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Your ref: Project Number 740
Our ref: DCP/NRC1934

June 12, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLN-124, (TR 124), Revision 0

In support of Combined License application pre-application activities, Westinghouse is submitting AP1000 Standard Combined License Technical Report Number 124. This report identifies and justifies standard changes to the AP1000 Design Control Document (DCD). The changes to the DCD identified in Technical Report 124 are included in the proposed amendment to the AP1000 Design Certification Rule (DCD Revision 16). This report is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in this report is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

The purpose for submittal of this report was explained in a March 8, 2006 letter from NuStart to the NRC.

Pursuant to 10 CFR 50.30(b), APP-GW-GLN-124, Revision 0, "Removal of PWS Source and WWS Retention Basins from Westinghouse AP1000 Scope of Certification," (Technical Report Number 124), is submitted as Enclosure 1 under the attached Oath of Affirmation.

It is expected that when the NRC review of Technical Report Number 124 is complete, the changes to the DCD identified in Technical Report 124 will be considered approved generically for COL applicants referencing the AP1000 Design Certification.

Questions or requests for additional information related to content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests for additional information to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Westinghouse requests the NRC to provide a schedule for review of the technical report within two weeks of its submittal.

D079
D063

NRO

Very truly yours,

D. J. Hutchings for

A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Attachment

1. "Oath of Affirmation," dated June 12, 2007

/Enclosure

1. APP-GW-GLN-124, Revision 0, "Removal of PWS Source and WWS Retention Basins from Westinghouse AP1000 Scope of Certification," Technical Report Number 124

cc:	D. Jaffe	- U.S. NRC	1E	1A
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	G. Zinke	- NuStart/Entergy	1E	1A
	C. Watson	- Westinghouse	1E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
NuStart Bellefonte COL Project	)
NRC Project Number 740	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

B. W. Bevilacqua, being duly sworn, states that he is Vice President, New Plants Engineering, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

Bruce W. Bevilacqua

B. W. Bevilacqua
Vice President
New Plants Engineering

Subscribed and sworn to
before me this 12th day
of June 2007.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Debra McCarthy, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Aug. 31, 2009
Member, Pennsylvania Association of Notaries

Debra McCarthy
Notary

ENCLOSURE 1

APP-GW-GLN-124, Revision 0

"Removal of PWS Source and WWS Retention Basins from Westinghouse AP1000 Scope of Certification"

Technical Report 124

AP1000 DOCUMENT COVER SHEET

TDC: Permanent File: APY

RFS#: RFS ITEM #:

AP1000 DOCUMENT NO.	REVISION NO.		ASSIGNED TO
APP-GW-GLN-124	0	Page 1 of 25	W-C. Watson

ALTERNATE DOCUMENT NUMBER: TR 124 WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: AP1000

TITLE: REMOVAL OF PWS SOURCE AND WWS RETENTION BASINS FROM WESTINGHOUSE AP1000 SCOPE OF CERTIFICATION

ATTACHMENTS: N/A	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION: APP-GW-GEE-198 Rev. 2
CALCULATION/ANALYSIS REFERENCE: N/A	

ELECTRONIC FILENAME	ELECTRONIC FILE FORMAT	ELECTRONIC FILE DESCRIPTION
APP-GW-GLN-124 R0.DOC	MicrosoftWord	

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Class 3 Documents being transmitted to the NRC require the following two review signatures in lieu of a Form 36.

LEGAL REVIEW Eric S. Gillen	SIGNATURE/DATE	[signature] 5/31/07
PATENT REVIEW M. Corletti	SIGNATURE/DATE	[signature] 5/30/2007

WESTINGHOUSE PROPRIETARY CLASS 2

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REVIEWERS P. Barilla	SIGNATURE/DATE P. Barilla 5/24/2007		
VERIFIER M. Stella	SIGNATURE/DATE [signature] 5/24/2007	VERIFICATION METHOD Page by Page	
AP1000 RESPONSIBLE MANAGER M. Corletti	SIGNATURE* [signature]	APPROVAL DATE 5/30/2007	

* Approval of the responsible manager signifies that document is complete, all required reviews are complete, electronic file is attached and document is released for use.

AP1000 Standard Combined License Technical Report

REMOVAL OF PWS SOURCE AND WWS RETENTION BASINS FROM WESTINGHOUSE AP1000 SCOPE OF CERTIFICATION

Technical Report 124

Revision 0

Westinghouse Electric Company LLC
Nuclear Power Plants
Post Office Box 355
Pittsburgh, PA 15230-0355

1.0 INTRODUCTION

The NuStart Consortium has requested the design of the Waste Water System (WWS) retention basins and associated piping and components outside the Turbine Building and that the Potable Water System (PWS) supply be removed from the Westinghouse AP1000 Scope of Certification and designated as site specific.

The designation of the PWS and applicable portions of the WWS as site specific is conducive to effective system interfaces with respect to plant design standardization at each site location. Facilitating this request will require a number of changes to the AP1000 Design Control Document (DCD) and associated design documents.

2.0 APPLICABILITY DETERMINATION

This evaluation is prepared to document that the change described above is a departure from Tier 1 and 2 information of the AP1000 Design Control Document (DCD) that may be included in plant specific FSARs, and thus requires NRC approval.

A.	Does the proposed change include a change to:		
	1. Tier 1 of the AP1000 Design Control Document APP-GW-GL-700	☐ NO ☒ YES	(If YES prepare a report for NRC review of the changes)
	2. Tier 2* of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
	3. Technical Specification in Chapter 16 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a report for NRC review of the changes)
B.	Does the proposed change involve:		
	1. Closure of a Combined License Information Item identified in the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare a COL item closure report for NRC review.)
	2. Completion of an ITAAC item identified in Tier 1 of the AP1000 Design Control Document, APP-GW-GL-700	☒ NO ☐ YES	(If YES prepare an ITAAC completion report for NRC review.)

☐ The questions above are answered no, therefore the departure from the DCD in a COL application does not require prior NRC review unless review is required by the criteria of 10 CFR Part 52 Appendix D Section VIII B.5.b. or B.5c

3.0 TECHNICAL BACKGROUND

There is a consensus among the NuStart members that the DCD description of the PWS should be revised, and the PWS source should be eliminated from the standard plant design. The standard Potable Water System design would then be comprised of an interface for a site specific PWS supply source (e.g. raw water, municipal, well water), the main PWS supply header, and the distribution network. This change will eliminate the Potable Water Storage Tank, Potable Water Pumps, Potable Water Jockey Pump, and their associated piping. In lieu of these components there will be an interface with a site specific raw water system or municipal water supply. This change also eliminates the Chemical Feed System (CFS) biocide feed pump (CFS-MP-14) and associated piping. Chemical treatment of potable water will then be the responsibility of the Combined License holder.

Per Tier 2, Figure 1.2-2 Site Plan of the DCD, the WWS Retention Basin (Number 24 on Figure 1.2-2) is not included within the boundary of the Westinghouse AP1000 Scope of Certification; however, there are specified design details of the WWS retention basins and associated piping in the DCD. Details of the WWS retention basins and piping from the Westinghouse will be removed from the AP1000 Scope of Certification.

This removal of certain components of the WWS from the Westinghouse AP1000 Scope of Certification will affect Tier 1 information in the DCD; specifically, an Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) designated in section 2.3.29 of the DCD. This ITAAC states the WWS will stop the discharge of waste water to the circulating water system upon detection of high radiation in the waste retention basin discharge stream to the circulating water system. Westinghouse will accomplish the functional requirement of this ITAAC by relocating the radiation monitor from the discharge of the WWS retention basins to downstream of the Turbine Building sump discharge. A high radiation signal will stop the Turbine Building sump pumps to stop the spread of radiation outside of the Turbine Building.

The condenser water box drains are also being removed from the WWS design. The design and discharge/routing of the condenser waterbox drains will be through the Circulating Water System (CWS) and determined by the Combined License applicant.

4.0 DCD MARK-UP

Tier 1, Section 2.3.29 of the DCD and Table 2.3.29-1 have changed to facilitate the ITAAC regarding a high radiation signal from the WWS discharge.

Section 9.2.5 of the DCD will be changed as indicated in the markup to eliminate the descriptions of the affected components and to identify the source of potable water as coming from a site-specific raw water system. This change will be the deletion of the PWS Biocide pump, associated piping, and descriptions of the affected equipment.

Section 10.4.11, the Chemical Feed System (CFS), has a portion of the system designated to pumping biocide to the raw water system piping that supplies the potable water storage tank. This biocide feed pump (CFS-MP-14) and associated piping will be removed.

The description of the WWS Retention Basin and Basin Transfer Pumps will be removed. A qualifying remark stating that "The waste water retention basins and associated pumps and piping are site specific components to be determined by the Combined License applicant," will be replace the WWS Retention Basin description.

Tier 2, Section 14.3 of the DCD has been reviewed and requires no change. This change to the Westinghouse AP1000 standard plant design maintains the functional requirement of the ITAAC to stop flow from the Turbine Building sump or Steam Generator drain temporary hose connection upon receiving a high radiation signal.

TIER 1 DCD CHANGES

CHAPTER 2
SYSTEM BASED DESIGN DESCRIPTIONS AND ITAAC

2.3.29 Radioactive Waste Drain System

Design Description

The radioactive waste drain system (WRS) collects radioactive and potentially radioactive liquid wastes from equipment and floor drains during normal operation, startup, shutdown, and refueling. The liquid wastes are then transferred to appropriate processing and disposal systems.

Nonradioactive wastes are collected by the waste water system (WWS). The WRS is as shown in Figure 2.3.29-1.

1. The functional arrangement of the WRS is as described in the Design Description of this Section 2.3.29.

2. The WRS collects liquid wastes from the equipment and floor drainage of the radioactive portions of the auxiliary building, annex building, and radwaste building and directs these wastes to a WRS sump or WLS waste holdup tanks located in the auxiliary building.

3. The WRS collects chemical wastes from the auxiliary building chemical laboratory drains and the decontamination solution drains in the annex building and directs these wastes to the chemical waste tank of the liquid radwaste system.

4. The WWS stops the discharge ~~of waste water to the circulating water system~~**from the Turbine Building sump** upon detection of high radiation in the ~~waste retention basin~~ discharge stream to the ~~circulating water system~~**oil separator**.

TABLE 2.3.29-1
INSPECTION, TESTS, ANALYSES AND ACCEPTANCE CRITERIA

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the WRS is as described in the Design Description of this Section 2.3.29.	Inspection of the as-built system will be performed.	The as-build WRS conforms with the functional arrangement as described in the Design Description of this Section 2.3.29.
2. The WRS collects liquid wastes from the equipment and floor drainage of the radioactive portions of the auxiliary building, annex building, and radwaste building and directs these wastes to a WRS sump or WLS waste holdup tanks located in the auxiliary building.	A test is performed by pouring water into the equipment and floor drains in the radioactive portions of the auxiliary building, annex building, and radwaste building.	The water poured into these drains is collected either in the auxiliary building radioactive drains sump or the WLS waste holdup tanks.
3. The WRS collects chemical wastes from the auxiliary building chemical laboratory drains and the decontamination solution drains in the annex building and directs these wastes to the chemical waste tank of the liquid radwaste system.	A test is performed by pouring water into the auxiliary building chemical laboratory and the decontamination solution drains in the annex building.	The water poured into these drains is collected in the chemical waste tank of the liquid radwaste system.
4. **The WWS stops the discharge from the Turbine Building upon detection of high radiation in the discharge stream to the oil separator.**~~The WWS stops the discharge of waste water to the circulating water system upon detection of high radiation in the waste retention basin discharge stream to the circulating water system.~~	Tests will be performed to confirm that a simulated high radiation signal from the ~~waste water retention basin~~**Turbine Building sump** discharge radiation monitor, WWS-021, causes the ~~basin transfer~~**sump** pumps (WWS-MP-~~04A~~-**01A** and B) to stop ~~running~~**operating, stopping the spread of radiation outside of the Turbine Building.**	A simulated high radiation signal causes the ~~basin transfer~~**Turbine Building sump** pumps (WWS-MP-~~04A~~-**01A** and B) to stop ~~running~~**operating, stopping the spread of radiation outside of the Turbine Building.**

TIER 2 DCD CHANGES

CHAPTER 1
INTRODUCTION AND GENERAL DESCRIPTION OF THE PLANT

Table 1.7-2 (Sheet 2 of 3)

AP1000 SYSTEM DESIGNATORS AND SYSTEM DIAGRAMS

Designator	System (Note 1)	DCD Section	DCD Figure (Note 2)
LOS	Main Turbine and Generator Lube Oil System	10.2	None
MES	Meteorological and Environmental Monitoring System (Wholly out of scope)	2.3.3	None
MHS	Mechanical Handling System	9.1	None
MSS	Main Steam System	10.3	10.3.2-2
MTS	Main Turbine System	10.2	10.2-1
OCS	Operation and Control Centers System	7.1, Ch. 18	7.1-1
PCS	Passive Containment Cooling System	6.2.2	6.2.2-1
PGS	Plant Gas Systems	9.3.2	None
PLS	Plant Control System	7.1 & 7.7	7.1-1
PMS	Protection and Safety Monitoring System	Ch. 7	7.2-1
PSS	Primary Sampling System	9.3.3	9.3.3-1
PWS	Potable Water System **(Partially out of scope)**	9.2.5	None
PXS	Passive Core Cooling System	6.3	6.3-1
RCS	Reactor Coolant System	5.1	5.1-5
RDS	Gravity and Roof Drain Collection System (Partially out of scope)	None	None
RMS	Radiation Monitoring System	11.5	None
RNS	Normal Residual Heat Removal System	5.4.7	5.4-7
RWS	Raw Water System (Wholly out of scope)	9.2.1.2.2, 9.2.1.2.3.1, 9.2.3, 9.2.5	None
RXS	Reactor System	3.9.4, 3.9.5, 4.2.2.2, 4.2.2.3.1, 5.3	5.3-1
SDS	Sanitary Drainage System (Partially out of scope)	9.2.6	None
SES	Plant Security System (Partially out of scope)	13.6	None
SFS	Spent Fuel Pit Cooling System	9.1.3	9.1-6
SGS	Steam Generator System	10.3, 10.4.7, 10.4.9	10.3.2-1
SJS	Seismic Monitoring System	3.7.4	None
SMS	Special Monitoring System	4.4.6.4	None
SSS	Secondary Sampling System	9.3.4	None
SWS	Service Water System	9.2.1	9.2.1-1
TCS	Turbine Building Closed Cooling Water System	9.2.8	None

Table 1.7-2 (Sheet 3 of 3)

AP1000 SYSTEM DESIGNATORS AND SYSTEM DIAGRAMS

Designator	System (Note 1)	DCD Section	DCD Figure (Note 2)
TDS	Turbine Island Vents, Drains and Relief System	9.2.9.2.2, 10.4.2.2.1, 10.4.3.1.2, 10.4.3.2.2, 10.4.6.3	None
TOS	Main Turbine Control and Diagnostics System	10.2.2.4	None
TVS	Closed Circuit TV System (Wholly out of scope)	None	None
VAS	Radiologically Controlled Area Ventilation System	9.4.3	9.4.3-1
VBS	Nuclear Island Nonradioactive Ventilation System	9.4.1	9.4.1-1
VCS	Containment Recirculation Cooling System	9.4.6	9.4.6-1
VES	Main Control Room Emergency Habitability System	6.4	6.4-2
VFS	Containment Air Filtration System	9.4.7	9.4.7-1
VHS	Health Physics and Hot Machine Shop HVAC System	9.4.11	9.4.11-1
VLS	Containment Hydrogen Control System	6.2.4	6.2.4 - various
VRS	Radwaste Building HVAC System	9.4.8	9.4.8-1
VTS	Turbine Building Ventilation System	9.4.9	9.4.9-1
VUS	Containment Leak Rate Test System	6.2.5	6.2.5-1
VWS	Central Chilled Water System	9.2.7	9.2.7-1
VXS	Annex/Auxiliary Non-Radioactive Ventilation System	9.4.2	9.4.2-1
VYS	Hot Water Heating System	9.2.10	None
VZS	Diesel Generator Building Ventilation System	9.4.10	9.4.10-1
WGS	Gaseous Radwaste System	11.3	11.3-2
WLS	Liquid Radwaste System	11.2	11.2-2
WRS	Radioactive Waste Drain System	9.3.5, 11.2	9.3.5-1
WSS	Solid Radwaste System	11.4	11.4-1
WWS	Waste Water System **(Partially out of scope)**	9.2.9	None
ZAS	Main Generation System (Note 3)	8.1	None
ZBS	Transmission Switchyard and Offsite Power System (Wholly out of scope)	8.2	None
ZOS	Onsite Standby Power System	8.2.1, 8.3.1	8.3.1-4, 8.3.1-5
ZVS	Excitation and Voltage Regulation System	10.2.2.3	None

1.8 Interfaces for Standard Design

The AP1000 is a plant design incorporating six buildings, the equipment in them and the associated yard structures and tankage. This includes the entire nuclear island (consisting of the containment/shield building and the auxiliary building), the annex building and associated equipment, the diesel/generator building and associated equipment, the turbine generator building, the turbine/generator equipment and the radwaste facilities. The physical boundary of the portion of the AP1000 design included in this application for Design Certification is shown on the site plan, Figure 1.2-2. It includes arrangement and placement of structures within the indicated boundary including the vehicle barriers necessary for security, but not the boundary fence. As a result, no interfaces need to be identified between or among the portions of the plant within the boundary. They are addressed in their appropriate section of this DCD. There are no safety-related interfaces to site-specific elements of the plant outside the scope of this certification application. Unless otherwise noted, the following site-specific elements are outside the scope of the AP1000 standard plant:

(1) The portions of the circulating water system and its heat sink outside the AP1000 buildings, as well as the specific design details of the main condenser. A conceptual design is presented, delineated by Double Brackets ([[ ]]), in subsection 10.4.5, based upon a cooling tower approach.

(2) The offsite power transmission system outside the low voltage terminals of the main and reserve transformers. Location and design of the main switchyard area and the equipment located therein, as well as design details such as voltage level for the main step-up transformers. A conceptual design of this system is included, delineated by Double Brackets ([[ ]]), in Section 8.2 for reference.

(3) Raw water source and treatment outside the turbine building. An interface specification of amount and water chemistry limits is provided.

(4) Sanitary and other drain systems outside the buildings identified above. This DCD is based upon the COL applicant providing adequate overall site drain collection and processing systems

(5) Communications systems and equipment outside the buildings identified above. This DCD is based upon the COL applicant providing adequate external communications.

(6) Location and design of administrative and training structures.

(7) Landscaping features.

(8) Size and location of Waste Water Retention Basins and the associated plant outfall piping.

A more detailed listing of the systems included in the standard AP1000 plant is included in Section 3.2.

Table 1.8-1 (Sheet 5 of 7)

SUMMARY OF AP1000 PLANT INTERFACES WITH REMAINDER OF PLANT

Item No.	Interface	Interface Type	Matching Interface Item	Section or Sub-section
9.4	Plant makeup water quality limits	NNS	Site specific parameter	9
9.5	Requirements for location and arrangement of raw and sanitary water systems	NNS	Site implementation	9
9.6	Ventilation requirements for diesel-generator room	NNS and Not an Interface	N/A	9
9.7	Requirements to satisfy fire protection program	AP1000 Interface	Combined License applicant program	9.5.1
9.8	**Requirements for location and size of waste water retention basins and associated plant outfall**	**NNS**	**Site Implementation**	**9**
11.1	Expected release rates of radioactive material from the Liquid Waste System including: Location of release points Effluent temperature Effluent flow rate Size and shape of flow orifices	Site Interface	Site specific parameters	11.2
11.2	Expected release rates of radioactive materials from the Gaseous Waste System including: Location of release points Height above grade Height relative to adjacent buildings Effluent temperature Effluent flow rate Effluent velocity Size and shape of flow orifices	Site Interface	Site specific parameters	11.3

Table 1.8-2 (Sheet 4 of 7)

SUMMARY OF AP1000 STANDARD PLANT COMBINED LICENSE INFORMATION ITEMS

Item No.	Subject	Subsection
8.3-1	Grounding and Lightning Protection	8.3.3
8.3-2	Onsite Electrical Power Plant Procedures	8.3.3
9.1-1	New Fuel Rack	9.1.6
9.1-2	Criticality Analysis for New Fuel Rack	9.1.6
9.1-3	Spent Fuel Racks	9.1.6
9.1-4	Criticality Analysis for Spent Fuel Racks	9.1.6
9.1-5	Inservice Inspection Program of Cranes	9.1.6
9.1-6	Radiation Monitor	9.1.6
9.2-1	**Potable Water**	**9.2.11**
9.2-2	**Waste Water Retention Basins**	**9.2.11**
9.3-1	Air Systems (NUREG-0933 Issue 43)	9.3.7
9.4-1	Ventilation Systems Operations	9.4.12
9.5-1	Qualification Requirements for Fire Protection Program	9.5.1.8
9.5-2	Fire Protection Analysis Information	9.5.1.8
9.5-3	Regulatory Conformance	9.5.1.8
9.5-4	NFPA Exceptions	9.5.1.8
9.5-5	Operator Actions Minimizing Spurious ADS Actuation	9.5.1.8
9.5-6	Verification of Field Installed Fire Barriers	9.5.1.8
9.5-7	Fire Resistance Test Data	9.5.1.8
9.5-8	Establishment of Procedures to Minimize Risk for Fire Areas Breached During Maintenance	9.5.1.8
9.5-9	Offsite Interfaces	9.5.2.5.1
9.5-10	Emergency Offsite Communications	9.5.2.5.2
9.5-11	Security Communications	9.5.2.5.3
9.5-12	Cathodic Protection	9.5.4.7
9.5-13	Fuel Degradation Protection	9.5.4.7
10.1-1	Erosion-Corrosion Monitoring	10.1.3
10.2-1	Turbine Maintenance and Inspection	10.2.6
10.4-1	Circulating Water Supply	10.4.12.1
10.4-2	Condensate, Feedwater and Auxiliary Steam System Chemistry Control	10.4.12.2

CHAPTER 3
DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT AND SYSTEMS

3.4.1.2.2.2 Auxiliary Building Flooding Events

Auxiliary Building Level 5 (Elevation 135′-3″)

- **Nonradiologically Controlled Area**

  Level 5 of the nonradiologically controlled area contains two mechanical HVAC equipment rooms and the upper portion of the two main steam isolation valve compartments. There is no safety-related equipment on level 5.

  The evaluation of the main steam isolation valve compartments is addressed in the discussion of level 4.

  Water from fire fighting **or**~~,~~ postulated pipe ~~or potable water storage tank (150 gallons)~~ ruptures in the main mechanical HVAC equipment rooms drains to the turbine building via floor drains or to the annex building via flow under the doors. Therefore, no significant accumulation of water occurs in this room. Floor penetrations are sealed and a 6 inch platform is provided at the elevator and stairwell such that flooding in these rooms does not propagate to levels below.

CHAPTER 9
AUXILIARY SYSTEMS

9.2.5 Potable Water System

9.2.5.1 Design Basis

The potable water system (PWS) is designed to furnish water for domestic use and human consumption. It complies with the following standards:

- Bacteriological and chemical quality requirements as referenced in EPA "National Primary Drinking Water Standards," 40 CFR Part 141.
- The distribution of water by the system is in compliance with 29 CFR 1910, Occupational Safety and Health Standards, Part 141.

9.2.5.1.1 Safety Design Basis

The potable water system serves no safety-related function and therefore has no nuclear safety design basis.

9.2.5.1.2 Power Generation Design Basis

- Potable water is supplied to provide a quantity of ~~100~~ **50** gallons/person/day for the largest number of persons expected to be at the station during a 24-hour period during normal plant power generation or outages.

- Water heaters provide a storage capacity equal to the probable hourly demand for potable hot water usage and provide hot water for the main lavatory, shower areas, and other locations where needed.

- A minimum pressure of 20 psig is maintained at the furthermost point in the distribution system.

- No interconnections exist between the potable water system and any potentially radioactive system or any system using water for purposes other than domestic water service.

9.2.5.2 System Description

9.2.5.2.1 General Description

Classification of components and equipment for the potable water system is given in Section 3.2.

The source of water for the potable water system is **a site specific** ~~the raw~~ water system. The potable water system consists of a ~~potable water storage tank, two potable water pumps, a jockey pump, a~~ distribution header around the power block, hot water storage heaters, and necessary interconnecting piping and valves. **All other components of the potable water system outside of the power block are site specific and will be addressed in accordance with section 9.2.11.** ~~Disinfection is provided upstream of the potable water storage tank (see subsection 10.4.11, turbine island chemical feed system for details).~~

9.2.5.2.2 Component Description

~~**Potable Water Storage Tank**~~

~~The potable water storage facility consists of a carbon steel tank with capacity less than 10,000 gallons and coated interior which stores water for distribution throughout the plant.~~

~~**Potable Water Pumps**~~

~~Each of the two motor-driven potable water pumps takes suction from the potable water storage tank and discharges to the domestic water distribution header. The pumps are operated as required to meet the potable water demand in the plant at a minimum supply pressure of 20 psig.~~

~~**Jockey Pump**~~

~~A continuously operated jockey pump is used to supply potable water to the distribution header and maintains the pressure of the system during low flow requirement periods. This motor-driven pump takes suction from the potable water system storage tank and pumps water through the distribution system. A recirculation line to the potable water system storage tank is provided to allow continuous running of the jockey pump when the system demand is low.~~

Hot Water Heaters

Electric immersion heating elements located inside the potable water hot water tank are used to produce hot water. This hot water is routed to the shower and toilet areas and to other plumbing fixtures and equipment requiring domestic hot water service. Point of use, inline electric water heating elements are used to generate hot water for the main control room and the turbine building secondary sampling laboratory.

9.2.5.3 System Operation

Filtered water ~~from the raw water system is stored in the top portion of one of the two fire water tanks which act as a clearwell for the raw water~~**is supplied from a site specific water source for the potable water distribution system.** ~~. This filtered water is pumped to the potable water system. Low water level instrumentation in the potable water storage tank generates a signal to activate the clearwell pumps supplying makeup to the potable water system storage tank. High water levels in the potable water system storage tank produce a signal which stops the clearwell pumps.~~

~~Prior to entering the potable water system storage tank, supply water is disinfected. A minimum residual chlorine level of 0.5 ppm is maintained in the system prior to entering the potable water system storage tank. The chlorination system is activated and deactivated by a flow signal generated by the fill valve located upstream of the potable water system storage tank.~~

~~Two potable water pumps and a system jockey pump are used to supply potable water throughout the plant.~~ The ~~potable~~ **onsite** water **supply** system ~~pumps are activated sequentially to~~ **will** maintain an appropriate pressure throughout the distribution system. ~~A pressure transmitter is provided downstream of the potable water system pumps to control their start/stop sequences. The jockey pump operates continuously to maintain system pressure.~~

Potable water is supplied to areas that have the potential to be contaminated radioactively. Where this potential for contamination exists, the potable water system is protected by a reduced pressure zone type backflow prevention device.

No interconnections exist between the potable water system and any system using water for purposes other than domestic water service including any potentially radioactive system. ~~The common supply from the onsite raw water system is designed to use an air gap to prevent contamination of the potable water system from other systems supplied by the raw water system.~~

9.2.5.4 Safety Evaluation

The potable water system has no safety-related functions and therefore requires no nuclear safety evaluation.

9.2.5.5 Tests and Inspections

The potable water system is hydrostatically tested for leak-tightness in accordance with the Uniform Plumbing Code. Inspection of the system is in compliance with the Uniform Plumbing Code or governing codes having jurisdiction. The system is then disinfected, flushed with potable water, and placed in service. The presence of residual chlorine can be confirmed through laboratory tests of samples at ~~the potable water storage tank and at other~~ sampling points as required. Tests for microbiological and bacteria presence in potable water are conducted periodically.

9.2.5.6 Instrumentation Applications

Thermostats, high-temperature limit controls, and temperature indication are installed on the potable water system hot water tank. Thermostats and high-temperature limit controls are installed on the inline water heaters. Pressure regulators are employed in those parts of the distribution system where pressure restrictions are imposed.

~~Control signals for the chlorinator (located in the turbine island chemical feed system) are provided by flow instrumentation associated with the potable water system tank fill valve.~~

~~Instrumentation on the potable water system storage tank provides level indication for the tank, alarm signals, and control signals for the fill valve and the potable water system pumps. Should the potable water system storage tank become depleted, the potable water system pumps are tripped.~~

~~A pressure transmitter located downstream of the potable water system pumps controls the stop/start sequence of the pumps. The jockey pump runs continuously to maintain system pressure. If the jockey pump is unable to maintain system pressure, a potable water system pump is started. The second potable water system pump starts if the distribution system flow rates are such that all three pumps are required to maintain an acceptable system pressure.~~

9.2.9 Waste Water System

The waste water system collects and processes equipment and floor drains from nonradioactive building areas.

9.2.9.1 Design Basis

9.2.9.1.1 Safety Design Basis

The waste water system serves no safety-related function and therefore has no safety-related design basis.

9.2.9.1.2 Power Generation Design Basis

The power generation design basis is:

- Remove oil and/or suspended solids from miscellaneous waste streams generated from the plant.
- Collect system flushing wastes during startup prior to treatment and discharge.
- Collect and process fluid drained from equipment or systems during maintenance or inspection activities.
- Direct nonradioactive equipment and floor drains which may contain oily waste to the building sumps and transfer their contents for proper waste disposal. The radioactive equipment and floor drain system is described in subsection 9.3.5.

9.2.9.2 System Description

9.2.9.2.1 General Description

The waste water system is capable of handling the anticipated flow of waste water during normal plant operation and during plant outages. The classification of components and equipment is given in Section 3.2.

Wastes from the turbine building floor and equipment drains (which include laboratory and sampling sink drains, oil storage room drains, the main steam isolation valve compartment, auxiliary building penetration area and the auxiliary building HVAC room) are collected in the two turbine building sumps. Drainage from the diesel generator building sumps, the auxiliary building sump – north (a nonradioactive sump) and the annex building sump is also collected in the turbine building sumps. The turbine building sumps provide a temporary storage capacity and a controlled source of fluid flow to the oil separator. In the event radioactivity is present in the turbine building sumps, the waste water is diverted from the sumps to the liquid radwaste system (WLS) for processing and disposal. A radiation monitor located on the common discharge piping of the sump pumps provides an alarm upon detection of radioactivity in the waste water. The radiation monitor also trips the sump pumps and ~~the waste water retention basin pumps~~ on detection of radioactivity to isolate the contaminated waste water. Provisions are included for sampling the sumps.

The turbine building sump pumps route the waste water from either of the two sumps to the oil separator for removal of oily waste. The diesel fuel oil area sump pump also discharges waste water to the oil separator. A bypass line allows for the oil separator to be out of service for maintenance. The oil separator has a small reservoir for storage of the separated oily waste which flows by gravity to the waste oil storage tank. The waste oil storage tank provides temporary storage prior to removal by truck for offsite disposal.

The waste water from the oil separator flows by gravity to the waste water retention basin for settling of suspended solids and treatment, if required, prior to discharge.~~ The waste water basin transfer pumps route the basin effluent to either the circulating water cooling tower basin or to the plant outfall, depending on the quality of the water in the waste water retention basin~~.

~~The condenser waterbox drains are routed directly to the waste water retention basins.~~**Design and routing of the condenser waterbox drains will be incorporated in the site-specific Circulating Water System (CWS) design.**

9.2.9.2.2 Component Description

Turbine Building Sumps

The two sumps collect waste water from the floor and equipment drains, laboratory drains, sampling waste drains, and plant washdowns from the turbine building. Selected drains from both the annex and auxiliary buildings are also collected in these sumps.

Turbine Building Sump Pumps

Each sump has one pneumatic, double diaphragm pump which routes the waste water to the oil separator. Interconnecting piping between the suction of the sump pumps allows for either pump to transfer waste water from either or both sumps. The plant service air system provides the supply of air for operation of the pumps. Operation of the pump is automatic based on sump level with controls provided for manual operation.

Oil Separator

The oil separator has internal, vertical coalescing tubes for removal of oily waste and an oil holdup tank. Sampling provisions are included on the oil holdup tank to confirm that the oil does not require handling and disposal as a hazardous waste. A sampling connection is also provided at the discharge of the oil separator.

Waste Oil Storage Tank

Waste oil from the oil separator reservoir and other plant areas is stored in a waste oil storage tank. A sampling connection is provided on the tank to verify that the oil does not require handling and disposal as a hazardous material. A truck connection on the tank allows for removal of the waste oil from the tank for offsite disposal.

Waste Water Retention Basin

~~The waste water retention basin is a lined basin with two compartments constructed such that its contents, dissolved or suspended, do not penetrate the liner and leach into the ground.~~

~~Either of these compartments can receive waste streams for holdup or, if required, for treatment to meet specific environmental discharge requirements.~~

~~The configuration and size of the waste water retention basin allows settling of solids larger than 10 microns which may be suspended in the waste water stream.~~

~~Waste water can be sampled prior to discharge from the waste water retention basin.~~**The waste water retention basins and associated basin transfer pumps and piping are site specific components as addressed in section 9.2.11.**

~~**Basin Transfer Pumps**~~

~~Two submersible type pumps, one per basin compartment, send the waste water from the retention basin to either the circulating water system or to a site specific plant outfall. In the event of oily waste leakage into the retention basin, a recirculation line is provided to recycle the oil/water waste from the basin to the oil separator. Controls are provided for automatic or manual operation of the pumps based on the level of the retention basin.~~

Waste Water Sumps

Waste water collection sumps are provided for the auxiliary building, the diesel generator building, the annex building and the diesel fuel oil area. These collection sumps are drained by air operated pumps and the effluent from the sumps, except the effluent from the diesel fuel oil area, is directed to the turbine building sumps for processing and release. The effluent from the diesel fuel oil area is pumped directly to the oil separator.

Sump Pumps

The waste water sump pumps are pneumatic, double diaphragm pumps. The plant service air system provides the supply of air for operation of these pumps. Operation of the pumps is automatic based on sump level with controls provided for manual operation.

9.2.9.3 Safety Evaluation

The waste water system has no safety-related function and therefore requires no nuclear safety evaluation.

9.2.9.4 Tests and Inspections

System performance and integrity during normal plant operation are verified by system operation and visual inspections.

9.2.9.5 Instrumentation Applications

Level instrumentation and associated pump controls on the turbine building sumps, ~~the waste water retention basin,~~ the auxiliary building sump, the diesel generator building sumps, and the diesel fuel oil sump are provided to prevent overflow of these waste water collection points. High alarms indicate ~~basin or~~ tank level where operator action is required.

A radiation monitor located on the **Turbine Building sump** common ~~waste water retention basin pump~~ discharge piping initiates an alarm and trips the turbine building sump ~~and waste~~

~~water retention basin~~ pumps when radioactivity above a preset high level point is detected in the waste stream.

9.2.11 Combined License Information

~~This section has no requirement for information to be provided in support of the Combined License application.~~

1. **Potable Water**

   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. Toxic gases such as chlorine are not recommended. The impact of toxic gases on the main control room compatibility is addressed in Section 6.4.

2. **Waste Water Retention Basins**

   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.

CHAPTER 10
STEAM AND POWER CONVERSION

10.4.11 Turbine Island Chemical Feed

The turbine island chemical feed system (CFS) injects required chemicals into the condensate (CDS), feedwater (FWS), auxiliary steam (ASS), circulating water (CWS), service water (SWS), **and** demineralized water treatment (DTS) ~~and potable water (PWS)~~ systems. CFS components are located in the turbine building.

10.4.11.2.1 Component Description

Condensate, Feedwater and Auxiliary Steam

An all-volatile chemical feed system (AVT) is used for condensate, feedwater and auxiliary steam water chemistry control. An oxygen scavenger is injected into the condensate system downstream of the condensate polishers to control the dissolved oxygen level. Feedwater chemistry is controlled by maintaining a residual level of oxygen scavenger. The injection point for the feedwater oxygen scavenger is located on the feedwater booster pump suction piping. A pH adjuster is also injected into the condensate system downstream of the condensate polisher for pH control. Injection for pH control of the feedwater is located on the feedwater booster pump suction. Chemical feed pumps and tanks are used to store and inject the chemicals into the piping system. Subsection 10.4.10.2.2 describes chemical feed for the auxiliary steam system.

Circulating Water and Service Water

A biocide, pH adjuster and dispersant/corrosion/scale inhibitor are injected into the circulating water and service water systems as required. An algicide can be fed to the circulating water and service water cooling tower basins or to the canals. Subsections 9.2.1.2.2 and 10.4.5.2.2 describe chemical feed for the service water and circulating water systems, respectively.

Demineralized Water Treatment

A pH adjuster and scale inhibitor are injected into the demineralized water treatment system. Subsection 9.2.3.2.3 describes chemical feed for the demineralized water treatment system.

~~**Potable Water**~~

~~A biocide is injected into the potable water system. Subsection 9.2.5.3 describes chemical feed for the potable water system.~~

10.4.11.2.2 System Operation

Condensate, Feedwater and Auxiliary Steam System Chemistry Control

An oxygen scavenger is injected into the feedwater booster pump suction to maintain a residual level of oxygen scavenger and a dissolved oxygen level of not more than 5 ppb at the inlet to the steam generator.

A pH adjuster is also injected into the feedwater booster pump suction to maintain the pH at the steam generator inlet within the control program for pH.

An oxygen scavenger is injected into the condensate system downstream of the condensate polisher to maintain a dissolved oxygen level of not more than 10 ppb at the inlet of the deaerator.

A pH adjuster is injected into the condensate system downstream of the condensate polisher to maintain the pH above 9.0 at the deaerator inlet within the control program for pH.

The chemical feed system may be used to place the steam generators in wet layup. This layup process is accomplished using the chemical feed system in conjunction with the steam generator blowdown system. Refer to subsection 10.4.8.2 for details of this process.

An oxygen scavenger and pH adjuster are injected into the auxiliary steam system downstream of the boiler makeup pumps to maintain the dissolved oxygen level and pH within the auxiliary boiler program levels. The chemical feed rates are manually adjusted.

Circulating Water and Service Water System Chemistry Control

A biocide, pH adjuster and dispersant/corrosion/scale inhibitor are injected downstream of the circulating water and service water pumps as required. Chemical feed rates for the biocide and dispersant/corrosion/scale inhibitor are manually adjusted to maintain proper concentrations. The pH adjuster chemical feed rate is controlled electronically from instrumentation that measures pH.

An algicide is provided to control algae formation on the circulating water cooling tower and service water cooling tower. The algicide is fed using a flexible hose and the feed rate is manually adjusted.

Demineralized Water Treatment System Chemistry Control

A pH adjuster and scale inhibitor are injected into the raw water supply to the demineralized water treatment system upstream of the cartridge filters. The scale inhibitor feed rate is manually adjusted and the pH adjuster chemical feed rate is controlled electronically from instrumentation that measures pH.

~~**Potable Water System Chemistry Control**~~

~~A biocide is injected into the raw water supply to the potable water system upstream of the potable water storage tank. The biocide feed rate is manually adjusted.~~

10.4.11.5 Instrumentation Applications

The secondary sampling system (SSS), as described in subsection 9.3.4, provides instrumentation which measures dissolved oxygen, oxygen scavenger residual, and pH for the condensate, feedwater, and steam generator systems. These analyzers provide an indication of water quality and inputs for either manual or automatic control of the condensate and feedwater systems oxygen scavenging and pH control chemical feed pumps. Grab samples are analyzed to provide input for manual adjustment of feed rates for the auxiliary steam system oxygen scavenging and pH control chemical feed pumps. Wet layup operations are manually performed based on the results of the grab sample analysis.

Grab samples are analyzed to provide input for manual adjustment of feed rates for biocide, pH adjustment and/or dispersant/corrosion/scale inhibitor chemicals for the circulating water, service water, **and** demineralized water treatment ~~and potable water~~ systems.

5.0 REGULATORY IMPACT

A. FSER IMPACT

There is no impact on the FSER. The changes in the equipment qualification methodology have no effect on design function. This change has no effect on analysis or analysis method.

B. SCREENING QUESTIONS

1. Does the proposed change involve a change to an SSC that adversely affects a DCD described design function? ☐ YES ☒ NO

   Changes to the PWS and WWS are not adverse to system design functions as described in the DCD.

2. Does the proposed change involve a change to a procedure that adversely affects how DCD described SSC design functions are performed or controlled? ☐ YES ☒ NO

   The removal of the PWS and portions of the WWS from AP1000 standard plant scope is not adverse to design functions.

3. Does the proposed activity involve revising or replacing an DCD described evaluation methodology that is used in establishing the design bases or used in the safety analyses? ☐ YES ☒ NO

   The change does not require changes to the evaluation of the response to postulated accident conditions. The changes to the design do not require changes to the structural or safety analysis of any safety related equipment.

4. Does the proposed activity involve a test or experiment not described in the DCD, where an SSC is utilized or controlled in a manner that is outside the reference bounds of the design for that SSC or is inconsistent with analyses or descriptions in the DCD? ☐ YES ☒ NO

   The change to the PWS and WWS does not require an additional test or experiment or changes to testing.

C. EVALUATION OF DEPARTURE FROM TIER 2 INFORMATION

10 CFR Part 52, Appendix D, Section VIII. B.5.a. provides that an applicant for a combined licensee who references the AP1000 design certification may depart from Tier 2 information, without prior NRC approval, if it does not require a license amendment under paragraph B.5.b. The questions below address the criteria of B.5.b.

1. Does the proposed activity result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD?	☐ YES ☒ NO
There are no new accident initiators and no effect on the frequency of evaluated accidents from this change in the PWS or WWS.	
2. Does the proposed activity result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety and previously evaluated in the plant-specific DCD?	☐ YES ☒ NO

The PWS and WWS changes will not affect the evaluation of a SSC malfunction.	
3. Does the proposed activity result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD?	☐ YES ☒ NO
This change does not affect the operation, performance, and pressure boundary integrity of the safety related equipment. Therefore, there is no increase in the calculated release of radioactive material during postulated accident conditions.	
4. Does the proposed activity result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific DCD?	☐ YES ☒ NO
The removal of the PWS and portions of the WWS from Westinghouse standard plant design has no effect on the design functions or reliability of the safety related equipment or other components. Therefore, there is no increase in the calculated release of radioactive material due to a malfunction of an SSC.	
5. Does the proposed activity create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD?	☐ YES ☒ NO
The design changes do not introduce any additional failure modes; therefore, there is no possibility of an accident of a different type than any evaluated previously in the DCD.	
6. Does the proposed activity create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD?	☐ YES ☒ NO
There are no additional failure modes or the possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously.	
7. Does the proposed activity result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered?	☐ YES ☒ NO
There is no change to the design function of the safety related equipment. The criteria to provide for pressure boundary integrity are not exceeded or altered.	
8. Does the proposed activity result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses?	☐ YES ☒ NO
The PWS and WWS changes to not affect any methodologies used within the DCD.	
☒ The answers to the evaluation questions above are "NO" and the proposed departure from Tier 2 does not require prior NRC review to be included in plant specific FSARs as provided in 10 CFR Part 52, Appendix D, Section VIII. B.5.b ☐ One or more of the answers to the evaluation questions above are "YES" and the proposed change requires NRC review.	

D. IMPACT ON RESOLUTION OF A SEVERE ACCIDENT ISSUE

10 CFR Part 52, Appendix D, Section VIII. B.5.a. provides that an applicant for a combined licensee who references the AP1000 design certification may depart from Tier 2 information, without prior NRC approval, if it does not require a license amendment under paragraph B.5.c. The questions below address the criteria of B.5.c.

1. Does the proposed activity result in an impact features that mitigate severe accidents. If the answer is Yes answer Questions 2 and 3 below.	☐ YES ☒ NO
The systems and components identified in the DCD Subsection 1.9.5 and Appendix 19 B that mitigate severe accidents are not impacted by the change in PWS and WWS.	

2. Is there is a substantial increase in the probability of a severe accident such that a particular severe accident previously reviewed and determined to be not credible could become credible?	☐ YES ☐ NO ☒ N/A
There is no chance that the changes to the PWS and WWS would make a previously reviewed accident become credible.	
3. Is there is a substantial increase in the consequences to the public of a particular severe accident previously reviewed?	☐ YES ☐ NO ☒ N/A
No, the changes to the PWS and WWS will not increase consequences of a severe accident.	
☒ The answers to the evaluation questions above are "NO" or are not applicable and the proposed departure from Tier 2 does not require prior NRC review to be included in plant specific FSARs as provided in 10 CFR Part 52, Appendix D, Section VIII. B.5.c.	
☐ One or more of the he answers to the evaluation questions above are "YES" and the proposed change requires NRC review.	

E. SECURITY ASSESSMENT

1. Does the proposed change have an adverse impact on the security assessment of the AP1000. ☐ YES ☒ NO

These changes will not alter barriers or alarms that control access to protected areas of the plant. The design changes will not alter requirements for security personnel.

6.0 REFERENCES

1. APP-GW-GL-700, AP1000 Design Control Document, Revision 15.