ample makeup flow during these conditions using the raw water ancillary pumps.

- If cooldown to Cold Shutdown (Mode 5) is required within 36 hours to comply with a limiting condition for operation, in accordance with the TSs, heat will be transferred from the RCS via the steam generators to the main steam system for a longer period of time, allowing the RNS to be placed in service at a lower temperature with lower decay heat levels. Because of the reduced RNS heat removal requirements associated with this cold shutdown sequence, the required RWS makeup flow to the SWS cooling towers is less than normal cooldown requirements.

- An ample inventory of raw water is available to provide makeup to the SWS cooling tower basins. As noted in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.2.2.3, a raw water storage tank serving both units (note: GDC 5, "Sharing of Structures, Systems, and Components," does not apply, because the RWS is not an important-to-safety system as discussed previously) receives potable water supplied from the MDWASD. The potable water supply piping enters the Turkey Point Units 6

and 7 plant area from the north and is routed to the raw water storage tank located to the east of the two Turkey Point Units 6 and 7 units (Turkey Point Units 6 and 7 COL FSAR, Figure 1.1-201). The raw water ancillary pumps are located at grade elevation in close proximity to the above ground raw water storage tank, which continually receives makeup from the potable water supply. Should the potable water supply to the raw water storage tank be interrupted, the volume of water in the tank would provide sufficient time to temporarily supply water from another onsite water source, such as reclaimed water from the MWR. The MWR has a capacity well in excess of that needed to support cooldown to cold shutdown conditions and maintain the station in Mode 5 for more than 7 days.

RWS Design Reliability

- Underground RWS piping will be high-density polyethylene, which is not susceptible to corrosion. Therefore, periodic inspections of the underground RWS piping are not required.

- As discussed above, the lack of designation of the RWS as RTNSS or Class D indicates there is no performance requirement for the system during a loss of normal AC power or in the event of a single active failure. Nonetheless, the RWS is highly reliable based on its design. Each raw water ancillary pump can deliver makeup flow to the SWS cooling tower basins to meet demand during all modes of operation. Failure of an operating pump would not prevent the RWS from providing makeup to the SWS cooling towers. In the event of a loss of normal AC power, the raw water ancillary pumps may be manually loaded onto the appropriate diesel bus and may be manually started by the operator. The RWS, therefore, continues to maintain the capability to provide makeup water to the SWS cooling tower basins during the loss of normal AC power events.

- As discussed above, in the unlikely event that all the RWS flow to the SWS cooling towers is lost, there is ample time to identify and correct the situation or to align alternate sources of water to provide that makeup flow, and the RWS is shown not to be an RTNSS system nor subject to investment protection short-term availability controls. It is also important to note that the RNS, CCS, SWS, nor RWS are required to establish and maintain the AP1000 plant in a safe shutdown condition, since passive safety-related systems perform that function. This is explicitly recognized throughout the AP1000 DCD and NUREG–1793.

- Turkey Points Units 6 and 7 COL FSAR, Section 9.2.11 will be revised to include additional details to address the applicable system attributes requested in items-(a) through-(r) of this RAI.

The staff found that the response to RAI Question 09.02.01-3 was missing information and generated RAI Question 09.02.01-6 (eRAI 6346) to resolve the following issues:

(1) Provide the volume of the RWS storage tank. A bounding volume of the RWS storage tank could be provided to support “sufficient time to restore the potable water supply” for various flow requirements, such as power operations, support for shutdown conditions, and SWS RTNSS conditions.

(2) The flow rate of the RWS pumps was not provided and reviewed to the AP1000 required flow rate (to support RWS being adequately designed). Established AP1000 raw water makeup flow requirements can be found in the NRC's public document system at ADAMS Accession No. ML090760819.

(3) The reclaimed water connections and system line-up from the MWR to support the SWS is not clearly defined in the Turkey Point Units 6 and 7 COL FSAR (drawings or text does not show interconnections). If temporary equipment is needed for this water makeup source, provide a statement that supports "sufficient time to restore the potable water supply."

(4) Flow rate of the reclaimed makeup water pumps to support SWS makeup is not defined.

(5) Since the MWR is a backup water source for the ESWS cooling tower, describe any negative SWS system performance issues with the cleanliness of the MWR water. Describe if the SWS cooling tower efficiency is affected by the change in water supply.

The applicant responded to RAI Question 09.02.01-6 on May 14, 2012, and provided the following response for each of the five requests.

(1) The raw water storage tank minimum capacity is two million gallons. The installed available supply of makeup water to the SWS cooling tower basins would be 7571 m^3 (2,000,000 gallons) (minimum raw water storage tank inventory), plus 1439 m^3 (380,000 gallons) (secondary fire water tanks nominal volume not reserved for fire protection), plus 1741 m^3 (460,000 gallons) (minimum usable SWS cooling tower basin inventory). This represents a combined capacity of 10,751 m^3 (2,840,000 gallons). Twenty-four (24) hours from the loss of the potable water supply to the raw water storage tank should be sufficient time to either restore the supply or assess the situation and provide another source (such as the makeup water reservoir) of makeup water to the SWS cooling tower basins. At the normal makeup combined flow rate of approximately 1.68 m^3/min (370 gpm) to both units' SWS cooling tower basins with blowdowns secured, greater than 72 hours of makeup flow would be available from the raw water storage tank alone.

For the case of shutdown of both units, the maximum makeup demand occurs at the beginning of cooldown, 4 hours after reactor shutdown. The maximum combined makeup requirement for simultaneous cooldown of both units, with blowdowns secured, is approximately 4.7 m^3/min (1,250 gpm). Conservatively assuming this flow rate, a raw water storage tank minimum capacity of two million gallons can provide makeup to the SWS cooling tower basins for greater than 24 hours. In reality, the required makeup flow rate drops off significantly during the initial cooldown period and the required makeup flow rate during cooldown (96 hours) is estimated by Westinghouse to be approximately 1.68 m^3/min (444 gpm) (combined average for both units with blowdowns secured). Based on this information, there is sufficient water in the raw water storage tank alone to provide makeup for at least 2 – 3 days to support simultaneous shutdown of both units while the potable water supply is

restored to the raw water storage tank or makeup water is provided from another source.

During Modes 5 and 6 (the modes when SWS RTNSS requirements could apply) the required makeup to the SWS cooling tower basins is much lower than during normal operation or cooldown during plant shutdown. Therefore, additional time would be available to restore the potable water supply to the raw water storage tank or provide SWS cooling tower basins makeup from another source.

Assuming normal power operations, the volume of raw water that is available in the raw water storage tank with blowdown secured is beyond 72 hours. Assuming the worst case raw water makeup requirements, the volume of raw water that is available in the raw water storage tank, in support of a shutdown of both units is beyond 24 hours. For the raw water makeup support for the SWS RTNSS functions, the available raw water volume will provide beyond 72 hours. Therefore, the staff finds that the raw water storage tank will adequately support power operations, shutdown, and RTNSS functions, and in the event that the raw water storage tanks become unavailable, there is adequate time (beyond 24 hours for worst case) to manually restore water makeup to the SWS basins. In addition, there is an initial 24 hours of SWS makeup water available within SWS basins and the FPS. The applicant provided a Turkey Point Units 6 and 7 COL FSAR markup adding the volume of the raw water storage tank, and the staff finds the Turkey Point Units 6 and 7 COL FSAR markup acceptable. The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 1, and finds it acceptable. The revised version of the Turkey Point Units 6 and 7 COL FSAR incorporates the associated revision to Section 9.2.11.2.2.3 as described in the applicant's letter of May 14, 2012.

(2) Both Unit 6 and Unit 7 RWS have two (2) redundant ancillary pumps. Each of the four (4) pumps has a minimum capacity to provide 100 percent of the design maximum makeup requirement for the SWS of approximately 832 gpm which includes approximately 207 gpm for the SWS blowdown.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 2, and finds it acceptable. The Turkey Point Units 6 and 7 raw water ancillary pumps are adequately designed to the Westinghouse AP1000 design data, which is 3.1 m^3/min (830 gpm) per unit, which includes a blowdown flow of 0.78 m^3/min (205 gpm) per unit. Therefore, RAI Question 09.02.01-6, Part 2, is considered resolved.

(3) Turkey Point Units 6 and 7 FSAR, Subsection 9.2.11.2.2.3 mentions the MWR as a potential temporary source of SWS makeup water in the event that the potable water supply to the raw water storage tank is interrupted. The Turkey Point Units 6 and 7 COL FSAR section specifically identifies the MWR as a potential temporary source of SWS makeup to convey that a sufficient volume of water would be available onsite should it be needed. Mention of the MWR does not preclude the use of water from other sources that may be determined to be suitable and available. The drawings and text do not show interconnections because the MWR is only identified as a potential temporary water source. Assuming water would be supplied from the MWR, determination of what interconnections, if any, would be used to transfer water from the MWR to the SWS cooling

tower basins will be made during the detailed design. The method of water transfer currently envisioned is the use of temporary pumps and hoses without the need for permanent connections/interconnections. This method would be procedurally controlled to ensure water would only be introduced into the SWS under controlled conditions to address a temporary need and that temporary equipment as necessary would be available for deployment and use.

As discussed in the response to RAI Question 09.02.05-6, Part 1, SWS makeup from another source of water, such as water from the MWR, would not be necessary for a number of days after the potable water supply to the raw water storage tank was interrupted. Therefore, there is ample time to restore the potable water supply or take steps to provide a temporary source of SWS makeup.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 3, and finds it acceptable. The MWR is considered a potential temporary source of SWS makeup and is not to be shown on Turkey Point Units 6 and 7 COL FSAR figures. Manual operator actions, with procedural controls, using temporary pumps and hoses are expected to be utilized in the water transfer from the MWR to the SWS, if the raw water storage tank becomes unavailable. Temporary equipment would be available for deployment. Therefore, RAI Question 09.02.01-6, Part 3, is considered resolved.

(4) The maximum SWS makeup requirement is less than 6.4 m^3/min (1700 gpm) (for two units), which is relatively small compared to the capacity of the reclaimed makeup water pumps (greater than 37.9 m^3/min (10,000 gpm) anticipated). Therefore, use of the reclaimed makeup water pumps would not likely be considered to support SWS makeup because of the provisions in the permanent piping system that might be needed to accommodate the low flow condition. Procedurally controlled temporary pumps will be available (in appropriate quantity and capacity) to support SWS makeup requirements.

The staff reviewed the applicant's response to RAI 53, Question 09.02.01-6, Part 4, and finds it acceptable. The applicant stated in the response to item 3 above that temporary pumps would be utilized. The reclaimed makeup water pumps would not likely be used to support SWS makeup in the event that the raw water storage tank becomes unavailable. Therefore, RAI 53, Question 09.02.01-6, Part 4, is considered resolved.

(5) Turkey Point Units 6 and 7 COL FSAR, Subsection 9.2.11.2.2.3 mentions the MWR as a potential temporary source of SWS makeup water in the event that the water supply to the raw water storage tank is interrupted. The Turkey Point Units 6 and 7 COL FSAR section specifically identifies the MWR as a potential temporary source of SWS makeup to convey that a sufficient volume of water would be available onsite should it be needed. Mention of the MWR does not preclude the use of water from other sources that may be determined to be suitable and available.

However, in the event a temporary source of SWS makeup water is needed and the MWR is used as the source, any negative impact to the

> SWS cooling tower performance would not be significant during the short term use.
>
> While the potable water supplied to the raw water storage tank is of higher quality than the water stored in the MWR, water from the MWR should be of sufficient quality for short term use in the SWS cooling towers. Finalization of the design will provide for additional treatment of the MWR water and/or another source that can supply sufficient water with acceptable chemistry, as necessary. The SWS includes permanent strainers and chemical injection to assist in controlling water quality. Additionally, during temporary operation with water from the MWR or another source, the SWS cooling towers would be subjected to heat loads lower than design capacity.
>
> Plant procedures will control restoration of the normal potable water supply, including SWS cleanup, to ensure appropriate levels of chemical treatment and blowdown of the system.

The staff reviewed the applicant's response to RAI Question 09.02.01-6, Part 5, and finds it acceptable. MWR is to be utilized as a short-term potential temporary source of SWS makeup, and the MWR is not expected to cause any negative impact of the SWS cooling tower performance. Finalization of the design will provide for additional treatment of the MWR water or another source, or a combination of MWR water with another source that can supply sufficient water with acceptable chemistry, as necessary.

In addition as stated in AP1000 DCD Sections 9.2.1.2.1 and 9.2.1.2.2, the SWS is designed with permanent strainers and chemical injection to assist in controlling water quality. Therefore, RAI Question 09.02.01-6, Part 5, is considered resolved.

In summary, the staff notes that each RWS ancillary pump can deliver adequate makeup flow to the SWS cooling tower basins to meet demand during all modes of operation. Further, without RWS makeup to the SWS cooling tower basins, adequate inventory in the SWS cooling tower basins exists along with the stored water in the secondary fire water tanks that would provide more than 24 hours to restore RWS makeup flow. The raw water storage tank provides over 7,570 m^3/min (2 million gal) of water for the SWS cooling tower basins, which are shared between the two nuclear units. The RWS is considered highly reliable based on its design, and a single failure of a structure or component in the RWS would not affect normal plant cooldown. The RWS ancillary pumps (two per unit) can be manually loaded onto the standby diesel generators to provide adequate makeup flow to the SWS cooling tower basins. Further, the staff reviewed the proposed Turkey Point Units 6 and 7 COL FSAR changes discussed in the RAI related to RWS operations and components. The staff finds that the Turkey Point Units 6 and 7 COL FSAR markup has been adequately incorporated into the revised version of the Turkey Point Units 6 and 7 COL FSAR for RAI 29, Questions 09.02.01-3. Therefore, the issues described in RAI Questions 09.02.01-3 and 09.02.01-6 are resolved. The staff confirms that the Turkey Point Units 6 and 7 COL FSAR has been revised accordingly.

C. Regulatory Treatment of Nonsafety-Related System

The RWS supports the SWS cooling function by providing makeup water to the SWS cooling tower basins. The staff noted that, while the SWS is designated for RTNSS during reduced

reactor inventory conditions, the RWS is not needed to support the SWS cooling function when the reactor water inventory is reduced, because the RWS is not designated for RTNSS. However, there is no explanation in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 as to why the RWS is not considered an RTNSS. Also, because the SWS cooling tower basins are very limited in their capacity, it was not clear why the RWS makeup would not be required for this situation. Consequently, the staff requested, in RAI Question 09.02.01-4 (eRAI 5491), that the applicant revise Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11 to explain why the RWS makeup is not needed during reduced reactor inventory conditions and, in particular, to describe controls that will be implemented to ensure that assumptions remain valid.

In its response dated August 17, 2011 (ADAMS Accession No. ML11234A011), the applicant stated that a detailed response was provided to RAI 5491, Question 09.02.01-3, explaining why the RWS is not designated as RTNSS and makeup from the RWS to the SWS cooling tower basins is not required during reduced reactor inventory conditions. The referenced RAI response also discusses that procedural control will be established to take the required actions to exit the conditions for applicability of the SWS as an RTNSS system, in the unlikely event of a failure to re-establish the RWS makeup capability.

The staff finds the applicant's response to RAI 5491, Question 09.02.01-4 (ADAMS Accession No. ML11234A011), which references the response to RAI Question 09.02.01-3, acceptable because (1) the RWS was previously evaluated in WCAP-15985 in Table-1-1, "Nonsafety-related system evaluation in AP1000 RTNSS Process," which was previously approved by the staff, (2) the RWS does not directly provide core cooling, and (3) the RWS has adequate stored water within the SWS cooling towers and the secondary fire water tank for more than 24 hours to support the SWS RTNSS functions, plus the 24 hours stored onsite water supply provides ample time to restore the RWS makeup flow or take the procedural actions necessary to exit the condition of applicability for the SWS and its RTNSS function. Therefore, RAI Question 09.02.01-4 is resolved.

D. System Design Consideration

As specified by 10 CFR 20.1406, COL applicants are required to describe how facility design and procedures for operation will minimize the generation of radioactive waste and contamination of the facility and environment, and facilitate eventual plant decommissioning. The reclaimed water or saltwater portions of the RWS provide an alternate dilution source for liquid radwaste discharge when the CWS cooling tower blowdown is not available. Although the RWS has no interconnections with any systems that contain radioactive fluids, industry experience has shown that this alone may not be sufficient to prevent the RWS from becoming contaminated. For example, unplanned leaks or release of contaminated fluids as a result of component failures or transport, drainage problems in contaminated areas, and the migration of contamination through soils and other porous barriers over time have caused systems and areas of the plant that are not directly connected with contaminated systems to become contaminated. Therefore, the staff requested, in RAI Question 09.02.01-5 (eRAI 5491), that the applicant provide additional information to describe design provisions and other measures that will be implemented to satisfy the requirements specified by 10 CFR 20.1406, including measures that will be implemented to monitor the RWS for contamination and corrective actions that will be taken to eliminate any radioactive contamination that is identified.

In its response, dated August 17, 2011 (ADAMS Accession No. ML11234A011), as described in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11, "Raw Water System," reclaimed water from the MDWASD is supplied to the FPL reclaimed water treatment facility.

- Water from the reclaimed water facility is then stored in the MWR for use as makeup to the CWS mechanical draft cooling tower basins. Also as described in Section 9.2.11, saltwater from beneath Biscayne Bay is used for makeup to the CWS cooling tower basins directly when reclaimed water is unavailable in sufficient quantity, quality, or both.

- As further described in Section 9.2.11, potable water from the MDWASD is supplied to the raw water storage tank for makeup to the SWS mechanical draft cooling tower basins, DTS, and FPS. The reclaimed water or saltwater portions of the RWS also provide an alternate dilution source for liquid radwaste discharge when the CWS cooling tower blowdown is not available.

- Potential failures of the plant systems causing external and internal flooding are described in AP1000 DCD Section 3.4, and potential sources that could transport contaminants to the RWS are monitored in accordance with AP1000 DCD Section 11.5.

- As described in AP1000 DCD Section 11.5, the radiation monitoring system provides plant effluent monitoring, process fluid monitoring, airborne monitoring, and continuous indication of the radiation environment in plant areas where such information is needed.

Compliance with 10 CFR 20.1406:

- In support of COL application pre-application activities, Westinghouse has submitted to the staff the report, AP1000 Standard Combined License Technical Report APP-GW-GLN-098, Revision 0, "Compliance with 10 CFR 20.1406," dated April 10, 2007. This report summarizes the design approach and features incorporated into the AP1000 standard plant design that demonstrate compliance with 10 CFR 20.1406. The plant features described in this report will minimize contamination and radioactive waste generation for the AP1000 design.

Groundwater Transport:

- Turkey Point Units 6 and 7 COL FSAR, Section 2.4.13, "Accidental Release of Radioactive Liquid Effluents in Ground and Surface Waters," presents an analysis of the effect of an accidental release of liquid effluents to the groundwater environment through the postulated failure of the liquid waste system effluent holdup tank.

Groundwater Monitoring Program:

- In accordance with 10 CFR 20.1406 and as covered in Westinghouse Technical Report APP-GW-GLN-098, a groundwater monitoring program beyond the normal radioactive effluent monitoring program will be developed. Turkey Point Units 6 and 7 COL FSAR, Section 12AA.5.4.14 lists locations of areas to be monitored for the AP1000 design and states a groundwater monitoring program will be developed. Groundwater monitoring program implementation considerations are also described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.13. A "Record of Operational Events of

Interest for Decommissioning" is described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.15.

- Based on the above monitoring program, unplanned leakage or release of contaminated fluids will be detected.

Conclusion:

- The RWS piping system interfaces do not provide a potential to be a flow path for radioactive fluids, as indicated in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.11.1.1 and shown in Turkey Point Units 6 and 7 COL FSAR, Figure 9.2-201. Also, the possibility of contaminating the RWS from a release to the subsurface environment from Units 6 and 7 is remote. Therefore, direct monitoring of the RWS for contamination is not required.

The staff finds that the RWS does not have the potential to be a flow path for radioactive fluids. The Turkey Point Units 6 and 7 WLS effluent discharge release point is where the WLS effluent discharge pipe connects to the blowdown sump discharge pipe to deep injection wells. Both CWS and RWS provide dilution flow to the blowdown sump for the effluent discharge. The pumping station associated with the blowdown sump and the associated WLS discharge piping is designed to ensure that there is no potential for contamination of the blowdown sump due to radioactive water discharge. The staff finds that it is unlikely that liquid radwaste would be able to travel to the RWS interface, based on the design of the blowdown sump. The blowdown sump design is further described in Section 9.2.9 of this report, and the WLS is described in Section 11.2.1.

In addition, the applicant indicated that the groundwater monitoring program should minimize the possibility of contaminating the RWS from external subsurface sources. The applicant noted that the groundwater monitoring program is described in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.14, "Ground Monitoring Program." The applicant stated, in Turkey Point Units 6 and 7 COL FSAR Section 12AA.5.4.14, that it has adopted Nuclear Energy Institute (NEI) 08-08A, "Generic FSAR Template Guidance for Life Cycle Minimization of Contamination," for the groundwater monitoring program description. The staff's evaluation of the groundwater monitoring program is provided in Chapter 12 of this SER.

Because there is no interconnection with any system that contains potentially radioactive fluids as indicated in Turkey Point Units 6 and 7 COL FSAR Section 9.2.11.1.1, the staff concludes that the requirements of 10 CFR 20.1406 are satisfied and considers this aspect of RAI Question 09.02.01-5 resolved.

Based on the above technical evaluation, the staff finds the information added to the Turkey Point Units 6 and 7 COL FSAR to address PTN SUP 9.2-2 and Interface Items 9.4 and 9.5 to be acceptable.

9.2.11.5 *Post-Combined License Activities*

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

9.2.11.6 *Conclusion*

The staff evaluated the RWS as described in Turkey Point Units 6 and 7 COL FSAR Section 9.2.11. The staff's evaluation focused primarily on confirming that (a) the design of the RWS complies with the requirements of GDC 2 and GDC 4 and conforms with the guidance in RG 1.29, (b) the RWS reliance for the support of SWS for achieving and maintaining cold shutdown conditions and RTNSS considerations is consistent with the guidance in SECY-94-084, (c) the RWS is not considered RTNSS, and (d) other system design considerations meet the requirements of 10 CFR 20.1406.

Based upon the results of this evaluation, the staff concludes that the Turkey Point Units 6 and 7 RWS, as described under PTN SUP 9.2-2 in Section 9.2.11 of the Turkey Point Units 6 and 7 COL FSAR, including Interface Items 9.4 and 9.5, is acceptable.

9.2.12 Deep Well Injection System

9.2.12.1 *Introduction*

The DIS is used to dispose of plant wastewater, including both nonradioactive liquid waste (e.g., CWS blowdown) and radioactive liquid waste from the liquid radwaste processing system. The principal DIS components consist of 12 deep injection wells, 6 dual zone monitoring wells and associated piping, valving, pumps, and instrumentation for system operational monitoring. The DIS functions to dispose of and confine plant wastewater to the Boulder Zone. The DIS has no safety-related function, and does not affect the ability of safety-related systems to perform their intended functions.

9.2.12.2 *Summary of Application*

Section 9.2 of the AP1000 DCD does not include a section on deep well injection. In response to RAI 6985, Questions 11.02-6-5 (ADAMS Accession No. ML13225A029) to RAI 6985, Question 11.02-6-6 (ADAMS Accession No. ML14269A066), the applicant supplemented Section 9.2 of the AP1000 DCD, Revision 19, by adding Section 9.2.12, "Deep Well Injection System," to the Turkey Point Units 6 and 7 COL FSAR. Therefore, no COL action items are associated with the added FSAR section of the COL application. Section 9.2.12 describes the operation and use of DIS.

9.2.12.3 *Regulatory Basis*

As identified above, the AP1000 DCD does not include a section on deep well injection. Therefore, COL FSAR Section 9.2.12 does not incorporate by reference associated information from the AP1000 DCD.

The regulatory basis for acceptance of this added information is established in:

- 10 CFR 20.1406, "Minimization of contamination"
- 10 CFR 20.2002, "Method for obtaining approval of proposed disposal procedures"
- 10 CFR Part 20, Appendix B, Table 2
- 10 CFR Part 50, Appendix I, Section II.A

9.2.12.4 *Technical Evaluation*

As described in Section 9.2.12.2 of this SER, Section 9.2.12 of the Turkey Point Units 6 and 7 COL FSAR does not have a corresponding section in the AP1000 DCD. The added section of the COL FSAR was created in response to staff RAI questions about the DIS that were raised for the staff's review of COL FSAR Section 11.2.

When discharging liquid radioactive waste, the DIS must maintain a minimum dilution water flow rate to comply with the radioactive waste release design objectives and limits described in NUREG–0800, Chapter 11. If sufficient dilution water is not available for a given liquid radwaste flow rate, the radwaste discharge flow rate can be adjusted as described in Turkey Point Units 6 and 7 COL FSAR, Chapter 11.

Circulating water is the primary source of dilution water for Turkey Point Units 6 and 7. Turkey Point Units 6 and 7 provide for the use of other sources of dilution water besides circulating water. Other sources of dilution water include reclaimed water and alternate dilution flow paths when circulating water system blowdown is not sufficient or available for dilution. These other sources of dilution water are available to supply the blowdown sump, which is the basin from which the dilution water pumps take suction. Sufficient dilution water is available in all modes of operation to provide at least 6,000 gpm of dilution water for each unit discharging liquid radwaste.

As stated in Appendix 12AA of the Turkey Point Units 6 and 7 COL FSAR, NEI 08-08A is adopted for Turkey Point Units 6 and 7. The NEI 08-08A template guidance provides a description of the operational and programmatic elements and controls that serve to minimize contamination of the facility, site, and the environment, to meet the requirements of 10 CFR 20.1406. Each of the 12 deep injection wells is constructed with materials designed to isolate and protect groundwater from injected fluid. This design will minimize potential environmental contamination. Six monitoring wells are located in close proximity to the injection wells to provide indication of leakage. Injection pipe casings are encapsulated in cement to protect against exposure to groundwater. The deep injection wells are constructed of new and unused steel casings designed to last for the life expectancy of the wells; a nominal 18 in. diameter fiberglass reinforced plastic pipe is encapsulated within the steel pipe with the intervening annulus filled with a nonhazardous corrosion inhibitor and sealed at the base and top to create a pressure-tight annular space.

In order to direct the discharge flow to the appropriate combination of discharge wells for discharge, the injectate piping contains manifolds, valves, and controls. The injectate piping also includes appurtenances, such as air/vacuum release valves, vent lines, and accessways, as necessary, for proper operation and maintenance of the discharge piping. 10 CFR 20.1406 specifies that the facility should be designed to minimize contamination of the facility and the environment. In order to comply with these requirements of 10 CFR 20.1406, the discharge piping, manifolds, valves, controls, and appurtenances are designed to minimize inadvertent or unidentified releases to the environment. The integrity of the injectate piping and the valve fittings will be monitored for leakage by performing periodic visual inspections, where accessible, as part of routine operation and maintenance activities. In order to ensure that leakage is contained and controlled, the valves associated with the injectate piping are included in the preventive maintenance program. As part of this program, they are checked periodically and maintained within acceptable parameters. Additional information concerning design

features of the discharge piping and deep injection wells incorporated to comply with the requirements of 10 CFR 20.1406 are described in Section 12.3.4 of the safety evaluation.

The staff reviewed Section 9.2.12 of the Turkey Point Units 6 and 7 COL FSAR and the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic. On the basis of its review, the staff confirms that the information in the application addresses most of the required information relating to the DIS. In response to NRC RAIs, the applicant supplied a response in FPL Letter L-2014-102, "Supplemental Response to NRC Request for Additional Information Letter No. 72 (RAI 6985) SRP Section 11.02 – Liquid Waste Management System (ADAMS Accession No. ML14269A066)." In the applicant's response, the applicant agreed to change some of the information in Section 9.2.12 by including additional sections discussing information on the source of alternate dilution flow from the makeup water reservoir; providing material to discuss information relating to the effluent concentration limits contained in 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," which is also discussed in SER Section 11; and describing typical monitoring and sampling systems used with the dual zone monitoring wells. The staff has reviewed the revised version of the Turkey Point Units 6 and 7 COL FSAR and has confirmed that the requested changes are incorporated and determined that the changes are acceptable. The staff considers those portions of RAI 6985, Questions 11.02-6-5 to 11.02-6-6 related to Section 9.2.12 closed.

9.2.12.5 *Post-Combined License Activities*

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

9.2.12.6 *Conclusion*

The staff evaluated the DIS as described in Turkey Point Units 6 and 7 COL FSAR Section 9.2.12 and 11.2. The staff's evaluation of the DIS is found in 11.2 and focused primarily on complying with 10 CFR 20.2002, "Alternate Disposal Methods." Through the staff's review of the information provided in DCD Section 9.2.12 and 11.2 the staff concludes that the DIS complies with the requirements of 10 CFR 20.2002. The staff's full evaluation of the 10 CFR 20.2002 requirements is found in SER Section 11.2.4, "Compliance with 10 CFR 20.2002."

Based upon the results of this evaluation, the staff concludes that the Turkey Point Units 6 and 7, as described under DCD Sections 9.2.12 and 11.2 of the Turkey Point Units 6 and 7 COL FSAR is acceptable.

9.3 Process Auxiliaries

9.3.1 Compressed and Instrument Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.1, "Compressed Air Systems")

9.3.1.1 *Introduction*

The compressed and instrument air system delivers instrument air, service air, and high-pressure air. The instrument air subsystem provides high-quality instrument air for plant use. The service air subsystem supplies plant breathing air. The high-pressure air subsystem produces air for high-pressure applications.

9.3.1.2 *Summary of Application*

Section 9.3 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.3 of the AP1000 DCD. Section 9.3 of the AP1000 DCD includes Section 9.3.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.3, the applicant provided the following:

Departures

- PTN DEP 6.4-2

The applicant provided additional information in Section 9.3.1.1.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the FSAR is reviewed in Section 21.3 of this SER.

AP1000 COL Information Item

- STD COL 9.3-1

The applicant provided additional information in STD COL 9.3-1 to address COL Information Item 9.3-1 (COL Action Item 9.3.1-1).

9.3.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements. In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the compressed and instrument air system are given in Section 9.3.1 of NUREG–0800. The regulatory basis for STD COL 9.3-1 addressing Generic Safety Issue 43, "Reliability of Air Systems," as part of training and procedures, is:

- 10 CFR Part 50, Appendix A, GDC 1, "Quality Standards and Records," as it relates to the reliability of safety-related equipment actuated or controlled by compressed air

9.3.1.4 *Technical Evaluation*

The staff reviewed Section 9.3.1 of the Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the compressed and instrument air system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

SER Section 1.2.3 provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside of the scope of the DC and use this review

in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.3.1.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.3-1 (COL Action Item 9.3.1-1), involving air systems (NUREG-0933, "Resolution of Generic Safety Issues," Issue 43)*

The NRC staff reviewed STD COL 9.3-1 related to COL Information Item 9.3-1. COL Information Item 9.3-1 states:

> *The Combined License applicant will address DCD 1.9.4.2.3, Issue 43 as part of training and procedures identified in section 13.5.*

The commitment was also captured as COL Action Item 9.3.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will address NUREG-0933, Issue 43 as part of training and procedures.*

The applicant proposed to resolve STD COL 9.3-1 by providing training and procedures for operations and maintenance of the instrument air subsystem and air operated valves. The methodology to develop system operating procedures, abnormal operating procedures, and alarm response procedures is reviewed in Section 13.5 of this SER. The training program for operators and maintenance

personnel is reviewed in Section 13.2 of this SER. The applicant also stated that the compressed and instrument air system will be maintained and tested in accordance with the manufacturers' recommendations and procedures and that the system will be periodically tested to demonstrate conformance with the quality requirements of ANSI/ISA-7.3-1981.

NUREG-0933, Issue 43 discusses that possible solutions for this issue, include better operator training, operator awareness of the importance of compress air systems, and periodic testing and inspection of the compressed air systems. The NRC staff reviewed the applicant's proposed resolution to STD COL 9.3-1 and determined that the BLN COL FSAR meets the guidance in NUREG-0933, Issue 43; therefore, the staff finds STD COL 9.3-1 resolved.

9.3.1.5 *Post-Combined License Activities*

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

9.3.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.3.1 of NUREG-0800.

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.

- STD COL 9.3-1, the staff evaluated Issue 43, "Reliability of Air Systems," as part of the training and procedures in accordance with the requirements of GDC 1, as it relates to the impact of a failure of the compressed and instrument air system on safety-related SSCs. Based on the results of this evaluation, the Turkey Point Units 6 and 7 COL FSAR meets the guidance in NUREG-0933, Issue 43, and is acceptable.

9.3.2 Plant Gas System (Related to RG 1.206 Section C.III.1, Chapter 9, C.I.9.3.1, "Compressed Air Systems)

The plant gas system is a nonsafety-related system that supplies hydrogen, carbon dioxide, and nitrogen gases to plant systems as required. Failure of the system does not compromise any safety-related system nor does it prevent safe reactor shutdown.

The Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.2, "Plant Gas System," of the AP1000 DCD. The staff reviewed the

application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.3.3 Primary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, "Process and Postaccident Sampling Systems")

The primary sampling system is used to collect samples during normal operations and following an accident. The system collects for analysis samples from the reactor coolant, auxiliary primary process streams, and containment atmosphere. Both the normal operation and post-accident requirements are carried out by this single system.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.3 incorporates by reference, with no departures or supplements, Section 9.3.3, "Primary Sampling System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.3.4 Secondary Sampling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.2, "Process and Post Accident Sampling Systems")

The secondary sampling system delivers representative samples of fluids from secondary systems to sample analyzer packages. Continuous online secondary chemistry monitoring detects impurity ingress and provides early diagnosis of system chemistry excursions in the plant.

The Units 6 and 7 COL FSAR Section 9.3 incorporates by reference, with no departures or supplements, Section 9.3.4, "Secondary Sampling System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.3.5 Equipment and Floor Drainage Systems (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.3, "Equipment and Floor Drainage System")

The equipment and floor drainage system collects liquid wastes from equipment and floor drains during normal operation, startup, shutdown, and refueling. The equipment and floor drainage system consists of two subsystems: radioactive waste drains and nonradioactive waste drains.

The Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.5, "Equipment and Floor Drainage Systems," of the AP1000 DCD.

The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.3.6 Chemical and Volume Control System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.3.4, "Chemical and Volume Control System (PWR) including Boron Recovery System")

The CVS maintains the required water inventory and quality in the RCS, provides pressurizer auxiliary spray, controls the boron neutron absorber concentration in the reactor coolant, provides a means for filling and pressure testing the RCS, controls the primary water chemistry, and reduces coolant radioactivity level. Further, the system provides recycled coolant for demineralized water makeup for normal operation and provides borated makeup flow to the RCS in the event of some accidents, such as a small-break loss-of-coolant accident.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.3 incorporates by reference, Section 9.3.6, "Chemical and Volume Control System," of the AP1000 DCD. In addition, in the Turkey Point Units 6 and 7 COL FSAR, the applicant provided the following:

Departures

- PTN DEP 7.3-1

The applicant provided additional information in Section 9.3.6 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 7.3-1 related to required design changes for the PMS source range neutron flux doubling logic to comply with the requirements of Institute of Electrical and Electronics Engineers (IEEE) Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," Clause 6.6. This information, as well as related PTN DEP 7.3-1 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR, is reviewed in Section 21.5 of this SER.

The NRC staff reviewed Section 9.3.6 of the Turkey Point Units 6 and 7 COL FSAR (letter dated April 29, 2016 (ADAMS Accession No. ML16124A921)) and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this section. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the NRC staff's technical evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG–1793 and its supplements.

9.4 Air-Conditioning, Heating, Cooling, and Ventilation Systems

9.4.1 Nuclear Island Nonradioactive Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.1, "Control Room Area Ventilation System")

9.4.1.1 *Introduction*

The VBS, in conjunction with the MCR emergency habitability system described in Section 6.4, provides a controlled environment for the comfort and safety of control room personnel and ensures the operability of control room and nearby components during normal operating, anticipated operational transient, and design-basis accident conditions.

9.4.1.2 *Summary of Application*

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4 incorporates by reference Section 9.4 of the AP1000 DCD. Section 9.4 of the DCD includes Section 9.4.1, describing the VBS.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Sections 9.4.1, 9.4.1.4, and 9.4.12, (and in a letters dated May 6, 2016 and May 16, 2016 (ADAMS Accession Nos. ML16131A674, and ML16140A087 respectively)), the applicant provided the following:

Departures

- PTN DEP 6.4-1

The applicant provided additional information in Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-1 related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators. This information, as well as related PTN DEP 6.4-1 information appearing in other chapters of the FSAR is reviewed in Section 21.2 of this SER.

- PTN DEP 6.4-2

The applicant provided additional information in Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 6.4-2 related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance. This information, as well as related PTN DEP 6.4-2 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR is reviewed in Section 21.3 of this SER.

AP1000 COL Information Items

- STD COL 9.4-1a

The applicant provided additional information in STD COL 9.4-1a to address the first part of COL Information Item 9.4-1 (COL Action Item 9.4.1-1), related to a program for inspections and testing applicable to the VBS.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.4.12, the applicant provided the following:

- PTN COL 9.4-1b

The applicant provided additional information in VCS COL 9.4-1b to address the second part of COL Information Item 9.4-1 (COL Action Item 6.4-3). The local toxic gas services are evaluated to determine the need for monitoring for control room habitability.

9.4.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements. In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the VBS are given in Section 9.4.1 of NUREG-0800.

The applicable regulatory guidance for the VBS is as follows:

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

9.4.1.4 *Technical Evaluation*

The staff reviewed Section 9.4.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the VBS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.4.1.4 of the VEGP SER:

AP1000 COL Information Items

- *STD COL 9.4-1a*

The applicant provided additional information in STD COL 9.4-1a to resolve COL Information Item 9.4-1. COL Information Item 9.4-1a states:

> *The Combined License applicants referencing the AP1000 certified design will implement a program to maintain compliance with ASME AG-1, ASME N509, ASME N510 and Regulatory Guide 1.140 for portions of the nuclear island nonradioactive ventilation system and the containment air filtration system identified in subsection 9.4.1 and 9.4.7.*

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.*

The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.1.4 of the BLN COL FSAR. The NRC staff reviewed the resolution to STD COL 9.4-1a on the proposed implementation of a program to maintain compliance with industry standards and RGs for the VBS included under Section 9.4.1.4 and Section 9.4.12 of the BLN COL FSAR, and concludes that this item has been resolved for the VBS because the applicant has referenced the applicable regulatory guide and industry standards.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.4.1.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.1.4 of the BLN COL FSAR." COL Action Item 9.4-1 does not exist and should be replaced with COL Information Item 9.4-1.

- PTN COL 9.4-1b

The applicant provided additional information in PTN COL 9.4-1b to resolve the second part of COL Information Item 9.4-1. The second part of COL Information Item 9.4-1 states:

> The Combined License applicant will also provide a description of the [Main Control Room/Technical Support Center] MCR/TSC HVAC subsystem's recirculation mode during toxic emergencies, and how the subsystem equipment isolates and operates, as applicable, consistent with the toxic issues, including conformance with RG 1.78 to be addressed by the Combined License applicant as discussed in DCD Subsection 6.4.7.

The commitment was also captured as COL Action Item 6.4-3 in Appendix F of NUREG-1793, which states:

> The COL applicant will determine the amount and location of possible sources of toxic chemicals in or near the plant and for seismic Category I Class 1E toxic gas monitoring, using methods discussed in RG 1.78.

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of NUREG-1793, which states:

> The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.

The staff review of PTN COL 9.4-1b is addressed in Section 6.4 of this SER.

9.4.1.5 *Post-Combined License Activities*

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

9.4.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

The applicant has provided sufficient information for satisfying the regulatory requirements and the acceptance criteria in Section 9.4.1 of NUREG–0800 and RG 1.140 related to the applicable inspection and testing standards. This addresses STD COL 9.4-1a for VBS. The staff based its conclusion on the following:

- PTN DEP 6.4-1, related to design changes affecting habitability of the MCR and changes to the calculated doses to control room operators, is reviewed and found acceptable by the staff in Section 21.2 of this SER.

- PTN DEP 6.4-2, related to design changes affecting how the temperature and humidity in the MCR are maintained within the limits for reliable human performance, is reviewed and found acceptable by the staff in Section 21.3 of this SER.

- STD COL 9.4-1a, related to a program for inspections and testing applicable to the VBS, is adequately addressed by the applicant and is resolved.

- PTN COL 9.4-1b, addressing the local toxic gas services are evaluated to determine the need for monitoring for control room habitability, is reviewed by the staff in Section 6.4 of this SER.

9.4.2 Annex/Auxiliary Buildings Nonradioactive HVAC System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.3, "Auxiliary and Radwaste Area Ventilation System")

The annex/auxiliary building nonradioactive HVAC system maintains ventilation, permits personnel access, and controls the concentration of airborne radioactive material in the nonradioactive personnel and equipment areas, electrical equipment rooms, clean corridors, the ancillary diesel generator room and demineralized water deoxygenating room in the annex building, and the main steam isolation valve compartments, reactor trip switchgear rooms, and piping and electrical penetration areas.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4.2 incorporates by reference, with no departures or supplements, Section 9.4.2, "Annex/Auxiliary Buildings Nonradioactive HVAC System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.2.6 the applicant provided the following:

Tier 2 Departures

- PTN DEP 18.8-1

  The Operations Support Center (OSC) is being moved from the location identified in DCD Subsections 18.8.3.6, 12.5.2.2, and 12.5.3.2 and as identified on DCD figures in Subsections 1.2, 12.3, and Appendix 9A. There will be a single OSC for Units 6 and 7 located as described in the Emergency Plan.

The applicant provided additional information in Section 9.4.2 of the Turkey Point Units 6 and 7 COL FSAR about PTN DEP 18.8-1 related to the OSC. This information is reviewed in Section 13.3 of this SER.

9.4.3 Radiologically Controlled Area Ventilation System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.2, "Spent Fuel Pool Area Ventilation System," and C.I.9.4.3, "Auxiliary and Radwaste Area Ventilation System")

The radiologically controlled area VBS maintains ventilation, permits personnel access, and controls the concentration of airborne radioactive material in the fuel handling area, the radiologically controlled areas of the auxiliary and annex buildings.

The Turkey Point Units 6 and 7 COL FSAR, Section 9.4 incorporates by reference, with no departures or supplements, Section 9.4.3, "Radiologically Controlled Area Ventilation System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.4.4 Balance-of-Plant Interface

This section is not applicable to AP1000.

9.4.5 Engineered Safety Features Ventilation System

This section is not applicable to AP1000.

9.4.6 Containment Recirculation Cooling System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, "Engineered Safety Feature Ventilation System")

The VCS provides a suitable and controlled environment for the containment building during normal plant operation and shutdown.

The Turkey Point Units 6 and 7 COL FSAR. Section 9.4 incorporates by reference, with no departures or supplements, Section 9.4.6, "Containment Recirculation Cooling System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.7 Containment Air Filtration System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.4.5, "Engineered Safety Feature Ventilation System

9.4.7.1 *Introduction*

The containment air filtration system (VFS) serves no safety function, except containment isolation. The system conditions and filters outside air for the containment, the fuel handling

area, and the other radiologically controlled areas of the auxiliary and annex buildings, except for the hot machine shop and health physics areas, which are served by a separate VBS.

9.4.7.2 *Summary of Application*

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.4 of the AP1000 DCD. Section 9.4 of the DCD includes Section 9.4.7, "Containment Air Filtration System," which addresses Section 9.4.5, "Engineered Safety Feature Ventilation System," of NUREG–0800.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.4.7.4, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.4-1a

The applicant provided additional information in STD COL 9.4-1a to address COL Information Item 9.4-1 related to a program for inspections and testing applicable to the VFS included under Section 9.4.7.4 of the Turkey Point Units 6 and 7 COL FSAR.

9.4.7.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the VFS are given in Section 9.4.5 of NUREG–0800.

The applicable regulatory guidance for the VFS is as follows:

- RG 1.140

9.4.7.4 Technical Evaluation

The staff reviewed Section 9.4.7 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the VFS. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.4.7.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.4-1a*

The applicant provided additional information in STD COL 9.4-1a to resolve COL Information Item 9.4-1. COL Information Item 9.4-1 states:

> *The Combined License applicants referencing the AP1000 certified design will implement a program to maintain compliance with ASME AG-1, ASME N509, ASME N510, and Regulatory Guide 1.140 for portions of the nuclear island nonradioactive ventilation system and the containment air filtration system identified in subsection 9.4.1 and 9.4.7. The Combined License applicant will also provide a description of the MCR/TSC HVAC subsystem's recirculation mode during toxic emergencies, and how the subsystem equipment isolates and operates, as applicable, consistent with the toxic issues, including conformance with Regulatory Guide 1.78, to be addressed by the Combined License applicant as discussed in DCD subsection 6.4.7.*

The commitment was also captured as COL Action Item 9.4.1-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will develop a program to maintain operability of the nuclear island nonradioactive ventilation system and the containment air filtration system.*

The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.7.4 of the BLN COL FSAR.

The NRC staff reviewed the resolution to STD COL 9.4-1a on the proposed implementation of a program to maintain compliance with industry standards and RGs for the VFS included under Section 9.4.7.4 of the BLN COL FSAR, and concludes that this item has been resolved for the VFS because the applicant has appropriately referenced the applicable regulatory guide and industry standards.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.4.7.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "The NRC staff reviewed STD COL 9.4-1a related to COL Action Item 9.4-1 included under Section 9.4.7.4 of the BLN COL FSAR." COL Action Item 9.4-1 does not exist and should be replaced with COL Information Item 9.4-1.

9.4.7.5 *Post-Combined License Activities*

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

9.4.7.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In conclusion, the applicant has provided sufficient information for satisfying Section 9.4.7 of NUREG–0800 and RG 1.140 related to the applicable inspection and testing standards. This addresses STD COL 9.4-1a for the VFS.

9.4.8 Radwaste Building HVAC System

The radwaste building HVAC system serves the radwaste building, which includes the clean electrical/mechanical equipment room and the potentially contaminated HVAC equipment room, the packaged waste storage room, the waste accumulation room, and the mobile systems facility.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.8, "Radwaste Building HVAC System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by

reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.9 Turbine Building Ventilation System

The turbine building VBS operates during startup, shutdown, and normal plant operations. The system maintains acceptable air temperatures in the turbine building for equipment operation and for personnel working in the building.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.9, "Turbine Building Ventilation System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.10 Diesel Generator Building Heating and Ventilation System

The diesel generator building heating and VBS serves the standby diesel generator rooms, electrical equipment service modules, and diesel fuel oil day tank vaults in the diesel generator building and the two diesel oil transfer modules located in the yard near the fuel oil storage tanks. Local area heating and ventilation equipment is used to condition the air to the stairwell and security room.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.10, "Diesel Generator Building Heating and Ventilation System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.4.11 Health Physics and Hot Machine Shop HVAC System

The health physics and hot machine shop HVAC system serves the annex building stairwell, S02; the personnel decontamination area; frisking and monitoring facilities; containment access corridor; and health physics facilities on the 100′-0″ elevation of the annex building and the hot machine shop on the 107′-2″ elevation of the annex building.

Section 9.4 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.11, "Health Physics and Hot Machine Shop HVAC System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.5 Other Auxiliary Systems

9.5.1 Fire Protection System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.1, "Fire Protection Program")

9.5.1.1 *Introduction*

The FPS provides assurance, through a defense-in-depth philosophy, that the Commission's FP objectives are satisfied. These objectives are (1) to prevent fires from starting, (2) to detect rapidly, control, and extinguish promptly those fires that do occur, and (3) to provide protection for SSCs important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant. In addition, FPSs must be designed such that their failure or inadvertent operation does not adversely impact the ability of the SSCs important to safety to perform their safety functions. These objectives are stated in NUREG–0800, Section 9.5.1, "Fire Protection Program," and are identified as the FP Program goals and objectives in RG 1.189, "Fire Protection for Nuclear Power Plants."

9.5.1.2 *Summary of Application*

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.1.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.5.1 the applicant provided the following:

Departures

- PTN DEP 6.3-1

The applicant revised DCD Table 9.5.1-1, "AP1000 Fire Protection Program Compliance with BTP CMEB 9.5-1," Sheet 11 of 33, as new Turkey Point Units 6 and 7 COL FSAR, Table 9.5.1-1R, providing additional information about PTN DEP 6.3-1 related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, changing the indefinite duration to greater than 14 days. This information, as well as related PTN DEP 6.3-1 information appearing in other chapters of the Turkey Point Units 6 and 7 COL FSAR is reviewed in Section 21.1 of the SER.

- PTN DEP 18.8-1

The applicant provided this departure from the AP1000 DCD to address the relocation of the OSC. This departure is evaluated both in this SER section and in SER Section 13.3.

AP1000 COL Information Items

- STD COL 9.5-1 and STD COL 9.5-3

The applicant provided additional information in STD COL 9.5-1 and STD COL 9.5-3 to resolve COL Information Items 9.5-1 and 9.5-3 (COL Action Item 9.5.1-1(a) through 9.5.1-1(o)) by establishing the site-specific implementation of the fire protection program in Section 9.5.1.8, "Fire Protection Program," and in Appendix 9A of the Turkey Point Units 6 and 7 COL FSAR.

- STD COL 9.5-4

The applicant provided additional information in STD COL 9.5-4 to resolve COL Information Item 9.5-4 (COL Action Item 9.5.1-5) by establishing Table 9.5-201, "AP1000 Fire Protection Program Compliance with BTP CMEB 9.5-1," and Table 9.5-202, "Exceptions to NFPA Standard Requirements," of the Turkey Point Units 6 and 7 COL FSAR.

- STD COL 9.5-6

The applicant provided additional information in STD COL 9.5-6 to resolve COL Information Item 9.5-6 (COL Action Item 9.5.1-6) by specifying a preoperational testing program to verify field-installed fire barriers are as tested, and to provide disposition for any deviation.

- STD COL 9.5-8

The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-8 (COL Action Item 9.5.1-3) by establishing an administrative control procedure to address fire barrier breaches.

- PTN COL 9.5-1

The applicant provided additional information in PTN COL 9.5-1 to resolve COL Information Item 9.5-1 for plant-specific fire protection issues in Turkey Point Units 6 and 7 COL FSAR Section 13.1.2.1.3.9.

- PTN COL 9.5-2

The applicant provided additional information in PTN COL 9.5-2 to resolve COL Information Item 9.5-2 (COL Action Item 9.5.1-2) by providing site-specific fire hazard analysis of the yard area and outlying buildings in Turkey Point Units 6 and 7 COL FSAR, Appendix 9A, Section 9A.3.3.

Supplemental Information

- STD SUP 9.5-1

The applicant provided supplemental information in Section 9.5.1.2.1.3, "Fire Water Supply System," by adding additional text to address the piping threads compatibility requirement between onsite hydrants, hose couplings, and standpipe risers and equipment used by the offsite fire department.

License Conditions

- Part 10, License Condition 3, Items C.2, D.1, and G.6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application addressing the Fire Protection Program implementation milestones.

- Part 10, License Condition 6

The applicant proposed a license condition in Part 10 of the Turkey Point Units 6 and 7 COL application to provide a schedule to support the staff's inspection of operational programs, including the Fire Protection Program.

9.5.1.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the FPS are given in Section 9.5.1 of NUREG-0800.

The regulatory basis for acceptance of STD COL 9.5-1, STD COL 9.5-3, STD COL 9.5-4, STD COL 9.5-6, STD COL 9.5-8, PTN COL 9.5-1, and PTN COL 9.5-2 includes the following:

- RG 1.189
- Branch Technical Position Chemical Engineering Branch (BTP CMEB) 9.5-1, in NUREG–0800, Revision 3
- 10 CFR 50.48, "Fire Protection"

The regulatory basis for acceptance of STD SUP 9.5-1 includes the following:

- RG 1.189

9.5.1.4 *Technical Evaluation*

The staff reviewed Section 9.5.1 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the fire protection system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside the scope of the DC and use this review in evaluating subsequent COL applications. To ensure that the staff's findings on standard

content that were documented in the SER for the reference COL application (VEGP Units 3 and 4 COL application) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that the site-specific differences were not relevant.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced [2] from Section 9.5.1.4 of the VEGP SER:

Supplemental Information

- *STD SUP 9.5-1 provided supplemental information within Section 9.5.1.2.1.3, "Fire Water Supply System," addressing compatibility of piping threads with equipment used by the off-site fire department.*

The NRC staff reviewed the information on the compatibility of piping threads with off-site equipment included under Section 9.5.1.2.1.3 of the BLN COL, and determined that the applicant conforms to the guidance of RG 1.189. In accordance with the applicant's response to RAI 14.2-9, the requirement to verify fire equipment hose thread compatibility, or alternatively, an adequate supply of readily available thread adapters will be verified. This was added to the Initial Test Program outlined in Section 14.2 of the BLN COL FSAR.

AP1000 COL Information Items

- *STD COL 9.5-1 (COL Action Item 9.5-1(a)), involving qualification requirements for the fire protection program*

[2] Only the BLN SER text relevant to PTN is reproduced here. For example, the BLN SER included a discussion of BLN SUP 9.5-2 after the discussion of STD SUP 9.5-1. Since BLN SUP 9.5-2 does not apply to Virgil C. Summer Nuclear Station (VCSNS), it was not reproduced here. Also, the discussion of PTN COL 9.5-2 (corresponds to BLN COL 9.5-2) was moved to the end of this technical evaluation section.

The applicant provided additional information in STD COL 9.5-1 to resolve COL Information Item 9.5-1. COL Information Item 9.5-1 states:

> *The Combined License applicant will address qualification requirements for individuals responsible for development of the fire protection program, training of firefighting personnel, administrative procedures and controls governing the fire protection program during plant operation, and fire protection system maintenance.*

The commitment was also captured as COL Action Item 9.5-1(a) in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will establish a fire protection program at the facility for the protection of structures, systems, and components (SSCs) important to safety. The COL applicant will also establish the procedures, equipment, and personnel needed to implement the program.*

The NRC staff reviewed the resolution to STD COL 9.5-1 on the qualification requirements for the Fire Protection Program included under Section 9.5.1.6, Section 9.5.1.8, and Section 9.5.1.9 of the BLN COL application, and determined that the above sections provided adequate details to ensure conformance with the regulatory positions contained in RG 1.189 regarding the implementation of the BLN Fire Protection Program. Such details include personnel qualifications and training, organization and responsibilities, fire brigade training, etc.

- *STD COL 9.5-3 (COL Action Items 9.5.1-1(b) through 9.5.1-1(o)), addressing regulatory conformance*

The applicant provided additional information in STD COL 9.5-3 to resolve COL Information Item 9.5-3. COL Information Item 9.5-3 states:

> *The Combined License applicant will address BTP CMEB 9.5-1 issues. The acronym 'WA' is the identifier in Table 9.5.1-1 for "will address."*

The commitment was also captured as COL Action Items 9.5.1-1(b) through 9.5.1-1(o) in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *9.5.1-1(b) – The COL applicant will implement the fire protection program prior to receiving fuel onsite for fuel storage areas, and for the entire unit prior to reactor startup.*
>
> *9.5.1-1(c) – The COL applicant will establish administrative controls to maintain the performance of the fire protection system and personnel.*

9.5.1-1(d) – The COL applicant will establish a site fire brigade that is trained and equipped for fire fighting to ensure adequate manual fire fighting capability for all plant areas containing SSCs important to safety.

9.5.1-1(e) – The COL applicant will establish a quality assurance (QA) program to ensure that the guidelines for the design, procurement, installation, and testing, as well as the administrative controls for fire protection systems are satisfied.

9.5.1-1(f) – The COL applicant is responsible for the inspection and maintenance of fire doors, access to keys for the fire brigade, and the marking of exit routes.

9.5.1-1(g) – The COL applicant is responsible for the collection and sampling of water drainage from areas that may contain radioactivity.

9.5.1-1(h) – The COL applicant is responsible for controlling the use of compressed gases inside structures.

9.5.1-1(i) – The COL applicant is responsible for the use of portable radio communication by the plant fire brigade.

9.5.1-1(j) – The COL applicant is responsible for fire protection inside containment during refueling and maintenance.

9.5.1-1(k) – The COL applicant is responsible for controlling combustible materials in the remote shutdown workstation.

9.5.1-1(l) – The COL applicant is responsible for fire protection for cooling towers.

9.5.1-1(m) – The COL applicant is responsible for the proper storage of welding gas cylinders.

9.5.1-1(n) – The COL applicant is responsible for the proper storage of ion exchange resins.

9.5.1-1(o) – The COL applicant is responsible for the proper storage of hazardous chemicals.

The NRC staff reviewed the resolution to STD COL 9.5-3 provided in Section 9.5.1.8, Fire Protection Program, and Table 9.5-201 of the BLN COL application. The staff determined that the applicant has incorporated the appropriate portions of RG 1.189 into the BLN Fire Protection Program, pending some changes to be included in Revision 2 to the BLN COL FSAR. The applicant provided the following clarifications related to the BLN Fire Protection Program:

(1) The applicant confirmed that no operator manual actions outside of the Main Control Room are credited or required for post-fire safe shutdown.

(2) The applicant stated that the wireless telephone system is credited as the portable communication system used by the fire brigade. In the applicant's response to RAI 9.5.1-12, the wireless telephone system was confirmed to be designed with multiple antennas (repeaters) throughout the plant to maintain communication capability if individual repeater(s) are damaged from fire. Also, preoperational and periodic testing during fire drills will be performed to verify that the fire brigade portable communication system operates without excessive interference at different locations inside and outside the plant.

(3) In its response to RAI 9.5.1-9, the applicant stated that a housekeeping program is provided in order to maintain cleanliness and minimize fire hazards in the Main Control Room areas.

(4) In its response to RAI 9.5.1-14, the applicant stated that no probabilistic risk assessment (PRA) or fire modeling results will be credited to demonstrate acceptable fire hazards or post-fire safe shutdown capability for specific fire areas or scenarios.

(5) In its response to RAI 9.5.1-15, the applicant confirmed that the supply of reserve air is sufficient to provide at least 6 hours of additional breathing air for "each" of the 10 self-contained breathing apparatus (SCBA) units.

(6) In its response to RAI 9.5.1-16, the applicant proposed a change to BLN COL FSAR Section 9.5.1.8.6 to clarify that testing and inspection of fire protection systems are to be performed per NFPA 25 and NFPA 72 as appropriate. This is ***Confirmatory Item 9.5-1****.*

(7) In its response to RAI 9.5.1-17, the applicant confirmed that the design pressure of the High Pressure Air Subsystem that is used to recharge fire brigade's SCBAs is 4000 psig, and that 2216 psig SCBAs are used to ensure that the cylinders are adequately charged to provide an operating life of at least 30 minutes.

- *STD COL 9.5-4 (COL Action Item 9.5.1-5), involving NFPA exceptions*

The applicant provided additional information in STD COL 9.5-4 to resolve COL Information Item 9.5-4. COL Information Item 9.5-4 states:

> *The Combined License applicant will address updating the list of NFPA exceptions in the plant-specific DCD, if necessary.*

The commitment was also captured as COL Action Item 9.5.1-5 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant is responsible for ensuring that any deviations from the applicable National Fire Protection Association (NFPA) codes and standards in addition to those in the DCD are incorporated into the final safety analysis report (FSAR) with appropriate technical justification.*

The NRC staff reviewed the resolution to STD COL 9.5-4 under Section 9.5.1.8.1.1 and Section 9.5.1.9.4 of the BLN COL. The applicant provided for BLN COL FSAR Table 9.5-202, "Exceptions to NFPA Standard Requirement," to document and justify deviations from applicable NFPA codes and standards in addition to those identified in the DCD. This provision satisfies FSER Action Item 9.5.1-5. The staff also reviewed the exception to NFPA 804 related to the intake structure as documented in Table 9.5-202 although NFPA 804 is not formally endorsed by the NRC as a regulatory guidance document. Since the exception and the provided justification are consistent with the guidance of RG 1.189, the staff finds it acceptable. Based on the above, the staff concludes that FSER Action Item 9.5.1-5 is resolved.

- *STD COL 9.5-6 (COL Action Item 9.5.1-6), involving verification of field installed fire barriers, also designated as a COL information item*

The applicant provided additional information in STD COL 9.5-6 to resolve COL Information Item 9.5-6. COL Information Item 9.5-6 states:

> *The Combined License applicant will address the process for identifying deviations between the as-built installation of fire barriers and their tested configurations.*

The commitment was also captured as COL Action Item 9.5.1-6 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will establish the process for identifying deviations between the as-built installation of fire barriers and their tested configurations.*

The NRC staff reviewed the resolution to STD COL 9.5-6 under Section 9.5.1.8.6 and Section 9.5.1.9.6. The applicant provided that new installation or modification of fire barriers not part of the AP1000 DCD will be controlled through administrative procedures. These procedures impose inspection and testing requirements to ensure that the as-built fire barrier configurations match tested configurations. These procedures also describe the process for identifying and dispositioning deviations. Based on the above, the staff concluded that FSER Action Item 9.5.1-6 is resolved.

- *STD COL 9.5-8 (COL Action Item 9.5.1-3), establishing procedures to minimize risk for fire areas breached during maintenance*

The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-7. COL Information Item 9.5-7 states:

> *The Combined License applicant will establish procedures to minimize risk when fire areas are breached during maintenance. These procedures will address a fire watch for fire areas breached during maintenance.*

The commitment was also captured as COL Action Item 9.5.1-3 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will establish procedures to address a fire watch for fire areas breached during maintenance.*

The NRC staff reviewed the resolution to STD COL 9.5-8 on the establishment of procedures to minimize risk for fire areas breached during maintenance included under Section 9.5.1.8.1.2 and Section 9.5.1.9.7 of the BLN COL, and determined that the applicant has adequately included a provision to have procedures and administrative controls in place, including fire watches, when fire barriers are breached.

<u>License Conditions</u>

- *License Condition 3, addressing the Fire Protection Program implementation milestones*
- *License Condition 6, addressing the Fire Protection Program implementation schedule*

In Part 10 of the BLN COL FSAR, License Condition 3, "Operational Program Implementation," the applicant proposed a license condition for the implementation of operational programs as described in Table 13.4-201 of the FSAR. This license condition included implementation milestones for the Fire Protection Program, namely D.1 and G.6. Specifically:

- *Milestone D.1 states that the applicable portions of the Fire Protection Program will be implemented prior to initial receipt of fuel onsite.*
- *Milestone G.6 states that the Fire Protection Program will be implemented prior to initial fuel load.*

In Part 10 of the BLN COL FSAR, proposed License Condition 6, "Operational Program Readiness," the applicant states:

> *The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of the NRC inspection of the operational programs listed in the operation program*

FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operation programs in the FSAR table have been fully implemented or the plant has been placed in commercial service.

Based on the above, the staff concludes that the applicant satisfied the documentation and implementation requirements for the Fire Protection Program in accordance with RG 1.189 by identifying and providing the implementation schedule for each of the operational program aspects of the Fire Protection Program.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.5.1.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "The applicant provided additional information in STD COL 9.5-8 to resolve COL Information Item 9.5-7. COL Information Item 9.5-7 states:" The reference to COL Information Item 9.5-7 should be to COL Information Item 9.5-8.

Resolution of Standard Content Confirmatory Item 9.5-1

To resolve Confirmatory Item 9.5-1, the VEGP applicant revised FSAR Section 9.5.1.8.6 to clarify that procedures governing the inspection, testing, and maintenance of fire protection alarm and detection systems, and water-based suppression and supply systems, use the guidance of NFPA 72 and NFPA 25 as appropriate. NFPA 25 standard is also added to VEGP COL FSAR Section 9.5.5. The staff determined that these documentation changes satisfy the requirement of standard content Confirmatory Item 9.5-1; therefore Confirmatory Item 9.5-1 is resolved.

Proposed License Condition 3, Item C.2

The VEGP applicant proposed to add another implementation milestone associated with the Fire Protection System to License Condition 3. Specifically, the applicant added Milestone C.2, which states that the applicable portions of the Fire Protection Program will be implemented prior to initial receipt of byproduct, source, or special nuclear materials onsite (excluding Exempt Quantities as described in 10 CFR 30.18). The staff concludes that the applicant satisfied the documentation and implementation requirements for the Fire Protection Program in accordance with RG 1.189 by identifying and providing the implementation schedule for each of the operational program aspects of the Fire Protection Program.

AP1000 COL Information Item

- PTN COL 9.5-1 (COL Information Item 9.5-1)

The applicant provided additional information in PTN COL 9.5-1 to resolve COL Information Item 9.5-1 for plant-specific fire protection issues. These plant-specific issues include:

- the responsibilities of the engineer in charge of fire protection and his staff
- the organization of the fire brigade
- the engineer in charge of fire protection being responsible for the formulation and implementation of the fire protection program and meeting the qualification requirements listed in Turkey Point Units 6 and 7 COL FSAR, Section 13.1.2.1.3.9

The staff reviewed the resolution of PTN COL 9.5-1 on the associated plant-specific fire protection issues and determined that the issues have been acceptably resolved by information provided in Turkey Point Units 6 and 7 COL FSAR, Sections 9.5 and 13.1.2.1.3.9.

- PTN COL 9.5-2 (COL Action Item 9.5.1-2), involving fire protection analysis information

The applicant provided additional information in PTN COL 9.5-2 to resolve COL Information Item 9.5-2. COL Information Item 9.5-2 states:

> The combined license applicant will provide site-specific fire protection analysis information for the yard area, the administration building, and for other outlying buildings consistent with Appendix 9A.

The commitment was also captured as COL Action Item 9.5.1-2 in Appendix F of NUREG-1793, which states:

> The COL applicant will provide site-specific fire protection analysis information for the yard area, the administration building, and other outlying buildings.

The staff reviewed the resolution to PTN COL 9.5-2 on the site-specific fire protection analysis information included under Section 9.5.1.9.2 and Section 9A.3.3 of the Turkey Point Units 6 and 7 COL FSAR and determined that the yard area, administration building, and other outlying areas are adequately described in the fire hazard analysis in accordance with RG 1.189, which is therefore acceptable.

Resolution of PTN DEP 18.8-1

The AP1000 annex building does not contain any system or equipment credited for achieving and maintaining post-fire safe shutdown. As such, the relocation of the OSC in the annex building as prescribed in PTN DEP 18.8-1 has no adverse impact on the post-fire safe shutdown capability. Therefore, the staff concludes that the proposed departure, relative to post-fire safe shutdown capability, is acceptable.

9.5.1.5 *Post-Combined License Activities*

The license condition language in this section has been clarified from previously considered language. In a letter dated April 8, 2016 (ADAMS Accession No. ML16103A507), the applicant did not identify any concerns with the clarified license condition language. The changes do not affect the staff's above analysis of the conditions, and therefore, for the reasons discussed in the technical evaluation section above, the staff finds the following license conditions acceptable:

- License Condition (9-2) – The licensee shall implement the Fire Protection Program or applicable portions thereof as described in the milestones below:

    1. The fire protection measures in accordance with RG 1.189 for designated storage building areas (including adjacent fire areas that 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 RG 1.189 for areas containing new fuel (including adjacent areas where a fire could affect the new fuel) implemented before receipt of fuel onsite;

    3. All fire protection program features implemented before initial fuel load;

- License Condition (9-3) – No later than 12 months after issuance of the COL, the licensee shall submit to the Director of the NRO a schedule that supports planning for and conduct of NRC inspections of the FP Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until the FP Program has been fully implemented.

9.5.1.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidance in Section 9.5.1 of NUREG-0800 and RG 1.189. The staff based its conclusion on the following:

- PTN DEP 6.3-1, related to quantifying the duration that the passive residual heat removal system heat exchanger can maintain safe shutdown conditions, is reviewed and found acceptable by the staff in Section 21.1 of this SER.

- PTN DEP 18.8-1, regarding the relocation of the OSC relative to the post-fire safe shutdown capability, is adequately addressed by the applicant and is resolved.

- STD SUP 9.5-1, addressing compatibility of piping threads with equipment used by the offsite fire department, is adequately addressed by the applicant and is resolved.

- STD COL 9.5-1, addressing the qualification and training requirements for the fire protection program at Turkey Point Units 6 and 7, is adequately addressed by the applicant and is resolved.

- STD COL 9.5-4, addressing the deviations from the applicable NFPA codes and standards and to those in the AP1000 DCD, is also adequately addressed by the applicant and is resolved.

- STD COL 9.5-6, addressing the establishment of a process for identifying deviations between the as-built installation of fire barriers and their tested configurations, is adequately addressed by the applicant and is resolved.

- STD COL 9.5-8, addressing establishment of procedures to minimize risk for fire areas breached during maintenance, is adequately addressed by the applicant and is resolved.

- STD COL 9.5-3, addressing the site-specific implementation of the Fire Protection Program, is adequately addressed by the applicant and is resolved.

- PTN COL 9.5-1, addressing site-specific fire protection issues, is adequately addressed by the applicant and is resolved.

- PTN COL 9.5-2, regarding the site-specific fire protection analysis information for the Turkey Point Units 6 and 7 yard areas and outlying buildings, is adequately addressed by the applicant and is resolved.

9.5.2 Communication System

9.5.2.1 *Introduction*

The communication system provides intra-plant communications and plant-to-offsite communications during normal, maintenance, transient, fire, and accident conditions, including loss of offsite power (LOOP).

9.5.2.2 *Summary of Application*

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.2, which the Turkey Point Units 6 and 7 COL application references without departures.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.5.2, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 9.5-9, involving offsite interfaces

The applicant provided additional information in PTN COL 9.5-9 to resolve COL Information Item 9.5-9 (COL Action Item 9.5.2-3).

- PTN COL 9.5-10, involving emergency offsite communications

The applicant provided additional information in PTN COL 9.5-10 to resolve COL Information Item 9.5-10 (COL Action Item 9.5.2-1).

- STD COL 9.5-11, involving security communications

The applicant provided additional information in STD COL 9.5-11 to resolve COL Information Item 9.5-11 (COL Action Item 9.5.2-2).

9.5.2.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the communications system are given in Section 9.5.2 of NUREG–0800.

The regulatory basis for PTN COL 9.5-9, addressing interfaces to offsite locations, is based on:

- 10 CFR Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” Subpart IV.E(9), “Emergency Planning and Preparedness for Production and Utilization Facilities”)

The regulatory basis for PTN COL 9.5-10, addressing the emergency offsite communication system, including the crisis management radio system, is based on:

- 10 CFR 50.47(b)(8), “Emergency Plans – Adequate Facilities and Equipment”

The regulatory basis for STD COL 9.5-11, addressing the description of the security communication system, is based on:

- 10 CFR 73.45(g)(4)(i), “Performance capabilities for fixed site physical protection systems-response”

- 10 CFR 73.46(f), “Fixed site physical protection systems, subsystem, components, and procedures-communications subsystems”

- 10 CFR 73.55(e), “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage-physical barriers”

- 10 CFR 73.55(f), “Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage-target sets”

9.5.2.4 *Technical Evaluation*

The staff reviewed Section 9.5.2 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] The staff review of this application is limited to information items described in Sections 9.5.2.2.5 through 9.5.2.5.3 of the Turkey Point Units 6 and 7 COL FSAR. On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the communications system. The results of the staff’s evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, in Turkey Point Units 6 and 7 COL FSAR Section 9.5.2.2.5, the applicant provided the following:

AP1000 COL Information Items

- PTN COL 9.5-9

In PTN COL 9.5-9 the applicant provided additional information via its Emergency Plan to resolve COL Information Item 9.5-9. COL Information Item 9.5-9 states:

> Combined license applicants referencing the AP1000 certified design will address interfaces to required offsite locations; this will include addressing the recommendations of BL-80-15 ([DCD] Reference 21) regarding loss of the emergency notification system due to a loss of offsite power.

The commitment was also captured as COL Action Item 9.5.2-3 in Appendix F of NUREG-1793, which states:

> The COL applicant will address interfaces to offsite locations; this will include addressing the recommendations of NRC Bulletin (BL) 80-15 regarding loss of the emergency notification system as a result of loss of offsite power.

The staff reviewed PTN COL 9.5-9, which is included under Section 9.5.2.5.1 of the Turkey Point Units 6 and 7 COL FSAR, concerning offsite interfaces. Section 9.5.2.5.1 of the Turkey Point Units 6 and 7 COL FSAR states the Emergency Plan describes offsite interfaces to address PTN COL 9.5-9. Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Emergency Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.3. Part 5, Section F, of the Emergency Plan, Revision 4, presents the methods used for emergency communications, including offsite interfaces.

The following excerpt from the Emergency Plan identifies communication equipment along with planned use:

(1) **Plant Page System**: The Plant Page System is a public address system with speakers and handsets located throughout the plant, including the Control Rooms and TSC. The system provides for transmission of warning and instructions in the event of an emergency. Plant alarms are broadcast over the Plant Page System. The system is primarily used for intra-plant communications and permits merging with and separation from other units of the plant. Power to the system is supplied from a variety of sources, and an alternate power supply is provided.

(2) **Private Branch Exchange (PBX) Telephone System**: The PBX telephone system provides communication capability between telephones located in the Turkey Point facilities through direct dialing. The PBX is used to connect the affected unit's Control Room, TSC, OSC, EOF and ENC. The PBX telephone system also provides for outside communications through interconnections with the FPL Intelligent Tandem Network (ITN) corporate telephone communications system and local commercial telephone lines. This system may be utilized as a secondary communication link to the county governments. Power to the PBX is provided from non-Class 1E dc and uninterruptible power supply system.

(3) **Local Commercial Telephone System**: This system provides standard commercial telephone service which is installed by the local telephone company for normal dial telephone service in the plant. This system includes connections to the PBX and FPL ITN System, dedicated lines to emergency response facilities, and is the primary system for routine communication with areas outside the plant. This system may be utilized as a secondary communication link to the county governments. The commercial vendor provides primary and secondary power for their lines.

(4) **FPL Intelligent Tandem Network (ITN) System**: The ITN System can be accessed in most plant locations and allows direct dial capability to company office locations, access to Wide Area Telephone Services (WATS) line, and local telephone calls.

(5) **State Hot Ring Down Telephone**: The state hot ring down is a dedicated communications system that has been installed for the purpose of notifying state and county authorities of declared emergencies at Turkey Point. This system links together the Control Rooms, TSC, EOF and state and county government agencies as appropriate and is the primary means of communication.

(6) **Emergency Satellite Communication System (EMNET)**: EMNET is an emergency satellite communication system that is available in the Control Rooms, TSC, and EOF. The initial notification of all emergencies and other required notifications to the State Division of Emergency Management (DEM) and the County's Department of Public Safety will

be made via the Hot Ring Down telephone with EMNET as the alternate communications pathway.

(7) **Automated ERO Callout System**: Turkey Point uses an automated callout system that employs pagers and telephones to notify the ERO. If the callout system fails, plant personnel may be required to manually activate the ERO group page feature and/or directly callout ERO personnel.

(8) **Dedicated Phone Lines**: A dedicated phone link is established by limiting a phone line to one purpose, blocking its use for all other purposes. Several dedicated telephone links have been established for use by the ERO to perform key communication tasks.

(9) **Satellite Telephones**: This satellite system is a portable satellite phone with international calling capabilities. The system is capable of communication with any telephone (public network, cellular, satellite, etc.). This system is available to Control Room, TSC, and EOF personnel and provides a backup or secondary communication link in the event that the landlines are rendered inoperative.

(10) **Company Radio System**: Radio systems are provided for offsite communication with other FPL facilities and government agencies. This radio system consists of a variety of fixed base radio equipment. The system operations power coordinator's office, trouble dispatcher offices, service centers, power plants, and mobile service vehicles are equipped with one or more of these radio systems. The radio may be used to communicate with the EOF System Operations, Storm Headquarters, and other FPL facilities and mobile units throughout Miami-Dade County, including the EOC. The radio may be used for longer range communications to the EOF and FPL Corporate Offices in Juno Beach. A repeater channel for plant use is also available to DOH-BRC for communication with emergency response teams and/or from the Mobile Emergency Radiological Laboratory (MERL) sites. In addition, the U.S. Coast Guard and NOAA Weather Radio Channels are also available on the systems for emergency communications, as required, and to monitor weather conditions and receive weather advisories. In the event of interruption of onsite electric service to the base radio stations, backup power is available to equipment.

(11) **900 Megahertz Radio System**: The 900 megahertz radio system is available to supplement fixed communications in the plant and is used for Field Monitoring Team communications. This system consists of necessary hardware to allow radio communication between the affected unit Control Room, EOF and mobile units in FPL vehicles. Commercial cell phones are available as backup to the primary field team communications system. This radio system also provides the ability to be used as a crisis management radio system.

The following excerpt from the Emergency Plan identifies phone lines dedicated for NRC communications along with planned use.

(1) **Emergency Notification System (ENS)**: The ENS is used for initial notification from the plant to the NRC, as well as ongoing information on plant systems, status, and parameters. The ENS is located in each Control Room, the TSC, and EOF. A separate line is available in the EOF with the capability of being patched with the plant through the NRC. Backup power is provided for these lines, which complies with the requirements of NRC BL 80-15 regarding LOOP to the ENS.

(2) **Health Physics Network (HPN)**: The HPN is used to transmit information to the NRC regarding radiological conditions (in-plant and offsite), meteorological conditions, and assessment of trends and needs for protective measures onsite and offsite. The HPN is located in the TSC and EOF and may be used as an open communication line with the NRC. Backup power is provided for these lines.

(3) **Reactor Safety Counterpart Link (RSCL)**: This system allows for internal NRC discussions regarding plant and equipment conditions. RSCL lines are located in the TSC and EOF.

(4) **Protective Measures Counterpart Link (PMCL)**: This system allows for conduct of internal NRC discussions on radiological releases, meteorological conditions, and protective measures. PMCL lines are located in the TSC and EOF.

(5) **Management Counterpart Link (MCL)**: This system has been established for internal discussions between the NRC executive team director/members and the NRC Site Team Director or FPL management. MCL lines are located in the TSC and EOF.

(6) **Emergency Response Data System (ERDS)**: As prescribed by 10 CFR 50 Appendix E.VI, ERDS will supply the NRC with selected plant data points on a near real-time basis. ERDS is activated by the ERO as soon as possible but not later than 1 hour after declaration of an *Alert, Site Area Emergency, or General Emergency*. The selected data points are transmitted via modem to the NRC at approximately 1-minute intervals. The ERO has backup methods available to provide required information to the NRC in the event that ERDS is inoperable during the declared emergency.

Appendix E to 10 CFR Part 50, Section IV.E (9), requires at least one onsite and one offsite communications system; each system shall have a backup power source. The applicant has stated that the PBX telephone system is powered by a “non-Class 1E dc and uninterruptible power supply”; power for the commercial telephone system is provided by the commercial vendor. In addition, NRC BL 80-15, “Possible Loss of Emergency Notification System (ENS) with Loss of Offsite Power,” states that the applicant should provide backup power sources for the ENS in case of LOOP. The applicant states that backup power is provided for the ENS, which conforms to the requirements of NRC BL 80-15.

On February 4, 2011, the staff sent RAI Question 09.05.02-1, requesting further details on the primary and secondary means of communications between the plant (CR and TSC) and State/local governments, Federal emergency response organizations (EROs), the emergency operations facility (EOF), the staff, the emergency operations centers (EOCs), and the field assessment teams, and for this information to be added to the FSAR or the Emergency Plan or both. In the letter dated March 3, 2011, the applicant provided its response to RAI 5192, Question 09.05.02-1 (ADAMS Accession No. ML110660200). The applicant response provides a more detailed description of the emergency response communications, including each party, organizational titles, initial notification paths, and primary and alternate methods of communications among the parties. Additionally, the response states the applicant would enhance its Emergency Plan to incorporate these details.

The applicant incorporated the additional details it had identified in the letter response within Emergency Plan, Revision 3, and these changes remain in Revision 4. As such, the Emergency Plan identifies the primary and secondary means of communication. The staff finds the applicant's response acceptable and that the applicant has demonstrated sufficient means for onsite and offsite communications, with adequate backup power sources, to meet the requirements of Appendix E to 10 CFR Part 50, Part IV.E(9). The staff also finds that the use of a battery system and a diesel generator to provide backup power to the ENS, in case of LOOP, adequately addresses NRC BL 80-15. Therefore, the staff concludes that COL Action Item 9.5-9 has been adequately addressed and RAI Question 09.05.02-1 is resolved.

- PTN COL 9.5-10

The applicant provided additional information in PTN COL 9.5-10 to resolve COL Information Item 9.5-10. COL Information Item 9.5-10 states:

> The emergency offsite communication system, including the crisis management radio system, will be addressed by the combined license applicant.

The commitment was also captured as COL Action Item 9.5.2-1 in Appendix F of NUREG-1793, which states:

> The COL applicant will provide a description of the emergency offsite communication system, including the crisis management radio system.

The staff reviewed PTN COL 9.5-10, which is included under Section 9.5.2.5.2 of the Turkey Point Units 6 and 7 COL FSAR, concerning the emergency offsite communication system and the crisis management radio system. The staff addressed offsite communications interfaces under its review of PTN COL 9.5-9 in this evaluation. Section 9.5.2.5.2 of the Turkey Point Units 6 and 7 COL FSAR states the Emergency Plan describes emergency offsite communications to address PTN COL 9.5-10. Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Emergency Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.3.

On February 4, 2011, the staff sent RAI 5192, Question 09.05.02-1, in which the staff requested additional clarification as to the design of the site's crisis management radio system. In the letter, dated March 3, 2011, the applicant provided its response to RAI 5192, Question 09.05.02-1 (ML110660200). The applicant response provides a more detailed description of the

crisis management radio system including the use of the 900 Megahertz Radio System. Additionally, the response states the applicant would enhance its Emergency Plan to incorporate these details.

The applicant incorporated the additional details it had identified in the letter response within Emergency Plan, Revision 3. The changes to the Emergency Plan provide a more detailed description of the 900 Megahertz Radio System and identify its use as a crisis management radio system.

Section 50.47(b)(8) of 10 CFR requires provisions and maintenance of adequate emergency facilities and equipment to support the emergency response. As discussed in the evaluation of PTN COL 9.5-9, the staff finds the offsite communications systems provide adequate emergency communications equipment and facilities to meet the requirements of 10 CFR 50.47(b)(8). Furthermore, the staff finds the 900 Megahertz Radio System adequately serves as the crisis management radio system. Therefore, the staff concludes that COL Action Item 9.5.2-1 has been adequately addressed.

- STD COL 9.5-11

The applicant provided additional information in STD COL 9.5-11 to resolve COL Information Item 9.5-11. COL Information Item 9.5-11 states:

> This COL item is addressed in the Physical Security Plan.

The commitment was also captured as COL Action Item 9.5.2-2 in Appendix F of NUREG-1793, which states:

> The COL applicant will provide a description of the security communication system.

Table 1.6-201 of the Turkey Point Units 6 and 7 COL FSAR maps the Physical Security Plan to Turkey Point Units 6 and 7 COL FSAR, Section 13.6. The NRC Office of Nuclear Security and Incident Response evaluates compliance with 10 CFR 73.55(e) and 10 CFR 73.55(f) as part of its review of Physical Security for Turkey Point Units 6 and 7 COL FSAR, Section 13.6. Therefore, the staff's review of STD COL 9.5-11, which relates to security communications, is provided under Section 13.6 of this SER, and Section 13.6 of this SER provides the staff's evaluation of the applicant's resolution of STD COL 9.5-11.

9.5.2.5 *Post-Combined License Activities*

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

9.5.2.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.5.2 of NUREG-0800. The staff based its conclusion on the following:

- PTN COL 9.5-9, has been adequately addressed by the applicant in that the onsite and offsite communications interfaces meet the communications requirements of 10 CFR Part 50, Appendix E, Section IV.E(9). In addition, the staff finds the use of a battery system and a diesel generator to provide backup power for the ENS in case of LOOP meets the guidance in NRC BL 80-15.

- PTN COL 9.5-10, has been adequately addressed by the applicant in that the Turkey Point Units 6 and 7 emergency offsite communications system, including the crisis management radio system, is capable of providing for notification of personnel and implementation of evacuation procedures in case of emergency and meets the requirements of 10 CFR 50.47(b)(8).

- STD COL 9.5-11, which involves security communications, is documented in Section 13.6 of this SER.

9.5.3 Plant Lighting System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.3, "Lighting Systems")

The plant lighting system provides normal, emergency, panel, and security lighting. The normal lighting provides normal illumination during plant operating, maintenance, and test conditions. The emergency lighting provides illumination in areas where emergency operations are performed upon loss of normal lighting. The panel and security lighting is designed to provide the minimum illumination required.

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.3, "Plant Lighting System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.5.4 Diesel Generator Fuel Oil System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.4, "Diesel Generator Fuel Oil Storage and Transfer System")

9.5.4.1 *Introduction*

The standby diesel generator fuel oil system maintains the fuel oil system for the diesel engines that provide backup onsite power. This system includes all piping up to the connection to the engine interface, fuel oil storage tanks, fuel oil transfer pumps, day tanks, and the tank storage vaults.

9.5.4.2 *Summary of Application*

Section 9.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD. Section 9.5 of the AP1000 DCD includes Section 9.5.4.

In addition, in Turkey Point Units 6 and 7 COL FSAR, Section 9.5.4.5.2, the applicant provided the following:

AP1000 COL Information Item

- STD COL 9.5-13

The applicant provided additional information in STD COL 9.5-13 to resolve fuel oil sampling and testing to protect against degradation.

9.5.4.3 *Regulatory Basis*

The regulatory basis of the information incorporated by reference is addressed in NUREG–1793 and its supplements.

In addition, the acceptance criteria associated with the relevant requirements of the NRC regulations for the diesel generator fuel oil system are given in Section 9.5.4 of NUREG–0800.

9.5.4.4 *Technical Evaluation*

The staff reviewed Section 9.5.4 of the Turkey Point Units 6 and 7 COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the COL application represents the complete scope of information relating to this review topic.[1] On the basis of its review, the staff confirms that the information in the application and incorporated by reference addresses the required information relating to the diesel generator fuel oil system. The results of the staff's evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

Section 1.2.3 of this SER provides a discussion of the strategy used by the staff to perform one technical review for each standard issue outside of the scope of the DC and use this review in evaluating subsequent COL applications. To ensure the staff's findings on standard content that were documented in the SER for the reference COL application (VEGP Units 3 and 4) were equally applicable to the Turkey Point Units 6 and 7 COL application, the staff undertook the following reviews:

- The staff compared the VEGP FSAR, Revision 5, to the Turkey Point Units 6 and 7 COL FSAR. In performing this comparison, the staff considered changes made to the Turkey Point Units 6 and 7 COL FSAR (and other parts of the COL application, as applicable) resulting from RAIs.

- The staff confirmed that all responses to RAIs identified in the corresponding standard content evaluation were endorsed.

- The staff verified that any site-specific differences were not relevant to the safety conclusion.

The staff completed its review and finds the evaluation performed for the standard content to be directly applicable to the Turkey Point Units 6 and 7 COL application. This standard content material is identified in this SER by use of italicized, double-indented formatting. Section 1.2.3 of this SER provides an explanation of why the standard content material from the SER for the reference COL application (VEGP) includes evaluation material from the SER for the BLN Units 3 and 4 COL application.

The following portion of this technical evaluation section is reproduced from Section 9.5.4.4 of the VEGP SER:

AP1000 COL Information Item

- *STD COL 9.5-13*

The applicant provided additional information in STD COL 9.5-13 to resolve COL Information Item 9.5-13. COL Information Item 9.5-13 states:

> *Address the diesel fuel specifications grade and the fuel properties consistent with manufacturers' recommendations and the measures to protect against fuel degradation by a program of fuel sampling and testing.*

The commitment was also captured as COL Action Item 9.5.9-2 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> *The COL applicant will develop site-specific factors in the fuel oil storage tank installation specification to reduce the effects of sun heat input into the stored fuel, as well as the diesel fuel specifications grade and fuel properties consistent with manufacturers' recommendations, and will develop a program of fuel sampling and testing to protect against fuel degradation.*

Revision 17 of the DCD addressed the requirement for limiting heat input by specifying a white epoxy-urethane coating system. Therefore, this information is no longer required from COL applicants.

The COL information in Revision 0 of the applicant's FSAR added Section 9.5.4.5.2, "Fuel Oil Quality." The new section addressed fuel quality as follows:

> *High fuel oil quality is provided by specification of the required grade and properties of the fuel oil for procurement, by testing of samples of new fuel oil prior to addition into the tanks, and by monitoring the fuel oil for contamination and degradation with periodic testing of samples from the storage tanks in accordance with manufacturer's recommendations.*

The fuel oil storage tanks are inspected at least once per 92 days to check for and remove accumulated water.

The fuel oil quality is verified by sampling and testing from the storage tanks at least once per 92 days. New fuel oil is tested prior to its addition to the storage tanks to verify that the sample meets the following minimum requirements:

- *Water and sediment content of less than or equal to 0.05 volume percent.*
- *Kinematic viscosity at 40°C of greater than or equal to 1.9 mm2/s (1.9 centistokes), but less than or equal to 4.1 mm2/s (4.1 centistokes).*
- *Specific gravity as specified by the manufacturer at 16/16°C (60/60°F), or an API [American Petroleum Institute] gravity at 16°C (60°F), within limits established in accordance with manufacturer's recommendations.*
- *Tested impurity level of less than 2 mg of insolubles per 100 ml. The analysis is completed within 7 days after obtaining the sample, but may be performed after the addition of new oil.*

As a result of the staff's review of BLN COL FSAR Section 9.5.4.5.2, the staff identified two questions that were submitted to the applicant in RAIs.

In RAI 9.5.4-1(a), the staff requested that the applicant identify the controls in place to ensure the fuel oil quality program is implemented according to BLN COL FSAR Section 9.5.4.5.2. In response, the applicant stated that implementation of the fuel oil program according to the FSAR is ensured by the Quality Assurance Program Description (QAPD) described in Chapter 17 and Part 11 of the COL application. The applicant stated QAPD Part III, Section 1, contains quality controls for non-safety-related SSCs that would require and verify implementation of the fuel oil program based on the FSAR description. The staff reviewed the information provided and concludes the proposed quality control requirements can ensure implementation of the fuel oil program in accordance with the BLN COL FSAR.

In RAI 9.5.4-1(b), the staff requested that the applicant provide quality requirements for the periodic testing of stored fuel oil. Section 9.5.4.5.2 of the BLN COL stated that diesel fuel oil from the storage tanks is sampled and tested, but no requirements were listed. The application listed quality requirements that appeared to apply only to new fuel oil. In its response, the applicant proposed the following revised BLN COL FSAR Section 9.5.4.5.2:

The diesel fuel oil testing program requires testing both new fuel oil and stored fuel oil. High fuel oil quality is provided by specifying the use of ASTM [American Society for Testing and Materials] Grade 2D fuel oil with a sulfur content as specified by the engine manufacturer.

A fuel sample is analyzed prior to addition of ASTM Grade 2D fuel oil to the storage tanks. The sample moisture content and particulate or color is verified per ASTM 4176. In addition, kinetic [sic] viscosity is tested to be within the limits specified in Table 1 of ASTM D975. The remaining critical parameters per Table 1 of ASTM D975 are verified compliant within 7 days.

Fuel oil quality is verified by sample every 92 days to meet ASTM Grade 2D fuel oil criteria. The addition of fuel stabilizers and other conditioners is based on sample results.

The fuel oil storage tanks are inspected on a monthly basis for the presence of water. Any accumulated water is to be removed.

The staff reviewed this revision and finds it acceptable because it addresses both the new and stored fuel oil and the requirements are the manufacturer's specifications and the same ASTM standards applied to safety-related diesel generators. The staff also confirmed that the revised fuel oil testing program was included as shown above in Revision 1 of the BLN COL FSAR.

Correction of Error in the Standard Content Evaluation Text

The NRC staff identified an error in the text reproduced above from Section 9.5.4.4 of the BLN SER that requires correction. The BLN SER includes the following statement: "In addition, kinetic [sic] viscosity is tested to be within the limits specified in Table 1 of the ASTM D975." The world "kinetic" should read as "kinematic." The staff thought this was a typographical error on the applicant's part because Table 1 of ASTM D975, "Standard Specification for Diesel Fuel Oils," which is the appropriate reference, specifies "kinematic viscosity." Therefore, the staff concludes that STD COL 9.5-13 has been resolved pending incorporation of the proposed revision in the VEGP COL FSAR, which is being tracked as Confirmatory Item 9.5-3.

Resolution of Standard Content Confirmatory Item 9.5-3

Confirmatory Item 9.5-3 is an applicant commitment to revise its FSAR Section 9.5.4.4 to correct a typographical error. The staff verified that the VEGP COL FSAR was appropriately revised. As a result, Confirmatory Item 9.5-3 is now closed.

9.5.4.5 *Post-Combined License Activities*

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

9.5.4.6 *Conclusion*

The staff reviewed the application and checked the referenced DCD. The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

In addition, the staff concludes that the relevant information presented in the Turkey Point Units 6 and 7 COL FSAR is acceptable and meets the guidelines given in Section 9.5.4 of NUREG–0800. The staff based its conclusion on the following:

- STD COL 9.5-13 has been adequately addressed by the applicant in that it ensures that the manufacturers' recommendations using industry standards are met and provides a fuel sampling and testing program to protect against fuel degradation.

9.5.5 Standby Diesel Generator Cooling Water System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.5, "Diesel Generator Cooling Water System)

Section 9.5.5 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.5, "Standby Diesel Generator Cooling Water System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] On the basis of its review, the staff confirms that there is no outstanding issue related to this section. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG-1793 and its supplements.

9.5.6 Standby Diesel Generator Starting Air System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.6, "Diesel Generator Starting System")

Section 9.5.6 of the Turkey Point Units 6 and 7 COL FSAR, incorporates by reference, with no departures or supplements, Section 9.5.6, "Standby Diesel Generator Starting Air System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.5.7 Standby Diesel Generator Lubrication System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.7, "Diesel Generator Lubrication System")

Section 9.5.7 of the Turkey Point Units 6 and 7 COL FSAR, incorporates by reference, with no departures or supplements, Section 9.5.7, "Standby Diesel Generator Lubrication System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point

Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.

9.5.8 Standby Diesel Generator Combustion Air Intake and Exhaust System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.9.5.8, "Diesel Generator Combustion Air Intake and Exhaust System")

Section 9.5.8 of the Turkey Point Units 6 and 7 COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.8, "Standby Diesel Generator Combustion Air Intake and Exhaust System," of the AP1000 DCD. The staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The staff's review confirmed that the applicant has addressed the relevant information relating to this section, and no outstanding information related to this section remains to be addressed in the Turkey Point Units 6 and 7 COL FSAR. The results of the staff's technical evaluation of the information incorporated by reference in the Turkey Point Units 6 and 7 COL application are documented in NUREG–1793 and its supplements.