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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: T. R. QUAY

SUBJECT: CLOSING THE LAST DSER OPEN ITEM FOR AP600 SSAR SECTION 16.1, TECHNICAL SPECIFICATIONS (TS)

Dear Mr. Quay:

This letter is written to close the last DSER open item for AP600 SSAR Section 16.1, Technical Specifications (TS). Westinghouse committed to provide written explanation of technical differences between the AP600 TS and those presented in NUREG-1431, the Standard TS (STS). Attached are:

1. A roadmap which identifies the sections comprising the STS versus those included in the AP600 TS. For any TS that are included in the STS but not in the AP600 TS, an explanation is provided. For any TS that are included in the AP600 TS but not in the STS, those sections are shaded in the roadmap and explained. Explanations are also provided for other content differences between the STS and AP600 TS.

2. A description of general or overall changes whose explanations apply to multiple TS.

3. A list of technical differences between the STS and AP600 TS. The TS and BASES are grouped by section and an explanation of each difference is provided.

4. A table of and explanation for those LCOs whose endpoint is defined as MODE 4 for the AP600, rather than MODE 5 or "Go to LCO 3.0.3" per the STS.

Discussions regarding ties between the AP600 PRA and the Technical Specifications will be provided in the response to RAI 630.10.

This submittal closes Open Item Tracking System (OITS) item 2353, which is the final open item for the AP600 Technical Specifications. If you have any questions regarding this transmittal, please contact Robin K. Nydes at (412) 374-4125.

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

/nja

Attachment

cc: W. Huffman, NRC
A. Chu, NRC
C. Grimes, NRC
N. Liparulo, Westinghouse (w/o Attachments)

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Roadmap for Content of

AP600 Technical Specifications

vs.

NUREG-1431

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
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1.1	Definitions	Included
1.2	Logical Connectors	Included
1.3	Completion Times	Included
1.4	Frequency	Included
2.0	SAFETY LIMITS (SLs)	Included
2.1	SLs	Included
2.2	SL Violations	Included
3.0	LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY	Included
3.0	SURVEILLANCE REQUIREMENT (SR) APPLICABILITY	Included
3.1	REACTIVITY CONTROL SYSTEMS	
3.1.1	SHUTDOWN MARGIN (SDM) — T_{avg} > 200°F	Included Combined with LCO 3.1.2, since SDM limit is the same
3.1.2	SHUTDOWN MARGIN (SDM) — T_{avg} ≤ 200°F	Included Combined with LCO 3.1.1, since SDM limit is the same
3.1.3	Core Reactivity	Included
3.1.4	Moderator Temperature Coefficient (MTC)	Included
3.1.5	Rod Group Alignment Limits	Included
3.1.6	Shutdown Bank Insertion Limits	Included
3.1.7	Control Bank Insertion Limits	Included
3.1.8	Rod Position Indication	Included
3.1.9	PHYSICS TESTS Exceptions — MODE 1	Not required for AP600 AP600 physics testing in MODE 1 can be performed within the limitations of applicable LCOs
3.1.10	PHYSICS TESTS Exceptions — MODE 2	Included

NUREG-1431 Rev. 1 / AP600 LCOS ADDED		DISCUSSION
3.1.11	SHUTDOWN MARGIN (SDM) Test Exceptions	Not required for AP600 AP600 control rod worth testing in MODE 2 can be performed without violation of the SDM requirements
3.1.9	**Chemical and Volume Control System (CVS) Demineralized Water Isolation Valves**	**Added for AP600** **Operable isolation valves are required to mitigate RCS boron dilution events in MODES 1 - 5**
3.2	POWER DISTRIBUTION LIMITS	
3.2.1	Heat Flux Hot Channel Factor ($F_Q(Z)$) (F_Q Methodology)	Included
3.2.2	Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)	Included
3.2.3	AXIAL FLUX DIFFERENCE (AFD) (Relaxed Axial Offset Control (RAOC) Methodology)	Included
3.2.4	QUADRANT POWER TILT RATIO (QPTR)	Included
3.2.5	**OPDMS-Monitored Power Distribution Parameters**	**Added for AP600** **AP600 system continuously monitors power distribution parameters via fixed incore detectors**
3.3	INSTRUMENTATION	
3.3.1	Reactor Trip System (RTS) Instrumentation	Included
3.3.2	Engineered Safety Feature Actuation System (ESFAS) Instrumentation	Included
3.3.3	Post Accident Monitoring (PAM) Instrumentation	Included
3.3.4	Remote Shutdown System	Included
3.3.5	Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation	Not applicable to AP600 Plant design difference Diesel generators not required for accident mitigation
3.3.6	Containment Purge and Exhaust Isolation Instrumentation	Included in LCO 3.3.2, ESFAS Plant design difference Instrumentation not separate from ESFAS as in typical W plants

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.3.7	Control Room Emergency Filtration System (CREFS) Actuation Instrumentation	Included in LCO 3.3.2, ESFAS Plant design difference Instrumentation not separate from ESFAS as in typical W plants
3.3.8	Fuel Building Air Cleanup System (FBACS) Actuation Instrumentation	Not applicable to AP600 Analysis difference Air cleanup system and actuating instrumentation not needed to mitigate fuel handling accident
3.3.9	Boron Dilution Protection System (BDPS)	Included in LCO 3.3.2, ESFAS Plant design difference Instrumentation not separate from ESFAS as in typical W plants
3.4	REACTOR COOLANT SYSTEM (RCS)	
3.4.1	RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits	Included
3.4.2	RCS Minimum Temperature for Criticality	Included
3.4.3	RCS Pressure and Temperature (P/T) Limits	Included
3.4.4	RCS Loops — MODES 1 and 2	Included
3.4.5	RCS Loops — MODE 3	Included MODE 3, 4, and 5 requirements specified in one LCO
3.4.6	RCS Loops — MODE 4	Included MODE 3, 4, and 5 requirements specified in one LCO
3.4.7	RCS Loops — MODE 5, Loops Filled	Included, MODE 3, 4, and 5 requirements specified in one LCO
3.4.8	RCS Loops — MODE 5, Loops Not Filled	Included, MODE 3, 4, and 5 requirements specified in one LCO
3.4.9	Pressurizer	Included
3.4.10	Pressurizer Safety Valves	Included
3.4.11	Pressurizer Power Operated Relief Valves (PORVs)	Not applicable to AP600 Plant design difference ADS valves (LCOs 3.4.12, 3.4.13, and 3.4.14) can be used to relieve RCS pressure
3.4.12	Low Temperature Overpressure Protection (LTOP) System	Included

NUREG-1431 Rev. 1		DISCUSSION
AP600 LCOS ADDED		
3.4.13	RCS Operational LEAKAGE	Included
3.4.14	RCS Pressure Isolation Valve (PIV) Leakage	Not applicable to AP600 Plant design difference The ultimate pressure for the Normal RHR system exceeds the RCS design pressure; therefore, intersystem LOCA is not a likely event
3.4.15	RCS Leakage Detection Instrumentation	Included
3.4.16	RCS Specific Activity	Included
3.4.17	RCS Loop Isolation Valves	Not applicable to AP600 Plant design difference AP600 does not include loop isolation valves
3.4.18	RCS Isolated Loop Startup	Not applicable to AP600 Plant design difference AP600 does not include loop isolation valves
3.4.19	RCS Loops — Test Exceptions	Not applicable to AP600 Low power physics tests without forced RCS flow are not required to establish that heat input from nuclear heat does not exceed the natural circulation heat removal capabilities
3.4.9	**Minimum RCS Flow**	**Added for AP600** **Plant design difference** **LCO required in MODES 3, 4 &5 to maintain uniform RCS mixing as an initial condition for the boron dilution transient.**
3.4.12	**Automatic Depressurization System (ADS) - Operating**	**Added for AP600** **Plant design difference** **Safety-related system required to depressurize the RCS, facilitating cooling water injection and sump recirculation**
3.4.13	**Automatic Depressurization System (ADS) - Shutdown, RCS Intact**	**Added for AP600** **Plant design difference** **Safety-related system required to depressurize the RCS, facilitating cooling water injection and sump recirculation**
3.4.14	**Automatic Depressurization System (ADS) - Shutdown, RCS Open**	**Added for AP600** **Plant design difference** **Safety-related system required to depressurize the RCS, facilitating cooling water injection and sump recirculation**

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.5	EMERGENCY CORE COOLING SYSTEMS (ECCS)	
3.5.1	Accumulators	Included
3.5.2	ECCS — Operating	Not applicable to AP600 Plant design difference Safety-related pumped ECCS replaced by passive systems
3.5.3	ECCS — Shutdown	Not applicable to AP600 Plant design difference Safety-related pumped ECCS replaced by passive systems
3.5.4	Refueling Water Storage Tank (RWST)	Not applicable to AP600 Plant design difference Safety-related pumped ECCS replaced by passive systems
3.5.5	Seal Injection Flow	Not applicable to AP600 Design difference Canned rotor RCPs do not require seal injection flow
3.5.6	Boron Injection Tank (BIT)	Not applicable to AP600 Design difference Safety-related borated water sources include Accumulator (3.5.1), Core Makeup Tank (3.5.2), and IRWST (3.5.6)
3.5.2	Core Makeup Tanks (CMTs) - Operating	Added for AP600 Plant design difference Function and requirements similar to Accumulators
3.5.3	Core Makeup Tanks (CMTs) - Shutdown, RCS Intact	Added for AP600 Plant design difference Function and requirements similar to Accumulators
3.5.4	Passive Residual Heat Removal Heat Exchanger (PRHR HX) - Operating	Added for AP600 Plant design difference Provides safety-related heat removal capability for DBAs
3.5.5	Passive Residual Heat Removal Heat Exchanger (PRHR HX) - Shutdown, RCS Intact	Added for AP600 Plant design difference Provides safety-related heat removal capability for DBAs
3.5.6	In-containment Refueling Water Storage Tank (IRWST) - Operating	Added for AP600 Plant design difference Provides safety-related core cooling water source for DBAs

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.5.7	In-containment Refueling Water Storage Tank (IRWST) - Shutdown, RCS Inventory High	Added for AP600 Plant design difference Provides safety-related core cooling water source for DBAs
3.5.8	In-containment Refueling Water Storage Tank (IRWST) - Shutdown, RCS Inventory Low	Added for AP600 Plant design difference Provides safety-related core cooling water source for DBAs
3.6	CONTAINMENT SYSTEMS	
3.6.1	Containment	Included
3.6.2	Containment Air Locks	Included
3.6.3	Containment Isolation Valves	Included
3.6.4	Containment Pressure	Included
3.6.5	Containment Air Temperature	Included
3.6.6	Passive Containment Cooling System (PCS) - Operating	Added for AP600 Plant design difference Provides cooling by water flow onto exterior of containment shell
3.6.7	Passive Containment Cooling System (PCS) - Shutdown	Added for AP600 Plant design difference Provides cooling by water flow onto exterior of containment shell
3.6.8	Containment Penetrations	Added for AP600 Containment closure required to maintain cooling water inventory for loss of normal core cooling events versus the STS (LCO 3.9.X) which requires closure in the event of a fuel handling accident in MODE 6
3.6.9	pH Adjustment	Added for AP600 Plant design difference LCO requires chemicals to be placed in the containment sump to control post accident pH
3.6.6	Containment Spray and Cooling Systems	Not applicable to AP600 Plant design difference
3.6.7	Spray Additive System	Not applicable to AP600 Plant design difference
3.6.8	Hydrogen Recombiners	Not applicable to AP600 Plant design difference

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.6.9	Hydrogen Mixing System (HMS)	Not applicable to AP600 Plant design difference
3.6.10	Hydrogen Ignition System (HIS)	Not applicable to AP600 Plant design difference
3.6.11	Iodine Cleanup System (ICS)	Not applicable to AP600 Plant design difference
3.6.12	Vacuum Relief Valves	Not applicable to AP600 Plant design difference
3.6.13	Shield Building Air Cleanup System (SBACS)	Not applicable to AP600 Plant design difference
3.6.14	Air Return System (ARS)	Not applicable to AP600 Plant design difference
3.6.15	Ice Bed	Not applicable to AP600 Plant design difference
3.6.16	Ice Condenser Doors	Not applicable to AP600 Plant design difference
3.6.17	Divider Barrier Integrity	Not applicable to AP600 Plant design difference
3.6.18	Containment Recirculation Drains	Not applicable to AP600 Plant design difference
3.6.19	Shield Building	Not applicable to AP600 Plant design difference
3.7	PLANT SYSTEMS	
3.7.1	Main Steam Safety Valves (MSSVs)	Included
3.7.2	Main Steam Isolation Valves (MSIVs)	Included
3.7.3	Main Feedwater Isolation Valves (MFIVs) and Main Feedwater Regulation Valves (MFRVs)	Included
3.7.4	Atmospheric Dump Valves (ADVs)	Not applicable to AP600 Plant design difference
3.7.5	Auxiliary Feedwater (AFW) System	Not applicable to AP600 Plant design difference
3.7.6	Condensate Storage Tank (CST)	Not applicable to AP600 Plant design difference

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.7.7	Component Cooling Water (CCW) System	Not applicable to AP600 Plant design difference
3.7.8	Service Water System (SWS)	Not applicable to AP600 Plant design difference
3.7.9	Ultimate Heat Sink (UHS)	Not applicable to AP600 Plant design difference
3.7.10	Control Room Emergency Filtration System (CREFS)	Not applicable to AP600 Plant design difference See LCO 3.7.6, Main Control Room Habitability System
3.7.11	Control Room Emergency Air Temperature Control System (CREATCS)	Not applicable to AP600 Plant design difference See LCO 3.7.6, Main Control Room Habitability System
3.7.12	Emergency Core Cooling System (ECCS) Pump Room Exhaust Air Cleanup System (PREACS)	Not applicable to AP600 Plant design difference
3.7.13	Fuel Building Air Cleanup System (FBACS)	Not applicable to AP600 Plant design difference
3.7.14	Penetration Room Exhaust Air Cleanup System (PREACS)	Not applicable to AP600 Plant design difference
3.7.15	Fuel Storage Pool Water Level	Included
3.7.16	Fuel Storage Pool Boron Concentration	Not applicable to AP600 Plant design difference
3.7.17	Spent Fuel Assembly Storage	Not applicable to AP600 Plant design difference
3.7.18	Secondary Specific Activity	Included
3.7.6	**Main Control Room Habitability System (VES)**	**Added for AP600 Plant design difference LCO specifies bottled air system and maximum MCR temperature**
3.7.7	**Startup Feedwater Isolation and Control Valves**	**Added for AP600 Plant analysis difference Analysis assumes valves close for specific DBAs to prevent excessive cooldown or SG overfill**

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.7.8	Secondary Coolant System Leakage	Added for AP600 Although the secondary coolant system leakage limit does not satisfy any of the criteria of the NRC Policy Statement, this specification has been included in Technical Specifications in accordance with NRC direction (NRC letter, Diane T. Jackson to Westinghouse (Nicholas J. Liparulo), dated September 5, 1996, "Staff Update to Draft Safety Evaluation Report (DSER) Open Items (OIs) Regarding the Westinghouse AP600 Advanced Reactor Design," Open Item # 365)
3.8	ELECTRICAL POWER SYSTEMS	
3.8.1	AC Sources — Operating	Not applicable to AP600 Plant design difference
3.8.2	AC Sources — Shutdown	Not applicable to AP600 Plant design difference
3.8.3	Diesel Fuel Oil, Lube Oil, and Starting Air	Not applicable to AP600 Plant design difference
3.8.4	DC Sources — Operating	Included
3.8.5	DC Sources — Shutdown	Included
3.8.6	Battery Cell Parameters	Included
3.8.7	Inverters — Operating	Included
3.8.8	Inverters — Shutdown	Included
3.8.9	Distribution Systems — Operating	Included
3.8.10	Distribution Systems — Shutdown	Included
3.9	REFUELING OPERATIONS	
3.9.1	Boron Concentration	Included
3.9.2	Unborated Water Source Isolation Valves	Included
3.9.3	Nuclear Instrumentation	Included
3.9.4	Containment Penetrations	Included in AP600 as LCO 3.6.8 Applicable in MODES 5 & 6 incorporates requirements from this NUREG-1431 LCO
3.9.5	Residual Heat Removal (RHR) and Coolant Circulation — High Water Level	Not applicable to AP600 Plant design difference

NUREG-1431 Rev. 1 AP600 LCOS ADDED		DISCUSSION
3.9.6	Residual Heat Removal (RHR) and Coolant Circulation — Low Water Level	Not applicable to AP600 Plant design difference
3.9.7	Refueling Cavity Water Level	Included
4.0	DESIGN FEATURES	
4.1	Site Location	Included
4.2	Reactor Core	Included
4.3	Fuel Storage	Included
4.4	Hydrogen Control	Added for AP600 Plant design difference Passive autocatalytic hydrogen recombiners are used instead of electric hydrogen recombiners
5.0	ADMINISTRATIVE CONTROLS	
5.1	Responsibility	Included
5.2	Organization	Included
5.3	Unit Staff Qualifications	Included
5.4	Procedures	Included
5.5	Programs and Manuals	Included
5.6	Reporting Requirements	Included
5.7	High Radiation Area	Bracketed section not included Utility reviewers indicated that the STS paragraph 5.7 alternative approach to compliance with 10CFR20.1601 was not desired.

Explanation of General/Overall Differences

between the

AP600 Technical Specifications

and

NUREG-1431

While editorial differences are not addressed herein, there are some general technical and non-technical differences between NUREG-1431 (STS) and the AP600 TS which are presented here, rather than explain each occurrence.

1. There are many technical differences based on the AP600 plant, system, or equipment design requiring modification of the standard requirements and or associated Bases discussion. While these are summarized in the attached listing, an understanding of the design may be gained through review of the appropriate AP600 SSAR sections and the AP600 TS Background sections of the Bases.

2. There are some instances where standardized AP600 system or equipment names are used for consistency with the SSAR, system descriptions, and drawings. AP600 system names replace the STS system names, consistent with those described in the AP600 SSAR Chapter 1.1. For example, the STS Rod Control System is part of the AP600 Plant Control System (PLS). The STS Residual Heat Removal System (RHRS) design is comparable to the normal residual heat removal system (RNS) in the AP600. No reference is made to the STS emergency core cooling system (ECCS) as an AP600 system, although it is used to explain some completion times/surveillance frequencies. NUREG-1431 requirements related to RHR operation are not applicable to the AP600 design or safety analyses.

3. The Applicable Safety Analyses sections present the Design Basis Analyses assumptions/ results and may require modification of the standard requirements and/or associated Bases discussion. See the Applicable Safety Analyses section of the Bases for a discussion of the AP600 analyses as well as the referenced SSAR Chapters 6 and 15.

4. There are some instances where the standard wording was considered confusing or misleading by reviewers, and was editorially changed to clarify the meaning (although not detailed in this listing). For example, in the Background section of B 3.1.2, there is a STS sentence which reads, "When the reactor is critical at RTP and *moderator temperature*, the excess positive reactivity is compensated by..." This sentence is revised to read, "When the reactor is critical at RTP and *a negative moderator temperature coefficient*, the excess positive reactivity is compensated by..."

   Another example is for SR 3.2.1.2 where "$F_Q(Z)$ is verified at power increases of at least 10% RTP above the thermal power of its last verification, 24 hours after achieving equilibrium conditions, to assure that $F_Q(Z)$ will be within its limit at higher power level." In the STS, this sentence was confusing written as, "$F_Q(Z)$ is verified at power levels $\geq$ 10% RTP above the thermal power of its last verification, 12 hours after achieving equilibrium conditions to ensure that $F_Q(Z)$ is within its limit at higher power level."

5. The standard MODE definitions and MODE reduction times have been modified to reflect the AP600 plant shutdown capabilities using passive systems. [applies to LCO 3.0.3, and most MODE 1, 2, 3, and 4 shutdown Actions] For AP600 the following Completion Times apply:

   MODE 2 8 hours
   MODE 3 8 hours
   MODE 4 24 hours
   MODE 5 48 hours

6. Information which is bracketed in the STS but is different or not included in the AP600 TS need not be explained, although a few cases are discussed.

7. To the extent practical, the AP600 Technical Specifications have been revised to eliminate differences from NUREG-1431, Rev. 1, dated 04/07/95[1]. However, in some instances, the NUREG-1431, Rev. 0 wording was retained because it was reviewed and accepted by the AP600 author and technical reviewers and is considered to be technically correct.

8. The standardized criteria for selecting action completion times and surveillance frequencies was used in developing the AP600 TS. The AP600 standardized criteria was developed by fitting typical NUREG-1431 times into a logical set of categories. Rather than address all timing differences between the STS and the AP600 TS on a spec-by-spec basis, these are explained on the following pages.

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[1] The AP600 Technical Specifications were originally issued in June 1992, just prior to the issue of NUREG-1431, Rev. 0, dated 09/28/92. The NUREG draft which was used as a guide for development of the AP600 Technical Specifications was quite similar to Rev. 0.

The AP600 Technical Specifications were revised and reissued in January 1994. The January 1994 revision included changes to eliminate differences between AP600 and NUREG-1431, Rev. 0.

Completion Times have been specified consistent with the following criteria:

1 hour - The 1 hour Completion Time is based on the loss of safety function and thus the need to take prompt action but providing time to make preparations for initiation of a controlled unit shutdown.

8 hours - The 8 hour Completion Time is based on the remaining ability to mitigate postulated accidents, assuming nominal conditions (not worst case) and no single failure.

24 hours - The 24 hour Completion Time is based on the remaining ability to mitigate postulated accidents, assuming nominal conditions (not worst case) and a single failure.

72 hours (equipment) - The 72 hour Completion Time is based on the remaining ability to mitigate postulated accidents, assuming worst case conditions and no single failure.

72 hours (parameter - all components) - Due to the frequent surveillance of the parameter and/or other indirect information (e.g., temperature, level, concentration), only small deviations outside the LCO limit are likely. For small deviations in the parameter the system is still capable of performing its safety function.

168 hours (7 days) (equipment) - The 168 hour Completion Time is based on the remaining ability to mitigate postulated accidents, assuming both worst case conditions and a single failure.

168 hours (7 days) (parameter - one component) - Due to the frequent surveillance of the parameter and/or other indirect information (e.g., temperature, level, concentration), only small deviations outside the LCO limit are likely. For small deviations in the parameter the system is still capable of performing its safety function plus the redundant component if fully OPERABLE.

Surveillance Frequencies have been specified consistent with the following methodology:

24 hours (control room indication) - The 24 hour Frequency is based on the availability of control room indication necessary to perform the SR. The Frequency for all SRs with control room indication has been standardized at 24 hours for consistency.

7 days (less effective control room monitor, baseline change likelihood) - The 7 day Frequency is based on the necessity to perform the SR locally, the main control room availability of indirect measurements of the feature, and the engineering judgement that the feature will not change significantly in 7 days.

31 days (less effective CR monitor, low change likelihood) - The 31 day Frequency is based on the necessity to perform the SR locally, the main control room availability of indirect measurements of the feature, and the engineering judgement that the feature will not change significantly in 31 days.

31 days (effective CR monitor, baseline change likelihood) - The 31 day Frequency is based on the necessity to perform the SR locally, the main control room availability of direct measurements of the feature, and the engineering judgement that the [feature] will not change significantly in 31 days.

24 months (effective CR monitor, low change likelihood) - The 24 month Frequency is based on the necessity to perform the SR locally, the main control room availability of direct measurements of the feature, and/or the engineering judgement that the feature will not change significantly in 24 months.

9. For the AP600 TS, there are many references to the On-Line Power Distribution Monitoring System (OPDMS). While most of these are listed herein, the general explanation is provided here.

   A new LCO has been added to Chapter 3.2, Power Distribution Limits - LCO 3.2.5, OPDMS-Monitored Power Distribution Parameters, which is applicable in MODE 1 above 50% RTP. The Chapter 3.2 LCOs 3.2.1 through 3.2.4 have been retained, although only applicable if OPDMS is inoperable.

   The OPDMS continuously monitors power distribution parameters via fixed incore detectors. The instantaneous OPDMS measurements preclude measurement inaccuracies due to changing plant conditions. Additionally, the OPDMS measurements are taken instantaneously versus several hours for the flux mapping system

   Allowances must be included in limits typically required for the LCO 3.2.1 through 3.2.4 monthly power distribution surveillances using the flux mapping system and more frequent surveillances using excore detectors to accommodate measurement errors due to small changes in the steady-state conditions during the flux mapping and due to the normal changes expected during the surveillance interval.

   Although the plant is held at steady-state conditions during flux mapping, minor changes in plant conditions must be accommodated by the parameter limits. Further, the limits established for monthly flux mapping measurements must include additional margin to ensure that core parameters assumed in accident analyses are met, considering changes which may occur during the surveillance interval.

   The NUREG-1431 power distribution LCOs have been retained to cover the possibility that the continuous, automatic OPDMS capability is not available. These LCOs will permit periodic manual data collection and off-line data reduction.

Explanation of Technical Differences

between the

AP600 Technical Specifications

and

NUREG-1431

The following differences exist for the Definitions presented in Section 1.1. No differences exist for Sections 1.2 through 1.4.

1. ACTUATION LOGIC TEST

   The requirement to perform a continuity check of the output devices has been deleted. The continuity check applies to actuation relays in current plants, but does not apply to the AP600 digital protection systems.

2. DOSE EQUIVALENT XE-133

   Definition of $\bar{E}$ — AVERAGE DISINTEGRATION ENERGY has been replaced by DOSE EQUIVALENT XE-133. This change supports the changes to LCO 3.4.11, RCS Specific Activity in which DOSE EQUIVALENT XE-133 replaced $\bar{E}$ — AVERAGE DISINTEGRATION ENERGY.

3. ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME

   The definition has been revised to eliminate reference to pump discharge pressure and diesel generator delays. The AP600 ESF RESPONSE TIME never includes pump start-up time or diesel generator delay.

4. LEAKAGE

   Items a.1 and b were revised to eliminate "pump" seals since the AP600 RCP is a canned rotor pump which does not have pump seals.

   Item a.4 was added since definition of RCS LEAKAGE through the passive residual heat removal heat exchanger is needed in conjunction with the addition of the associated limit in LCO 3.4.8, RCS Operational Leakage.

   Item c was revised to include exception to passive residual heat removal heat exchanger tube leakage since this leakage is excluded on the basis that it is tracked separately as part of the identified leakage, similar to the SG leakage.

5. MASTER RELAY TEST and SLAVE RELAY TEST

   These definitions have been deleted. The AP600 I&C design does not include master or slave relays.

6. REACTOR TRIP CHANNEL OPERATIONAL TEST (RTCOT)

   This definition has been added. The new RTCOT definition is similar to the CHANNEL OPERATIONAL TEST definition, but is written to reflect the AP600 I&C design differences.

7. MODE Table

The temperature limit between MODES 3 and 4 has been changed from "[350]" to "420°F. " Additionally, the MODE 4 title has been changed from "Hot Shutdown" to "Safe Shutdown." These changes are based on the capability of the AP600 passive systems to reduce the RCS temperature to less than 420°F and the explanation that MODE 4 is a safe plant condition provided in SECY-94-084.

1. SL 2.0 Figure 2.1.1-1

   Reactor Core Safety Limits are AP600 specific.

1. LCO 3.0.2

LCO and Bases 3.0.2 have been revised to permit longer MODE reduction times, if the active heat removal systems needed for cool-down are not available. The normal MODE reduction times specified in Required Actions are based on the availability of non-safety, non-Technical specification heat removal systems. These revisions to LCO 3.0.2 recognize that the non-safety systems could be degraded or unavailable and provide direction for safe plant operation.

Additionally, the Bases clarify that OPERABILITY of the non-safety heat removal systems is not required by the Technical Specifications. While these systems are important for normal plant operations, they do not meet any of the Policy Statement criteria and, therefore, are not required to be included in the Technical Specifications.

2. LCO 3.0.3

The MODE reduction times have been increased to values which are consistent with the AP600 plant capabilities. Direction has been added which recognizes that without non-safety heat removal systems, the specified MODE reduction times may not be achievable. These revisions to LCO 3.0.3 provide direction for safe plant operation and recognize that the non-safety systems could be degraded or unavailable (refer to the BASES for additional information).

Additionally, the Bases clarify that OPERABILITY of the non-safety heat removal systems is not required by the Technical Specifications. While these systems are important for normal plant operations, they do not meet any of the Policy Statement criteria and, therefore, are not required to be included in the Technical Specifications.

Table B 3.0-1, Passive Systems Shutdown MODE Matrix and associated discussion have been added to the Bases. This addition is considered to satisfy the NRC request contained in Open Item 2352.

The last paragraph of the LCO 3.0.3 Bases has been revised to specify examples of exceptions to LCO 3.0.3 which are included in the AP600 Technical Specifications.

1. LCO 3.1.1

   NUREG-1431 has two separate SDM TSs: 3.1.1, SDM for Tavg > 200°F and 3.1.2, SDM for Tavg ≤ 200°F. For the AP600, these TS were combined since the SDM is the same for all Tavg.

2. LCO 3.1.2 SR 3.1.2.1

   Note was improved.

3. LCO 3.1.3 LCO

   MTC limits and figure not presented in TS since COLR is applicable.

4. LCO 3.1.4 Condition B

   Actions are modified from NUREG-1431 to account for the On-Line Power Distribution Monitoring System (OPDMS) incorporated into the AP600 design.

5. LCO 3.1.4 Action D.2.1

   Added to allow time to restore rods to within alignment limits.

6. LCO 3.1.4 SR 3.1.4.3

   The basis for performing rod drop time measurement at a lower temperature is not AP600 specific. Wolf Creek has made a submittal for NRC approval and the WOG is pursuing this as a generic change.

7. LCO 3.1.5 SR 3.1.5.1

   Added frequency of "Within 15 minutes prior to an approach to criticality" to ensure each shutdown bank is verified to be within the COLR limits prior to criticality. This will ensure the shutdown banks are withdrawn before the control banks are withdrawn during a unit startup.

8. LCO 3.1.7 Actions

   Reference is made to the OPDMS.

9. LCO 3.1.8

   There is no AP600 TS for Physics Test Exceptions in MODE 1 since AP600 physics testing in MODE 1 can be performed within the limitations of applicable LCOs.

10. LCO 3.1.8 SR 3.1.8.1

    Reference to RTS SRs and Table were revised to be consistent with the AP600 RTS TS 3.3 (see description of TS 3.3 differences).

11. LCO 3.1.9

New LCO added for AP600 since operable CVS isolation valves are required to mitigate RCS boron dilution events in MODES 1-5.

12. B 3.1.1 Applicable Safety Analyses

One STS acceptance criteria for SDM requirements is that specified acceptable fuel design limits are maintained by ensuring that the reactivity transients associated with postulated accidents are controlled "within ... $\leq$ 280 cal/gm energy deposition for the rod ejection accident. This was modified for the AP600 to "within ... radial average fuel enthalpy limits for the rod ejection accident". No DNBR or fuel centerline temperature limits are specified such that it seemed reasonable not to specify an enthalpy limit which may change.

13. B 3.1.1 Applicable Safety Analyses

Inadvertent opening of a SG relief or safety valve was added as a limiting accident for SDM requirements. This is safety analysis specific, related to the AP600 design. That same paragraph goes on to explain the AP600-specific SLB accident

14. B 3.1.1 Applicable Safety Analyses

The AP600-specific events which the SDM must protect against are slightly different than the STS (startup of an inactive RCP is not SDM-significant and inadvertent operation of the AP600 passive residual heat removal heat exchanger is SDM-significant). Each of the AP600 SDM-significant events is described in this section.

15. B 3.1.1 Applicable Safety Analyses & LCO Page B 3.1-4

The AP600 control room is referred to as the main control room.

For the LCO, reference to 10CFR100 limits is deleted as they will not be applicable to AP600 and reference to operator action is replaced with automatic action to terminate an inadvertent boron dilution. The APPLICABILITY Bases reflect this SDM TS applying in MODE 5.

16. B 3.1.1 Action A.1

The BASES for Action A.1 in the STS provides an example for determining the boration flow rate but is not considered necessary for the AP600 TS.

17. B 3.1.2 Background

The reference to "When the reactor is critical at RTP and moderator temperature..." is clarified for the AP600 as a negative moderator temperature coefficient

18. B 3.1.2 Applicable Safety Analyses Page B 3.1-8

The Applicable Safety Analyses reference to "Every" accident evaluation being dependent upon accurate evaluation of core reactivity is changed to "Certain", since not every evaluation is dependent upon core reactivity.

19. B 3.1.3 Background Page B 3.1-13

Although NUREG-1431 states that both the initial and reload cores are designed so that the BOC MTC is less than zero when THERMAL POWER is at RTP, for the AP600 specifically, the core design MTC requirements is not limited to BOC (the AP600 is not a positive MTC plant). Also, additional fixed distributed poisons, defined as burnable absorbers for the AP600; burnable absorbers are again referred to at the end of the Background section.

20. B 3.1.3 Background Page B 3.1-14

This Background sentence was deleted from the AP600 TS, "The core could violate criteria that prohibit a return to criticality, or the DNBR criteria of the approved correlation may be violated, which could lead to a loss of fuel cladding integrity."

This statement applies to the AP600 and should not have been deleted; it will be restored in the final Tech Spec submittal.

21. B 3.1.3 Applicable Safety Analyses

Again, both the least negative and most negative MTC values are important to the AP600 safety analyses, not the most positive and most negative, since the AP600 is not a positive MTC designed plant.

22. B 3.1.3 LCO

The MTC discussions are AP600 specific since the AP600 is not a positive MTC designed plant.

23. B 3.1.3 Action B.1

The AP600 concern is to prevent operation with an MTC which is less negative than that assumed in the safety analyses. For PMTC core designs, the concern is with a more positive MTC.

24. B 3.1.4 Background

The rod control function for the AP600 is part of the Plant Control System (PLS), not the Rod Control System noted in NUREG-1431. The AP600 design has five control banks and three shutdown banks, not the four control banks and at least two shutdown banks noted in NUREG-1431. The MSHIM and RPR design features of the AP600 are discussed.

25. B 3.1.4 Applicable Safety Analyses Page B 3.1-22

Applicable Safety Analyses, second sentence, second paragraph is clarified to "With control banks at *or above* their insertion limits..." to better represent the analysis conditions.

26. B 3.1.4 LCO - Page B 3.1-23

The first LCO paragraph was clarified to, "The operability requirements also assure that the RCCAs and banks *will move correctly upon command, to* maintain the correct power distribution and rod alignment."

27. B 3.1.4 Action B.1

The first paragraph is modified to reflect discussion of the AP600 OPDMS.

28. B 3.1.4 Action B.2.1

The second paragraph is modified to reflect the AP600 MSHIM design feature.

29. B 3.1.4 Actions

For B.2.2 through B.2.6, the first and last paragraphs are modified to reflect the AP600 OPDMS.

30. B 3.1.4 Actions C & D

The AP600 TS correctly reflects the BASES (by transposing BASES text that appears in the NUREG).

31. B 3.1.4 Action D.1

Since the AP600 has no boric acid pumps, reference is made to starting the CVS makeup pumps.

32. B 3.1.4 SR 3.1.4.3

SR 3.1.4.3 was modified to provide the BASES for performing control rod drop time testing at a lower temperature.

33. B 3.1.5 Background

The rod control function for the AP600 is part of the Plant Control System (PLS), not the Rod Control System noted in NUREG-1431.

34. B 3.1.5 Applicable Safety Analyses

Reference to LCO 3.1.2 as a SDM TS is not applicable to AP600 since 3.1.2 was combined with 3.1.1.

35. B 3.1.5 LCO

The Bases are enhanced by stating that the shutdown bank insertion limits LCO, *in conjunction with the control bank insertion limits LCO*, ensures sufficient available negative reactivity.

36. B 3.1.5 Applicability

The NUREG-1431 Applicability statement, "The shutdown banks do not have to be within their insertion limits in MODE 3, unless an approach to criticality is being made." is deleted since it is not applicable to AP600 operation.

37. B 3.1.5 Action B.1

Completion time explanation for reaching the required MODE, "from full power conditions" was deleted from the explanation since this LCO applies in MODE 1 and MODE 2 when any control bank is not fully inserted.

38. B 3.1.5 SR 3.1.5.1

The additional frequency of "within 15 minutes prior to approach to criticality" was added to ensure that the shutdown banks are withdrawn before the control banks are withdrawn during a unit startup. The AP600 control room is referred to as the main control room.

39. B 3.1.6 Background

The AP600 design has five control banks and three shutdown banks, not the four control banks and at least two shutdown banks noted in NUREG-1431. The control bank insertion limits are clarified for the AP600 as control bank insertion *sequence and overlap* limits. No control bank insertion limit example figure or description was considered necessary. The rod control function for the AP600 is part of the Plant Control System (PLS), not the Rod Control System noted in NUREG-1431.

40. B 3.1.6 B 3.1-35

The first Background paragraph was made specific to the AP600 LCOs which provide limits on control component operation and on monitored process variables which ensure that the core operates within the fuel design criteria. In the second paragraph, "AFD and QPTR" is replaced with "power distribution limits" because the primary limits are those parameters specified in LCO 3.2.5, Online Power Distribution Monitoring System (OPDMS). However, if OPDMS is inoperable AFD and QPTR limits will be applicable in accordance with LCOs 3.2.3 and 3.2.4.

41. B 3.1.7 B 3.1-40

The AP600 Background is enhanced by referring to the *RCCA misalignment* safety analysis assumption.

42. B 3.1.7 Action A.1

The first sentence was modified to refer to the AP600 OPDMS.

43. B 3.1.7 SR 3.1.7.1

The 24 month Frequency was clarified to refer to a *refueling* outage, rather than a plant outage.

44. B 3.1.8 Background

Although the description of PHYSICS TESTS is bracketed in NUREG-1431 such that a difference from the NUREG may need no explanation, one is provided here. Because the Critical Boron Concentration - Control Rods Inserted and the Neutron Flux Symmetry tests are not typically performed, they do not appear in the AP600 TS (and the word "typical" was added to the introduction of the PHYSICS TESTS list).

45. B 3.1.8 Background

For the AP600, the Control Rod Worth Test has four (not three) alternative methods of performance. The fourth (described on page B 3.1-48) method, Dynamic Rod Worth Measurement, is described in the AP600 TS BASES.

46. B 3.1.8 B 3.1-48

The ITC Test described in the Background no longer consists of two methods. Only the method referred to in NUREG-1431 as the Slope Method is described for the AP600 (although not referred to as the Slope Method).

47. B 3.1.8 Analyses

The AP600 SSAR does not have a table defining initial testing requirements; instead the SSAR sections and test types are referenced. Also, the temperature (529°F) provided in the paragraph following the list of LCOs is AP600 specific. This is the AP600 specific RCS temperature for return to criticality (539°F) and includes the 10°F allowance consistent with operating plants and the STS.

49. B 3.1.8 Applicable Safety Analyses Page B 3.1-49

The Applicable Safety Analysis sentence, "Among the process variables involved are AFD and QPTR, which represent initial conditions of the unit safety analyses." was deleted as not applicable to the AP600. The AP600 analyses are based on the use of the Online Power Distribution Monitoring System parameters (LCO 3.2.5, OPDMS).

50. B 3.1.8 LCO

Item a contains an AP600 specific temperature of 529°F (539°F is the temperature for return to criticality and a 10 °F allowance is made, consistent with the STS. Note that this temperature is bracketed in NUREG-1431 such that a plant specific temperature is not considered a deviation from the STS but since this temperature was previously explained, it seemed appropriate to explain it here.

51. B 3.1.8 Applicability

Reference to PHYSICS TESTS Exceptions in MODE 1 was deleted since this TS was deleted for AP600.

52. B 3.1.8 Action A.1 and A.2

The following sentence was deleted, "Suspension of PHYSICS TESTS exceptions requires restoration of each of the applicable LCOs to within specification.". This statement is considered to be misleading, since if at the end of an hour (A.2) compliance was not restored with all of the LCOs, then a LCO 3.0.3 shutdown would apply. Without this statement, it is considered that noncompliance with one or more of the LCOs would require entry into the applicable Conditions of the LCOs.

53. B 3.1.8 Action D.1

The completion time explanation was enhanced from "...for reaching MODE 3 in an orderly manner..." to "to reach MODE 3 from MODE 2 HZP conditions in an orderly manner..."

54. B 3.1.8 SR 3.1.8.2

The temperature of 529°F and the verification requirement that the power is $\leq$ 5% RTP are AP600 specific.

55. B 3.1.8 References

The NUREG-1431 reference to WCAP-11618 is not applicable to AP600. Instead, where "Reference 6" appeared in the BASES (page B 3.1-49, last paragraph), "Reference 6" was changed to "The NRC Policy Statement". Reference 6 was replaced with a reference to SSAR Chapter 14 for a summary of the initial criticality and low power tests.

56. B 3.1.9

No exceptions are noted since this TS does not appear in NUREG-1431.

1. LCO 3.2.1 Applicability

   Reference is made to the OPDMS.

2. LCO 3.2.1 SR Notes

   Notes 2 and 3 are added to reflect the OPDMS.

3. LCO 3.2.1 SR 3.2.1.2

   STS note referred to $z[F^C_Q(Z)/K(Z)]$ but note was changed to refer to just $z[F^C_Q(Z)]$. K(Z) does not apply for the AP600 since the normalized F_Q is not a function (is independent) of elevation. The normalized F_Q curve for this plant is flat as it is not limited by small break LOCA results.

4. LCO 3.2.2 Applicability

   Reference is made to the OPDMS.

5. LCO 3.2.2 SR 3.2.2.1

   Reference is made to the OPDMS.

6. LCO 3.2.3 Applicability

   Reference is made to the OPDMS.

7. LCO 3.2.4 Applicability

   Reference is made to the OPDMS.

8. LCO 3.2.4 SR 3.2.4.1

   Note 2, which refers to SR 3.2.4.2 being performed in lieu of SR 3.2.4.1 if adequate Power Range Neutron Flux channel inputs are not OPERABLE, does not apply for AP600.

9. LCO 3.2.4 SRs 3.2.4.1 and 3.2.4.2

   Reference is made to power range channels rather than Power Range Neutron Flux channels. This is just AP600 terminology.

10. LCO 3.2.4 SR 3.2.4.2

    For the AP600 design, QPTR is verified using not less than 4 symmetric pairs of fixed incore detectors rather than using the moveable incore detectors referred to in NUREG-1431.

11. LCO 3.2.5

This specification, for the On-Line Power Distribution Monitoring System (OPDMS), has been added to reflect this AP600 design feature. This system continuously monitors power distribution parameters via fixed incore detectors.

12. B 3.2.1 Background

The 3rd, 5th, 6th, and last paragraphs were revised to reflect the AP600 OPDMS.

13. B 3.2.1 LCO

Reference to K(Z) was deleted since the normalized F_Q is not a function of elevation for the AP600.

14. B 3.2.1 Applicability

A sentence was added to discuss OPDMS considerations.

15. B 3.2.1 SRs

The first paragraph is revised to reflect the AP600 OPDMS. There are 2 new notes for the AP600 Tech Specs which tend to replace the intent of the second half of the first paragraph as applicable to the AP600 design.

16. B 3.2.1 SR 3.2.1.1

The K(Z) function is no longer referred to since the normalized F_Q is not a function of elevation for the AP600.

1. LCO 3.3.1 General

   Use of the word *required* clarifies that not all channels need to be operable based on the AP600 typical design requirement of having four channels but only requiring three.

2. LCO 3.3.1 Functions

   Table 3.3.1-1 has been significantly revised to reflect the AP600 Protection and Safety Monitoring System (PMS) reactor trip system design. RTS Design Features are presented in AP600 SSAR Chapter 7.

   1. AP600 has no reactor trip on a high negative power range neutron flux rate.
   2. STS RCP breaker position function is replaced by RCP bearing water high temperature.
   3. STS RCP undervoltage and underfrequency trips are replaced with RCP underspeed.
   4. AP600 design uses SG narrow range water level high and low setpoints for reactor trip rather than the water level low and coincident shown in the STS.
   5. AP600 has no reactor trip on turbine trip.
   6. manual and automatic functions are provided for safeguards actuation (not SI) from ESFAS.
   7. reactor trip system interlocks applicable to the AP600 design are P-6, P-8, P-10, and P-11 (STS has P-6 through P-10 and P-13).
   8. reactor trip functions are added given actuation of the Automatic Depressurization System (ADS) and core makeup tanks (CMTs), AP600 design features.

3. LCO 3.3.1 Conditions

The following provides a guideline when comparing the AP600 RTS Instrumentation Conditions to the STS:

STS Condition	AP600 Condition
A	A
B	B
C	C
D	D
E	E
F	F
G	G
H	H
I,J,K,L	I,J
M	K
N	L
O	n/a (no Rx trip on RCP breaker position)
P	n/a (no Rx trip on turbine trip)
Q	M
R	P
S	N
T	O
U	Q
V	n/a (redundant)
n/a	R (ADS and CMTs)

4. LCO 3.3.1 Condition B

For the AP600, manual *initiation devices* are referred to rather than the Condition C STS *channels* or *trains* to be consistent with the AP600 terminology.

5. LCO 3.3.1 Action B.2

This was added for the AP600 to enable the operator to verify the Remote Shutdown Workstation manual initiation devices are operable in the event those devices are needed for plant operation.

6. LCO 3.3.1 Condition D

The STS Required Actions D.1.1 and D.2.1 and the associated Note regarding placing a channel in bypass for surveillance testing does not apply. For AP600, placing the channel in bypass will automatically provide a trip if not enough required channels are operable. These changes are based on the AP600 design which ensures that with one of the three required channel in bypass and a resulting logic of 1 out of 2, failure of a remaining channel will not prevent a protective function.

In the Note for action D.2, reference is made to the OPDMS, an AP600 design feature.

Action D.2.3 is added to permit the operator to restore all required channels.

7. LCO 3.3.1 Condition E

The STS note regarding placing a channel in bypass for surveillance testing no longer applies. Placing the channel in bypass will automatically provide a trip if not enough channels are operable. Action E.1.2 is added to permit the operator to restore all required channels.

8. LCO 3.3.1 Condition F

Action F.1.2 is added to permit the operator to place the inoperable channel in bypass and restore all required channels such that no power change is necessarily required.

9. LCO 3.3.1 Action H.1

Based on the AP600 design, 3 of 4 (all required) channels need be restored.

10. LCO 3.3.1 Condition I

In the STS, I, J, K, and L apply to Source Range Neutron Flux channels. For the AP600, I applies if there is one Source Range Neutron Flux channel inoperable while J applies if there is more than one inoperable. As such, when compared to the STS, AP600 I and J actions are a combination of STS I, J, K, and L actions. This simplification is possible based on the AP600 difference which provides 3 channels when the reactor trip breakers are closed versus 2 channels in the STS. This additional channel allows for I, rather than suspend operations involving positive reactivity additions, reduction of power to outside the source range, or place the inoperable channel in bypass as restore 3 of 4 (all required) channels. In the event Condition I cannot be met with these actions, Condition J applies and operations involving positive reactivity additions are suspended.

The changes are technically equivalent to the STS, considering the available AP600 channels.

11. LCO 3.3.1 Condition J

STS Conditions and Actions for J, K, and L are essentially combined to AP600 Conditions and Actions for J. This is reasonable based on the availability of 3 required channels when the reactor trip breakers are closed versus 2 channels in the STS.

The changes are technically equivalent to the STS, considering the available AP600 channels.

12. LCO 3.3.1 Condition K

K compares to STS Condition M. An additional action (K.1.2) permits the operator to restore 3 of 4 (all required) channels. For the AP600, power is reduced to below P-10 (AP600 does not have a P-7, low power reactor trip block).

14. LCO 3.3.1 Condition L

L compares to STS Condition N except that L pertains to both Reactor Coolant Flow - Low and to RCP Bearing Water Temperature - High, an AP600-specific trip. Rather than limit operations to placing the inoperable channel in bypass (which will place it in trip if 3 channels are not operable), the operator can restore 3 of 4 (all required) channels.

15. LCO 3.3.1

There is no condition which compares to STS Conditions O or P since the AP600 has no reactor trip on RCP breaker position or turbine trip.

16. LCO 3.3.1 Condition M

M compares to STS Condition Q for automatic trip logic (and automatic safeguards actuation on ESFAS) except that it also pertains to reactor trip on actuation of AP600 design features ADS and/or CMT actuation. M applies, not for one *train* but for one required *channel/division* inoperable and rather than restore a *train* to operable, the operator restores 3 of 4 *channels/divisions* to operable.

17. LCO 3.3.1 Conditions N & O

N compares to STS Condition S and O to STS Condition T except that, because the AP600 design requires 3 of 4 channels, an option is added to bypass the functions associated with the inoperable interlocks and restore 3 of 4 interlocks to operable status.

18. LCO 3.3.1 Condition P Because the AP600 design requires 3 divisions with 2 RTBs per division, the TS is worded such that the inoperable RTB is opened and 3 of 4 divisions must be operable. Or the unit can be brought to Mode 3, 4, or 5 and RTBs opened.

19. LCO 3.3.1 Condition Q

Because the AP600 design requires 1 channel per RTB mechanism for required RTBs, the TS is worded such that the inoperable RTB is opened and 3 of 4 divisions must be operable. Or the unit can be brought to Mode 3, 4, or 5 and RTBs opened.

20. LCO 3.3.1 Condition R

This is a new Condition, established for the AP600 reactor trip functions associated with ADS Stage 1 and CMT actuation. It follows the same logic as STS Conditions B, C, K, and U: restoring required channels or opening the RTBs. It also follows the AP600 logic in that it allows for placing the inoperable channel/division in bypass, restoring 3 of 4 channels/divisions to operable or opening the RTBs.

21 LCO 3.3.1 Surveillances

Reference to the NIS is deleted since the AP600 does not have an NIS. AP600 has nuclear instrumentation channels in the Protection and Safety Monitoring System (PMS).

The following provides a guideline when comparing the AP600 RTS Instrumentation Surveillance Requirements to the STS:

SR	STS	AP600	
3.3.1.	1	1	
3.3.1.	2	2	
3.3.1.	3	3	
3.3.1.	4	6	(RTB test)
3.3.1.	5	5	(actuation logic test)
3.3.1.	6	4	
3.3.1.	7	5	(COT replaced with RTCOT; see SR 3.3.1.5 and BASES, also 1.1 definition)
3.3.1.	8	5	(COT replaced with RTCOT; see SR 3.3.1.5 and BASES, also 1.1 definition)
3.3.1.	9	6	
3.3.1.	10	7	
3.3.1.	11	8	
3.3.1.	12	9	
3.3.1.	13	5	
3.3.1.	14	10	
3.3.1.	15	n/a	(STS SR 3.3.1.15 is only specified for Function 16, Turbine Trip, which is not an AP600 RT Function)
3.3.1.	16	11	

The AP600 RT Instrumentation system design has allowed simplification of the surveillance requirements by elimination of special Notes and Frequency differences for different portions of the system.

22. LCO 3.3.1 SR 3.3.1.2

Note 3 was added to account for inaccuracies when the calorimetric heat balance is < 70% RTP based on Westinghouse Technical Bulletin NSD-TB-92-14 Rev 1.

23. LCO 3.3.1 SR 3.3.1.3

Note 2 was revised to specify ≥ 50% power instead of [15%] power. This change is consistent with the Applicability of LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)".

24. LCO 3.3.1 SR 3.3.1.5

The new reactor trip channel operation test (RTCOT) (see Definitions in TS Section 1.1) is like the channel operational test of STS SR 3.3.1.13 but reflect the AP600 I&C design.

25. LCO 3.3.1 SR 3.3.1.6

The STS Note regarding surveillance of the RT bypass breaker has been deleted. The restriction is not applicable to the AP600 RT breaker design and configuration.

26. LCO 3.3.1 SR 3.3.1.8

For the AP600 neutron detectors can be excluded from the channel calibration as explained in the BASES.

27. LCO 3.3.1 SR 3.3.1.9

The Note was deleted since the AP600 design does not have an RCS RTD bypass loop and therefore, does not require flow rate verification.

28. LCO 3.3.1 SR 3.3.1.10

The Note, "Verification of setpoint is not required." is deleted from the AP600 TS for TADOT. The Note does not apply to AP600, since this surveillance is only specified for functions which do not have setpoints (Table 3.3.1-1, Setpoint column specifies "N/A"). The Note does not apply since there are no setpoints to verify.

29. B 3.3.1 Background

The STS sentence, " The LSSS, defined in this specification as the [Trip Setpoints], in conjunction with the LCOs, establish the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs)." is not included in the AP600 TS since the nominal trip setpoint discussion is added to the BASES page B 3.3-5 .

30. B 3.3.1 Background

Rather than specify 10 CFR 50 and 10 CFR 100 for offsite doses, no reference is made since it is not clear at this time which limits will be imposed by the NRC.

31. B 3.3.1 Background

A paragraph is added, top of page B 3.3-2, to provide additional details of the design. Also, no SSAR figure is referenced for illustrating the four RTS instrumentation modules since the design description details are provided in the AP600 3.3.1 BASES.

32. B 3.3.1 B 3.3-7

The general AP600 RTS requirement for three channels operable is presented. The AP600 RTS functions are presented consistent with the design and the previous discussion for Table 3.3.1-1.

33. B 3.3.1 Actions

The Actions were revised to be consistent with the previous 3.3.1 Conditions discussion as applicable to the AP600 RTS design and functions.

34. B 3.3.1 SRs

The Surveillances were revised to be consistent with the previous 3.3.1 Surveillances discussion as applicable to the AP600 RTS design and functions.

35. B 3.3.1 References

The AP600 setpoint methodology document is referenced (the setpoint study is not part of Design Certification). NRC Generic Letter 83-27 is included as Reference 8.

1. LCO 3.3.2 Functions

Table 3.3.2-1 is significantly different from the STS table since it was revised to reflect the advanced design. The ESFAS Design Features are presented in AP600 SSAR Chapter 7.

1. STS functions b, e2, f and g do not apply for the AP600. A new function e, cold RCS cold leg temperature, is added.
2. STS Containment Spray functions are replaced by the AP600 CMT Actuation functions.
3. Reference to Phase A and the Phase B functions are deleted. Function 3b is now manual initiation of the AP600 passive containment cooling and 3c refers to safeguards actuation rather than the STS safety injection.
4. STS functions b, e, f, and g do not apply for the AP600. A new function d, low T_{cold}, is added.
5. Feedwater Isolation is no longer part of the main function; instead "Manual Main Feedwater Isolation" replaces function a. 5c refers to safeguards actuation rather than the STS safety injection. A new function d, ESFAS on reactor trip, is added.

6-7. STS functions 6 and 7 are deleted.

8. STS ESFAS Interlocks Function 8 are AP600 ESFAS Interlocks Function 18.

The AP600 ESFAS Instrumentation table includes additional functions 6-17 and 19-26 to reflect the AP600 design. Also, all notes were moved to the end of the table, given the larger size of the AP600 table.

2. LCO 3.3.2 Conditions

Again, the AP600 design refers to *manual initiation devices* and not *trains*. Given the extensive changes to this section, no guideline is provided for comparing the AP600 ESFAS Conditions to the STS ESFAS Conditions. It is easier just to compare the AP600 ESFAS TS to the design. The only change worth noting here is that Action B.2 is added in case the remote shutdown workstation devices are operable in case operation need be transferred there.

3. LCO 3.3.2 Surveillances

The following provides a guideline when comparing the AP600 ESFAS Instrumentation Surveillance Requirements to the STS:

SR	STS	AP600
3.3.2	1	1
3.3.2	2	2
3.3.2	3	2
3.3.2	4	N/A - AP600 has no master relays
3.3.2	5	5
3.3.2	6	N/A - AP600 has no slave relays
3.3.2	7	3
3.3.2	8	3
3.3.2	9	4
3.3.2	10	6
3.3.2	11	3

4. LCO 3.3.2 SR 3.3.2.2

The Actuation Logic Test is referred to as the ESF Actuation Logic Test for the AP600. No note for excluding a continuity check is included, since the Actuation Logic Test definition no longer requires a continuity check. The definition change is discussed with the section 1.0 differences.

5. LCO 3.3.2 SR 3.3.2.3

The TADOT is performed for this SR and the note from STS SR 3.3.2.8 remains applicable to the AP600.

6. LCO 3.3.2 SR 3.3.2.4

Channel Calibration SRs include the time constants verification note of the STS and a note for exclusion of the RTDs is added as described in the BASES.

7. LCO 3.3.2 SR 3.3.2.5

The Channel Operational Test is referred to as the ESF Channel Operational Test for the AP600.

8. LCO 3.3.2 SR 3.3.2.6

ESF Response times are verified but the STS note regarding AFW does not apply to the AP600.

9. B 3.3.2 Background

The background is updated to show AP600 ESFAS design details, starting with the segmentation into 4 modules (not 3 as in the STS). Since the changes are extensive, they are not described here. The AP600 TS contain a section of "Nominal Trip Setpoints" instead of the "Trip Setpoint and Allowable Values" of the STS.

10. B 3.3.2 B 3.3-60

The AP600 ESFAS functions are presented consistent with the design and the previous discussion for Table 3.3.2-1.

11. B 3.3.2 Actions

The Actions were revised extensively as were the 3.3.2 Conditions as applicable to the AP600 ESFAS design and functions.

12. B 3.3.2 SRs

The Surveillances were revised to be consistent with the previous 3.3.2 Surveillances discussion as applicable to the AP600 ESFAS design and functions.

13. B 3.3.1 References

The AP600 setpoint methodology document is referenced (the setpoint study is not part of Design Certification) and 10 CFR 50 Appendix A is included as Reference 7.

1. LCO 3.3.3 Condition G

   Condition G and its associated action and completion time were deleted from the AP600 TS. In the STS the PAM report (STS paragraph 5.6.8) only applies to channels which have backup instrumentation which may be substituted for the primary channels. STS Condition G does not apply to any of the AP600 channels.

2. LCO 3.3.3 Table 3.3.3-1

   The Required Channels is clarified for the AP600 as Required Channels/Divisions. See the BASES for a discussion regarding which PAM functions are included in the AP600 TS. Generally, the differences from the STS are:

   STS Functions 1 and 2 are both included in AP600 Function 1.

   STS Functions 3, 4, and 5 are included as AP600 Functions 2, 3, and 4.

   STS Function 6 (reactor vessel water level) is replaced by AP600 Function 5 (pressurizer pressure and RCS subcooling monitor) and a note.

   STS Functions 7-12 are included as AP600 Functions 6-11. AP600 Function 11 also refers to the associated reference leg temperature and the note for STS Function 9, AP600 Function 19, was deleted.

   STS Function 13 for steam generator water level is not included in the AP600 table.

   STS Function 14 for condensate storage tank level is replaced by AP600 Function 12, IRWST.

   STS Functions 15-18 are included as AP600 Functions 14-17 and the noted definition of channel was made AP600-specific.

   STS Function 19 does not apply for AP600 since the AP600 does not have an auxiliary feedwater system.

   Functions the AP600 table has that the STS does not are for AP600 specific features (PRHR flow and outlet temperature and PCS storage tank level and flow).

3. LCO 3.3.4 General

Each of the differences between the AP600 3.3.4 and the STS 3.3.4 are explained by the overall approach that it is the Remote Shutdown Workstation (RSW) itself, not the functions, that are included in the TS.

4. LCO 3.3.4 Title

The AP600 title is Remote Shutdown *Workstation*, not *System*, since the RSW is not considered as a system for the AP600 (see systems list in SSAR Chapter 1).

5. LCO 3.3.4 LCO

No functions table is referenced since the RSW itself must be operable (not the functions) and operable is defined in the BASES.

6. LCO 3.3.4 Note

As such, the STS Note, "Separate Condition entry is allowed for each function." does not apply for the AP600 TS since it is the RSW, not the functions, that are included in the TS.

7. LCO 3.3.4 Condition A

Refers to the RSW, not functions, being inoperable.

8. LCO 3.3.4 Surveillances

Also follow the approach that it is the RSW, not functions, that are verified, from the transfer switch to the hardware and software. These supersede the need to verify operable channels, etc.

1. LCO 3.4.1 LCO/ SR 3.4.1.1

   The LCO and surveillance limits have been replaced with references to limits in the COLR. This change is consistent with the WOG proposal to add DNB limits to the COLR provided in WCAP-14483, "Generic Methodology for Expanded Core Operating Limits Report", November 1995, which is currently being considered by the NRC.

2. LCO 3.4.2 LCO

   AP600 Minimum temperature for criticality is 539°F.

3. LCO 3.4.4 LCO

   The LCO has been revised to specify two loops OPERABLE and in operation with a total of four RCPs. This change is required to specify the AP600 design.

4. LCO 3.4.4 Action A.1

   This action, which specifies restoration of the four pumps within 8 hours, has been added (and old A.1 renumbered as A.2). This is an editorial change since the current NUREG-1431 requirements would allow restoration (LCO 3.0.2) of the pump(s) as an alternative to shutdown to MODE 3. This editorial change is considered to be a needed clarification based on AP600 reviewer comments. Reviewers were not sure it would actually be acceptable to restart RCPs in MODE 1 or 2.

5. LCO 3.4.5 LCO

   The LCO requirements from NUREG-1431 LCOs 3.4.5, 3.4.6, 3.4.7, and 3.4.8 have been combined into one AP600 LCO which is applicable in MODES 3, 4, and 5, whenever the reactor trip breakers are closed . In these MODES, three RCPs must be in operation to maintain the assumed initial conditions (RCS flow) for an inadvertent rod withdrawal from subcritical event. Flow requirements related to boron dilution events are specified in AP600 LCO 3.4.9, RCS Minimum Flow.

6. LCO 3.4.5 Condition A

   This condition and its actions were written to address the AP600 Applicability and safety analysis assumptions. The Actions requirements are explained in the Bases.

7. LCO 3.4.6 LCO

   Revised to eliminate the OPERABILITY requirements for the pressurizer heaters. The basis for including the heaters in NUREG-1431 LCO 3.4.9 is provided in the Applicable Safety Analysis section of the associated Bases: "Although the heaters are not specifically used in accident analysis, the need to maintain subcooling in the long term during loss of offsite power, as indicated in NUREG-0737, is the reason for providing an LCO." For the AP600 design, pressurizer heaters are not needed to maintain subcooling in the long term during a loss of offsite power.

8. LCO 3.4.6 Action A.1

This has been added (and old A.1 renumbered as A.2) to specify restoration of the pressurizer water lever within 72 hours. This is an editorial change since the current NUREG-1431 requirements would allow restoration (LCO 3.0.2) of the water level as an alternative to shutdown to MODE 4. This editorial change is considered to be a needed clarification based on AP600 reviewer comments.

9. LCO 3.4.7 Applicability

The Applicability has been modified to specify MODE 4 with RNS isolated. This change has been made to be consistent with the Applicability of LCO 3.4.15, Low Temperature Overpressure Protection (LTOP) System, which specifies overpressure protection requirements when the Normal Residual Heat Removal System (RNS) is aligned and open to the RCS. With the RNS aligned and open to the RCS the RNS relief valves provide overpressure protection for the RCS.

10. LCO 3.4.8 LCO

The total leakage through all steam generators (item d) has been changed from 1 gpm to 1000 gallons per day. The standard 1 gpm (1440 gallons per day) rate exceeds the leakage assumed in the AP600 safety analysis, which is 500 gallons per day per steam generator or 1000 for both steam generators. Item f, IRWST LEAKAGE has been added to the LCO. This leakage limit is similar to the steam generator limit. The 500 gallons per day limit is based on the assumption that a single crack leaking this amount would not lead to a PRHR HX tube rupture under the stress condition of an RCS pressure increase event.

11. LCO 3.4.8 Action A.1

The 4 hour Completion Time to reduce LEAKAGE to within limits has been changed to 8 hours. Although Condition A does not closely correspond to basis for any of the standard Completion Times discussed in general explanation D, it is similar to the basis for the 8 hour Completion Time. The 8 hour Completion Time is applied to Conditions in which postulated accidents can be mitigated by the remaining capability, assuming nominal conditions (not worst case) and no single failure. Since the leakage limits are based on worst case assumptions regarding either material flaw size or offsite dose criteria, and typical noncompliance with leakage limits is expected to be minor, it is expected that postulated accidents based on material flaw size would not occur and that offsite dose criteria would be met. Therefore, an 8 hour Completion Time is considered appropriate.

12. LCO 3.4.9

Added for AP600 based on plant design difference. This LCO is required to maintain initial conditions needed for natural circulation flow through the RWST HX in MODES 3, 4, and 5.

13. LCO 3.4.10 LCO

NUREG-1431, LCO 3.4.15, RCS Leakage Detection Instrumentation, item c, containment air cooler condensate flow rate monitor has been eliminated from the AP600 LCO. Additionally, NUREG-1431 Required Action B.2.2, Conditions C and F and Surveillance 3.4.15.5 are not applicable to AP600 and have been eliminated. The containment air cooler condensate flow rate monitor is not needed for AP600 to measure leakage to verify compliance with the RCS leakage limits.

14. LCO 3.4.10 Condition F

STS Condition F, applicable when all required monitors are inoperable has been deleted for AP600.

15. LCO 3.4.10 Actions

For actions B.2, D.1, and D.2, the 30 day Completion Times permitted for restoration of inoperable monitors specified for NUREG-1431 Required Actions has been changed to 168 hours (7 days) for AP600, consistent with the AP600 Completion Times discussed in General Explanation D. This shorter time combined with the B.1.1 or B.1.2 requirements to monitor leakage by alternate means eliminates the need for Condition F.

16. LCO 3.4.11 Condition A/ SR 3.4.11.2

The DOSE EQUIVALENT I-131 limit has been changed from 1.0 to 0.4 μCi/gm, consistent with the AP600 safety analysis assumptions as discussed in the Applicable Safety Analyses section of the Bases.

17. LCO 3.4.11 Action A.1

Because the acceptance criteria has been changed from Figure 3.4.16-1 to a constant limit of 24 μCi/gm, Figure 3.4.16-1 is not needed and has been eliminated. The limit is consistent with the AP600 safety analysis assumptions as discussed in the Applicable Safety Analyses section of the Bases.

18. LCO 3.4.1 Condition B

The NUREG-1431 RCS gross specific activity requirement has been replaced with DOSE EQUIVALENT XE-133 for AP600. The AP600 RCS specific activity parameters and limits are equivalent to the NUREG-1431 limits in that compliance with the AP600 limits will ensure that doses resulting from a DBA will be within the values reported in Chapter 15 of the SSAR.

19. LCOs 3.4.12, 3.4.13, & 3.4.14

These LCOs have been added for AP600, based on a plant design and analysis differences. The Automatic Depressurization System is safety-related and required to depressurize the RCS, facilitating cooling water injection.

20. LCO 3.4.15 LCO

The LCO has been revised to eliminate the PORVs (items a.1 and a.3). For AP600, only the Normal Residual Heat Removal (RNS) suction relief valve is required to provide overpressure protection.

21. LCO 3.4.15 LCO Note

The LCO note has been added to restrict startup of a reactor coolant pump. This limitation is necessary to limit heat input transient to within the capacity of the RNS suction relief valve as discussed in the Applicable Safety Analyses section of the Bases.

22. LCO 3.4.15 Applicability

The Applicability has been revised to specify "with the RNS aligned and open to the RCS and the RCS temperature < 350°F." This change is necessary to ensure that the RNS suction relief valve is available for overpressure protection. Additionally, this Applicability is consistent with the requirements of AP600 LCO 3.4.7, Pressurizer Safety Valves, which provides overpressure protection in MODES 1 - 4 with the RNS isolated or RCS temperature above 350°F.

23. LCO 3.4.15

Conditions A and B, and SR 3.4.12.1 and SR 3.4.12.2 have been deleted. Requirements applicable to injection and charging pumps do not apply to AP600.

24. LCO 3.4.15 Action B.1

This specifies requirements technically equivalent to NUREG-1431 Required Action D.1. Both Actions specify increasing the temperature; however, AP600 specifies a temperature in the PTLR based on the accumulator pressure.

25. LCO 3.4.15 Condition C

NUREG-1431 Conditions E, F, and G simplify to AP600 Condition C since AP600 only has one relief valve.

26. LCO 3.4.15

NUREG-1431 SRs 3.4.12.6, .8, and .9 (PORV OPERABILITY requirements) have been deleted, since AP600 overpressure protection does not require PORVs. NUREG-1431 SR 3.4.12.7 (RHR suction valve locked open with power removed) has been deleted. For the AP600, SR 3.4.15.2 (RNS suction flow path open) with control room indications is considered adequate to ensure that the flow path remains open.

27. LCO 3.4.15 SR 3.4.15.1

The Frequency for accumulator isolation has been changed to include "Within 15 minutes before opening the RNS to the RCS". The revised Frequency ensures that the accumulators will be isolated prior to entering the LCO Applicability.

28. LCO 3.4.15 SR 3.4.15.4

This SR to verify the relief valve setting has been added. Currently NUREG-1431 LTOP surveillances do not specify verification of relief valve setting. However, the NUREG-1431 Bases for SR 3.4.12.4 state that the relief valves will be tested in accordance with the ASME Code., This AP600 requirement is considered to be consistent with the intent of NUREG-1431.

29. B 3.4.1 Background

Information regarding normalization of the cold leg flow channels to the calorimetric has been added to clarify the use of the calorimetric flow and the cold leg flow in establishing compliance with the DNB limit.

30. B 3.4.1 Applicable Safety Analyses

The DNBR criterion value, and pressurizer pressure and RCS average temperature limits have not been included, since the limits will be included in the COLR and, thus, subject to cycle-specific changes.

31. B 3.4.1 LCO

The penalty for undetected fouling of the feedwater venturi has been deleted for AP600. Values for these variables have not been finalized and, therefore, can not be specified in the Bases.

32. B 3.4.3 References

NUREG-1431 Bases Reference 1, WCAP-7924, April 1975 is not considered to be a relevant reference for this paragraph and, therefore, has not been specified for AP600. (Used later in Bases as Reference 7.)

1. Chapter 3.5 General

These specifications are for the Passive Core Cooling Systems (PXS) since the AP600 does not have an STS Emergency Core Cooling System (ECCS).

2. LCO 3.5.1 LCO

The AP600 has two (not four) accumulators.

3. LCO 3.5.1 Condition A

Condition A has been revised to address accumulator inoperabilities due to pressure or volume outside limits in addition to boron concentration. This change is based on logical application of the AP600 Completion Time criteria which indicated that for any of the three parameters outside specified limits a Completion Time of 7 days should apply.

4. LCO 3.5.1 Condition C

This is a new Condition, in case both accumulators are considered inoperable if the boron concentration, nitrogen pressure, or volume is outside the limits.

5. LCO 3.5.1 Condition D

This combines STS Conditions C and D, but with no requirement to enter LCO 3.0.3. AP600 Required Action D.1 specifies entry into MODE 3 and reduction of pressurizer pressure to less than 1000 psig. The Required Action D.1 requirement removes the plant from the Applicability of LCO 3.5.1 and is identical to the LCO 3.0.3 requirements which would apply. Therefore, there is no basis for separate Conditions for AP600.

6. LCO 3.5.1 SR 3.5.1.2

The borated water volume range for the accumulators is AP600 specific.

7. LCO 3.5.1 SR 3.5.1.3

The nitrogen cover gas pressure range for the accumulators is AP600 specific.

8. LCO 3.5.1 SR 3.5.1.4

The boron concentration range for the accumulators is AP600 specific.

9. LCO 3.5.1 SR 3.5.1.6

This Surveillance is added for the AP600 since the accumulators are included in the IST Plan.

10. B 3.5.1 Background

As described in the first paragraph, the function of the AP600 accumulators is somewhat different than the STS accumulators. The design is different in that the accumulators are piped into the reactor vessel, not the RCS cold leg, and isolation is not provided by an MOV but the MOVs are normally open. While the STS discusses an interlock, the AP600 TS discuss power lockout and position alarms to meet IEEE-279. Again, the Background discusses the AP600 2-accumulator design and for what one or both are adequate and the basis for this performance.

11. B 3.5.1 Analyses

The LOCA analyses discussed are AP600-specific. In addition, the non-LOCA analysis considerations are also presented.

12. B 3.5.1 LCO

The LCO discussion in the Applicable Safety Analyses section of the STS is moved to the AP600 LCO Bases section.

13. B 3.5.1 Applicability

This is written as it applies to the AP600 design and operation, including Mode 4 with Mode 3 rather than with Modes 5 and 6.

14. B 3.5.1 Actions

The actions are described consistent with the AP600 design and operation as presented for Conditions A through D of 3.5.1.

15. B 3.5.1 Surveillances

Except for editorial or AP600 design differences, the SR discussions are similar to those presented in the STS, with exceptions explained below.

16. B 3.5.1 SR 3.5.1.4

Sampling is adequate after a 3% (not 1%) volume increase, due to the reduced sensitivity to volume and boron concentration changes for AP600. Also, the STS sentences relating to the RWST makeup have not been included for AP600, since the AP600 design does not include makeup from the IRWST.

17. B 3.5.1 SR 3.5.1.5

The sentence, "Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves." is deleted from the AP600 TS. The AP600 design does not include the RCS pressure interlock. Removal of power to the valves and an open actuation signal with a safeguards actuation are considered adequate to assure accumulator function.

18. B 3.5.1 SR 3.5.1.6

This is added for the AP600 IST program.

19. B 3.5.1 References

A reference is not included for 10 CFR 50.46, although it is appropriately referenced in the LCO section of the Bases.

Reference is not made to NUREG-1366, since it discusses RWST makeup to the accumulator and is, therefore, not applicable to AP600.

20. The following AP600 Technical Specifications are added for AP600-specific design features.

3.5.2 Core Makeup Tanks (CMTs) - Operating
3.5.3 Core Makeup Tanks (CMTs) - Shutdown, RCS Intact
3.5.4 Passive Residual Heat Removal Heat Exchanger (PRHR HX) - Operating
3.5.5 Passive Residual Heat Removal Heat Exchanger (PRHR HX) - Shutdown, RCS Intact

While there is no applicable STS to compare these to, they follow the general STS and AP600 TS presentation philosophy.

21. LCO 3.5.6 General

Although the AP600 IRWST is quite different in design from the STS RWST, for illustration purposes, AP600 TS 3.5.6 will be compared to STS 3.5.4.

22. LCO 3.5.6 LCO

The IRWST needs two injection flow paths and two containme... recirculation flow paths to be considered operable.

23. LCO 3.5.6 Conditions

Conditions A, B and D are added for actions required when an isolation valve is inoperable or not in the appropriate conditions.

24. LCO 3.5.6 Condition C

In addition to the conditions of STS Condition A, IRWST water volume must be within the limits.

25. LCO 3.5.6 Condition E

Like a combination of STS Conditions B and C, this includes the new AP600 IRWST-Operating Conditions.

26. LCO 3.5.6 Surveillances

SRs 3.5.6.1 through 3.5.6.3 contain the applicable AP600 limits/ranges. SRs 3.5.6.4 through 3.5.6.7 are new, for the AP600 isolation valves.

27. LCO 3.5.6 SR 3.5.6.8

This Surveillance is added for the AP600 since the IRWST is included in the IST Plan.

1. LCO 3.6.1 SR 3.6.1.1, Bases LCO, Bases SR

   SR 3.6.1.1 has been revised to replace the leakage rate testing in accordance with 10 CFR 50 Appendix J with the Containment Leakage Rate Testing Program. The second paragraph of the surveillance, which specified the acceptance criteria, has been deleted. The acceptance criteria are specified in the program requirements, Technical Specification paragraph 5.5.9, Containment Leakage Rate Testing Program. These changes will permit use of alternative containment leakage testing requirements recently added to 10 CFR 50, Appendix J, Option B. The AP600 changes are technically equivalent to the NUREG-1431 requirements.

2. LCO 3.6.2 SR 3.6.2.1, Bases SR

   SR 3.6.2.1 has been revised to replace the leakage rate testing in accordance with 10 CFR 50 Appendix J with the Containment Leakage Rate Testing Program. The second paragraph of the surveillance, which specified the acceptance criteria, has been deleted. The acceptance criteria are specified in the program requirements, Technical Specification paragraph 5.5.9, Containment Leakage Rate Testing Program. These changes will permit use of alternative containment leakage testing requirements recently added to 10 CFR 50, Appendix J, Option B. The AP600 changes are technically equivalent to the NUREG-1431 requirements.

3. LCO 3.6.3 SR 3.6.3.5, Bases SR

   The NUREG-1431 valve actuation test Frequency of 18 months has been changed to "In accordance with the Inservice Testing Program" for AP600. The AP600 Inservice Testing Program has been expanded beyond the ASME Section XI requirements to include additional equipment and system tests which may or may not be included in the Technical Specifications. The Inservice Testing Program test Frequencies are specified in the SSAR and are thus subject to 10 CFR 50.59 change controls.

4. LCO 3.6.6 Passive Containment Cooling System - Operating
   LCO 3.6.7 Passive Containment Cooling System - Shutdown
   LCO 3.6.8 Containment Penetrations
   LCO 3.6.9 pH Adjustment

   These LCOs and Bases are unique to AP600. Comparison to specific NUREG-1431 LCOs is not appropriate.

1. LCO 3.7.1 Applicability

NUREG-1431, LCO 3.7.1, Applicability specifies MODES 1 2, and 3. The AP600 Applicability specifies MODES 1 2, 3, and 4 with RCS not cooled by RNS. Due to the AP600 changes to the Definition of the MODES, the switchover to RNS occurs in the middle of MODE 4 (approximately 350°F) which is equivalent to entry into MODE 4 (350°F) for the standard MODE Definitions. Therefore, the AP600 requirement is technically equivalent.

2. LCO 3.7.1 Applicable Safety Analyses

The following statement is included in the NUREG-1431 Bases:

> "The events that challenge the relieving capacity of the MSSVs, and thus **RCS** pressure, are those characterized as decreased heat removal events, ..."

For AP600 this was revised to address steam generator pressure:

> "The events that challenge the relieving capacity of the MSSVs, and thus **steam generator** pressure, are those characterized as decreased heat removal events, ..."

This change is considered to be a correction to the NUREG wording.

3. B 3.7-2 LCO

The following statement is included in the NUREG-1431 Bases:

> "A MSSV will be considered inoperable if it fails to open on demand."

For AP600 this was revised to address steam generator pressure:

> "A MSSV will be considered inoperable if it fails to open in the event of a pressure excursion in excess of the setpoint."

This change is considered to be a clarification of the NUREG wording.

4. LCO/ Bases 3.7.2 Applicability

NUREG-1431, LCO 3.7.2 Applicability specifies MODES 1, 2, and 3 except when all MSIVs are closed and [de-activated]. The AP600 Applicability specifies MODES 1, 2, 3, and 4 except when both MSIVs are closed. Due to the AP600 changes to the Definition of the MODES, the switchover to RNS occurs in the middle of MODE 4 (approximately 350°F) which is equivalent to entry into MODE 4 (350°F) for the standard MODE Definitions. Therefore, the AP600 requirement is technically equivalent.

5. LCO 3.7.2 Condition B

NUREG-1431 does not provide Conditions for more than one MSIV inoperable in MODE 1 or in MODES 2 and 3. For AP600 a new Condition D was added as discussed below in item 3. Following addition of Condition D, it was apparent that the change to Condition B was needed to address the MODE 1 Action for two inoperable MSIVs.

The Condition "Two MSIVs inoperable in MODE 1" has been added to Condition B. Required Action B.1 requires entry into MODE 2. Upon Entry into MODE 2, new Condition D would apply with Required Action D.1 requiring closure of the MSIVs.

6. LCO/ Bases 3.7.2 Condition D

Condition D has been added for AP600 to separate the requirements applicable to one MSIV inoperable from those applicable with two MSIVs inoperable in MODES 2, 3, or 4. For AP600, different Completion Times are appropriate considering the safety analyses. With only one MSIV inoperable (Condition C), 72 hours are allowed to close (or restore) the valve since all postulated DBAs can be mitigated assuming no single failure of the remaining OPERABLE valve. However, if both valves are inoperable, the function assumed in the accident analyses is not available, and corrective action must be completed within 1 hour.

7. LCO/ Bases 3.7.2 SR 3.7.2.1

The note has been revised to specify that the surveillance is "only required to be preformed prior to entry into MODE 2". For AP600 it is not considered prudent to perform MSIV closure time tests in MODE 1 or 2, when the steam generators are the primary means of heat removal from the RCS. This change is consistent with the existing Bases discussion.

8. LCO/ BASES 3.7.3 Applicability

NUREG-1431, LCO 3.7.2 Applicability specifies MODES 1, 2, [and 3] except when MFIV, MFRV is closed and [de-activated]. The AP600 Applicability specifies MODES 1, 2, 3, and 4 except when the MFIVs or associated MFCVs are closed and deactivated. Due to the AP600 changes to the Definition of the MODES, the switchover to RNS occurs in the middle of MODE 4 (approximately 350°F) which is equivalent to entry into MODE 4 (350°F) for the standard MODE Definitions. Therefore, the AP600 requirement is technically equivalent.

9. LCO/ BASES 3.7.3 Required Actions A.1 and B.2

Both Actions A.1 and B.2 have been revised to specify "flow path." This change is technically equivalent to the existing requirement, clarifies the intended requirement and is consistent with NUREG-1431 Required Action D.1.

10. LCO/ BASES 3.7.3 SR 3.7.3.1

A note has been added to specify that the surveillance is "only required to be performed prior to entry into MODE 2". For AP600 it is not considered prudent to perform main feedwater valve closure time tests in MODE 1 or 2, when the steam generators are the primary means of heat removal from the RCS.

11. LCO/ BASES 3.7.4 Applicability, Action A.1

NUREG-1431, LCO 3.7.18 Applicability specifies MODES 1, 2, 3, and 4. The AP600 Applicability specifies MODES 1 and 2. AP600 DBA analyses do not assume secondary specific activity limits for any events which may occur in MODES 3 or 4, therefore; Secondary Specific Activity LCO Applicability in MODES 3 and 4 is not required.

Since the Applicability only includes MODES 1 and 2, Action A.1 specifies shutdown to MODE 3 to place the plant in a MODE in which the LCO does not apply.

12. LCO/ BASES 3.7.5 Applicability, Action A.2

For AP600, the spent fuel pool water level LCO applies **at all times**, not just during movement of irradiated fuel assemblies as specified in NUREG-1431.

The AP600 Applicability is required because the safety analyses assume the minimum water level as an initial condition for a loss of spent fuel pool cooling event.

For this reason Action A.2 has been added to ensure that the water level is restored in addition to suspending movent of irradiated fuel assemblies.

13. LCO/ BASES 3.7.6

The AP600 specification Main Control Room (MCR) Habitability System, LCO 3.7.6 has the same purpose as NUREG-1431 LCOs 3.7.10, Control Room Emergency Filtration System, and 3.7.11, Control Room Air Temperature Control System. AP600 LCO 3.7.6 provides requirements which provide breathing air for operators in the event of an accident and assures that control room temperature will remain below analyzed values during the course of the accident. While the AP600 LCO is similar to the requirements in NUREG-1431, no comparison has been made due to the system design and analysis differences.

14. LCO/ BASES 3.7.7

This LCO and Bases is unique to AP600. Comparison to specific a NUREG-1431 LCO is not appropriate.

1. Chapter 3.8 General

   The AP600 electrical power systems design is described in SSAR Chapter 8. A review of this SSAR chapter will familiarize the reader with the AP600 design terminology (Divisions, not trains; instrument and control bus, not vital bus; etc.) such that each terminology difference is not noted in this listing. It is also important to note that the AC electrical power distribution subsystems are not required to be included in the AP600 TS since they are not assumed in the safety analyses, either as initial conditions or to mitigate the consequences of an accident.

2. LCO 3.8.1 LCO

   The AP600 electrical power system design consists of divisions, not trains

3. LCO 3.8.1 SR 3.8.1.6, SR 3.8.1.7

   The Note "This Surveillance shall not be performed in MODE 1, 2, 3, or 4." was deleted since the AP600 has a spare battery and charger such SR 3.8.1.8 that these Surveillances can be performed in these modes.

4. LCO 3.8.2 Applicability

   For the AP600, DC Sources - Shutdown does not specify the Applicability of "during movement of irradiated fuel assemblies," only Mode 5 and 6. An Applicability of "during movement of irradiated fuel assemblies" would ensure that required DC sources would be available for fuel movement in MODES other than 5 and 6. This could be necessary for fuel movement in the spent fuel pool area; however, for AP600 there are no DC power sources needed to support Technical Specifications during movement of fuel in the spent fuel pool area.

5. LCO 3.8.2 Action A.2.2

   NUREG-1431 Required Action A.2.2, "Suspend movement of irradiated fuel assemblies," has not been included in AP600 for the same reasons discussed above in item 4.

   A new Required Action A.2.2 has been added for AP600: "Initiate action to suspend operations with a potential for draining the reactor vessel." This Action has been specified to provide added assurance that potential Mode 5 and 6 events are precluded.

6. LCO 3.8.2 SR 3.8.2.1

   NUREG-1431 has a note excluding some DC Sources - Operating SRs from being performed. With applicability of the AP600 LCO 3.8.2 to MODES 5 and 6, regardless of whether or not irradiated fuel is being moved, the NUREG-1431 note and exclusion of some DC Sources - Operating SRs do not apply.

7. LCO 3.8.3 LCO

   The AP600 electrical power system design consists of divisions, not trains.

8. LCO 3.8.3 LCO Note

For the AP600, reference is made to instrument and control buses, not "vital" buses.

9. LCO 3.8.4 LCO

For the AP600, the inverters shall be OPERABLE to support the onsite Class 1E power distribution subsystems of LCO 3.8.6, not the Class 1E AC vital bus electrical power distribution subsystems noted in NUREG-1431.

10. LCO 3.8.4 Applicability

For the AP600, Inverters - Shutdown does not specify the Applicability of "during movement of irradiated fuel assemblies," only Mode 5 and 6. An Applicability of "during movement of irradiated fuel assemblies" would ensure that required DC sources would be available for fuel movement in MODES other than 5 and 6. This could be necessary for fuel movement in the spent fuel pool area; however, for AP600 there are no DC power sources needed to support Technical Specifications during movement of fuel in the spent fuel pool area.

11. LCO 3.8.4 Action A.2.2

NUREG-1431 Required Action A.2.2, "Suspend movement of irradiated fuel assemblies," has not been included in AP600 for the same reasons discussed above in item 4.

A new Required Action A.2.2 has been added for AP600: "Initiate action to suspend operations with a potential for draining the reactor vessel." This Action has been specified to provide added assurance that potential Mode 5 and 6 events are precluded.

12. LCO 3.8.5 LCO

For the AP600, divisions and instrument and control buses are referred to rather than trains and vital buses.

13. LCO 3.8.5 Conditions

Condition A of NUREG-1431 is not required since the AP600 does not have Class 1E AC subsystems.

14. LCO 3.8.5 Conditions

The word Division was added to Conditions A and B since the AP600 is designed such that there are two AC busses and two DC subsystems in Divisions B and C, while there is one AC bus and DC subsystem each per Divisions A and D.

15. LCO 3.8.5 Condition E

Reference is made to Divisions instead of Trains.

23. LCO 3.8.6 SR 3.8.6.1

To be consistent with the AP600 design and terminology and not including the AC power system in the AP600 TS, "... required AC, DC, and AC vital bus electrical power distribution subsystems." is changed to "required DC and AC instrument and control bus electrical power distribution subsystems..."

24. LCO 3.8.7 LCO

Reference is made to Division instead of Train.

25. LCO 3.8.7 Table 3.8.7-1

Battery cell specific gravity parameters are to be supplied by battery vendor. Use of TBD is considered appropriate in this instance. Note that this value is bracketed in the STS.

26. B 3.8.1

This section of the Tech Specs is revised to reflect the AP600 electrical systems design for DC Sources - Operating, including details for the battery banks and spares and the DC power system being Class 1E. Also, the loss of all offsite and onsite AC power sources as an applicable safety analyses is an AP600-specific analysis (STS refer to loss of all offsite or onsite AC power sources).

27. B 3.8.1 B 3.8-8

For the AP600, SR 3.8.1.7 may be performed during any plant condition with the spare battery and charger providing power to the bus.

28. B 3.8.1 B 3.8-8

The reason given for SR 3.8.1.7 Note 2 is a little different for the AP600 than that stated in the STS.

29. B 3.8.1 B 3.8-9

The reason given for SR 3.8.1.8 Note 2 is a little different for the AP600 than that stated in the STS.

30. B 3.8.1 B 3.8-10

Reference to Reg Guide 1.93 (Ref 8 in the STS) is not needed for the AP600 since the plant need not be brought to MODE 5.

31. B 3.8.2

This section of the Tech Specs is revised to reflect the AP600 electrical systems design for DC Sources - Shutdown, including reference to the DC power system as Class 1E.

32. B 3.8.2 Applicable Safety Analyses Page B 3.8-11

For applicable safety analysis assurance c, *inadvertent draindown of the vessel* is included in events postulated during shutdown, since this is a consideration for the AP600 design. This is consistent with the 3.8 shutdown specs for which actions are initiated to *suspend operations with a potential for draining the reactor vessel* rather than suspend movement of irradiated fuel assemblies as in the STS.

33. B 3.8.2 Pages B 3.8-11&12

Following the applicable safety assurances, there are paragraphs added which provide operating details with respect to safety analysis applicability for shutdown modes.

34. B 3.8.2 LCO Page B 3.8-12

The subsystems are described in the Background section for LCO 3.8.1. And a paragraph is added to reference the Applicable Safety Analysis description for 3.8.2.

35. B 3.8.2 Page B 3.8-12

Again, Applicability of this TS for the AP600 is in MODES 5 and 6, not *and during movement of irradiated fuel*. See item 4 above.

36. B 3.8.2 B 3.8-12

Applicability item a explains coolant inventory is makeup is available *in case of an inadvertent draindown of the reactor vessel*. This additional discussion of the inadvertent draindown is consistent with the changes made to the Applicable Safety Analyses section.

37. B 3.8.2 B 3.8-13

Actions in the STS refer to trains while the AP600 design has subsystems. References to *draining the reactor vessel* are made. This additional discussion of the inadvertent draindown is consistent with the changes made to the Applicable Safety Analyses section.

38. B 3.8.2 B 3.8-14

Actions discuss the AP600 design feature of a spare battery bank and charger.

39. B 3.8.2 SR 3.8.2.1

The note appearing in the STS for SR 3.8.5.1 is not included in AP600 TS since, with applicability of AP600 LCO 3.8.2 to MODES 5 and 6, regardless of whether or not irradiated fuel is being moved, the NUREG-1431 note and exclusion of some DC Sources - Operating SRs do not apply.

40. B 3.8.3 General

Bases sections for 3.8.3 describe the AP600 inverters design. This includes an expanded description in the Background section, reference to the AP600 Protection and Safety Monitoring System (PMS) rather than the STS Reactor Protection System (RPS) in the Background and Applicable Safety Analyses sections. Also, the STS ESFAS is not referred to since the engineered safety features related to the Inverters TS are part of the PMS.

41. B 3.8.3 B 3.8-16

Consistent with the AP600 I&C design and the safety analyses, the Applicable Safety Analyses section discusses that only three of the four Divisions of AC I&C buses need be operable. Also, the loss of all offsite and onsite AC power sources as an applicable safety analyses is an AP600-specific analysis (STS refer to loss of all offsite or onsite AC power sources).

42. B 3.8.3 B 3.8-16 LCO

The STS ESFAS is not referred to since the engineered safety features related to the Inverters TS are part of the PMS. OPERABILITY is defined as it relates to the AP600 inverters.

43. B 3.8.3 Action A.1

The STS AC vital bus is referred to as a Class 1E AC instrument and control bus, for Action A.1, as well as throughout the AP600 Tech Specs. The related switches provided in the AP600 design are also discussed.

44. B 3.8.3 B 3.8-18

For AP600 , the safe endstate is MODE 4 (not MODE 5 as listed in the STS). This is addressed globally in another section of this explanation of differences between the AP600 Technical Specifications and NUREG-1431.

45. B 3.8.3 SR 3.8.3.1

The related switches provided in the AP600 design are verified.

46. B 3.8.4 B 3.8-20

The AP600 Class 1E AC instrument and control bus is referred to (rather than the STS *AC vital bus*).

47. B 3.8.4 B 3.8-21

The Applicable Safety Analyses section contains three additional paragraphs of detail when compared to the STS. Also, the inverters are better defined as *Class 1E UPS inverters*.

48. B 3.8.4 LCO

The LCO discussion is enhanced with AP600 design details: reference to the Class 1E AC instrument and control buses, the normal power supply from the 480 VAC being de-energized, output voltage and frequency within tolerances, and the power input to the inverter from a 125 VDC station battery. Also, reference is again made to the inadvertent reactor vessel draindown event.

49. B 3.8.4 Applicability

The first paragraph is added to reflect the 3.8.4 LCO Bases discussion. Applicability does not include *and during movement of irradiated fuel* and refers to *an inadvertent draindown of the reactor vessel*. The inverters are better defined as *Class 1E UPS*.

50. B 3.8.4 Actions

Trains are not part of the AP600 design and are therefore not discussed in the AP600 Tech Specs (although a few references to "train" were discovered during this review and will be corrected for the final Tech Specs). For the AP600, reference is made to inadvertent draining the reactor vessel.

51. B 3.8.4 SR 3.8.4.1

For the AP600, Class 1E AC instrument and control buses, not AC vital buses, are energized from the inverter. Also, the Frequency is further explained by effectiveness of the voltage and frequency instruments.

52. B 3.8.5 Background

The AP600 electrical system design difference is made apparent in this section, especially with respect to the Divisions of the power distribution subsystems. Also, rather than just reference Table B 3.8.5-1 for a list of all required distribution buses, SSAR Section 8.3.2 is also referenced.

53. B 3.8.5 B 3.8-25

AC vital buses are not part of the AP600 design and are therefore not referred to in 3.8.5. In the OPERABILITY paragraph, the sentence, "This includes maintaining power distribution systems..." is enhanced as applicable to the AP600, "This includes maintaining at least three of the four Divisions of Class 1E AC and DC power distribution systems..." Also, the loss of all offsite and onsite AC power sources as an applicable safety analyses is an AP600-specific analysis (STS refer to loss of all offsite or onsite AC power sources).

54. B 3.8.5 LCO

Trains and AC vital buses are not part of the AP600 design and are therefore not referred to in 3.8.5. The AP600 spare battery bank and chargers design feature is discussed. The last LCO Bases paragraph in the STS, regarding tie breakers, does not apply to the AP600 design.

55. B 3.8.5 Applicability

Rather than refer to "The electrical power distribution subsystems", the Class 1E AC and DC electrical power distribution subsystems are discussed.

56. B 3.8.5 Actions

The actions are revised to reflect the AP600 LCO 3.8.5 Conditions as previously discussed. The standard PWR reduced reliability and single failure discussion does not apply to the AP600 distribution systems design. Instead the passive/fail-safe design features are discussed. Additional completion time explanation is provided.

57. B 3.8.5 A.1

For item b, *DC power* replaces *adequate vital AC power*. Operability of the AP600 Class 1E AC instrument and control bus (not AC vital bus) is discussed.

58. B 3.8.5 B.1

Reference to Reg Guide 1.93 is not applicable here for the AP600. An *AC bus* is defined for the AP600 as an *AC instrument and control bus*.

59. B 3.8.5 C.1 and C.2

Rather than bring the unit to a MODE where the LCO does not apply, it is appropriate to bring the AP600 unit to MODE 4, where the probability and consequences of an event are minimized.

60. B 3.8.5 SR 3.8.5.1

The AP600 Spec does not contain the sentence, "The correct breaker alignment ensure the appropriate separation and independence of the electrical divisions is maintains, and the appropriate voltage is available to each required bus." is not applicable to the AP600 since this separation and independence is inherent in the design.

61. B 3.8.5 References

Reference is made to SSAR Section 8.3.2 and not to Reg Guide 1.93 (See Background and action B.1 discussions).

62. B 3.8.5 Table

The Electrical Power Distribution System table has been revised to reflect the AP600 design.

63. B 3.8.6 Background

Rather than refer to STS LCO 3.8.9 for the *AC, DC, and AC vital bus electrical power distribution systems* description, reference is made to AP600 LCO 3.8.5 for the *Class 1E AC instrument and control bus and Class 1E DC electrical power distribution system* description.

64. B 3.8.6 B 3.8-33

A sentence which appears in the STS which does not appear in the AP600 Tech Specs, but for no apparent reason, will be added, "The OPERABILITY of the Class 1E AC and DC electrical power sources and associated power distribution subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY." Also, OPERABILITY in MODES 5 and 6 needs no reference to *and during movement of irradiated fuel assemblies* and additional discussion of DBA analyses is provided for the AP600.

65. B 3.8.6 Applicability

No reference is needed to *and during movement of irradiated fuel assemblies*. Reference is made to *an inadvertent draindown of the reactor vessel*.

66. B 3.8.6 Actions

Reference is made to *operations with a potential for draining the reactor vessel*. Regarding the allowance for sufficiently conservative actions, *movement of irradiated fuel assemblies* is replaced with *any activities that could potentially result in inadvertent draining of the reactor vessel*. The STS paragraph which discusses the RHR system was removed since it is not applicable to the AP600 design.

67. B 3.8.6 SR 3.8.6.1

This Surveillance verifies the *Class 1E AC and DC* electrical power distribution subsystems are functioning properly, with *the required circuit breakers and switches properly aligned*, rather than the STS verification that *AC, DC, and AC vital bus* electrical power distribution subsystems are functioning properly, with *all buses energized*.

68. B 3.8.6 References

Reference 3, SSAR Section 8.3.2, is added although no explicit reference is made in B 3.8.6.

69. B 3.8.7 B 3.8-37

For the AP600, what the DC electrical power system provides power for is different that for the plant described in the STS. OPERABILITY refers to maintaining *at least three of the four Divisions of DC Sources* not *one train*. Also, the loss of all offsite and onsite AC power sources as an applicable safety analyses is an AP600-specific analysis (STS refer to loss of all offsite or onsite AC power sources).

70. B 3.8.7 SR 3.8.7.2

"The quarterly inspection of specific gravity..." needs to include "and voltage".

71. B 3.8.7 Table 3.8.7-1

Battery cell specific gravity parameters are to be supplied by battery vendor. Use of TBD is considered appropriate in this instance. Note that this value is bracketed in the STS.

72. B 3.8.7 References

Reference 1 was added to hold a place for the battery manufacturer recommended parameter values and Reference 3 for IEEE-308 1980 was added. No explicit reference to Refs 1 or 3 are made in B 3.8.7.

1. 3.9.1 LCO

   The STS *refueling canal* is referred to as a *fuel transfer canal* for AP600.

2. B 3.9.1 Background

   The STS refueling canal is referred to as a transfer tube for AP600.

   The AP600 TS do not contain the paragraph which begins, "GDC 26 of 10 CFR 50, Appendix A, requires that two independent reactivity control systems . . ." which described the control system as well as the Chemical and Volume Control System. Since the reviewers could not confirm the applicability of this paragraph to AP600, it was deleted.

3. B 3.9.1 Backgroun

   The AP600 design is such that borated water comes from the IRWST by using the spent fuel pool cooling system (not from the RWST using the RHR pumps per the STS). The *pumping action* paragraph uses the AP600 RNS and SFS design features. References to the RHR TSs are deleted.

4. B 3.9.1 Analyses

   Because no boron dilution event is postulated in MODE 6 for the AP600, references to that analysis are deleted.

5. B 3.9.1 LCO

   The STS *refueling canal* is referred to as a *transfer tube* for AP600.

6. B 3.9.1 Applicability

   A correction will be made of the sentence: *Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) - T_{avg} <200°F," and LCO 3.1.1, "SHUTDOWN MARGIN (SDM) T_{avg} <200°F," ensure that an adequate amount of negative reactivity...* It should read: *Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) ensures that an adequate amount of negative reactivity...*

7. B 3.9.1 A.1 and A.2

   The STS *refueling canal* is referred to as the *fuel transfer canal* in the AP600 TS. The last sentence is appended with *including moving a component to a safe position.* for clarification.

8. B 3.9.1 SR 3.9.1.1

   The STS *refueling canal* is referred to as the *fuel transfer canal*. For the AP600 SR frequency explanation, LCOs 3.9.2 and 3.9.3 are referenced in addition to operating experience.

9. B 3.9.1 References

Reference is not made to 10 CFR 50, Appendix A, GDC 26. See item 2 above.

10. 3.9.2 General

The STS title is Unborated Water Source Isolation Valves but for the AP600, this specification is titled and applies to Unborated Water Source Flow Paths and only one valve is required to be closed to consider a path isolated. These minor changes are necessary to reflect the AP600 system design as well as SSAR accident analyses.

11. 3.9.2 , SR 3.9.2.1

There is a typo *psoition* to be corrected for the next Tech Spec revision.

12. B 3.9.2 Applicability

The last sentence was revised to reflect LCO 3.1.9 requirements rather than provide conclusions of the boron dilution analysis for Modes 1-5 since this seems a more appropriate applicability statement.

13. B 3.9.2 Action A.1

As was done for B 3.9.1 Actions A.1 and A.2, the last sentence is appended with *including moving a component to a safe position.*

14. B 3.9.3 Background

Reference is appropriately made to the AP600 PMS, not the STS NIS.

15. B 3.9.3 Analyses

Reference to the boron dilution event is deleted since this TS is applicable in MODE 6 and there is no boron dilution event postulated for the AP600. The sentence, "During initial fuel loading, or when otherwise required, temporary neutron detectors may be used to provide additional reactivity monitoring (Ref. 2)" was added given the AP600 design feature as described in SSAR 14.2.6.1.

16. B 3.9.3 Action B.2

The second sentence adds *no changes are permitted until the source range neutron flux monitors are restored to OPERABLE status* as clarification.

17. B 3.9.3 SR 3.9.3.2

For the AP600, performance is described as *during the refueling outage* rather than the ST 18 months.

18. B 3.9.3 References

Reference is not made to 10 CFR 50 (STS Ref. 1) since it is not referenced in the AP600 Bases for 3.9.3 (also not referenced in STS Bases, just reference section). Reference 2 was added and referred to in the Applicable Safety Analyses section.

STS 3.9.4, Containment Penetrations, is found in the AP600 Tech Specs Containment Systems section, specifically section 3.6.8.

STS 3.9.5 and 3.9.6, RHR and Coolant Circulation, are not applicable to the AP600 design and are therefore not included in the AP600 Tech Specs. No RNS substitution is made since the RNS is a nonsafety system and does not meet the criteria for inclusion in the Tech Spes.

19. 3.9.7

No deviations from STS 3.9.7.

20. B 3.9.4 Background

The 10 CFR 100 dose limits are not going to apply for the AP600. The TS are worded such that no change should be required when the limits and reference are specified by the NRC.

21. B 3.9.4 Applicable Safety Analyses

Portions of the STS discussion have been deleted, since, for AP600, the details of the analyses assumptions and results are different from the STS description. These details are provided in Reference 2 to the Bases.

22. B 3.9.4 Applicability

The LCO minimizes *the possibility of radioactive release due to a fuel handling accident*, not *the possibility of a fuel handling accident*.

23. B 3.9.4 References

The references are made consistent with the AP600 TS 3.9.4 Bases. Note that SSAR Section 15.7.4 contains the fuel handling accident analysis.

1. 4.1

   Site specific information to be provided by COL Applicant.

2. 4.2.1

   The AP600 specifies the cladding is a zirconium based alloy.

3. 4.2.2

   AP600 Gray Rod Assemblies are also discussed (in addition to the control rods).

4. 4.3.1

   Although this is bracketed in the STS and differences need not be explained, no item e and f apply for the AP600.

5. 4.3.2

   The wording of this sentence is clarified slightly.

6. 4.4.1

   The Passive Autocatalytic Recombiners, an AP600 design feature for reducing the hydrogen concentration in containment following a LOCA, are described in the new section titled, "4.4 Hydrogen Control".

1. 5.2.1

   Organizations for the AP600 plant are not referred to as Onsite and Offsite since it is premature for Westinghouse to know what the COL Applicant Onsite and Offsite Organizations look like.

2. 5.2.2

   A Reviewer's note is added to tie completion to Human Factors Engineering.

3. 5.2.2.a

   This is different based on the fact that, for the Tech Specs, we need to describe RO and SRO, not non-licensed operator requirements. It is important to note that, for AP600 operation, the SRO can fulfil the requirements of 5.1.2 and 5.2.2.

4. 5.2.2.c

   A table is added to summarize the SRO and RO staffing requirements consistent with SSAR Chapter 18.

5.

   STS 5.2.2.d is not required for the AP600 TS since health physics technicians do not operate the plant or mitigate accidents.

6. 5.2.2.f

   A sentence is added to permit one of the SROs on shift to perform the functions of the STA provided this individual has the specified engineering expertise.

7. 5.3.1

   The staff shall meet or exceed Reg Guide 1.8, Rev. 2, 1987, requirements. This document is bracketed as a representative example of the commitment.

8. 5.4.1

   No differences between NUREG-1431 and the AP600 TS.

9. The following STS programs do not apply to the AP600 for the following reasons:

5.5.2 Primary Coolant Sources Outside Containment

Due to AP600 design differences, the reactor coolant inventory remains inside containment. The AP600 is not expected to remove water given a transient and reactor coolant is not recycled outside containment.

5.5.5 Component Cyclic or Transient Limit

For the RCS, there are no SSAR requirements related to this program such that it does not apply to the AP600. The transient cycles analyzed for AP600 are listed in the SSAR. The number of cycles for each transient is considered to exceed the actual number of cycles during the life of the plant such that tracking the transient cycles is not required. Further, periodic inservice inspection of the RCS pressure boundary is considered to provide adequate assurance of pressure boundary integrity.

5.5.6 Pre-Stressed Concrete Containment Tendon Surveillance Program

The AP600 design is such that the tendons referred to in this program are not part of the AP600 design.

5.5.7 RCP Flywheel Inspection Program

The AP600 uses canned motor RCPs.

5.5.11 Ventilation Filter Testing Program

There are no ESF filters credited in the safety analyses such that their function is not required for the AP600 and need not be tested.

5.5.12 Explosive Gas and Storage Tank Radioactivity Monitoring Program

The AP600 design is such that there is no waste gas tank or any other tank containing potentially explosive gas . The Ap600 uses through processing with no holdup tanks.

5.5.13 Diesel Fuel Oil Testing Program

The AP600 does not use or need safety-grade diesels.

10. 5.5.1.c

Because only the changed portion of the ODCM need be submitted, the STS sentence regarding how changes are identified does not apply. It is thought submitting the whole ODCM is overly burdensome. In addition, with word processing/computer technologies, changes are more easily packaged and communicated.

11. 5.5.3.b

Reference to 10 CFR 20, Appendix B, Table *II*, Column 2 should be to Table *2*. This will be corrected in the final revision of the AP600 Tech Specs.

12. 5.5.3.c

The NUREG-1431 Rev. 0 reference to 10 CFR 20.106 was changed to 10 CFR 20.1302 in Rev. 1, consistent with the changes to 10 CFR 20. This change will be made in the final revision of the AP600 Tech Specs.

13. 5.5.3.g

Reference to 10 CFR 20, Appendix B, Table *II*, Column 2 should be to Table *2*. This will be corrected in the final revision of the AP600 Tech Specs.

14. 5.5.5

The SG tube surveillance program requirements are specified here.

15. 5.5.9

A Containment Leakage Rate Testing Program has been added to the programs section of the Administrative Controls. This addition has been made in conjunction with the revisions to SR 3.6.1.1. SR 3.6.1.1 has been revised to replace the leakage rate testing in accordance with 10 CFR 50 Appendix J with the Containment Leakage Rate Testing Program. The second paragraph of the surveillance, which specified the acceptance criteria, has been deleted. The acceptance criteria are specified in the program requirements, Technical Specification paragraph 5.5.9, Containment Leakage Rate Testing Program. These changes will permit use of alternative containment leakage testing requirements recently added to 10 CFR 50, Appendix J, Option B. The AP600 changes are technically equivalent to the NUREG-1431 requirements.

16. 5.6.1

The NUREG-1431 Rev. 0 reference to 10 CFR 20.407 was changed to 10 CFR 20.2206 in Rev. 1, consistent with the changes to 10 CFR 20. This change will be made in the final revision of the AP600 Tech Specs.

Note that a typo (no spaces between 10 CFR 20) will be corrected in the final revision.

Also, the report should be submitted by March 31, not April 30 (STS). While this is not considered a significant change, the end of the first quarter following the reporting year seemed a more appropriate time for providing the annual exposure report.

17. 5.6.3

The Note was modified since the AP600 will always submit separate reports, given that each unit will have its own radwaste system.

18. 5.6.5.b

A reviewer Note was added explaining that additional methodologies are being developed for core operating limits and will be added to the TS upon NRC approval.

19. STS 5.6.7

The emergency diesel generator failure report does not apply to the AP600 since the plant does not require emergency diesel generators for accident mitigation.

20. 5.6.7

Reference to Condition G of LCO 3.3.3 is deleted since, as explained previously, Condition G of LCO 3.3.3 does not apply for the AP600.

21. 5.6.8

Details of the AP600 SG Tube Inspection Report are included in the TS.

Explanation for Specifying MODE 4 as the Safe Endstate for the AP600

MODE 4 VS. MODE 5

The Required Actions for the 14 AP600 LCOs listed in the table below specify shutdown to MODE 4 in cases where NUREG-1431 specifies MODE 5. Each of these AP600 LCOs specify shutdown to MODE 4 for the limited set of anticipated Conditions which are listed in the specifications. In addition to the LCOs listed below, several AP600-specific LCOs are Applicable in MODE 4 and specify a shutdown end state of MODE 4. Although the Applicability for these AP600 LCOs includes MODE 4, MODE 4 is considered to be a safe and acceptable shutdown end state. For AP600, MODE 4 is a more desirable end state than MODE 5.

ACTION END STATE DIFFERENCE: AP600 MODE 4 -- NUREG-1431 MODE 5

	AP600		NUREG-1431	
	APPLICABILITY	END STATE	APPLICABILITY	END STATE
3.3.2 ESFAS (selected channels only)	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.4.3 RCS P/T Limits	At all times	From 1-4: MODE 4	At all times	From 1-4: MODE 5 with press. < 500 psig
3.4.10 RCS Leakage Detection Instrumentation	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5 All inop: LCO 3.0.3
3.6.1 Containment	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.6.2 Air Locks	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.6.3 Isolation Valves	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.6.4 Containment Pressure	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.6.5 Containment Temperature	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.6.6 Passive Containment Cooling System	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5 Two trains: LCO 3.0.3
3.6.9 pH Adjustment	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4 (Spray Additive System)	MODE 5
3.7.6 Main Control Room Habitability System	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	One train inop: MODE 5 Two trains inop: LCO 3.0.3
3.8.1 DC Sources - Operating	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.8.3 Inverters - Operating	MODE 1, 2, 3, 4	MODE 4	MODE 1, 2, 3, 4	MODE 5
3.8.5 Distribution Systems - Operating	MODE 1, 2, 3, 4	One train: MODE 4 Two trains: LCO 3.0.3	MODE 1, 2, 3, 4	One train: MODE 5 Two trains: LCO 3.0.3

Although the energy in the RCS is greater in MODE 4 than in MODE 5, this is more than offset by the availability of more safety and non-safety related system trains in MODE 4 for mitigation of postulated events.

MODE 4/ 5 COMPARISON OF SYSTEMS AVAILABLE FOR HEAT REMOVAL

MODE 4 (>200, <420°F)	RCS COOLING	MODE 5 (<200°F)	RCS COOLING
ADS (10 paths)	2	ADS (9 paths)	1
CMT (2 tanks)	2	CMT (1 tank)	1
IRWST (2 paths)	2	IRWST (1 path)	1
PRHR HX (2 paths)	2	PRHR HX (2 paths)	2
PCS (2 paths)	N/A	---	0
SG/ FWS	2	---	0
RNS	2	RNS	2
Total Trains	12		7

In MODES 4 and 5 the likely and significant events are those which fail core cooling methods. Therefore, the MODE in which the most core cooling systems and trains are available is the safer MODE based on failure probability.

Additionally, engineering judgment and operating experience indicates that actions necessary to achieve MODE 5, especially with inoperable or degraded equipment, incur some additional risk compared to staying in MODE 4. The challenges to systems and equipment due to MODE changes are recognized by the NUREG-1431 Bases discussions associated with the following Required Actions:

BASES	REQUIRED ACTIONS
B 3.6.6A	B.1 and B.2
B 3.7.5	D.1
B. 3.8.1	A.2
B 3.8.7	A.1

Further, it is considered that the AP600 Technical Specifications comply with the Draft Rule 50.67, Shutdown Operation of Nuclear Power Plants, dated March 25, 1996, along with the associated Draft Regulatory Guide, Shutdown Operation of Nuclear Power Plants, dated April 5, 1996.

MODE 4 is considered to be a safer shutdown end state than MODE 5 for AP600, considering the availability of approximately twice as many heat removal system trains and the avoidance of challenges to systems and equipment associated with MODE changes.