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Your ref: Project Number 740
Our ref: DCP/NRC1897

May 25, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLN-111, Revision 0

In support of Combined License application pre-application activities, Westinghouse is submitting Revision 0 of AP1000 Standard Combined License Technical Report Number 111. This report identifies and justifies standard changes to Design Control Document Sections in the AP1000 Design Control Document. The changes to the Design Control Document identified in Technical Report Number 111 are intended to be incorporated into FSARs referencing the AP1000 design certification or incorporated into the design certification by an amendment to the design certification. 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-111, Revision 0, "Component Cooling System and Service Water System Changes Required for Increased Heat Loads," Technical Report Number 111, is submitted as Enclosure 1 under the attached Oath of Affirmation.

It is expected that when the NRC review of Technical Report Number 111 is complete, the changes to the AP1000 DCD identified in Technical Report 111 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 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

Very truly yours,

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

/Attachment

1. "Oath of Affirmation," dated May 25, 2007

/Enclosure

1. APP-GW-GLN-111, Revision 0 "Component Cooling System and Service Water System Changes Required for Increased Heat Loads," Technical Report Number 111

cc:	D. Jaffe	-	U.S. NRC	1E	1A
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	G. Curtis	-	TVA	1E	1A
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	G. Zinke	-	NuStart/Entergy	1E	1A
	M. Stella		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

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs & Standardization, 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.

W. E. Cummins
W. E. Cummins
Vice President
Regulatory Affairs & Standardization

Subscribed and sworn to
before me this 25th day
of May 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-111, Revision 0

"Component Cooling System and Service Water System Changes Required for Increased Heat Loads,"

Technical Report 111

F-AP-3.2-1 Rev. 0

AP1000 DOCUMENT COVER SHEET

TDC: ____ Permanent File: ____ APY: ____

PSA 5-25-07 RFS#: ____ RFS ITEM #: ____

AP1000 DOCUMENT NO.	REVISION NO.		ASSIGNED TO
APP-GW-GL~~R~~N-111	0	Page 1 of ~~30~~ 34	W-STELLA

ALTERNATE DOCUMENT NUMBER: TR 111 WORK BREAKDOWN #: GW

ORIGINATING ORGANIZATION: Westinghouse Electric Company

TITLE: **Component Cooling System and Service Water System Changes Required For Increased Heat Loads**

ATTACHMENTS:	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION: APP-GW-GEE-066, APP-GW-GEE-152
CALCULATION/ANALYSIS REFERENCE:	

ELECTRONIC FILENAME	ELECTRONIC FILE FORMAT	ELECTRONIC FILE DESCRIPTION
APP-GW-GLR-111	PDF	See EDMS

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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	SIGNATURE/DATE
~~T. J. White~~ JOSEPH C. SPADACENE	5/23/07
PATENT REVIEW M. M. Corletti	SIGNATURE/DATE 5/23/07

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VERIFIER D. J. McDermott	SIGNATURE/DATE TLS for D. J. McDERMOTT	VERIFICATION METHOD INSPECTION
AP1000 RESPONSIBLE MANAGER M. M. Corletti	SIGNATURE	APPROVAL DATE 5/23/07

* 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.

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APP-GW-GLN-111
Revision 0

May 2007

AP1000 Standard Combined License Technical Report

COMPONENT COOLING SYSTEM
AND
SERVICE WATER SYSTEM CHANGES
REQUIRED FOR INCREASED HEAT LOADS

Technical Report 111

Revision 0

Westinghouse Non-Proprietary Class 3

Westinghouse Electric Company LLC
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1.0 INTRODUCTION

In the AP1000 nuclear power plant design the Component Cooling System (CCS) and Service Water System (SWS) operate together to provide the cooling for numerous components important to plant power and shutdown operation, defense-in-depth, and investment protection. The initial design attributes of the AP1000 CCS and SWS systems (e.g., pipe sizes, pump performance requirements, sizing of heat exchange equipment, locations of key components) were derived directly from the AP600 design. Changes are required to both the CCS and SWS designs to meet applicable design and performance criteria related to their function to provide cooling water for key AP1000 primary and secondary plant equipment, and to transfer these equipment heat loads to the atmosphere.

The changes made do not affect the results of any AP1000 safety analysis since neither the CCS nor the SWS are safety-related systems. Details of the CCS and SWS design are included in the AP1000 DCD because they can affect the performance of safety systems, or are needed for defense-in-depth purposes. Changes to the AP1000 DCD are required, including changes to Tier 1 materials (ITAAC for the CCS and SWS) and Tier 2 materials (description of the CCS and SWS and their key parameters and investment protection controls for certain parameters affecting system performance).

This Technical Report documents the DCD changes required in Section 4.0.

2.0 APPLICABILITY DETERMINATION

This evaluation is prepared to document that the changes described above are departures from existing Tier 1 and 2 information of the AP1000 Design Control Document (DCD) that may be included in plant specific FSARs, and thus require USNRC 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

3.1 Basis for Changes to CCS Design

The modifications described in this Technical Report are needed to address the following changes in CCS system design:

- Higher heat loads and flow rates for cooling the Reactor Coolant System (RCS) Reactor Coolant Pumps (RCPs)
- Higher heat loads and flow rates for cooling the Condensate System (CDS) Condensate Pump bearing oil coolers
- Adding the Reactor Coolant Pump Variable Frequency Drive (VFD) units to the system as new cooled components
- Relocating the VFDs from the northwest side of the Turbine Building to the southwest side of the Turbine Building
- Higher flow in the CCS headers supplying cooling water to loads inside containment, resulting in excessively high fluid velocity and greater dynamic head losses in this portion of the CCS
- Higher flow in the CCS pump suction and discharge headers, resulting in excessively high fluid velocity and greater dynamic head losses through these lines

3.2 Basis for Changes to SWS Design

Since the AP1000 SWS has only one function, to transfer the plant component heat load from the CCS to the atmosphere, its design has also been affected by CCS heat load and flow increases listed in the previous section. Increased SWS heat duty results in the need for increased SWS flow, larger pumps, pipe and component sizing, and increased cooling tower size. Because of the increased heat load, the makeup rate to the SWS cooling tower must also be increased.

3.3 Description of CCS Design Changes

CCS design changes have been made in the following categories: addition of new cooled components to CCS; reconfiguration of CCS piping layout; change to CCS piping sizes; change to CCS pump parameters; change to CCS heat exchanger parameters; increase in CCS system design pressure.

3.3.1 Addition of New Cooled Components to CCS

The RCP Variable Frequency Drive (VFD) units are now water-cooled and have an internal cooling water circulating system, which transfers heat via a small heat exchanger to the CCS.

3.3.2 Reconfiguration of CCS Piping Layout

The location of the VFDs has been changed from the northwest corner of the Turbine Building to the southern end of the Turbine Building, near the CCS pumps and heat exchangers. (Directions are referenced to the standard plant northing and easting grid directions). VFD cooling supply and return piping is now run separately to the CCS pump discharge and suction headers. As part of this overall change, the VFD supply header configuration has been modified to incorporate a remotely-actuated flow isolation valve with a smaller bypass line upstream of the VFD coolers. This configuration reduces the total flow in the VFD cooling water header from approximately 440 gpm to less than 100 gpm, when the RCPs are operating at full speed (power being supplied through the bypass around the VFDs), as they would be with the reactor plant in Mode 1. The isolation/bypass valve arrangement reduces the required CCS pump flow rate during the most frequently-encountered operating condition for the plant. A small bypass flow is necessary because the VFDs are maintained in an energized state when not powering the RCPs. The isolation valve is interlocked with the VFD control system to prevent energizing RCP motors through the VFDs unless there is full cooling flow provided from the CCS to the drive units.

Separate supply and return headers for the CAS Air Compressors and CDS Condensate Pumps have been provided. Separate supply and return headers reduce the dynamic head losses encountered in these lines and reduce the CCS pump head and power requirements.

3.3.3 Changes to CCS Piping Sizes

Several changes to individual pipeline sizes (including changes to the size of associated valves) have been made in the CCS to reduce the flow velocity in these lines, decrease dynamic head losses, and reduce system pumping power requirements. Pipelines affected include the main CCS supply and return headers, the individual CCS pump-heat exchanger lines, and the cooling water lines to and from the reactor coolant pumps.

3.3.4 Changes to CCS Pump Parameters

The design head and flow of the CCS pumps has been changed to 9500 gpm at 250 feet developed head. These parameters are based on balancing flow to all CCS cooling water users with a revised piping layout as described in this Technical Report. Sufficient margin is available in the system layout and balance orifice sizing to provide for adjustments to maintain system performance with anticipated minor changes in piping layout and pump parameters.

As a result of the change in pump parameters, the expected pump motor size has been reduced from 900 hp to 700 hp, which reduces diesel generator loading requirements for the CCS pumps.

3.3.5 Changes to CCS Heat Exchanger Parameters

The size (UA) of the CCS heat exchangers has been increased to 15.5 x 10^6 Btu/hr-°F to meet all CCS performance requirements with the increased heat loads from cooled components. The design case for the CCS heat exchangers is the normal plant power operation case, with one train of CCS and SWS in service to remove a total CCS heat load of 103 x 10^6 Btu/hr. The increase in CCS heat exchanger size is associated with an increased SWS flow rate (see Section 3.4) as well as an increased CCS flow rate.

3.3.6 Increase in CCS System Design Pressure

Analysis of fluid pressure throughout the revised CCS piping system verifies that the design pressure of the system must be increased from 150 psig to 200 psig.

3.3.7 Addition of Temperature Instrumentation for VFDs and Condensate Pump Coolers

Temperature channels with remote MCR indication via the PLS have been added to the Variable Frequency Drives and the CDS Condensate Pump oil cooler lines. These temperature channels permit the operator to monitor the cooling performance of the CCS at their specific locations. Channels added are T-482A/B/C for the Condensate Pump coolers and T-491A/B/C/D for the VFD cooling water lines.

3.4 Description of SWS Design Changes

The design changes made to the SWS are as follows: changes to SWS piping and equipment sizing, and changes to SWS pump and cooling tower water / air flow parameters.

3.4.1 Increase in SWS Water Flow Rates

The SWS water flow rate per train has been increased to maintain the SWS return temperature from the CCS heat exchanger to the cooling tower below 120°F under design heat load conditions. This limit is set to limit long-term degradation of the tower fill material. The SWS flow rate must be increased to 10,500 gpm per train to meet this requirement for the highest SWS heat duty (3.46×10^8 Btu/h). This load occurs 4 hours after reactor shutdown, at the beginning of RNS cooldown. Both SWS cooling tower cells are in operation at this time.

3.4.2 Changes to SWS Piping and Equipment Sizing

Several changes to SWS pipeline sizes have been made. Associated valves in the pipelines affected have also been resized. The increased heat duty of the system and the increased SWS water flow rate described above require increases in the size of SWS piping on the discharge side of the SWS pumps through the CCS heat exchangers, to limit flow velocity and reduce dynamic pressure losses in the system. The SWS cooling tower bypass lines have been increased in size to provide capability to bypass full system flow. Cross-connections between trains have also been increased to match the size changes in the main SWS headers.

The SWS makeup lines to the cooling tower basins have been increased in size to provide increased makeup flow rates required by the increased cooling tower design heat duty. The SWS basin size has been increased, consistent with increased cooling tower heat duty. The in-line strainers in each SWS pumping train upstream of the CCS heat exchangers have been increased in size to handle the increased system flow rates.

3.4.3 Changes to SWS Pump Parameters and SWS Cooling Tower Fan Size

The design head and flow for the SWS pumps has been increased to 10,500 gpm at 125 feet developed head. As a result of this change, the diesel generator loading requirements for the SWS pumps have been increased from 350 hp to 500 hp.

3.4.4 Minimum Shutdown Cooling and Spent Fuel Cooling Case

The minimum shutdown cooling and spent fuel cooling mode of operation of the combined CCS and SWS has been reevaluated with the changes made to the system, to verify that all performance requirements in this mode can be met by the operation of only one train of SWS and CCS equipment at 1% exceedence wet bulb temperature conditions. A single-train CCS system flow rate of 8300 gpm (assuming flow to one RNS HX and one SFS HX, in addition to other equipment cooled by the CCS) and a single-train SWS flow rate of 10,000 gpm are sufficient to transfer the minimum shutdown cooling case heat load of 1.70×10^8 Btu/h. The minimum required CCS HX UA for this case is 1.4×10^7 Btu/hr-°F (10% reduction in HX design UA).

4.0 DCD MARK-UP

Specific changes to the AP1000 Design Control Document that reflect the results of CCS and SWS design changes discussed herein are listed below. Markups of the affected sections of the DCD are provided in the pages that follow.

Tier 1:

- ITAAC Table 2.3.1-2, changes to minimum CCS heat exchanger UA and flow rates to reflect revisions to the minimum shutdown cooling case parameters for the system.
- ITAAC Table 2.3.8-2, changes to minimum SWS flow rate, heat load, 1% exceedence wet bulb temperature, and cold water temperature to reflect revisions to the minimum shutdown cooling case parameters for the system.

Tier 2:

- Table 8.3.1-1 & -2, changes to diesel loads for SWS and CCS components.
- Table 9.1.3-1, change to CCS pressure for SFS HX.
- Section 9.2.2.3.4, change to CCS design pressure.
- Table 9.2.1-1 changes to SWS operating mode conditions.
- Table 9.2.1-2 changes to CCS pump and heat exchanger parameters.
- Table 9.3.6-2, change to design pressure for CVS Letdown HX shell side.
- Table 11.2-2, change to design pressure for WLS RCDT HX shell side.
- Table 16.3-2, change to SWS flow requirement.
- Figure 9.2.1-1, changes to SWS piping diagram.
- Figures 9.2.2-2 (sheets 1 through 5) changes to CCS piping diagrams.

TIER 1

CHAPTER 2
INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC)

Table 2.3.1-2
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CCS is as described in the Design Description of this Section 2.3.1.	Inspection of the as-built system will be performed.	The as-built CCS conforms with the functional arrangement described in the Design Description of this Section 2.3.1.
2. The CCS preserves containment integrity by isolation of the CCS lines penetrating the containment.	See Tier 1 Material, Table 2.2.1-3, items 1 and 7.	See Tier 1 Material, Table 2.2.1-3, items 1 and 7.
3. The CCS provides the nonsafety-related functions of transferring heat from the RNS during shutdown and the spent fuel pool cooling system during all modes of operation to the SWS.	i) Inspection will be performed for the existence of a report that determines the heat transfer capability of the CCS heat exchangers.	i) A report exists and concludes that the UA of each CCS heat exchanger is greater than or equal to 14.0million Btu/hr-°F.
	ii) Testing will be performed to confirm that the CCS can provide cooling water to the RNS HXs while providing cooling water to the SFS HXs.	ii) Each pump of the CCS can provide at least 2685 gpm of cooling water to one RNS HX and at least 1200 gpm of cooling water to one SFS HX while providing at least 4415 gpm to other users of cooling water.
4. Controls exist in the MCR to cause the pumps identified in Table 2.3.1-1 to perform the listed functions.	Testing will be performed to actuate the pumps identified in Table 2.3.1-1 using controls in the MCR.	Controls in the MCR operate to cause pumps listed in Table 2.3.1-1 to perform the listed functions.
5. Displays of the parameters identified in Table 2.3.1-1 can be retrieved in the MCR.	Inspection will be performed for retrievability of the parameters in the MCR.	Displays identified in Table 2.3.1-1 can be retrieved in the MCR.

Table 2.3.8-2
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SWS is as described in the Design Description of this Section 2.3.8.	Inspection of the as-built system will be performed.	The as-built SWS conforms with the functional arrangement as described in the Design Description of this Section 2.3.8.

2. The SWS provides the nonsafety-related function of transferring heat from the component cooling water system to the surrounding atmosphere to support plant shutdown and spent fuel pool cooling.	i) Testing will be performed to confirm that the SWS can provide cooling water to the CCS heat exchangers. ii) Inspection will be performed for the existence of a report that determines the heat transfer capability of each cooling tower cell.	i) Each SWS pump can provide at least 10000 gpm of cooling water through its CCS heat exchanger. ii) A report exists and concludes that the heat transfer rate of each cooling tower cell is greater than or equal to 170 million Btu/hr at a 80.1°F ambient wet bulb temperature and a cold water temperature of 90°F.
3. Controls exist in the MCR to cause the components identified in Table 2.3.8-1 to perform the listed function.	Testing will be performed on the components in Table 2.3.8-1 using controls in the MCR.	Controls in the MCR operate to cause the components listed in Table 2.3.8-1 to perform the listed functions.
4. Displays of the parameters identified in Table 2.3.8-1 can be retrieved in the MCR.	Inspection will be performed for retrievability of parameters in the MCR.	The displays identified in Table 2.3.8-1 can be retrieved in the MCR.

TIER 2
CHAPTER 8
ELECTRIC POWER

Table 8.3.1-1 (Sheet 2 of 5)

ONSITE STANDBY DIESEL GENERATOR ZOS MG 02A NOMINAL LOADS

Automatic Loads (Note 2)					
				Operating Load (kW) (Note 4)	
Item No.	**Time Seq. (sec)**	**Event or Load Description**	**Rating (hp/kW)**	**At Power (Note 10)**	**Shutdown (Note 10)**
17.	120	Diesel Oil Transfer Module Exhaust Fan A	0.5 hp	0.5	0.5
18.	120	D/G A Jacket Water Radiator Fan	25 hp	21	21
19.	120	Class 1E Div. A Regulating XFMR 1	45 kVA	15	15
20.	120	Class 1E Div. C Regulating XFMR 1	45 kVA	15	15
21.	120	Motor Operated Valves (Note 5)	-	-	-
22.	120	D/G A Fuel Oil Transfer Pump	3 hp	3	3
23.	120	D/G A Bldg Stdby Exhaust Fan 1A	3 hp	3	3
24.	120	D/G A Bldg Stdby Exhaust Fan 2A	3 hp	3	3
25.	120	D/G A Bldg Primary AHU MS 01A Fan	3 hp	3	3
26.	120	D/G A Fuel Oil Cooler Fan	2 hp	2	2
27.	140	Start-up Feed Water Pump A	800 hp	665	0
28.	160	Load Center Transformer EK13 (Note 9)	2500 kVA	7.5	7.5
29.	160	Aux Bldg Lighting Panel (Note 8)	60 kVA	15	15
30.	160	Fuel Oil Day Tank Vault Exhaust Fan A	0.5 hp	0.5	0.5
31.	160	Diesel Fuel Oil Transfer Heater A	90 kW	90	90
32.	160	Service Water Pump A	500 hp	350	350
33.	180	Service Water Cooling Tower Cell Fan A	175 hp	120	120
34.	200	Component Cooling Water Pump A	700 hp	500	500

Table 8.3.1-1 (Sheet 3 of 5)

ONSITE STANDBY DIESEL GENERATOR ZOS MG 02A NOMINAL LOADS

Automatic Loads (Note 2)

Item No.	Time Seq. (sec)	Event or Load Description	Rating (hp/kW)	Operating Load (kW) (Note 4)	
				At Power (Note 10)	Shutdown (Note 10)
35.	240	Normal Residual Heat Removal Pump A	200 hp	0	166
36.	240	RNS Pump Room Fan A	1.5 hp	0	1.5
37.	240	Annex Bldg Equipment Room Return/Exhaust Fan A (Note 12)	20 hp	17	17
38.	240	Annex Bldg Equipment Room AHU MS02A Fan (Note 12)	50 hp	42	42
39.	240	Annex Bldg Swgr Rm AHU MS 05A Fan (Note 12)	50 hp	42	42
40.	240	Annex Bldg Swgr Rm Ret/Exhaust Fan 06A (Note 12)	25 hp	21	21
41.	300	Non-1E Battery Charger EDS1-DC-1	117 kVA	88	88
42.	300	Non 1E Battery Room A Exhaust Fan	0.5 hp	0.5	0.5
43.	300	Containment Recirculation Fan A	150 hp	21	21
44.	360	Containment Recirculation Fan D	150 hp	21	21
45.	360	Non-1E Battery Charger EDS3-DC-1	117 kVA	88	88
46.	420	Div. A/C Class 1E Battery Room Exhaust Fan A	5 hp	5	5
		Total Automatically Sequenced Loads (kW)		**2469**	**1971.5**

Table 8.3.1-2 (Sheet 2 of 4)

ONSITE STANDBY DIESEL GENERATOR ZOS MG 02B NOMINAL LOADS

Automatic Loads (Note 2)

Item No.	Time Seq. (sec)	Event or Load Description	Rating (hp/kW)	Operating Load (kW) At Power (Note 10)	Operating Load (kW) Shutdown (Note 10)
19.	120	Class 1E Div. B Regulating XFMR 1	45 kVA	15	15
20.	120	Class 1E Div. D Regulating XFMR 1	45 kVA	15	15
21.	120	Motor Operated Valves (Note 5)	-	-	-
22.	120	D/G B Fuel Oil Transfer Pump	3 hp	3	3
23.	120	D/G B Bldg Stdby Exhaust Fan 1B	3 hp	3	3
24.	120	D/G B Bldg Stdby Exhaust Fan 2B	3 hp	3	3
25.	120	D/G B Bldg. Primary AHU MS 01B Fan	3 hp	3	3
26.	120	D/G B Fuel Oil Cooler Fan	2 hp	2	2
27.	140	Start-up Feed Water Pump B	800 hp	665	0
28.	160	Load Center Transformer EK23 (Note 9)	2500 kVA	7.5	7.5
29.	160	Aux Bldg Lighting Panel (Note 8)	60 kVA	15	15
30.	160	Fuel Oil Day Tank Vault Exhaust Fan B	0.5 hp	0.5	0.5
31.	160	Diesel Fuel Oil Transfer Heater B	90 kW	90	90
32.	160	Service Water Pump B	500 hp	350	350
33.	180	Service Water Cooling Tower Cell Fan B	175 hp	120	120
34.	180	Main Control Room AHU Supply Fan B	40 hp	34	34
35.	180	Main Control Room AHU Return Fan B	25 hp	21	21
36.	180	Div. B/D Class 1E Electrical Room AHU Supply Fan B	25 hp	21	21

Table 8.3.1-2 (Sheet 3 of 4)

ONSITE STANDBY DIESEL GENERATOR ZOS MG 02B NOMINAL LOADS

Automatic Loads (Note 2)					
Item No.	**Time Seq. (sec)**	**Event or Load Description**	**Rating (hp/kW)**	**Operating Load (kW)**	
				At Power (Note 10)	**Shutdown (Note 10)**
37.	180	Div B/D Class 1E Electrical Room Return Fan B	25 hp	21	21
38.	180	Div A/C Class 1E Electrical Room AHU Supply Fan C	40 hp	34	34
39.	180	Div A/C Class 1E Electrical Room Return Fan C	25 hp	21	21
40.	180	Air Cooled Chiller Pump 3	20 hp	17	17
41.	200	Component Cooling Water Pump B	700 hp	500	500
42.	220	Air Cooled Chiller 3	375 kW	375	375
43.	240	CVS Pump Room Fan B	1.5 hp	1.5	1.5
44.	300	Normal Residual Heat Removal Pump B	200 hp	0	166
45.	300	RNS Pump Room Fan B	1.5 hp	0	1.5
46.	300	Non-1E Battery Charger EDS2-DC-1	117 kVA	88	88
47.	300	Non-1E Battery Room B Exhaust Fan 09B	0.5 hp	0.5	0.5
48.	360	Containment Recirculation Fan B	150 hp	21	21
49.	360	Containment Recirculation Fan C	150 hp	21	21
50.	360	Non-1E Battery Charger EDS4-DC-1	117 kVA	88	88
51.	420	Div. B/D Class 1E Battery Room Exhaust Fan B	1.5 hp	1.5	1.5
52.	420	Instrument Air Compressor B	200 hp	166	166
		Total Automatically Sequenced Loads (kW)		**2870**	**2372.5**

TIER 2
CHAPTER 9
AUXILIARY SYSTEM

Table 9.1-3 (Sheet 1 of 2)

**COMPONENT DATA –
SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM**

Spent Fuel Pool Pump		
Number		2
Design pressure (psig)		150
Design temperature (°F)		250
Nominal flow (gallons/minute)		1200
Minimum flow to support normal cooling (gpm)		900
Material		Stainless Steel
Spent Fuel Pool Heat Exchangers		
Number		2
Type		Plate
Design heat transfer (Btu/hour)		14.75×10^6
Design capacity (Btu/hour-°F)		24.0×10^5
Minimum capacity to support normal cooling (Btu/hour-°F)		22.0×10^5
	Side 1	**Side 2**
Design pressure (psig)	200	150
Design temperature (°F)	250	250
Nominal flow (pounds/hour)	6.23×10^5	5.94×10^5
Inlet temperature (°F), typ.	89.5	120
Outlet temperature (°F), typ.	113.3	95.1
Fluid circulated	Component cooling water	Spent fuel pool water
Material	Stainless steel	Stainless steel
Spent Fuel Pool Demineralizers		
Number		2
Design pressure (psig)		150
Design temperature (°F)		200
Nominal flow (gallons/minute)		250
Nominal resin volume (cubic feet)		75
Material		Stainless steel

9.2.2.3.4 *Component Cooling Water System Valves*

Most of the valves in the component cooling water system are manual valves used to isolate cooling flow from components for which cooling is not required in a given plant operating mode.

Three motor operated isolations valves and a check valve provide containment isolation for the supply and return component cooling water system lines that penetrate the containment barrier. The motor-operated valves are normally open and are closed upon receipt of a safety injection signal. They are controlled from the main control room and fail as-is.

A motor operated isolation valve is located in the component cooling water discharge line from each reactor coolant pump. These valves, which are normally open, are closed on a high component cooling water flow signal. High flow in the component cooling water discharge line indicates significant reactor coolant leakage from the pump cooling coils or thermal barrier into the component cooling water system. Closing these valves prevents radioactive reactor coolant flow through the component cooling water system.

Relief valves are provided in the cooling water outlet line from each reactor coolant pump. These valves are sized to protect the pump motor cooling jacket (design pressure 200 psig) and the component cooling water piping in the event of a tube rupture in the pump motor cooling coil or thermal barrier. A relief valve in the cooling water outlet line from the letdown heat exchanger also protects the component cooling water piping in the event of a tube rupture in the heat exchanger. Small relief valves are included in the cooling water outlet line from the other components to relieve the volumetric expansion which occurs if the cooling water lines to the component are isolated and the water temperature rises.

Table 9.2.1-1

NOMINAL SERVICE WATER FLOWS AND HEAT LOADS AT DIFFERENT OPERATING MODES

	CCS Pumps and Heat Exchangers	**SWS Pumps and Cooling Tower Cells (Number Normally is Service)**	**Flow (gpm)**	**Heat Transferred (Btu/hr)**
Normal Operation (Full Load)	1	1	10,500	103×10^6
Cooldown	2	2	21,000	346×10^6 (173×10^6 per cell)
Refueling (Full Core Offload)	1	1	10,500	74.9×10^6
Plant Startup	2	2	21,000	75.8×10^6
Minimum to Support Shutdown Cooling and Spent Fuel Cooling	1	1	10,000	170×10^6

Table 9.2.2-1

NOMINAL COMPONENT DATA - COMPONENT COOLING WATER SYSTEM

CCS Pumps (all data is per pump)	
Quantity	2
Type	Horizontal centrifugal
Minimum capacity (gpm, each) to support shutdown cooling and spent fuel pool cooling	8300
Design capacity (gpm, each)	9500
Design total differential head (ft)	250
CCS Heat Exchangers (all data is per exchanger)	
Quantity	2
Type	Plate
Design duty end of cooldown (MBtu/hr)	44.1
Minimum UA (MBtu/hr/°F) to support shutdown cooling and spent fuel pool cooling	14.0
Design UA (MBtu/hr/°F)	15.5
CCS side Design flow rate (gpm)	 9629
Service water side Design flow rate (gpm)	 10500
Plate material	Austenitic stainless steel
Seismic design	Non-seismic

Table 9.3.6-2 (Sheet 1 of 3)

CHEMICAL AND VOLUME CONTROL SYSTEM
NOMINAL EQUIPMENT DESIGN PARAMETERS

Pumps

Makeup Pumps

Number	2
Type	Multistage horizontal centrifugal
Design pressure (psig)	3,100
Design flow (gpm)	140
Material	Stainless Steel (SS)

Heat Exchangers

Regenerative Heat Exchanger

Number	1
Type	Counterflow

	Shell Side	Tube Side
Design pressure (psig)	3,100	3,100
Design temperature (°F)	600	650
Design flow (lb/hr)	41,580	49,710
Material	SS	SS

Letdown Heat Exchanger

Number	1
Type	U-Tube

	Shell Side	Tube Side
Design pressure (psig)	200	3,100
Design temperature (°F)	200	650
Design flow (lb/hr)	224,034	49,710
Material	Carbon Steel	SS

TIER 2
CHAPTER 11
RADIOACTIVE WASTE MANAGEMENT

Table 11.2-2 (Sheet 4 of 7)

COMPONENT DATA – LIQUID RADWASTE SYSTEM

Heat Exchangers	
Reactor Coolant drain tank heat exchanger	
Number	1
Type	Horizontal U-tube
Design pressure (psig)	150 tubeside, 200 shellside
Design temperature (°F)	250 tubeside, 200 shellside
Design flow (lb/hr)	48,700 tubeside, 62,200 shellside
Heat Transfer Design Case	
Temperature inlet (°F)	175 tubeside, 95 shellside
Temperature outlet (°F)	143 tubeside, 120 shellside
Material	SS tubeside, CS shellside
Vapor condenser	
Number	1
Type	Horizontal U-tube
Design pressure (psig)	150
Design temperature (°F)	150
Design flow (lb/hr)	100,000 tubeside, 1700 shellside
Heat Transfer Design Case	
Temperature inlet (°F)	45 tubeside, 84 shellside
Temperature outlet (°F)	63 tubeside, 60 shellside
Material	SS

TIER 2
CHAPTER 16
TECHNICAL SPECIFICATIONS

Table 16.3-2 (Cont.)

INVESTMENT PROTECTION SHORT-TERM AVAILABILITY CONTROLS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	2.4.1	Verify that one SWS pump is operating and that each SWS pump operating individually provides a SWS flow > 10000 gpm	Within 1 day prior to entering the MODES of applicability
SR	2.4.2	Operate each cooling tower fan for > 15 min	Within 1 day prior to entering the MODES of applicability

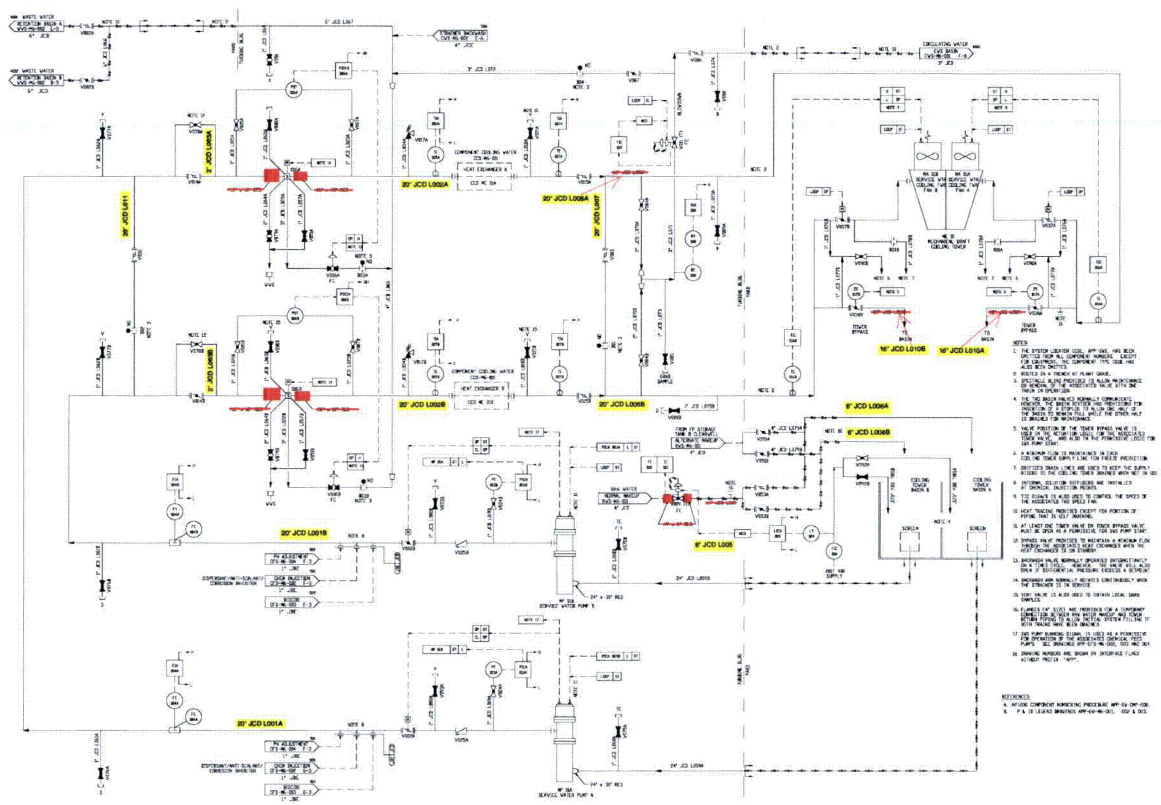
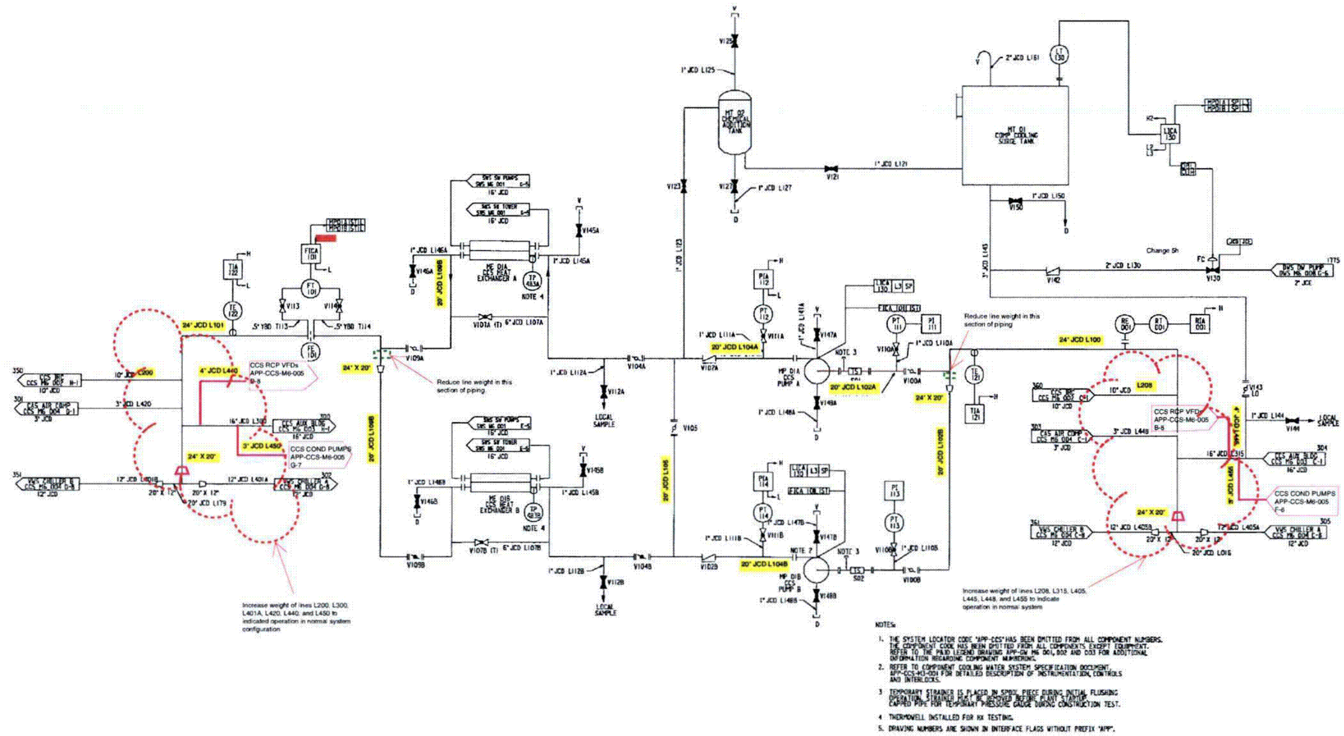


Figure 9.2.1-1

Service Water System
Piping and Instrumentation Diagram
(REF) SWS001



Inside Turbine Building

Figure 9.2.2-2 (Sheet 1 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram
(REF CCS 001)

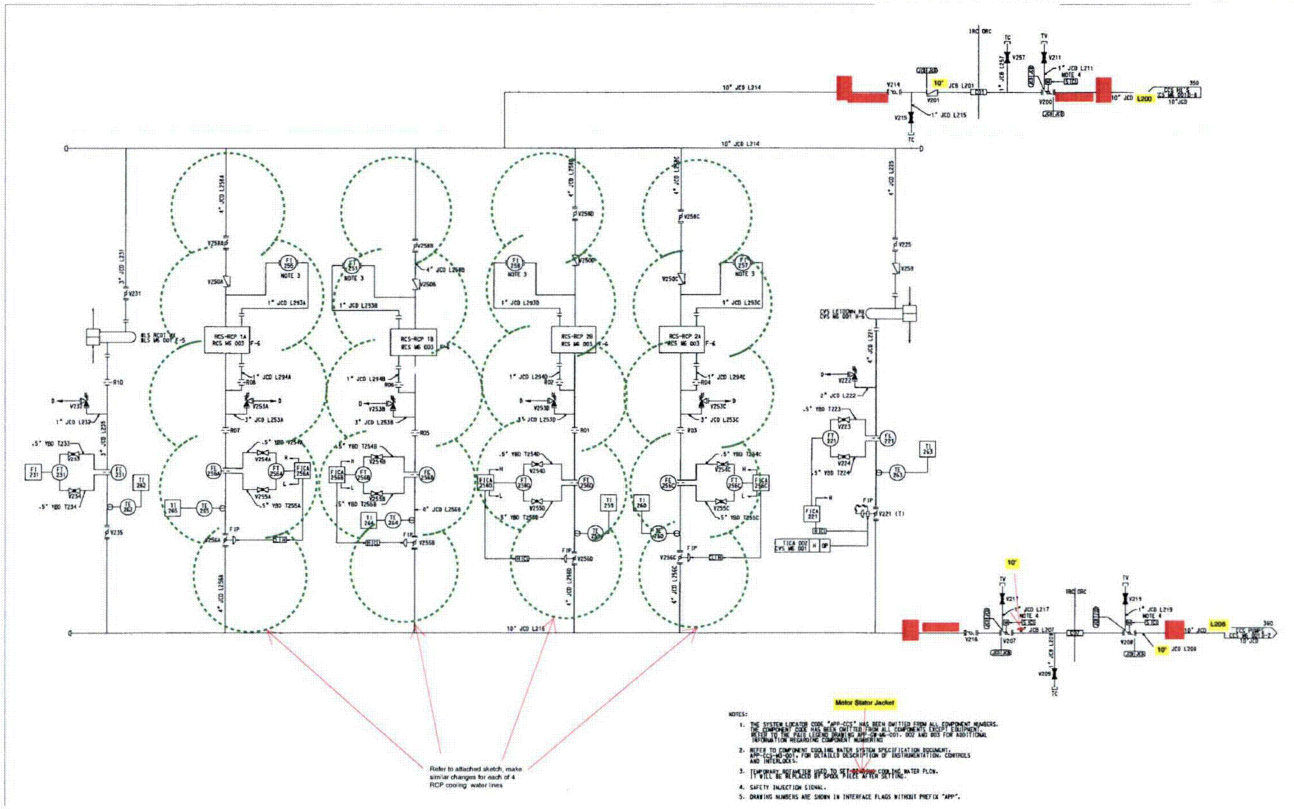
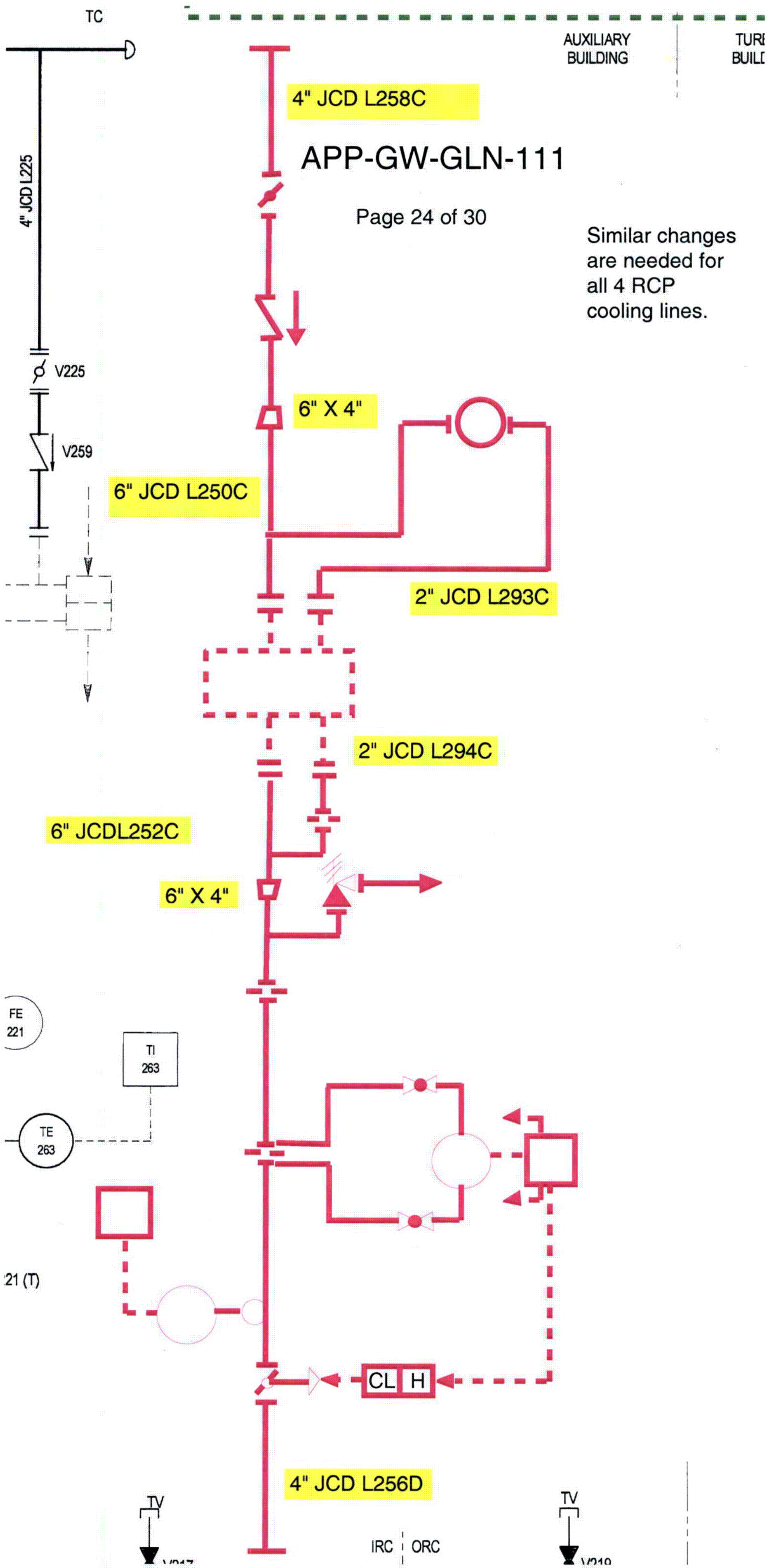


Figure 9.2.2-2 (Sheet 2 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram
(REF) CCS 002

Similar changes are needed for all 4 RCP cooling lines.



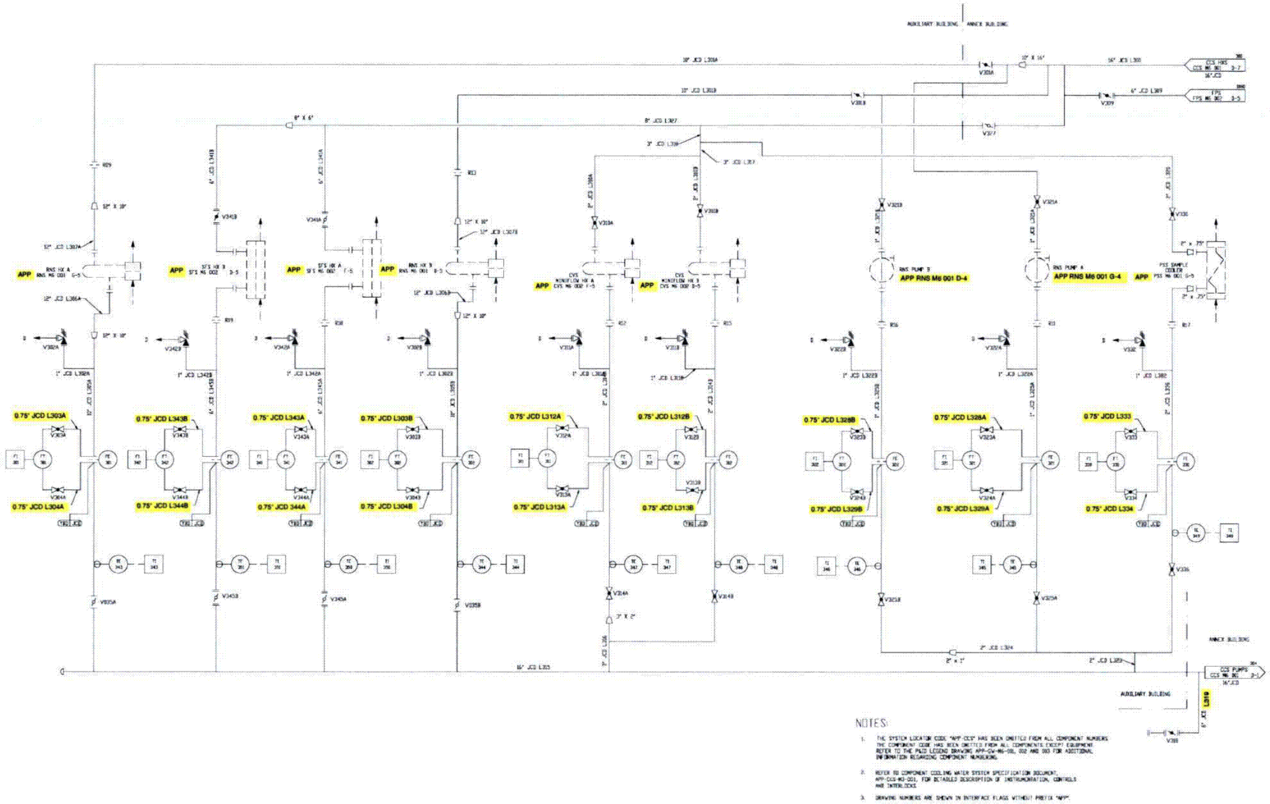
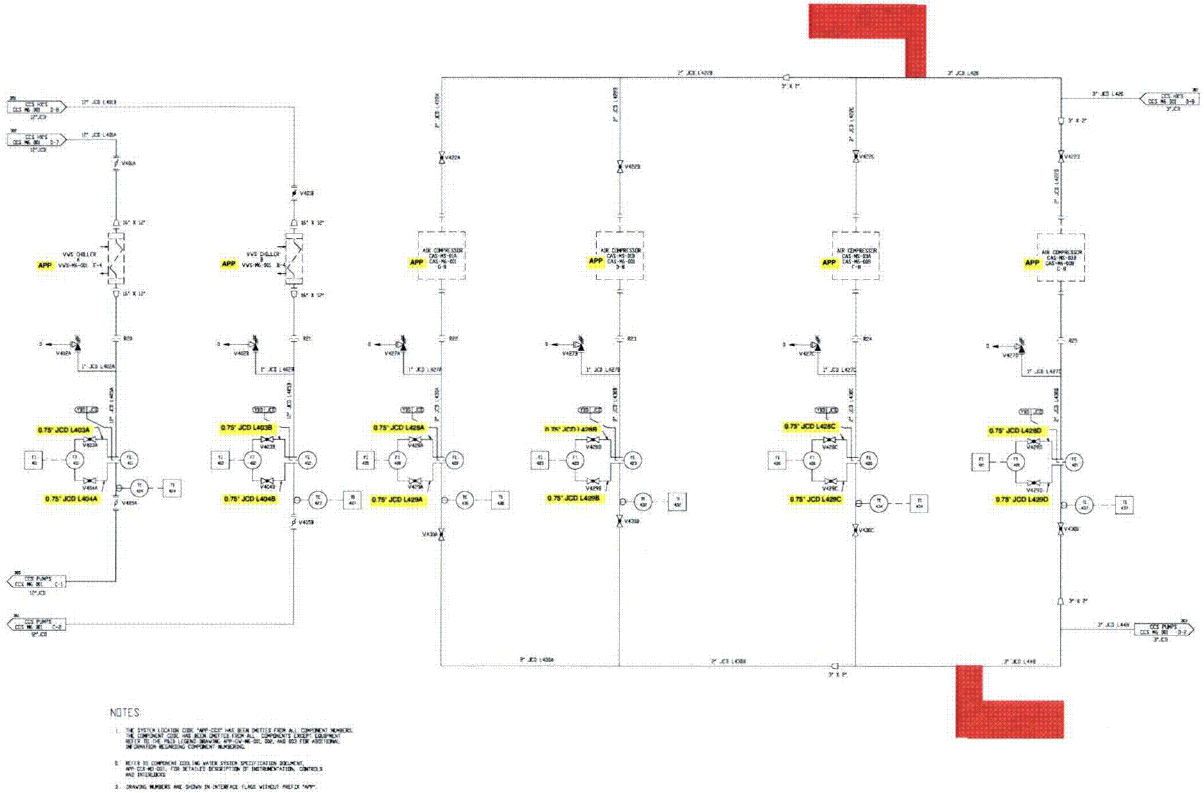


Figure 9.2.2-2 (Sheet 3 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram
(REF) CCS 003



Inside Turbine Building

Figure 9.2.2-2 (Sheet 4 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram
(REF) CCS 004

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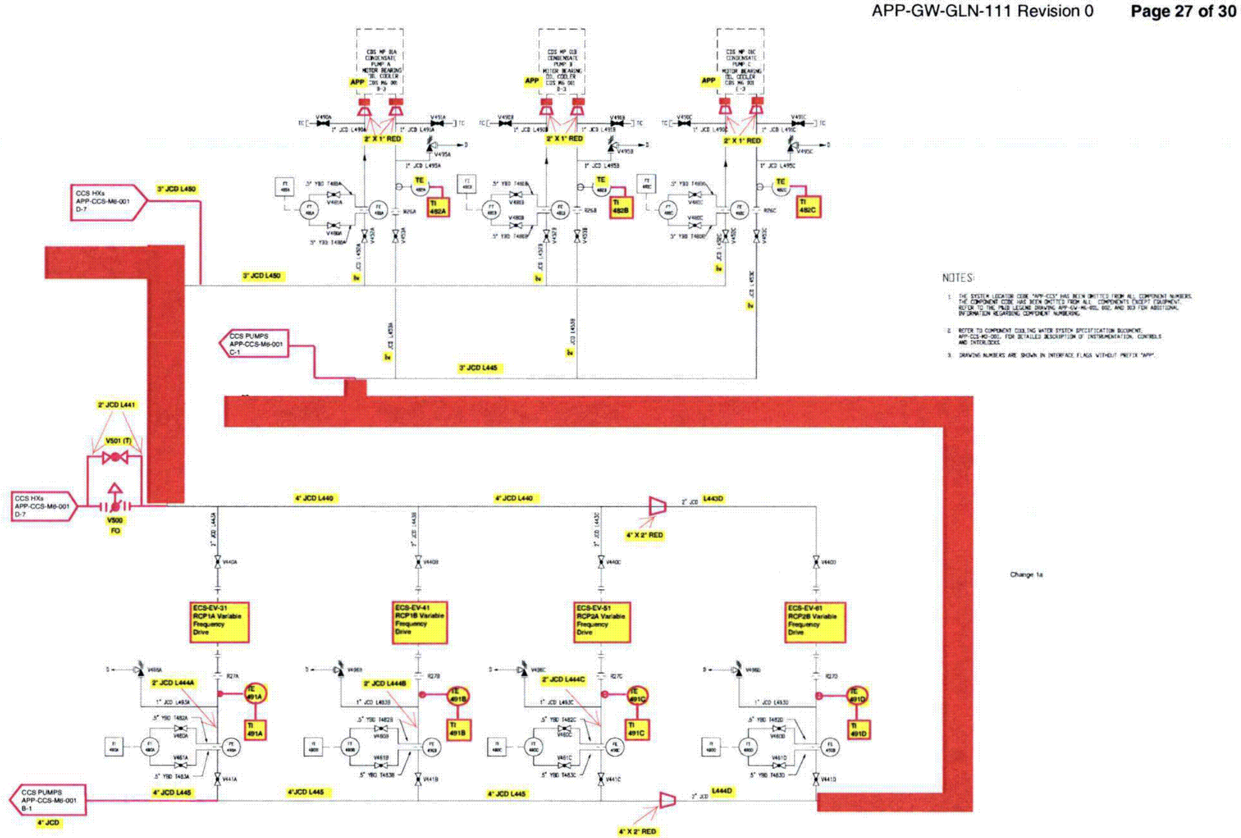

Inside Turbine Building

Figure 9.2.2-2 (Sheet 5 of 5)

Component Cooling Water System
Piping and Instrumentation Diagram
(REF) CCS 005

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

   There is no change to a design function of any safety related equipment.

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 change to these particular CCS and SWS parameters has no effect on operation of the reactor coolant system. The changes have no effect on the initiation or operation of the passive core cooling system.

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 changes to CCS and SWS parameters do 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 changes do 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
These particular changes to CCS and SWS parameters produce no new accident initiators and no effect on the frequency of evaluated accidents.	
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

	These particular changes to CCS and SWS parameters have no effect on malfunctions of structures, systems, or components. The operating conditions for the reactor coolant system and passive core cooling system are not altered.	
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
	The change in CCS and SWS parameters has no effect on 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 change in CCS and SWS parameters has no effect on the design functions or reliability of the safety related equipment or other components and operation of the passive core cooling system. 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 change to these particular CCS and SWS parameters has no effect on the operation, performance, and pressure boundary integrity of the plant equipment. The response of the safety related equipment and the passive core cooling system to postulated accident conditions is not altered by the design changes. 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
	The design changes have no effect on the design functions of the safety related equipment or operation of the passive core cooling system. 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 change in CCS and SWS parameters is provided to support design configurations that may be necessary depending on site specific data and Utility requirements. There is no change to any methodologies used within the DCD. There are no effects of the design changes on the structural analysis or turbine generated missile analysis.	
☒	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 the CCS and SWS parameters.	
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
3. Is there is a substantial increase in the consequences to the public of a particular severe accident previously reviewed?	☐ YES ☐ NO ☒ N/A
☒ 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

The change in CCS and SWS parameters 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; therefore, the system design changes do not have an adverse impact on the security assessment of the AP1000.

6.0 REFERENCES

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