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**To:** Quinones, Lauren  
**Date:** Tue, Oct 11, 2005 1:41 PM  
**Subject:** Fwd: AP1000 Tier 1 Changes Responses

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**From:** "Lindgren, Donald A." <lindg1da@westinghouse.com>  
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**Date:** Mon, Oct 10, 2005 4:22 PM  
**Subject:** AP1000 Tier 1 Changes Responses

We have developed responses for some of the questions and concerns that NRC reviewers have about the proposed changes to the AP1000 DCD Tier 1.

Below I have paraphrased the reviewer question, concern or request and provided a response.

If questions remain about the PCS storage tank volume please contact us.

We anticipate additional questions about the reactor coolant pump and the RCS flow measurement.

Once the questions and comments are resolved, We anticipate submitting a revised change write-up with an updated DCD.

Table 2.3.4-4: Please explain where the line numbers come from.

Response: The line numbers come from the fire protection system P&ID

Subsection 2.3.7: Staff is concerned that the way the addition to the design description is written a plant could continue to operate with boiling of the spent fuel pool occurring. We will propose revised words. Instead of deleting revise item 7.b. v) in Table 2.3.7-4 to provide a reference to Table 2.2.2-3 Item 7a for PFS storage tank volume. Put specific item reference in Item 7.b. vi) of Table 2.3.7-4.

Response: The description in 2.3.7 will be revised to read as follows:

The spent fuel pool cooling system (SFS) removes decay heat from spent fuel by transferring heat from the water in the spent fuel pool to the component cooling water system during normal modes of operation. During abnormal operation, when the normal heat removal method is not available, decay heat is removed from spent fuel by boiling water in the pool. The SFS purifies the water in the spent fuel pool, fuel transfer canal, and in-containment refueling water storage tank during normal modes of operation.

Item 7.b. of Table 2.3.7-4 will be revised to read as follows:

iv)ITA See Tier 1 Material Table 2.2.2-3, item 7.f. subsection 2.2.2 for inspection, testing, and acceptance criteria for the makeup water supply line from the passive containment cooling system (PCS) water storage tank to the spent fuel pool.

iv)AC See Tier 1 Material Table 2.2.2-3, item 7.f. subsection 2.2.2 for inspection, testing, and acceptance criteria for the makeup water supply line from the PCS water storage tank to the spent fuel pool.

v)ITA Inspection will be performed to verify that the passive containment cooling system water storage tank includes a sufficient volume of water.

v)AC See Tier 1 Material Table 2.2.2-3, item 7. The volume of for the passive containment cooling system water storage tank is greater than or

equal to 756,700 gallons.

vi)TA See Tier 1 Material Table subsection 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS Inspection will be performed to verify that the passive containment cooling system ancillary water storage tank to the spent fuel pool includes a sufficient volume of water.

vi)AC See Tier 1 Material Table subsection 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS The volume of the passive containment cooling system ancillary water storage tank to the spent fuel pool is greater than or equal to 175,000 gallons

A revised write-up for the 2.3.7 is attached.

In Table 2.3.2-2 the new Note 1 may be inconsistent with the write-up in the FSER. We need to rewrite to clear up the confusion about what is the first normally closed valve.

Response: The note in the table defines the extent of seismically analyzed piping and applies to small fill, vent, and drain lines. The write-up in the FSER refers to the break between safety-related, ASME Code pipe and nonsafety-related, B31.1 pipe. Both of these segments are seismically analyzed. The valves in the lines that connect chemical and volume control system components, such as demineralizers, with the reactor coolant system are not normally closed valves.

In Table 2.2.3-2 we need to explain where the line numbers come from.

Response: The line segment numbers are defined in Table 3B-1 of Tier 2.

In Table 3.3-1 the NRC reviewer needs information against which to check the information in the table.

Response: The information in Table 3.3-1 has been verified against detailed structural design information and is consistent with the information in Figure 3.7.2-12, Nuclear Island Key Structural Dimensions. This figure is Tier 2\* information.

The proposed changes in the elevation of the walls in the pressurizer compartment would require revision of Figure 3.7.2-12 and will be withdrawn.

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**Tier 1 Subsection 2.3.7, and Tables 2.3.7-1, 2.3.7-2, 2.3.7-3, and 2.3.7-4**  
**Spent Fuel Pool Cooling System**

**Description of Change**

Correct and clarify the Tier 1 information for the spent fuel pool cooling system. Also provide precise references for ITAAC items.

**Technical Justification**

Change Table 2.3.7-4, Items 6.b and 7.b) to provide a direct reference to the relevant material.

Standardize the descriptive terms for "components" versus "equipment" and for "pipes" versus "lines" versus "piping," throughout the ITAAC to be component(s) and pipeline(s), respectively.

Table 2.3.7-4, Item 7.b) Design Commitment: revise the ITAAC Commitment statement to state that "The SFS provides spent fuel cooling for 7 days by boiling the spent fuel pool water and makeup water from on-site water storage tanks." The makeup water addition function is performed by the PCS, and ITAAC 2.2.2 provides the required inspection and acceptance criteria.

Table 2.3.7-4, Item 7.b), v: revise the Inspections, Tests, and Analyses entry and the Acceptance Criteria entry to state, "See Tier 1 Material subsection 2.2.2 for inspection, testing, and acceptance criteria for the SFS makeup water supply from the passive containment cooling system (PCS) ancillary water storage tank to the spent fuel pool." The makeup water addition function is performed by the PCS, and ITAAC 2.2.2 provides the required inspections, tests, and acceptance criteria.

**Regulatory Consequence**

There is no change to design function. There is no change to safety analyses of analysis methodology. This change will not affect the FSER.

**Change Markup**

Revise Tier 1 subsection 2.3.7 under "Design Description" as follows:

**2.3.7 Spent Fuel Pool Cooling System**

**Design Description**

The spent fuel pool cooling system (SFS) removes decay heat from spent fuel by transferring heat from the water in the spent fuel pool to the component cooling water system during normal modes of operation. During abnormal operation, when the normal heat removal method is not available, decay heat is removed from spent fuel by boiling water in the pool. The SFS purifies the water in the spent fuel pool, fuel transfer canal, and in-containment refueling water storage tank during normal modes of operation.

The SFS is as shown in Figure 2.3.7-1 and the component locations of the SFS are as shown in Table 2.3.7-5.

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1. The functional arrangement of the SFS is as described in the Design Description of this Section 2.3.7.
2.
  - a) The components identified in Table 2.3.7-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
  - b) The piping lines identified in Table 2.3.7-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.
3. Pressure boundary welds in piping lines identified in Table 2.3.7-2 as ASME Code Section III meet ASME Code Section III requirements.
4. The piping lines identified in Table 2.3.7-2 as ASME Code Section III retain their pressure boundary integrity at its design pressure.
5. The seismic Category I components identified in Table 2.3.7-1 can withstand seismic design basis loads without loss of safety function.
6.
  - a) The Class 1E components identified in Table 2.3.7-1 are powered from their respective Class 1E division.
    - a) Separation is provided between SFS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.
7. The SFS performs the following safety-related functions:
  - a) The SFS preserves containment integrity by isolating the SFS piping lines penetrating the containment.
  - b) The SFS provides spent fuel cooling for 7 days by boiling the spent fuel pool water and makeup water from on-site water storage tanks.
  - c) Check valves in the drain line from the refueling cavity prevent flooding of the refueling cavity during containment flooding.
8. The SFS provides the nonsafety-related function of removing spent fuel decay heat using pumped flow through a heat exchanger.
9. Safety-related displays identified in Table 2.3.7-1 can be retrieved in the main control room (MCR).
10. Controls exist in the MCR to cause the pumps identified in Table 2.3.7-3 to perform their listed functions.
11. Displays of the SFS parameters identified in Table 2.3.7-3 can be retrieved in the MCR.

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**Tier 1 Table 2.3.7-1** Revise the title of the first column and change the second entry on the second page of Tier 1 Table 2.3.7-1 as follows:

Table 2.3.7-1									
Component Name	Tag No.	ASME Code Section III	Seismic Cat 1	Remotely Operated Valve	Class 1E/ Qual for Harsh Envir.	Safety-Related Display	Control PMS	Active Function	Loss of Motive Power Position

Note: Dash (-) indicates not applicable.

Table 2.3.7-1 (cont.)									
Component Name	Tag No.	ASME Code Section III	Seismic Cat 1	Remotely Operated Valve	Class 1E/ Qual for Harsh Envir.	Safety-Related Display	Control PMS	Active Function	Loss of Motive Power Position
SFS Pump Discharge Line to Cask Loading Pit Isolation Valve	SFS-PL-V045	Yes	Yes	No	-/-	No	-	-	-

Note: Dash (-) indicates not applicable.

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**Tier 1 Table 2.3.7-2** Revise the title of the first column and revise the 11th entry in Tier 1 Table 2.3.7-2 as follows:

Table 2.3.7-2		
Piping Line Name	Line Number	ASME Code Section III
Cask Pit Transfer Branch Line	L045	Yes

**Tier 1 Table 2.3.7-3** Revise the title of the first column in Tier 1 Table 2.3.7-3 as follows:

Table 2.3.7-3			
Component Name	Tag No.	Display	Control Function
SFS Pump 1A	SFS-MP-01A	Yes (Run Status)	Start
SFS Pump 1B	SFS-MP-01B	Yes (Run Status)	Start
SFS Flow Sensor	SFS-13A	Yes	-
SFS Flow Sensor	SFS-13B	Yes	-
Spent Fuel Pool Temperature Sensor	SFS-018	Yes	-
Cask Loading Pit Level Sensor	SFS-022	Yes	-

Note: Dash (-) indicates not applicable.

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**Tier 1 Table 2.3.7-4** Revise Items 2.b), 3, 4, 5, 6.b, and 7.b) of Tier 1 Table 2.3.7-4 as follows:

<b>Table 2.3.7-4</b> <b>Inspections, Tests, Analyses, and Acceptance Criteria</b>		
<b>Design Commitment</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
2.b) The piping lines identified in Table 2.3.7-2 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built piping lines as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built piping lines identified in Table 2.3.7-2 as ASME Code Section III.
3. Pressure boundary welds in piping lines identified in Table 2.3.7-2 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds.
4. The piping lines identified in Table 2.3.7-2 as ASME Code Section III retain their pressure boundary integrity at its design pressure.	A hydrostatic test will be performed on the piping lines 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 lines identified in Table 2.3.7-2 as ASME Code Section III conform with the requirements of the ASME Code Section III.

<b>Table 2.3.7-4 (cont.)</b> <b>Inspections, Tests, Analyses, and Acceptance Criteria</b>		
<b>Design Commitment</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
5. The seismic Category I components identified in Table 2.3.7-1 can withstand seismic design basis loads without loss of safety functions.	<p>i) Inspection will be performed to verify that the seismic Category I components identified in Table 2.3.7-1 are located on the Nuclear Island.</p> <p>ii) Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.</p> <p>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.</p>	<p>i) The seismic Category I components identified in Table 2.3.7-1 are located on the Nuclear Island.</p> <p>ii) A report exists and concludes that the seismic Category I equipment can withstand seismic design basis loads without loss of safety function.</p> <p>iii) A report exists and concludes that the as-built equipment including anchorage is seismically bounded by the tested or analyzed conditions.</p>

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<b>Table 2.3.7-4 (cont.) Inspections, Tests, Analyses, and Acceptance Criteria</b>		
<b>Design Commitment</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
6.b) Separation is provided between SFS Class 1E divisions, and between Class 1E divisions and non-Class 1E cable.	See Tier 1 Material, Table 3.3-6, item 7.d.	See Tier 1 Material, Table 3.3-6, item 7.d.
7.b) The SFS provides spent fuel cooling for 7 days by boiling the spent fuel pool water and makeup water from on-site storage tanks.	i) Inspection will be performed to verify that the spent fuel pool includes a sufficient volume of water.  ii) Inspection will be performed to verify the cask washdown pit includes sufficient volume of water.  iii) A safety-related flow path exists from the cask washdown pit to the spent fuel pool.  iv) See Tier 1 Material Table 2.2.2-3, item 7.f. for inspection, testing, and acceptance criteria for the makeup water supply from the passive containment cooling system (PCS) water storage tank to the spent fuel pool.  v) Inspection will be performed to verify that the passive containment cooling system water storage tank includes a sufficient volume of water.  vi) See Tier 1 Material Table 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS ancillary water storage tank to the spent fuel pool.	i) The volume of the spent fuel pool and fuel transfer canal above the fuel and to the elevation 6 feet below the operating deck is greater than or equal to 46,700 gallons.  ii) The water volume of the cask washdown pit is greater than or equal to 30,900 gallons.  iii) See item 1 of this table.  iv) See Tier 1 Material Table 2.2.2-3, item 7.f. for inspection, testing, and acceptance criteria for the makeup water supply from the PCS water storage tank to the spent fuel pool.  v) See Tier 1 Material Table 2.2.2-3, item 7. for the passive containment cooling system water storage tank.  vi) See Tier 1 Material Table 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS ancillary water storage tank to the spent fuel pool.

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Table 2.3.4-4: Please explain where the line numbers come from.

Response: The line numbers come from the fire protection system P&ID

Subsection 2.3.7: Staff is concerned that the way the addition to the design

description is written a plant could continue to operate with boiling of the spent fuel pool occurring. We will propose revised words. Instead of deleting revise item 7.b. v) in Table 2.3.7-4 to provide a reference to Table 2.2.2-3 Item 7a for PFS storage tank volume. Put specific item reference in Item 7.b. vi) of Table 2.3.7-4.

Response: The description in 2.3.7 will be revised to read as follows:

The spent fuel pool cooling system (SFS) removes decay heat from spent fuel by transferring heat from the water in the spent fuel pool to the component cooling water system during normal modes of operation. During abnormal operation, when the normal heat removal method is not available, decay heat is removed from spent fuel by boiling water in the pool. The SFS purifies the water in the spent fuel pool, fuel transfer canal, and in-containment refueling water storage tank during normal modes of operation.

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iv)ITA See Tier 1 Material Table 2.2.2-3, item 7.f. subsection 2.2.2 for inspection, testing, and acceptance criteria for the makeup water supply line from the passive containment cooling system (PCS) water storage tank to the spent fuel pool.

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vii)TA See Tier 1 Material Table subsection 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS Inspection will be performed to verify that the passive containment cooling system ancillary water storage tank to the spent fuel pool includes a sufficient volume of water.

vi)AC See Tier 1 Material Table subsection 2.2.2-3 Items 7.e., 7.f., 8.a., and 8.b. for inspection, testing, and acceptance criteria for the SFS makeup water supply from the PCS The volume of the passive containment cooling system ancillary water storage tank to the spent fuel pool is greater than or equal to 175,000 gallons

A revised write-up for the 2.3.7 is attached.

In Table 2.3.2-2 the new Note 1 may be inconsistent with the write-up in the FSER. We need to rewrite to clear up the confusion about what is the first normally closed valve.

Response: The note in the table defines the extent of seismically analyzed piping and applies to small fill, vent, and drain lines. The write-up in the FSER refers to the break between safety-related, ASME Code pipe and nonsafety-related, B31.1 pipe. Both of these segments are seismically analyzed. The valves in the lines that connect chemical and volume control system components, such as demineralizers, with the reactor coolant system are not normally closed valves.

In Table 2.2.3-2 we need to explain where the line numbers come from.

Response: The line segment numbers are defined in Table 3B-1 of Tier 2.

In Table 3.3-1 the NRC reviewer needs information against which to check the information in the table.

Response: The information in Table 3.3-1 has been verified against detailed structural design information and is consistent with the information in Figure 3.7.2-12, Nuclear Island Key Structural Dimensions. This figure is Tier 2\* information.

The proposed changes in the elevation of the walls in the pressurizer compartment would require revision of Figure 3.7.2-12 and will be withdrawn.

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