PMVogtleCOLNPEm Resource

From: Simms, Tanya
Sent: Friday, November 20, 2009 3:54 PM
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Subject: Bellefonte Chapter 9 SER with Open Items
Attachments: BLN SER 9 Cover Letter.pdf; BLN SER 9 CLEAN Nov19-09.pdf

To all,

Attached is Chapter 9 of the Bellefonte SER with open items and the transmittal cover letter. Please note that we are conservatively marking each page of the SER as proprietary until either: (1) 10 days have passed and we have not heard from TVA regarding a proprietary claim, or (2) TVA informs us that there is no proprietary information in the document. Once it is clear that there is no proprietary information in the Chapter, the proprietary markings will be removed and the rest of the distribution for the document will be completed.

Sincerely,

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SUBJECT: BELLEFONTE UNITS 3 AND 4 SAFETY EVALUATION REPORT WITH OPEN ITEMS FOR CHAPTER 9, "AUXILIARY SYSTEMS"

Dear Ms. Sterdis and Mr. Miller:

By letter dated October 30, 2007 (ML073110527), as supplemented by letters dated November 2, 2007 (ML073090428), January 8, 2008 (ML080100104), and January 14, 2008 (ML080160252), the Tennessee Valley Authority (TVA) submitted its application to the U.S. Nuclear Regulatory Commission (NRC) for a combined license (COL) for two AP1000 advanced passive pressurized water reactors in accordance with the requirements of 10 CFR 52, "Licenses, Certifications and Approvals for Nuclear Power Plants." The NRC formally docketed the application on January 18, 2008. These reactors are identified as Bellefonte (BLN) Units 3 and 4 and would be located near the town of Scottsboro in Jackson County, Alabama. The docket numbers established for Units 3 and 4 are 52-014 and 52-015, respectively. Subsequent to the original BLN COL application, TVA has updated and revised the application by letters dated October 10, 2008 (ML083100262), November 18, 2008 (ML083250490), and January 21, 2009 (ML090290406).

Based on our review of TVA's application, the staff prepared the enclosed Safety Evaluation Report (SER) with Open Items for Chapter 9, "Auxiliary Systems." Unless otherwise stated in the SER with Open Items, the staff's review was based on revisions and updates made to the BLN COL application through January 21, 2009. Issuance of this SER is an important milestone in the staff's review to determine whether TVA's application meets the Commission's regulations.

Enclosure transmitted herewith contains SUNSI. When separated from enclosure, this transmittal document is decontrolled.

[redacted]

In a letter dated April 28, 2009, the NuStart Energy Development, LLC, consortium informed the NRC that it had changed the Reference COL designation for the AP1000 Design Center from BLN Nuclear Plant, Units 3 and 4 to the Vogtle Electric Generating Plant (VEGP), Units 3 and 4. The NRC staff is taking steps necessary to implement this change. It is the staff's understanding that Southern Nuclear Operating Company will be responsible for responding to open items related to standard content within a 45-day response period.

The staff concludes that the enclosed SER with Open Items does not contain any information for which exemption from public disclosure has been sought or approved. However, the NRC will withhold the enclosed SER from public disclosure for ten calendar days from the date of this letter to allow TVA the opportunity to verify the staff's conclusion that the SER contains no such exempt information. If within that time, TVA does not request that all or portions of the SER be withheld from public disclosure in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," the enclosure will be made available for public inspection through the NRC's Public Document Room and the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the Public Electronic Reading Room section of the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions, please contact Ms. Tanya Simms, the NRC project manager at (301) 415-1387, tanya.simms@nrc.gov or Mr. Joseph Sebrosky, the lead project manager for the BLN COL application at (301) 415-1132, joseph.sebrosky@nrc.gov .

Sincerely,

/RA/

Stephanie Coffin, Branch Chief
AP1000 Projects Branch 1 (NWE1)
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Office of New Reactors

Docket Nos. 52-014
52-015
52-025
52-026

Enclosure:
As stated
cc w/ encl: see next page

In a letter dated April 28, 2009, the NuStart Energy Development, LLC, consortium informed the NRC that it had changed the Reference COL designation for the AP1000 Design Center from BLN Nuclear Plant, Units 3 and 4 to the Vogtle Electric Generating Plant (VEGP), Units 3 and 4. The NRC staff is taking steps necessary to implement this change. It is the staff's understanding that Southern Nuclear Operating Company will be responsible for responding to open items related to standard content within a 45-day response period.

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Sincerely,

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Docket Nos. 52-014
52-015
52-025
52-026

Enclosure:
As stated
cc w/ encl: see next page

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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 Bellefonte (BLN) Combined License (COL) Final Safety Analysis Report (FSAR), Revision 1, incorporates by reference, with no departures or supplements, Section 9.1.1, "New Fuel Storage," of Revision 17 of the AP1000 Design Control Document (DCD). The 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 Westinghouse application to amend Appendix D of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52 includes changes to Section 9.1.1 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to new fuel storage incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to the NRC staff's Final Safety Evaluation Report (FSER) related to the AP1000 DCD, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.1.1 of this Safety Evaluation Report (SER) to reflect the final disposition of the design certification (DC) application.

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

9.1.2.1 Introduction

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

[1] See Section 1.2.2 for a discussion of the staff's review related to verification of the scope of information to be included within a COL application that references a DC.

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

9.1.2.2 Summary of Application

Section 9.1 of the BLN COL FSAR, Revision 1, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 17. Section 9.1 of the DCD includes Section 9.1.2.

In addition, in BLN COL FSAR Section 9.1.6, the applicant provided the following:

AP1000 COL Information Items

- STD COL 9.1-7

The applicant provided additional information in standard (STD) COL 9.1-7 to resolve COL Information Item 9.1-7 (COL Action Item 9.1.6-7).

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.

License Condition

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

The license condition related to STD COL 9.1-7 sets the implementation milestone for the Metamic coupon monitoring program.

9.1.2.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission regulations for the Fuel Storage and Handling, and the associated acceptance criteria, are given in NUREG-0800, “Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants,” Section 9.1.2.

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

- 10 CFR Part 50, Appendix A, 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 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff’s review confirmed that the

information contained in the application and incorporated by reference addresses the required information relating to spent fuel storage. Section 9.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to spent fuel storage will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

AP1000 COL Information Items

- 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**.**

9.1.2.5 Post Combined Operating License Activities

The following item was identified as the responsibility of the COL holder:

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

A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation.

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 COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.1.2 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet completed, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.1.2 of this SER to reflect the final disposition of the DC Application.

As a result of **Open Item 9.1-1**, the staff is unable to finalize its conclusions involving the Metamic Monitoring 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")

The spent fuel pool cooling system is designed to remove decay heat, which is generated by stored fuel assemblies from the water in the spent fuel pool. This is done by pumping the high temperature water from within the fuel pool through a heat exchanger, and then returning the water to the pool. A secondary function of the spent fuel pool cooling system is clarification and purification of the refueling water and the spent fuel pool.

Section 9.1.3 of the BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.1.3, "Spent Fuel Pool Cooling System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.1.3 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the spent fuel pool cooling system incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.1.3 of this SER to reflect the final disposition of the DC application.

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 spent fuel pool, 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 BLN COL FSAR, Revision 1, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 17. Section 9.1 of the DCD includes Section 9.1.4.

In addition, in BLN COL FSAR Section 9.1.4, the applicant provided the following:

AP1000 COL Information Items

- 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).

- 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).

9.1.4.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission regulations for the LLHS and the associated acceptance criteria are listed in SRP Section 9.1.4 of NUREG-0800.

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

- GDC 61, "Fuel Storage and Handling and Radioactivity Control"
- 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 BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to the LLHS.

Section 9.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the LLHS will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

AP1000 COL Information Items

- 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.

- 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 (OHLHS) 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**.

9.1.4.5 Post Combined License Activities

There are no post-COL activities related to this section. However, in Open Item 9.1-2 the staff requested an additional commitment from the applicant.

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 LLHS and there is no outstanding information expected to be addressed in the COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.1.4 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.1.4 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidelines of the associated acceptance criteria given in Section 9.1.4 of NUREG-0800.

- STD COL 9.1-6, the staff finds that the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

However, as a result of **Open Item 9.1-2**, the staff is unable to finalize its conclusions regarding STD COL 9.1-5 involving the implementation of the plant inspection program for the LLHS.

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

9.1.5.1 Introduction

The overhead heavy load handling systems (OHLHS) are used to lift loads whose weight is greater than the combined weight of a single spent fuel assembly and its handling device. The principal equipment is the containment polar crane, equipment hatch hoist, maintenance hatch hoist, and the cask handling crane. The OHLHSs are designed to ensure that inadvertent operations or equipment malfunctions, separately or in combination, will not 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.

9.1.5.2 Summary of Application

Section 9.1 of the BLN COL FSAR, Revision 1, incorporates by reference Section 9.1 of the AP1000 DCD, Revision 17. Section 9.1 of the AP1000 DCD includes Section 9.1.5.

In addition, in BLN COL FSAR Section 9.1.5, the applicant provided the following:

Supplemental Information

- STD SUP 9.1-1

The applicant provided supplemental (SUP) information within Section 9.1.5.3, "Safety Evaluation," describing heavy load lifts outside those already described in Revision 17 of the DCD.

- STD SUP 9.1-2

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

- STD SUP 9.1-3

The applicant provided supplemental information within 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 within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the OHLHS and the associated acceptance criteria are listed 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, "Environmental and Dynamic Effects Design Bases"
- GDC 61, "Fuel Storage and Handling and Radioactivity Control"
- 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 BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to OHLHSs.

Section 9.1.5 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the OHLHSs will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

Supplemental Information

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

The staff reviewed the information provided by the applicant for STD SUP 9.1-1. The applicant stated that it did not provide an itemized list of heavy load lifts outside the scope of heavy loads described in the AP1000 DCD because no such heavy load lifts are currently planned. The applicant provided a general description for addressing heavy load movements outside the

planned scope if needed in the future. However, the applicant did not address all the program elements and detail listed in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, nor did it provide a schedule for implementation of the heavy load handling program. A heavy load handling program that meets the guidelines of NUREG-0612 and NUREG-0800 Section 9.1.5, needs to be in place at a time before there is a possibility that a load drop could cause a release of radioactivity, a criticality accident, inability to cool fuel within the reactor vessel or spent fuel pool, or prevent safe shutdown of the reactor. The staff asked the applicant in RAI 9.1.5-1 to provide the program elements specified in NUREG-0612 Section 5.1.1 and NUREG-0800 Section 9.1.5, and a schedule for implementation.

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

In its response to RAI 9.1.5-1, the applicant stated that details of the implementation milestones for the development of heavy load handling procedures and related engineering documents are not currently available, nor are the implementation milestones expected to be available until after a detailed construction schedule has been developed. The applicant stated that appropriate scheduling information will be provided, when available, to the NRC as necessary to support timely completion of inspection and audit functions. The applicant did not provide any schedule for when the heavy load handling program will be completed for the implementation of an approved heavy load handling program (including OHLHS procedures). The applicant is asked to revise BLN COL FSAR Table 1.8-202 to commit in the BLN COL FSAR to implementing the heavy load handling program before receipt of fuel. This is **Open Item 9.1-3**.

AP1000 COL Information Items

- STD COL 9.1-6

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.

- 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 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.

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**.

9.1.5.5 Post Combined License Activities

There are no post-COL activities related to this section. However, in Open Items 9.1-3 and 9.1-4 the staff requested additional commitments from the applicant.

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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.1.5 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.1.5 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidelines of the associated acceptance criteria given in Section 9.1.5 of NUREG-0800.

- STD COL 9.1-6, the staff finds that the BLN COL FSAR meets the applicable requirements of 10 CFR Part 50, Appendix A, GDC 61.

However, as a result of **Open Items 9.1-3 and 9.1-4,** the staff is unable to finalize its conclusions involving the implementation schedules for the heavy loads handling program and the plant inspection program.

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 non-safety-related system that supplies cooling water to remove heat from the non-safety-related component cooling water system (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

Section 9.2 of the BLN COL FSAR, Revision 1, incorporates by reference Section 9.2 of the AP1000 DCD, Revision 17. Section 9.2 of the DCD includes Section 9.2.1.

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

Tier 2 Departure

- BLN DEP 9.2-1

The applicant proposed the following Tier 2 departure (DEP) from the AP1000 DCD. The third paragraph of Section 9.2.1.2.1 of the AP1000 DCD states:

> A small portion of the service water flow is normally diverted to the circulating water system. This blowdown is used to control levels of solids concentration in the SWS. An alternate blowdown flow path is provided to the waste water system (WWS).

The proposed plant-specific departure modifies this paragraph to state:

> A small portion of the service water system (SWS) flow is normally diverted to the waste water system. This blowdown is used to control levels of solids concentration in the SWS. See Figure 9.2-202.

Supplemental Information

- BLN SUP 9.2-3

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.

9.2.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

Although the SWS (including heat sink) is not safety-related, it is considered to be important to safety because 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 non-safety systems (RTNSS) in accordance with the Commission's policy for passive reactor plant designs in SECY 94-084.

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 ITAAC, test program specifications, and RTNSS availability controls for the SWS are appropriate.

The regulatory basis for acceptance of BLN SUP 9.2-3, addressing the SWS Cooling Tower are the guidelines of the associated acceptance criteria given 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 BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the SWS. Section 9.2.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the SWS will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

Tier 2 Departures

- BLN DEP 9.2-1

The applicant addressed this proposed departure in Part 7 of the application, "Departures and Exemption Requests." The standard plant design diverts a small amount of the SWS flow to the circulating water system (CWS) in order to control the buildup of solids in the cooling tower basin, but the standard plant also allows this flow to be diverted to the WWS as an alternative. The applicant proposes to direct the SWS blowdown flow exclusively to the WWS because of the long distance between the SWS and the CWS cooling towers. The WWS is recognized by the DCD as an authorized flow path for this purpose, and redundancy between the CWS and the WWS flow paths was not specified as a necessary design consideration. Consequently, the BLN design is consistent with the AP1000 licensing basis as approved by the staff, which

includes conformance with Section 9.2.1 of NUREG-0800 (as applicable). Therefore, the staff determined that the plant-specific departure proposed by the applicant is acceptable.

Supplemental Information

- BLN SUP 9.2-3

The cooling capability of the SWS cooling towers for the BLN units can be adversely affected by interactions that exist between the two 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. In RAI 9.2.1-1, the NRC staff requested that the applicant address potential adverse interactions between the cooling towers for the two units and to describe in the BLN COL FSAR any additional design provisions that are necessary, as appropriate.

In its response, the applicant stated that the interactions related to the existing natural draft cooling towers (secondary heat sinks for unit 3 and unit 4) have been addressed. Due to the height of the natural draft cooling towers which have a plume rise between 145 meters (475 feet) and 305 meters (1000 feet) TVA determined that there was no likelihood of interference. Section 10.4.5.2.2 of the COL application was revised in Revision 1 of the application to state that the existing natural draft cooling tower plumes will dissipate before they interfere with the SWS cooling tower intake.

The applicant's response did not adequately address any interactions between each of the SWS mechanical cooling towers, thus the staff generated RAI 9.2.5-1, which was a supplement to RAI 9.2.1-1. Due to the physical separation between each unit of 244 meters (800 ft) and the turbine building structure between the two units there is ample opportunity to disperse the plume and minimize interference effects. Section 9.2.1.2.2 has been revised in Revision 1 of the application to state the SWS cooling towers are evaluated for potential impacts from interference and air restriction effect due to yard equipment layout and tower operation and no adverse impacts were determined. The staff determined that the response is acceptable since the unit spacing, yard layout, tower operation, and margins inherent in the performance requirements have been adequately addressed. RAI 9.2.1-1 and RAI 9.2.5-1 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

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 SWS, and there is no outstanding information expected to be addressed in the BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.1 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD

(NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.1 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidelines of the associated acceptance criteria given in Sections 9.2.1 and 9.2.5 of NUREG-0800.

- BLN DEP 9.2-1, the staff evaluated a proposed plant-specific departure to Tier 2 of the AP1000 DCD, as described in Section 9.2.1 of the BLN COL FSAR and discussed above in the evaluation section. The proposed departure replaces the normal SWS blowdown flow path specified in the AP1000 DCD with the designated alternate flow path. Based on the results of this evaluation, the staff determined that the proposed departure is consistent with the approved licensing basis for the AP1000 plant and conforms to the NRC review guidance provided in Sections 9.2.1 and 9.2.5 of NUREG-0800, as applicable.

- BLN SUP 9.2-3, the staff also determined that the RAI response related to natural draft cooling tower and SWS cooling tower interactions has been adequately addressed. Therefore, the staff concludes that the BLN SWS, as described in Section 9.2.1 of the BLN 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")

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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.2.2, "Component Cooling Water System (CCS)," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.2 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the CCS incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.2 of this SER to reflect the final disposition of the DC application.

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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.2.3, "Demineralized Water Treatment System," of Revision 17 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.

Section 9.2.3 of Revision 17 of the AP1000 DCD is identical to Section 9.2.3 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This section is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the Demineralized Water Treatment System have been resolved.

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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.2., "Demineralized Water Transfer and Storage System," of Revision 17 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.

Section 9.2.4 of Revision 17 of the AP1000 DCD is identical to Section 9.2.4 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This section is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the Demineralized Water Transfer and Storage System have been resolved.

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. This is a non-safety system which includes design provisions for controlling the release of water containing radioactive material and preventing contamination of the PWS.

9.2.5.2 Summary of Application

Section 9.2 of the BLN COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD, Revision 17. 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 BLN COL FSAR Section 9.2.5, the applicant provided the following:

COL Information Item

- BLN COL 9.2-1

The applicant provided additional information in BLN COL 9.2-1 to address COL Information Item 9.2-1 in BLN 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 within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the PWS and the associated acceptance criteria are given in Section 9.2.5 of NUREG-0800.

The regulatory basis for acceptance 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 BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information related to the PWS. Section 9.2.5 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the PWS will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

COL Information Item

- BLN COL 9.2-1

The applicant provided additional information in BLN COL 9.2-1 to resolve COL Information Item 9.2.11.1. COL Information Item 9.2.11.1 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 PWS included under Sections 9.2.5.2.1, 9.2.5.3, and 9.2.12.1 of the BLN COL FSAR. In these sections the applicant proposes to use the local municipal water supply system as the source of potable water. In addition, the applicant submitted a letter dated June 29, 2009, which included proposed changes to the FSAR to incorporate additional references to the FSAR sections addressing the water supply quality and capacity. The staff finds these changes acceptable because the changes clarified that the water quality, capacity, and pressure are consistent with the DCD. In AP1000 DCD Revision 17, 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 BLN COL 9.2-1 is outside the power block and not potentially contaminated by radioactive water. Therefore, the staff finds that COL Information Item 9.2-1 is resolved. Pending incorporation of these changes into the next FSAR revision, the staff finds that GDC 60 is satisfied, with respect to preventing contamination by radioactive water. This is **Confirmatory Item 9.2-1.**

The staff's evaluation of control room habitability is addressed in Section 6.4 of this SER.

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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.5 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be

documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.5 of this SER to reflect the final disposition of the DC application.

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

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

Therefore, the staff concludes that the potable water system meets the guidance of SRP Section 9.2.4 and is acceptable, pending incorporation of **Confirmatory Item 9.2-1**.

9.2.6 Sanitary Drainage System (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 is a non-safety system that collects sanitary wastes from plant restrooms and locker room facilities. The system design ensures that there is no possibility for radioactive contamination of the sanitary drainage system.

9.2.6.2 Summary of Application

Section 9.2 of the BLN COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD, Revision 17. Section 9.2 of the AP1000 DCD includes Section 9.2.6, "Sanitary Drainage System," which addresses Section 9.2.4, "Potable and Sanitary Water Systems," of NUREG-0800.

In addition, in BLN COL FSAR Section 9.2.6, the applicant provided the following:

Supplemental Information

- BLN 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 address the waste treatment plant being the local municipal waste treatment plant.

9.2.6.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for BLN SUP 9.2-1 and the associated acceptance criteria are given in Section 9.2.4 of NUREG-0800.

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

- GDC 60, "Control of Releases of Radioactive Materials to the Environment."

9.2.6.4 Technical Evaluation

The NRC staff reviewed Section 9.2.6 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to the sanitary drainage system. Section 9.2.6 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the sanitary drainage system will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

Supplemental Information

- BLN 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 BLN COL FSAR. In Section 9.2.6.2.1 of the BLN COL FSAR, the applicant proposes to treat waste at the local municipal waste treatment plant. The AP1000 DCD, Revision 17 states that there are no interconnections between the sanitary drainage system and systems having the potential for containing radioactive material. The applicant submitted a letter dated June 29, 2009, which included proposed changes to the FSAR to replace all the site-specific references shown in Section 9.2.6 of the DCD with BLN plant-specific design details. Pending incorporation of these changes into the next FSAR revision, the staff finds that GDC 60 is satisfied, with respect to preventing contamination by radioactive water. This is **Confirmatory Item 9.2-2.**

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 drainage system, and there is no outstanding information expected to be addressed in the BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.6 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD

(NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.6 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN 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:

- BLN SUP 9.2-1, involving the location of the waste treatment plant is adequately addressed by the applicant and is acceptable.

In conclusion, the applicant has provided sufficient information for satisfying GDC 60, with respect to preventing contamination by radioactive water. Therefore, the staff concludes that the sanitary drainage system meets the guidance of NUREG-0800, Section 9.2.4 and is acceptable, pending incorporation of **Confirmatory Item 9.2-2.**

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 non-safety 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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.2.7, "Central Chilled Water System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.7 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the central chilled water system incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.7 of this SER to reflect the final disposition of the DC application.

9.2.8 Turbine Building Closed Cooling Water System

9.2.8.1 Introduction

The turbine building closed cooling water system (TCS) is a non-safety 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.

9.2.8.2 Summary of Application

Section 9.2 of the BLN COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD, Revision 17. Section 9.2 of the DCD includes Section 9.2.8.

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

Site-Specific Information Replacing Conceptual Design Information

- BLN CDI

The applicant provided additional information to replace conceptual design information (CDI) contained in the AP1000 DCD with information indentifying the source of cooling water for the BLN TCS heat exchangers.

9.2.8.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission regulations for the TCS, and the associated acceptance criteria, are given in Sections 9.2.2 of NUREG-0800.

9.2.8.4 Technical Evaluation

The NRC staff reviewed Section 9.2.8 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the TCS.

The staff reviewed the information contained in the BLN COL FSAR:

Site-Specific Information Replacing Conceptual Design Information

The AP1000 DCD states that the applicant is to provide a source of cooling water, such as circulating water, for removing heat from the TCS heat exchangers. The BLN design specifies the use of both circulating water and raw water for this purpose. The staff's evaluation of the supplementary information that is provided in place of the CDI confirms that the plant-specific information is consistent with the AP1000 DCD, Section 9.2.8, as approved by the staff, and is consistent with guidance in NUREG-0800, Section 9.2.2. Therefore, the CDI that was provided for the BLN TCS is acceptable since either the circulating water or raw water provide an adequate water supply in order for the TCS to perform its intended function.

Other Design Considerations

The COL applicant modified BLN COL FSAR Section 9.2.8.2.3, "Startup," to eliminate the provision that the CWS must be placed in operation prior to placing the TCS in operation. As stated in the AP1000 DCD Section 9.2.8.2.3, the turbine building closed cooling water system is

placed in operation during the plant startup sequence after the circulating water system is in operation but prior to the operation of systems that require turbine building closed cooling water flow. The proposed BLN COL FSAR Section 9.2.8.2.3 stated the turbine building closed cooling water system is placed in operation during the plant startup sequence prior to the operation of systems that require turbine building closed cooling water flow. This proposed change appeared to be a departure from the description provided in the AP1000 DCD.

In RAI 9.2.2-1, the staff requested the applicant revise FSAR Section 9.2.8.2.3 to address this change to the startup description provided in the AP1000 DCD, Section 9.2.8.2.3. In its response, the applicant provided clarification that the TCS system will be placed in operation "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." The staff considers the licensee's resolution of this issue to be consistent with the AP1000 design requirements and is consistent with guidance in NUREG-0800, Section 9.2.2 and is therefore acceptable, pending submittal by the applicant and review by the staff of the BLN COL FSAR revision that incorporates this information in Section 9.2.8. The staff agrees the FSAR change provides the needed CDI, as such, this is not considered a departure. This is identified as **Confirmatory Item 9.2-3**.

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 COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.8 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the TCS incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.8 of this SER to reflect the final disposition of the DC application.

The staff evaluated the site-specific information replacing CDI for the BLN TCS as described in Section 9.2.8 of the BLN COL FSAR. Based on the results of this evaluation, the staff determined that the site-specific information to be provided is consistent with the licensing basis for the AP1000 DCD, which includes conformance with the guidance provided by Section 9.2.2 of NUREG-0800 (as applicable). Therefore, the staff concludes that the BLN TCS, as described in Section 9.2.8 of the BLN COL FSAR, is acceptable, pending completion of **Confirmatory Item 9.2-3.**

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

9.2.9.1 Introduction

The Waste Water System (WWS) is a non-safety system that collects and processes the waste water from the equipment and floor drains in the nonradioactive building areas during plant operations and outages. The design of the system precludes inadvertent discharge of radioactively contaminated drainage.

9.2.9.2 Summary of Application

Section 9.2 of the BLN COL FSAR incorporates by reference Section 9.2 of the AP1000 DCD, Revision 17. 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 BLN COL FSAR Section 9.2, the applicant provided the following:

AP1000 COL Information Item

- BLN COL 9.2-2

The applicant provided additional information in BLN COL 9.2-2 to address COL Information Item 9.2-2, by replacing the paragraph in the waste water retention basin portion of DCD Section 9.2.9.2.2 with additional text.

9.2.9.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the WWS and the associated acceptance criteria 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, "Environmental and Dynamic Effects Design Bases"
- GDC 60, "Control of Releases of Radioactive Materials to the Environment"

9.2.9.4 Technical Evaluation

The NRC staff reviewed Section 9.2.9 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information related to the WWS. Section 9.2.9 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the WWS will be documented in the corresponding SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

AP1000 COL Information Item

- BLN COL 9.2-2

The applicant provided additional information in BLN 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 the BLN COL 9.2-2 on the design of the plant waste water retention basin included under Section 9.2.9.2.2 and Section 9.2.12.2 of the BLN COL FSAR, and determined that it needed additional information before it is able to conclude the adequacy of the of the site-specific waste water retention basin.

In RAI 9.3.3-1, the staff requested that the applicant provide a justification for not providing water level instrumentation and radiation monitoring in the waste water retention basin. By a letter, dated July 18, 2008, TVA responded to the RAI stating that the overflow from the retention basin cascades through a series of ponds before being discharged into Town Creek, per FSAR Section 9.2.9.2.2. By design, the pond is allowed to overflow and level is not a controlled parameter. The applicant stated that level instrumentation for the waste water retention basin is not required. Further, based on the design configuration, the potentially contaminated fluids are monitored with the radiation monitoring instruments before entering the retention basin. Therefore, the applicant stated that radiation monitoring in the waste water retention basin itself is not required. The staff has reviewed the response, and finds it acceptable, because potentially contaminated fluids are monitored prior to entering the waste water retention basin and level control is not an issue because the basin is designed to overflow.

In RAI 9.3.3-2, the staff requested that the applicant provide a justification for not providing a description of the basin transfer pumps. These design features were included and approved in the AP1000, Revision 15 DC document, as documented in the NRC staff's FSER (NUREG-1793). In Revision 17, Westinghouse removed the waste water retention basin from the DCD and identified it as COL Information Item 9.2-2.

In its response TVA stated that the overflow from the retention basin cascades through a series ponds before being discharged into Town Creek. The Bellefonte retention basin design does not utilize basin transfer pumps. The staff finds the response acceptable, because the Bellefonte plant-specific design does not need the basin transfer pumps.

Based on the resolution of RAIs 9.3.3-1 and 9.3.3-2, the staff finds that the information provided by the applicant to address COL Item 9.2-2 is acceptable. The staff finds that because potentially contaminated fluids are monitored prior to entering the waste water retention basin that compliance with the applicable requirements of GDC 60 as stated in the AP1000 FSER

including supplements are met. Because the waste water retention basins are designed to overflow, compliance with GDC 4, as stated in the AP1000 FSER including supplements is met.

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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.9 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.9 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidelines of the associated acceptance criteria given in Section 9.3.3 of NUREG-0800.

- BLN COL 9.2-2, the staff finds that the BLN 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 non-safety system that supplies heated water to selected non-safety 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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.2.10 of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.2.10 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the hot water heating system incorporated by reference in the BLN COL FSAR, Revision 1, will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.2.10 of this SER to reflect the final disposition of the DC application.

9.2.11 Raw Water System

9.2.11.1 Introduction

The RWS is a non-safety-related system that uses water from the Tennessee River and Guntersville Reservoir as the source of cooling and makeup water for the BLN units. The water for the BLN units is drawn through a shared intake channel which extends from the river to a shared intake structure. The shared intake structure is divided into two independent sections (one for each BLN unit), and each section has two independent water basins from which the RWS for a particular unit draws water. Major system features and components for each BLN unit include the intake channel with a floating boom, intake structure with two water storage basins, trash rakes, traveling screens, screen wash pumps, three RWS pumps, three automatic strainers, two ancillary RWS pumps, and a granular media filters.

The RWS pumps provide a continuous supply of unfiltered river water for fill and makeup to the CWS natural draft cooling tower basin and can supply an alternate (unfiltered) cooling water supply for the TCS heat exchangers. The RWS ancillary pumps provide filtered and chemically treated makeup water for the SWS mechanical draft cooling tower basin and for the demineralized water treatment system (DTS). The RWS includes a piping connection to the municipal water supply for filling and providing makeup water to the primary and secondary fire water storage tanks. A normally closed RWS connection provides backup capability for supplying filtered and chemically treated river water to the fire water storage tanks. A normally closed RWS connection is also provided for draining water from the secondary fire water tank clearwell to the SWS cooling tower basin as an alternate source of SWS makeup. When the CWS is not available, the RWS provides an alternate source of water for diluting liquid radwaste.

9.2.11.2 Summary of Application

Section 9.2.11 of the BLN COL FSAR, Revision 1, provides information concerning the RWS design basis, system description, system operation, safety evaluation, tests and inspections, and instrumentation. The RWS was referred to in the DCD in relation to the CWS, SWS, DTS, and fire protection system (FPS), but a RWS section was not included in the AP1000 DCD for the NRC staff to evaluate.

In addition, the AP1000 DCD, Table 1.7-2, indicates that the RWS is “wholly out of scope.” The RWS is needed in order to operate the BLN units and consequently, the applicant has provided a complete description of this system in the BLN COL FSAR for the BLN units.

In BLN COL FSAR Section 9.2.11, the applicant provided the following:

Supplemental Information

- BLN SUP 9.2-2

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

9.2.11.3 Regulatory Basis

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

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

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

- GDC 2, “Design Basis for Protection Against Natural Phenomena”
- GDC 4, “Environmental and Dynamic Effects Design Bases”
- RG 1.29, “Seismic Design Classification,” Position C2
- 10 CFR 20.1406, “Minimization of Contamination”

9.2.11.4 Technical Evaluation

The staff reviewed the information provided in Section 9.2.11 of the BLN COL FSAR that describes the RWS for the BLN units, including the information provided by Figure 9.2-201, “Raw Water System Flow Diagram.” The staff’s evaluation in this section focuses primarily on RWS failure considerations and on the capability and reliability of the RWS to perform its cooldown function.

A. GDC 2, GDC 4, and RG 1.29

The staff reviewed the information in BLN FSAR Section 9.2.11 to confirm that RWS failures will not adversely affect SSCs that are safety-related or designated for regulatory treatment of non-safety related system (RTNSS) or impact the control room occupants. Although Section 9.2.11.1.1, “Safety Design Basis,” states that failures of the RWS or its components will not affect the ability of safety-related systems to perform their intended functions, 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. Because the applicant did not identify and address these considerations, the staff was unable to confirm compliance with GDC 2, GDC 4, conformance with the guidance contained in RG 1.29, Position C.2, and passive plant policy considerations. Consequently, the staff requested in RAI 01-9, RAI 9.2.1-2, and supplemental RAI 9.2.1-5, that the applicant revise BLN 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. A summary of the applicant’s response is described below.

- The RWS provides river water for makeup to the CWS natural draft and SWS mechanical draft cooling tower basins and feeds the DTS. The RWS also provides the backup raw water to the fire water storage tanks and an alternate supply of cooling water to the TCS heat exchangers. The potential failures of the RWS and the corresponding impact on SSCs that are safety related of AP1000 Class D are also described.

- The systems interfacing with RWS (i.e., CWS, SWS, DTS and TCS) do not have a safety related function. The RWS, CWS, and SWS are located in the intake area or the yard. The piping is routed underground from the intake structure to the points of interface. The most extensive above ground portions of the RWS are at the intake structure, the CWS cooling tower basin and the SWS cooling tower basin. A break in the RWS is bounded by a break in the CWS. DCD Section 3.4.1.1.1, "Protection from External Flooding," indicates that failure of the cooling tower, the service water or circulating water piping under the yard could result in a potential flood source. However, these potential sources are located far from safety-related structures and systems classified as subject to RTNSS and the consequences of a failure in the yard would be enveloped by the analysis described in DCD Section 10.4.5, "Circulating Water System," for failure of the CWS. Site grading will carry water away from safety-related or AP1000 Class D structures systems and components. The RWS piping connection to the fire water storage tanks is via a normally closed manual isolation valve. The effects of the failure of RWS piping connection to fire water storage tank is enveloped by the CWS piping break in the yard.

- RWS piping is routed inside the turbine building to the interface points with SWS, TCS and DTS. The primary source of flooding from a break in the RWS piping would be limited to the time when the RWS pumps are running and would be terminated upon shutdown of these pumps. As discussed in DCD Section 3.4.1.2, "Evaluation of Flooding Events," and 10.4.5.2.3, "System Operation," the bounding flood is due to a break in the CWS. Water from a postulated system rupture above elevation 100' would travel to elevation 100' through floor gratings and stairwells and would run out of the building through a relief panel in the turbine building west wall. This relief panel limits the maximum flood level to less than six inches, which is not high enough to cause damage. The RWS piping connection to the TCS has a normally closed valve and due to the size of the system piping, flooding of the turbine building resulting from a break in the RWS is less severe than flooding resulting from a break in the CWS.

- The effects of flooding due to a RWS failure will not result in detrimental effects on safety-related equipment since there is not safety-related equipment in the turbine building. The component cooling water and service water components on elevation 100', which provide the RTNSS support for the normal residual heat removal system, would remain functional following a flooding event in the turbine building since the pump motors and valve operators are above the expected flood level. Therefore, failures of the RWS piping within the turbine building will not adversely impact any safety-related or RTNSS systems, structures, or components.

- The RWS has no interconnection with any system that contains potentially radioactive fluids. The RWS operates at a higher system pressure than those systems that it directly interfaces with and therefore in-leakage is not feasible. The interfacing systems are the SWS, DTS, and the CWS during plant operations. The fire water storage tanks and TCS do not have any interfaces with radioactive systems and are isolated by normally closed valves from the RWS.

The staff reviewed the applicant's response described above and concludes that failure of the RWS or its components will not affect the ability of any safety-related system to perform their intended safety function nor will it adversely affect any RTNSS systems. Postulated breaks in

the RWS piping will not impact safety-related components because the RWS is not located in the vicinity of any safety-related equipment, and the water from a postulated pipe break will not reach any safety-related equipment or result in injury to occupants of the control room. The staff reviewed the applicant's proposal for testing of the RWS as described in BLN COL FSAR Section 14.2.9.4.24, "Raw Water System." The staff found the testing to be acceptable because it ensures proper operations of the RWS. The applicant agreed to provide a clear reference to this program in Chapter 9 of the BLN COL FSAR. This is **Confirmatory Item 9.2-4**. The RWS instrumentation requirements ensure the operators have sufficient indications of system alarms to identify component failures such as traveling screens, strainers, water level, and system pressures as described in BLN COL FSAR Section 9.2.11.6, "Instrumentation Application." 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 4 and guidance in RG 1.29 have been satisfied; therefore, RAIs 9.2.1-5, 01-09, and 9.2.1-2 are resolved.

There is, however, a possibility of external flooding caused by severe environmental events such as hurricanes or tornadoes. The staff has evaluated the RWS intake structure described in BLN COL FSAR Section 9.2.11.2.2, "Component Description," and concluded that the failure of the intake structure would not impact the ability of safety-related systems to perform their intended functions. The applicant is currently performing an evaluation of the PMF, the results of which will be available in December 2009. In addition, review of Sections 3.4.2, 3.5.3 and 3.3.2 in the BLN COL FSAR showed that an additional one-foot flood level on top of Probable Maximum Flood (PMF) will result as a consequence of failure of water tanks in radwaste and auxiliary buildings. Under this scenario, the RWS pumps and ancillary raw water pumps will likely not function well as they will be emerged in water. The site-specific PMF level was addressed in BLN COL FSAR Section 2.4.1. The resolution of hydrologic engineering issues is identified as **Open Item 2.4-1**. The staff cannot come to a conclusion regarding the acceptability of the intake structure until Open Item 2.4-1 is resolved. This is **Open Item 9.2-1.**

B. Cold Shutdown

The RWS is relied upon for achieving and maintaining cold shutdown conditions which (in addition to the passive plant policy considerations discussed in SECY-94-084) is necessary for satisfying Technical Specification (TS) requirements. In particular, the RWS is relied upon for cooling the reactor coolant system (RCS) from Mode 4 to Mode 5 conditions within 36 hours. The staff found that Section 9.2.11 does not provide a clearly defined design basis with respect to the RWS cooldown function, and the reliability and capability of the RWS to perform this function for the most limiting situations 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 BLN 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 clearly 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 are satisfied. Consequently, the staff requested in RAI 01-03, RAI 9.2.1-3, and supplemental RAI 9.2.1-6, that the applicant revise BLN FSAR Section 9.2.11 accordingly, and to develop plant-specific ITAAC and initial test program specifications as appropriate. In its response, the applicant provided the following:

- As described in DCD Section 5.4.7.1.2.1, “Shutdown Heat Removal,” the normal residual heat removal system (RNS) in conjunction with its associated support systems, CCS and SWS, are used for shutdown heat removal. RWS provides indirect support for this function by providing a source of makeup water to the SWS cooling tower basins to compensate for evaporation, drift, and blowdown. The RWS provides this makeup water to support the cooling requirements for SWS. During a normal plant cooldown, RNS and CCS reduce the temperature of the RCS from approximately 350°F to approximately 125°F within 96 hours after shutdown. In addition, SWS has investment protection short-term availability controls as described in DCD Table 16.3-2. The availability controls 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.

- In the unlikely event of a failure of the RWS, the inventory in the service water cooling tower basin and available stored inventory in the upper region of the secondary fire water tank ensure that the SWS can maintain the required defense-in-depth cooling functions for an extended period of time. DCD Section 9.2.1.2.2, “Component Description,” states for the SWS that with no makeup to the cooling tower basin, the storage capacity of the basin allows continued system operation for at least 12 hours under limiting conditions, provided that blowdown flow is isolated.

- An ample inventory of water is available to provide makeup to the SWS cooling tower basins. As noted in BLN FSAR Section 2.4.1.2.1, “Tennessee River/Guntersville Reservoir,” the reservoir on the Tennessee River with 1,018,000 acre-ft. has a normal maximum pool volume, and therefore has sufficient capacity to support cooldown to cold shutdown condition and maintain the station in Mode 5 for greater than seven days.

- The ancillary RWS provides this make-up water to support the cooling requirements for SWS. During a normal plant cooldown, the RNS and the CCS reduce the temperature of the RCS from approximately 350°F to approximately 125°F within 96 hours after shutdown (DCD Section 9.2.2.1.2.2). Each unit’s ancillary RWS is designed to provide ample makeup flow requirements during these conditions. An ancillary raw water pump can provide up to 891 gpm to the SWS tower basins to support plant cooldown, which is in excess of the specified makeup flow rate of 831 gpm.

- The underground RWS piping is designed to ASME B31.1, “Power Piping,” requirements. The RWS piping is located above the site’s groundwater levels, and is protected from external corrosion.

- The intake bays at the intake structure are inspected for silt buildup and cleaned as necessary based on operating experience. These inspections will be performed as part of preventive maintenance for the intake structure and support equipment.

- Given a loss of offsite power event, the ancillary RWS is designed for single failure. Failure of any system component such as an operating pump, discharge valve, traveling screen, or strainer would not prevent the ancillary RWS pumps from providing makeup to the SWS cooling towers. Additionally, the power supplies for the ancillary pumps, discharge valves, strainers, and their associated traveling screens and screen wash pumps are powered from the normal ac power system and have a back-up power supply from the diesel generators as shown in Figure 8.3.1-1, “AC Power Station One Line Diagram.” In the event of a loss of normal ac power, the components are manually

loaded onto the appropriate diesel bus and are manually started by the operator. The ancillary RWS valves have handwheels to manually adjust the RWS flow as required. The RWS, therefore, continues to maintain the capability to provide makeup water to the SWS cooling tower basins during the loss of normal ac power events.

The staff finds the RWS is designed with the provision of single failure since many of the ancillary RWS components can be supplied with backup power from the on site diesel generators as necessary. During a loss of station power, RWS make-up to the SWS is not required for 12 hours due to existing cooling tower basin inventory. After 12 hours, on-site 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 volume of water available in the reservoir and redundancies of pumps with backup power supplies. Since the RWS is not safety-related and its failure does not lead to the failure of any safety-related systems, the staff concludes the RWS system design is consistent with the guidance in SECY-94-084; therefore, RAIs 9.2.1-3, 9.2.1-6, and 01-03 are resolved. The staff will verify that the next update of the BLN COL FSAR Section 9.2.11 markup adequately incorporates this information. This is **Confirmatory Item 9.2-4.**

C. Regulatory Treatment of Non-Safety Related System

The RWS supports the SWS cooling function by providing makeup water to the SWS cooling tower basins. The staff noted that while the SWS is RTNSS during reduced reactor inventory conditions, the applicant stated that the RWS is not needed to support the SWS cooling function when the reactor water inventory is reduced. However, there was no explanation in Section 9.2.11 as to why the RWS is not RTNSS to support the SWS cooling function, because the SWS cooling tower basins are very limited in their capacity. Consequently, the staff requested in RAI 9.2.1-7, that the applicant revise Section 9.2.11 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, the applicant 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 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, “Final Safety Evaluation Report Relating to Certification of the AP1000 Standard Design,” and WCAP-15985, “AP1000 Implementation of the Regulatory Treatment of Nonsafety-Related System Process.” Unlike the SWS, the applicant stated that 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. In addition, the applicant stated that neither the 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 recognized throughout the AP1000 DCD and Final Safety Evaluation Report NUREG-1793.

The staff finds the applicant's response to RAI 9.2.1-7 acceptable since: 1) the RWS was previously evaluated in WCAP-15985 in Table 1-1, "Nonsafety-related system evaluation in AP1000 RTNSS Process" which was previously approved by the staff; 2) the RWS does not directly provide core cooling; 3) the RWS has adequate stored water within the SWS cooling towers and fire water tank for more than 24 hours to support SWS RTNSS functions plus the 24 hours stored on site water supply provides ample time to restore RWS makeup flow or take the procedural actions necessary to exit the condition of applicability for SWS and its RTNSS function. Therefore RAI 9.2.1-7 is resolved.

D. System Design Consideration

As specified by 10 CFR 20.1406, COL applicants are required to describe how facility design and procedures for operation will minimize, to the extent practicable, 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 01-02 and RAI 9.2.1-4 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 its response, the applicant noted that the RWS has no interconnection with systems that contains radioactive fluids. In addition, in a supplemental response, 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 BLN COL FSAR Section 12AA.5.4.13. The staff's evaluation of the groundwater monitoring program is provided in Chapter 12 of this SER. However, chapter 12 of this SER has identified additional site procedures for decommissioning records which are part of compliance for 10 CFR 20.1406 and has been identified as **Open Item 12.3-1.** Because there is no interconnection with any system that contains potentially radioactive fluids as indicated in BLN COL FSAR Section 9.2.11.1.1, the staff concludes that the requirements of 10 CFR 20.1406 are satisfied and considers this aspect of RAI 01-02 and RAI 9.2.1-4 are resolved pending resolution of **Open Item 9.2-2**.

In response to RAI 9.2.1-6, the applicant provided additional information related to the fire protection interface with the RWS. In Revision 1 of the BLN COL FSAR, the applicant addressed the fire protection interface by stating that if river water is used as makeup for the fire water storage tanks, actions such as chemical treatment or system flushing will be taken as appropriate. The staff finds this acceptable because it ensures that the fire protection system is appropriately maintained with respect to the interface with the RWS. The staff's evaluation of the fire protection system is included in Section 9.5.1.

9.2.11.5 Post Combined License Activities

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

9.2.11.6 Conclusion

The NRC staff has evaluated the RWS as described in BLN COL FSAR Section 9.2.11. The staff's evaluation focused primarily on confirming that: a) the design of the RWS complies with the requirements of GDC 2 and GDC 4 and conforms with the guidance contained in RG 1.29; b) the RWS reliance for the support of SWS for achieving and maintaining cold shutdown conditions and RTNSS considerations is consistent with the guidance in SECY-94-084; c) the RWS is not considered RTNSS; and d) other system design considerations meet the requirements of 10 CFR 20.1406 and (e) the interaction with the fire protection system has been properly evaluated. Based upon the results of this evaluation, the staff concluded that the BLN RWS, as described in Section 9.2.11 of the FSAR, is acceptable, pending satisfactory resolution of **Confirmatory Item 9.2-4**.

The staff cannot come to a conclusion regarding a reliable estimation on PMF until **Open Item 9.2-1** is resolved. The staff concludes that the requirements of 10 CFR 20.1406 are satisfied pending resolution of **Open Item 9.2-2.**

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 BLN COL FSAR incorporates by reference Section 9.3 of the AP1000 DCD, Revision 17. Section 9.3 of the AP1000 DCD includes Section 9.3.1.

In addition, in BLN 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 within the NRC staff's FSER related to the DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the compressed and instrument air system and the associated acceptance criteria 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 BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the compressed and instrument air system. Section 9.3.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the compressed and instrument air system will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.3.1 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.3.1 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidelines and the associated acceptance criteria 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 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 into safety-related SSCs. Based on the results of this evaluation, the BLN COL FSAR meets the guidance in NUREG-0933, Issue 43, as described in Section 9.3.7 of the BLN COL FSAR, 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 non-safety 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 Bellefonte COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.2, "Plant Gas System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.3.2 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the CVCS incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.3.2 of this SER to reflect the final disposition of the DC application.

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 samples from the reactor coolant, auxiliary primary process streams, and containment atmosphere for analysis. Both the normal operation and post accident requirements are carried out by this single system.

Section 9.3 of the Bellefonte COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.3, "Primary Sampling System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.3.3 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the CVCS incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.3.3 of this SER to reflect the final disposition of the DC application.

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

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

Section 9.3 of the Bellefonte COL FSAR Revision 1, incorporates by reference, with no departures or supplements, Section 9.3.4, "Secondary Sampling System," of Revision 17 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.

Section 9.3.4 of Revision 17 of the AP1000 DCD is identical to Section 9.3.4 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This section is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the secondary sampling system have been resolved.

9.3.5 Equipment and Floor Drainage System (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 Bellefonte COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.5, "Equipment and Floor Drainage System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.3.5 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the CVCS incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.3.5 of this SER to reflect the final disposition of the DC application.

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 chemical and volume control system (CVCS) 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 Bellefonte COL FSAR incorporates by reference, with no departures or supplements, Section 9.3.6, "Equipment Chemical and Volume Control System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.3.6 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the CVCS incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.3.6 of this SER to reflect the final disposition of the DC application.

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 nuclear island nonradioactive ventilation system (VBS), in conjunction with the main control room emergency habitability system described in Section 6.4provides 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 BLN COL FSAR incorporates by reference Section 9.4 of the AP1000 DCD, Revision 17. Section 9.4 of the DCD includes Section 9.4.1, describing the VBS.

In addition, in BLN COL FSAR Sections 9.4.1.4 and 9.4.12, 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 Action Item 9.4-1, related to a program for inspections and testing applicable to the VBS.

In addition, in BLN COL FSAR Section 9.4.12, the applicant provided the following:

- BLN COL 9.4-1b

The applicant provided additional information in BLN COL 6.4.4.2 to address COL Action Item 6.4-1. 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 within the FSER related to the DCD.

In addition, the relevant requirements of the Commission regulations for the VBS, and the associated acceptance criteria, 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, June 2001

9.4.1.4 Technical Evaluation

The NRC staff reviewed Section 9.4 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the VBS. Section 9.4.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the nuclear island nonradioactive ventilation system will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

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.

- BLN COL 9.4-1b

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 applicant will also provide a description of the [Main Control Room] 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 review of BNL 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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to NUREG-1793. The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4 of this SER to reflect the final disposition of the DC application.

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 BLN 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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.2, "Annex/Auxiliary Buildings Nonradioactive HVAC System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.2 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the annex/auxiliary buildings nonradioactive HVAC system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.2 of this SER to reflect the final disposition of the DC application.

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 control 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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.3, "Radiologically Controlled Area Ventilation System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.3 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the radiologically controlled area ventilation system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.3 of this SER to reflect the final disposition of the DC application.

9.4.4 Balance-of-Plant-Interface

This section not applicable to AP1000.

9.4.5 Engineered Safety Features Ventilation System

This section 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 BLN COL FSAR, Revision 1, incorporates by reference, with no departures or supplements, Section 9.4.6, "Containment Recirculation Cooling System", of Revision 17 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.

Section 9.4.6 of Revision 17 of the AP1000 DCD is identical to Section 9.4.6 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This section is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the Containment Recirculation Cooling System have been resolved.

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 BLN COL FSAR incorporates by reference Section 9.4 of the AP1000 DCD, Revision 17. 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 BLN 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 Action 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 BLN COL FSAR.

9.4.7.3 Regulatory Basis

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

In addition, the relevant requirements of the Commission regulations for the containment air filtration system and the associated acceptance criteria are given in Section 9.4.5 of NUREG-0800.

The applicable regulatory guidance for the containment air filtration system 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"

9.4.7.4 Technical Evaluation

The NRC staff reviewed Section 9.4.7 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the containment air filtration system. Section 9.4.7 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the containment air filtration system will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

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.

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 relevant information and there is no outstanding information expected to be addressed in the COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.7 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.7 of this SER to reflect the final disposition of the DC application.

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 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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.8, "Radwaste Building HVAC System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.8 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the radwaste building HVAC system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.8 of this SER to reflect the final disposition of the DC application.

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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.9, "Turbine Building Ventilation System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.9 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the turbine building ventilation system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.9 of this SER to reflect the final disposition of the DC application.

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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.10, "Diesel Generator Building Heating and Ventilation System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.10 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the diesel generator building heating and ventilation system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete,

and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.10 of this SER to reflect the final disposition of the DC application.

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 BLN COL FSAR incorporates by reference, with no departures or supplements, Section 9.4.11, "Health Physics and Hot Machine Shop HVAC System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.4.11 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to health physics and hot machine shop HVAC system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.4.11 of this SER to reflect the final disposition of the DC application.

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 fire protection system 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, fire protection systems 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 indentified as the Fire Protection Program goals and objectives in Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants".

9.5.1.2 Summary of Application

Section 9.5 of the BLN COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD, Revision 17. Section 9.5 of the AP1000 DCD includes Section 9.5.1.

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

AP1000 COL Information Items

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

The applicant provided additional information in STD COL 9.5-1 and STD COL 9.5-3 to resolve COL Information Items 9.5-1 and 9.5-3 (COL Action Item 9.5.1-1(a) through 9.5.1-1(o)) by establishing the site-specific implementation of the fire protection program in Section 9.1.5.8, Fire Protection Program, of the BLN 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 9.5-202, Exceptions to NFPA Standard Requirements, of the BLN COL FSAR.

- STD COL 9.5-8

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

- BLN COL 9.5-2

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

Supplemental Information

- STD SUP 9.5-1

The applicant provided supplemental information within Section 9.5.1.2.1.3, “Fire Water Supply System,” by adding additional text to address the piping threads compatibility requirement between on-site hydrants, hose couplings, and standpipe risers and equipment used by the off-site fire department.

- BNL SUP 9.5-2

The applicant provided supplemental information within Section 9.5.1.2.1.3, “Fire Water Supply System,” by adding additional text to address the requirement to prevent or control bio-fouling

and microbiologically-induced corrosion of the fire water system when river water is used for makeup to the fire water storage tanks.

The NRC staff reviewed FSAR Section 9.2.11, "Raw Water System", and the supplemental information provided in FSAR Section 9.5.1.2.1.3 of the BNL COL addressing the prevention and control of potential bio-fouling and microbiologically-induced corrosion of the fire water supply system.

License Conditions

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

License Condition 6, addressing the Fire Protection Program implementation schedule

9.5.1.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

The relevant requirements of the Commission regulations for the fire protection system and the associated acceptance criteria are given in Section 9.5.1 of NUREG-0800.

The regulatory basis for acceptance of STD COL 9.5-1, STD COL 9.5.4, STD COL 9.5-8, STD COL 9.5-6, and STD COL 9.5-3 includes the following:

- RG 1.189, "Fire Protection for Nuclear Power Plants"
- Branch Technical Position (BTP) CMEB 9.5-1, contained within NUREG-0800, Revision 3
- 10 CFR 50.48, "Fire Protection"

The regulatory basis for acceptance of STD SUP 9.5-1 and BLN SUP 9.5-2 include the following:

- RG 1.189, "Fire Protection for Nuclear Power Plants"

9.5.1.4 Technical Evaluation

The NRC staff reviewed Section 9.5 of the BLN COL FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL represent the complete scope of information relating to this review topic.[1] The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to the fire protection system. Section 9.5.1 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the fire protection system will be documented in the staff SER on the DC application for the AP1000 design.

The staff reviewed the information contained in the BLN COL FSAR:

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.

- BNL SUP 9.5-2 provided supplemental information within Section 9.5.1.2.1.3 "Fire Water Supply System," addressing the requirement to prevent or control bio-fouling and microbiologically-induced corrosion of the fire water system.

The NRC staff reviewed the information provided under Section 9.5.1.2.1.3 of the BNL COL regarding the sampling and chemical treatment of the fire water tanks as needed and determined that the applicant conforms to the guidance of RG 1.189.

The RWS provides filtered and disinfected municipal water as the normal supply and filtered river water as the backup supply for the fire water storage tank. In supplemental information BNL SUP 9.5-2, the applicant provided that if the backup water supply of river water is used to refill the fire water storage tank, water sampling will be conducted and appropriate actions such as chemical treatment or system flushing will be taken, if needed, to prevent or control bio-fouling and microbiologically-induced corrosion of the fire water system. Based on the above, the staff concludes that the applicant has provided adequate assurance to protect the fire water system from potential bio-fouling and microbiologically-induced corrosion in accordance with the guidance of RG 1.189.

AP1000 COL Information Items

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

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.

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

The applicant provided additional information in BLN 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 the NRC staff's FSER for the AP1000 DCD (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 BLN 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 BLN COL, and determined that the yard area, administration building and other outlying areas are adequately described in the Fire Hazard Analysis and therefore is acceptable.

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.

9.5.1.5 Post Combined License Activities

The following items were identified as the responsibility of the COL holder:

- Part 10, License Condition 3, Items D.1 and G.6, set the implementation milestones for elements of the Fire Protection Program.

- License Condition 6, "Operational Program Readiness," in Part 10 of the BLN COL application will require the licensee to develop a schedule that supports planning for and conduct of NRC inspections of the operational programs (the Fire Protection Programs) listed in BLN COL FSAR Table 13.4-201, "Operational Programs Required by NRC

Regulations." This schedule must be available to the NRC staff no later than 12 months after issuance of the COL. The condition will also require that the schedule be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until either the operational programs listed in BLN COL FSAR Table 13.4-201 have 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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.5.1 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.5.1 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the relevant information presented within the BLN COL FSAR is acceptable and meets the guidance in NUREG-0800, Section 9.5.1 and RG 1.189, pending resolution of **Confirmatory Item 9.5-1.** The staff based its conclusion on the following:

- STD SUP 9.5-1, addressing compatibility of piping threads with equipment used by the off-site fire department, and STD COL 9.5-1 summarizing the qualification requirements for the Fire Protection Program are adequately addressed by the applicant and are 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 9.5-8, addressing establishment of procedures to minimize risk for fire areas breached during maintenance, and 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 are adequately addressed by the applicant and are resolved.

- STD COL 9.5-3, addressing compliance with BTP CMEB 9.5-1, and BLN COL 9.5-2 addressing the site specific fire protection analysis information are adequately addressed by the applicant and are resolved.

- BLN SUP 9.5-2, addressing the requirement to prevent or control bio-fouling and microbiologically-induced corrosion of the fire water system is adequately addressed by the applicant and is resolved.

9.5.2 Communication System (Related to RG 1.206, Section C.III.1, Chapter 9, C.I.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 accidents conditions, including loss of offsite power.

9.5.2.2 Summary of Application

Section 9.5 of the BLN COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD, Revision 17. Section 9.5 of the DCD includes Section 9.5.2.

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

COL Information Items

- BLN COL 9.5-9, involving offsite interfaces

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

- BLN COL 9.5-10, involving emergency offsite communications

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

- STD COL 9.5-11, involving security communications

The applicant provided additional information in STD COL 9.5-11 to resolve COL Information Item 9.5-11 (COL Action Item 9.5.2-2).

9.5.2.3 Regulatory Basis

The regulatory basis of the information incorporated by reference is addressed within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the communications system and the associated acceptance criteria are given in Section 9.5.2 of NUREG-0800.

In addition, the regulatory basis for BLN COL 9.5-9 addressing interfaces to offsite locations are based on the requirements of Appendix E to 10 CFR Part 50, Part IV.E(9) to provide at least one onsite and one offsite communications system; each system shall have a backup power source. The regulatory basis for BLN COL 9.5-10 addressing the emergency offsite communication system, including the crisis management radio system is based on the requirements within 10 CFR 50.47(b)(8), "Equipment and Facilities to Support Emergency Response."

The regulatory basis for BLN COL 9.5-11 addressing the description of the security communication system is based on:

- 10 CFR 73.45 (g)(4)(i), "Provide Communications Networks," 10 CFR 73.46 (f), "Fixed Site Physical Protection Systems, Subsystem, Components, and Procedures-Communications Subsystems"

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

- 10 CFR 73.55(f), "Communications Subsystems"

9.5.2.4 Technical Evaluation

The NRC staff reviewed Section 9.5.2 of the BLN COL FSAR and checked the referenced DCD. The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to this communications system. Section 9.5 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to the communications system will be documented in the corresponding SER.

The staff reviewed the information contained in the BLN COL FSAR:

COL Information Items

- BLN COL 9.5-9 (COL Action Item 9.5.2-3), involving offsite interfaces

The applicant provided additional information in BLN 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 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 the NRC staff's FSER for the AP1000 DCD (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 NRC staff reviewed the resolution to BLN COL 9.5-9 involving offsite interfaces included under Section 9.5.2.2.3.1 and Section 9.5.2.5.1 of the BLN COL. BLN COL FSAR Section 9.5.2.2.3.1 states that communication networks to federal, state, and other supporting services will be provided through commercial facilities, tie lines and digital services, as well as privately-owned and maintained microwave and fiber optic systems.

Telecommunication services will be provided using the Central Emergency Control Center to communicate with State Emergency Management Agencies, as well as to other nuclear sites in the TVA system. The State Emergency Management Agencies provide telecommunications services to the County Emergency Management Agencies.

In addition, public telephone lines are provided at the Joint Information Centers and the Field Coordination Centers, in case of emergencies. The Emergency Off-site Communications System includes both the Emergency Notification System (ENS) and the Health Physics Network (HPN), which provide the primary communication to the NRC. In the case of a loss of offsite power, the emergency diesel generator located at the Emergency Operating Facility (EOF) will provide back-up power for the ENS. The NRC staff finds that the on-site and off-site communications interfaces meet the communications requirements of Appendix E to 10 CFR Part 50, Part 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 BL-80-15.

- BLN COL 9.5-10 (COL Action Item 9.5.2-1), involving emergency offsite communications

The applicant provided additional information in BLN COL 9.5-10 to resolve COL Information Item 9.5-10. COL Information Item 9.5-10 states:

> The emergency offsite communication system, including the crisis management radio system, will be addressed by the Combined License applicant.

The commitment was also captured as COL Action Item 9.5.2-1 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> The COL applicant will provide a description of the emergency offsite communication system, including the crisis management radio system.

The NRC staff reviewed the resolution to BLN COL 9.5-10 on the emergency offsite communications included under Section 9.5.2.2.3.2 and Section 9.5.2.5.2 of the BLN COL, and finds that the applicant meets the emergency communications and response requirements in 10 CFR 50.47(b)(8). The applicant states that the TSC is the primary on-site communication center to the Operations Support Center (OSC), the EOF, and the NRC. The communication interfaces to off-site locations consist of dedicated telephone lines and emergency radios that are designed to conform to NUREG-0696, "Functional Criteria for Emergency Response Facilities," and the recommendations of Regulatory Issue Summary (RIS) 2000-11, "NRC Emergency Telecommunications Systems."

Dedicated telephone system links are provided for essential communication functions. The NRC Emergency Telecommunications System consists of dedicated Federal Telephone system circuits to provide communication between the NRC Operations Center and the following systems: the ENS, the HPN, the Reactor Safety Counterpart Link, Protective Measure Counterpart Link, the Management Counterpart Link, the Emergency Response Data System (ERDS), and the Operational Center Local (OCL) area network. ERDS and OCL links are analog phone lines. The Operational hotlines connect to the control room, TSC, and EOF for initial notification and ongoing communication during an emergency.

The NRC emergency radio communication system serves as an alternate means of communications to notify local authorities of an emergency at the nuclear plant. Radios connect the following facilities: Control room/TSC/EOF, and Local Authorities. The emergency radio communications system connects on-site and off-site monitoring teams with the OSC and EOF, respectively. Radios are issued to the OSC emergency response teams to connect them to the OSC.

The NRC staff finds the BLN emergency offsite communications system capable of providing for notification of personnel and implementation of evacuation procedures in case of emergency and meets the requirements of 10 CFR 50.47(b)(8).

- STD COL 9.5-11 (COL Action Item 9.5.2-2), involving security communications

The applicant provided additional information in BLN 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 Section 13.6.

The commitment was also captured as COL Action Item 9.5.2-2 in Appendix F of the NRC staff's FSER for the AP1000 DCD (NUREG-1793), which states:

> The COL applicant will provide a description of the security communication system.

The staff will review the resolution to BLN COL 9.5-11 on the security communications. This review will be 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 BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.5.2 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER related to the AP1000 DCD (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.5.2 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes the applicant's proposed resolution to the COL information items is acceptable as follows:

- BLN COL 9.5-9, has been adequately addressed by the applicant because the on-site and off-site communications interfaces meet the communications requirements of Appendix E to 10 CFR Part 50, Part 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 BL-80-15.

- BLN COL 9.5-10, has been adequately addressed by the applicant because the BLN 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).

- STD COL 9.5-11, will be 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 Bellefonte COL FSAR incorporates by reference, with no departures or supplements, Section 9.5.3, "Plant Lighting System," of Revision 17 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 Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.5.3 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information related to the plant lighting system incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.5.3 of this SER to reflect the final disposition of the DC application.

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 BLN COL FSAR incorporates by reference Section 9.5 of the AP1000 DCD, Revision 17. Section 9.5 of the AP1000 DCD includes Section 9.5.4.

In addition, in BLN 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 within the NRC staff's FSER related to the AP1000 DCD (NUREG-1793).

In addition, the relevant requirements of the Commission regulations for the diesel generator fuel oil system and the associated acceptance criteria are given in Section 9.5.4 of NUREG-0800.

9.5.4.4 Technical Evaluation

The NRC staff reviewed Section 9.5 of the BLN COL FSAR and the referenced DCD. The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to this diesel generator fuel oil system. Section 9.5 of the AP1000 DCD is being reviewed by the staff under Docket Number 52-006. The NRC staff's technical evaluation of the information incorporated by reference related to diesel generator fuel oil quality will be documented in the corresponding SER.

The standby and ancillary diesel generators are classified as AP1000 Class D, nonseismic systems. As such, they incorporate standard industrial QA standards to provide integrity and function and are included in the AP1000 Investment Protection Short-Term Availability Controls (IPSAC) and Design Reliability Assurance Program (D-RAP) programs.

The staff reviewed the information contained in the BLN COL FSAR:

AP1000 COL Information Items

- 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.

9.5.4.5 Post Combined Operating 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 standby diesel generator fuel oil system, and there is no outstanding information expected to be addressed in the BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.5.4 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical

evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.5.4 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the applicant's proposed resolution to the COL information item in Section 9.5.4.5.2 of the BLN COL FSAR addresses the commitment in the DCD to maintain diesel fuel oil quality according to manufacturers' recommendation.

- COL Information Item 9.5-13 has been adequately addressed by the applicant because it ensures that the manufacturers' recommendations using industry standards are met and provides a fuel sampling and testing program to protect against fuel degradation.

9.5.4.6 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 standby diesel generator fuel oil system, and there is no outstanding information expected to be addressed in the BLN COL FSAR related to this section.

The Westinghouse application to amend Appendix D to 10 CFR Part 52 includes changes to Section 9.5.4 of the AP1000 DCD, as stated in Revision 17 of the AP1000 DCD. The staff is reviewing this information on Docket Number 52-006. The results of the NRC staff's technical evaluation of the information incorporated by reference in the BLN COL FSAR will be documented in a supplement to the NRC staff's FSER (NUREG-1793). The supplement to NUREG-1793 is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 9.5.4 of this SER to reflect the final disposition of the DC application.

In addition, the staff concludes that the applicant's proposed resolution to the COL information item in Section 9.5.4.5.2 of the BLN COL FSAR addresses the commitment in the DCD to maintain diesel fuel oil quality according to manufacturers' recommendation.

- COL Action Item 9.5-13 has been adequately addressed by the COL information item resolution because it requires meeting manufacturers' recommendations using industry standards.

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 8.3 of the BLN COL FSAR incorporates by reference, without any departures, Section 8.3, "Onsite Power Systems," of Revision 17 of the AP1000 DCD and Revision 0 of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," (TR-134, Revision 0). Section 8.3 of the AP1000 DCD includes Tiers 1 and 2 information of Subsection 8.3.1.1.2.1, "Onsite Diesel Generators." The NRC staff reviewed the application and considered the referenced DCD. The NRC staff's review confirmed there is no outstanding information, outside of the DCD, related to this subsection.

Section 8.3 of Revision 17 of the AP1000 DCD is identical to Section 8.3 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This subsection is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD and TR-134, Revision 0. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the standby diesel generator cooling water system have been resolved.

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 8.3 of the BLN COL FSAR incorporates by reference, without any departures, Section 8.3, "Onsite Power Systems," of Revision 17 of the AP1000 DCD and Revision 0 of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," (TR-134, Revision 0). Section 8.3 of the AP1000 DCD includes Tiers 1 and 2 information of Subsection 8.3.1.1.2.1, "Onsite Diesel Generators." The NRC staff reviewed the application and considered the referenced DCD. The NRC staff's review confirmed there is no outstanding information, outside of the DCD, related to this subsection.

Section 8.3 of Revision 17 of the AP1000 DCD is identical to Section 8.3 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This subsection is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD and TR-134, Revision 0. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the standby diesel generator starting air system have been resolved.

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 8.3 of the BLN COL FSAR incorporates by reference, without any departures, Section 8.3, "Onsite Power Systems," of Revision 17 of the AP1000 DCD and Revision 0 of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," (TR-134, Revision 0). Section 8.3 of the AP1000 DCD includes Tiers 1 and 2 information of Subsection 8.3.1.1.2.1, "Onsite Diesel Generators." The NRC staff reviewed the application and considered the referenced DCD. The NRC staff's review confirmed there is no outstanding information, outside of the DCD, related to this subsection.

Section 8.3 of Revision 17 of the AP1000 DCD is identical to Section 8.3 of Revision 15 of the AP1000 DCD, which is incorporated by reference into 10 CFR Part 52, Appendix D. This subsection is not affected by the changes that Westinghouse proposed in Revision 17 to the AP1000 DCD and TR-134, Revision 0. Pursuant to 10 CFR 52.63(a)(5) and 10 CFR Part 52, Appendix D, Section VI.B.1, all nuclear safety issues relating to the standby diesel generator lubrication system have been resolved.

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 8.3 of the BLN COL FSAR incorporates by reference, without any departures, Section 8.3, "Onsite Power Systems," of Revision 17 of the AP1000 DCD and Revision 0 of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," (TR-134, Revision 0). Section 8.3 of the AP1000 DCD includes Tiers 1 and 2 information of Subsection 8.3.1.1.2.1, "Onsite Diesel Generators." The NRC staff reviewed the application and considered the referenced DCD. The NRC staff's review confirmed there is no outstanding information, outside of the DCD, related to this subsection.

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 8.3 of the BLN COL FSAR incorporates by reference, without any departures, Section 8.3, "Onsite Power Systems," of Revision 17 of the AP1000 DCD and Revision 0 of APP-GW-GLR-134, "AP1000 DCD Impacts to Support COLA Standardization," (TR-134, Revision 0). Section 8.3 of the AP1000 DCD includes Tiers 1 and 2 information of Subsection 8.3.1.1.2.1, "Onsite Diesel Generators." The NRC staff reviewed the application and considered the referenced DCD. The NRC staff's review confirmed there is no outstanding information, outside of the DCD, related to this subsection.

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