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July 13, 2010

Subject: Submittal of APP-GW-GLE-002 Revision 7 – "Impacts to the AP1000™ to Address Generic Safety Issue (GSI) - 191"

In support of Combined License application pre-application activities, Westinghouse is submitting the Non-Proprietary version of document APP-GW-GLE-002 Revision 7, "Impacts to the AP1000™ to Address Generic Safety Issue (GSI) – 191". The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Questions or requests for additional information related to the content and preparation of this document 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.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Strategy

/Enclosures

1. APP-GW-GLE-002 Revision 7 – "Impacts to the AP1000™ to Address Generic Safety Issue (GSI) - 191"

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ENCLOSURE 1

APP-GW-GLE-002 Revision 7

"Impacts to the AP1000™ to Address Generic Safety Issue (GSI) - 191"

TABLE OF CONTENTS

RECORD OF REVISIONS

Revision No.	Description of Changes
0	Original Issue
1	DCD changes not captured herein. DCD changes included in this revision were incorporated into DCD, Revision 17.
2	Changes made to some DCD sections based upon Design Change Proposals APP-GW-GEE-797 and APP-GW-GEE-798.
3	Changes made to ITAAC for screen mesh size.
4	APP-GW-GLE-002: Section I. Technical Description The word "engineered" was deleted in describing "engineered components." The sentence now refers to "components". Changes made to various DCD Revision 17 sections based upon Design Change Proposal APP-GW-GEE-1072 for coatings. Tier 2, Section 6.1.2.1.2 was changed to delete inorganic zinc with an epoxy topcoat. Tier, 2, Section 6.1.2.1.5 was changed to remove "specific gravity > 1.05" and replace with "density $\geq$ 100 lbm/ft^3." Other wording changes incorporated with a dry film density requirement of $\geq$ 100 lbm/ft^3. Changes use of inorganic zinc (IOZ) coating on OEM Mechanical Components from Coating Service Level II to Coating Service Level I. Tier 2, Section 6.3.2.2.7.1 changes regarding suitable equivalent insulation. Changes regarding signs/tags and use of them inside enclosures where there is insufficient water flow to transport. Specify that signs and tags must be made of a material that has density $\geq$ 100 lbm/ft^3. Defines ZOI for epoxy and inorganic zinc coatings and amount of debris available for transport following a LOCA. Also discusses the maximum flow rates during recirculation for testing purposes.
5	Numerous changes related to Design Change Proposal APP-GW-GEE-1145 for the addition of a third IRWST screen and the addition of a cross-connect pipe between all IRWST screens. These are changes to DCD, Revision 17, Tier 1: Table 2.2.3-1, Figure 2.2.3-1, Table 2.2.3-2, Table 2.2.3-4, Table 2.2.3-5, and Table 3.7-1. Also there are changes to Tier 2: Section 3.4.1.2.2.1, Table 3.2-3, Section 6.3.2.2.7.2, Section 6.3.2.2.7.3, Section 6.3.2.2.8.9, Table 6.3-2, Figure 6.3-2, Figure 6.3-6, and Table 17.4-1. Additional DCD mark-ups are included in Revision 5 of this document. Those mark-ups include wording changes in Tier 2, Sections 6.1.2.1.2 and 6.1.2.1.5 for clarification. Wording changes were made in Tier 2, Section 6.3.2.2.7.1, Item 11 to clarify the discussion on high-density and light-density coatings. The flow rates in Item 12 of this subsection were revised according to knowledge obtained from current analyses and testing.

Document Number: APP-GW-GLE-002 **Revision Number:** 7

Title: Impacts to the AP1000 DCD to Address Generic Safety Issue (GSI)-191

Revision No.	Description of Changes
6	Change to DCD Tier 1, Figure 2.2.3-1 to correct valve labels. Change to DCD Tier 2, Section 6.1.3.2 in regards to Service Level II coatings (RAI-SRP6.1.2-CIB1-01). Changes to DCD Tier 2, Section 6.3.2.2.7.1 related to: • Change to zone of influence (ZOI) for inorganic zinc coatings based upon discussions with NRC staff, • LOCA-generated coatings debris load (response RAI-SRP6.2.2-SPCV-25-R0), • Chemical precipitate loading (response RAI-SRP6.2.2-SPCV-30-R0), • And discussion of screen design flows and RNS operation (responses RAI-SRP6.2.2-SPCV-26-R1 and RAI-SRP6.2.2-SPCV-28-R1).
7	Add RAI-SRP6.2.2-SPCV-13, Rev. 1 to the RAI list in Section I – Technical Description. A change to DCD Tier 2, Section 6.3.2.2.7.1 was previously made in APP-GW-GLE-002, Rev. 2 to add the flood-up water elevation in this section, however the RAI was never included as a reference. Changes to DCD Tier 2, Section 6.1.3.2 are made related to RAI-SRP6.1.2-CIB1-01, Rev. 0. The size of the zone of influence for inorganic zinc coatings was changed from 5D to 10D in Tier 2, Section 6.3.2.2.7.1, Item 12 in APP-GW-GLE-002, Rev. 6. The reference for this change is now stated as RAI-SRP6.2.2-CIB1-30, Rev. 0. DCD Tier 2, Section 6.3.2.2.7.1, Item 12 will be updated based upon the coatings debris (from within the ZOI) information discussed in RAI-SRP6.2.2-SPCV-25, Rev.1. DCD Tier 2, Section 6.3.2.2.7.1, Item 3 is changed to state the language in use by DCD Revision 17 (refer to RAI-SRP6.2.2-SPCV-32, Rev. 0). This undoes a mark-up to this paragraph previously shown in Revision 5 of APP-GW-GLE-002. The formatting of the document was changed on the pages with the Table of Contents and the Record of Revisions. The document header was changed to match the headers on all subsequent pages.

Brief Description of the Impact (what is being changed and why):
The AP1000™ Design Control Document, Revision 17, (Tier 1 and Tier 2) is being amended to address Nuclear Regulatory Commission (NRC) Generic Letter 2004-02, in accordance with the responses to Requests for Additional Information (RAIs) from the NRC.

SRP Section Impacted:
Refer to DCD mark-ups listed in Section V of this document.

This evaluation is prepared to document the Design Control Document (DCD) changes described above. The DCD change is a departure from Tier 1 and Tier 2 information of the AP1000 DCD Revision 17. Changes that were implemented in Revision 17 of the DCD were included in APP-GW-GLE-002, Rev. 1. The changes identified in this document are intended to be included in a revision to the DCD and in the review of the Design Certification amendment or included as generic information in plant specific FSARs. Changes to Tier 1 and Tier 2 information require review and approval by the NRC.

I. TECHNICAL DESCRIPTION

The DCD Tier 1 and Tier 2 information needs to be updated to clarify specifications on the required application and use of high density safety grade coatings on components, use of Metal Reflective Insulation (MRI) or equivalent within postulated Loss of Coolant Accident (LOCA) Zones of Influence, In-containment Refueling Water Storage Tank (IRWST) and containment recirculation screen mesh sizes, allowable aluminum content, physical property restrictions on miscellaneous materials associated with signs, tags, and tape, and magnitude and type of debris loading. The following list of RAIs are the driving factor behind the DCD Tier 1 and Tier 2 revisions delineated in this document:

	NRC RAI Number	APP-GW-GLE-002 Revision Number that Relates to the RAI
1.	RAI-SRP6.2.2-SPCV-13, Rev. 1	Revision 2
2.	RAI-SRP6.2.2-SPCV-19	Revision(s) 2, 3
3.	RAI-SRP6.2.2-SPCV-17	Revision(s) 2, 3
4.	RAI-SRP6.2.2-SPCV-12	Revision(s) 2, 3
5.	RAI-SRP6.2.2-CIB1-22	Revision(s) 2, 3
6.	RAI-SRP6.2.2-CIB1-21	Revision(s) 2, 3
7.	RAI-SRP6.2.2-CIB1-20	Revision(s) 2, 3
8.	RAI-SRP6.2.2-SRSB-05	Revision(s) 2, 3
9.	RAI-SRP6.2.2-SPCV-22	Revision 4
10.	RAI-SRP6.2.2-SPCV-24	Revision 4
11.	RAI-SRP6.2.2-CIB1-24	Revision 4
12.	RAI-SRP6.2.2-SRSB-16	Revision 4
13.	RAI-SRP6.2.2-SRSB-23	Revision 4
14.	RAI-SRP6.2.2-SPCV-25	Revision 6
15.	RAI-SRP6.2.2-SPCV-26	Revision 6
16.	RAI-SRP6.2.2-SPCV-28	Revision 6
17.	RAI-SRP6.2.2-SPCV-30	Revision 6
18.	RAI-SRP6.1.2-CIB1-01	Revision(s) 6, 7
19.	RAI-SRP6.2.2-CIB1-30	Revision 6
20.	RAI-SRP6.2.2-SPCV-32	Revision 7
21.	RAI-SRP6.2.2-SPCV-25, Rev. 1	Revision 7

Additional DCD changes were made based upon discussions with the NRC. These DCD changes were implemented in Revision 5 of this document and include changes to clarify wording of some DCD sections.

II. CHANGE JUSTIFICATION

The change is made to address the industry issue of sump screen blockage and emergency core cooling performance. Westinghouse and the NRC have previously communicated and agreed to the approach Westinghouse is taking for closure of Generic Safety Issue-191 with the guidance of the NRC. This report represents one piece of the entire plan to confirm AP1000's compliance with GL-2004-02 (Reference 2).

III. REGULATORY IMPACT

A. EVALUATION OF DEPARTURE FROM TIER 1 & 2 INFORMATION (Check correct response and provide justification for that determination under each response)

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. These questions are addressed here to provide an evaluation of the regulatory impact. Regardless of the answers to these questions these changes are being provided to the NRC for review and approval as part of the design certification amendment. Also changes to Tier 1 require NRC review and approval. The questions below address the criteria of B.5.b.0

1. Does the proposed departure result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

2. Does the proposed departure 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

3. Does the proposed departure Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD? ☐ YES ☒ NO

4. Does the proposed departure 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

5. Does the proposed departure create a possibility for an accident of a different type from any evaluated previously in the plant-specific DCD? ☐ YES ☒ NO

6. Does the proposed departure 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

7. Does the proposed departure result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered? ☐ YES ☒ NO

8. Does the proposed departure result in a departure from a method of evaluation described in the plant-specific DCD for establishing the design bases or safety analyses? ☐ YES ☒ NO

B. 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 to features that mitigate severe accidents? If the answer is Yes, answer Questions 2 and 3 below. ☐ YES ☒ NO

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

C. SECURITY ASSESSMENT

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

D. OTHER REGULATORY CRITERIA

Further guidance for this change is found in Regulatory Guide 1.82, Revision 3, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident" (Reference 1).

IV. REFERENCES

1. "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident", Regulatory Guide 1.82, Revision 3, ML033140347, United States Nuclear Regulatory Commission.
2. "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS", Generic Letter 2004-02 September 2004, ML042360586, United States Nuclear Regulatory Commission.
3. "AP1000 Verification of Water Sources for Long-Term Recirculation Cooling Following a LOCA", TR-026, APP-GW-GLR-079, Rev. 7, Westinghouse Electric Company LLC.
4. "AP1000 Containment Recirculation and IRWST Screen Design", TR-147, APP-GW-GLN-147, Rev. 3, Westinghouse Electric Company LLC.

V. DCD MARK-UP

Tier 1

DCD Tier 1 Mark-ups			DCD Mark-up Included in the following Revision of APP-GW-GLE-002
1.	*Table 2.2.3-1*		Revision 5
2.	*Figure 2.2.3-1*		Revision 5, 6
3.	*Table 2.2.3-2*		Revision 5
4.	*Table 2.2.3-4*		
	a.	*Item 5a-ii*	Revision 4
	b.	*Item 5a-iii*	Revision 4
	c.	*Item 8c-viii*	Revision 3, 5
	d.	*Item 8c-ix*	Revision(s) 2, 4
	e.	*Item 8c-x*	Revision(s) 2, 4, 5
5.	*Table 2.2.3-5*		Revision 5
6.	*Table 3.7-1*		Revision 5

Tier 2

DCD Tier 2 Mark-ups		DCD Mark-up Included in the following Revision of APP-GW-GLE-002
1.	*Table 3.2-3*	Revision 5
2.	*Section 6.1.1.4*	Revision 2
3.	*Section 6.1.2.1.1*	Revision 5
4.	*Section 6.1.2.1.2*	Revision(s) 4, 5
5.	*Section 6.1.2.1.5*	Revision(s) 2, 4, 5
6.	*Section 6.1.2.1.6*	Revision 2
7.	*Table 6.1-2*	Revision(s) 2, 4, 5
8.	*Section 6.1.3.2*	Revision(s) 6, 7
9.	*Section 6.3.2.2.7.1*	Revision(s) 2, 3, 4, 5, 6, 7
10.	*Section 6.3.2.2.7.2*	Revision(s) 2, 5
11.	*Section 6.3.2.2.7.3*	Revision(s) 2, 5
12.	*Table 6.3-2*	Revision 5
13.	*Figure 6.3-2*	Revision 5
14.	*Figure 6.3-6*	Change to a Note of the Figure in Revision 2. Multiple changes to the Figure in Revision 5.
15.	*Section 6.3.8.1*	Revision(s) 2, 4
16.	*Table 17.4-1*	Revision 5

AP1000 Design Control Document Revision 17
Tier 1 Changes

Description of DCD Changes *APP-GW-GLE-002 Rev #*

Justification for changes to Tier 1, Table 2.2.3-1: *Add new IRWST Screen C to the Table based upon addition of this screen to the AP1000 design, captured in Design Change Proposal APP-GW-GEE-1145.* *5*

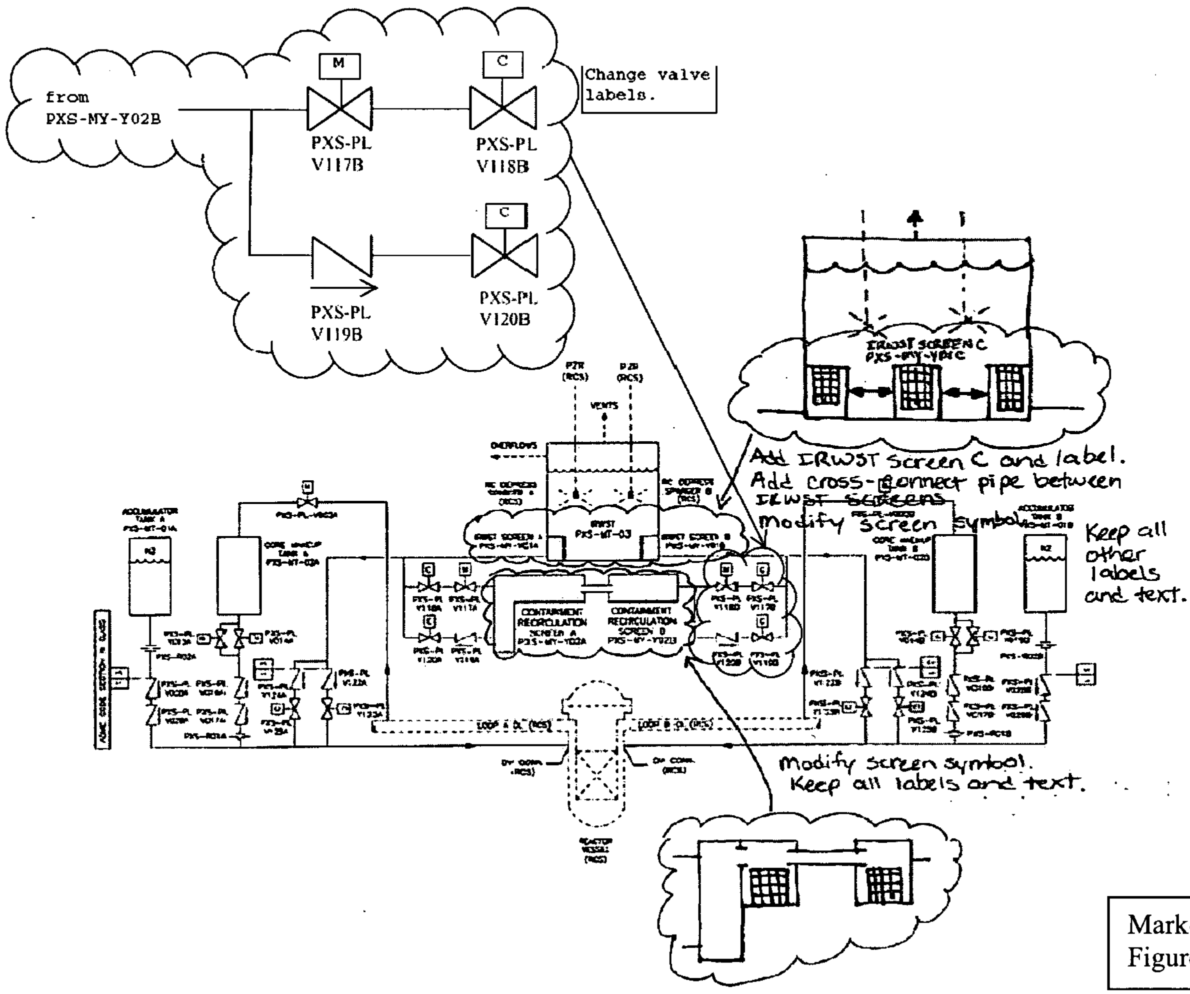
Table 2.2.3-1

Equipment Name	Tag No.	ASME Code Section III	Seismic Cat. I	Remotely Operated Valve	Class 1E/ Qual. Harsh Envir.	Safety-Related Display	Control PMS/ DAS	Active Function	Loss of Motive Power Position
Passive Residual Heat Removal Heat Exchanger (PRHR HX)	PXS-ME-01	Yes	Yes	-	- / -	-	- / -	-	-
Accumulator Tank A	PXS-MT-01A	Yes	Yes	-	- / -	-	- / -	-	-
Accumulator Tank B	PXS-MT-01B	Yes	Yes	-	- / -	-	- / -	-	-
Core Makeup Tank (CMT) A	PXS-MT-02A	Yes	Yes	-	- / -	-	- / -	-	-
CMT B	PXS-MT-02B	Yes	Yes	-	- / -	-	- / -	-	-
IRWST	PXS-MT-03	No	Yes	-	- / -	-	- / -	-	-
IRWST Screen A	PXS-MY-Y01A	No	Yes	-	- / -	-	- / -	-	-
IRWST Screen B	PXS-MY-Y01B	No	Yes	-	- / -	-	- / -	-	-
IRWST Screen C	PXS-MY-Y01C	No	Yes	-	-/-	-	-/-	-	-
Containment Recirculation Screen A	PXS-MY-Y02A	No	Yes	-	- / -	-	- / -	-	-

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to Tier 1, Figure 2.2.3-1: *Correct valve labels on Train B valves downstream of Containment Recirculation Sump Screen B. Valves were incorrectly labeled when Figure was rearranged in APP-GW-GLE-002, Revision 1.*	*6*
Justification for changes to Tier 1, Figure 2.2.3-1: *Add new IRWST Screen C and cross-connect piping between IRWST screens based upon changes in APP-GW-GEE-1145.*	*5*

Document Number: APP-GW-GLE-002 **Revision Number:** 7

Title: Impacts to the AP1000 DCD to Address Generic Safety Issue (GSI)-191



Mark-up to DCD Tier 1,
Figure 2.2.3-1

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to Tier 1, Table 2.2.3-2: *Add new cross-connect piping between IRWST screens based upon changes in APP-GW-GEE-1145.*	*5*

Table 2.2.3-2

Line Name	Line Number	ASME Code Section III	Leak Before Break	Functional Capability Required
CMT A inlet line from cold leg C and outlet line to reactor vessel direct vessel injection (DVI) nozzle A	RCS-L118A, PXS-L007A, PXS-L015A, PXS-L016A, PXS-L017A, PXS-L018A, PXS-L020A, PXS-L021A	Yes	Yes	Yes
	PXS-L019A, PXS-L070A	Yes	Yes	No
CMT B inlet line from cold leg D and outlet line to reactor vessel DVI nozzle B	RCS-L118B, PXS-L007B, PXS-L015B, PXS-L016B, PXS-L017B, PXS-L018B, PXS-L020B, PXS-L021B	Yes	Yes	Yes
	PXS-L019B, PXS-L070B	Yes	Yes	No
Accumulator A discharge line to DVI line A	PXS-L025A, PXS-L027A, PXS-L029A	Yes	Yes	Yes
Accumulator B discharge line to DVI line B	PXS-L025B, PXS-L027B, PXS-L029B	Yes	Yes	Yes
IRWST injection line A to DVI line A	PXS-L125A, PXS-L127A	Yes	Yes	Yes
	PXS-L123A, PXS-L124A, PXS-L118A, PXS-L117A, PXS-L116A, PXS-L112A	Yes	No	Yes
IRWST injection line B to DVI line B	PXS-L125B, PXS-L127B	Yes	Yes	Yes
	PXS-L123B, PXS-L124B, PXS-L118B, PXS-L117B, PXS-L116B, PXS-L114B, PXS-L112B, PXS-L120	Yes	No	Yes
IRWST Screen Cross-connect line	PXS-L180A, PXS-L180B	Yes	No	Yes

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to Tier 1, Table 2.2.3-4:	
Item 5a) ii) and iii): *To ensure that the screens are designed for the applicable requirements a design report is required for both the as designed screen and the as installed screen.*	*4*
Item 8c) viii: *To update the Table to reflect changes to the Acceptance Criteria for the IRWST screen frontal areas, since the third IRWST Screen (PXS-MY-Y01C) has a larger frontal area compared to IRWST Screens A and B.*	*5*
Item 8c) viii: *To ensure the IRWST and CR screens are constructed to prohibit debris greater than 0.0625" from transporting an ITAAC has been added to ensure the screen mesh size is ≤ 0.0625" for both the CR and IRWST screens*	*3*
Item 8c) ix: *To ensure that if insulation other than MRI is used in the specified location that a report exists and concludes that that insulation is a suitable equivalent. The DCD contains words that define the requirements for the report.*	*4*
Item 8c) ix: *To ensure no additional debris generation results from the maximum magnitude of jet impingements associated with an ASME Class 1 line break item ix was amended to include inspections of high density coatings used on components within the ZOI of the limiting line break. Also, tags and signs within the ZOI will also be inspected to ensure composition of said items will prohibit debris transport to the containment recirculation and IRWST screens.*	*2*
Item 8c) x: *Item x was amended to clarify the wording to be consistent with DCD Tier 2, Section 6.3.2.2.7.1 for caulking, signs, and tags.*	*5*
Item 8c) x: *Item x was amended to require inorganic zinc coatings used in specified locations to be safety – service level I. It was also amended to ensure materials used for tags, signs, etc. were of a sufficient density to ensure transport to the recirculation screens would not occur during a DBA. Additionally this section was amended to require a report to show that lighter weight caulking, signs or tags did not transport.*	*4*
Item 8c) x: *Item x was amended to ensure materials used for tags, signs, etc. were of a sufficient density to ensure transport to the recirculation screens would not occur during a DBA. Additionally this section was amended to ensure coatings on said components would be of a high density ≥ 100 lbm/ft^3 to prohibit transport to the screens in a DBA environment.*	*2*

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a) The components identified in Table 2.2.3-1 as ASME Code Section III retain their pressure boundary integrity at their design pressure.	A hydrostatic test will be performed on the components required by the ASME Code Section III to be hydrostatically tested.	A report exists and concludes that the results of the hydrostatic test of the components identified in Table 2.2.3-1 as ASME Code Section III conform with the requirements of the ASME Code Section III.
4.b) The piping identified in Table 2.2.3-2 as ASME Code Section III retains its pressure boundary integrity at its design pressure.	A hydrostatic test will be performed on the piping required by the ASME Code Section III to be hydrostatically tested.	A report exists and concludes that the results of the hydrostatic test of the piping identified in Table 2.2.3-2 as ASME Code Section III conform with the requirements of the ASME Code Section III.
5.a) The seismic Category I equipment identified in Table 2.2.3-1 can withstand seismic design basis loads without loss of safety function.	i) Inspection will be performed to verify that the seismic Category I equipment and valves identified in Table 2.2.3-1 are located on the Nuclear Island.	i) The seismic Category I equipment identified in Table 2.2.3-1 is located on the Nuclear Island.
	ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis dynamic loads without loss of safety function. For the PXS containment recirculation and IRWST screens, a report exists and concludes that the screens can withstand seismic dynamic loads and also post accident operating loads including head loss and debris weights.
	iii) Inspection will be performed for the existence of a report verifying that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions.	iii) A report exists and concludes that the as-installed equipment including anchorage is seismically bounded by the tested or analyzed conditions. For the PXS containment recirculation and IRWST screens, a report exists and concludes that the as-installed screens including their anchorage is bounded by the seismic loads and also post accident operating loads including head loss and debris weights.

Item 8c) sections shown on the following pages:

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	viii) Inspections of the IRWST and containment recirculation screens will be conducted. The inspections will include measurements of the pockets and the number of pockets used in each screen. The pocket frontal face area is based on a width times a height. The width is the distance between pocket centerlines for pockets located beside each other. The height is the distance between pocket centerlines for pockets located above each other. The pocket screen area is the total area of perforated plate inside each pocket; this area will be determined by inspection of the screen manufacturing drawings.	viii) The screens utilize pockets with a frontal face area of $\geq$ 6.2 in^2 and a screen surface area $\geq$ 140 in^2 per pocket. IRWST Screens A and B **each have** a sufficient number of pockets to provide a frontal face area $\geq$ 20 ft^2, a screen surface area $\geq$ 500 ft^2, and a screen mesh size $\leq$ 0.0625". IRWST Screen C has a sufficient number of pockets to provide a frontal face area $\geq$ 40 ft^2, a screen surface area $\geq$ 1000 ft^2, and a screen mesh size $\leq$ 0.0625". Each containment recirculation screen has a sufficient number of pockets to provide a frontal face area $\geq$ 105 ft^2, a screen surface area $\geq$ 2500 ft^2, and a screen mesh size $\leq$ 0.0625". A debris curb exists in front of the containment recirculation screens which is $\geq$ 2 ft above the loop compartment floor. The bottoms of the IRWST screens are located $\geq$ 6 in above the bottom of the IRWST.
	ix) Inspections will be conducted of the insulation used inside the containment on ASME Class 1 lines, the reactor vessel, reactor coolant pumps, pressurizer and the steam generators.	ix) The type of insulation used on these lines and equipment is a metal reflective type or a suitable equivalent. If an insulation other than metal reflective insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

	Inspections will be conducted of other insulation used inside the containment within the zone of influence.	The type of insulation used on these lines and equipment is a metal reflective type or a suitable equivalent. If an insulation other than metal reflective insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.
	Inspection will be conducted of other insulation below the maximum flood level of a design basis loss of coolant accident.	The type of insulation used on these lines is metal reflective insulation, jacketed fiberglass or a suitable equivalent. If an insulation other than metal reflective or jacketed fiberglass insulation is used, a report must exist and conclude that the insulation is a suitable equivalent.
	x) Inspections will be conducted of the as-built nonsafety-related coatings or of plant records of the nonsafety-related coatings used inside containment on walls, floors, ceilings, structural steel except in the CVS room. Inspections will be conducted of the as-built nonsafety-related coatings or of plant records of the nonsafety-related coatings used on components below the maximum flood level of a design basis loss of coolant accident or located above the max flood level and not inside cabinets or enclosures.	x) A report exists and concludes that the coatings used on these surfaces have a dry film density of ≥ 100 lb/ft^3. If a coating is used that has a lower dry film density, a report must exist and conclude that the coating will not transport. A report exists and concludes that inorganic zinc coatings used on these surfaces is safety – service level I.

Table 2.2.3-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

	Inspections will be conducted on caulking, tags and signs used inside containment below the maximum flood level of a design basis loss of coolant accident or located above the maximum flood level and not inside cabinets or enclosures.	A report exists and concludes that tags and signs used in these locations are made of steel or another metal with a density ≥ 100 lb/ft^3. In addition, a report exists and concludes that caulking used in these locations or coatings used on these signs or tags have a dry film density of ≥ 100 lb/ft^3. If a material is used that has a lower density, a report must exist~~s~~ and conclude~~s~~ that there is insufficient water flow to transport lightweight caulking, signs or tags.
	Inspections will be conducted of ventilation filters and fiber producing fire barriers used inside containment within the ZOI or below the maximum flood level of a design basis loss of coolant accident.	A report exists and concludes that the ventilation filters and fire barriers in these locations has a density of ≥ 100 lb/ft^3.
	xi) Inspection of the as-built CMT inlet diffuser will be conducted.	xi) The CMT inlet diffuser has a flow area ≥ 165 in^2.

Description of DCD Changes ***APP-GW-GLE-002 Rev #***

Justification for changes to Tier 1, Table 2.2.3-5: *Add new IRWST Screen C to the Table to reflect changes in APP-GW-GEE-1145.* *5*

Table 2.2.3-5

Component Name	Tag No.	Component Location
Passive Residual Heat Removal Heat Exchanger (PRHR HX)	PXS-ME-01	Containment Building
Accumulator Tank A	PXS-MT-01A	Containment Building
Accumulator Tank B	PXS-MT-01B	Containment Building
Core Makeup Tank (CMT) A	PXS-MT-02A	Containment Building
CMT B	PXS-MT-02B	Containment Building
IRWST	PXS-MT-03	Containment Building
IRWST Screen A	PXS-MY-Y01A	Containment Building
IRWST Screen B	PXS-MY-Y01B	Containment Building
IRWST Screen C	PXS-MY-Y01C	Containment Building
Containment Recirculation Screen A	PXS-MY-Y02A	Containment Building
Containment Recirculation Screen B	PXS-MY-Y02B	Containment Building
pH Adjustment Basket 3A	PXS-MY-Y03A	Containment Building
pH Adjustment Basket 3B	PXS-MY-Y03B	Containment Building
pH Adjustment Basket 4A	PXS-MY-Y04A	Containment Building
pH Adjustment Basket 4B	PXS-MY-Y04B	Containment Building

Description of DCD Changes ***APP-GW-GLE-002 Rev #***

Justification for changes to Tier 1, Table 3.7-1: *Add new IRWST Screen C to the Table to reflect changes in APP-GW-GEE-1145.* *5*

Table 3.7-1
Risk-Significant Components

Passive Core Cooling System (PXS)	
IRWST Vents	PXS-MT-03
IRWST Screens	PXS-MY-Y01A/B/C
Containment Recirculation Screens	PXS-MY-Y02A/B

AP1000 Design Control Document Revision 17
Tier 2 Changes

Description of DCD Changes ***APP-GW-GLE-002 Rev #***

Justification for changes to DCD Tier 2 : Table 3.2-3: *Add New IRWST Screen C based upon changes in APP-GW-GEE-1145.* *5*

Table 3.2-3 (Sheet 15 of 65)

AP1000 CLASSIFICATION OF MECHANICAL AND FLUID SYSTEMS, COMPONENTS, AND EQUIPMENT

Tag Number	Description	AP1000 Class	Seismic Category	Principal Construction Code	Comments
Passive Core Cooling System (Continued)					
PXS-MY-Y01B	IRWST Screen B	C	I	Manufacturer Std.	
PXS-MY-Y01C	IRWST Screen C	C	I	Manufacturer Std.	
PXS-MY-Y02A	Containment Recirculation Screen A	C	I	Manufacturer Std.	

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to DCD Tier 2 : Section 3.4.1.2.2.1: *Since the containment recirculation squib valves (PXS-V118A/B and PXS-V120A/B) will be qualified to actuate underwater, the following text in this DCD section needs revised.*	*5*

3.4.1.2.2.1 Containment Flooding Events

Passive Core Cooling System Compartments

The PXS-A and PXS-B compartments, located in the southeast and northeast quadrants of the containment, primarily contain components associated with the passive core cooling system. The safe shutdown related components of the passive core cooling system located in these two compartments are redundant and essentially identical. One set of the redundant equipment is located in each of the two separate compartments.

The redundant passive core cooling system components located in these two compartments provide coolant to the reactor vessel from the two core makeup tanks, the two accumulators, and the in-containment refueling water storage tank via two independent and redundant direct vessel injection lines.

Each passive core cooling system compartment contains a parallel set of normally closed, air operated, core makeup tank isolation valves that receive actuation signals to open during a safe shutdown operation. These valves are approximately 10 feet above the floor level of the passive core cooling system compartments and 26 feet above the floor of the reactor vessel cavity.

Each passive core cooling system compartment also contains one normally open accumulator isolation valve and one normally open in-containment refueling water storage tank isolation valve. These valves do not have to be repositioned during a safe shutdown operation and a coincident flooding event.

In addition, each passive core cooling system compartment contains four passive core cooling system containment recirculation subsystem isolation valves. A normally closed, squib valve is located in each of two parallel flow paths. One of the lines includes a check valve in series with the squib valve. The other line includes a normally-open, motor-operated valve in series with the squib valve. The squib valve and motor-operated valves are opened on a low in-containment refueling water storage tank level signal to provide a redundant flow path from the flooded reactor/steam generator compartments to the reactor vessel. One set of these redundant containment recirculation subsystem isolation valves is required to open to provide a redundant recirculation flow path to the reactor vessel. In the unlikely event that one of the two passive core cooling system compartments were to be flooded, the set of recirculation valves in the other, unflooded, compartment could be opened. Note that these squib valves are qualified to operate after being flooded.

Description of DCD Changes *APP-GW-GLE-002 Rev #*

***Justification for changes to DCD Tier 2 : Section 6.1.1.4** has been amended to specify requirements on the quantity and use of aluminum in containment susceptible to design basis accident conditions.* 2

6.1.1.4 Material Compatibility with Reactor Coolant System Coolant and Engineered Safety Features Fluids

Engineered safety features components materials are manufactured primarily of stainless steel or other corrosion-resistant material. Protective coatings are applied on carbon steel structures and equipment located inside the containment, as discussed in subsection 6.1.2.

Austenitic stainless steel plate conforms to ASME SA-240. Austenitic stainless steel is confined to those areas or components which are not subject to post-weld heat treatment. Carbon steel forgings conform to ASME SA-350. Austenitic stainless steel forgings conform to ASME SA 182. Nickel-chromium-iron alloy pipe conforms to ASME SB-167. Carbon steel castings conform to ASME SA-352. Austenitic stainless steel castings conform to ASME SA-351.

Hardfacing material in contact with reactor coolant is a qualified low- or zero-cobalt alloy, equivalent to Stellite 6. The use of cobalt-base alloys is minimized. Low- or zero-cobalt alloys used for hardfacing or other applications where cobalt-base alloys have been previously used are qualified by wear and corrosion tests. The corrosion tests qualify the corrosion resistance of the alloy in reactor coolant. Cobalt-free, wear-resistant alloys considered for this application include those developed and qualified in nuclear industry programs.

In post-accident situations where the containment is flooded with water containing boric acid, pH adjustment is provided by the release of trisodium phosphate into the water. The trisodium phosphate is held in baskets located in the floodable volume that includes the steam generator compartments and contains the reactor coolant loop. The addition of trisodium phosphate to the solution is sufficient to raise the pH of the fluid to above 7.0. This pH is consistent with the guidance of NRC Branch Technical Position MTEB-6.1 for the protection of austenitic stainless steel from chloride-induced stress corrosion cracking. Section 6.3 describes the design of the trisodium phosphate baskets.

In the post-accident environment, both aluminum and zinc surfaces in the containment are subject to chemical attack resulting in the production of hydrogen and/or chemical precipitants that can affect long-term core cooling. The amount of aluminum allowed in containment below the maximum flood level of a design basis LOCA (refer to DCD section 6.3.2.2.7.1, item 3) will be limited to less than 60 lbs during operating conditions. A large potential source of aluminum in the AP1000 containment are the excore detectors described in Subsection 7.1.2.7.2. To avoid sump water contact with the excore detectors, they are enclosed in stainless steel or titanium housings. The non-flooded surfaces would be wetted by condensing steam but they would not be subjected to the boric acid or trisodium phosphate solutions since there is no containment spray. For this reason the amount of aluminum in the excore detectors is not applied to the 60lb weight limit restriction as they are not subject to the post-DBA accident environment as a result of steel/titanium encasement. Furthermore, other aluminum within containment encased in stainless steel/titanium that can ensure interaction with the boric acid or trisodium phosphate solutions does not occur should not be applied to the 60lb weight limit. Nonsafety-related passive autocatalytic recombiners are provided to limit hydrogen buildup inside containment.

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to DCD Tier 2 : Sections 6.1.2.1.1, 6.1.2.1.2, and 6.1.2.1.5. *Minor wording changes made for clarification.*	*5*
Justification for changes to DCD Tier 2 : Sections 6.1.2.1.2 and 6.1.2.1.5 *have been amended to restrict the use of inorganic zinc coatings (other than on the inside of the containment vessel) inside containment and to require any used to be safety – service level 1.*	*4*
Justification for changes to DCD Tier 2 : Section 6.1.2.1.5 *has been amended to include discussion regarding high density coatings on engineered components within the ZOI of a design basis accident. These comments need be incorporated to ensure no additional debris generation occurs from coating immersion or interaction with jet impingements. The discussion in this sucsection in Revision 17 that discusses why coatings on manufactured components do not detach has been deleted.*	*2*

6.1.2.1.1 General

The AP1000 is divided into four areas with respect to the use of protective coatings. These four areas are:

- Inside containment
- Exterior surfaces of the containment vessel
- Radiologically controlled areas outside containment
- Remainder of plant

The considerations for protective coatings differ for these four areas and the coatings selection process accounts for these differing considerations. The AP1000 design considers the function of the coatings, their potential failure modes, and their requirements for maintenance. Table 6.1 2 lists different areas and surfaces inside containment and on the containment shell that have coatings, their functions, and to what extent their coatings are related to plant safety.

Coatings used outside containment do not provide functions related to plant safety except for the coating on the outside of the containment shell. The coating on the outside of the containment shell above elevation 135′ 3″ shell supports passive containment cooling system heat transfer and is classified as a Service Level III coating.

The coating used on the inside surface of the containment shell, greater than 7′ above the operating deck, supports the transfer of thermal energy from the post-accident atmosphere inside containment to the containment shell. Passive containment cooling system testing and analysis have been performed with a coating. This coating is classified as a Service Level I coating.

Coatings are not used in the vicinity of the containment recirculation screens to minimize the possibility of debris clogging the screens. Subsection 6.3.2.2.7.3 defines the area in the vicinity of the recirculation screens where coatings are not used.

Coatings used inside containment, except for inorganic zinc used on the inside surface of the containment shell and on other components, are classified as Service Level II coatings because their failure does not prevent functioning of the engineered safety features. If the Service Level II coatings delaminate, the solid debris they may form will not have a negative impact on the performance of safety-related post-accident cooling systems. See subsection 6.1.2.1.5 for a discussion of the factors including plant design features and low water flows that permit the use of Service Level II coatings inside containment. Protective coatings are maintained to provide corrosion protection for the containment pressure boundary and for other system components inside containment.

The corrosion protection of the containment shell is a safety-related function. Good housekeeping and decontamination functions of the coatings are nonsafety-related functions.

For information on coating design features, quality assurance, material and application requirements, and performance monitoring requirements, see subsection 6.1.2.1.6.

6.1.2.1.2 Inside Containment

Carbon Steel

Inorganic zinc is the basic coating applied to all of the containment vessel. Below the operating floor, most of the inorganic zinc coating is top coated with epoxy where enhanced decontamination is desired. The epoxy top coat on the containment vessel extends above the operating floor up to a wainscot height of 7 feet above the operating floor. Carbon steel and structural modules within the containment are coated with self-priming high solids epoxy (SPHSE). Where practical, miscellaneous carbon steel items (such as stairs, ceilings, gratings, ladders, railings, conduit, duct, and cable tray) are hot-dip galvanized. Steel surfaces subject to immersion during normal plant operation (such as sumps and gutters) are stainless steel or are coated with SPHSE applied directly to the carbon steel without an inorganic zinc primer. Carbon steel structures and equipment are assembled in modules and the modules are coated in the fabrication shop under controlled conditions.

Concrete

Concrete surfaces inside containment are coated primarily to prevent concrete from dusting, to protect it from chemical attack and to enhance decontaminability. In keeping with ALARA goals, the exposed concrete surfaces are made as decontaminable as practical in areas of frequent personnel access and areas subject to liquid spray, splash, spillage or immersion.

Exposed concrete surfaces inside containment are coated with an epoxy sealer to help bind the concrete surface together and reduce dust that can become contaminated and airborne. Concrete floors inside containment are coated with a self-leveling epoxy or SPHSE floor coating. Exposed concrete walls inside containment are coated to a minimum height of 7 feet with an epoxy or SPHSE applied over an epoxy surfacer that has been struck flush.

6.1.2.1.5 Safety Evaluation

This subsection describes the basis for classifying coatings as Service Level I, II, or III. Table 6.1 2 identifies which coatings are classified as Service Level I and Service Level III.

The inorganic zinc coating on the outside of the containment shell above elevation 135′ 3″ supports passive containment cooling system heat transfer and is classified as a Service Level III coating.

The inorganic zinc coating used on the inside surface of the containment shell, greater than 7′ above the operating deck, supports the transfer of thermal energy from the post-accident atmosphere inside containment to the containment shell. Passive containment cooling system testing and analysis have been performed with an inorganic zinc coating. This coating is classified as Service Level I coating.

The AP1000 has a number of design features that facilitate the use of Service Level II coatings inside containment. These features include a passive safety injection system that provides a long delay time between a LOCA and the time recirculation starts. This time delay provides time for settling of debris. These passive systems also flood the containment to a high level which allows the use of containment recirculation screens that are located well above the floor and are relatively tall. Significant volume is provided for the accumulation of coating debris without affecting screen plugging. These screens are protected by plates located above the screens that extend out in front and to the side of the screens. Coatings are not used under these plates in the vicinity of the screens. The protective plates, together with low recirculation flow, approach velocity and the screen size preclude postulated coating debris above the plates from reaching the screens. Refer to subsection 6.3.2.2.7.3 for additional discussion of these screens, their protective plates and the areas where coatings are prohibited from being used.

The recirculation inlets are screened enclosures located near the northwest and southwest corners of the east steam generator compartment (refer to the figures in Section 6.3.2.2.7.3). The enclosure bottoms are located above the surrounding floor which prevent ingress of heavy debris (density $\geq$ 100lb_m/ft^3). Additionally, the screens are oriented vertically and are protected by large plates located above the screens, further enhancing the capability of the screens to function with debris in the water. The screen mesh size and the surface area of the containment recirculation screens in the AP1000, in conjunction with the large floor area for debris to settle on, can accommodate failure of coatings inside containment during a design basis accident even though the residue of such a failure is unlikely to be transported to the vicinity of the enclosures.

The AP1000 does not have a safety-related containment spray system. The containment spray system provided in the AP1000 is only used for beyond design basis events. This reduces the chance that coatings will peel off surfaces inside containment because the thermal shock of cold spray water on hot surfaces combined with the rapid depressurization following spray initiation are recognized as contributors to coating failure. Parts of the containment below elevation 110′ are flooded and water is recirculated through the passive core cooling system. However, the volume of water moved in this manner is relatively small and the flow velocity is very low.

The coating systems used inside containment also include epoxy and/or self-priming high solids epoxy coatings. These are applied to concrete substrates, as top coats over the inorganic zinc coating, and directly to steel, as noted in subsection 6.1.2.1.2. The failure modes of these systems could include delamination or peeling if the epoxy coatings are not properly applied (References 1, 2, 3). The epoxies applied to concrete and carbon steel surfaces are sufficiently heavy (dry film density greater than 100 lb/ft^3) so that transport of small chips with the low water velocity in the AP1000 containment is limited.

Inside containment, there are components coated with various manufacturers' standard coating systems. These coating systems are generally not required to have Class I or III safety classification as delineated in Table 6.1-2, however those that are located below the maximum flood level of a design basis loss of coolant accident or where there is sufficient water flow to transport debris are required to be sufficiently heavy (dry film density greater than or equal to 100 lb/ft^3) so that transport of small chips with the low water velocity in the AP1000 containment is limited.

If a coating on walls, structures, or components has a dry film density less than 100 lb/ft^3 then testing and/or analysis must be performed to demonstrate that the debris is not transported to an AP1000 screen or into the core through a flooded break. The testing and/or analysis must be approved by the NRC.

In addition, inorganic zinc should only be used on surfaces that may be exposed to temperatures that are above the limits of epoxy coatings during normal operating conditions; inorganic zinc coatings used in such applications are required to be Safety – Service Level I to prevent detachment during a LOCA since such debris is not likely to settle out.

Requirements related to production of hydrogen as a result of zinc corrosion in design basis accident conditions, including the zinc in paints applied inside containment, were eliminated by the final rule, effective October 16, 2003, amending 10 CFR 50.44, "Standards for Combustible Gas Control System in Light Water Cooled Power Reactors."

Description of DCD Changes *APP-GW-GLE-002 Rev #*

Justification for changes to DCD Tier 2 : Section 6.1.2.1.6 has been amended to specify requirements on the requirements for the coatings used on manufactured components. 2

6.1.2.1.6 Quality Assurance Features

Service Level II Coatings

The use of Service Level II coatings inside containment is based on the use of selected types of coatings and the properties of the coatings. To preclude the use of inappropriate coatings, the procurement of Service Level II coatings used inside containment is considered a safety related activity whereas the Service Level II coatings used outside the containment are nonsafety related.

Appendix B to 10 CFR Part 50 applies to procurement of Service Level II coatings used inside containment on internal structures, including walls, floor slabs, structural steel, and the polar crane, except for such surfaces located inside the chemical and volume control system room # 11209. Service Level II coatings used in the chemical and volume control system room are not subject to procurement under 10 CFR 50, Appendix B, because the room is connected to the containment in a limited way through a drain line. Service Level II coatings used on manufactured components are not subject to procurement under 10 CFR 50, Appendix B, because their high density limits the transport with the low water velocity in the AP1000 containment. In addition, the drain line is routed to the waste liquid processing system sump which is located well below and separate from the recirculation screens. The specified Service Level II coatings used inside containment are tested for radiation tolerance and for performance under design basis accident conditions. Where decontaminability is desired, the coatings are evaluated for decontaminability.

The Service Level II coatings used inside containment are as shown in Table 6.1-2. The application, inspection, and monitoring of Service Level II coatings are controlled by a program described in subsection 6.1.3.2. This program is not subject to 10 CFR 50, Appendix B, quality assurance requirements.

Due to the use of modularized construction, a significant portion of the containment coatings are shop applied to the containment vessel and to piping, structural and equipment modules. This application of coatings under controlled shop conditions provides additional confidence that the coatings will perform as designed and as expected.

The coatings used in radiologically controlled areas outside containment are tested for radiation resistance and evaluated for decontaminability; they are not specified to be design basis accident tested, and they are not procured to Appendix B to 10 CFR 50. Where practical, the same coating materials are used in radiologically controlled areas outside containment as are used inside containment. This provides a high level of quality and optimizes maintenance painting over the life of the plant.

Description of DCD Changes *APP-GW-GLE-002 Rev #*

***Justification for changes to DCD Tier 2: Table 6.1-2** has been amended to modify Note 6 to be consistent with DCD Tier 2, Section 6.1.2.1.5.* 5

***Justification for changes to DCD Tier 2: Table 6.1-2** has been amended to restrict the use of inorganic zinc coatings inside containment (other than on the inside of the containment vessel) and to require any used to be safety – service level 1.* 4

***Justification for changes to DCD Tier 2: Table 6.1-2** should be amended to clarify the requirements for coatings used on engineered components within the ZOI for design basis accident conditions.* 2

Table 6.1-2

AP1000 COATED SURFACES, CONTAINMENT SHELL AND SURFACES INSIDE CONTAINMENT

Surface	Boundary	Surface Material	Coating	Coating Functions/Safety Classifications		Coating Classification (1)
Containment Shell, Outside Surface	Shell surfaces above elevation 135′ 3″	Carbon Steel	Inorganic Zinc Coating	1 Promote wettability 2 Heat conduction 3 Nondetachable 4 Inhibit corrosion	1 Safety 2 Safety 3 Safety 4 Safety	Safety – Service Level III
Containment Shell, Inside Surface	Shell surfaces above 7 feet above operating deck	Carbon Steel	Inorganic Zinc Coating	1 Promote wettability 2 Heat conduction 3 Nondetachable 4 Inhibit corrosion	1 Safety (2) 2 Safety 3 Safety 4 Safety	Safety – Service Level I
	Shell surfaces below 7 feet above operating deck	Carbon Steel	Inorganic Zinc Coating with Epoxy Top Coat	1 Nondetachable 2 Inhibit corrosion 3 Enhance radioactive decontamination	1 Safety 2 Safety 3 Safety	Safety – Service Level I
Components Inside Containment	(6)	Material of component(6)	NA(6)	1 Ensure settling 2 Inhibit corrosion	1 Safety (7) 2 Nonsafety	Nonsafety (7) Service Level II
Inside Containment	Areas surrounding the containment recirculation screens (3)	NA	NA	NA	NA	NA

Table 6.1-2

AP1000 COATED SURFACES, CONTAINMENT SHELL AND SURFACES INSIDE CONTAINMENT

	Concrete walls, ceilings and floors (4)	Concrete	Self-Priming High Solid Epoxy	1 Ensure settling 2 Prevent dusting 3 Protect from chemical attack 4 Enhance radioactive decontamination 5 Heat conduction	1 Safety (5) 2 Nonsafety 3 Nonsafety 4 Nonsafety 5 Safety (5)	Nonsafety (5) Service Level II
	Steel walls, ceilings, floors, columns, beams, braces, plates (4)	Carbon Steel	Self-Priming High Solid Epoxy	1 Ensure settling 2 Inhibit corrosion 3 Enhance radioactive decontamination 4 Heat conduction	1 Safety (5) 2 Nonsafety 3 Nonsafety 4 Safety (5)	Nonsafety (5) Service Level II

Notes:

1. The applicability of 10 CFR 50, Appendix B, and other codes and standards to coatings and their application are discussed in DCD subsection 6.1.2.1.6.
2. An inorganic zinc coating on the inside of the containment shell is not required to promote wettability, however it has been included in PCS testing and analysis and as a result is considered safety-related.
3. Areas around PXS recirculation screens do not require coatings as defined in DCD subsection 6.3.2.2.7.3.
4. 10 CFR 50, Appendix B, does not apply to DBA testing and manufacture of coatings in the CVS room inside containment as discussed in DCD subsection 6.1.2.1.6.
5. 10 CFR 50, Appendix B, applies to DBA testing and manufacture of these Service Level II coatings as discussed in DCD subsection 6.1.2.1.6.
6. The explicit coating material is not required to be specified. However, the coating material must comply with the restrictions set forth in Section 6.1.2.1.5 and Table 6.1-2 for components located below the maximum flood level for a design basis loss of coolant accident or where there is sufficient water flow to transport debris. If a coating on walls, structures, or components has a dry film density less than 100 lb/ft^3 then testing and/or analysis must be performed to demonstrate that the debris is not transported to an AP1000 screen or into the core through a flooded break. The testing and/or analysis must be approved by the NRC. Inorganic zinc should only be used on surfaces that may be exposed to temperatures that are above the limits of epoxy coatings during normal operating conditions; inorganic zinc coatings used in such applications is required to be Safety – Service Level I to prevent detachment during a LOCA since such debris is not likely to settle out.
7. 10 CFR 50, Appendix B, does not apply to DBA testing and manufacture of coatings used on manufactured components as discussed in DCD subsection 6.1.2.1.6.

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to DCD Tier 2: Section 6.1.3.2: *Edits regarding Service Level II coatings in response to NRC RAI-SRP6.1.2-CIB1-01. The RAI response was finalized and submitted to the NRC after APP-GW-GLE-002, Revision 6 was completed. Therefore the exact DCD mark-up shown in the RAI response is reflected in this current version of APP-GW-GLE-002.*	*7*
Justification for changes to DCD Tier 2: Section 6.1.3.2: *Addition of information regarding Service Level II coatings in response to NRC RAI-SRP6.1.2-CIB1-01.*	*6*

6.1.3.2 Coating Program

The Combined License applicants referencing the AP1000 will provide programs to control procurement, application, inspection, and monitoring of Service Level I, Service Level II, and Service Level III coatings. The programs for the control of the use of these coatings will be consistent with subsection 6.1.2.1.6.

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *Item 3 includes a mark-up in this revision of APP-GW-GLE-002, which can also be found in the response to NRC RAI-SRP6.2.2-CIB1-30, Rev. 0. The mark-up reverts the language of the second paragraph under Item 3 back to the language in Revision 17 of the AP1000 DCD.* *Please note that the change in the ZOI for inorganic zinc coatings, previously shown in Revision 6 of APP-GW-GLE-002 and retained in this revision, is also stated in the response to NRC RAI-SRP6.2.2-CIB1-30, Rev. 0.* *Item 12 of Section 6.3.2.2.7.1 is updated with a new discussion and debris loading for coatings debris from within the LOCA ZOI as described in RAI-SRP6.2.2-SPCV-25, Rev. 1. The increase in coatings particles from within the ZOI to 70 lb from 50 also increases the total particulate debris loading from 173.4 lbm to 193.4 lbm* *Item 12, tenth bullet, is updated with a new minimum flow rate for the containment recirculation screens based upon WCAP-16914-P, Revision 5, Section 5.2.*	*7*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *Explanation added that the 50 lbm of LOCA-generated coatings debris is for double-ended cold leg (DECL) and double-ended direct vessel injection line (DEDVI) LOCAs. More detailed discussion can be found in RAI response RAI-SRP6.2.2-SPCV-25-R0.* *Also, the ZOI for inorganic zinc coatings was changed from 5 pipe IDs to 10 pipe IDs. This change is based upon discussions with the NRC staff. The background of the discussions can be found in Westinghouse letter LTR-NRC-10-10, dated February 12, 2010, regarding an inconsistency found in the test rig used to perform LOCA ZOI jet impingement tests. Test data generated was previously used to determine the 5D ZOI for inorganic zinc coatings. The ZOI for inorganic zinc in the DCD is now changed from 5D to 10D. The 10D ZOI for coatings can be found in the NRC Safety Evaluation Report (SER) on NEI 04-07(December 2004).*	*6*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *Correction to chemical precipitate loading. Related to response to RAI-SRP6.2.2-SPCV-30-R0.*	*6*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *Changes made to information in Item 12 relevant to RNS operation and the corresponding flow rates for CR screen and IRWST screen design. Relates to the responses to RAI-SRP6.2.2-SPCV-26-R1 and RAI-SRP6.2.2-SPCV-28-R1.*	*6*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *Wording changes made for clarification. Flow rates through screens and core are revised based upon current analyses and testing.*	*5*

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1 *is amended to clarify the requirements on "suitable equivalent" insulation. The ZOI for Min-K and rigid closed cellular glass insulation is added. A requirement for a test and/or analysis report to justify the non-transport of light weight caulking, signs or tags is added. The latent debris amounts (total and fiber) are changed. An allowance is added for ZOI coating fines. The transport of debris has been clarified to specifically address fiber and particles separately. The maximum amount of fiber that can be transported into a flooded LOCA break is increased and the limiting break changed to a large cold leg (CL). The limiting screen and core flow rates are reduced to those applicable to PXS operation with the limiting amount of debris. Justification as to why this will not limit RNS operation is also provided. The dP limits with the limiting debris loads were reduced to those applicable for operation with the PXS.*	*4*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1. *The maximum flow rate through the containment recirculation (CR) screens when PXS and RNS are operating is changed.*	*3*
Justification for changes to DCD Tier 2: Section 6.3.2.2.7.1 *should be amended to quantify the total latent amount of debris allowable within containment and to clarify the total amount contributed by fibrous material. Also to define the transport of this debris to the screens. These markups also address debris from signs and tags. A summary of the RG 1.82 evaluation is also added.*	*2*

6.3.2.2.7.1 General Screen Design Criteria

1. Screens are designed to Regulatory Guide 1.82, including:
   - Separate, large screens are provided for each function.
   - Screens are located well below containment floodup level. Each screen provides the function of a trash rack and a fine screen. A debris curb is provided to prevent high density debris from being swept along the floor to the screen face.
   - Floors slope away from screens (not required for AP1000).
   - Drains do not impinge on screens.
   - Screens can withstand accident loads and credible missiles.
   - Screens have conservative flow areas to account for plugging. Operation of the non- safety-related normal residual heat removal pumps with suction from the IRWST and the containment recirculation lines is considered in sizing screens.
   - System and screen performance are evaluated.
   - Screens have solid top cover. Containment recirculation screens have protective plates that are located no more than 1 foot above the top of the screens and extend at least 10 feet in front and 7 feet to the side of the screens. The plate dimensions are relative to the portion of the screens where water flow enters the screen openings. Coating debris, from coatings located outside of the ZOI, is not transported to the containment recirculation screens, the IRWST screens, or into a

DVI or a cold leg LOCA break that becomes submerged during recirculation considering the use of high density coatings discussed in DCD section 6.1.2.1.5.

- Screens are seismically qualified.
- Screen openings are sized to prevent blockage of core cooling.
- Screens are designed for adequate pump performance. AP1000 has no safety-related pumps.
- Corrosion resistant materials are used for screens.
- Access openings in screens are provided for screen inspection.
- Screens are inspected each refueling.

2. Low screen approach velocities limit the transport of heavy debris even with operation of normal residual heat removal pumps.

3. Metal reflective insulation is used on ASME class 1 lines because they are subject to loss-of-coolant accidents. Metal reflective insulation is also used on the reactor vessel, the reactor coolant pumps, the steam generators, and on the pressurizer because they have relatively large insulation surface areas and they are located close to large ASME class 1 lines. As a result, they are subject to jet impingement during loss-of-coolant accidents. A suitable equivalent insulation to metal reflective may be used. A suitable equivalent insulation is one that is encapsulated in SS that is seam welded such that LOCA jet impingement does not damage the insulation and generate debris. Another suitable insulation is one that may be damaged by LOCA jet impingement as long as the resulting insulation debris are not transported to the containment recirculation screens, IRWST screens, or into a DVI or a cold leg LOCA break that becomes submerged during recirculation. In order to qualify as a suitable equivalent insulation, testing must be performed that subjects the insulation to conditions that bound the AP1000 conditions and demonstrates that debris would not be generated. If debris is generated testing and/or analysis must be performed to demonstrate that the debris is not transported to an AP1000 screen or into the core through a flooded break. It would also have to be shown that the material used would not generate chemical debris. In addition, the testing and/or analysis must be approved by the NRC.

   In order to provide additional margin, metal reflective insulation is used inside containment where it would be subject to jet impingement during loss-of-coolant accidents that are not otherwise shielded from the blowdown jet. As a result, fibrous debris is not generated by loss-of-coolant accidents. Insulation located within the zone of influence (ZOI), which is a spherical region within a distance equal to 29 inside diameters (for Min-K, Koolphen-K, or rigid cellular glass insulation) or 20 inside diameters (for other types of insulation) of the LOCA pipe break, is assumed to be affected by the LOCA when there are intervening components, supports, structures, or other objects.

   The ZOI in the absence of intervening components, supports, structures, or other objects includes insulation in a cylindrical area extending out a distance equal to 45 inside diameters from the break along an axis that is a continuation of the pipe axis and up to 5 inside diameters in the radial direction from the axis. A suitable equivalent insulation to metal reflective may be used as discussed in the previous paragraph.

Insulation used inside containment, outside the ZOI but below the maximum post DBA accident LOCA floodup water level (plant elevation 110.2 feet) is metal reflective insulation, jacketed fiberglass or a suitable equivalent. A suitable equivalent insulation is one that would be restrained such that it would not be transported by the flow velocities present during recirculation and would not add to the chemical precipitates. In order to qualify as a suitable equivalent insulation, testing must be performed that subjects the insulation to conditions that bound the AP1000 conditions and demonstrates that debris would not be generated. If debris is generated testing and/or analysis must be performed to demonstrate that the debris is not transported to an AP1000 screen or into the core through a flooded break. It would also have to be shown that the material used would not generate chemical debris. In addition, the testing and/or analysis must be approved by the NRC.

Insulation used inside containment, outside the ZOI but above the maximum post DBA accident LOCA floodup water level is jacketed fiberglass, rigid cellular glass or a suitable equivalent. A suitable equivalent insulation is one that when subjected to dripping of water from the containment dome would not add to the chemical precipitates; suitable equivalents include MRI.

4. Coatings are not used on surfaces located close to the containment recirculation screens. The surfaces considered close to the screens are defined in subsection 6.3.2.2.7.3. Refer to subsection 6.1.2.1.6. These surfaces are constructed of materials that do not require coatings.
5. The IRWST is enclosed which limits debris egress to the IRWST screens.
6. Containment recirculation screens are located above lowest levels of containment.
7. Long settling times are provided before initiation of containment recirculation.
8. Air ingestion by safety-related pumps is not an issue in the AP1000 because there are no safety-related pumps. The normal residual heat removal system pumps are evaluated to show that they can operate with minimum water levels in the IRWST and in the containment.
9. A commitment for cleanliness program to limit debris in containment is provided in subsection 6.3.8.1.
10. Other potential sources of fibrous material, such as ventilation filters or fiber producing fire barriers, are not located in jet impingement damage zones or below the maximum post DBA accident LOCA floodup water level.
11. Other potential sources of transportable material, such as caulking, signs, equipment tags installed inside the containment are located
    - below the maximum flood level, or
    - above the maximum flood level and not inside a cabinet or enclosure.

    Tags and signs in these locations are made of stainless steel or another metal that has a density ≥ 100 lbm/ft^3. Caulking in these locations are a high density (≥ 100 lbm/ft^3).

    The use of high-density metal prevents the production of debris that could be transported to the containment recirculation screens, IRWST screens, or into a DVI or a cold leg LOCA break location that is submerged during recirculation. If a high-density material is not used for these components, then the components must be located inside a cabinet or other enclosure or otherwise shown not to transport; the enclosures do not have to be water tight but need to prevent water dripping on them from creating a flow path that would transport the debris outside the enclosure. For light weight (< 100 lb_m/ft^3) caulking, signs or tags that are located outside enclosures, testing must be performed that subjects the caulking, signs or tags to conditions that bound the AP1000 conditions and demonstrates that debris would not be transported to an AP1000 screen or into the core through a flooded break. Note that in determining if there is sufficient water flow to transport these materials, consideration needs to be given as to whether they are within the ZOI (for the material used) because that determines whether they are in their original geometry or have been reduced to smaller pieces. It would also have to be shown that the material used would not generate chemical debris. In addition, the testing must be approved by the NRC.

12. An evaluation consistent with Regulatory Guide 1.82, revision 3, and subsequently approved NRC guidance, has been performed (Reference 3) to demonstrate that adequate long-term core cooling is available considering debris resulting from a LOCA together with debris that exists before a LOCA. As discussed in DCD subsection 6.3.2.2.7.1, a LOCA in the AP1000 does not generate fibrous debris due to damage to insulation or other materials included in the AP1000 design. The evaluation considered resident fibers and particles that could be present considering the plant design, location, and containment cleanliness program. The determination of the characteristics of such resident debris was based on sample measurements from operating plants. The evaluation also considered the potential for the generation of chemical debris (precipitants). The potential to generate such debris was determined considering the materials used inside the AP1000 containment, the post accident water chemistry of the AP1000, and the applicable research/testing.

    The evaluation considered the following conservative considerations:

    - The COL cleanliness program will limit the total amount of resident debris inside the containment to ≤130 pounds and the amount of the total that might be fiber to ≤ 6.6 pounds.
    - In addition to the resident debris, the LOCA blowdown jet may impinge on coatings and generate coating debris fines, which because of their small size might not settle. The amount of coating debris fines that can be generated in the AP1000 by a LOCA jet will be limited to less than 70 pounds for DECL and DEDVI LOCAs. In evaluating this limit, a ZOI of 4 IDs for epoxy and 10 IDs for inorganic zinc will be used. A DEHL LOCA could generate more coating debris however with the small amount of fiber available in the AP1000 following a LOCA, the additional coating debris fines that may be generated in a DEHL LOCA is not limiting.
    - The total resident and ZOI coating debris that are available for transport following a LOCA are ≤193.4 pounds of particulate and ≤6.6 pounds of fiber. The percentage of this debris that could be transported to the screens or to the core is:
        - Containment recirculation screens is ≤100% fiber and particles,
        - IRWST screens is ≤50% fiber and 100% particles,
        - Core (via a DVI or a cold leg LOCA break that becomes submerged) is ≤90% fiber and 100% particles.

- Fibrous insulation debris is not generated and transported to the screens or into the core as discussed in item 3 above.
- Metal reflective insulation including accident generated debris is not transported to the screens or into the core.
- Coating debris is not transported to the screens or into the core as discussed in item 1 above.
- Debris from other sources including caulking, signs and tags is not generated and transported to the screens or into the core as discussed in item 11 above.
- The total amount of chemical precipitates that could form in 30 days is ≤57 pounds.
- The percentage of the chemical precipitates that could be to transported to the
    - Containment recirculation screens is ≤100%,
    - IRWST screens is ≤100%,
    - Core is ≤100%.
- The range of flow rates during post-LOCA injection and recirculation are as follows:
    - CR screens is 2320 to 539 gpm,
    - IRWST screens is 2320 to 464 gpm,
    - Core is 2012 to 484 gpm.

  These flows bound operation of the PXS and the RNS. Note that if the RNS operates during post-LOCA injection or recirculation, the RNS flow is limited to 2320 gpm. This limit ensures that the operation of the plant is consistent with the screen head loss testing. In addition, the screens will be designed structurally to withstand much higher flow rates and pressure losses to provide appropriate margin during PXS and RNS operation.

  No chemical precipitates are expected to enter the IRWST because the primary water input to the IRWST is steam condensed on the containment vessel. However, during a DVI LOCA, recirculation can transport chemical debris through the containment recirculation screens and to the IRWST screens. As a result, 100% of the chemical debris is conservatively assumed to be transported to the IRWST screens.

  The AP1000 containment recirculation screens and IRWST screens have been shown to have acceptable head losses. The head losses for these screens were determined in testing performed using the above conservative considerations. It has been shown that a head loss of 0.25 psi at the maximum screen flows is acceptable based on long term core cooling sensitivity analysis.

  Considering downstream effects as well as potential bypass through a CL LOCA the core was shown to have acceptable head losses. The head losses for the core was determined in testing performed using the above conservative considerations. It has been shown that a head loss of 4.1 psi at these flows is acceptable based on long term core cooling sensitivity analysis.

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to DCD Tier 2 : Section 6.3.2.2.7.2. *Add the third IRWST screen and the cross-connect piping. Wording changes for clarification regarding inorganic zinc coatings.*	*5*
Justification for changes to DCD Tier 2 : Section 6.3.2.2.7.2 The design mesh size for the containment and IRWST recirculation screens is 0.0625 as opposed to the previous value of 0.125.	*2*

6.3.2.2.7.2 IRWST Screens

The IRWST screens are located inside the IRWST at the bottom of the tank. Figure 6.3-6 shows a plan view and Figure 6.3-7 shows a section view of these screens. Three separate screens are provided in the IRWST, one at either end of the tank and one in the center. A cross-connect pipe connects all three IRWST screens to distribute flow. The IRWST is closed off from the containment; its vents and overflows are normally closed by louvers. The potential for introducing debris inadvertently during plant operations is limited. A cleanliness program (refer to subsection 6.3.8.1) controls foreign debris from being introduced into the tank during maintenance and inspection operations. The Technical Specifications require visual inspections of the screens during every refueling outage.

The IRWST design eliminates sources of debris from inside the tank. Insulation is not used in the tank. Air filters are not used in the IRWST vents or overflows. Wetted surfaces in the IRWST are corrosion resistant such as stainless steel or nickel alloys; the use of these materials prevents the formation of significant amounts of corrosion products. In addition, the water is required to be clean because it is used to fill the refueling cavity for refueling; filtering and demineralizing by the spent fuel pit cooling system is provided during and after refueling.

During a LOCA, steam vented from the reactor coolant system condenses on the containment shell, drains down the shell to the operating deck elevation and is collected in a gutter. It is very unlikely that debris generated by a LOCA can reach the gutter because of its location. The gutter is covered with a trash rack which prevents larger debris from clogging the gutter or entering the IRWST through the two 4 inch drain pipes. The inorganic zinc coating applied to the inside surface of the containment shell is safety – Service Level I and will stay in place and will not detach.

The design of the IRWST screens reduces the chance of debris reaching the screens. The screens are oriented vertically such that debris that settles out of the water does not fall on the screens. The lowest screening surface of the IRWST screens is located 6 inches above the IRWST floor to prevent high density debris from being swept along the floor by water flow to the IRWST screens. The screen design provides the trash rack function. This is accomplished by the screens having a large surface area to prevent a single object from blocking a large portion of the screen and by the screens having a robust design to preclude an object from damaging the screen and causing by-pass. The screen prevents debris larger than 0.0625" from being injected into the reactor coolant system and blocking fuel cooling passages. The screen is a type that has sufficient surface area to accommodate debris that could be trapped on the screen. The design of the IRWST screens is described further in APP-GW-GLN-147 (Reference 4).

The screen flow area is conservatively designed considering the operation of the nonsafety-related normal residual heat removal system pumps which produce a higher flow than the safety-related gravity driven IRWST injection/recirculation flows. As a result, when the normal residual heat removal system pumps are not operating there is a large margin to screen clogging.

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to DCD Tier 2 : Section 6.3.2.2.7.3. *Modify description since APP-GW-GEE-1145 will have the recirculation squib valves (PXS-V118A/B and PXS-V120A/B) qualified to operate when submerged.*	*5*
Justification for changes to DCD Tier 2 : Section 6.3.2.2.7.3 The design mesh size for the containment and IRWST recirculation screens is 0.0625 as opposed to the previous value of 0.125.	*2*

6.3.2.2.7.3 Containment Recirculation Screens

The containment recirculation screens are oriented vertically along walls above the loop compartment floor (elevation 83 feet). Figure 6.3-8 shows a plan view and Figure 6.3-9 shows a section view of these screens. Two separate screens are provided as shown in Figure 6.3-3. The loop compartment floor elevation is significantly above (11.5 feet) the lowest level in the containment, the reactor vessel cavity. A two-foot-high debris curb is provided in front of the screens.

During a LOCA, the reactor coolant system blowdown will tend to carry debris created by the accident (pipe whip/jets) into the cavity under the reactor vessel which is located away from and below the containment recirculation screens. As the accumulators, core makeup tanks and IRWST inject, the containment water level will slowly rise above the 108 foot elevation. The containment recirculation line opens when the water level in the IRWST drops to a low level setpoint a few feet above the final containment floodup level. When the recirculation lines initially open, the water level in the IRWST is higher than the containment water level and water flows from the IRWST backwards through the containment recirculation screen. This back flow tends to flush debris located close to the recirculation screens away from the screens. A flow connection between Screen A and Screen B is provided so that both recirculation screens will operate. This connection increases the reliability of the PXS in a PRA sequence where there are multiple failures of valves in one of the PXS subsystems.

The water level in the containment when recirculation begins is well above (~ 10 feet) the top of the recirculation screens. During the long containment floodup time, floating debris does not move toward the screens and heavy materials settle to the floors of the loop compartments or the reactor vessel cavity. During recirculation operation the containment water level will not change significantly nor will it drop below the top of the screens.

The amount of debris that may exist following an accident is limited. Reflective insulation is used to preclude fibrous debris that can be generated by a loss of coolant accident and be postulated to reach the screens during recirculation. The nonsafety-related coatings used in the containment are designed to withstand the post accident environment. The containment recirculation screens are protected by plates located above them. These plates prevent debris from the failure of nonsafety-related coatings from getting into the water close to the screens such that the recirculation flow can cause the debris to be swept to the screens before it settles to the floor. Stainless steel is used on the underside of these plates and on surfaces located below the plates, above the bottom of the screens, 10 feet in front and 7 feet to the side of the screens to prevent coating debris from reaching the screens.

A cleanliness program (refer to subsection 6.3.8.1) controls foreign debris introduced into the containment during maintenance and inspection operations. The Technical Specifications require visual inspections of the screens during every refueling outage.

The design of the containment recirculation screens reduces the chance of debris reaching the screens. The screens are orientated vertically such that debris settling out of the water will not fall on the screens. The protective plates described above provide additional protection to the screens from debris. A 2-foot-high debris curb is provided to prevent high density debris from being swept along the floor by water flow to the containment recirculation screens. The screen design provides the trash rack function. This is accomplished by the screens having a large surface area to prevent a single object from blocking a large portion of the screen and by the screens having a robust design to preclude an object from damaging the screen and causing by-pass. The screen prevents debris larger than 0.0625" from being injected into the reactor coolant system and blocking fuel cooling passages. The screen is a type that has more surface area to accommodate debris that could be trapped on the screen. The design of the containment recirculation screens is further described in APP-GW-GLN-147 (Reference 4).

Description of DCD Changes	***APP-GW-GLE-002 Rev #***
Justification for changes to DCD Tier 2 : Section 6.3.2.2.8.9: *Since the containment recirculation squib valves (PXS-V118A/B and PXS-V120A/B) and IRWST Injection squib valves (PXS-V123A/B and PXS-V125A/B) will be qualified to actuate underwater, the following text in this DCD section needs revised.*	*5*

6.3.2.2.8.9 Explosively Opening (Squib)Valves

Squib valves are used in several passive core cooling system lines in order to provide the following:

- Zero leakage during normal operation
- Reliable opening during an accident
- Reduced maintenance and associated personnel radiation exposure

Squib valves are used to isolate the incontainment refueling water storage tank injection lines and the containment recirculation lines. In these applications, the squib valves are not expected to be opened during normal operation and anticipated transients. In addition, after they are opened it is not necessary that they re-close.

In the incontainment refueling water storage tank injection lines, the squib valves are in series with normally closed check valves. In the containment recirculation lines, the squib valves are in series with normally closed check valves in two lines and with normally open motor operated valves in the other two lines. As a result, inadvertent opening of these squib valves will not result in loss of reactor coolant or in draining of the incontainment refueling water storage tank.

The type of squib valve used in these applications provides zero leakage in both directions. It also allows flow in both directions. A valve open position sensor is provided for these valves. The IRWST injection squib valves and the containment recirculation squib valves in series with check valves are diverse from the other containment recirculation squib valves. They are designed to different design pressures. The IRWST injection and the containment recirculation squib valves are qualified to operate after being submerged; this capability adds margin to the performance of the PXS in handling debris during long-term core cooling following a LOCA.

Squib valves are also used to isolate the fourth stage automatic depressurization system lines. These squib valves are in series with normally open motor operated gate valves. Actuation of these squib valves requires signals from two separate protection logic cabinets. This helps to prevent spurious opening of these squib valves. The type of squib valve used in this application provides zero leakage of reactor coolant out of the reactor coolant system. The reactor coolant pressure acts to open the valve. A valve open position sensor is provided for these valves.

Description of DCD Changes *APP-GW-GLE-002 Rev #*

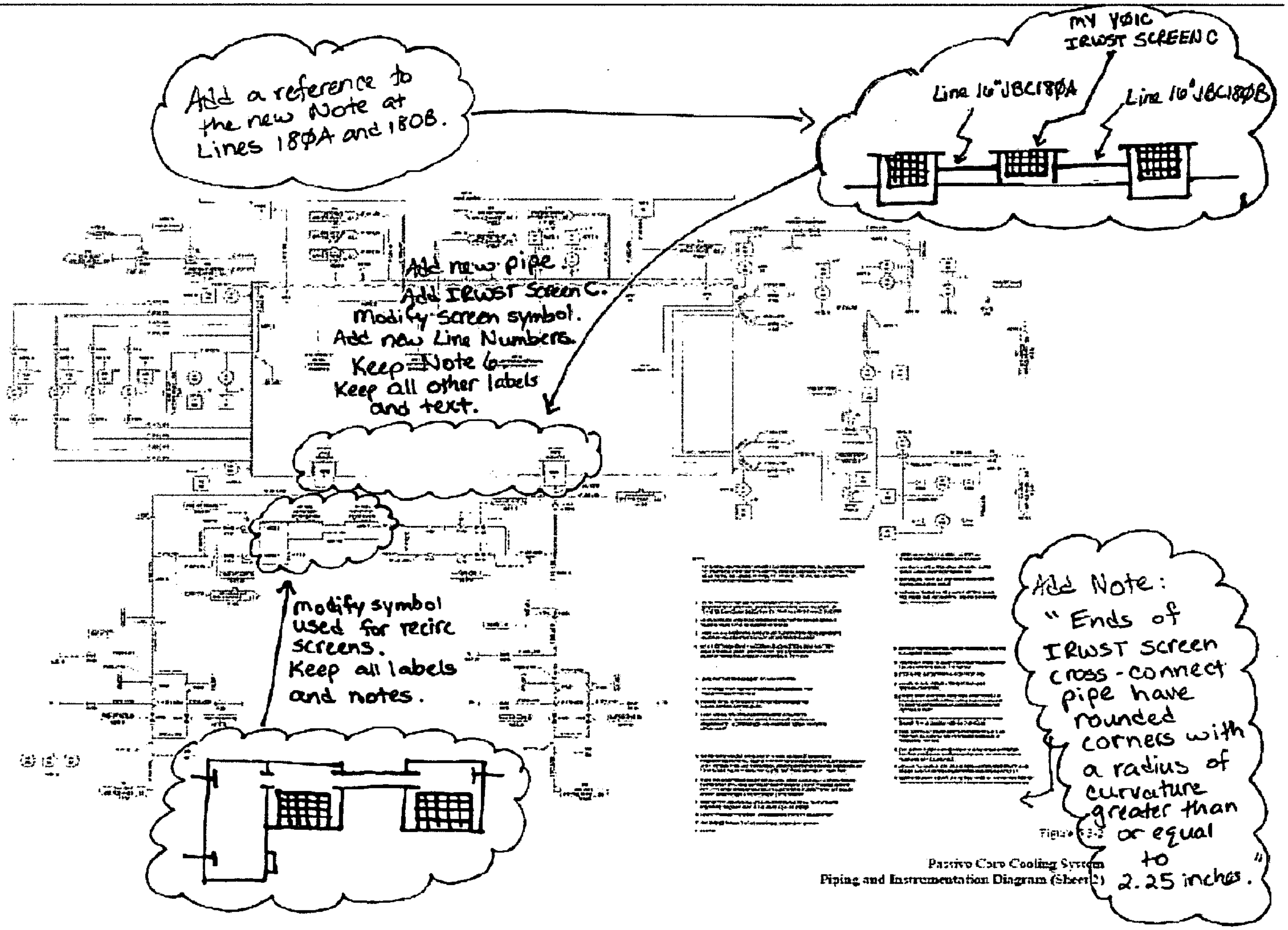
Justification for changes to DCD Tier 2 : Table 6.3-2 *Add data for IRWST Screen C..* *5*

Table 6.3-2 (Sheet 2 of 2)

COMPONENT DATA - PASSIVE CORE COOLING SYSTEM

IRWST		
Number	1	
Type	Integral to containment internal structure	
Volume, minimum water (cubic feet)	73,100	
Design pressure (psig)	5	
Design temperature (°F)	150 *	
Material	Wetted surfaces are stainless steel	
AP1000 equipment class	C	
Spargers		
Number	2	
Type	Cruciform	
Flow area of holes (in^2)	274	
Design pressure (psig)	600	
Design temperature (°F)	500	
Material	Stainless Steel	
AP1000 equipment class	C	
pH Adjustment Baskets		
Number	4	
Type	Rectangular	
Volume minimum total (cubic feet)	560	
Material	Stainless steel	
AP1000 equipment class	C	
Screens	<u>IRWST</u>	<u>Containment Recirculation</u>
Number	3	2
Surface area, screen (square feet)	IRWST Screens A and B: ≥500 per screen IRWST Screen C: ≥1000 ft^2	≥2,500 per screen
Material	Stainless steel	Stainless steel
AP1000 equipment class	C	C

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to Figure 6.3-2: *Add new IRWST Screen C and cross-connect piping between IRWST screens based upon changes in APP-GW-GEE-1145.*	*5*



Description of DCD Changes — *APP-GW-GLE-002 Rev #*

Justification for changes to DCD Tier 2 : Figure 6.3-6: *Add IRWST Screen C to reflect changes in APP-GW-GEE-1145.* — *5*

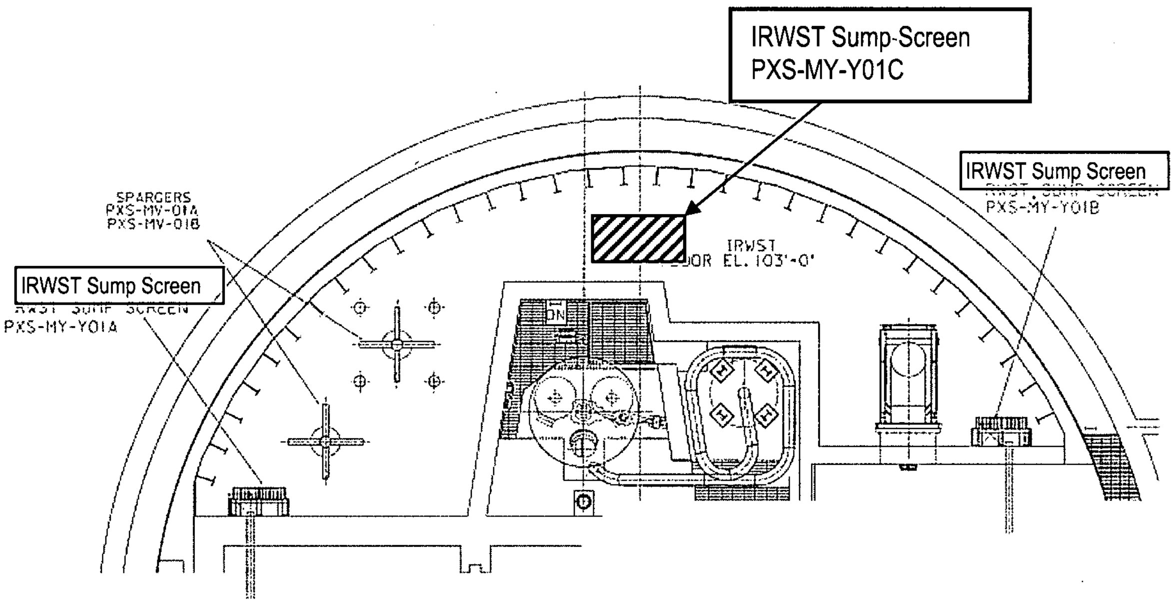


Figure 6.3-6

IRWST Screen Plan Location

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to DCD Tier 2 : Figure 6.3-2, note 13, *should be amended to identify that the gutter drain line termination point is well away from the IRWST screens and close to the tank floor to facilitate settling of coating debris before it is transported to the IRWST screens.*	*2*

13. GUTTER IS PROVIDED AT OPERATING DECK ELEV. TO COLLECT CONDENSATE FROM CONTAINMENT SHELL. SUMP IS PROVIDED WITH NORMALLY OPEN DRAIN TO CONTAINMENT SUMP. CLOSING V130A OR V130B CAUSES DRAIN TO OVERFLOW INTO IRWST. OVERFLOW LINE TERMINATES HORIZONTALLY 12 FEET AWAY FROM IRWST SCREEN FACE AND WITHIN 5 FEET OF THE IRWST FLOOR. GUTTER IS COVERED BY TRASH RACK.

Description of DCD Changes	*APP-GW-GLE-002 Rev #*
Justification for changes to DCD Tier 2: Section 6.3.8.1. *Latent debris loading changed from 150 pounds to 130 pounds. Fibrous component of latent debris changed from 8 pounds to 6.6 pounds.*	*4*
Justification for changes to DCD Tier 2: Section 6.3.8.1 *should be amended to quantify the total latent amount of debris allowable within containment and to clarify the total amount contributed by fibrous material.*	*2*

6.3.8.1 Containment Cleanliness Program

The Combined License applicants referencing the AP1000 will address preparation of a program to limit the amount of debris that might be left in the containment following refueling and maintenance outages. The cleanliness program will limit the storage of outage materials (such as temporary scaffolding and tools) inside containment during power operation to items that do not produce debris (physical or chemical) that could be transported to the containment recirculation screens, the IRWST screens, or into a DVI or a cold leg LOCA break that becomes submerged during recirculation. The cleanliness program shall limit the amount of latent debris located within containment to less than 130 pounds with less than or equal to 6.6 pounds being composed of fibrous material

Description of DCD Changes ***APP-GW-GLE-002 Rev #***

Justification for changes to DCD Tier 2 : Table 17.4-. 1 *Add IRWST Screen C to tag numbers.* *5*

Table 17.4-1 (Sheet 5 of 8)

RISK-SIGNIFICANT SSCs WITHIN THE SCOPE OF D-RAP

System, Structure, or Component (SSC)[1]	Rationale[2]	Insights and Assumptions
IRWST Screens (PXS-MY-Y01A/B/C)	RAW/CCF	The IRWST injection lines provide long-term core cooling following a LOCA. These screens are located inside the IRWST and prevent large particles from being injected into the RCS. They are designed so that they will not become obstructed.