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10 CFR 50.4
10 CFR 50.59
10 CFR 72.4
10 CFR 72.48

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Washington, D.C. 20555-0001

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Sequoyah Nuclear Plant, Units 1 and 2
Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327, 50-328, and 72-034

Subject: **10 CFR 50.59 and 10 CFR 72.48 Changes, Tests, and Experiments Summary Report**

In accordance with 10 CFR 50.59(d)(2) and 10 CFR 72.48, the summary reports for evaluations of changes, tests, and experiments are required to be submitted at intervals not to exceed 24 months. The previous summary report for evaluations of changes, tests, and experiments performed in accordance with 10 CFR 50.59 and 10 CFR 72.48 was submitted on June 12, 2008. As such, the summary report for the evaluations that have occurred since June 12, 2008 are required to be submitted by June 12, 2010.

The enclosure to this letter provides the summary report of the implemented safety evaluations, performed in accordance with 10 CFR 50.59 and 10 CFR 72.48, that have occurred since the previous submittal dated June 12, 2008.

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There are no commitments contained in this letter. If you have any questions, please contact J. W. Proffitt at (423) 843-6651.

Respectfully,

R. M. Krich

Enclosure:
10 CFR 50.59 and 10 CFR 72.48 Changes, Tests, and Experiments Summary Report

cc (Enclosure):
NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

ENCLOSURE

**SEQUOYAH NUCLEAR PLANT
10 CFR 50.59 AND 10 CFR 72.48
CHANGES, TESTS, AND EXPERIMENTS SUMMARY REPORT**

DCN	DESCRIPTION	SAFETY ANALYSIS
D-22239-A	This design change replaces the obsolete steam generator level control system (SGLCS) electronics with a digital distributed control system (DCS) manufactured by INVENSYS for Sequoyah Unit 2. The components impacted directly with this modification are the electronic controls for the main feedwater pumps and the electronic controls for the main and bypass feedwater control valves. The new system is composed of redundant fault tolerant processors, redundant input process signals, redundant power supplies (both sources and direct current [DC] supplies), redundant switched control networks, and redundant operator display units. The old analog equipment located in the auxiliary instrument room was replaced with DCS components which include field control processors (FCPs), fieldbus modules (FBMs), fieldbus communications modules (FCMs), base plates, and cables. Also a new engineering work station (EWS) rack and master DCS rack were installed containing central processing units, monitor, printer, keyboard, mouse, and keyboard-video-mouse (ICVM) switches. In the main control room, several instruments were removed and/or relocated on Control Panel No. M-3 to make room for two operator display units (flat screens). Old manual/auto stations for the main feedwater (MFW) regulating valve and bypass valves, and the main feed pump (MFP) speed controls were replaced by new manual/auto stations. New alarms for the DCS were added to the annunciator panel on Control Panel M-3. Input/output equipment (FBMs, FCMs, base plates, and power supplies) were added to Control Panel M-11 to service the equipment in Panel M-3. Two new transmitters were added to each main steam header and feedwater header that provides redundant inputs into the DCS. The old analog steam generator narrow range level median signal selector (MSS) modules were replaced by a software MSS.	The new digital DCS system replaces function-for-function the old analog SGLCS with reliability improvements. The new DCS provides redundant inputs, redundant processors, networks and power supplies. The new system is designated as "Quality Related" and is designed to meet Quality Related requirements. The reliability of the new system is superior to the old analog system. The modification does not negatively impact any system, structure or component (SSC) that is important to safety nor does it impact the consequences or the frequency of their occurrence. The new DCS does not cause a new type of malfunction or accident to be created. The new DCS reduces the likelihood of SGLCS failures and their consequences by providing a more reliable and redundant control system. The potential credible failure modes that have been identified in the screening review are: Failure of all feedwater regulating valves to close with the MFPs slowing to their minimum speed. Control Group 1 failing low with both MFPs slowing to their minimum speed with its associated controls valves closed. Control Group 1 failing high causing its associated regulating valves to fail open and the MFP speed increasing to the maximum RPM. These failure modes have been evaluated using methods and acceptance criteria contained in the current Updated Final Safety Analysis Report (UFSAR). The evaluation confirmed that all established analysis acceptance criteria continue to be met for the new DCS.

PROCEDURE	DESCRIPTION	SAFETY ANALYSIS
Clearance Nos. 2-30-1611 and 2-30-1622	This activity involves establishment of a maintenance clearance boundary which removed Unit 2 containment building Upper Compartment Cooler (UCC) Nos. 2A, 2B, 2C, and 2D from service for a period which exceeded 90 days. The coolers are supplied with cooling water from the essential raw cooling water (ERCW) system. The coolers were removed from service to support replacement of the ERCW supply piping that was, upon inspection, found to be below the minimum required wall thickness. The coolers were out of service from March of 2009 thru the start of the Unit 2 Cycle 16 (U2C16) refueling outage in October 2009. The repair/replacement of the ERCW piping was completed during the U2C16 refueling outage at which point the maintenance clearance boundary was lifted.	Removing the UCCs from service affects the ability to manage the upper containment building temperatures. Technical Specification (TS) Section 3.6.1.5.a requires the temperature in the containment upper compartment to be maintained between 85 degrees Fahrenheit (°F) and 105°F for normal operating conditions. An alarm will indicate when upper compartment temperatures exceed 100°F. Based on previous plant-specific operating experience, upper compartment temperatures will remain below the alarm value without any UCCs in service for extended periods of time. If needed (as indicated by an alarm annunciation), administrative controls would permit at least one train of upper compartment cooling to be placed in-service based on a structural integrity analysis of the ERCW supply piping in accordance with American Society of Mechanical Engineers (ASME) Code Case N-513-2. It was concluded that it was acceptable to implement the proposed activity based on 1) the UCCs were not expected to be needed to maintain the upper compartment temperatures within established operating limits, 2) if needed, one train of upper compartment cooling could be re-established by administrative controls, and 3) if one train of upper compartment cooling ability was insufficient to maintain the maximum temperature below established limits the actions for TS Section 3.6.1.5 will be followed.

UFSAR REVISION	DESCRIPTION	SAFETY ANALYSIS
Section 5.2.2.4.4	This section of the UFSAR contains a precaution which indicates that if all reactor coolant pumps (RCPs) have stopped for more than 5 minutes during plant heatup (and the reactor coolant temperature is greater than the charging and seal injection water temperature), RCP restart will not be performed unless a steam bubble is formed in the pressurizer. This change clarifies the intent of this precaution. The revised text will indicate that the precaution is not applicable to RCP operation in Mode 5 when steam generator temperatures on the secondary side are no more than 25°F warmer than the reactor coolant system temperature. The change will specifically remove the restriction of starting a RCP under water solid conditions at temperatures less than 200°F (i.e., the conditions under which "sweep and vent" operations are performed for the removal of gas voids in the high points of the reactor coolant system (RCS) prior to system return to service following refueling outage activities).	The original precaution can be conservatively interpreted to preclude RCP operation under water solid conditions during the performance of "sweeps and vents" during system recovery from a refueling outage. The "sweep and vent" process involves operation of one RCP in each loop sequentially followed by four pump operation to sweep non-condensable gases collected in the steam generator tube high points to the reactor vessel head where they can be vented from the RCS prior to plant startup. This operation is separate and distinct from a plant heatup from cold shutdown conditions to power operating conditions. The proposed change will specifically permit operation of RCPs under water-solid conditions for the purpose of performing "sweep and vent" operations. These operations are performed only in Mode 5. The system overpressure protection features will not be challenged by RCP operation with the stated restriction of the secondary temperature being no greater than 25°F warmer than the primary temperature in Mode 5. In the unlikely event that the overpressure protection system devices are activated sufficient controls (i.e., temperatures less than 200°F) have been established to limit the pressurization transient to well within the capability of the low temperature overpressure protection system (LTOPS) (for primary system protection) and the residual heat removal (RHR) pump suction relief valve (for RHR system protection) to mitigate the event. As such, the proposed change remains within the existing design basis for the reactor coolant and RHR systems and is acceptable for implementation. The revised requirement is more restrictive that the 50°F difference specified in UFSAR Section 5.2.2.4.2 which serves as one of the design basis transients for the LTOPS. As such, it does not affect the ability of the LTOPS to provide adequate primary system overpressure protection for the Mode 5 operation. The revision of the statement to allow pump starts at temperatures below 200°F is a less restrictive statement. However, at temperatures below 200°F the RCS is not significantly warmer than either charging or seal injection. This

UFSAR REVISION	DESCRIPTION	SAFETY ANALYSIS
		small temperature differential will restrict the volumetric expansion. Additionally, the expansion will happen on a portion of the specific volume curve where changes in temperature result in a small change in specific volume. During the performance of the primary system "sweep and vent" operation the RHR system will be aligned to the primary system for shutdown cooling. As such, the RHR pump suction piping has the potential to be exposed to the same potential pressure transient as the primary system. The capacity of the RHR suction piping pressure relief valve has been previously evaluated with respect to primary system pressure transients during shutdown cooling. The evaluation concluded that the RHR suction relief valve has sufficient capacity to protect the RHR suction piping for the design basis LTOPS thermal addition transient (i.e., four RCPs in operation with the steam generator secondary side temperature 50°F warmer than the primary system) when primary system temperatures are less than 200°F. Given that the "sweep and vent" operation will be performed for primary system temperatures less than 200°F and the maximum allowable secondary system to primary system temperature difference will be limited to 25°F or less, the RHR suction relief valve will provide adequate overpressure protection for the RHR piping aligned to the primary system for shutdown cooling.
Section 5.6	This section of the UFSAR describes the provisions that must be in place to address loss of decay heat removal when the RCS is in a reduced inventory condition consistent with the requirements of NRC Generic Letter 88-17. The text indicates that one train of containment building upper compartment coolers (UCCs) will be maintained available and guidance will be provided on their use. The proposed change will remove the requirement to maintain at least one train of UCCs available during mid-loop and reduced inventory operation.	An analysis was performed to determine the containment temperature and pressure response following a postulated loss of decay heat removal capability during mid-loop operation. The evaluation concluded that the upper compartment coolers provide approximately 2°F of cooling benefit during the duration of the transient and recovery and have no measurable effect on the pressurization transient. As sufficient margins exist to meet the temperature response acceptance criteria without operation of the UCCs, credit for their operation was conservatively deleted from the analysis of record.

WORK ORDER	DESCRIPTION	SAFETY ANALYSIS
09-771564-000 09-771564-001	Based on concerns with the hydrology model used to establish the current Sequoyah probable maximum flood (PMF) elevation, the potential exists for the PMF elevation to increase from plant Elevation 719.6 ft to 722.6 ft. While the issues with the hydrology model are being address such that an accurate PMF elevation can be established, this activity will conservatively provide contingency PMF flood protection to Elevation 722.6 ft for interim operation. Specifically, the following activities will be added to the scope of plant activities credited to prepare for a PMF event. Work Order 09-771564-000 installs passive flood protection for the diesel generator building. The passive flood protection consists of 1) construction of sand bag dikes across the alcoves at the building entrance doors and other building penetrations, 2) sealing fill ports and manhole access to the 7-day fuel supply tanks, 3) plugging sewer and drain lines that communicate with the yard and cannot be isolated, and 4) sealing the lower portion of four doors subject to the flood elevation. Work Order No. 09-771564-001 installs caps on the enclosure for the spent fuel pool cooling (SFPC) pumps.	Based on design reviews and field walkdowns, the additional compensatory actions imposed by these work orders will ensure the operability of safety-related equipment consistent with the plant Flood Protection Plan for a potential maximum PMF elevation of 722.6 ft. The compensatory actions do not adversely affect other aspects of the facility or procedures credited for safety functions. The work orders that implement the compensatory measures are planned and available for work with all material required to implement the actions available on-site. Adequate man power is available to implement the additional actions. [Note: final PMF has been determined to be 722.0 ft]

DIOCUMENT NUMBER/ 72.48 EVALUATION TRACKING NUMBER	DESCRIPTION	SAFETY ANALYSIS
ECO 5014-179, R0 Tracking No. 2010-01	Holtec has provided a clarification to the classification to its supplement cooling system (SCS). The clarification changes the classification of the SCS from Important to Safety Category B (ITSB) to Not Important to Safety (NITS) with the exception of the temperature monitoring instruments which remain ITSB. The review evaluated the Holtec clarification to the Holtec FSAR. The evaluation also looked at NRC Regulatory Guide 7.10 which provides guidance on classification of components. The evaluation also looked at the guidance of NEI 96-07 Appendix B. The conclusion of the evaluation is that the clarification of the classification of the SCS is acceptable.	Holtec FSAR Appendix 2.C provides the current design criteria for the Holtec supplied SCS. The SCS is used as necessary to maintain the peak fuel cladding temperature below the limit of 752°F as set forth in Chapter 2 of the Holtec FSAR during normal short-term operations as defined in Section 2.2 of the Holtec FSAR. Section 2.C.5 of Appendix 2.C states that the SCS is classified as ITSB. NRC Regulatory Guide (RG) 7.10, Rev. 2, Appendix A, Paragraph 2 states that Category B is for items that have a major impact on safety and that Category B items could include structures, systems, and components for which a failure or malfunction could indirectly result in a condition that would adversely affect public health and safety. However, an unsafe condition could result only if the primary event occurs in conjunction with a secondary event or other failure or environmental occurrence. Holtec FSAR Table 8.1.6 also documents that the SCS is ITSB. Holtec SCS Purchase Specification PS-1421 states that the SCS is NITS with the exception of the temperature monitoring instruments TG-1 and TG-2 which are used to provide indication that the system is functioning properly during normal operations. Normal operation is determined by measuring the differential temperature across the HI-TRAC. Therefore, the temperature monitoring instruments are ITSB. Holtec has provided a clarification to the Holtec FSAR to reconcile the differences between the FSAR and the purchase specification with respect to SCS classification. Holtec letter dated February 9, 2010, provides analysis for two scenarios evaluating the temperature reached by the fuel cladding with a loss of SCS. For multi-purpose canister's (MPCs) loaded to a maximum thermal payload of 28.74 kilowatt (kW) and helium backfilled to

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		29.3-48.5 psig at 70°F to ensure a normal storage pressure of 5 atmosphere absolute, the maximum cladding temperature reaches 872°F. For MPCs loaded to a maximum thermal payload of 36.9 kW and helium backfilled to 45.5-48.5 pounds per square inch gauge (psig) at 70°F to ensure a normal storage pressure of 7 atmosphere absolute, the maximum cladding temperature reaches 883°F. Since the loss of SCS is classified as an off-normal event, the fuel clad temperature is allowed to go up to 1058°F. Since the analyzed fuel clad temperature due to the loss of SCS is less than the allowable limit, the fuel clad temperature is acceptable. Holtec Technical Specification 3.1.4 requires that the SCS be restored operable within 7 days and if that is unsuccessful, then the fuel is to be removed from the cask and returned to the spent fuel pool within the following 30 days. The design basis accident is documented in Holtec FSAR, Section 11.2.16, SCS Failure. The credible failure modes associated with the SCS failure are simultaneous loss of external and backup power, or complete loss of annulus water from an uncontrolled leak or line break (reference Holtec FSAR 11.2.16.1). Holtec has evaluated additional failure modes in their February 9. 2010 letter. Even with the SCS failure, no other failure modes were found credible which would cause the FSAR limits to be exceeded. The fuel clad temperature remains within the limits allowed by the FSAR with the failure of the SCS.
72.212 Evaluation Report, Rev 4 Tracking No. 2010-02	The NRC has reviewed and approved HI-STORM 100 Certificate of Compliance (CoC) 1014, Amendment No.5, for use in accordance with the general license provisions of 10 CFR 72, Subpart K. Changes to the HI-STORM 100 FSAR that are incorporated into Revision 7 represent changes to reflect analysis submitted to the NRC and changes by the certificate holder in	The changes to the SQN 10 CFR 72.212 Evaluation Report are summarized and discussed in detail in Attachment A to the screening review. Most of the changes were editorial in nature or provided updates to the report to incorporated new or revised information resulting from the adoption of Holtec CoC, Amendment 5,

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	accordance with the provisions of 10 CFR 72.48 and the authority granted to the certificate holder. SON intends to store high burnup fuel (HBF) as a first time evolution under HI-STORM 100 CoC 1014, Amendment No.5. In accordance with 10 CFR 72.212 (b) (2) (ii), the licensee shall evaluate any changes to the written evaluations (i.e., documented in SQN's 10 CFR 72.212 Written Evaluation Report) required by this paragraph using the requirements of 10 CFR 72.48(c). SQN intends to place into storage cask systems that have been design, fabricated, tested, and subsequently to be loaded under the Part 72 codified CoC No. 1014, Amendment 5, and its associated updated FSAR Revision 7. The use of CoC 1014, Amendment 5, and its associated updated FSAR, is a first time evolution at the SQN Independent Spent Fuel Storage Installation (ISFSI). SQN currently operates an ISFSI using the same CoC 1014 although under previous Amendments 1 and 2. Moderate burn-up fuel (MBF) is currently authorized for SQN under Holtec CoC 1014 Amendment 2 and is defined as a commercial spent fuel assembly with an average burn-up of less than or equal to 45000 MWD/MTU. HBF, authorized under Holtec CoC 1014, Amendment 5 is defined as a commercial spent fuel assembly with an average burn-up of greater than 45000 MWD/MTU. This review evaluates the changes to the SQN 10 CFR 72.212 Evaluation Report that are necessary to document the acceptability of use of the cask system certified under CoC 1014 Amendment 5 at the SQN ISFSI and Holtec FSAR Revision 7.	and Holtec FSAR, Revision 7. As such, most of the changes did not result in any change to a SQN site specific written evaluation used to support the 72.212 Evaluation Report. However, implementation of storage of HBF at SQN under Holtec CoC 1014, Amendment 5 resulted in one change to a written evaluation. Re-analysis to account for non-fuel hardware burnable poison rod assemblies (BPRAs) required changes to written evaluations needed to document higher levels of dose. SQN Calculation SQS2-0224, "10 CFR 72.212 Reactor Site Parameters Evaluation," is the SQN calculation of record that documents the site specific evaluations issued in support of the 10 CFR 72.212 Evaluation Report. The change that resulted in a change to a written evaluation used in support of the SQN 10 CFR 72.212 report, as documented in SQN Calculation SQS2-0224, are summarized as follows. IMPACT TO WRITTEN EVALUATION A review of calculation SQNSQS2-0171 for impact due to Holtec CoC Amendment 5 identified the following dose issue: Westinghouse Electric Company analysis LTR-REA-03-175, Revision 1, "Sequoyah ISFSI Site Boundary Dose Calculation," did not account for burnable poison rod assemblies (BPRA) in the design basis fuel source term. To correct this, SQS2-0224 was revised to document an increase from 10.06 mrem/year to 11.47 mrem/year of dose to the site boundary for ISFSI anticipated occurrences (off normal events) combined with ISFSI normal operations and other site operations. 10 CFR 72.104 gives the ISFSI a 25 mrem/year dose limit at the site boundary.

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		It was shown that the gamma component of the total dose rate for existing analyzed fuel with 35,000 MWD/MTU and 3 years cooling source term remains bounding (including HBF) as the design basis fuel for calculating the site boundary dose. Offsite doses due to a SQN ISFSI accident in accordance with 10 CFR 72.106 are based on effluents from one postulated cask failure and do not include the 10 CFR 72.104 off normal dose component, and therefore are not impacted.
EDC E22443A Tracking No. 2010-03	TVA drawing 47W455-4 establishes actions to take for ISFSI operations coincident with a Part 50 loss of coolant accident / loss of offsite power. The ISFSI accident which could take place during this time is a failure of the supplement cooling system (SCS). The required actions have been reviewed within TVA calculation SQS2-0225 to determine if they are achievable within certain timeframes. Mission dose is also addressed within this calculation. The conclusion is that the actions are achievable and that there is sufficient time to perform the necessary actions without exceeding regulatory dose limits.	During ISFSI operations, it is possible that a Part 50 accident could occur. TVA calculation SQS2-0225 evaluates this condition. This calculation already addresses the actions to take during previous campaigns performed under Holtec Certificate of Compliance (CoC) 1014 Amendment 2. For ISFSI operations under Holtec CoC 1014 Amendment 5, this calculation has been revised to address the requirements from Holtec CoC 1014 Amendment 5 and the corresponding Holtec FSAR Revision 7. The calculation forms a basis for actions for the plant to take which are shown on drawing 47W455-4 which is revised as a part of this EDC. This demonstrates compliance with 10 CFR 72.122 (d) and (k). Amendment 5 of the Holtec CoC 1014, and Amendment 7 of the Holtec FSAR have been approved to permit storage of HBF and introduces new equipment and new operating requirements, such as the requirement to meet NRC Interim Staff Guidance (ISG) 11," Revision 3 temperature limits by use of a mandatory SCS. The FSAR described design function of the SCS is to ensure that mandatory temperature limits are met for MBF

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		resulting in a MPC heat load "GREATER THAN" 28.74 kW, or for any HBF. This assures that cladding temperature limits are met at higher MPC heat loads assuring compliance with ISG 11, Revision 3 requirements. The SCS provides heat removal from the MPC to maintain the peak fuel cladding temperature below the limit set forth in Chapter 2 of the FSAR during normal short-term operations. ISG 11 limits the peak cladding temperature to 752°F for normal operations. For off-normal and accident conditions, the peak cladding temperature limit is 1058°F. Holtec Technical Specification 3.1.4 requires that the SCS be restored operable within 7 days and if that is unsuccessful, then the fuel is to be removed from the cask and returned to the spent fuel pool within the following 30 days. The SCS is required to be monitored and maintained operable or otherwise in compliance with its TS action statements even in the event of a coincident 10 CFR 50 event.