AP1000DCDFileNPEm Resource

From: Adams II, Samuel L. [adamssl@westinghouse.com]
Sent: Tuesday, August 19, 2008 8:52 AM
To: Sikhindra Mitra
Cc: Perry Buckberg; Rhonda Carmon
Subject: FW: AP1000 CTSB RAIs.doc
Attachments: AP1000 CTSB RAIs.doc

Hi S.K.

I acknowledge receipt of the attached RAIs on SRP16.

I will let you know as soon as possible if a clarification call is necessary.

Thanks.

Sam

From: Sikhindra Mitra [mailto:Sikhindra.Mitra@nrc.gov]
Sent: Monday, August 18, 2008 10:53 AM
To: Adams II, Samuel L.
Cc: Eileen McKenna; Perry Buckberg; Rhonda Carmon; Theodore Tjader
Subject: AP1000 CTSB RAIs.doc

Sam

Please find attached SRP-16 RAIs. Please acknowledge receipt and let us know if you need clarifications. Thanks

Sikhindra (S.K) Mitra
Project Manager
AP1000 Project Branch 2 (NWE2)
301-415-2783

Hearing Identifier: AP1000_DCD_Review
Email Number: 90

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RAI-SRP 16-CTSB-01.

TS Section 1.1, Definitions, Shutdown Margin.
Related TS Sections requiring review;
TS Section 3.1.4, Rod Group Alignment Limits, and associated Bases;
TS Section 3.1.5, Shutdown Bank Insertion Limits, and associated Bases;
TS Section 3.1.6, Control Bank Insertion Limits, and associated Bases.

Clarify the role of Gray Rod Control Assemblies (GRCAs).

GRCAs are mentioned in the TS and associate Bases, yet their role is not adequately explained. In TS Section 1.1, Definitions, Shutdown Margin, the GRCAs are mentioned in paragraph c, by stating, "In MODES 3, 4, and 5, the worth of fully inserted GRCAs will be included in the SDM calculation." The implication is that in MODES 1 and 2 the GRCAs worth is not included; the treatment of GRCAs in the SDM calculation should be explicit.

RAI-SRP 16-CTSB-02.

TS Section 1.4 Frequency
Revise the discussion of Example 1.4-1 to make it consistent with requirements specified in SR 3.0.2 and SR 3.0.4.

The last paragraph of the example, as written in STS prior to Revision 3.1, does not correctly reflect requirements specified in SR 3.0.2 and SR 3.0.4. This error was identified and corrected under TSTF-485, Correct Example 1.4-1, Revision 0.

RAI-SRP 16-CTSB-03.

Technical Specification (TS) Section 2.1.1, Reactor Core Safety Limits (SL), and associated Bases.

Justify the DCD Revision 16 TS SL change from Reactor Coolant System (RCS) highest loop average temperature to RCS highest loop cold leg temperature.

This change differs from previously approved AP1000 DCD TS and from the Westinghouse Standard Technical Specifications (STS), NUREG-1431. This change is not supported or consistent with bases section B 2.1.1 (Page B 2.1.1-2); still refers to highest loop average temp.

The Bases for Section 2.1.1 makes reference to the average temperature per the following:

"The figure provided in the COLR shows the loci of points of THERMAL POWER, RCS pressure, and average temperature for which the minimum DNBR is not less than the safety analysis limit."

In addition, LCO 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," uses RCS Average Temperature as well as TR-74A Revision 2. Also, TR-74C Revision 0, SR 3.4.1.2 states: "Verify RCS average temperature is less

than or equal to the limit specified in the COLR" and TR-74C Revision 0, Section B2, "Reactor Coolant System Flow Measurement," states: "TS 3.4.1 requires frequent monitoring (every 12 hours) of reactor coolant system (RCS) average temperature, pressure, and flow."

RAI-SRP 16-CTSB-04

TS Section 3.1.4, Rod Group Alignment Limits

Correct the format of the DCD TS which is not consistent with the STS format. Specifically, the STS connects the LCO requirements with the word “and,” while the DCD TS does not.

DCD TS should read:

“All shutdown and control rods shall be OPERABLE.
[and]
Individual indicated rod positions shall be within 12 steps of their group step counter demand position.”

RAI-SRP 16-CTSB-05.

TS Section 3.1.5, Shutdown Bank Insertion Limits; and related
TS Section 3.1.6, Control Bank Insertion Limits.

Explain and justify the Applicability of each of the above TS with respect to the limitation of the TS applying only when OPDMS is inoperable.

If the Shutdown Bank and Control Bank Insertion Limits are not met the Required Actions and Completion Times of TS 3.1.5 and TS 3.1.6 should apply. By making the TS apply only when the OPDMS is inoperable, the LCO can be not met for an extended/indefinite period of time when the OPDMS is Operable, which is not intended.

RAI-SRP 16-CTSB-06.

TS Section 3.2.1, Heat Flux Hot Channel Factor (FQ(Z)) (FQ Methodology);
and related TS:
TS Section 3.2.2, Nuclear Enthalpy Rise Hot Channel Factor ($NF\Delta H$)) ;
TS Section 3.2.3, AXIAL FLUX DIFFERENCE (AFD) (Relaxed Axial Offset Control (RAOC) Methodology);
TS Section 3.2.4, QUADRANT POWER TILT RATIO (QPTR); and,
TS Section 3.2.5, OPDMS-Monitored Parameters.

Explain and justify the Applicability of each of the above TS with respect to the limitation of the TS applying only when OPDMS is inoperable.

By relying on TS Section 3.2.5, OPDMS-Monitored Parameters, when the OPDMS is Operable, the Completion Times for restoring the parameters to within limits are not consistent with the related TS. In addition, the difference with the STS in using this approach results in SR Frequency changes.

The limits of TS 3.2.1, TS 3.2.2, TS 3.2.3, and TS 3.2.4, apply whether or not the OPDMS is operable; it appears that these TS need to be revised, and that TS 3.2.5 may not be necessary.

RAI-SRP 16-CTSB-07.

TS 3.4.11, Automatic Depressurization System (ADS) - Operating.
TS 3.4.12, Automatic Depressurization System (ADS) - Shutdown, RCS Intact

Explain how Condition B is different from Condition A in its scope. Revise TS 3.4.11 and the associated bases B 3.4.11, as appropriate.

Condition A states "One required flow path inoperable." Condition B states "One required stage 1 ADS flow path inoperable AND Either one required stage 2 or stage 3 ADS flow path inoperable." In addition, a Completion Time of 72 hours is assigned for both conditions even though Condition B appears to affect more ADS equipment than Condition A.

The above request applies also to TS 3.4.12.

RAI-SRP 16-CTSB-08.

TS 3.4.6, Pressurizer Safety Valves.

Revise SR 3.4.6.1 and related information in TS bases B 3.4.6 to reconcile the lift setpoint requirements.

LCO 3.4.6 specifies the allowable range for OPERABILITY of the Pressurizer Safety Valves to be from 2460 psig to 2510 psig (2485 psig +/- 1%). SR 3.4.6.1 requires verification that the lift setting to be within +/- 1%. The basis for SR 3.4.6.1, however, states that "the pressurizer safety valve setpoint is +/- 3% for OPERABILITY, and the valves are reset to +/- 1% during the Surveillance to allow for drift." Also, it should be noted that the +/- 1% tolerance is based on ASME Code, Section III, NB 7500 requirements which state, in part, "the set pressure tolerance plus or minus shall not exceed the following: 2 psi (15 kPa) for pressures up to and including 70 psi (480 kPa), 3% for pressures from 70 psi (480 kPa) to 300 psi (2 MPa), 10 psi (70 kPa) for pressures over 300 psi (2 MPa) to 1,000 psi (7 MPa), and 1% for pressures over 1,000 psi (7 MPa). The set pressure tolerance shall apply unless a greater tolerance is established as permissible in the Overpressure Protection Report (NB-7200)."

RAI-SRP 16-CTSB-09.

TS 3.4.8, Minimum RCS Flow. Technical Report (TR) 80.

Revise LCO 3.4.8 and related information in TS bases B 3.4.8 to reflect the RNS pump operation including a justification that the affected RCS volume is well mixed under this configuration. Also, list FSAR Section 15.4.6 as a reference in the TS bases B 3.4.8.

AP1000 TS 3.4.8 is used to establish a minimum RCS flow rate through the reactor core in support of boron dilution event during plant shutdown at Mode 5. 10CFR50.36(d)(2)(ii) requires an LCO to be established for "a process variable, design feature, or operating

restriction that is an initial condition of a design basis accident or transient analysis." The fifth bullet paragraph of Section 15.4.6.2.2 is being revised under TR 80 to allow for an alternate equipment lineup (e.g. using RNS pumps versus one RCP, to maintain the minimum RCS flow required in Mode 5 under TS 3.4.8. No change to TS 3.4.8 or the associated bases B 3.4.8 is being proposed to account for this alternate equipment lineup.

RAI-SRP 16-CTSB-10.

TS 3.4.8, Minimum RCS Flow.

Evaluate TS 3.4.8 and related information in TS bases B 3.4.8 for the applicability of a Note in LCO 3.4.8 to ensure operability of the PRHR HX is maintained in Shutdown Modes 4 and 5, if applicable. Revise LCO 3.4.8 and related information in the bases B 3.4.8, as appropriate.

For operability of the Passive Residual Heat Removal Heat Exchanger (PRHR HX) in Shutdown Modes 4 and 5 with RCS intact, LCO 3.5.5 contains a Note that requires "when any reactor coolant pumps (RCPs) are operating, at least one RCP must be operating in the loop with the PRHR HX, Loop 1." This Note should also be placed in LCO 3.4.8 when at least one RCP shall be in operation to provide the minimum RCS Flow in Modes 3, 4, and 5. The staff's concern is that a reverse flow in the idle loop may affect the operability of the PRHR HX, if required.

RAI-SRP 16-CTSB-11.

TS 3.7.1, Main Steam Safety Valves (MSSVs). Technical Report (TR) 74C, Revision 0.

Provide additional justification for the change of tolerance from 1% to 3% for the setpoint setting of MSSVs in Table 3.7.1-2.

AP1000 DCD Revision 15 specifies a tolerance of 1%. TR 74C, Revision 0, proposed a change from 1% to 3%. The 1% tolerance was based on requirements of ASME Code, Section III, NC 7000 (Subsection NC 7512) which is listed as Reference 2 in the TS bases B 3.7.1. ASME Code Subsection NC 7512 states, in part, "The set pressure tolerance plus or minus shall not exceed the following: 2 psi (15 kPa) for pressures up to and including 70 psi (500 kPa), 3% for pressures over 70 psi (500 kPa) up to and including 300 psi (2000 kPa), 10 psi (70 kPa) for pressures over 300 psi (2000 kPa) up to and including 1000 psi (7000 kPa), and 1% for pressures over 1000 psi (7000 kPa). The set pressure tolerance shall apply unless a greater tolerance is established as permissible in the Overpressure Protection Report (NC-7200)." For justification of the proposed change, in TR 74C, Westinghouse states "Table 3.7.1-2 as-found setting was revised from 1% to 3% to be consistent with NUREG-1431 and the AP1000 Bases," however, the 3% value is bracketed in the STS, NUREG-1431, depending on conformance to ASME Code requirements discussed above.

RAI-SRP 16-CTSB-12.

TS 3.7.1, Main Steam Safety Valves (MSSVs).

Revise TS 3.7.1 and related information in TS bases B 3.7.1 to provide a completion time (CT) for the Required Action A.1 including a justification for the selected value.

A CT was missing for the Required Action A.1. In the Westinghouse STS 3.7.1, a CT of 4 hours is posted for a similar action.

RAI-SRP 16-CTSB-13.

B3.6.4 Containment Pressure
Clarify the Bases regarding the maximum peak containment pressure. In the Bases, on page B 3.6.4-1 in the APPLICABLE SAFETY ANALYSIS section, it states that the maximum peak containment pressure is a result of a SLB. However, in the same section the maximum peak pressure from a LOCA is 57.8 psig and the maximum pressure for a SLB is 57.3 psig. Clarify the discrepancy regarding the maximum peak pressures for accuracy in the Bases.

RAI-SRP 16-CTSB-14.

B3.6.5 Containment Air Temperature
Clarify the Bases regarding the containment vessel design temperature. In the Bases, on page B 3.6.5-2 in the APPLICABLE SAFETY ANALYSIS section, it states that the containment vessel design temperature is 300 degrees Fahrenheit and that containment vessel temperature remains below 300 degrees Fahrenheit for DBAs. However, in the FSAR Chapter 6, Table 6.2.1.1-1 three of the four DBAs listed have peak temperatures (416.5, 373.9, and 375.3 degress) that exceed 300 degrees. Clarify this discrepancy regarding containment vessel design temperature for accuracy between the Bases and FSAR.

RAI-SRP 16-CTSB-15.

B3.6.6 Passive Containment Cooling System - Operating
Correct the Bases B 3.6.6 to accurately reflect Technical Specification 3.6.6. In the Bases, on page B 3.6.6-5, the description for D.1 and D.2 does not accurately reflect what is stated in Condition D. for Technical Specification 3.6.6. Condition D requires cold shutdown when the required action and associated completion times are not met or when the LCO is not met for reasons other than Conditions A, B, or C. The description for D.1 and D.2 states that the plant must go into cold shutdown when the required action and associated completion times for Conditions A or B are not met or if the LCO is not met for reasons other than Condition A or B. This description fails to include Condition C. Provide a corrected description in the Actions section that matches the requirements of Technical Specification 3.6.6.

RAI-SRP 16-CTSB-16

B3.6.7 Passive Containment Cooling System - Shutdown
Corret Bases B 3.6.7 to accurately reflect Technical Specification 3.6.7. In the Bases, on page B 3.6.7-2, the description for D.1.1, D.1.2, and D.2 does not accurately reflect what is stated in Condition D. for Technical Specification 3.6.7. Condition D is applicable when the required action and associated completion times are not met or when the LCO is not met for reasons other than Conditions A, B, or C. The description for D.1.1, D.1.2, and D.2 states that initiation is applicable when the required action

and associated completion times for Conditions A or B are not met or if the LCO is not met for reasons other than Condition A or B. This description fails to include Condition C. Provide a corrected description in the Actions section that matches the requirements of Technical Specification 3.6.7.

RAI-SRP 16-CTSB-17.

Bases 3.1.5; Page B.3.1.5-2 and associated Bases (B.3.1.5; Page B.3.1.5-4):

Provide clarification/justification regarding conflicting statements defining SDM with respect to gray rod cluster assemblies (GRCAs). State specifically which control rods are to be inserted during a scram in order to maintain SDM.

The Bases for Section 3.1.5 appears to conflict with Sections 3.1.1 and 3.1.6 in defining SDM. The Bases for Section 3.1.1 states " ..SDM defines the degree of subcriticality that would be obtained immediately following the insertion or scram of all Rod Cluster Control Assemblies (RCCAs), assuming that the single rod cluster assembly of highest reactivity worth is fully withdrawn." This appears to conflict with the statement in the Bases for Section B 3.1.5, "On a reactor trip, all RCCAs (shutdown banks and control banks exclusive of GRCAs), except the most reactive RCCA, are assumed to insert into the core." The discrepancy in these two statements involves the GRCAs (a subgroup of the Control Bank).

RAI-SRP 16-CTSB-18.

LCO 3.1.5; Page 3.1.5-1 and associated Bases (B.3.1.5; Page B.3.1.5-3) and LCO 3.2.5; Page 3.2.5-1 and associated Bases (B.3.1.5; Page B.3.1.5-3):

Discuss the methodology and process used to calculate SDM using the OPDMS or provide the reference for the applicable approved method. Provide justification for why LCO 3.1.5 is not applicable when OPDMS is operable. LCOs 3.1.5 and 3.2.5 both relate to the operability of the online power distribution monitoring system (OPDMS) and its capability to calculate SDM.

The staff needs to understand the methodology and/or process of how shutdown margin (SDM) is calculated using OPDMS (e.g.: how the various parameters, in-core neutronics and actual flux distribution, are measured and if values are being extrapolated, etc. Assuming instrumentation is octal symmetric - is the algorithm and placement of the instruments sensitive to individual rod position?).

This RAI also applies to Section 3.1.6, "Control Bank Insertion Limits," Section 3.1.7, "Rod Position Indication," and Section 3.2.5, "OPDMS-Monitored Parameters."

RAI-SRP 16-CTSB-19.

LCO 3.1.8, Page 3.1.8-1:

Provide justification for going critical with an RCS lowest loop average temperature >541oF during the performance of PHYSICS TESTS initiated in MODE 2.

Per TS 3.4.2, "RCS Minimum Temperature for Criticality," the minimum temperature for criticality is Tavg >551oF. The justification may be similar to that provided in the APPLICABILITY section in B 3.4.2, page B 3.4.2-2 for MTC.

RAI-SRP 16-CTSB-20.

Bases B.3.1.8; Pages B.3.1.8-3 and B.3.1.8-7:

Provide the correct edition year for referencing ANSI/ANS-19.6.1. Confirm the version used in the current submittal is justified and implemented.

The "Applicable Safety Analyses" paragraph makes reference to ANSI/ANS-19.6.1-1985 (Ref 4), however, the Reference Section lists Reference 4 as having a revision year of 1997 (ANSI/ANS-19.6.1-1997).

In addition, per ANSI/ANS, both ANSI/ANS-19.6.1-1997 and ANSI/ANS-19.6.1-1985 are retired. The active version is ANSI/ANS-19.6.1-2005.

NOTE:
It appears that the BASES Background section describes the testing requirements per ANSI/ANS-19.6.1-2005, which only gives three tests at Hot Zero Power (HZP) instead of the four tests required per ANSI/ANS-19.6.1-1997. If ANSI/ANS-19.6.1-1997 is governing, then the Differential Boron Worth (The Critical Boron Concentration - Control Rods Inserted Test) test will need to be described.

RAI-SRP 16-CTSB-21.

LCO 3.1.8; Page 3.1.8-1:

Provide the correct Function number listed in LCO 3.1.8. The incorrect Function reference appears to be the result of a change to the previously referenced Function number.

Revision 16 states:
"During the performance of PHYSICS TESTS, the requirements of ..may be suspended and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6 and 16.c, may be reduced to 3 required channels, provided.. "

The inappropriate Function is Function 16.c (see Page 3.3.1-15). Function 16.c now relates to "Pressurizer Pressure,
P-11." The appropriate function appears to be 16.b, "Power Range Neutron Flux, P-10" based on the changes made from Revision 15 to Revision 16.

RAI-SRP 16-CTSB-22.

LCO 3.2.1; Page 3.2.1-4 (SR 3.2.1.2):

Resolve discrepancy between "Note a." in SR 3.2.1.2 and "Note a." in the associated Bases for SR 3.2.1.2 (Surveillance Requirements). Guidance provided in the Bases is not included in LCO 3.2.1 "Note a." which ensures the last FQW (Z) measurement is to

be increased. Also, provide an explanation for reverifying that FQW(Z) is within limits (this reasoning is not provided in the Bases).

SR 3.2.1.2 Note states:
If FQW(Z) measurements indicate maximum over zFQC(Z) has increased since the previous evaluation of FQC(Z) :

a. Increase FQW(Z) by the greater of a factor of 1.02 or by an appropriate factor specified in the COLR and reverify FQW(Z) is within limits; or

b. Repeat SR 3.2.1.2 once per 7 EFPD until two successive flux maps indicate maximum over zFQC(Z) has not increased.

Bases SR 3.2.1.2 states:
If the two most recent FQ(Z) evaluations show an increase in FQC(Z) , it is required to meet the FQ (Z) limit with the last FQW(Z) increased by the greater of a factor of 1.02 or by an appropriate factor as specified in the COLR or to evaluate FQ(Z) more frequently, each 7 EFPDs. These alternative requirements will prevent FQ(Z) from exceeding its limit for any significant period of time without detection.

The Bases specifically states to use the last FQW(Z) when increasing by a factor of 1.02 or the appropriate COLR factor, however, "Note a" of LCO 3.2.1 does not specifically provide this guidance.

RAI-SRP 16-CTSB-23.

LCO 3.2.5; page 3.2.5-1:

Resolve discrepancy of APPLICABILITY for Mode 2 between the Bases and the LCO Applicability section where Keff >1.

LCO APPLICABILITY Section states:
"Modes 1 and 2 and OPDMS OPERABLE for parameter d."

Bases APPLICABILITY Section states:
"The OPDMS monitoring of SDM must be operable in Modes 1 and 2 with Keff >1."

RAI-SRP 16-CTSB-24.

LCO 3.3.2, B 3.3.2; Page 3.3.2-41;

For the description of RCS pressure permissive P-19, provide the basis for the 92% pressurizer water level value as a definition of water solid conditions in lower MODES without automatic isolation of the CVS makeup pumps.

The basis for this value was not evident.

RAI-SRP 16-CTSB-25.

SR 3.4.1.4; Page 3.4.1-2:

Provide justification that ensures the staff that an accepted method will continue to be used for monitoring RCS flow if precision heat balance is not performed to verify this parameter. The current SR 3.4.1.4 (Rev. 15) provides an NRC accepted method, precision heat balance, to verify that RCS total flow rate meets TS and COLR requirements. Revision 16 proposes to delete this method, without replacing it with any other method(s), stating (in TR 74C) the deletion permits for use of a simpler and more accurate alternate method for monitoring RCS flow.

By deleting this specific and NRC-accepted method of verification, the staff is no longer ensured that an acceptable method will be used to verify this parameter since it would no longer be included in the TS. The staff needs assurance that an NRC-accepted method will be used in place of precision heat balance for verification of this surveillance requirement. By including the method(s) in the TS the staff is fully aware of what specific method(s) would be used.

RAI-SRP 16-CTSB-26.

TS 3.4.11, Automatic Depressurization System (ADS) - Operating.
TS 3.4.12, Automatic Depressurization System (ADS) - Shutdown, RCS Intact

Explain how Condition B is different from Condition A in its scope. Revise TS 3.4.11 and the associated bases B 3.4.11, as appropriate.

Condition A states "One required flow path inoperable." Condition B states "One required stage 1 ADS flow path inoperable AND Either one required stage 2 or stage 3 ADS flow path inoperable." In addition, a Completion Time of 72 hours is assigned for both conditions eventhough Condition B appears to affect more ADS equipment than Condition A.

The above request applies also to TS 3.4.12.

RAI-SRP 16-CTSB-27.

TS 3.4.6, Pressurizer Safety Valves.

Revise SR 3.4.6.1 and related information in TS bases B 3.4.6 to reconcile the lift setpoint requirements.

LCO 3.4.6 specifies the allowable range for OPERABILITY of the Pressurizer Safety Valves to be from 2460 psig to 2510 psig (2485 psig +/- 1%). SR 3.4.6.1 requires verification that the lift setting to be within +/- 1%. The basis for SR 3.4.6.1, however, states that "the pressurizer safety valve setpoint is +/- 3% for OPERABILITY, and the valves are reset to +/- 1% during the Surveillance to allow for drift." Also, it should be noted that the +/- 1% tolerance is based on ASME Code, Section III, NB 7500 requirements which state, in part, "the set pressure tolerance plus or minus shall not

exceed the following: 2 psi (15 kPa) for pressures up to and including 70 psi (480 kPa), 3% for pressures from 70 psi (480 kPa) to 300 psi (2 MPa), 10 psi (70 kPa) for pressures over 300 psi (2 MPa) to 1,000 psi (7 MPa), and 1% for pressures over 1,000 psi (7 MPa). The set pressure tolerance shall apply unless a greater tolerance is established as permissible in the Overpressure Protection Report (NB-7200)."

RAI-SRP 16-CTSB-28.

TS 3.4.8, Minimum RCS Flow. Technical Report (TR) 80.

Revise LCO 3.4.8 and related information in TS bases B 3.4.8 to reflect the RNS pump operation including a justification that the affected RCS volume is well mixed under this configuration. Also, list FSAR Section 15.4.6 as a reference in the TS bases B 3.4.8.

AP1000 TS 3.4.8 is used to establish a minimum RCS flow rate through the reactor core in support of boron dilution event during plant shutdow at Mode 5. 10CFR50.36(d)(2)(ii) requires an LCO to be established for "a process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis." The fifth bullet paragraph of Section 15.4.6.2.2 is being revised under TR 80 to allow for an alternate equipment lineup (e.g. using RNS pumps versus one RCP, to maintain the minimum RCS flow required in Mode 5 under TS 3.4.8. No change to TS 3.4.8 or the associated bases B 3.4.8 is being proposed to account for this alternate equipment lineup.

RAI-SRP 16-CTSB-29.

TS 3.4.8, Minimum RCS Flow.

Evaluate TS 3.4.8 and related information in TS bases B 3.4.8 for the applicability of a Note in LCO 3.4.8 to ensure operability of the PRHR HX is maintained in Shutdown Modes 4 and 5, if applicable. Revise LCO 3.4.8 and related information in the bases B 3.4.8, as appropriate.

For operability of the Passive Residual Heat Removal Heat Exchanger (PRHR HX) in Shutdown Modes 4 and 5 with RCS intact, LCO 3.5.5 contains a Note that requires "when any reactor coolant pumps (RCPs) are operating, at least one RCP must be operating in the loop with the PRHR HX, Loop 1." This Note should also be placed in LCO 3.4.8 when at least one RCP shall be in operation to provide the minimum RCS Flow in Modes 3, 4, and 5. The staff's concern is that a reverse flow in the idle loop may affect the operability of the PRHR HX, if required.

RAI-SRP 16-CTSB-30.

TS 3.7.1, Main Steam Safety Valves (MSSVs).

Revise TS 3.7.1 and related information in TS bases B 3.7.1 to provide a completion time (CT) for the Required Action A.1 including a justification for the selected value.

A CT was missing for the Required Action A.1. In the Westinghouse STS 3.7.1, a CT of 4 hours is posted for a similar action.

RAI-SRP 16-CTSB-31.

TS 3.7.1, Main Steam Safety Valves (MSSVs). Technical Report (TR) 74C, Revision 0.

Provide additional justification for the change of tolerance from 1% to 3% for the setpoint setting of MSSVs in Table 3.7.1-2.

AP1000 DCD Revision 15 specifies a tolerance of 1%. TR 74C, Revision 0, proposed a change from 1% to 3%. The 1% tolerance was based on requirements of ASME Code, Section III, NC 7000 (Subsection NC 7512) which is listed as Reference 2 in the TS bases B 3.7.1. ASME Code Subsection NC 7512 states, in part, "The set pressure tolerance plus or minus shall not exceed the following: 2 psi (15 kPa) for pressures up to and including 70 psi (500 kPa), 3% for pressures over 70 psi (500 kPa) up to and including 300 psi (2000 kPa), 10 psi (70 kPa) for pressures over 300 psi (2000 kPa) up to and including 1000 psi (7000 kPa), and 1% for pressures over 1000 psi (7000 kPa). The set pressure tolerance shall apply unless a greater tolerance is established as permissible in the Overpressure Protection Report (NC-7200)." For justification of the proposed change, in TR 74C, Westinghouse states "Table 3.7.1-2 as-found setting was revised from 1% to 3% to be consistent with NUREG-1431 and the AP1000 Bases," however, the 3% value is bracketed in the STS, NUREG-1431, depending on conformance to ASME Code requirements discussed above.

RAI-SRP 16-CTSB-32.

TS 3.7.6 Main Control Room Habitability System.

Demonstrate that generic safety issues identified in the NRC Geniric Letter 2003-01, Control Room Habitability, are addressed in the AP1000 DCD and in the AP1000 Generic Technical Specifications.

The adoption of the NRC approved TSTF-448, Control Room Habitability, Revision 3, if determined to be applicable, would be an acceptable option to resolve the above stated issues.

RAI-SRP 16-CTSB-33.

TS Bases B 3.6.9, pH Adjustment. Technical Report (TR) 74A, Revision 1.

Revise the TS bases B 3.6.9 to provide the value of the minimum TSP manufactured density which is used to convert the required TSP amount from a mass number to a volume number.

A mass value of 27540 pounds is given for the required TSP amount in the AP1000 DCD Subsection 6.3.2.2.4. LCO 3.6.9 specifies a minimum TSP amount of 560 cubic feet. The TS bases B 3.6.9 further state "a required volume is specified instead of mass because it is not feasible to weigh the TSP in the containment. The minimum required volume is based on the manufactured density of TSP." The minimum TSP manufactured density value is needed to verify the accuracy of the calculated volume. In addition, TR 74A, Revision 1 proposed a change from "27540 pounds" to "26460 pounds" for the minimum TSP mass value listed in the TS bases B 3.6.9, but the specified volume

number of 560 cubic feet remains the same in LCO 3.6.9. Also, DCD Subsection 6.3.2.2.4 should be changed to reflect the new mass number of 26460 pounds.

RAI-SRP 16-CTSB-34.

Resolve inconsistency between Bases and SR.
The applicability of SR 3.1.1.1 (LCO 3.1.1) in MODE 2 when Keff > 1.0 was omitted. The Bases is not consistent with the SR. The applicability of LCO 3.1.1 is MODE 2 with Keff < 1.0 and MODES 3, 4 and 5.

Per NUREG 1431 Rev 3 Vol. 2; the sentence should read:
"In MODES 1 and 2 with Keff ≥ 1.0, SDM is verified"

DCD Chapter 16.1, rev 16 currently reads:
"In MODES 1 and 2, SDM is verified ."

RAI-SRP 16-CTSB-35.

TS 3.4.14 Low Temperature Over Protection System (LTOP)

Provide additional justification for the RCS vent reduction. The final value of an RCS vent is given as greater than or equal to 4.15 square inches replacing the bracketed (preliminary) value of 9.3 square inches.

Additional justification is needed to reduce the size of the RCS vent. The RCS vent size was 9.3 square inches and the requested change is 4.15 square inches. The AP1000 design of the RNS suction relief valve and piping should have been understood prior to in the design yet the cross sectional area of the valve has just been reduced by over half. With the exception of the numerical value, all other verbiage remained unchanged. Therefore there is no basis provided to support this change.

RAI-SRP 16-CTSB-36.

TS 3.5.4 Passive Residual Heat Removal Heat Exchanger System

Deleted brackets in SR 3.5.4.3:

The volume of the non-condensable gases in the PRHR HX inlet line changed to <= 0.9 ft3 from <= 0.4 ft3. Provide additional justification for this change.

RAI-SRP 16-CTSB-37.

TS 3.5.6 In-containment Refueling Water Storage Tank

Deleted brackets in SR 3.5.6.2; Verify the IRWST borated water volume was changed and brackets removed:

Provide additional justification for the reduction of the IRWST borated water volume from 73,900 ft3 to 73,100 ft3. This change also affects SR 3.5.8.2.

RAI-SRP 16-CTSB-38.

TS 4.3.1 Criticality

Provide a basis for the fuel rack spacing of the defective fuel cells and provide an explanation for the differences between the dimensions (noted in Section 4.3.1 Criticality, paragraph 4.3.1.1 (c.) and DCD Section 9.1) for the fuel rack spacing of the Region 2 fuel cells. Also, provide a reference to APP-GW-GLR-029 for Figure 4.3-2.

Section 4.3.1 Criticality, paragraph 4.3.1.1 (c.) notes a nominal 11.62 inch center-to-center distance between fuel assemblies placed in the Defective Fuel Cells. This number is not noted in the discussion or figures in Section 9.1 of the DCD. The AP1000 Standard COLA Technical Report, APP-GW-GLR-029, page 10 of 67 notes a 10.478 center-to-center spacing. Section 4.3.1.1 (c.) notes a nominal 9.028-inch center-to-center distance between fuel assemblies placed in Region 2 spent fuel storage racks. Section 9.1.2.2.1 and Figure 9.1-3 sheet 102 notes a 9.03-inch center-to-center distance. Additionally Section 4.3 includes Figure 4.3-2 that provides a fuel cell diagram for storing new fuel in the Spent Fuel Region 2 area (the "1-out-4 5.0 Weight-Percent Fresh" Fuel Configuration). This figure was not included in Section 9.1, or Section 4.3.2.6, but was included in APP-GW-GLR-029.

RAI-SRP 16-CTSB-39.

TS 4.3.1 Criticality

Provide an explanation for the differences in allowable Keff for the new fuel storage racks noted in DCD Section 9.1.1.3 and Design Features, Section 4.3.1.2. b and c.

Section 9.1.1.3, Safety Analysis, second paragraph, describes that Keff remains less than or equal to 0.95 with new fuel of the maximum design basis enrichment, and that Keff does not exceed 0.98 for a postulated accident condition of flooding of the new fuel storage area with unborated water. This is not consistent with sections 4.3.1.2.b and c, which notes that Keff less than or equal to 0.95 for the fully flooded with un-borated water case and Keff less than or equal to 0.98 for the moderated with aqueous foam condition.

RAI-SRP 16-CTSB-40.

TS 1.1 Definition (EDITORIAL)

Spell out the acronym GRCA in the definition for SHUTDOWN MARGIN, para. (c).

The acronym is not spelled out here and it is the first use of the acronym in the Technical Specifications. Upon the first reference in each Specification or Bases to a phrase for which an abbreviation is desired to be used, use the full phrase followed by the acronym or initialism set off by parentheses. Use the abbreviation alone on all subsequent references in that Specification or Bases.

RAI-SRP 16-CTSB-41.

TS 2.1 Safety Limits (EDITORIAL)

Resolve the discrepancy in the title of Reference 5. The title of DCD Section 7.2 is not correctly stated.

For Reference 5, the correct title of DCD Section 7.2 is "Reactor Trip" and not "Reactor Trip System."