Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-039

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10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Watts Bar Nuclear Plant, Unit 1
Facility Operating License No. NPF-90
NRC Docket No. 50-390

Subject: **Application to Modify Watts Bar Nuclear Plant Unit 1 Technical Specifications Regarding Use of Component Cooling System (CCS) Pump 2B-B to Support CCS Train B Operability (WBN-TS-14-004)**

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," Tennessee Valley Authority (TVA) is submitting a request for an amendment to Facility Operating License No. NPF-90 for the Watts Bar Nuclear Plant (1088649.

This license amendment proposes to amend WBN Unit 1 Technical Specification (TS) 3.7.7, "Component Cooling System (CCS)," to allow the use of CCS pump 2B-B to support WBN Unit 1 Train 1B operability when the normal CCS pump C-S is removed from service. The proposed change provides increased flexibility in maintaining CCS operability when the C-S pump is inoperable for maintenance. The proposed change is also consistent with the WBN Unit 2 TS 3.7.7.

The enclosure to this letter provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of environmental considerations. Attachments 1 and 2 to the enclosure provide the existing TS and Bases pages marked-up to show the proposed changes. Attachments 3 and 4 to the enclosure provide the existing TS and Bases pages retyped to show the proposed changes. Changes to the existing TS Bases are provided for information only and will be implemented under the Technical Specification Bases Control Program.

TVA requests approval of this proposed license amendment by April 30, 2017, with implementation within 60 days following NRC approval.

TVA has determined there are no significant hazards considerations associated with the proposed change and that the change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The WBN Plant Operations Review Committee and the TVA Nuclear Safety Review Board has reviewed this proposed change and determined that operation of WBN, Unit 1 in accordance with the proposed change will not endanger the health and safety of the public.

Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosure to the Tennessee Department of Environment and Conservation.

There are no new regulatory commitments associated with this submittal.

If you have any questions regarding this request, please contact Gordon Arent at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 7th day of June 2016.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosure: Evaluation of Proposed Change

cc (Enclosure):

NRR Project Manager – Watts Bar Nuclear Plant
NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant
Director, Division of Radiological Health – Tennessee State Department of Environment and Conservation

ENCLOSURE

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT UNIT 1

EVALUATION OF PROPOSED CHANGE

Subject: **Application to Modify Watts Bar Nuclear Plant, Unit 1 Technical Specifications Regarding Use of Component Cooling System (CCS) Pump 2B-B to Support CCS Train B Operability (WBN TS 14-004)**

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ATTACHMENTS

1. Proposed TS Changes Mark-Ups for WBN Unit 1
2. Proposed TS Bases Page Changes (Mark-Ups) for WBN Unit 1 (For Information Only)
3. Proposed TS Changes (Final Typed) for WBN Unit 1
4. Proposed TS Bases Changes (Final Typed) for WBN Unit 1 (For Information Only)

ENCLOSURE

1.0 SUMMARY DESCRIPTION

Tennessee Valley Authority (TVA) is requesting a license amendment to the Watts Bar Nuclear Plant (WBN), Unit 1 Technical Specifications (TS) to allow Component Cooling System (CCS) pump 2B-B to support CCS Train 1B operability when the normal CCS pump C-S is removed from service. This license amendment provides increased flexibility in maintaining CCS operability when the C-S pump is inoperable for maintenance. The proposed change is also consistent with the current WBN Unit 2 TS.

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

This license amendment request (LAR) proposes changes to WBN, Unit 1, TS 3.7.7, "Component Cooling System," to allow the use of CCS pump 2B-B in place of CCS pump C-S for maintaining the operability of CCS Train 1B. Specifically, Surveillance Requirement (SR) 3.7.7.4 is revised as follows.

TS 3.7.7 Surveillance Requirement changes

WBN Unit 1 SR 3.7.7.4 states:

	SURVEILLANCE	FREQUENCY
SR 3.7.7.4	Verify each CCS pump starts automatically on an actual or simulated actuation signal.	18 months

This LAR changes SR 3.7.7.4 as follows:

	SURVEILLANCE	FREQUENCY
SR 3.7.7.4	----------NOTE---------- *Verification of CCS pump 2B-B automatic start on SI is not required when CCS pump 2B-B is supporting CCS Train B OPERABILITY.* ---------- Verify each CCS pump starts automatically on an actual or simulated actuation signal.	18 months

This LAR also adds new SR 3.7.7.5 as follows:

SURVEILLANCE		FREQUENCY
SR 3.7.7.5	----------NOTE---------- *Only required to be met when CCS pump 2B-B is supporting CCS Train B OPERABILITY.* ---------- *Verify CCS pump 2B-B is aligned to CCS Train B and is in operation.*	*12 hours*

Attachments 1 and 2 to this enclosure provide the existing WBN Unit 1 TS and Bases pages marked-up to show the proposed changes. Attachments 3 and 4 to this enclosure provide the clean typed TS and Bases pages with the proposed changes incorporated.

2.2 Need for Condition Intended to Resolve

WBN Unit 1 has two CCS trains with CCS pumps 1A-A and 1B-B supplying CCS Train 1A, and CCS pump C-S supplying CCS Train 1B. Similarly, WBN Unit 2 has two CCS trains with CCS pumps 2A-A and 2B-B supplying CCS Train 2A, and CCS pump C-S supplying CCS Train 2B (see Table 1, Component Cooling System Pump Power Supplies," and Figure 1, "Simplified Component Cooling System Normal Lineup). The design of the CCS allows for the alignment of either CCS pump 1B-B or 2B-B to CCS Train 1B as a replacement for CCS pump C-S when CCS pump C-S is removed from service for maintenance.

If CCS pump 2B-B is aligned to replace CCS pump C-S for supplying CCS Train 1B, TS Limiting Condition for Operation (LCO) 3.7.7, Action A must be entered, placing time restrictions on unit operation (i.e., 72 hours to restore the CCS train to an operable status). Entering LCO 3.7.7, Action A is required in this case because CCS pump 2B-B does not receive an automatic start from a Unit 1 Safety Injection actuation signal.

Requiring CCS pump 2B-B to be in operation eliminates the need for the automatic start on a Unit 1 Safety Injection actuation signal, allowing CCS pump 2B-B to replace CCS pump C-S without entering Action A of TS LCO 3.7.7. The LCO Bases for WBN TS 3.7.7 state that at least one CCS train will operate assuming the worst case single active failure occurs coincident with a loss of offsite power (LOOP). Accordingly, SR 3.7.7.4 verifies that CCS pump 2B-B will automatically start on a LOOP in order for the CCS pump 2B-B to be operable.

Note that TS LCO 3.7.7 already allows CCS pump 1B-B to replace CCS Pump C-S because CCS pump 1B-B receives the automatic start from a Unit 1 Safety Injection actuation signal.

As noted in Section 4.2, these changes are consistent with the corresponding WBN Unit 2 TS.

3.0 TECHNICAL EVALUATION

3.1 System Description

3.1.1 Ultimate Heat Sink Interface

The CCS is a shared closed cooling water system with five pumps and three heat exchangers (HXs) serving as an intermediate loop between potentially or normally radioactive fluid systems and the essential raw cooling water (ERCW) system. The CCS provides a heat sink for the removal of process and operating heat from non-safety related and safety-related components. The safety functions of the CCS are to remove heat from the engineered safety feature (ESF) loads, including the Residual Heat Removal (RHR) HXs (used for reactor and containment cooling), and the oil/seal HX coolers for Safety Injection (SI) pumps, Centrifugal Charging Pumps (CCP), Containment Spray (CS) pumps, and RHR pumps. During normal operation, the CCS provides cooling for various nonessential components and the spent fuel storage pool. The CCS transfers heat to the ERCW, which supplies the tube side of each CCS HX, and ultimately to the Chickamauga Reservoir on the Tennessee River.

Removal of residual heat is accomplished in two stages. The first stage is from hot standby to 350°F. During this stage, steam is released from the steam generator safety valves to maintain hot standby and through the steam generator power operated relief valves when the cooldown begins. The Auxiliary Feedwater (AFW) system supplies feedwater to the steam generators to maintain an adequate heat sink. The second stage is from 350°F to cold shutdown. During this stage, the RHR system is brought into operation and the RHR HX transfers the residual heat from the Reactor Coolant System (RCS) to the CCS, which transfers the heat to the ERCW system.

3.1.2 CCS Description

The CCS is designed for operation during all phases of plant operation and shutdown. The CCS serves to remove residual and sensible heat from the RCS via the RHR system during plant cooldown; cool the spent fuel pool water and the letdown flow of the chemical and volume control system; provide cooling to dissipate waste heat from various plant components; and provide cooling for safeguard loads after an accident.

The CCS is a shared system with Unit 2 and consists of five CCS pumps, two thermal barrier booster pumps per unit, three HXs, two surge tanks, one CCS pump seal water collection unit, and associated valves, piping and instrumentation serving both units (see Figure 1" and WBN Updated Final Safety Analysis Report (UFSAR) Figure 9.2-19). The CCS pumps are designated as 1A-A, 1B-B, C-S, 2A-A, and 2B-B.

Typically one CCS pump is in operation per train. Train 1A can be supplied by either CCS pump 1A-A or CCS pump 1B-B with the non-operating pump in standby. Train 2A

can be supplied by either CCS pump 2A-A or CCS pump 2B-B with the non-operating pump in standby. Trains 1B and 2B is normally supplied by the C-S pump. Although B Train CCS pumps can supply either Unit's Train A, the A Train CCS pump must be operable to consider the Unit's A Train operable.

WBN Units 1 and 2 are served by two cooling system trains (A and B) serving ESF equipment, with CCS Train A also serving miscellaneous non-safety-related components. Except for the RHR HXs, both trains of the safeguards equipment of both units served by the CCS are normally aligned and supplied with CCS water and continue to be supplied with CCS water in a Loss of Coolant Accident (LOCA). However, the RHR HXs may be aligned with CCS water flowing through the HXs during normal operation to meet CCS flow requirements. In the event of an accident, non-safety-related components are not required; therefore, CCS flow to these components may be manually isolated. Prior to the switchover from injection to recirculation phase of SI, the CCS valves are manually opened at the RHR HXs of the accident unit in order to supply these HXs with cooling water.

If an emergency power train is lost during an accident condition, additional operator action on the CCS is required for the following cases.

1. If CCS Train A power is lost and if the non-accident unit is utilizing CCS Train B RHR cooling, the CCS flow would be adjusted to the non-accident unit RHR HX.
2. If the spent fuel pool cooling and cleanup system (SFPCCS) HX A is inservice and if a LOCA occurs on Unit 1 concurrent with a LOOP and loss of CCS Train B, the CCS flow would be isolated to the SFPCCS HX A.
3. If CCS Train A power is lost, spent fuel pool cooling could be restored by using CCS pump 1B-B to supply CCS flow through CCS HX A and SFPCCS HX A. This also requires the re-alignment of ERCW header 1B to CCS HX A.

In the event of a design basis flood at WBN, the CCS pumps would be submerged. Because cooling must be maintained to certain CCS loads during the flood, the ERCW and CCS systems can be interconnected to supply ERCW flow to those loads.

The CCS pumps automatically start on three conditions:

1. If a low header pressure occurs on CCS Train 1A or 2A, the standby pump will start automatically. The standby pump is usually needed to supply cooling when the RHR HXs and SFPC HXs are in service.
2. During plant operation, all five CCS pumps automatically start on a LOOP and receive diesel generator (DG) power.

3. A Unit 1 SI signal will start CCS pumps 1A-A, 1B-B, and C-S. A Unit 2 SI signal will start CCS pumps 2A-A, 2B-B, and C-S (see Table 2, "Component Cooling System Pump Interlocks").

Figure 1 and Figure 2, "Simplified Component Cooling System – CCS Pump 2B-B Supplying Trains 1B and 2B," provide a simplified CCS flowpath drawing that is explained in the following discussion.

During full power operation, with all CCS equipment available (refer to Figure 1), CCS pumps 1A-A and 1B-B and HX A are aligned with Unit 1, Train 1A ESF and miscellaneous equipment. CCS pumps 2A-A and 2B-B and HX B are aligned with Unit 2 Train 2A ESF and miscellaneous equipment. CCS pump C-S and HX C are aligned with both Unit 1, Train 1B and Unit 2, Train 2B. CCS pump 1B-B can be used as additional capacity for Train 1A and as a replacement for pump C-S, if it should be out of service. Pump 2B-B is used as additional capacity for Train 2A or as a replacement for CCS pump C-S, if it should be out of service.

During full power operation, with the C-S pump out-of-service using CCS pump 2B-B for Train B (refer to Figure 2), pumps 1A-A and 1B-B and HX A are aligned with Unit 1, Train 1A ESF. CCS pumps 2A-A and HX B are aligned with Unit 2, Train 2A ESF. CCS pump 2B-B and HX C are aligned with both Unit 1, Train 1B and Unit 2, Train 2B. CCS pump 1B-B can be used as additional capacity for Train 1A, as required.

3.2 Technical Analysis

3.2.1 Overview

The CCS is a Seismic Category I system and provides heat transfer from the RCS, reactor support equipment, and engineered safety equipment to the Seismic Category I ERCW system. The CCS serves as an intermediate system and provides a barrier between potentially or normally radioactive fluids and the river water, which flows in the ERCW system. The ERCW system transfers heat to the ultimate heat sink (UHS). The UHS is comprised of a single water source, the Tennessee River, including the complex of TVA-controlled dams upstream of the plant intake, TVA's Chickamauga Dam (the nearest downstream dam), and the plant intake channel.

Because the CCS interfaces between normally or potential radioactive heat sources and the ERCW system, the applicable review aspect for this system is its ability to deliver the required flow of cooling water at appropriate temperatures for normal, accident, or shutdown reactor conditions.

3.2.2 Heat Removal Capability

This LAR proposes to allow the use of CCS pump 2B-B for supplying water to CCS Train 1B, thus maintaining CCS Train 1B operability when CCS pump C-S is out-of-service, while leaving CCS pump 1B-B aligned to CCS Train 1A. In WBN UFSAR Table 9.2-8, Component Cooling System Component Design Data, the CCS pump design data states that there are five pumps with identical design data. All five component cooling pumps are horizontal centrifugal type pumps with a rated capacity of 6000 gallons per minute, a rated head of 190 feet of water, and a motor horsepower (hp) of 350 hp. Both CCS pump C-S and pump 2B-B take suction on a common 24-inch header through an 18-inch pipe and discharge through a 16-inch pipe to a common 20-inch header. Manual motor operated valves provide separation on the common 24-inch header and the 20-inch header for directing the pump's suction and discharge to the appropriate unit and train. When CCS pump 2B-B is aligned as a replacement for CCS pump C-S, the cooling of the water will be by CCS HX C regardless of which pump is in service.

Therefore, the cooling water flow and temperature, whether using CCS pump C-S or CCS pump 2B-B, will result in no appreciable difference in the train's heat removal capability.

3.2.3 Post-Accident Operation

The CCS is required to operate both post-accident and following a LOOP. Because the system is required to operate post-accident, the CCS pumps receive an automatic start signal from the Engineered Safety Feature Actuation System (ESFAS) SI actuation signal. In addition, because the system is required to operate following a LOOP, the CCS pumps receive an automatic trip and subsequent sequential start signal on a LOOP load shed signal, caused either by a sustained degraded voltage condition or a loss of voltage on its respective 6.9kV shutdown board (SDB).

The SI signal generated is unit specific as shown in WBN UFSAR Figure 9.2-23, attached Figure 3, "Station Auxiliary Power," Figure 4, "Component Cooling Pumps 1A-A and 1B-B Wiring Diagram," and Figure 5, "Component Cooling Pumps 2A-A and 2B-B Wiring Diagram." If an accident occurs on Unit 1, the Unit 1 ESFAS SI actuation signal is sent to CCS pumps 1A-A, 1B-B, and common pump C-S. CCS pumps 2A-A and 2B-B do not receive an automatic start signal from the Unit 1 ESFAS SI actuation signal. If an accident occurs on Unit 2, the Unit 2 ESFAS SI actuation signal is sent to CCS pumps 2A-A, 2B-B, and common pump C-S. Although CCS pumps receive an automatic start signal from the ESFAS SI actuation signal, there is no automatic trip on an SI actuation signal. Therefore, if a CCS pump is in operation when an accident occurs that generates an SI actuation signal, any CCS pump in operation would continue to operate, and the automatic SI actuation signal would be unnecessary to ensure the CCS pump in operation performs its required safety function. Therefore, because CCS pump 2B-B does not receive a Unit 1 SI actuation signal, this LAR proposes a new SR to verify CCS

pump 2B-B is aligned to Unit 1 Train B and in operation when it is being used to support CCS Train B operability.

The WBN 6.9kV SDB load-shedding and sequencing circuitry actuates on a sustained degraded voltage condition or loss of voltage on its specific SDB. Table 1 lists the normal power supply for CSS pump C-S as 480V SDB 2B2-B and the power supply for CSS pump 2B-B as 480V SDB 2B1-B. Figure 3 shows that both 480V SDBs 2B2-B and 2B1-B are powered from 6.9kV SDB 2B-B, which on a LOOP is powered from DG 2B-B. Therefore, because load shedding and sequencing of CCS pump 2B-B are specific to the SDB and independent of which CCS train the pump is aligned to, any voltage condition that would affect CCS pump 2B-B would load shed the pump and subsequently sequence the pump to operate. Figure 4, Figure 5, and Figure 6, "Component Cooling Pump C-S Wiring Diagram," show the CCS pump's power supply and controls.

WBN UFSAR Table 8.3-3 shows that the CCS pumps are loaded on to their respective DG 35 seconds after the closing of the generator breaker connecting the DG to the SDB. This table also states that DGs 1A or 2B will have two CCS pumps sequentially loaded, whichever DG the C-S CCS pump is aligned to. Thus, no matter which CCS train the 2B-B CCS pump is aligned to, starting of the 2B-B CCS pump is accounted for in the DG loading analysis.

There are two loading sequences that describe the interaction between a safety injection signal (SIS) and a LOOP. One, which is applied in the absence of an SIS (i.e., the non-accident condition), and the other (i.e., the accident condition), applied when an SIS is received prior to or coincident with a sustained loss of voltage on the 6.9kV SDB. A LOOP coincident with an SIS is the design basis event. An SIS received during the course of a non-accident shutdown loading sequence will cause the actions described below:

- Loads already sequentially connected that are not required for an accident would be disconnected.
- Loads already sequentially connected that are required for an accident would remain connected.
- Loads waiting sequential loading that are not required for an accident would not be connected.
- Loads awaiting sequential loading that are required for an accident would either be sequentially loaded as a result of the non-accident loading sequence or have their sequential timers reset to time zero from which they would be sequentially loaded in accordance with the accident sequence.

Therefore, with CCS pump 2B-B in operation, the pump will continue to operate following an SIS without a LOOP, and will sequence onto DG 2B-B following a LOOP or a LOOP coincident with an SIS.

3.2.4 Single Failure Considerations

10 CFR 50 Appendix A General Design Criteria (GDC) 44, "Cooling Water," states, "A system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions. Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure."

Because the CCS is required for post-accident removal of heat from the reactor, the CCS is designed such that no single active or passive failure can interrupt cooling water to both A and B ESF trains. One ESF train is capable of providing sufficient heat removal capability for maintaining safe reactor shutdown.

The CCS pumps and required motor-operated valves are automatically placed on emergency power in the event of a LOOP. Therefore, the ESF requirements are met with regard to supply of CCS water. Separate trains provide component cooling water to the ESF. Each train services its safety-related cooling loads associated with the same train. Should a single failure result in the loss of a train of equipment (A or B), the other train is available for handling all required heat loads.

With CCS pump 2B-B supplying CCS Train 1B/2B, each train continues to service its safety-related cooling loads associated with the same train, as discussed above. Therefore, the system's safety function can still be accomplished assuming a single failure.

3.2.5 Testing/Inspection

System piping and components were hydrostatically tested and CCS operability verified prior to unit startup. The position of system valves and automatic start of CCS pumps 1A-A, 1B-B, 2B-B, and C-S on a simulated or actual signal are verified periodically.

3.2.6 Appendix R Considerations

The purpose of the WBN Fire Protection Report (FPR) (Reference 1) is to consolidate a sufficiently detailed summary of the WBN regulatory-required Fire Protection Program (FPP) into a single document and to reflect the design of both units. The UFSAR references this report as detailing WBN's FPP.

Common Unit 1 and Unit 2 support systems and process monitoring equipment (e.g., CCS, ERCW, electrical power distribution, and common area Heating Ventilation and Air Conditioning) are required for the safe shutdown analysis. Section 4.7 of Part III of the FPR further discusses the function of the CCS.

The FPR states that the CCS is a supporting system to other safe shutdown systems. Two redundant trains per unit are available. For each unit, Train A consists of two available pumps (pumps 1A-A and 1B-B for Unit 1 and pumps 2A-A and 2B-B for Unit 2) and the associated valves, piping, instrumentation and HX (HX A for Unit 1 and HX B for Unit 2). Train B is common for both units and consists of one pump (pump C-S) and the associated valves, piping, instrumentation and HX C. Each unit has a Train A pump (1A-A for Unit 1 and 2A-A for Unit 2) that receives electrical power from Train A. Each unit also has a Train B pump (1B-B for Unit 1 and 2B-B for Unit 2) that receives electrical power from Train B. CCS pump 1B-B and CCS pump 2B-B are normally aligned to the Train A piping system for that unit but can be aligned to the common Train B piping system. The C-S pump, which normally receives Train B electrical power while serving as the common Train B CCS pump, is capable of being powered from a Train A power source.

Following a reactor trip with a LOOP (either assumed or caused by a fire), decay heat is initially removed by natural circulation within the RCS, heat transfer to the main steam system via the steam generators, and operation of the SG power-operated relief valves (PORVs) or lift of the main steam system code safety valves. Continued heat removal is achieved by the controlled operation of the PORVs and continued operation of the AFW system. After reduction of RCS temperature to 350°F, the RHR system is used to establish long-term core cooling by the removal of decay heat from the RCS to the environment via the RHR, CCS, and ERCW systems.

In addition, the charging pumps require cooling water from the CCS to their mechanical seal HXs, gear oil coolers and bearing oil coolers, and seal housings. For added operational flexibility in certain post-fire scenarios, RCP thermal barrier cooling provided by CCS is available for safe shutdown. However, the availability of either seal injection or thermal barrier cooling provides adequate protection of the RCP seals. In addition, a seal HX for each RHR pump is supported by operation of the CCS.

The WBN FPR includes Operating Requirements (ORs) for a minimum set of plant systems and components identified at WBN to ensure that the plant can achieve and maintain safe shutdown in the event of plant fires. The WBN TS and Technical

Requirements Manual address the identified plant systems and components and list surveillance requirements for verifying the operability of the systems and components. The exception is the 1B-B and 2B-B CCS pumps. The 1B-B and 2B-B CCS pumps are credited to be aligned for the 1A and 2A CCS headers for 10 CFR 50 Appendix R fire scenarios. When this alignment is not met, the associated unit will enter OR 14.10 for that unit, except as allowed by a note for the eight hour period prior to entering Mode 4 from Mode 3. In accordance with OR 14.10, with an identified safe shutdown component non-functional, the nonfunctional component must be restored within 30 days when the unit is in Modes 1, 2, or 3.

Therefore, the FPR allows the proposed configuration but limits the time to 30 days.

3.2.7 Conclusion

The above analyses support the proposed LAR by demonstrating that the proposed TS changes provide an equivalent level of safety and protection as that which would be provided by the use of CSS pump C-S in supplying CCS Train 1B.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The CCS at WBN Units 1 and 2 is designed to comply with the following applicable regulations and requirements.

10 CFR 50 Appendix A GDC 44 – "Cooling Water"

A system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions.

Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

UFSAR Section 3.1 describes WBN compliance with GDC 44

10 CFR 50 Appendix A GDC 45 – "Inspection of Cooling Water System"

The cooling water system shall be designed to permit appropriate periodic inspection of important components, such as HXs and piping, to assure the integrity and capability of the system.

UFSAR Section 3.1 describes WBN compliance with GDC 45

10 CFR 50 Appendix A GDC 46 – "Testing of Cooling Water System"

The cooling water system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and the performance of the active components of the system, and (3) the operability of the system as a whole and under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation for reactor shutdown and for LOCAs, including operation of applicable portions of the protection system and the transfer between normal and emergency power sources

UFSAR Section 3.1 describes WBN compliance with GDC 46

4.2 Precedent

WBN – Unit 2

Surveillance Requirements in WBN Unit 2 TS 3.7.7, "Component Cooling System (CCS)," SR 3.7.7.4 and SR 3.7.7.5, are similar to those proposed for WBN Unit 1, differing only to make the requirements unit specific. The WBN Unit 2 TS change was proposed in a letter dated June 13, 2013 (Reference 2) and Nuclear Regulatory Commission (NRC) approved with the issuance of the WBN Unit 2 Facility Operating License (Reference 3).

Industry

This LAR proposes to use a CCS pump that normally supports WBN Unit 2 Train 2B operability to also support Unit 1 CCS Train 1B operability. The proposed change will allow WBN Unit 1 to substitute CCS Pump 2B-B for CCS pump C-S in maintaining the operability of CCS Train 1B. Substituting CCS 2B-B for CCS pump C-S is essentially a like-for-like substitution except that CCS pump 2B-B does not receive an automatic start on a Unit 1 SI signal. TVA is proposing to replace this lack of an automatic start on SI feature with a surveillance requirement that requires CCS pump 2B-B to be in operation. This proposed automatic actuation replacement is similar to other NRC-approved TS that require equipment to be placed in operation when their actuation circuitry is inoperable, which could be that the circuitry is removed or disconnected.

For example, NUREG 1431, "Standard Technical Specifications - Westinghouse Plants," Revision 4.0, Technical Specification 3.3.6, Containment Purge and Exhaust Isolation Instrumentation, Condition B, requires that with the actuation circuitry inoperable (e.g., one or more Functions with one or more manual or automatic actuation trains inoperable, or two or more radiation monitoring channels inoperable) the applicable Conditions and Required Actions of LCO 3.6.3, "Containment Isolation Valves," for containment purge and exhaust isolation valves made inoperable by isolation instrumentation is entered immediately. LCO 3.6.3 would require isolation of the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange. Thus, the actuation signal would place the actuated component in its designed condition.

In addition, NUREG 1431, Technical Specification 3.3.7, Control Room Emergency Filtration System (CREFS) Actuation Instrumentation, Condition B, requires that with one or more Functions with two channels or two trains inoperable to 1) place CREFS in the toxic gas protection mode if automatic transfer to toxic gas protection mode is inoperable, and 2) place both trains in emergency [radiation protection] mode. Thus, the actuation signal would place the actuated component in its designed condition

Other examples exist in the NUREG Standard Technical Specification such as NUREG 1434, "Standard Technical Specifications - General Electric BWR/6 Plants," Revision 4.0, TS 3.3.6.2, Secondary Containment Isolation Instrumentation, Required Action C.2.1, which requires that the standby gas treatment subsystem(s) be placed in operation when one or more automatic functions with secondary containment isolation capability are not maintained.

4.3 Significant Hazards Consideration

The proposed change modifies the Component Cooling System (CCS) Technical Specification (TS) for Watts Bar Nuclear Plant (WBN) Unit 1 to allow use of the 2B-B CCS pump to support operability of CCS Train 1B. The proposed change adds a Note to an existing surveillance requirement (SR) and a new SR to allow CCS pump C-S to be removed from service and replaced by CCS pump 2B-B while maintaining Train 1B operable. This change is needed to support required periodic maintenance on CCS pump C-S.

Tennessee Valley Authority (TVA) has concluded that the proposed changes to the CCS TSs for WBN Unit 1 do not involve a significant hazards consideration. This conclusion is based on its evaluation focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment,” as discussed below.

1. *Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?*

   Response: No.

   The proposed change to allow the use of the CCS pump 2B-B to support Train 1B operability does not result in any physical changes to plant safety-related structures, systems, or components (SSCs). The CCS functions to remove plant system heat loads during normal, shutdown, and accident conditions. The CCS will continue to perform this function with equipment qualified to the same standards. The CCS is not an accident initiator, but instead performs accident mitigation functions by serving as the heat sink for safety-related equipment, ensuring the conditions and assumptions credited in the accident analyses are preserved. Therefore, the proposed change does not involve a significant increase in the probability of an accident previously evaluated.

   The purpose of this change is to modify the CCS TS to allow the use of CCS pump 2B-B to replace CCS pump C-S in supporting Train 1B operability. The proposed change provides assurance that the minimum conditions necessary for the CCS to perform its heat removal safety function are maintained. Accordingly, operation as specified by the addition of the Notes and the additional surveillance requirement will provide the necessary assurance that fuel cladding, reactor coolant system pressure boundary, and containment integrity limits are not challenged during worst-case pos--accident conditions. CCS pump C-S and pump 2B-B are identical pumps with identical controls except that the CCS pump 2B-B does not receive an automatic start signal from a Unit 1 Safety Injection (SI) actuation signal. To compensate for the lack of the SI actuation signal, CCS pump 2B-B is required to be in operation to support Unit 1 operation when substituting for CSS pump C-S. With the CCS pump 2B-B in operation, the pump will continue to operate following a SI actuation signal. Accordingly, the conclusions of the accident analyses will remain as previously evaluated such that there will be no significant increase in the consequences of an accident previously evaluated.

   Therefore, the proposed change does not involve a significant increase in the probability or consequence of an accident previously evaluated.

2. *Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Response: No.

   The proposed change does not involve any physical changes to plant safety-related SSCs or alter the modes of plant operation in a manner that will change the design function or operation of the CCS. The proposed additional limits on CCS alignment and CCS pump 2B-B operation provide assurance that the conditions and

assumptions credited in the accident analyses are preserved. Thus, the plant's overall ability to reject heat to the ultimate heat sink during normal operation, normal shutdown, and worst-case accident conditions will not be significantly affected by this proposed change. Because the safety and design requirements continue to be met and the integrity of the reactor coolant system pressure boundary is not challenged, no new credible failure mechanisms, malfunctions, or accident initiators are created, and there will be no effect on the accident mitigating systems in a manner that would significantly degrade the plant's response to an accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the proposed amendment involve a significant reduction in a margin of safety?*

   Response: No.

   The proposed change modifies the CCS TS to maintain the CCS Train 1B operable while aligned with CCS pump 2B-B. With CCS pump 2B-B in operation when aligned to CCS Train 1B, CCS pump 2B-B will operate to provide the CCS accident mitigation function if a postulated accident occurs. CCS pumps C-S and 2B-B are identical pumps and will perform the same function with this change, resulting in essentially no change in the safety margin before the change to the safety margin after the change. Accordingly, the proposed change will not significantly reduce the margin of safety of any SSCs that rely on the CCS for heat removal to perform their safety-related functions.

   Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment, as a licensing or regulatory action subject to 10 CFR 51.

6.0 ABBREVIATIONS/ACRONYMS

10 CFR	Title 10, of the Code of Federal Regulations
AFW	Auxiliary Feedwater
CCS	Component Cooling System
CREFS	Control Room Emergency Filtration System
DG	Diesel Generator
ERCW	Essential Raw Cooling Water
ESF	Engineered Safety Feature
ESFAS	Engineered Safety Feature Actuation System
FPP	Fire Protection Program
FPR	Fire Protection Report
GDC	General Design Criteria
hp	Horsepower
HX	Heat Exchanger
LAR	License Amendment Request
LCO	Limiting Condition for Operation
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
NRC	U. S. Nuclear Regulatory Commission
OR	Operating Requirement
RCS	Reactor Coolant System
RHR	Residual Heat Removal
SDB	Shutdown Board
SFPCCS	Spent Fuel Pool Cooling and Cleanup System
SI	Safety Injection
SIS	Safety Injection Signal
SSCs	Structures, Systems, or Components
SR	Surveillance Requirement
TS	Technical Specification
TVA	Tennessee Valley Authority
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
WBN	Watts Bar Nuclear Plant

7.0 REFERENCES

1. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 - Transmittal of Unit 1/Unit 2 Fire Protection Report," dated December 21, 2015.

2. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Submittal of Three Revised Specifications from Developmental Revision G of the Unit 2 Technical Specification (TS)," dated June 13, 2013 (ML13171A100)

3. NRC letter to TVA, "Issuance of Facility Operating License No. NPF-96, Watts Bar Nuclear Plant Unit 2," dated October 22, 2015 (ML15251A587)

Table 1 **Component Cooling System Pump Power Supplies**	
CCS Pump	480 Volt Shutdown Board[(1)]
1A-A	1A1-A
1B-B	1B1-B
C-S	Normal - 2B2-B Alternate - 1A2-A
2A-A	2A1-A
2B-B	2B1-B

[(1)] Refer to Figures 4, 5, and 6

Table 2 **Component Cooling System Pump Interlocks**		
Function	Interlock	Response
AUTO STARTS	Low header pressure ≤ 40 psig	1A-A, 1B-B, 2A-A and 2B-B (Unit Specific from A Train)
	Unit 1 Safety Injection Signal starts after 8 sec. Time Delay	1A-A, 1B-B, and C-S
	Unit 2 Safety Injection Signal starts after 8 sec. Time Delay	2A-A, 2B-B, and C-S
	35 seconds after a loss of voltage and Shutdown Board voltage restored (with or without SI signal present)	All pumps. SI signal occurring after blackout during timing sequence will re-initiate timer
TRIPS	Amptector - 570 amps	All pumps
	Blackout	All pumps

Figure 1

Simplified Component Cooling System
Normal Lineup

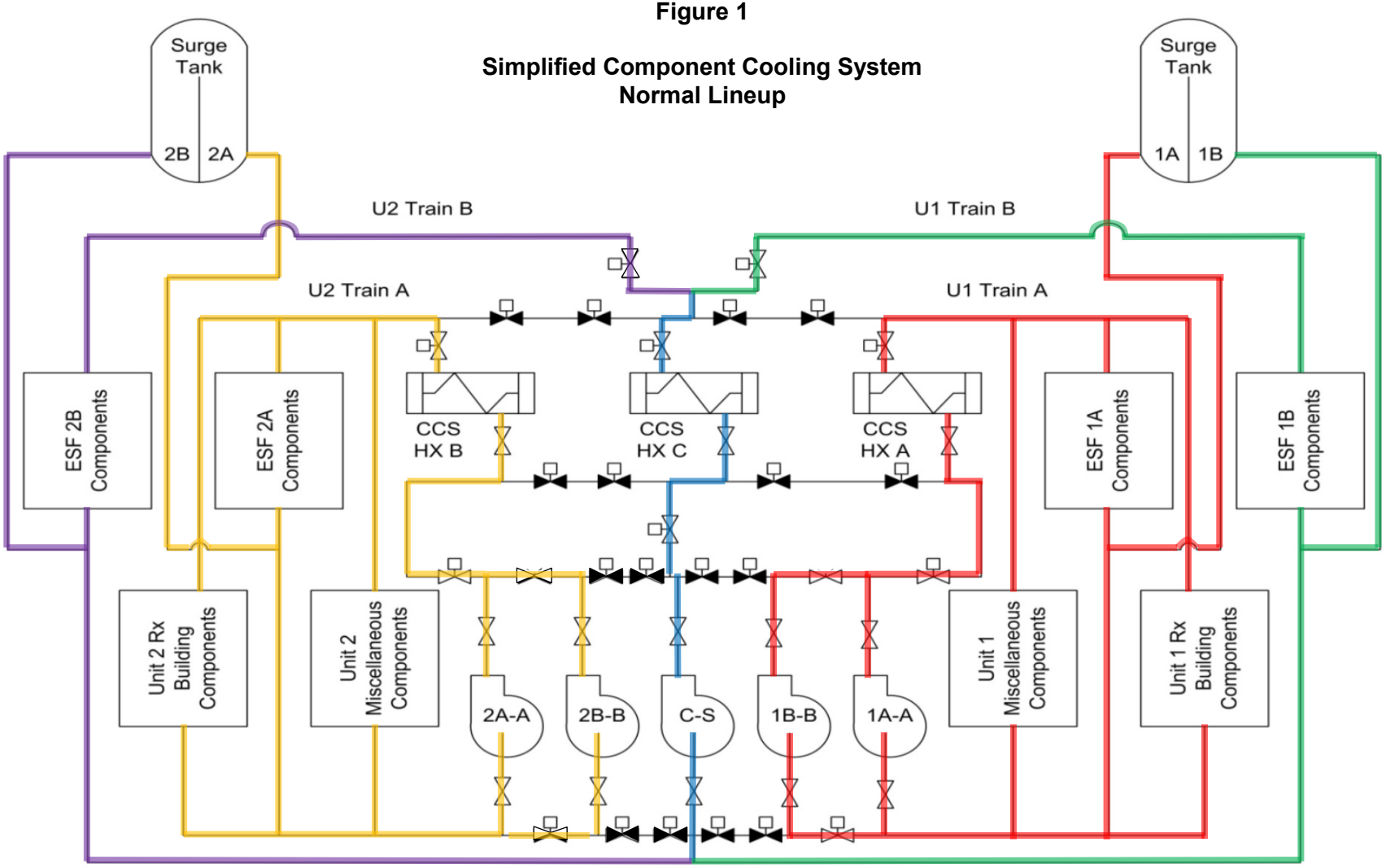
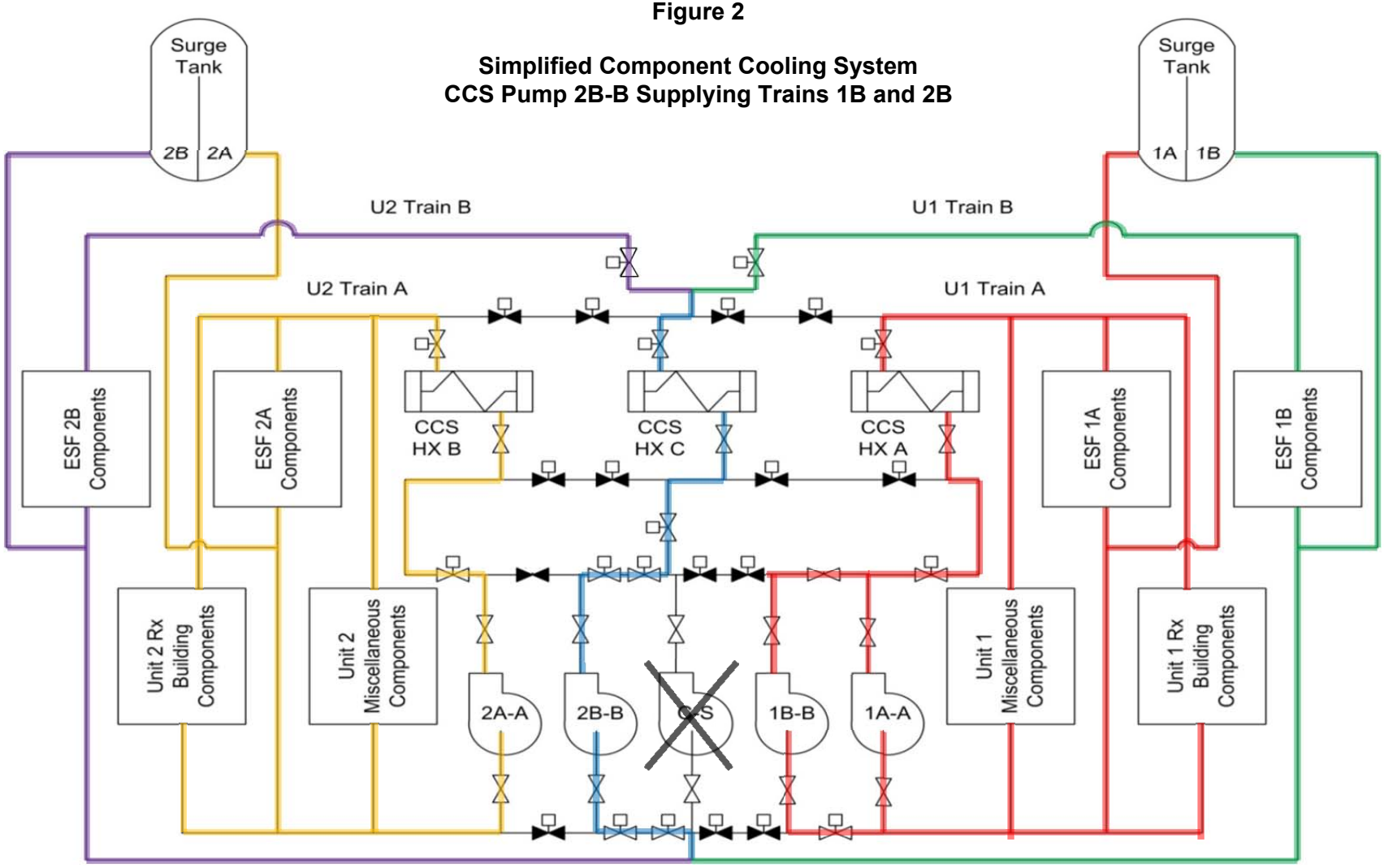


Figure 2

Simplified Component Cooling System
CCS Pump 2B-B Supplying Trains 1B and 2B



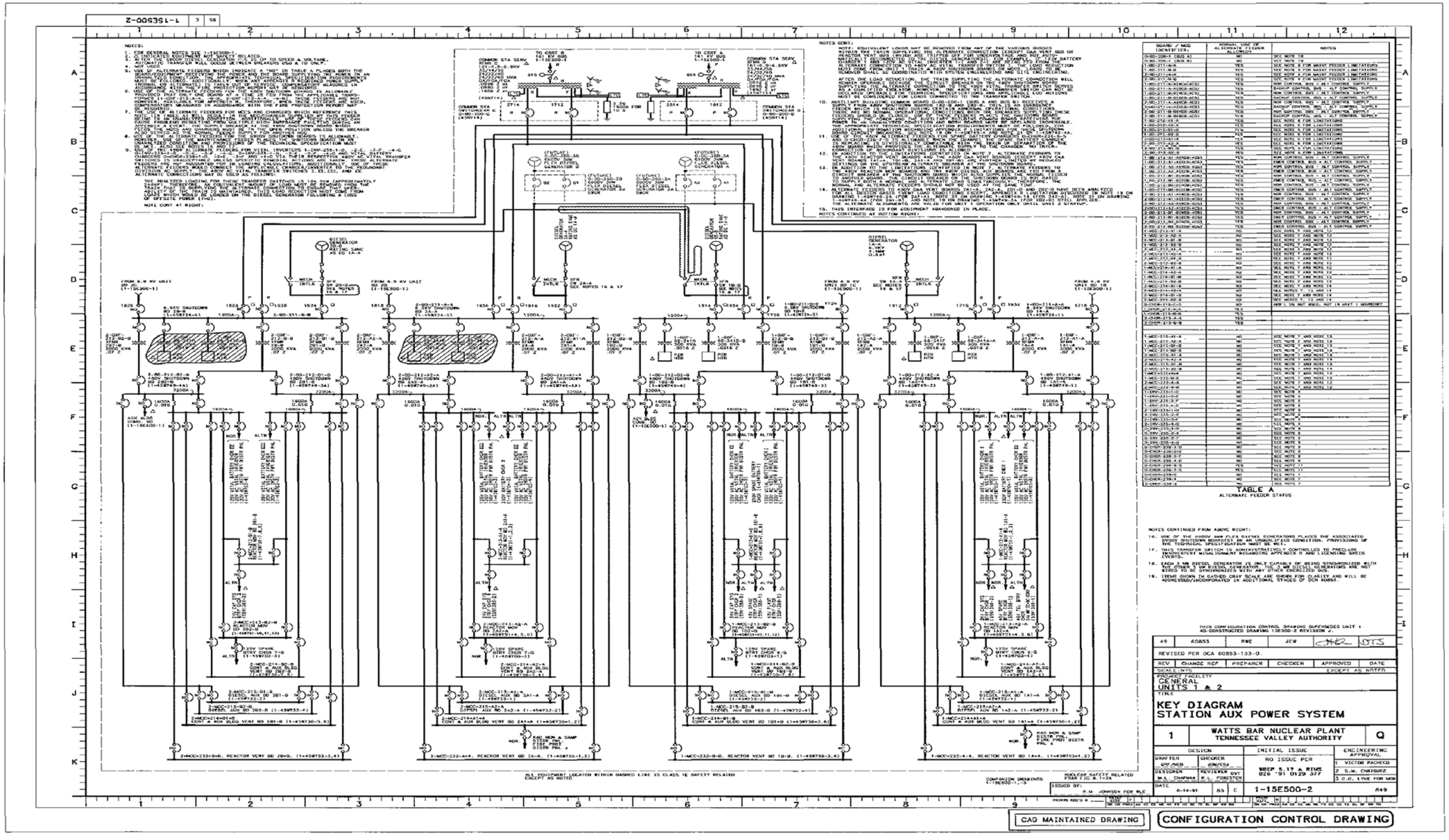
Unit 2 Train A
Unit 2 Train B
Common Train B
Unit 1 Train A
Unit 1 Train B

ENCLOSURE

Tennessee Valley Authority
Watts Bar Nuclear Plant, Unit 1

WBN-TS-14-004

Figure 3
Station Auxiliary Power

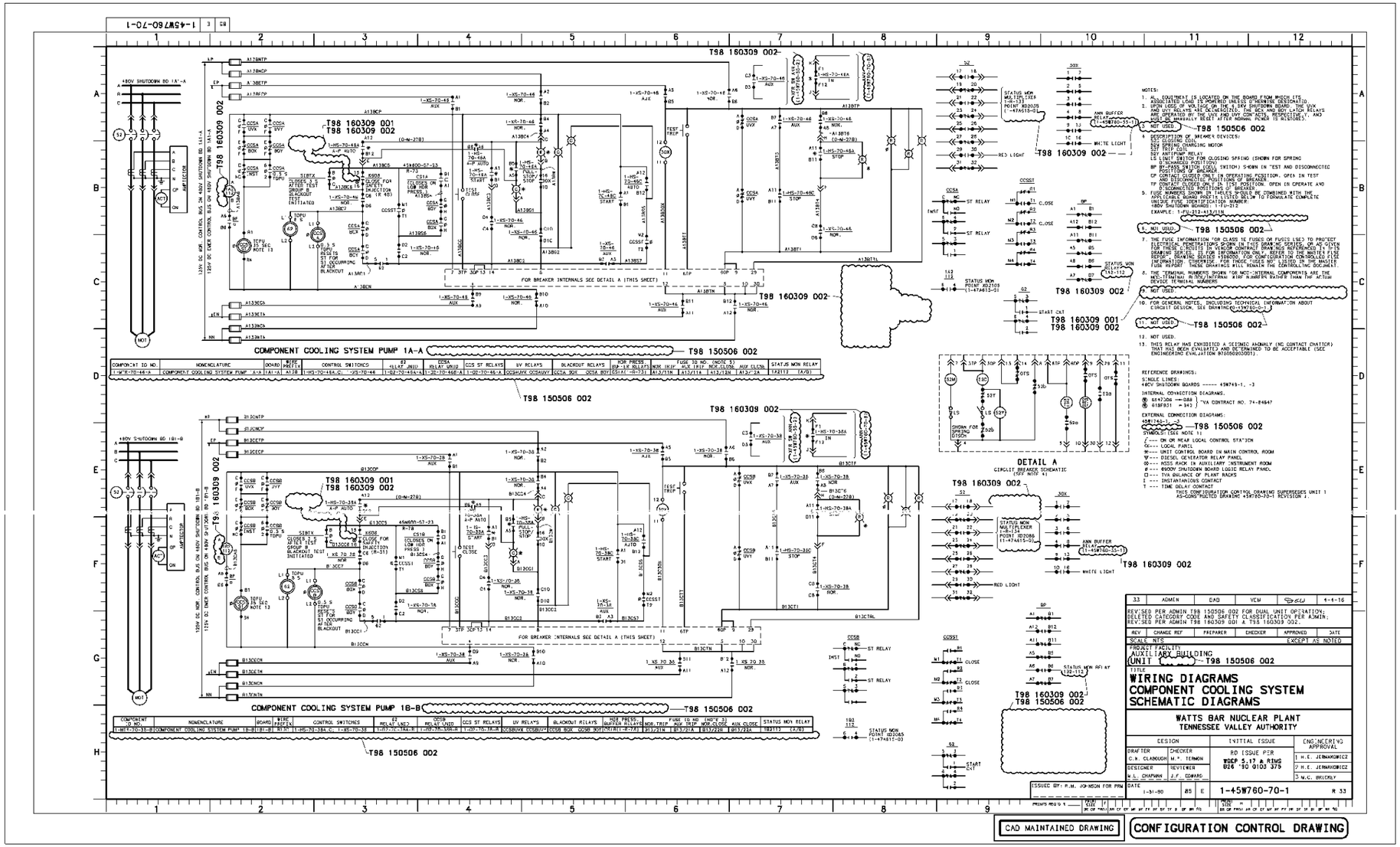


ENCLOSURE

Tennessee Valley Authority
Watts Bar Nuclear Plant, Unit 1

WBN-TS-14-004

Figure 4
Component Cooling Pumps 1A-A and 1B-B Wiring Diagram



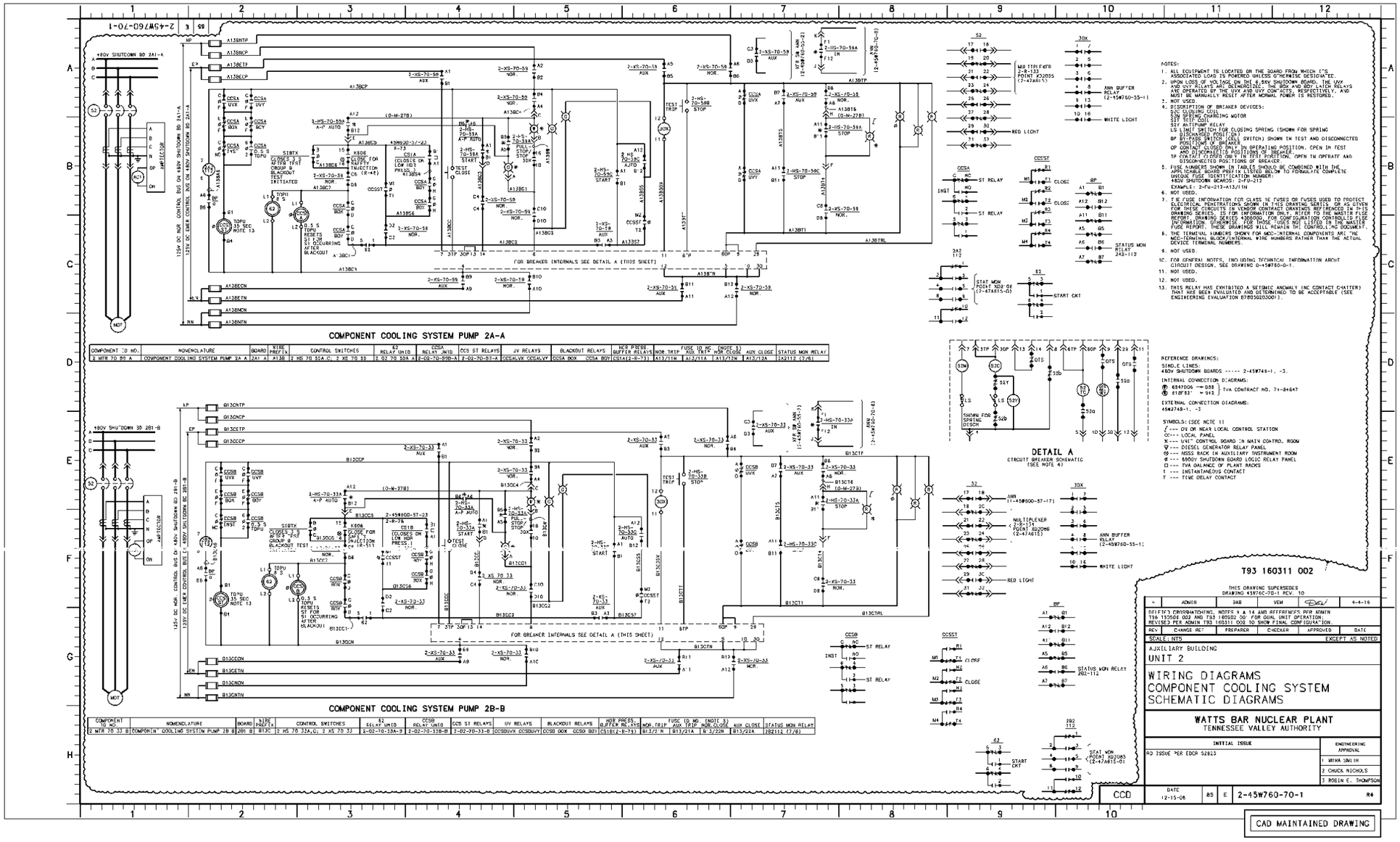
ENCLOSURE

Tennessee Valley Authority
Watts Bar Nuclear Plant, Unit 1

WBN-TS-14-004

Figure 5

Component Cooling Pumps 2A-A and 2B-B Wiring Diagram

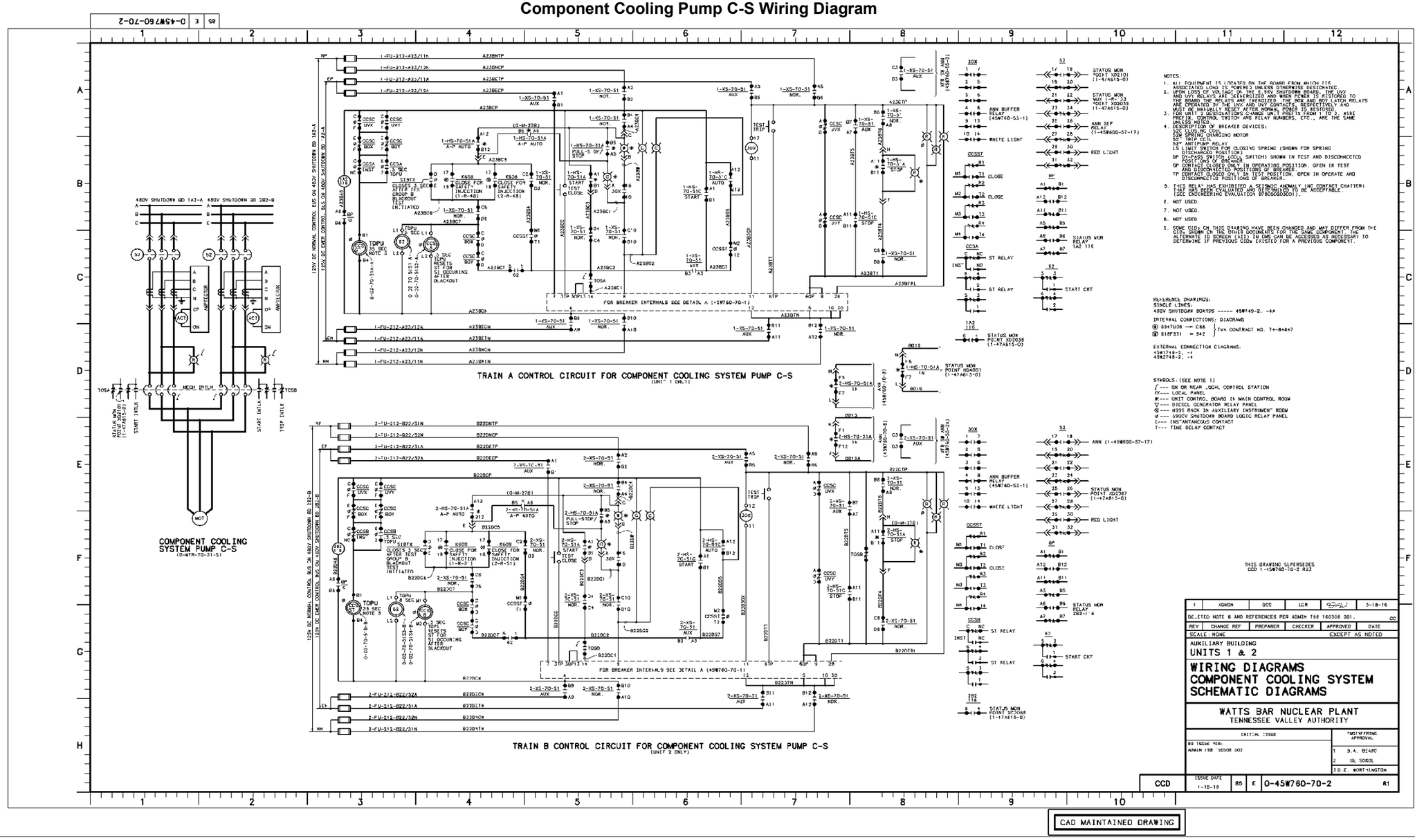


ENCLOSURE

Tennessee Valley Authority
Watts Bar Nuclear Plant, Unit 1

WBN-TS-14-004

Figure 6
Component Cooling Pump C-S Wiring Diagram



ATTACHMENT 1

WBN-TS-14-004
Proposed TS Changes (Mark-Ups) for
WBN Unit 1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.7.1	Verify that the alternate feeder breaker to the C-S pump is open.	7 days
SR 3.7.7.2	----------NOTE---------- Isolation of CCS flow to individual components does not render the CCS inoperable. ---------- Verify each CCS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.7.3	Verify each CCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.7.7.4	----------Note---------- Verification of CCS pump 2B-B automatic start on Unit 1 SI is not required when CCS Pump 2B-B is supporting CCS Train B OPERABILITY. ---------- Verify each CCS pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.7.7.5	----------Note---------- Only required to be met when CCS Pump 2B-B is supporting CCS Train B OPERABILITY. ---------- Verify CCS pump 2B-B is aligned to CCS Train B and is in operation.	12 hours

ATTACHMENT 2

WBN-TS-14-004
Proposed TS Bases Page Changes (Mark-Ups)
WBN Unit 1
(For Information Only)

BASES

BACKGROUND

The CCS provides a heat sink for the removal of process and operating heat from safety related components during a Design Basis Accident (DBA) or transient. During normal operation, the CCS also provides this function for various nonessential components, as well as the spent fuel storage pool. The CCS serves as a barrier to the release of radioactive byproducts between potentially radioactive systems and the Essential Raw Cooling Water (ERCW) System, and thus to the environment.

The CCS is arranged as two independent, full-capacity cooling trains, Train A and B. Train A in unit 1 is served by CCS Hx A and CCS pump 1A-A. Pump 1B-B, which is actually Train B equipment, is also normally aligned to the Train A header in unit 1. However, pump 1B-B can be realigned to Train B on loss of Train A.

Train B is served by CCS Hx C. Normally, only CCS pump C-S is aligned to the Train B header since few nonessential, normally-operating loads are assigned to Train B. However, pump 1B-B can be realigned to the Train B header on a loss of the C-S pump.

In addition, CCS Pump 2B-B may be substituted for CCS Pump C-S supplying the CCS Train B header provided the OPERABILITY requirements for the pump are met and the pump is in operation. CCS Pump 2B-B only receives a safety injection (SI) actuation signal from Unit 2. The presence of a Unit 1 SI signal will have no effect on CCS Pump 2B-B. If CCS Pump 2B-B is aligned as a substitute for CCS Pump C-S, then Unit 1 CCS Train B would not be OPERABLE because CCS pump 2B-B does not start if a Unit 1 SI signal is generated. However, if CCS Pump 2B-B pump is in operation, and an SI signal is generated, it will continue to operate. In the event of a loss of offsite power, with or without an SI signal present, CCS pump 2B-B will be automatically sequenced onto its respective diesel and continue to perform its required safety function.

Each safety related train is powered from a separate bus. An open surge tank in the system provides pump trip protective functions to ensure that sufficient net positive suction head is available. The pump in each train is automatically started on receipt of a safety injection signal, and all nonessential components will be manually isolated.

Additional information on the design and operation of the system, along with a list of the components served, is presented in the FSAR, Section 9.2.2 (Ref. 1). The principal safety related function of the CCS is the removal of decay heat from the reactor via the Residual Heat Removal (RHR) System. This may be during a normal or post accident cooldown and shutdown.

APPLICABLE SAFETY ANALYSES

The design basis of the CCS is for one CCS train to remove the post loss of coolant accident (LOCA) heat load from the containment sump during the recirculation phase, with a maximum CCS temperature of 110°F (Ref. 2). The Emergency Core Cooling System (ECCS) LOCA and containment OPERABILITY LOCA each model the maximum and minimum performance of

(continued)

BASES

LCO (continued)

A CCS train is considered OPERABLE when:

a. The pump and associated surge tank are OPERABLE; and

b. The associated piping, valves, heat exchanger, and instrumentation and controls required to perform the safety related function are OPERABLE.

CCS Train B is also considered OPERABLE when:

a. Pump 2B-B and associated surge tank are OPERABLE; and

b. Pump 2B-B is in operation; and

c. The associated piping, valves, heat exchanger, and instrumentation and controls required to perform the safety related function are OPERABLE.

The isolation of CCS from other components or systems not required for safety may render those components or systems inoperable but does not affect the OPERABILITY of the CCS.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CCS is a normally operating system, which must be prepared to perform its post accident safety functions, primarily RCS heat removal, which is achieved by cooling the RHR heat exchanger.

In MODE 5 or 6, the OPERABILITY requirements of the CCS are determined by the systems it supports.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," be entered if an inoperable CCS train results in an inoperable RHR loop. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

If one CCS train is inoperable, action must be taken to restore OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE CCS train is adequate to perform the heat removal function. The 72 hour Completion Time is reasonable, based on the redundant capabilities afforded by the OPERABLE train, and the low probability of a DBA occurring during this period.

B.1 and B.2

If the CCS train cannot be restored to OPERABLE status within the associated Completion Time, the plant must be placed in a MODE in which the LCO does

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.7.2 (continued)

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

SR 3.7.7.3

This SR verifies proper automatic operation of the CCS valves on an actual or simulated actuation signal. The CCS is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative control. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.4

This SR verifies proper automatic operation of the CCS pumps on an actual or simulated actuation signal. The CCS is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

The SR is modified by a Note that eliminates the requirement to verify CCS pump 2B-B starts automatically on an actual or simulated Unit 1 SI actuation signal. Because CCS pump 2B-B is supporting Unit 1 operation and the pump does not receive a Unit 1 SI actuation signal, ensuring CSS pump 2B-B is in operation ensures the pump will continue to operate if a condition requiring a Unit 1 SI actuation signal exists. If a LOOP occurs, the SR continues to require verification of an automatic start on a simulated or actual loss of offsite power actuation signal.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.7.5

This SR assures the operability of Unit 1 CCS Train B when CCS Pump 2B-B is substituted for CCS Pump C-S. Because CCS Pump 2B-B does not receive a safety injection (SI) actuation signal from Unit 1, by verifying the pump is aligned and in operation, assurance is provided that Unit 1 CCS Train B will be operable in the event of a Unit 1 safety injection (SI) actuation with a loss of CCS Train A.

This SR is modified by a Note that states the alignment and operating verification requirement is only required to be met when CCS pump 2B-B is being used to support the OPERABILITY of CCS Train B. When CCS pump 2B-B is not supporting the OPERABILITY of CCS Train B the other SRs provide the necessary and appropriate verifications of the CSS Train OPERABILITY.

The Frequency of 12 hours is sufficient considering other indications and alarms available to the operator in the control room to monitor CCS performance.

REFERENCES

1. Watts Bar FSAR, Section 9.2.2, "Component Cooling System."

2. Watts Bar Component Cooling System Description, N3-70-4002.

ATTACHMENT 3

WBN-TS-14-004
Proposed TS Changes (Final Typed) for
WBN Unit 1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.7.1	Verify that the alternate feeder breaker to the C-S pump is open.	7 days
SR 3.7.7.2	----------NOTE---------- Isolation of CCS flow to individual components does not render the CCS inoperable. ---------- Verify each CCS manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.7.3	Verify each CCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.7.7.4	----------Note---------- Verification of CCS pump 2B-B automatic start on Unit 1 SI is not required when CCS Pump 2B-B is supporting CCS Train B OPERABILITY. ---------- Verify each CCS pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.7.7.5	----------Note---------- Only required to be met when CCS Pump 2B-B is supporting CCS Train B OPERABILITY. ---------- Verify CCS pump 2B-B is aligned to CCS Train B and is in operation.	12 hours

ATTACHMENT 4

WBN-TS-14-004
Proposed TS Bases Changes (Final Typed) for
WBN Unit 1
(For Information Only)

BASES

BACKGROUND

The CCS provides a heat sink for the removal of process and operating heat from safety related components during a Design Basis Accident (DBA) or transient. During normal operation, the CCS also provides this function for various nonessential components, as well as the spent fuel storage pool. The CCS serves as a barrier to the release of radioactive byproducts between potentially radioactive systems and the Essential Raw Cooling Water (ERCW) System, and thus to the environment.

The CCS is arranged as two independent, full-capacity cooling trains, Train A and B. Train A in unit 1 is served by CCS Hx A and CCS pump 1A-A. Pump 1B-B, which is actually Train B equipment, is also normally aligned to the Train A header in unit 1. However, pump 1B-B can be realigned to Train B on loss of Train A.

Train B is served by CCS Hx C. Normally, only CCS pump C-S is aligned to the Train B header since few nonessential, normally-operating loads are assigned to Train B. However, pump 1B-B can be realigned to the Train B header on a loss of the C-S pump.

In addition, CCS Pump 2B-B may be substituted for CCS Pump C-S supplying the CCS Train B header provided the OPERABILITY requirements for the pump are met and the pump is in operation. CCS Pump 2B-B only receives a safety injection (SI) actuation signal from Unit 2. The presence of a Unit 1 SI signal will have no effect on CCS Pump 2B-B. If CCS Pump 2B-B is aligned as a substitute for CCS Pump C-S, then Unit 1 CCS Train B would not be OPERABLE because CCS pump 2B-B does not start if a Unit 1 SI signal is generated. However, if CCS Pump 2B-B pump is in operation, and an SI signal is generated, it will continue to operate. In the event of a loss of offsite power, with or without an SI signal present, CCS pump 2B-B will be automatically sequenced onto its respective diesel and continue to perform its required safety function.

Each safety related train is powered from a separate bus. An open surge tank in the system provides pump trip protective functions to ensure that sufficient net positive suction head is available. The pump in each train is automatically started on receipt of a safety injection signal, and all nonessential components will be manually isolated.

Additional information on the design and operation of the system, along with a list of the components served, is presented in the FSAR, Section 9.2.2 (Ref. 1). The principal safety related function of the CCS is the removal of decay heat from the reactor via the Residual Heat Removal (RHR) System. This may be during a normal or post accident cooldown and shutdown.

APPLICABLE SAFETY ANALYSES

The design basis of the CCS is for one CCS train to remove the post loss of coolant accident (LOCA) heat load from the containment sump during the recirculation phase, with a maximum CCS temperature of 110°F (Ref. 2). The Emergency Core Cooling System (ECCS) LOCA and containment OPERABILITY LOCA each model the maximum and minimum performance of

(continued)

BASES

LCO (continued)

A CCS train is considered OPERABLE when:

a. The pump and associated surge tank are OPERABLE; and

b. The associated piping, valves, heat exchanger, and instrumentation and controls required to perform the safety related function are OPERABLE.

CCS Train B is also considered OPERABLE when:

a. Pump 2B-B and associated surge tank are OPERABLE; and

b. Pump 2B-B is in operation; and

c. The associated piping, valves, heat exchanger, and instrumentation and controls required to perform the safety related function are OPERABLE.

The isolation of CCS from other components or systems not required for safety may render those components or systems inoperable but does not affect the OPERABILITY of the CCS.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CCS is a normally operating system, which must be prepared to perform its post accident safety functions, primarily RCS heat removal, which is achieved by cooling the RHR heat exchanger.

In MODE 5 or 6, the OPERABILITY requirements of the CCS are determined by the systems it supports.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that the applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," be entered if an inoperable CCS train results in an inoperable RHR loop. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

If one CCS train is inoperable, action must be taken to restore OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE CCS train is adequate to perform the heat removal function. The 72 hour Completion Time is reasonable, based on the redundant capabilities afforded by the OPERABLE train, and the low probability of a DBA occurring during this period.

B.1 and B.2

If the CCS train cannot be restored to OPERABLE status within the associated Completion Time, the plant must be placed in a MODE in which the LCO does

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.7.2 (continued)

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

SR 3.7.7.3

This SR verifies proper automatic operation of the CCS valves on an actual or simulated actuation signal. The CCS is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative control. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.4

This SR verifies proper automatic operation of the CCS pumps on an actual or simulated actuation signal. The CCS is a normally operating system that cannot be fully actuated as part of routine testing during normal operation. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

The SR is modified by a Note that eliminates the requirement to verify CCS pump 2B-B starts automatically on an actual or simulated Unit 1 SI actuation signal. Because CCS pump 2B-B is supporting Unit 1 operation and the pump does not receive a Unit 1 SI actuation signal, ensuring CSS pump 2B-B is in operation ensures the pump will continue to operate if a condition requiring a Unit 1 SI actuation signal exists. If a LOOP occurs, the SR continues to require verification of an automatic start on a simulated or actual loss of offsite power actuation signal.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.7.5

This SR assures the operability of Unit 1 CCS Train B when CCS Pump 2B-B is substituted for CCS Pump C-S. Because CCS Pump 2B-B does not receive a safety injection (SI) actuation signal from Unit 1, by verifying the pump is aligned and in operation, assurance is provided that Unit 1 CCS Train B will be operable in the event of a Unit 1 safety injection (SI) actuation with a loss of CCS Train A.

This SR is modified by a Note that states the alignment and operating verification requirement is only required to be met when CCS pump 2B-B is being used to support the OPERABILITY of CCS Train B. When CCS pump 2B-B is not supporting the OPERABILITY of CCS Train B the other SRs provide the necessary and appropriate verifications of the CSS Train OPERABILITY.

The Frequency of 12 hours is sufficient considering other indications and alarms available to the operator in the control room to monitor CCS performance.

REFERENCES

1. Watts Bar FSAR, Section 9.2.2, "Component Cooling System."

2. Watts Bar Component Cooling System Description, N3-70-4002.