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, 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 William States Lee III Nuclear Station (WLS) combined license (COL) final safety analysis report (FSAR), Revision 4, incorporates by reference, with no departures or supplements, Section 9.1.1, "New Fuel Storage," of Revision 19 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 NRC staff's review confirmed that there is no outstanding issue related to this section. 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, "Final Safety Evaluation Report [FSER] 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 facilities must maintain the spent fuel in subcritical arrays during all credible storage conditions. In addition, spent fuel must remain subcritical during fuel handling.

[1] See Section 1.2.2 for 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 certification (DC).

9.1.2.2 *Summary of Application*

Section 9.1 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 19. Section 9.1 of the DCD includes Section 9.1.2.

In addition, in WLS 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 in WLS Part 10, Revision 4, a license condition to provide a schedule to support the NRC's inspection of operational programs and added the Metamic monitoring program to this list.

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 Commission regulations for the fuel storage and handling are given in Section 9.1.2 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: [Light-Water Reactor] LWR Edition."

The regulatory basis for acceptance of the COL information and supplementary information items are 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 Criteria for Nuclear Power Plants," General Design Criteria (GDC) 4, "Environmental and Dynamic Effects Design Bases"

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

9.1.2.4 *Technical Evaluation*

The NRC staff reviewed Section 9.1.2 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to spent fuel storage. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 (Vogtle Electric Generating Plant [VEGP], Units 3 and 4) were equally applicable to the WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 5 to the WLS COL FSAR, Revision 4. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 Station (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 WLS designation (e.g., **Confirmatory Item WLS 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 Revision 19, 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 Revision 19.

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 WLS 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 proposed by the applicant 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to spent fuel storage, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

In addition, the staff concludes that the relevant information presented in the WLS 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 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, and then returns the water to the pool. The SFS heat exchangers 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.

Section 9.1.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.1.3, "Spent Fuel Pool Cooling System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staffs review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

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 is comprised of 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 WLS COL FSAR, Revision 4, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 19. Section 9.1 of the DCD includes Section 9.1.4.

In addition, in WLS 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 Commission regulations for the LLHS are given in Section 9.1.4 of NUREG-0800.

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

- 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 NRC staff reviewed Section 9.1.4 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the LLHS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 WLS 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:

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

9.1.4.6 *Conclusion*

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

In addition, the staff concludes, that the relevant information presented in the WLS COL FSAR is acceptable and meets the guidelines given 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 relevant information in the WLS COL FSAR provided clarification 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 relevant information in the WLS 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 system (OHLHS) is 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 is 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 WLS COL FSAR, Revision 4, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 19. Section 9.1 of the AP1000 DCD includes Section 9.1.5.

In addition, in WLS 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 Commission 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 include the following:

- GDC 4
- 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 NRC staff reviewed Section 9.1.5 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to OHLHS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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****.*

<u>AP1000 COL Information Items</u>

- *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.

Resolution of Standard Content Open Items 9.1-3 and 9.1-4

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 WLS 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:

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

9.1.5.6 *Conclusion*

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

In addition, the staff concludes, that the relevant information presented in the WLS COL FSAR is acceptable and meets the guidelines 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 Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Section C.I.9.1.5 guidance 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 relevant information in the WLS COL FSAR provided clarification that ISI of the OHLHS is part of the plant inspection program for the OHLHS, which is implemented through procedures.

- STD COL 9.1-6 is acceptable because the staff finds that the relevant information in the WLS 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 heat exchangers 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*

As provided in Section 9.2 of the WLS COL FSAR, Revision 4, Section 9.2.1, "Service Water System," is incorporated by reference. However, the AP1000 standard design is for a single unit and the following item concerning multiple units is a site-specific consideration that needs to be addressed:

Potential SWS Cooling Tower Interactions:

> The AP1000 DCD was approved for use as a single unit. The applicant proposes to install two units, and potential interactions between the two SWS cooling towers were not considered in the original design and need to be addressed to assure adequate cooling capability for each unit.

In addition, in WLS COL FSAR Section 9.2.1, the applicant provided the following:

Supplemental Information

- WLS SUP 9.2-2

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.

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 mid-loop 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 NRC 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 WLS SUP 9.2-2, addressing the SWS cooling tower is the acceptance criteria in Sections 9.2.1 and 9.2.5 of NUREG-0800.

9.2.1.4 *Technical Evaluation*

The NRC staff reviewed Section 9.2.1 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the SWS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLSNS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the WLS COL FSAR:

Supplemental Information

- WLS SUP 9.2-2

The applicant provided supplemental information in WLS COL FSAR Section 9.2.1.2.2 by adding additional text to address the SWS cooling tower potential interactions.

Potential SWS Cooling Tower Interactions:

The cooling capability of the SWS cooling towers for the WLS units can be adversely affected by interactions that exist between the station's cooling towers. Adverse interactions can occur due to localized atmospheric influences caused by siting and relative proximity considerations. Because this is not a factor for single cooling towers, it is not addressed by the AP1000 DCD. Therefore, the staff generated **RAI Letter #008 Question 9.2.1-1** and **RAI Letter #093 Question 9.2.1-8** requesting additional information for the applicant to address potential adverse interactions between the cooling towers for the two units and to describe any additional design provisions that are necessary, as appropriate.

The applicant provided responses for these two questions in two letters, dated September 26, 2008, and March 14, 2011. In its responses, the applicant stated that the effects on cooling capacity of the SWS mechanical draft cooling towers from interactions with the circulating water system (CWS) mechanical draft cooling towers at the WLS site have been considered.

The WLS has three Unit 1 CWS cooling towers, clustered in a triangular configuration, and located west-southwest of the Units 1 and 2 SWS cooling towers. A cluster of three Unit 2 CWS cooling towers is located east-northeast of the Units 1 and 2 SWS cooling towers. The CWS cooling towers are mechanical induced draft towers and their plumes are directed upward by their fans and the buoyant effect of warm air. Because the three CWS cooling towers of each unit are in close proximity to each other, the individual plumes combine to form a single plume for each unit. Only 50 percent of the heat removal capacity of the SWS cooling tower is required to maintain the required tower function, thus providing substantial margin to accommodate any potential for adverse effects on tower performance due to an interference condition. When an SWS cooling tower of one unit is operating at the highest heat loads, the CWS cooling tower of that unit would be operating at a much reduced heat load. Therefore, the potential for adverse impacts is confined to plume interactions between the CWS cooling towers of one unit and the SWS cooling tower of the adjacent unit. Interaction between the Unit 2 CWS cooling towers and the Unit 1 SWS cooling tower would require a wind direction from the east-northeast, which is not a prevailing wind direction for the site. Winds from the east-northeast direction occur at a yearly frequency of less than 6 percent. Since the natural

tendency of the plume would be to rise and disperse at higher elevations, this wind direction would also have to coincide with meteorological conditions that would maintain the Unit 2 CWS cooling towers plume at ground level. Finally, this ground level plume from the Unit 2 CWS cooling towers would have to travel a distance of approximately 365 meters (1200 feet) and circumvent the Unit 2 turbine building to interact with the Unit 1 SWS cooling tower. Even with the assumption of a worst-case plume condition, independent of CWS cooling tower fan speed or the number of fans operating, there is a minimal potential for adverse impacts to the Unit 1 SWS cooling tower. Interaction between the Unit 1 CWS cooling tower and the Unit 2 SWS cooling towers has a lower probability. This plume interaction requires wind direction from the west-southwest, which occurs at a yearly frequency of less than 5 percent. In addition to the favorable wind and meteorological conditions, the Unit 1 CWS cooling towers plume would also be required to travel a distance of approximately 640 meters (2100 feet) and circumvent both the Units 1 and 2 turbine building structures to interact with the Unit 2 SWS cooling tower.

In addition, there is a minimal probability that an SWS cooling tower plume could travel to the vicinity of a SWS tower on an adjacent unit. Interfering structures in the path of the plume would provide ample opportunity for plume dispersion, greatly minimizing any adverse effect on tower performance. Due to the power block separation requirements for a two-unit facility (approximately 243 meters (800 feet) of separation between SWS cooling tower), the SWS cooling tower is in much closer proximity to the buildings and structures within its own unit than to those located in an adjacent unit. There are no site-specific conditions that could result in adverse impacts from air restriction. During conditions where the SWS cooling tower is subject to RTNSS requirements , the tower is only operating at 50 percent of its operational heat load, leaving a substantial margin available to accommodate site-specific adverse interactions, if they exist.

The maximum normal wet bulb temperature for the site is over 4 degrees less than the wet bulb temperature used to size the tower, creating additional margin.

Based on the information that was provided in the applicant's responses, the staff considers the applicant's resolution of this issue to be acceptable since all of the mechanical draft cooling tower interactions at WLS have been considered and that there will be minimal cooling tower interaction effects and the cooling tower interactions will not adversely affect the cooling capacity of the SWS since the cooling towers have at least 243 meters (800 feet) of building separation and the large structure, the turbine building, being placed between the cooling towers. Therefore, there is reasonable reassurance to conclude that any postulated 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. **RAI Letter #008 Question 9.2.1-1** and **RAI Letter #093 Question 9.2.1-008** are resolved.

9.2.1.5 *Post Combined License Activities*

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

9.2.1.6 *Conclusion*

Information that the applicant incorporated by reference was previously reviewed and approved by the NRC as documented in NUREG-1793, including Supplement 2. Consequently, this information was not included within the scope of this evaluation. Therefore, the staff's

evaluation of the WLS COL application was limited to plant-specific considerations that were not included within the scope of the generic AP1000 DCD approval.

The staff evaluated the potential for adverse interactions between the SWS cooling towers and CWS cooling towers for the WLS units. Based on the results of this evaluation, the staff determined that the applicant's RAI response related to CWS mechanical draft cooling tower and SWS cooling tower interactions has been adequately resolved. Therefore, the staff concludes that the WLS SWS, as described in Section 9.2.1 of the WLS COL FSAR 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 provides a closed loop of cooling water for reactor system components, reactor shutdown equipment, ventilation equipment, and components of the emergency core cooling system.

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements. Section 9.2.2, "Component Cooling Water System (CCS)," of Revision 19 of the AP 1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.2.3 Demineralized Water Treatment System

The demineralized water treatment system 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.2.3, "Demineralized Water Treatment System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.2.4 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.

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.2.4, "Demineralized Water Transfer and Storage System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.2.5 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 the raw water system (RWS) for domestic use and human consumption. The potable water system has no safety-related functions other than to prevent in-leakage into the main control room envelope during main control room emergency habitability system (VES) operation. A loop seal in the safety-related PWS piping that penetrates the main control room envelope boundary prevents in-leakage into the main control room envelope

9.2.5.2 *Summary of Application*

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.2 of the AP1000 DCD, Revision 19. 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 WLS COL FSAR Section 9.2.5, the applicant provided the following:

AP1000 COL Information Item

- WLS COL 9.2-1

The applicant provided additional information in WLS COL 9.2-1 to address COL Information Item 9.2-1 in WLS COL FSAR Sections 9.2.5.2.1, "General Description," 9.2.5.3, "System Operation, and 9.2.12.1,"Potable Water, by providing information concerning the source of water for the PWS.

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 Commission 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 NRC staff reviewed Section 9.2.5 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the PWS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the WLS COL FSAR:

AP1000 COL Information Item

- WLS COL 9.2-1

The applicant provided additional information in WLS 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 NRC staff reviewed the resolution to COL Information Item 9.2-1 on the source of water for the potable water system included under Sections 9.2.5.2.1, 9.2.5.3, and 9.2.12.1 of the Lee COL FSAR. In these sections the applicant proposes to use the Draytonville Water District as the source of potable water. The water supply meets DCD Section 9.2.5 regarding pressure, capacity, and quality requirements. Because the applicant is using a municipal water supply, no biocide is necessary; therefore there is no impact of toxic gases on main control room habitability from this system. The staff finds this an acceptable resolution of COL Information Item 9.2-1 because the pressure, capacity, and quality requirements from the DCD are met. In DCD Revision 19, Westinghouse states that no interconnections exist between the PWS and any potentially radioactive system or any system using water for purposes other than domestic water service. The site specific information provided in WLS COL 9.2-1 is outside the power block and not potentially contaminated by radioactive water. Because no interconnections exist between the PWS and any potentially radioactive system, the staff finds that GDC 60 is satisfied, with respect to preventing contamination by radioactive water.

9.2.5.5 *Post Combined License Activities*

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

9.2.5.6 *Conclusion*

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

this section. 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.

In addition, the staff concludes that the relevant information presented in the WLS COL FSAR is acceptable and meets the guidance in Section 9.2.4 of NUREG-0800. The staff based its conclusion on the following:

- WLS 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 drainage system has no safety-related function other than main control room envelope isolation. Redundant safety-related isolation valves are provided in the vent line penetrating the main control room. Therefore, there are no single active failures that would prevent isolation of the main control room envelope. 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 WLS COL FSAR, Revision 4, incorporates by reference Section 9.2 of the AP1000 DCD, Revision 19. 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 WLS COL FSAR Section 9.2.6, the applicant provided the following:

Supplemental Information

- WLS SUP 9.2-1

The applicant provided supplemental information by adding text to the end of Section 9.2.6.2.1, "General Description," to state that the sanitary drainage systems (SDS) collects sanitary waste from plant restrooms and locker room facilities in the turbine building, auxiliary building, and annex building, and carries this waste off-site to Gaffney Board of Public works treatment plant where it is processed.

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 Commission regulations for WLS SUP 9.2-1 are given in Section 9.2.4 of NUREG-0800.

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

- GDC 60

9.2.6.4 *Technical Evaluation*

The NRC staff reviewed Section 9.2.6 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to sanitary drains. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the WLS COL FSAR:

Supplemental Information

- WLS SUP 9.2-1

The NRC staff reviewed the location of the waste treatment plant included under Section 9.2.6.2.1 of the WLS COL FSAR. In Section 9.2.6.2.1 of the WLS COL FSAR, the applicant proposes the Gaffney Board of Public Works sewage treatment plant for the treatment of sanitary waste which is located Off-site. 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 does not affect compliance with 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to sanitary drains, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

In addition, the staff concludes that the relevant information presented in the WLS 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:

- WLS SUP 9.2-1 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)")

The central chilled water system is a nonsafety system that provides chilled water to the cooling coils of the supply air handling units and unit coolers of several radiologically controlled areas of the plant.

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.2.7, "Central Chilled Water System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review. The NRC staff's review confirmed that there is no outstanding issue related to this section. The results of the NRC staff's technical evaluation of the information incorporated by reference in the VEGP COL application are documented in NUREG-1793 and its supplements.

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 system that provides closed-loop cooling for the removal of heat from heat exchangers in the turbine building and rejects the heat to either the CWS or the RWS. The system consists of two 100-percent capacity pumps, three 50-percent capacity heat exchangers (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 heat exchanger. System piping is made of carbon steel, except that nonmetallic piping may be used in accordance with ASME B31.1, "Power Piping," if justified by evaluation.

9.2.8.2 *Summary of Application*

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.2 of the AP1000 DCD, Revision 19. Section 9.2 of the DCD includes Section 9.2.8.

In addition, in WLS COL FSAR Section 9.2.8, the applicant provided the following:

Site-Specific Information Replacing Conceptual Design Information

- WLS CDI

The applicant provided additional information to replace conceptual design information (CDI) in the AP1000 DCD with site-specific information identifying the source of cooling water for the WLS 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 Commission regulations for the TCS are given in Section 9.2.2 of NUREG-0800.

9.2.8.4 *Technical Evaluation*

The NRC staff reviewed Section 9.2.8 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the TCS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the WLS COL FSAR:

Site-Specific Information Replacing Conceptual Design Information

- WLS CDI

The AP1000 standard plant allows the use of either circulating water or raw water for removing heat from the TCS heat exchangers. The AP1000 DCD leaves it up to the COL applicant to specify a specific source of cooling water for plant-specific applications. The WLS design specifies the use of both circulating water and raw water for this purpose. This arrangement was reviewed and approved by the NRC during its evaluation of the AP1000 DCD. Consequently, the WLS design is consistent with the AP1000 licensing basis as approved by the staff, which includes conformance with NUREG-0800 Section 9.2.2 (as applicable). Therefore, the supplementary design information that was provided for the WLS TCS is acceptable.

The COL applicant modified FSAR Section 9.2.8.2.3, "System Operations - Startup," in Revision 1 to eliminate the provision that the CWS must be placed in operation prior to placing the TCS in operation. Based on the staff's review, this appeared to be an apparent departure from the description provided in the AP1000 DCD, but it was not recognized and evaluated as such. Therefore, in **RAI 038 Question 9.2.2-1**, the staff requested that the applicant revise FSAR Section 9.2.8.2.3 to address the need to properly address this change to the startup description provided in the AP1000 DCD Tier 2, Revision 16, Section 9.2.8.2.3. Based on the applicant's response, the applicant provided clarification on how the TCS system is to be placed in operation during startup. The FSAR markup states that after cooling water flow from the CWS, or RWS when applicable, is established but prior to the operation of systems that required turbine building closed cooling water flow, then the TCS is placed into operation. The staff considers the licensee's resolution of this issue to be acceptable since it clarifies the cooling water sources as either CWS or RWS. In addition, the staff verified this item is not

considered a departure. The staff verified that the WLS COL FSAR markup that was provided with the applicant's RAI responses was added to Revision 1 of the COL; therefore, **Question 9.2.2-1** is resolved.

9.2.8.5 *Post Combined License Activities*

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

9.2.8.6 *Conclusion*

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

In addition, the staff concludes that the relevant information presented in the WLS 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:

- WLS 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 the 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) has no safety-related function other than main control room envelope isolation. A normally closed safety-related isolation valve is provided in the drain line penetrating the main control room. The drain line is safety related up to the isolation valve to ensure that the main control room habitability pressure boundary is maintained. The waste water system collects and processes the waste water from the equipment and floor drains in the nonradioactive building areas during plant operations and outages. The waste water from the turbine building sumps flows to a waste water retention basin, if required, for settling of suspended solids and treatment before discharge. The waste water retention basin transfer pumps discharge the basin effluent to the blowdown sump prior to discharge to the Parr Reservoir via the plant outfall piping. The design of the system precludes inadvertent discharge of radioactively contaminated drainage

9.2.9.2 *Summary of Application*

Section 9.2 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.2 of the AP1000 DCD, Revision 19. Section 9.2 of the AP1000 DCD includes Section 9.2.9, "Waste Water System," which addresses Section 9.3.3, "Equipment and Floor Drainage System," of NUREG-0800.

In addition, in WLS COL FSAR Section 9.2, the applicant provided the following:

AP1000 COL Information Item

- WLS COL 9.2-2

The applicant provided additional information in WLS COL 9.2-2 to address COL Information Item 9.2-2, by including additional design information to the waste water retention basin portion of AP1000 DCD Section 9.2.9.2.2.

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 Commission 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:

- GDC 4
- GDC 60

9.2.9.4 *Technical Evaluation*

The NRC staff reviewed Section 9.2.9 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the WWS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

The staff reviewed the information in the WLS COL FSAR:

AP1000 COL Information Item

- WLS COL 9.2-2

The applicant provided additional information in WLS COL 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 NRC staff reviewed the resolution to WLS COL 9.2-2 with respect to the design of the plant waste water retention basin (WWRB) and associated components included under Section 9.2.9.2.2, "Component Description" of the WLS COL FSAR. To address WLS COL 9.2-2, details were provided for the location of the WWRB and routing configuration.

The waste water from the WWRB is discharged to the Ninety-Nine Islands on the Broad River through a common blowdown sump with inputs from the Unit 1 and 2 WWRB and CWS cooling tower blowdown. There is one WWRB per unit. The method for forwarding the waste water from the basin to the blowdown sump is by use of two transfer pumps.

In order to meet GDC 60, the applicant must demonstrate suitable control of the release of radioactive materials in liquid effluent. Upon review of WLS COL 9.2-2, the staff requested the applicant, in RAI 9.3.3-1, to provide a discussion on whether all site-specific potentially radioactive fluid draining into and downstream of the WWRB will be monitored prior to distribution 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 item.

The applicant responded to RAI 9.3.3-1 in a letter dated May 4, 2010. The response provided detailed information on radiation monitoring, level instrumentation and components for the WWS. Each unit's WWRB is divided into two separate compartments, which allows one compartment to be out of service while the other compartment is available. Each WWRB is constructed such that its contents dissolved or suspended, do not penetrate the liner and leach into the ground. The configuration and size of the WWRB allows settling of solids larger than 10 microns, which may be suspended in the waste water stream. The applicant confirmed that the potentially contaminated fluids entering the WWRB from the turbine building sumps are monitored with a radiation monitor on the common discharge piping. As indicated in the RAI response, there is several effluent lines within the scope of the certified design that bypass this radiation monitor. These include the diesel fuel area sumps, SWS cooling tower blowdown, SWS strainer blowdown, and CWS strainer backwash. The RAI response clarified that these lines do not come in contact with radioactive sources or contain radiation monitoring prior to discharge into the WWRB. The applicant indicated that for WLS Units 1 and 2, there are no additional site–specific influent streams to the WWRB outside of those associated with the certified design. Waste water can also be sampled prior to discharge from the WWRB.

Two 100 percent capacity submersible type pumps send waste water from the WWRB to the common blowdown sump. The transfer pumps have 900 gallons per minute (gpm) capacity and the discharge piping has a design pressure of 150 pounds per square inch gauge (psig).

The blowdown sump is a concrete structure and is open to the atmosphere. The blowdown sump is located to the east of Units 1 and 2, outside the protected area. The blowdown sump, common to both WLS Units 1 and 2, receives input from the WWRB and mixes with high volume CWS stream. The RWS provides water for an alternate dilution source to the blowdown sump when the CWS blowdown is not sufficient or not available for that purpose. As discussed in WLS COL FSAR Section 9.2.11.4, the RWS comes directly from the make-up pond A intake and does not interact with any recognized radioactive sources.

The combined dilution flow gravity drains from the blowdown sump flows through an outfall pipe to the Ninety-Nine Islands dam on the Broad River. The blowdown sump outfall is sized to prevent sump overflow during maximum inlet flow to the sump. At the dam, the dilution flow is

mixed with liquid radwaste effluent from each unit and discharged to the environment through a diffuser mounted on the upstream side of the dam. The elevation difference between the sump and the river prevents liquid radwaste cross-contamination of the blowdown sump. The liquid radwaste is monitored and sampled for radiation and is addressed in detail in WLS COL FSAR Section 11.2.

Based on the content in WLS COL FSAR Section 9.2.9 and the RAI 9.3.3-1 response, the staff concludes that the design of the WWS complies with GDC 60, with respect to control of radiation release to environment because as discussed above, the WWS does not normally interact with any potential radioactive sources and any influent streams with the potential to become contaminated are monitored.

To protect against flooding, the WWRB will be equipped with level instrumentation used to control the WWRB transfer pumps and to alarm when the basin level reaches a point where operator action is required. Each WWRB is located approximately 850 feet north of the associated power block. The normal WWRB water level in the basin is at or below grade. Site grading and the distance between the basins and the power block ensures that there will be no adverse impact on safety-related or RTNSS SSCs in the unlikely event of an overflow of the WWRB.

Waste water and blowdown effluent from the blowdown sump drains by gravity to the Broad River via the plant outfall piping. The blowdown sump outfall pipe is sized with adequate capacity to gravity drain the blowdown sump at the highest anticipated influent flow rate. Therefore, no level instrumentation is provided at the blowdown sump. The blowdown sump is located well away from the power block (approximately 1125 feet). Site drainage features ensure that there will be no impact on safety-related or RTNSS SSCs in the unlikely event of an overflow of the sump. Based on the content in WLS COL FSAR Section 9.2.9 and the RAI 9.3.3-1 response, the staff concludes that the design of the WWS complies with GDC 4, with respect to flood protection because the WWRB are designed with two 100-percent pumps controlling level by use of WWRB level instrumentation.

Based on the information provided in WLS COL FSAR Section 9.2.9 and in the response to RAI 9.3.3-1, the staff finds that the applicant has adequately addressed COL information item WLS COL 9.2-2. The staff finds that GDC 4 is met based on the WWS arrangement to prevent flooding that could affect safety-related SSCs adversely and 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 9.3.3-1 is closed and incorporation of the proposed markup into a future revision of the WLS COL FSAR is identified as **Confirmatory Item 9.2-3**.

9.2.9.5 *Post Combined License Activities*

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

9.2.9.6 *Conclusion*

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

In addition, the staff concludes that, the relevant information presented in the WLS COL FSAR is acceptable and meets the guidelines given in Section 9.3.3 of NUREG-0800. The staff based its conclusion on the following:

- WLS COL 9.2-2 is acceptable because the staff finds that the relevant information in the WLS COL FSAR meets the applicable requirements of GDC 4 and GDC 60.

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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.2.10 of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.2.11 Raw Water System

9.2.11.1 *Introduction*

WLS COL FSAR Section 9.2.11, "Raw Water System," describes the RWS for WLS Units 1 and 2. The RWS is a nonsafety-related system that pumps water from the Broad River for use by the WLS units. The RWS supplies raw water for makeup to the CWS cooling tower basins, makeup for the SWS cooling tower basins, WWS alternate dilution flow, the demineralizer water treatment system (DTS), the fire protection system (FPS); and serves as an alternate source of cooling water for the TCS heat exchangers. The RWS also provides alternate sources of make-up water to the SWS cooling towers during a loss of offsite power from the secondary fire water storage tank clearwell, the clarified water subsystem, and the raw water supply subsystem. The RWS consists of the river water subsystem, the raw water supply subsystem (which includes make-up pond A), the make-up pond B subsystem, refill subsystem, make-up pond C system (offsite supply), clarifier subsystem, and the clarified water supply subsystem. The RWS is shared by the two WLS units.

Make-up pond A serves as a central repository for raw water and contains the intake structure for the station. During normal Broad River flow conditions, withdrawal from the river is used to maintain a normal level in make-up pond A and, if required, store water in make-up ponds B and C. When permit conditions limit withdrawal from the Broad River, withdrawal from make-up ponds B and C, and if allowed, the Broad River is used to maintain a normal level in make-up pond A. The water inventory required to support the power generation design basis is provided by the raw water supply subsystem and maintained in make-up pond A. The river water, refill, and make-up ponds B and C subsystems provide water storage and source diversity to adapt to

Broad River flow conditions. Make-up pond A has a usable storage volume of 1200 acre-foot, which provides sufficient capacity to support a dual unit cooldown to cold shutdown conditions and maintain the station in this condition for longer than 7 days.

9.2.11.2 *Summary of Application*

Section 9.2.11 of the WLS COL FSAR provides information concerning the RWS design basis, system description, system operation, safety evaluation, tests and inspections, and instrumentation. The RWS was only vaguely referred to in the AP1000 DCD in relation to the CWS, SWS, DTS, and FPS, and a RWS section was not included in the AP1000 DCD for the NRC 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 WLS units and consequently, the applicant has provided a complete description of this system in the WLS COL FSAR.

In addition, in WLS COL FSAR Section 9.2.11, the applicant provided the following:

Tier 2 Departure

- STD DEP 1.1-1

The applicant proposed a Tier 2 departure (DEP) from the AP1000 DCD by adding a new Section 9.2.11, "Raw Water System" after DCD Section 9.2.10 and renumbering DCD Sections 9.2.11 and 9.2.12 as Sections 9.2.12 and 9.2.13, respectively.

Supplemental Information

- WLS SUP 9.2-4 - reference RAI response letter from Duke Energy dated May 15, 2009. This is supplemental description including FSAR sections addressing design basis, system description, component description, system operations, safety evaluation, testing and inspections, and instrumentation applications.

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*

In most cases, the regulatory bases for AP1000 systems are provided in NUREG-1793 and its supplements. However, because the RWS was not addressed in the AP1000 DCD, it was not evaluated by the staff in NUREG-1793 and a regulatory basis for this system was not established for the standard plant design. Consequently, the staff is unable to refer to NUREG-1793 for the regulatory basis of the RWS and instead, the regulatory basis of the RWS for the WLS units is provided in this section.

The RWS pumps water from the Broad River for use in dissipating the heat necessary for normal power operation (among other things) and in this capacity, the RWS is somewhat similar to a CWS. Because large amounts of water are being pumped and stored by the RWS, flooding is a major consideration. The regulatory criteria that pertain to CWS are provided in NUREG-0800, Section 10.4.5, "Circulating Water System." As specified in this section of

NUREG-0800, the staff's acceptance of the RWS is based upon compliance with GDC 4, by confirming that design provisions for minimizing the occurrence and accommodating the effects of discharging water that may result from RWS failures are adequate.

The RWS also provides makeup water for the SWS cooling tower basins and in this capacity supports the SWS and the nonsafety-related ultimate heat sink (UHS) functions. The regulatory criteria that pertain to the SWS and the UHS are provided in NUREG-0800, Section 9.2.1, "Station Service Water System," and NUREG-0800, Section 9.2.5, "Ultimate Heat Sink," respectively. As specified in these NUREG-0800 sections, the staff's acceptance is based upon compliance with GDC 2, "Design Basis for Protection against Natural Phenomena." The staff considers the RWS to be acceptable with respect to GDC 2 if it satisfies Position C.2 of RG 1.29, "Seismic Design Classification." Position C.2 indicates that the design is acceptable if RWS failures do not adversely affect the control room occupants or safety-related SSCs.

9.2.11.4 *Technical Evaluation*

As discussed above in the Regulatory Basis section, the RWS was not specifically described for the AP1000 standard plant design and consequently, it was not evaluated by the staff in NUREG-1793. In addition, AP1000 DCD, Table 1.7-2, indicates that the RWS is "wholly out of scope." The staff reviewed the information provided in Section 9.2.11 of the WLS COL FSAR, Revision 4 that describes the RWS for the WLS units, including the information provided by Figure 9.2-201, "Raw Water System," through Figure 9.2-207. As discussed above, 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 following staff's technical evaluation includes the Tier 2 departure and supplemental information addressed in Section 9.2.11.2 of this SER.

A. GDC 2, "Design Bases for Protection against Natural Phenomena"; RG 1.29, "Seismic Design Classification"; and GDC 4, "Environmental and Dynamic Effects Design Bases"

The staff's review of the information in WLS COL Section 9.2.11 was to confirm that RWS failures will not adversely affect SSCs that are safety-related or designated for RTNSS, impact the control room occupants. Although Section 9.2.11.1.1, "Safety Design Basis," stated that failures of the RWS or its components will not affect the ability of safety-related systems to perform their intended functions, more detailed information was needed to adequately describe the consequences of RWS failures and to explain why safety-related SSCs are not affected. Likewise, additional information was needed to explain why a failure of the RWS will not adversely affect RTNSS systems and components or impact the control room occupants, 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. The staff issued RAI 9.2.1-1, dated September 23, 2008, asking the applicant to revise WLS COL FSAR Section 9.2.11 to address the impact of RWS failures accordingly, including development of plant-specific ITAAC and test program specifications as appropriate. The applicant's response to RAI 9.2.1-1, dated October 28, 2008, did not adequately address the question and subsequently, the staff expanded the question and issued supplemental RAI 9.2.1-5, dated January 28, 2009, to more fully address RWS failure considerations.

In its response, dated May 15, 2009, the applicant provided a detailed response to the GDC 2, GDC 4, ITAAC, and testing questions. In the response that follows, the applicant stated that failure of the RWS piping located in the yard and inside the turbine building were considered. In addition, the staff has determined that appropriate testing of the RWS was addressed in WLS COL FSAR Section 14.2.

> The potential failures of the RWS and the corresponding impact on SSCs that are safety-related or AP1000 equipment Class D are described below.
>
> Underground piping transfers water from the Broad River to the make-up ponds. The significant above ground portions of this piping are at the intake structures. This piping does not interface with Class D systems nor is it routed in close proximity to safety-related structures or Class D equipment. Underground piping from the make-up pond A intake structure supplies the water treatment equipment in the RWS clarifier subsystem, make-up to the CWS cooling towers, alternate dilution flow to the WWS and alternate make-up to the SWS. This piping is in relatively close proximity to the underground portions of the CWS, and a break in the RWS piping is bounded by a break in the CWS. As discussed in DCD Tier 2, Section 3.4.1.1.1, “Protection from External Flooding,” a failure of the cooling tower or the SWS or the CWS piping under the yard could result in a potential flood source. The consequences of a failure in the yard would be enveloped by the analysis described in DCD Tier 2, Section 10.4.5, for failure of the CWS. Site grading will carry the water away from safety-related or important to safety SSCs.
>
> Underground piping from the RWS clarifier subsystem supplies the clarified water storage tank, where additional underground piping supplies the yard-located interface with the FPS, as well as the SWS, DTS and TCS interfaces located in the turbine building. This underground piping is also in close proximity to the underground portions of the CWS and is bounded by the analysis previously discussed.
>
> Short runs of RWS piping from the raw water supply and clarified water supply subsystems are routed inside the turbine building to provide normal and alternate supplies to SWS. Clarified water supply piping also supplies the interface points with DTS and TCS. The RWS to SWS interface is at the SWS make-up control valve V009 (refer to DCD Tier 2, Figure 9.2.1-1). The SWS piping is routed from the control valve to the top of the SWS cooling tower basin. There is an air gap between the piping discharge and the SWS cooling tower basin water level. This air gap ensures that any break in the raw water make-up flow path will not result in the draining of the SWS cooling tower basin by preventing backflow from the basin to the break. Therefore, any flooding will be from the RWS water that discharges through the break prior to securing the make-up supply. The RWS piping to DTS and TCS is on the 100'-0" elevation of the turbine building (WLS Elevation 590') and the primary source of flooding in this scenario would be from the RWS water that discharges through a break prior to securing the clarified water supply subsystem. A break in the RWS piping to the SWS, DTS and TCS is bounded by a break in circulating water piping. As discussed in DCD Tier 2, Section 3.4.1.2.2.3, “Adjacent Structures Flooding Events,” the bounding flooding source inside the turbine building is a break in the circulating water piping. Flow from any postulated line breaks above elevation 100'-0" would flow down to elevation 100'-0" via floor gratings and stairwells and would run out of the building through a relief panel in the turbine building west wall. There is no safety-related equipment in the turbine building.

The components cooling water and service water components on elevation 100'-0", which provide the RTNSS support for the RNS will remain functional following a flooding event in the turbine building since the pump motors and valve operators are above the flood level. Therefore, a failure of the RWS piping within the turbine building will not adversely impact any safety-related or important to safety SSCs.

The control room is located inside the AP1000 nuclear island. No RWS piping is located inside or outside in the vicinity of the nuclear island. Therefore, there are no RWS pipe breaks or flooding events which could impact the control room. Atmospheric releases of the pH adjustment and chlorination chemicals used in RWS treatment are bounded by the DCD Section 6.4 discussion, as the storage volume is much smaller than those used in the CWS treatment. All other chemicals used for RWS treatment are non-toxic, small in volume, and do not represent a hazard to the control room. Therefore, RWS flooding or postulated chemical releases will not adversely impact control room habitability.

Accidental releases of radioactive fluids in ground and surface waters are addressed in WLS COL FSAR Section 2.4.13. In accordance with this discussion, any radioactive fluids released from the AP1000 power block would follow the preferential path for groundwater movement. This flow path is generally northward towards the Broad River.

The RWS piping corridor between the intake on the Broad River and make-up pond A is the closest to the preferential groundwater flow path. This piping corridor is positioned above the water table and located approximately 600 to 2150 feet east of the preferential groundwater flow path. The remaining RWS underground piping corridors are located upgradient to the south and west of the preferential groundwater flow path. When the RWS system is in operation it is under positive pressure. Therefore, migration of any potential contamination from the power block to the piping is considered unlikely.

The RWS does not have the potential to be a flow path for radioactive fluids. The RWS operates at a higher system pressure than those systems that it directly interfaces with; therefore, in-leakage is not feasible when the system is in operation. During normal operations, the interfacing systems for RWS are CWS, WWS at the blowdown sump, SWS, FPS, DTS and TCS. None of these systems have interfaces with radioactive systems.

As discussed in WLS COL FSAR Section 9.2.11.3.5, “Raw Water Supply Subsystem,” the RWS supplies an alternate source of dilution water to the WWS for diluting the WLS effluent stream when the normal dilution source, CWS blowdown, is not available. This function is supported by routing branch lines from the raw water supply subsystem to the CWS blowdown sump. The blowdown sump is open to atmosphere and as shown on WLS COL FSAR Figure 1.1-202 is located on the east side of the site at an elevation approximately 60 feet above the Broad River. The CWS blowdown sump mixes CWS blowdown (and, if required, RWS) with discharge from WWS and the combined dilution flow gravity drains through an outfall pipe to the Ninety-Nine Islands dam on the Broad River. At the dam, the dilution flow is mixed with liquid radwaste effluent from each unit and discharged to the environment through a diffuser mounted on the upstream side of the dam. There are no valves on the outfall piping between the blowdown sump and the dam, so the elevation difference between the sump and the river prevents liquid radwaste cross-contamination of the blowdown sump. There is an air gap maintained

between the RWS piping discharge into the sump and the sump level that provides additional assurance that cross-contamination is unlikely.

As described in WLS COL FSAR Section 14.2.9.4.24, "Raw Water System," initial testing verifies that as installed components supply raw water to the CWS cooling tower basin, SWS cooling tower basin, FPS storage tanks, and other systems, as described in WLS COL FSAR Section 9.2.11. Testing shall consist of performance and functions of components and integrated systems.

The applicant's response to RAI 9.2.1-5 was found acceptable based on the following evaluation. The staff determined 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 impact any Class D 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 impact to the control room occupants, or result in a release of radioactivity to the environment. Testing of the RWS has been properly addressed, and the RWS instrumentation requirements have been satisfied. In addition, based on the staff's review of the instrumentation application of the RWS as described in WLS COL FASR Section 9.2.11.7, the operators have sufficient indications of system alarms to identify component failures, such as traveling screens, strainers, and pumps. Since the RWS is not safety-related and its failure does not lead to the failure of any safety-related systems, the staff has concluded that the requirements of GDC 2 and GDC 4 have been satisfied; therefore, RAIs 9.2.1-1 and 9.2.1-5 are resolved.

B. Cold Shutdown

The RWS is relied upon for achieving and maintaining cold shutdown conditions, which is necessary for satisfying Technical Specification requirements. In particular, the RWS is relied upon for cooling the RCS from Mode 4 to Mode 5 conditions within 36 hours. The staff found that Section 9.2.11 did 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 were not 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 WLS 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 assure RWS functionality over time were not addressed. Because the applicant did not adequately define and address RWS design-bases considerations with respect to its cooldown function, the staff was unable to confirm that the cooldown and policy considerations that apply to passive plant designs were satisfied. Therefore, in RAI 9.2.1-2, dated September 23, 2008, the staff asked the applicant to provide clarification. The applicant's response to RAI 9.2.1-2 dated October 28, 2008, did not adequately address the question and subsequently the staff expanded the question and issued supplemental RAI 9.2.1-6, dated January 28, 2009, to further fully address cold shutdown considerations.

In its response, dated May 15, 2009, the applicant stated that the RWS consists of several subsystems. Of these subsystems, only two supply water to support plant system functions during Modes 1 through 5. The clarified water supply subsystem supplies treated make-up, fill water to the DTS and FPS in both units, serve as the preferred make-up, and fill supply to the SWS. The raw water supply subsystem supplies untreated make-up and fill water to the CWS.

The raw water supply subsystem also provides an assured make-up supply to SWS to ensure that the power generation design basis for SWS is maintained during abnormal conditions that could deplete the inventory in the clarified water supply subsystem.

This response specifically focuses on the clarified water supply and raw water supply subsystems interfaces with the SWS. This is because, as noted in the response to RAI 9.2.1-5, the other functions performed by the RWS do not have a direct interface with any other system identified within the AP1000, which is safety-related, designated for RTNSS, or designated as AP1000 Class D.

The RWS clarified water supply and raw water supply subsystems provide a water fill/makeup interface with the SWS. The 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, as noted in the response to RAI 9.2.1-5, was evaluated by Westinghouse and determined to meet the RTNSS criteria as documented in NUREG-1793 and Westinghouse Topical Report WCAP-15985, “AP1000 Implementation of the Regulatory Treatment of Nonsafety-Related System Process.” Unlike the SWS, the RWS does not directly provide core cooling. As discussed in response to RAI 9.2.1-5, RWS support of the SWS cooling function was evaluated in WCAP-15985 and determined to not meet the RTNSS criteria and to not require investment protection short-term availability controls.

In the unlikely event of a failure of the RWS to provide adequate make-up flow to the SWS cooling tower basins during the short time period in which the SWS is performing a RTNSS function as stated above, the remaining inventory in the service water cooling tower basins and the stored water, which is available in the upper region of the secondary fire water tank provide ample time (more than 24 hours) to restore the RWS make-up flow or take the procedural actions necessary to exit the conditions for applicability. Therefore, the RWS is not a RTNSS system or subject to investment protection short-term availability controls. However, as described below, 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 RWS make-up flow 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 in the operating procedures, where appropriate.

As described in AP1000 DCD Section 5.4.7.1.2.1, “Shutdown Heat Removal,” the RNS, in conjunction with its associated support systems, the CCS and the SWS, are used for shutdown heat removal. The RWS provides indirect support for this function by providing a source of make-up water to the SWS cooling tower basins to compensate for evaporation, drift, and blowdown. The RWS provides this make-up 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 350 °Fahrenheit (F) to approximately 125 °F within 96 hours after shutdown. The RWS is designed to provide ample make-up flow to both units' cooling tower basins during these conditions using the clarified water supply pumps.

WLS COL FSAR Figure 2.4.1-202, “Water Balance Summary,” identifies the maximum make-up requirement for RWS to the SWSs in both units to be 1660 gpm (830 gpm per unit). This demand represents a design maximum make-up to the SWS cooling towers, occurring four hours after a simultaneous shutdown of both units, when the maximum SWS heat load is encountered at the beginning of cooldown. This flow rate is very conservative, as the decay heat load decreases during cooldown with an accompanying decrease in make-up requirements.

If cooldown to cold shutdown (Mode 5) is required within 36 hours to comply with a limiting condition for operation (LCO) in accordance with the Technical Specifications, heat will be transferred from the RCS via the steam generators to the main steam system for a longer period of time, allowing 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 make-up flow to the SWS cooling towers is less than normal cooldown requirements.

For a loss of normal ac power scenario, Westinghouse AP1000 design data indicates an RWS flow of approximately 108 gpm will provide sufficient make-up to account for evaporation and drift losses from the SWS cooling tower following the first 28 hours of event initiation.

The clarified water supply subsystem is the normal make-up source for the SWS cooling towers in both units and the preferred source of water for the normal plant cooldown described in the power generation design basis. The clarified water storage tank, shared by both units, has a capacity of 2.7 million gallons. There are four clarified water supply pumps (two per unit) that take suction from the storage tank. Each pump has a design flow rate of 1500 gpm, so one pump can easily supply the maximum make-up requirements for the associated unit.

The raw water supply subsystem provides the assured make-up supply to the SWS to ensure that the power generation design basis for the SWS is maintained during abnormal conditions that could deplete the inventory in the clarified water supply subsystem. The inventory for the subsystem is make-up pond A, which has a useable storage volume of 1200 acre-foot and provides sufficient capacity to support a dual unit cooldown to cold shutdown conditions and maintain the station in this condition for longer than 7 days. There are six raw water supply pumps (three per unit) that take suction from make-up pond A. Each pump has a design flow rate of 15,000 gpm.

The underground RWS piping will be high-density polyethylene (HDPE), which is not susceptible to corrosion or biological fouling and is designed to ASME B31.1; therefore, periodic inspections of the underground RWS piping are not required. Equipment that remains idle for extended periods of time (pumps, valves) will be operated periodically in accordance with vendor recommended maintenance practices.

The lack of designation of the RWS as RTNSS or Class D indicates there is no performance requirement for the system in the event of a single active failure or during a loss of normal ac power. Nonetheless, the RWS is highly reliable based on its design, and a single failure of an active component in the RWS would not affect normal plant cooldown. Only one of the two clarified water supply pumps or one of the three raw water supply pumps are required to support make-up to the SWS cooling tower basins in

each unit during all modes of SWS operation. Failure of an operating pump or electrically-operated valve in the make-up path to the SWS would not prevent the RWS from providing make-up to the cooling towers. The clarified water supply pumps are supplied from separate buses that are automatically loaded on the standby power supply during a loss of normal ac power. All RWS valves in the make-up to SWS are manual. Restoring make-up flow requires starting a pump from the control room. The raw water supply pumps are supplied by separate buses and two pumps in each unit are on buses that can be manually loaded on the standby power supply. If the clarified water supply subsystem is not available, operator actions will be taken to align the raw water supply subsystem as described in WLS COL FSAR Section 9.2.11.3.5. The water inventory in the SWS cooling tower basins provides adequate time to perform the manual actions needed to restore SWS make-up. The RWS, therefore, continues to maintain the capability to provide make-up water to the SWS cooling tower basins during loss of normal ac power events.

The raw water screen wash pumps and traveling screen do not have backup power. The traveling screens are powered by the normal ac power system, which is backed by a standby power supply for occurrences of loss of normal ac power. RWS make-up requirements following a loss of normal ac power are a small fraction of the normal flow. In such condition, the intake screens act as passive screens.

In the unlikely event that all 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 make-up flow, and the RWS is shown to not be a 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.

The applicant's response to RAI 9.2.1-6 was found acceptable based on the following evaluation. The staff finds that the RWS is designed with the provision of single failure since many of the raw water supply subsystem and clarified subsystem components can be supplied with backup power from the onsite diesel generators as necessary. During a loss of SWS make-up from the RWS supply subsystem or clarified water supply subsystem, make-up to the SWS is not required for 12 hours due to existing cooling tower basin inventory. After 12 hours, onsite make-up capacity from the fire protection storage tank is available for more than an additional 12 hours. In addition, the RWS is considered highly reliable and able to supply required water for the SWS for greater than 7 days due to the redundancies of pumps, strainers, screens, and screen wash components associated with make-up pond A. The raw water screen wash pumps and traveling screen do not have backup power; however, the staff finds the RWS make-up requirements following a loss of normal ac power are a small fraction of the normal flow. In such condition, the intake screens act as passive screens. This is acceptable because lower flow rates and limited duration reduce the potential for entrainment and impingement.

In addition, the staff finds the RWS underground material acceptable since buried HDPE will be designed and installed in accordance with industry Codes, such as ASME B31.1 and American Water Works Association (AWWA) C906, "Polyethylene (PE) Pressure Pipe and Fittings, 4 in (100mm) through 63 in (1,575mm), for Water Distribution and Transmission." This material is an industry proven material that is corrosion resistant inside and out, hydraulically smooth, and tends to resist buildup (bio-fouling) so the inner surface usually remains in this condition

throughout the service life of the pipe. In addition, HDPE has a life expectancy of approximately 50 years. Ultraviolet protection is of no concern since the RWS HDPE piping will be buried. HDPE materials are well within the temperature and pressures ranges in which the RWS piping system will be exposed to during operations.

C. Regulatory Treatment of Non-Safety Related System (RTNSS)

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 RWS is not designated for RTNSS. However, there was no explanation in Section 9.2.11 as to why this was the case. Also, because the SWS cooling tower basins are very limited in their capacity, it was not clear why RWS makeup was not required for this situation. Therefore, the staff asked the applicant to explain this as part of RAI 9.2.1-2, dated September 23, 2008. The applicant's response to RAI 9.2.1-2, dated October 28, 2008, did not adequately address the question. Subsequently, the staff expanded the question and issued supplemental RAI 9.2.1-7, dated January 28, 2009, which asked the applicant to explain why 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 to RAI 9.2.1-7, dated May 15, 2009, the applicant referred to its RAI 9.2.1-6 response, which provided an explanation as to 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 a RTNSS system, in the unlikely event of a failure to re-establish RWS makeup capability. Plant documentation, in the form of the system description for the RWS, will include the information addressed in the responses to RAI 9.2.1-6 and RAI 9.2.1-7.

In the response to RAI 9.2.1-6, the applicant also stated that the RWS does not have a direct interface with any other system identified within the AP1000, which is safety-related, designated for RTNSS, or designated as AP1000 Class D. The RWS provides a water fill/makeup function for the SWS, and the SWS has investment protection short-term availability controls as described in AP1000 DCD Table 16.3-2, "Investment Protection Short-Term Availability Controls," 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 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 was evaluated in WCAP-15985 and determined to not meet the RTNSS criteria and to not require investment protection short-term availability controls. Neither the SWS nor the 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.

The applicant's response to RAI 9.2.1-6, also stated that in the unlikely event of a failure of the RWS to provide makeup flow to the SWS cooling tower basis during the short time period (as stated above) that SWS is performing a RTNSS function, the remaining inventory in the SWS cooling tower basins and water in the secondary fire tank will provide more than 24 hours to restore the RWS makeup flow or take procedural actions to exit the conditions for applicability.

In summary, the staff finds the applicant's response to RAI 9.2.1-7 acceptable because the NRC previously concluded in NUREG-1793 that the SWS meets the RTNSS criteria for provided active core cooling. The RWS does not directly provided core cooling. Therefore, the staff concludes the RWS need not be considered RTNSS and, RAIs 9.2.1-2, 9.2.1-6, and 9.2.1-7 are resolved and closed.

D. 10 CFR 20.1406, "Minimization of Contamination" Considerations

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. 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. Also, because the RWS is used as a source of water for diluting liquid radwaste, this may create a potential for contaminating the RWS or for spreading contamination inadvertently. Therefore, the staff requested in RAI 9.2.1-3, dated September 23, 2008, 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 (as appropriate). In a response dated October 26, 2008, it was stated that the RWS has no interconnection with systems that contain radioactive fluids. 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 WLS COL FSAR Section 12AA.5.4.13, "Groundwater Monitoring Program." The staff's evaluation of the groundwater monitoring program is provided in the corresponding section of this SER. The staff considers the applicant's resolution of this issue to be acceptable, and RAI 9.2.1-3 is closed.

9.2.11.5 *Post Combined License Activities*

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

9.2.11.6 *Conclusion*

The RWS was evaluated using the guidance referred to in the Regulatory Basis section as it pertains to these considerations and acceptability was based upon conformance with the NRC requirements and criteria that are specified in this regard.

The NRC staff has evaluated the RWS as described in WLS COL FSAR Section 9.2.11. The staff's evaluation focused primarily on confirming that: a) the RWS will not adversely affect safety-related SSCs, or impact the control room occupants; b) the RWS is capable of performing its intended function over the life of the plant; c) the RWS reliance for the support of SWS for achieving and maintaining cold shutdown conditions and RTNSS considerations; and

d) the initial test program considerations have been adequately addressed and are appropriate. The RWS was evaluated using the guidance referred to in the regulatory basis section as it pertains to these considerations and acceptability was based upon conformance with the NRC requirements and criteria that are specified in this regard. Based upon the results of this evaluation, the staff concluded that the RWS, as described in WLS COL FSAR Section 9.2.11, is acceptable and all of the FSAR markups included in the above noted RAIs have been adequately incorporated into Revision 4 of the FSAR.

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 WLS COL FSAR, Revision 4, incorporates by reference Section 9.3 of the AP1000 DCD, Revision 19. Section 9.3 of the AP1000 DCD includes Section 9.3.1.

In addition, in WLS COL FSAR Section 9.3, the applicant provided the following:

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 Commission 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 (GSI) 43, "Reliability of Air Systems," as part of training and procedures include the following:

- 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 NRC staff reviewed Section 9.3.1 of the WLS 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 NRC staff's review confirmed 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 NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to compressed and instrument air system, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

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

- 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 WLS 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 gasses to plant systems as required. Failure of the system does not compromise any safety-related system nor does it prevent safe reactor shutdown.

Section 9.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.3.2, "Plant Gas System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.3.3 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.

Section 9.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.3.3, "Primary Sampling System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

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

Section 9.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.3.4, "Secondary Sampling System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.3.5 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.

Section 9.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.3.5, "Equipment and Floor Drainage Systems," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.3.6 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.

Section 9.3 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.3.6, "Chemical and Volume Control System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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 assures 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*

Section 9.4 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.4 of the AP1000 DCD, Revision 19. Section 9.4 of the DCD includes Section 9.4.1, describing the VBS.

In addition, in WLS COL FSAR Sections 9.4.1.4 and 9.4.12, the applicant provided the following:

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 WLS COL FSAR Section 9.4.12, the applicant provided the following:

- WLS COL 9.4-1b

The applicant provided additional information in WLS 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 Commission 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 NRC staff reviewed Section 9.4.1 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the VBS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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.*

- WLS COL 9.4-1b

The applicant provided additional information in WLS 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 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 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 NRC staff review of WLS 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the VBS, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

The applicant has provided sufficient information for satisfying 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.

Conclusions regarding WLS COL 9.4-1b are discussed 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.

Section 9.4.2 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.2, "Annex/Auxiliary Buildings Nonradioactive HVAC System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.3 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 ventilation system 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.

Section 9.4 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.3, "Radiologically Controlled Area Ventilation System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.4 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 containment recirculation cooling system provides a suitable and controlled environment for the containment building during normal plant operation and shutdown.

Section 9.4 of the WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.6, "Containment Recirculation Cooling System", of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.7 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 ventilation system.

9.4.7.2 *Summary of Application*

Section 9.4 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.4 of the AP1000 DCD, Revision 19. 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 WLS 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 WLS 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 Commission 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 NRC staff reviewed Section 9.4.7 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the VFS. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the VFS, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.8, "Radwaste Building HVAC System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.9 Turbine Building Ventilation System

The turbine building ventilation system 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.9, "Turbine Building Ventilation System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.10 Diesel Generator Building Heating and Ventilation System

The diesel generator building heating and ventilation system 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.10, "Diesel Generator Building Heating and Ventilation System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.4.11 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.4.11, "Health Physics and Hot Machine Shop HVAC System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.5 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 fire protection 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 Fire Protection Program goals and objectives in RG 1.189,

9.5.1.2 *Summary of Application*

Section 9.5 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.5 of the AP1000 DCD, Revision 19. Section 9.5 of the AP1000 DCD includes Section 9.5.1.

In addition, in WLS COL FSAR Section 9.5.1, the applicant provided the following:

Tier 2 Departure

- WLS DEP 18.8-1

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

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, including the organization, responsibility, qualification, and training for fire protection program personnel and fire brigade members in Section 9.5.1.8, “Fire Protection Program,” and in Appendix 9A of the WLS 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 WLS COL FSAR.

- 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.

- 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.

- WLS COL 9.5-2

The applicant provided additional information in WLS 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 areas and outlying buildings in WLS 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.

- WLS SUP 9.2-2

The applicant provided supplemental information in Section 9.5.1.2.1.3, "Fire Water Supply System," by adding additional text to address the makeup water, which is provided to the fire water storage tanks by RWS as described in Section 9.2.11.

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 WLS 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 WLS COL application to provide a schedule to support the NRC'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 Commission regulations for the FPS are given in Section 9.5.1 of NUREG-0800.

The regulatory basis and guidance documents 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, and WLS COL 9.5-2 includes the following:

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

The regulatory guidance for acceptance of STD SUP 9.5-1 and WLS SUP 9.2-2 includes the following:

- RG 1.189

9.5.1.4 *Technical Evaluation*

The NRC staff reviewed Section 9.5.1 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the fire protection system. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 WLS 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 WLS, it was not reproduced here. Also, the discussion of WLS 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 9.5-4 (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 9.5-8 (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.

- *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 9.5-3 (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.

<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.

- WLS SUP 9.2-2

The applicant provided supplemental information in Section 9.5.1.2.1.3, "Fire Water Supply System," by adding additional text to address the makeup water, which is provided to the fire water storage tanks by RWS as described in Section 9.2.11.

The applicant stated that the makeup water is filtered, treated, and monitored in the clarification process to prevent or control biofouling or microbiologically induced corrosion. The NRC Staff reviewed the information provided under Section 9.5.1.2.1.3 of the WLS COL regarding the sampling and chemical treatment of the fire water as needed and determined that the applicant conforms to the guidance of RG 1.189.

AP1000 COL Information Items

- WLS COL 9.5-2

The applicant provided additional information in WLS 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 NRC staff reviewed the resolution to WLS 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 WLS COL FSAR, and determined that the yard area, administration building and other outlying areas are adequately described in accordance with RG 1.189 in the fire hazard analysis, which is, therefore, acceptable.

Resolution of VCS 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 WLS 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.

Resolution of Site-Specific RAIs

In addition to the review of the standard content, the staff also reviewed WLS site-specific content and issued five site-specific RAIs.

In its response to site-specific RAI 9.5.1-1 related to the applicant specifically identifying the engineer in charge of fire protection as responsible for the fire brigade organization, the applicant revised FSAR Section 13.1.2.1.2.9 to state that the engineer in charge of fire protection is responsible for the fire brigade organization. Based on the above, the staff finds that this meets the guidance of RG 1.189 and, therefore, is acceptable.

In its response to site-specific RAI 9.5.1-2 related to the organizational responsibility and lines of communication needed for a successful fire protection program the applicant revised FSAR

sections 13.1.1.2.10 and 13.1.1.3.2.2.3 to reflect that the engineer in charge of fire protection and the functional manager of emergency preparedness coordinate and communicate with each other to fulfill their individual fire protection related responsibilities. Based on the above, the staff finds the description of the lines of communications is in accordance with RG 1.189 and, therefore, is acceptable.

In its response to site-specific RAI 9.5.1-3 related to the qualifications of personnel in charge of the fire brigade drills the applicant revised FSAR section 13.1.1.2.10 to state that fire protection trainers are qualified to perform classroom instruction or practical training. Based on the above, the staff finds that this meets the guidance of RG1.189 and, therefore, is acceptable.

In its response to site-specific RAI 9.5.1-4 related to the filtering and treatment of fire water supplies to prevent or control biofouling or microbiologically induced corrosion of the fire water system the applicant revised FSAR Section 9.5.1.2.3 to add WLS SUP 9.2-2 to clarify how fire protection system makeup water quality is monitored and maintained. Additionally, the applicant stated that administrative controls will ensure that the makeup water supply to the fire water storage tanks will be monitored and treated such that the appropriate standards are maintained to prevent or control microbiologically induced corrosion which meets the guidance of RG 1.189. Based on the above, the staff finds that this meets the guidance of RG1.189 and, therefore, is acceptable.

In its response to site-specific RAI 9.5.1-5 related to the qualifications of the engineer in charge of fire protection, the applicant revised FSAR Section 13.1.2.1.2.9 to state that the engineer in charge of fire protection is trained and experienced in nuclear safety or has available personnel who are trained and experienced in nuclear plant safety. Based on the above, the staff finds that this meets the guidance of RG1.189 and, therefore, is acceptable.

9.5.1.5 *Post Combined License Activities*

For the reasons discussed in the technical evaluation section above, the staff finds the following license conditions proposed by the applicant acceptable:

- License Condition (9-2) - The licensee shall implement the Fire Protection Program or portions of the FP Program identified below on or before the associated milestones identified below.

    1. Applicable portions of the FP Program – prior to initial receipt of byproduct, source, or special nuclear materials onsite (excluding Exempt Quantities as described in 10 CFR 30.18).

    2. Applicable portions of the FP Program – prior to initial receipt of fuel onsite.

    3. FP Program – prior to initial fuel load.

- License Condition (9-3) - 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 NRC inspections of the Fire Protection Program. The schedule shall be updated every 6 months until 12 months before scheduled fuel

loading, and every month thereafter until either the FP Program has been fully implemented or the plant has been placed in commercial service, whichever comes first.

9.5.1.6 *Conclusion*

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

In addition, the staff concludes that the relevant information presented in the WLS 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:

- 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 WLS 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.

- WLS COL 9.5-2, addressing the site-specific fire protection analysis information for the WLS yard areas and outlying buildings is adequately addressed by the applicant and is resolved.

- WLS DEP 18.8-1, addressing the relocation of the OSC relative to the post-fire safe shutdown capability, 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.

9.5.2.2 *Summary of Application*

Section 9.5 of the WLS COL FSAR, Revision 4, incorporates by reference Section 9.5 of the AP1000 DCD, Revision 19. Section 9.5 of the DCD includes Section 9.5.2.

In addition, in WLS COL FSAR Section 9.5.2, the applicant provided the following:

AP1000 COL Information Items

- WLS COL 9.5-9, involving offsite interfaces

The applicant provided additional information in WLS COL 9.5-9 to resolve COL Information Item 9.5-9 (COL Action Item 9.5.2-3).

- WLS COL 9.5-10, involving emergency offsite communications

The applicant provided additional information in WLS COL 9.5-10 to resolve COL Information Item 9.5-10 (COL Action Item 9.5.2-1).

- WLS COL 9.5-11, involving security communications

The applicant provided additional information in WLS 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 Commission regulations for the communications system are given in Section 9.5.2 of NUREG-0800.

The regulatory basis for WLS COL 9.5-9, addressing interfaces to offsite locations, is based on:

- Appendix E to 10 CFR Part 50, Part IV.E(9), “Emergency Planning and Preparedness for Production and Utilization Facilities”

The regulatory basis for WLS 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”

The regulatory basis for WLS 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"

- 10 CFR 73.46(f), "Fixed site physical protection systems, subsystems, components, and procedures"

- 10 CFR 73.55(e), "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage"

- 10 CFR 73.55(f) "Requirements for Physical Protection of Licensed Activities in Nuclear Power Reactors Against Radiological Sabotage"

9.5.2.4 *Technical Evaluation*

The NRC staff reviewed Section 9.5.2 of the WLS 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 NRC staff's review confirmed that the information in the application and incorporated by reference addresses the required information relating to the communications system. The results of the NRC staff's evaluation of the information incorporated by reference in the WLS COL application are documented in NUREG-1793 and its supplements.

In addition, in WLS COL FSAR Section 9.5.2, the applicant provided the following:

AP1000 COL Information Items

- WLS COL 9.5-9 (COL Action Item 9.5.2-3) Involving Offsite Interfaces

The applicant provided additional information in WLS COL 9.5-9 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 the resolution to the Lee COL Item 9.5-9 involving offsite interfaces included under Section 9.5.2.2.3.1 and Section 9.5.2.5.1 of the WLS COL FSAR. Section 9.5.2.2.3.1 of the WLS COL FSAR states that the primary means of communication between the station and the NRC is the Emergency Telephone System (ETS). The ETS provides a reliable communication link to the NRC Operations Center. The ETS provides voice and data communication between the station and the NRC headquarters. Calls using the ETS phones

are connected directly to Duke's long distance provider over Duke's private, fiber-optic network. Onsite systems supporting the ETS phones are provided with diverse alternate or backup power sources with automatic transfer capability to maintain continuity of communication in the event the normal power source is lost. This aspect of the design is based on the applicant's stated adherence to the guidance provided by NRC Bulletin 80-15 in the FSAR.

In the event of an emergency at the station, notification and activation of the state, local and corporate emergency response network is established. This network requires communication interfaces between the station and the following offsite agencies:

- North Carolina State Emergency Operations Center
- South Carolina Warning Point
- Cherokee County Warning Point
- Cleveland County Warning Point
- York County Warning Point
- Duke Energy Emergency Operating Facility (EOF)

The applicant stated that the primary means of communication between the station and these offsite agencies is the Selective Signal System using Duke telecommunication interfaces to dedicated private lines leased from local telephone companies. The design of the selective signaling system utilizes exiting corporate telecommunications equipment so as to avoid calls being routed through the local telephone company switch. Onsite systems supporting the selective signaling system are provided with sufficient alternate or backup power sources having automatic transfer capability to maintain continuity of communication in the event the normal power source is lost, based upon guidance provided by NRC Bulletin 80-15. The secondary means of communication between the station and various offsite local, state and corporate agencies is provided by commercial telephone lines. The station radio system provides another alternative means of communication between the station and offsite agencies. Communications between the station and offsite radiological monitoring teams is by the radio system as well. The site radio system is powered by non-essential AC sources with built-in battery backups. As an alternative to ground-based communications, in the event of a natural disaster the Lee Station also maintains a satellite phone system. This phone system is portable, self-contained, and intended for use with communications with the NRC.

Appendix E to 10 CFR Part 50, Part IV.E (9) requires at least one onsite and one offsite communications system; each system shall have a backup power source. In addition, NRC Bulletin 80-15 states that the applicant should provide backup power sources for the ENS in case of loss-of-offsite power. With the design of the ETS, Selective Signaling System and radio system the applicant provided adequate means for onsite and offsite communications. In addition, the applicant states that the guidance of NRC Bulletin 80-15 regarding the backup power supplies has been incorporated into the design of the primary and backup power supplies for both onsite and offsite communications, which the staff finds acceptable. The applicant 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). Therefore, the staff concludes that COL Action Item 9.5.2-3 has been adequately addressed.

9.5.2.4.2 WLS COL Item 9.5-10 (COL Action Item 9.5.2-1) Involving Emergency Offsite Communications

The applicant provided additional information in WLS COL Item 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 the NRC staff's FSER for the AP1000 FSAR (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 the resolution to the Lee COL Item 9.5-10 on the emergency offsite communications included under Sections 9.5.2.2.3.2.1, 9.5.2.2.3.2.2, and 9.5.2.5.2 of the WLS FSAR. The ETS is the primary voice and data communication from the main control rooms and Technical Support Center (TSC) to the NRC. The minimum communications links provided for the primary onsite communication center include connections to the NRC ENS, the NRC Health Physics Network (HPN), the emergency response data system (ERDS), and dedicated phone lines for use by NRC personnel for dialing onsite and offsite locations. These dedicated phone lines include:

- Reactor safety counterpart link (RSCL),
- Protective measure counterpart link (PMCL)
- Management counterpart link (MCL)
- Operational center link (OCL)

The dedicated telephones in the ETS use Duke Energy fiber-optic lines to public long distance lines. The secondary means of communication between the station and the NRC are commercial telephone company lines. Sufficient backup or alternate power sources are provided with automatic transfer capability. The primary means of communication between the station and offsite agencies listed in Section 9.5.2.4.1 of this safety evaluation for emergency communication is the Selective Signaling System using private lease lines. The design utilizes existing corporate telecommunications equipment to complete calls without having to go through a local telephone company switch. Sufficient backup or alternate power sources are provided with automatic transfer capability. The secondary means for communication to these offsite agencies are commercial telephone lines.

FSAR Section 9.5.2.2.3.2.2 states that the plant radio system is also provided either through the Duke radio network or the local radio network provided by each offsite emergency agency. Communication between the station, offsite radiological teams and the EOF can is provided by the radio system. 10 CFR 50.47(b)(8) requires that adequate emergency facilities and equipment to support the emergency response be provided and maintained. The staff finds the offsite communications systems described above and in Section 9.5.2.4.1 of this evaluation are adequate in providing emergency communications equipment and facilities and thus meet the requirements of 10 CFR 50.47(b)(8). The staff finds that the backup radio system adequately serves as the crisis management radio system, and thus the staff concludes that the COL Action Item 9.5.2-1 has been adequately addressed.

- WLS COL 9.5-11 (COL Action Item 9.5.2-2) Involving Security Communications

The applicant provided additional information in WLS COL 9.5-11 to resolve COL Information Item 9.5-11. COL Information Item 9.5-11 states:

> Specific details for the security communication system are as discussed in separate security documents referred to in Section 13.6.

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.

The staff's review of WLS COL 9.5-11 related to security communications is documented in Section 13.6 of this SER.

9.5.2.5 *Post Combined License Activities*

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

9.5.2.6 *Conclusion*

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

In addition, the staff concludes that the relevant information presented in the WLS 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:

- WLS 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 emergency diesel generator capable of providing backup power for the emergency notification system in case of loss of offsite power, and thus meets the guidance in NRC Bulletin 80-15.

- WLS COL 9.5-10 has been adequately addressed by the applicant in that the WLS emergency offsite communications 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).

- WLS 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.5.3, "Plant Lighting System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.5.4 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 WLS COL FSAR, Revision 4, incorporates by reference Section 9.5 of the AP1000 DCD, Revision 19. Section 9.5 of the AP1000 DCD includes Section 9.5.4.

In addition, in WLS 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 Commission 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 NRC staff reviewed Section 9.5.4 of the WLS 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 NRC staff's review confirmed 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 NRC staff's evaluation of the information incorporated by reference in the WLS 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 NRC 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 WLS Units 1 and 2 COL application, the staff undertook the following reviews:

- The staff compared the VEGP COL FSAR, Revision 2 to the WLS COL FSAR. In performing this comparison, the staff considered changes made to the WLS 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 has completed its review and found the evaluation performed for the standard content to be directly applicable to the WLS 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 1.0 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.

<u>Correction of Error in the Standard Content Evaluation Text</u>

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 feels this was a typographical error on the applicant's part because Table 1 of ASTM D975, 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 NRC staff reviewed the application and checked the referenced DCD. The NRC staff's review confirmed that the applicant addressed the required information relating to the standby diesel generator fuel oil system, and there is no outstanding information expected to be addressed in the WLS COL FSAR related to this section. 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.

In addition, the staff concludes that the relevant information presented in the WLS COL FSAR revision 4 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.5.5, "Standby Diesel Generator Cooling Water System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.5.6 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.5.6, "Standby Diesel Generator Starting Air System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.5.7 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.5.7, "Standby Diesel Generator Lubrication System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.

9.5.8 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 WLS COL FSAR, Revision 4, incorporates by reference, with no departures or supplements, Section 9.5.8, "Standby Diesel Generator Combustion Air Intake and Exhaust System," of Revision 19 of the AP1000 DCD. The NRC staff reviewed the application and checked the referenced DCD to ensure that no issue relating to this section remained for review.[1] The NRC staff's review confirmed that there is no outstanding issue related to this section. 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.