DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1

TECHNICAL SPECIFICATIONS

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3.19 EMERGENCY CONDENSER CIRCULATING WATER

Applicability

Applies to the first siphon portion of the Emergency Condenser Circulating Water (ECCW) System, the Essential Siphon Vacuum (ESV) System, and the Siphon Seal Water (SSW) System whenever operability of the Low Pressure Service Water (LPSW) System is required.

Applicability of this Specification for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

Objective

Supports operability of the LPSW pumps by specifying operability requirements for the systems required to maintain siphon flow capability.

Specification

3.19.1 ECCW Siphon Headers for Unit 1&2 LPSW

a. Whenever the shared Unit 1&2 LPSW System is required to be operable, at least two ECCW siphon headers shall be operable from among the four ECCW siphon headers on Unit 1 and Unit 2.

b. For each ECCW siphon header required to be operable per Specification 3.19.1.a; the ESV System shall be operable with an ESV pump and its supporting SSW flow operating, with ESV aligned to the ECCW siphon header, and, at least one CCW pump discharge valve shall be open on that ECCW header.

c. If only one ECCW siphon header is operable and two ECCW siphon headers are not restored to meet the requirements of Specification 3.19.1.a within 72 hours, then the reactor(s) shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.19.1.a are not met within 24 hours following hot shutdown, the reactor(s) shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

3.19.2 ECCW Siphon Headers for Unit 3 LPSW

a. Whenever the Unit 3 LPSW System is required to be operable, at least two ECCW siphon headers shall be operable from among the four siphon headers on Unit 2 and Unit 3.

b. For each ECCW siphon header required to be operable per Specification 3.19.2.a; the ESV System shall be operable with an ESV pump and its supporting SSW flow operating, with ESV aligned to the ECCW siphon header, and, at least one CCW pump discharge valve shall be open on that ECCW header.

c. If only one ECCW siphon header is operable to supply suction to the Unit 3 LPSW system and two ECCW siphon headers are not restored to meet the requirements of Specification 3.19.2.a within 72 hours, then the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.19.2.a are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

3.19.3 A Unit 2 ECCW siphon header shall not simultaneously serve to support operability of both the Unit 1&2 LPSW System and the Unit 3 LPSW System.

3.19.4 Lake level requirements to support operability of the LPSW System shall be contained in the ONS Selected Licensee Commitment Manual.

<u>BASES</u>:

The Low Pressure Service Water (LPSW) pumps receive their suction supply from the Condenser Circulating Water (CCW) crossover header. During normal operation, the CCW pumps from all Oconee units can provide the water supply to the CCW crossover header. During certain events involving loss of off-site power, the CCW pumps will receive a load shed signal, and the Emergency Condenser Circulating Water (ECCW) first siphon must be capable of supplying suction to the LPSW pumps. The ECCW first siphon takes suction from the CCW intake canal and supplies flow to the CCW crossover header where the LPSW System takes its suction.

The LPSW System provides a heat sink for the removal of process and operating heat from safety related components during an accident or transient. During normal operation and normal shutdown, the LPSW System also provides this function for various safety related components. The LPSW System cannot perform these functions, in the event of a loss of offsite power, if the ECCW System is not available to support LPSW System operability. Therefore, the applicability of this specification is any time LPSW System operability is required.

Due to the piping configuration, each CCW inlet header on a given Oconee unit is independent of the other header for the purposes of siphoning water from the intake canal to the CCW crossover header. If one CCW inlet header is incapable of supplying siphon flow, it would not prevent the other CCW inlet header on that Oconee unit from supplying siphon flow. Therefore, each CCW inlet header may be considered to be an independent "ECCW siphon header".

An "ECCW siphon header" provides an open flow path from the intake canal to the CCW crossover header. A single open CCW pump discharge valve supplying a single 11 ft. diameter CCW inlet header on a given Oconee unit may qualify as an ECCW siphon header if the applicable CCW crossover tie valve is open to align the ECCW siphon header to the suction of the LPSW pumps. Each Oconee unit has two CCW inlet headers that can supply flow to the CCW crossover header. Therefore, each Oconee unit can potentially provide up to two ECCW siphon headers.

The ECCW siphon supply to LPSW must be capable of withstanding a single active failure. For example, failure of the ESV pump or float valve for a given ECCW siphon header could cause siphon flow in that header to eventually fail due to air accumulation. Therefore, two ECCW siphon headers are required to be operable for each LPSW system. By requiring two ECCW siphon headers to be operable, no single active failure will cause a loss of function for the ECCW supply to the LPSW pumps.

Based on analysis of the net positive suction head (NPSH) for the LPSW pumps, the Unit 1&2 LPSW pumps cannot be supplied with adequate suction from a Unit 3 siphon header using worst case assumptions. Therefore, the siphon headers for the Unit 1&2 LPSW pumps must come from either Unit 1 or Unit 2. Similarly, the Unit 3 LPSW pumps cannot be supplied adequate NPSH from a Unit 1 siphon header, so the siphon headers for the Unit 3 LPSW pumps must be supplied from Unit 2 or Unit 3. A Unit 2 ECCW siphon header shall not simultaneously serve to support operability of both the Unit 1&2 LPSW System and the Unit 3 LPSW System. Under certain conditions of low lake level and high LPSW System demand, a Unit 2 ECCW siphon header is not capable of simultaneously providing adequate NPSH to both the Unit 1&2 LPSW System and the Unit 3 LPSW System.

Lake level requirements to support operability of the LPSW System shall be contained in the ONS Selected Licensee Commitment (SLC) Manual. SLC 16.9.7 currently contains the lake level requirements which are necessary to support operability of the LPSW System in conjunction with this specification.

For any ECCW siphon header to be considered operable, one Essential Siphon Vacuum (ESV) pump must be operating and aligned to the header, to ensure that the CCW piping remains sufficiently primed during normal operation. This configuration maintains the initial conditions used during testing and assumed in accident analyses. The ESV pump must be capable of restarting after restoration of emergency power following a loss of off-site power. This ensures that the siphon supply to LPSW can be maintained by removing any air that may leak into the CCW piping or any air that is degassed from the lake water.

To operate any ESV pump, it must have a continuous supply of seal water from the SSW System. The safety function of the SSW System is to supply seal water to the ESV pumps, but the SSW System also supplies seal/cooling water to the CCW pumps. SSW is fed from the LPSW System. The SSW System consists of two headers. One SSW header is sufficient to provide sealing flow to ESV pumps and CCW pumps. A solenoid valve is provided to isolate SSW flow to each ESV pump. This solenoid valve must be operable to ensure that SSW flow is provided to its respective ESV pump.

To maintain separation between the ESV System headers on a given unit, the cross-connect between the ESV pumps' suction shall be closed. Operability of the ESV System also requires that the float valve on the respective ECCW siphon header be operable. When the potential for freezing exists, the heat tracing on the ESV float valve must also be operable. To support continued operability of the ESV System during a LOCA/LOOP, instrumentation must be available to ensure that the ESV vacuum tank will be drained, and the SSW duplex strainers will be rotated, on an as needed basis. The instrumentation used to support these two activities is ESV vacuum tank level, and SSW to ESV pump flow, respectively. Other instrumentation is provided to monitor proper operation of the ESV System, but is not required for ESV System operability.

Surveillance testing for the ECCW, ESV, and SSW systems is conducted by performing tests listed in Table 4.1-2. The Emergency Condenser Circulating Water System test is conducted on a refueling outage basis. This test verifies that air in-leakage to the ECCW siphon headers will not exceed ESV pump capability.

The Essential Siphon Vacuum System Test is performed quarterly to verify adequate performance of the ESV system. This includes a functional test to ensure the ESV float valves are capable of opening, a test of the ESV pumps performance, a test of ESV Pumps to ensure that they can be automatically restarted upon restoration of emergency power after a loss of off-site power, and a test of active valves which support operability of the ESV System.

Applicability of this Specification as described above for each Oconee unit will begin following completion of the Service Water upgrades on the respective unit. The Service Water upgrade is scheduled for completion in the Unit 2 EOC 16 refueling outage, in the Unit 3 EOC 17 refueling outage, and in the Unit 1 EOC 18 refueling outage.

Table 4.1-2

MINIMUM EQUIPMENT TEST FREQUENCY

	Item	Test	Frequency
1.	Control Rod Movement (1)	Movement of Each Rod	Monthly
2.	Pressurizer Safety Valves	Setpoint	Each Refueling(4)
3.	Main Steam Safety Valves	Setpoint	Each Refueling(4)
4.	Refueling System Interlocks(5)	Functional	Prior to Refueling
5.	Main Steam Stop Valves (1)	Movement of Each Stop Valve	Monthly
6.	Reactor Coolant System (2) Leakage	Evaluate	Daily
7.	Emergency Condenser (6) Circulating Water System Test	Functional	Each Refueling
8.	High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9.	Spent Fuel Cooling System	Functional	Prior to Refueling
10.	High Pressure and Low (3) Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
11.	Emergency Feedwater Pump Automatic Start and Automatic Valve Actuation Feature	Functional	Each Refueling
12.	MSLB Feedwater Isolation (7) Feature	Functional	Each Refueling
13.	Essential Siphon Vacuum (8) System Test	Functional	Quarterly

(1) Applicable only when the reactor is critical.

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.

(4) Number of safety valves to be tested each refueling shall be in accordance with ASME Codes Section XI, Article IWV-3511, such that each valve is tested at least once every 5 years.

(5) Applicable only to the interlocks associated with the Reactor Building Purge System.

(6) Verification of the Emergency Condenser Circulating Water (ECCW) System function to supply siphon suction to the Low Pressure Service Water System shall be performed to ensure operability of the LPSW System.

(7) Verification that Main Feed Pumps, Main Feedwater Control Valves, and Turbine Driven Emergency Feedwater Pumps are appropriately actuated/inhibited by the MSLB Feedwater Isolation Feature.

(8) Applicability of these surveillances for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

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ATTACHMENT 2

TECHNICAL SPECIFICATIONS
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Table 4.1-2

MINIMUM EQUIPMENT TEST FREQUENCY

	Item	Test	Frequency
1.	Control Rod Movement (1)	Movement of Each Rod	Monthly
2.	Pressurizer Safety Valves	Setpoint	Each Refueling(4)
3.	Main Steam Safety Valves	Setpoint	Each Refueling(4)
4.	Refueling System Interlocks(5)	Functional	Prior to Refueling
5.	Main Steam Stop Valves (1)	Movement of Each Stop Valve	Monthly
6.	Reactor Coolant System (2) Leakage	Evaluate	Daily
7.	Emergency Condenser Circulating Water(6) ~~Flow~~ System Test	Functional	Each Refueling
8.	High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9.	Spent Fuel Cooling System	Functional	Prior to Refueling
10.	High Pressure and Low (3) Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
11.	Emergency Feedwater Pump Automatic Start and Automatic Valve Actuation Feature	Functional	Each Refueling
12.	MSLB Feedwater Isolation (7) Feature	Functional	Each Refueling
13.	Essential Siphon Vacuum (8) System Test	Functional	Quarterly

(1) Applicable only when the reactor is critical.

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.

(4) Number of safety valves to be tested each refueling shall be in accordance with ASME Codes Section XI, Article IWV-3511, such that each valve is tested at least once every 5 years.

(5) Applicable only to the interlocks associated with the Reactor Building Purge System.

(6) Verification of the Emergency Condenser Circulating Water (ECCW) System function to supply siphon suction to the Low Pressure Service Water System shall be performed to ensure operability of the LPSW System.

(7) Verification that Main Feed Pumps, Main Feedwater Control Valves, and Turbine Driven Emergency Feedwater Pumps are appropriately actuated/inhibited by the MSLB Feedwater Isolation Feature.

(8) Applicability of these surveillances for each Oconee unit will begin following completion of the Service Water upgrade on the respective unit.

ATTACHMENT 3

TECHNICAL JUSTIFICATION

1.0 Technical Specification Change:

The proposed revision to the Technical Specifications provided in Attachment 1 adds new limiting conditions for operation and new surveillance requirements for the Emergency Condenser Circulating Water (ECCW), Essential Siphon Vacuum (ESV) and Siphon Seal Water (SSW) Systems. A new Technical Specification, 3.19, is added to address the operability of these systems. In addition, Specification Table 4.1-2 is revised to include new surveillance requirements for these systems.

2.0 Background:

In a letter to the NRC dated December 28, 1995, Duke Power described the conceptual design of the ECCW System project, now called the Oconee Service Water (OSW) Project. As part of this proposed amendment, a final design description, which supersedes the preliminary design description, is being provided. This final design description is being provided to include system design information for consideration in the proposed amendment review. The OSW Project is being performed to resolve several service water issues at Oconee. Among other things, Duke proposed to upgrade the existing ECCW System by installing a new Essential Siphon Vacuum (ESV) System, a new Siphon Seal Water (SSW) System, and to reclassify portions of the CCW System to QA Condition 1. The purpose of these changes is to eliminate reliance on existing non-QA Condition systems and equipment, including the CCW pumps and the High Pressure Service Water (HPSW) System, after a loss of coolant accident with loss of off-site power (LOCA/LOOP).

The OSW Project described in the December 28, 1995 letter also included changes to the Low Pressure Service Water (LPSW) System. A change to the Technical Specifications for LPSW was approved by the NRC in a letter dated August 19, 1996.

PART I: CURRENT SYSTEM DESCRIPTION

3.0 CCW/ECCW Systems

Section 9.2.2.2.1 of the Oconee Nuclear Station Updated Final Safety Analysis Report (UFSAR) contains a description of the Condenser Circulating Water (CCW) System and the Emergency Condenser Circulating Water (ECCW) System. The ECCW System is a siphon system that is a subset of the CCW System. The ECCW System is required to supply suction to the Low Pressure Service Water (LPSW) pumps after a LOOP. The LOCA/LOOP was considered the bounding LOOP case for the OSW Project.

3.1 CCW/ECCW System Description

The CCW System takes its suction from the Little River arm of Lake Keowee. As illustrated in Figure 1, the suction of the CCW pumps extends below the maximum draw down lake level of 775 feet. As shown in Figure 2, each ONS unit has four CCW pumps supplying water via two 11 ft pipes into a common condenser intake header. An inter-unit crossover header is also provided upstream of the condensers. The LPSW System for each unit takes suction from the crossover header in order to supply various safety-related loads. These loads include the Low Pressure Injection (LPI) coolers and the Reactor Building Cooling Units. The LPSW System is shared for Units 1 and 2, and independent for Unit 3. During normal operation, the CCW crossover header is aligned to all three ONS units and CCW pumps provide flow to the suctions of the LPSW Systems for all three units. Occasionally, the CCW System for a given Oconee unit may be manually isolated from the CCW crossover header for maintenance or testing.

The ECCW System can be divided into two distinct parts based on the piping configuration. The CCW piping has two high points, one at the discharge of the CCW pumps and one downstream of the condensers on the emergency discharge piping. These high points are referred to as the "first siphon" and the "second siphon", respectively. The first siphon takes lake water from the intake canal, lifts it into the CCW piping through the CCW pumps, and supplies flow to the CCW crossover header in the Turbine Building basement where the LPSW pumps take their suction. The second siphon takes suction from the condenser inlet piping, supplies flow through the condenser, and discharges through the emergency discharge piping to a trench that leads to the Keowee Hydro tailrace. This proposed specification addresses the first siphon.

3.2 Pre-Modification ECCW System Operation

To meet the requirements of Technical Specification 3.3.7 or the LPSW System operability requirements for conditions below 250 °F and/or 350 psig RCS pressure, the ECCW System must be capable of supplying suction to the LPSW pumps in the event of a LOCA/LOOP. The LOCA/LOOP is the bounding accident for operation of the ECCW System. In addition, the ECCW supply to LPSW must be capable of withstanding a single active failure.

The CCW pumps are load shed during a LOCA/LOOP. Therefore, the ECCW System is designed to supply suction to the LPSW pumps using an unassisted siphon. To maintain siphon flow capability, the ECCW piping must be relatively air-free and leak-tight. HPSW currently supplies seal water to the CCW pump shafts which helps to minimize air in-leakage that may degrade the siphon. The Elevated Water Storage Tank (EWST) provides flow through the HPSW System as necessary to provide sealing to the CCW pumps immediately following a LOCA/LOOP.

Operability of the siphon supply to the LPSW pumps is currently controlled by a combination of lake level and CCW System alignment as dictated by ONS Selected Licensee Commitment (SLC) 16.9.7 and associated station procedures. The duration of siphon flow operation during a LOCA/LOOP is currently credited for 1.5 hours until a CCW pump can be restarted to supply LPSW suction for the affected unit(s). Presently, CCW pump forced flow is reestablished manually by the operators during recovery from the LOCA/LOOP event. In addition, HPSW cooling water flow must be available in order to restart CCW pumps for the LOCA/LOOP. Availability of HPSW cooling water flow is controlled by SLC 16.9.8 and associated station procedures.

3.3 Pre-Modification ECCW System Design

The CCW intake structure, CCW pumps, CCW pump motors, CCW intake piping to the LPSW pumps, CCW piping through the condenser, emergency CCW discharge piping, and normal CCW discharge piping are seismically-qualified, per UFSAR Section 3.2.2. The first siphon portion of the ECCW System is designed to withstand a single active failure.

As described in an NRC Safety Evaluation Report dated August 3, 1995, the 10CFR50 Appendix B Quality Assurance program (QA-1) requirements were not applied to portions of the CCW System due to certain features of its design. These features were: 1) redundancy and diversity, 2) passive mitigation functions, 3) seismic design, and 4) constant use of these systems in normal operation of the plant. As a result, 10CFR50 Appendix B Quality Assurance requirements have not been applied to some of the service water system SSCs such as the CCW pump motors, CCW pump discharge valve control circuitry and cabling, and HPSW cooling water to the CCW pump motors.

Although CCW pump and valve power sources are routed from a Class 1E power source, they do not meet the Class 1E requirements for routing and cable material. The cabling routes are, however, isolated from the Class 1E source by a breaker and fuse which meet Class 1E requirements.

PART II: NEW SYSTEM DESCRIPTION

The Oconee Service Water System (OSW) project has three objectives:

- Eliminate dependence on the HPSW System for mitigating a LOCA/LOOP.
- Ensure adequate NPSH for the LPSW pumps during all design basis conditions.
- Upgrade the systems, structures, and components (SSCs) necessary for supplying suction to the LPSW pumps following a LOCA/LOOP to QA-1.

To satisfy these three objectives, the OSW project is implementing the following modifications:

1. Addition of a new QA-1 Essential Siphon Vacuum (ESV) System to increase the reliability and duration of the ECCW System first siphon supply to LPSW, and to remove any requirements to restart CCW pumps following a LOOP event.
2. Adding a new QA-1 seal water path, Siphon Seal Water (SSW), to the ESV pumps and the CCW pumps.
3. LPSW System changes to ensure adequate NPSH. These changes involve:
   a) reducing LPSW System flow demands,
   b) providing capability to isolate non-essential loads with QA-1 equipment,
   c) providing LPSW pump minimum flow protection due to reduction in system flow demands
4. Reclassification of all existing systems and components required to maintain the ECCW System first siphon supply to LPSW to QA-1.

LPSW System changes to ensure adequate NPSH (Item 3) have already been described in Technical Specification Amendment 217/217/214 for Units 1, 2, and 3 respectively. That information is contained in a letter to the staff dated June 6, 1996, as approved by a Safety Evaluation Report dated August 19, 1996. Therefore, this report provides a final description of changes associated with Items 1, 2, and 4.

4.0 Essential Siphon Vacuum (ESV) System

The new Essential Siphon Vacuum (ESV) System upgrades the first siphon and removes reliance on manually restarting the CCW pumps following a LOOP. The ESV System is designed to remove any air accumulation in the ECCW siphon headers during normal operation and following a LOCA/LOOP event. The ESV System is QA-1 and seismically qualified.

4.1 ESV System Description

The new ESV System consists of three vacuum pumps per unit. Each unit has an independent ESV System with the exception of the sealing water, which is provided from Siphon Seal Water (SSW) headers. A simplified flow diagram of the ESV System for a single unit is provided in Figure 3. One continuously operating vacuum pump will normally be aligned to each 11 ft. ECCW siphon header. A third pump is provided as an installed spare pump which can be aligned to replace one of the two normally aligned pumps. The vacuum piping is connected to the top of the ECCW siphon header and contains an automatic float valve to prevent water from entering the system during normal operation. Piping from each header goes to a small receiver tank. This allows for the collection and drainage of any entrained liquids and adds system capacitance. The tank also provides a suitable location for installation of instrumentation.

The ESV System vacuum pumps and tanks are supported by a seismically qualified, QA-1 reinforced concrete foundation located in the plant yard just north of the CCW intake dike (Figure 4). A seismically qualified, QA-4 pre-engineered structural steel building provides shelter for the ESV System vacuum pumps and other components. All QA-1 equipment is supported by the reinforced concrete foundation. The heating and ventilating system for the building is non-QA because it is not required to support ESV System operation.

The ESV System vacuum pumps are powered by Class 1E power. Power from independent sources is supplied to each pump on a per unit basis. The ESV pumps are designed to restart following a loss of the CCW pumps due to a LOOP. A short time delay is designed to occur between restoration of power from emergency sources and starting of the ESV pumps. The siphon will not fail during the time delay prior to ESV pumps restart. A calculation has been performed to assess the impact of these additional loads on the capacity of the Emergency Power System. This study concluded that the Emergency Power System is able to adequately support the additional loads with no significant impact on the Electrical AC Power Distribution System.

ESV System piping is routed from the turbine building to the ESV System building and intake structure via the existing Radwaste Facility (RWF) trench, direct burial, and the newly constructed ESV System dike trench. Routing of ESV System cabling from the turbine building to the ESV System building and intake structure is by way of the existing RWF trench, the newly constructed ESV System cable and ESV System dike trenches and embedded conduit. The RWF trench runs north-south and is a seismically qualified, QA-4 structure. The ESV System cable trench runs generally east-west. The ESV System dike trench, constructed by permit from the Federal Energy Regulatory Commission (FERC), runs north-south over the dike and east-west along the dike carrying vacuum lines to individual CCW inlet headers. Piping to route cooling water to the CCW pumps, motors, and necessary instrumentation cabling is also routed within this trench. Both the ESV System cable trench and ESV System Dike trench are seismically qualified and QA-1. Figure 4 depicts a general arrangement of this portion of the Service Water Project.

4.2 ESV Pumps

A total of nine vacuum pumps are provided (three per unit). Each vacuum pump is sized to handle the maximum expected air accumulation associated with one ECCW siphon header. The ESV pumps are of a liquid ring design. They have an open design with the sealing water being discharged from the pump. Seal water supply is controlled by a solenoid valve that is interlocked with pump controls. This sealing water will be provided from the new Siphon Seal Water (SSW) System as shown in Figures 2 and 3.

Each unit has two 11 ft. ECCW siphon headers, which are each fed by two 8 ft. diameter CCW pump discharge pipes. Only one 8 ft. CCW pump discharge pipe is needed to feed an ECCW siphon header during siphon operations. One ESV System vacuum pump will be aligned to each of the ECCW siphon headers. One vacuum pump per unit will be treated as an installed spare capable of being aligned to either of the two CCW inlet headers for its unit.

To size the ESV pumps, a test was performed to provide a conservative value for air in-leakage. This testing was performed during the Unit 1 end-of-cycle 16 refueling outage. Based on past operating experience, the CCW pump shaft is the major air in-leakage path for the ECCW siphon header. Two CCW pumps were tested with no packing or seal water in order to evaluate the maximum amount of air in-leakage in this degraded condition. The air in-leakage during this degraded condition conservatively bounds that expected during either normal operation or a design basis accident. A siphon flow test was then performed on the degraded ECCW siphon header for 1.5 hours to determine the rate of air in-leakage. The results from this test were extrapolated to reflect worst-case design basis conditions for important variables, such as lake level. The ESV pumps were conservatively sized to handle the air in-leakage associated with these test results. Therefore, seal/cooling water to the CCW pumps is not required for ECCW siphon operation.

A minimum flow line assembly is connected to each ESV tank. This line prevents dead heading of the respective ESV pump during normal operation. However, the ESV pumps can operate while dead headed for over a month with no adverse effects. The minimum flow line is automatically isolated in the event of a loss of power to the CCW pumps to ensure that the entire ESV pump capacity is available to remove air from the ECCW siphon header. This isolation is accomplished with solenoid valves which are normally energized to open or remain open, and which fail closed upon loss of power.

The ESV pumps and motors are QA-1 components, and were seismically qualified. The seismic qualification of the equipment was established using the experience-based approach criteria and procedures developed by the Seismic Qualification Users Group (SQUG). The guidance used was the Generic Implementation Procedure, Revision 2 (GIP-2), as revised on February 14, 1992, and as supplemented by the NRC's Supplemental Safety Evaluation Report No. 2, dated May 22, 1992. Part 1, Section 2.3.4 of GIP-2 describes the application to new and replacement equipment.

4.3 ESV System Vacuum Tanks

Six vacuum tanks, one for each ECCW siphon header, are provided. The tanks will provide some system capacitance for transient conditions. In addition, the tanks provide a place to remove any accumulated water. A level gauge is provided on each vacuum tank to monitor water accumulation.

4.4 Float Valve/CCW Tie-in

A float valve is provided near the CCW header connection to prevent water from entering the vacuum lines. In addition, an isolation valve and a test vent valve were added upstream of the float valve as shown in Figure 3. The test vent valve will allow air to be introduced into the system to demonstrate the ability of the ESV System to remove it.

4.5 ESV System Monitoring, Alarms, and Controls

No immediate or short term (less than 24 hours following the event) operator action is required for the ESV System to perform its accident mitigation functions. Long term (after 24 hours following the event) operator action is necessary to support continued operability of the ESV System during mitigation of a LOCA/LOOP. Specifically, manual actions must be taken to drain the ESV vacuum tank and to swap the SSW strainer, as necessary. Instrumentation and alarms, where appropriate, are provided to prompt these manual actions. The two instruments which provide indications to support these manual actions are ESV vacuum tank level, and SSW to ESV pump seal water flow, respectively. Although not required for system operability, other instrumentation is provided to monitor proper operation of the ESV System. The table below lists some features of the more important ESV System instruments:

Instrumentation	Indication Type and Location	Required for System Operability ?	QA-1?	R.G 1.97 Classifi-cation
ESV Tank level	Gage (local)	Yes	Yes	Yes - (D2)
SSW Strainer D/P	Gage (local),	No	No	No
ESV Tank Pressure	Gage (local), Alarm (control room)	No No	Yes No	Yes - (D2)
SSW Flow to ESV Pumps	Gage (local), alarm (control room)	Yes No	Yes No	Yes - (D2)
ESV pump motor status	On/Off Status lights (local and control room)	No	Yes	No
ESV float valve heat trace status	Alarm (control room)	No	Yes, except for alarm circuit	No

Regulatory Guide (RG) 1.97 requirements were reviewed for applicability to the new instrumentation. RG 1.97 requirements were determined to be applicable to three instruments: ESV tank level, SSW flow to ESV pumps, and ESV tank pressure. ESV tank level and SSW flow to the ESV pumps are required for continued system operability during a LOCA/LOOP. ESV tank pressure is available during a LOCA/LOOP to monitor continued proper operation of the ESV System.

The ESV pumps are driven by Class 1E electric motors. The power to the motors for each unit is from independent, QA-1, Class 1E power sources. OFF/ON controls are located in each respective unit's control room. Local OFF/ON capability is available for testing and maintenance purposes. Control room indication is also provided for pump operating status (OFF/ON).

4.6 ESV System Design Criteria

All ESV piping and components necessary to support ECCW siphon flow are QA-1, seismically qualified, and designed to meet or exceed Power Piping Code ANSI B31.1.0 (7/67 ed. for Units 1 and 2, 8/69 ed. for Unit 3) per UFSAR Table 3-1. The ESV piping necessary to support ECCW siphon flow therefore meets Duke's Class F piping requirements. Any other ESV piping meets Duke's Class G piping requirements. ESV System equipment is ASME Code Section III, or it is designed and constructed to appropriate commercial standards and dedicated as a basic component by Duke in order to meet QA-1 requirements.

To ensure that the requirements of UFSAR Section 3.1.41 are met, a single failure analysis has been performed for the ESV System. This single failure analysis concludes that no single active failure can occur which would render the ESV System incapable of performing its intended safety function.

The ESV System is designed to withstand Oconee's Maximum Hypothetical Earthquake. The ESV building used to house portions of the ESV System meets Duke's Class 2 structure criteria but is also qualified for a Maximum Hypothetical Earthquake (MHE) as described in UFSAR Section 3.8.5.

Cable separation is in accordance with UFSAR Section 8.3.1.4.6.2. Power to the vacuum pumps on the same unit is from independent IEEE Class 1E power sources. Cable routes use both existing QA-1 cable supports/trays and new QA-1 cable supports/trays. Where QA-1 cable supports/trays have been added, a seismic review has been performed. This review addresses the potential for any interaction of non-seismic equipment with the new QA-1 cable supports/trays. As a result, the modifications will ensure that no seismic interaction exists between non seismic equipment and the new QA-1 cable supports/trays.

UFSAR Sections 8.3.1.5.1 and 8.3.1.5.2 currently provide descriptions of power cable installation configuration with respect to layering and spacing. A 10CFR50.59 safety evaluation was performed to revise UFSAR Sections 8.3.1.5.1 and 8.3.1.5.2 to adopt additional installation methodologies already permitted under ICEA P-46-426 and referenced in UFSAR Section 8.3.1.5.1. This results in less restrictive cable layering and spacing in both existing and new cable trays while still providing conservative installation practices. The basis for the evaluation was that these cables are conservatively de-rated per ICEA P-46-426 to assure that the potential for overheating due to loading is remote and there is no increase in fire potential. Cable derating also assures that the cables and fault protection are coordinated such that faults are cleared and the cables protected. Therefore, conditions which result in cable fires and any fault impact to adjacent cables are not credible, even with cables installed in layers contact for greater than the approximate two feet as previously stated in the UFSAR.

An engineering analysis has been performed which reviewed the heat tracing requirements of the ESV System. Heat tracing/freeze protection is provided for lines and equipment containing moisture or which have the potential to contain fluids, except for those items contained within heated structures or buried below the frost line. The heat tracing on the ESV float valves is QA-1 and is supplied with Class 1E power. Other heat tracing on the ESV System is non QA-1, non Class 1E equipment since it is not required for the ESV System to perform its accident mitigation function.

The ESV System conforms to the turbine missile design requirements of UFSAR Section 3.1.40. Specifically, the ESV System is within a low probability strike zone for low trajectory turbine missiles. In addition, the ESV System has been evaluated to be a low probability target for high trajectory turbine missiles. Therefore, no separation or shielding protection is necessary for turbine missiles.

As described in ONS UFSAR Section 3.2.2, the Oconee design basis for mitigation of a tornado takes credit for water trapped in the embedded CCW piping below 791 feet as a source of water for the Auxiliary Service Water (ASW) Pump. Therefore, tornado wind loads and missiles were not considered during the design of the new equipment and structures installed by this modification.

UFSAR Section 9.5.1.4.3 generally precludes routing of cabling and piping in the same trench. The basis for this UFSAR statement is documented in a Duke letter to the NRC dated December 31, 1976. This letter contains Duke's response to Appendix A to Branch Technical Position APCSB 9.5.1, "Guidelines for Fire Protection for Nuclear Plants Docketed prior to July 1, 1976". The letter was reviewed as part of a 10CFR50.59 safety evaluation to determine the acceptability of routing service water project cable in the Radwaste Facility (RWF) trench with both service water project piping and RWF piping, as well as in the intake dike trench with service water piping. The evaluation of these installations concluded that a piping failure in these trenches is not capable of causing a fire. The piping contains non-flammable process fluids (water, steam) or compressed air, and the piping is made of non-flammable material. The cable has also been sufficiently de-rated so that an internally generated cable fire is not credible. Miscellaneous storage is not permitted in these cable trays or trenches. This restriction precludes a fire concern from arising due to miscellaneous storage. As a result of the 10CFR50.59 evaluation, UFSAR Section 9.5.1.4.3 will be revised as appropriate to address installation of piping and cabling in the same trench.

UFSAR Section 2.4.2.2 describes the potential for flooding and overflow of the Keowee dam due to the maximum hypothetical precipitation. The current parameters for this condition listed in the UFSAR are 808 feet for static lake level and a wave height of 6.42 feet at the Keowee dam. The bottom of the trench will cause a low spot of approximately 810 feet. A 10CFR50.59 evaluation was performed to evaluate the acceptability of this condition. It was determined that the lake level, in combination with the corrected (lower) wave height at the dike, would not result in overwash into the trench. Therefore, no potential for flooding was determined to exist for this condition. UFSAR Section 2.4.2.2 will be revised to address this change.

5.0 Siphon Seal Water (SSW) System

The Siphon Seal Water (SSW) System will provide a seal water supply for the new ESV pumps. This system will also become the normal source of seal/cooling water for the CCW pumps.

The safety function of the SSW System will be to supply seal water for the ESV pumps. Supplying seal/cooling water to the CCW pumps is a non safety function which will not be required for accident mitigation, although SSW to the CCW pumps is QA-1 and is expected to be available.

5.1 SSW System Description

Two SSW headers are routed from the LPSW System in the turbine building to the CCW intake structure, as shown in Figure 2. One header taps off the Units 1&2 LPSW System, and the other taps off the Unit 3 LPSW System. Both taps are downstream of LPSW pump cross-connects. An HPSW supply line is connected to each of the SSW headers in the turbine building to provide a means for flushing the lines.

The SSW headers are routed to the intake structure. Duplex strainers located in the ESV building will filter SSW to a particulate size acceptable for the CCW pump shaft seal and bearings and the ESV pump seal. Two ESV pump seal supply headers, one from each SSW header, are provided for each of the nine ESV pumps. These ESV pump seal supply headers will be cross connected at each of the nine pumps. Downstream of each ESV pump's seal supply cross-connect, the common ESV seal supply piping section contains a solenoid valve. This valve is interlocked with ESV pump controls to isolate and restore SSW to an ESV pump that has lost and regained power.

At the CCW intake structure, each SSW header is routed across the bridge and east and west along the length of the intake structure. These headers will be cross-connected at each of the twelve CCW pumps. From the header cross-connects, the new SSW piping to each CCW pump and motor will follow a path similar to the existing HPSW supply path.

All piping is constructed of stainless steel to minimize the effects of corrosion and biological fouling. Freeze protection is applied appropriately. Where the new piping will be exposed to outside temperatures, non QA-1 heat tracing is provided. This heat tracing is not required since the flow in the SSW header will prohibit freezing.

Local flow indication is provided for flow through each of the SSW headers in the turbine building. Local indication is provided for pressure drop across each SSW duplex strainer. Local flow indication is provided in the ESV building for SSW flow to an ESV pump.

5.2 SSW System Design Criteria

This portion of the upgrade is designed such that a single, active failure will not prevent the system's safety-related function from being accomplished.

The SSW System is designed to withstand Oconee's Maximum Hypothetical Earthquake.

All new piping and components necessary to support ECCW siphon flow are QA-1 and seismically qualified. In addition, the piping necessary to support ECCW siphon flow is designed to meet or exceed Power Piping Code ANSI B31.1.0 under the Duke Class F piping requirements per UFSAR Table 3-1.

The SSW valves and duplex strainers are ASME Code Section III or they are designed and constructed to appropriate commercial standards and dedicated by Duke as a basic component to meet QA-1 requirements.

The replacement of HPSW piping with SSW piping requires that the SSW piping be able to function after an Appendix R fire. Currently, a submersible pump can supply shaft seal and bearing lubrication and motor oil cooling water via HPSW piping to a CCW Pump after an Appendix R fire. Restart of a CCW pump is required as part of the fire damage repairs necessary to achieve cold shutdown. After the OSW project modifications, the submersible pump will connect to SSW 'A' header and will pump water from the intake backwards through SSW 'A' header. The water will pass through the cross-connect at the duplex strainers and through SSW 'B' header strainer to a CCW pump. No new electrical components are necessary for the seal water supply to perform its function after a fire. Therefore the new SSW System meets the applicable design requirements associated with the 10CFR 50 Appendix R design criteria.

The SSW System conforms to the turbine missile design requirements of UFSAR Section 3.1.40. Specifically, the new SSW System is either within a low probability strike zone or is shielded by the turbine generator foundation for a low trajectory turbine missile. In addition, the SSW System has been evaluated to be a low probability target for high trajectory turbine missiles. Therefore, no separation or shielding protection is necessary for high trajectory missiles.

As described in the ONS UFSAR Section 3.2.2, the Oconee design basis for mitigation of a tornado takes credit for water trapped in the embedded CCW piping below 791 feet as a source of water for the Auxiliary Service Water (ASW) Pump. Therefore, tornado wind loads and missiles were not considered during the design of the new equipment and structures installed by this modification.

6.0 Reclassification of Existing Systems and Equipment to QA Condition 1

Existing systems and equipment that are required to function to maintain the ECCW siphon to the LPSW pumps suction were reclassified to QA-1 and upgraded as necessary to meet seismic design criteria.

Reclassification involves changing design documents to indicate that the items are QA-1, even though they were not originally designed, procured, or constructed to meet QA-1 criteria. This ensures that activities affecting these items in the future will be performed using QA-1 programs and procedures, including the use of QA-1 replacement parts. Reclassification does not imply backfitting to meet all nuclear safety-related design criteria, procurement criteria, and material traceability.

The following equipment will be reclassified to QA-1:

1. CCW pumps (pressure boundary only).
2. CCW piping from the CCW pumps to the CCW crossover header and to the LPSW pumps suction.
3. CCW pump discharge valves, 1,2,3CCW-10 through 13, and specific portions of their control circuitry related to maintaining position on power loss and restoration.
4. CCW crossover valves 1CCW-40, 2CCW-41, 3CCW-42 and 3CCW-94.

Newly constructed structures which directly support equipment required to function to maintain the ECCW siphon to the LPSW pumps suction are QA-1 and seismically designed. Existing structures that support the aforementioned equipment are seismically qualified for the Maximum Hypothetical Earthquake (MHE) and are QA-4 such as the CCW intake structure and the turbine building. The Radwaste Facility trench is being upgraded to QA-4.

Oconee Nuclear Station plant structures are classified according to their function and the degree of integrity required to protect the public. Class 1 structures are those which prevent uncontrolled release of radioactivity and are designed to withstand all loadings (i.e., seismic and applicable tornado and missile loadings) without loss of function. Class 2 structures are those whose limited damage would not result in a release of radioactivity and would permit a controlled plant shutdown but could interrupt power generation. Class 2 structures qualified for the Class 1 seismic load (MHE) perform to the same standards as Class 1 structures except during events requiring resistance to tornado wind, tornado missiles, or turbine missiles. The design bases for normal operating conditions for all structural classifications are governed by the applicable building design codes. In accordance with the Oconee Quality Assurance classification, existing Class 1 structures are QA Condition 1, and existing Class 2 structures are QA Condition 4.

Within the scope of the OSW project, the Class 2/QA-4 designation for existing, interfacing structures dictates quality assurance of materials, maintenance and future modification and is commensurate with their functional requirements (i.e., shelter, support and seismic integrity) and current licensing bases. These structures are not reclassified to QA-1 because nuclear safety-related procurement criteria, material traceability, and erection control do not exist.

6.1 Physical Description

The CCW pumps are vertical, single-stage, centrifugal pumps. The suction bell of each pump extends below the maximum draw down of the intake canal. Each pump discharges into a horizontal section of 8 ft. diameter pipe which has its centerline at elevation 800.5 ft. Each 8 ft. section connects with the discharge piping from another pump to form an 11 ft. diameter condenser inlet header with its centerline at elevation 799 ft. Each condenser inlet header is above ground for about 100 feet before becoming embedded. The condenser inlet header continues underground until it emerges from the turbine building floor at an elevation of 775.5 ft. near the condenser inlet water boxes.

The CCW pump discharge valves are electric motor-operated valves located in the 8 ft. diameter pipe sections downstream of the CCW pumps. Each CCW pump discharge valve is open whenever its respective CCW pump is operating. Normal unit operation requires from two to four CCW pumps operating per unit for optimum power generation, depending upon Keowee lake temperature. Therefore, each unit normally has at least two CCW pump discharge valves open during unit operation.

If power to the pumps is lost, the open valves must remain open to provide a flow path for the ECCW siphon. The control function that maintains the valves open will be a safety-related function, and the controls will be reclassified to QA-1 accordingly. The controls will provide isolation between the QA-1 and non-QA portions so that a failure in the non-QA controls cannot prevent the successful performance of the safety-related function.

Although CCW pump and valve power sources are routed from a Class 1E power source, they do not meet the Class 1E requirements for routing and cable material. The cabling routes are, however, isolated from the Class 1E source by a breaker and fuse which meet Class 1E requirements.

Since the valves are not required to change position after a LOCA/LOOP, the valve actuator is not QA-1, except that the gear box will be QA-1 to ensure that the valve will stay open if already open or will stay closed if already closed. Only the portions of each valve's circuit that performs the function of maintaining valve position is being upgraded to QA-1.

The CCW crossover valves are manual valves located in the CCW crossover header in pits in the turbine building basement floor. The valves are normally open and are not required to change position during an accident. They can be closed to isolate a single unit's condenser inlet piping from the CCW crossover header to perform maintenance or testing. The LPSW pumps take suction from the CCW crossover header. Administrative controls ensure that suction to the LPSW pumps will be adequate for normal conditions and for postulated emergencies whenever any CCW crossover valve is closed.

6.2 Design Criteria

The equipment mentioned above will be upgraded as necessary to meet seismic qualification criteria. The CCW pumps and the CCW piping from the CCW pumps to the LPSW pumps are capable of withstanding the Maximum Hypothetical Earthquake (MHE). The large diameter, embedded CCW piping was designed as a Class 2 structure that meets Class 1 structure seismic (MHE) loads. The valves located in this section of piping (1,2,3CCW-10 through -13, 1CCW-40, 2CCW-41, 3CCW-42, and 3CCW-94) have been reviewed to verify that they are capable of meeting seismic qualification criteria. The controls for the CCW pump discharge valves have been evaluated, and they meet the appropriate seismic qualification criteria.

Oconee's design basis for mitigation of a tornado event takes credit for the water trapped in the embedded CCW piping as a source of water used by the Auxiliary Service Water (ASW) pump. The embedded CCW piping is protected from damage due to a tornado. The non-embedded condenser inlet header piping, the CCW pumps, and the CCW pump discharge valves are not designed for tornado protection, because no credit is taken for water in the piping above elevation 791 ft. for mitigating a tornado event.

All systems and components required for the ECCW siphon supply to LPSW pumps are designed so that no single active failure would prevent the performance of the safety-related function required to mitigate a LOCA/LOOP. The siphon pressure boundary does not perform an active function.

A portion of the power and control cables for the CCW pump discharge valves' logic circuit maintains valve position upon loss of power and subsequent restoration of power. These portions were not required to meet the separation criteria for mutually redundant safety cables as described in UFSAR Section 8.3.1.4.6.2. Mutual redundancy is not applicable to this circuitry because the circuitry monitors all CCW pumps, each of the four individual discharge valves, and all four CCW pumps breakers. The combination of CCW pumps, CCW pump valve positions, and whether power has been lost and restored is then configured into a common logic circuit. This logic circuit interfaces with and maintains all four CCW pump discharge valves in a known position whenever power is lost and then restored. A single failure review of this logic circuit was performed. As a result, it was determined that there is not a credible failure which could cause the CCW pump discharge valves to change position after a loss of power and subsequent power restoration. Additionally, interlocked armor cables are used in this application. Based on documented Duke testing of fault propagation between armored cables of this type, Duke has concluded that faults in one of these cables cannot affect other adjacent cables.

The SSCs which were reclassified are located in mild environments, so environmental qualification requirements do not apply.

The Security Plan is not affected by the reclassification of these CCW SSCs to QA-1.

An engineering evaluation has been performed to ensure that UFSAR Section 3.7.3.9, which addresses seismic boundary requirements, will be met. As a result of this evaluation, certain portions of piping are being seismically upgraded as necessary to meet UFSAR Section 3.7.3.9.

The CCW System conforms to the turbine missile design requirements of UFSAR Section 3.1.40. Specifically, the CCW System is shielded for protection from low trajectory turbine missiles. In addition, the CCW System function to support LPSW System operability is not impacted by a high-trajectory turbine missile due to either equipment separation and redundancy, or evaluation as a low probability target.

Oconee's licensing basis for fire protection was not affected by the reclassification of equipment necessary to support LPSW System operability to QA-1. Design features needed to mitigate a fire are not required to be QA-1.

PART III: DESCRIPTION OF PROPOSED SPECIFICATION

7.0 Operability Requirements for ECCW Siphon Headers

The LPSW System provides a heat sink for the removal of process and operating heat from safety related components during an accident or transient. During normal operation and normal shutdown, the LPSW System also provides this function for various safety related components. The LPSW System cannot perform these functions, in the event of a loss of offsite power, if the ECCW System is not available to support LPSW System operability. Therefore, the applicability of this specification is any time LPSW System operability is required.

Due to the piping configuration, each 11 ft. CCW inlet header on a given Oconee unit is independent of the other header for the purposes of siphoning water from the intake canal to the CCW crossover header. The headers combine under the Turbine Building basement, and there are no active components after they combine. Also, if one CCW inlet header was incapable of supplying siphon flow, it would not prevent the other CCW inlet header on that Oconee unit from supplying siphon flow. Therefore, each CCW inlet header may be considered to be an independent "ECCW siphon header".

The ECCW siphon supply to LPSW must be capable of withstanding a single active failure. Failure of active components in the ESV and/or SSW Systems for a given ECCW siphon header could cause siphon flow in a header to eventually fail due to air accumulation. Therefore, two ECCW siphon headers are required to be operable for the Units 1&2 LPSW System and two different ECCW siphon headers are required to be operable for the Unit 3 LPSW System. By requiring two ECCW siphon headers to be operable, no single active failure will cause a loss of function for the ECCW supply to the LPSW pumps.

Based on analysis of the net positive suction head (NPSH) for the LPSW pumps, the Unit 1&2 LPSW pumps cannot be supplied adequate suction from a Unit 3 siphon header, when worst case assumptions are applied. Therefore, the siphon headers for the Unit 1&2 LPSW pumps must come from either Unit 1 or Unit 2. Similarly, the Unit 3 LPSW pumps cannot be supplied adequate NPSH from a Unit 1 siphon header. Therefore, the Unit 3 LPSW pumps can be supplied by the siphon headers from Unit 2 or Unit 3. The siphon header for Unit 2 may not fulfill the requirements for both LPSW Systems simultaneously. Under certain conditions of low lake level and high LPSW System demand, a Unit 2 ECCW siphon header is not capable of simultaneously providing adequate NPSH to both the Unit 1&2 LPSW System and the Unit 3 LPSW System.

For any ECCW siphon header to be considered operable, an ESV pump must be operating and aligned to the header to ensure that the CCW piping remains primed during normal operation. This priming requirement maintains the initial conditions used during testing and assumed in accident analyses. Failure of an ESV pump during normal operation would not immediately result in significant air in the CCW piping. Depending on the lake level and the number of operating CCW pumps, the pressure and/or flow in the CCW piping may be adequate to prevent any accumulation of air in the CCW piping, even without operation of an ESV pump. Regardless, no credit is taken for this in the proposed Technical Specification. For conservatism and for simplicity, an ECCW siphon header will be considered inoperable if its assigned/aligned ESV pump is not operating. In addition, for an ECCW siphon header to be operable, at least one CCW pump discharge valve shall be open on that ECCW siphon header.

The ESV pump must be capable of restarting upon restoration of emergency power after a loss of off-site power (LOOP). This ensures that the siphon supply to LPSW can be maintained indefinitely. An ESV pump will be considered inoperable if it is incapable of automatically restarting after a LOOP.

During siphon operation, the CCW piping at the highest elevation near the CCW pump discharge will be under a vacuum. This vacuum creates the possibility for air to leak into the CCW piping. Also, any air dissolved in the lake water may be degassed under vacuum conditions. Testing in the past indicates that the CCW pumps shaft seals are the most likely source of significant air in-leakage. Testing also indicates that degassing rates are relatively insignificant.

To operate any ESV pump, it must have a continuous supply of seal water from the Siphon Seal Water (SSW) System. The safety function of the SSW System is to supply seal water to the ESV pumps, but the SSW System also supplies seal/cooling water to the CCW pumps. SSW is fed from the LPSW System. The SSW System consists of two headers. One SSW header is sufficient to provide sealing flow to ESV pumps and CCW pumps. Filtration is provided in each SSW header to protect the ESV and CCW pump seals from particulates.

The SSW System contains nine solenoid valves that are active to close upon loss of power and re-open upon power restoration. These valves isolate and restore SSW to an ESV pump that has lost and then regained power, respectively. Thus, these solenoid valves must be operable to ensure that SSW flow is provided to their respective ESV pumps.

Normal operation of the SSW System to support normal operation of the ESV pumps will ensure that SSW is aligned and ready to perform its function after a LOOP. Therefore, no explicit operability requirements are established for the SSW System. If the SSW System is incapable of performing its function, the ESV pumps will be inoperable and the Technical Specifications will require appropriate actions to be taken.

The proposed Technical Specifications will establish the required actions and time limits if two ECCW siphon headers are not operable for either LPSW System. The required actions and time limits are identical to the required actions and time limits in the existing Technical Specification 3.3.7 for the LPSW pumps. This is appropriate and conservative since the function of the ECCW System is to support the operability of the LPSW pumps.

8.0 Surveillance Requirements

Surveillance testing for the ECCW, ESV, and SSW systems is conducted by performing tests listed in Table 4.1-2. The following is a description of the Technical Specification required tests and the post-modification testing:

8.1 Emergency Condenser Circulating Water System Test

The Emergency Condenser Circulating Water System Test will be conducted on a refueling outage basis. This test will verify that the ECCW system is capable of supplying siphon flow to the CCW crossover header during design basis conditions. Item #7 in Table 4.1-2 addresses this test.

The system test will verify that the air accumulation in the ECCW siphon headers is within the capabilities of the ESV System design. During siphon operation, air can be introduced into the ECCW siphon header by two mechanisms: air in-leakage and degassing. Air in-leakage is primarily a function of lake level-induced vacuum and effective leakage area. Degassing is primarily a function of lake level, ECCW flow rate and water temperature. Past testing experience indicates that air in-leakage is the dominant factor. This test will establish a siphon flow condition with the ESV System isolated from the ECCW siphon header. In addition, SSW sealing flow to the CCW pumps will be isolated. As air accumulates in the ECCW siphon header, the water level in the pipe will be reduced. Water level reduction is a function of the amount of air accumulation. This water level reduction will be recorded over a specified period of time and compared to the test acceptance criteria. The basis of the acceptance criteria will be to verify that the air accumulation, extrapolated to design basis conditions of lake level, flow rate, and lake water temperature, is within the ESV System design capacity.

For Unit 3, the LPSW system will take suction from the Unit 3 siphon during this test. To avoid potential effects on an operating unit, the Units 1&2 LPSW system will not be required to take suction from a siphon during this periodic test. This is acceptable, because the flowpath from the CCW crossover piping to the LPSW pumps is demonstrated during normal operation. A loss of suction to the LPSW pumps during the periodic siphon flow testing would be unlikely. However, it is prudent from a plant safety perspective to minimize any potential for affecting the suction supply to the LPSW pumps while they are being required to support an operating unit. In addition, the one-time post-modification testing will include operation of the Unit 1&2 LPSW pumps while taking suction from the siphon.

During this test, the CCW pump discharge valves will be tested to ensure that they will remain open after power is lost and later restored.

8.2 Essential Siphon Vacuum System Functional Test

The Essential Siphon Vacuum System Functional Test will be performed on a quarterly basis to ensure continued operability of the ESV system. This includes a functional test to ensure the ESV float valves are capable of opening, a test of the ESV pumps performance, a test of ESV Pumps to ensure that they can be automatically restarted upon restoration of emergency power after a loss of off-site power, and a test of active valves which support operability of the ESV System.

Although the ASME code for inservice testing of QA-1 pumps does not specifically address vacuum pumps, manufacturer's test methods coupled with the ASME standard (OM-6) requirements for testing methodology will be used as a guide for quarterly vacuum pump testing. As a minimum, this test will record pressure (vacuum), flow rate, and vibration at a baseline point on the performance curve to evaluate for potential pump degradation.

The ESV System float valves will be tested per In-Service Testing (IST) requirements to verify these valves can cycle properly. These valves will be required to cycle during a LOOP event.

The ESV pumps will be tested to demonstrate the capability of the ESV pumps to automatically start upon restoration of emergency power after a simulated loss of off-site power. This test will also include a test of the time delay. In addition, the test will verify operability of the SSW flow to ESV pump solenoid valve and the ESV pump minimum flow suction solenoid valve.

The ESV System functional test is added as Item #13 in Table 4.1-2.

Optimization of system availability was considered when determining the periodicity of this test. Several factors were considered such as the ASME code recommendation that the testing be performed on a quarterly basis and the low likelihood that a limiting condition for operation (LCO) would need to be entered to perform the test. Normally, an LCO would only need to be entered if a Unit was in an outage with that Unit's CCW System or ESV System out of service. It was concluded that this situation can usually be avoided by appropriate scheduling of the quarterly testing.

8.3 Post Modification Testing

Detailed post modification testing will be developed to verify that the ESV System and ECCW System can perform their intended safety-related functions. As a minimum, a post modification test will be performed equivalent to each of the equipment and system tests described above.

After the system and equipment tests described above have been successfully completed, an integrated test of the ESV System will be performed to determine its operability. This test will establish siphon flow conditions with the ESV System operating. Air will be introduced into the ECCW siphon header to demonstrate that the ESV System can remove this air. Based on successfully completing this test and the system and equipment testing previously described, the ESV System will be declared operable. The LPSW pumps will not take suction from the siphon until the ESV System is declared operable.

After the ESV System is declared operable on each unit, a one-time endurance test will be performed. During this test, siphon flow conditions will be established with the LPSW pumps taking suction from the siphon. This test will demonstrate that the ECCW System can maintain siphon flow to the LPSW pumps for an extended period of time.

9.0 Other Considerations

After a LOOP or LOCA/LOOP, operators may restart CCW pumps per abnormal procedure (AP) guidance. However, CCW pump restart within 1.5 hours of a LOOP event is not required.

The ESV System will keep the CCW inlet piping primed during normal operation. Therefore, the current requirements in Selected Licensee Commitments (SLC) Manual Section 16.9.7 will be changed. This change will eliminate the requirements to operate a minimum number of CCW pumps during normal operation to keep the piping primed. SLC 16.9.7 will continue to maintain the lake level requirements which are necessary to support operability of the LPSW System. Lake level requirements are maintained in SLC 16.9.7 since these numbers are subject to change due to modifications, and changes in operating practices, which may impact LPSW System demand.

Upon implementation of the new ECCW Technical Specification on each unit, the design basis requirement to restart CCW pumps within 1.5 hours after a LOOP will no longer be necessary. Therefore, the existing requirements associated with the High Pressure Service Water (HPSW) pumps provided in SLC Manual Section 16.9.8 will be eliminated when the new Technical Specifications are implemented on each unit. Upon completion of the ESV and SSW Systems, the revised design basis will eliminate reliance on the HPSW System and CCW pump restart.

10.0 Implementation

As described in a meeting with the NRC staff on March 20, 1997, Duke committed to submit this Technical Specification amendment by September, 1997, to support operability of Unit 2's upgraded Service Water System following the Unit 2 end-of-cycle 16 (U2EOC16) refueling outage. Therefore, approval of this proposed amendment is requested by no later than February 1, 1998, to support integrated testing and startup of Unit 2 from the U2EOC16 refueling outage.

The Specification is also structured so that it can be applied on an as-completed basis to the upgraded Service Water Systems of Units 1 and 3. Units 1 and 3 will be operated under the existing Selected Licensee Commitments until completion of the upgrades on their Service Water Systems. Duke expects to complete upgrades on the Service Water Systems on Units 1 and 3 in the U1EOC18 and U3EOC17 refueling outages, scheduled for early 1999, and late 1998, respectively.

A note has been included in the Bases of Specification 3.19 to describe how this Specification will be phased in on Units 1 and 3 as their Service Water Systems are upgraded.

11.0 10CFR50.36 Justification for Inclusion into Technical Specifications

The four criteria from 10CFR50.36 were reviewed to determine if a Technical Specification was necessary to address the equipment installed by the Oconee Service Water project. If any criterion is answered "Yes", then a Technical Specification should be implemented. It was determined that a Technical Specification is necessary based on Criterion 3 of 10CFR50.36 as described below:

3) Is the equipment added by the Oconee Service Water project a part of the primary success path and which functions or actuates to mitigate a Design Basis Accident or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier?

   Yes.

   The equipment added by the Oconee Service Water project is part of the primary success path for mitigation of a LOCA/LOOP because the equipment being modified or added is required to function to provide suction to the Low Pressure Service Water (LPSW) System. Portions of the LPSW System perform the safety-related function of removing heat from containment during a LOCA/LOOP event.

   Thus, the equipment added by the Oconee Service Water project functions to mitigate a design basis accident or transient that presents a challenge to the integrity of a fission product barrier.

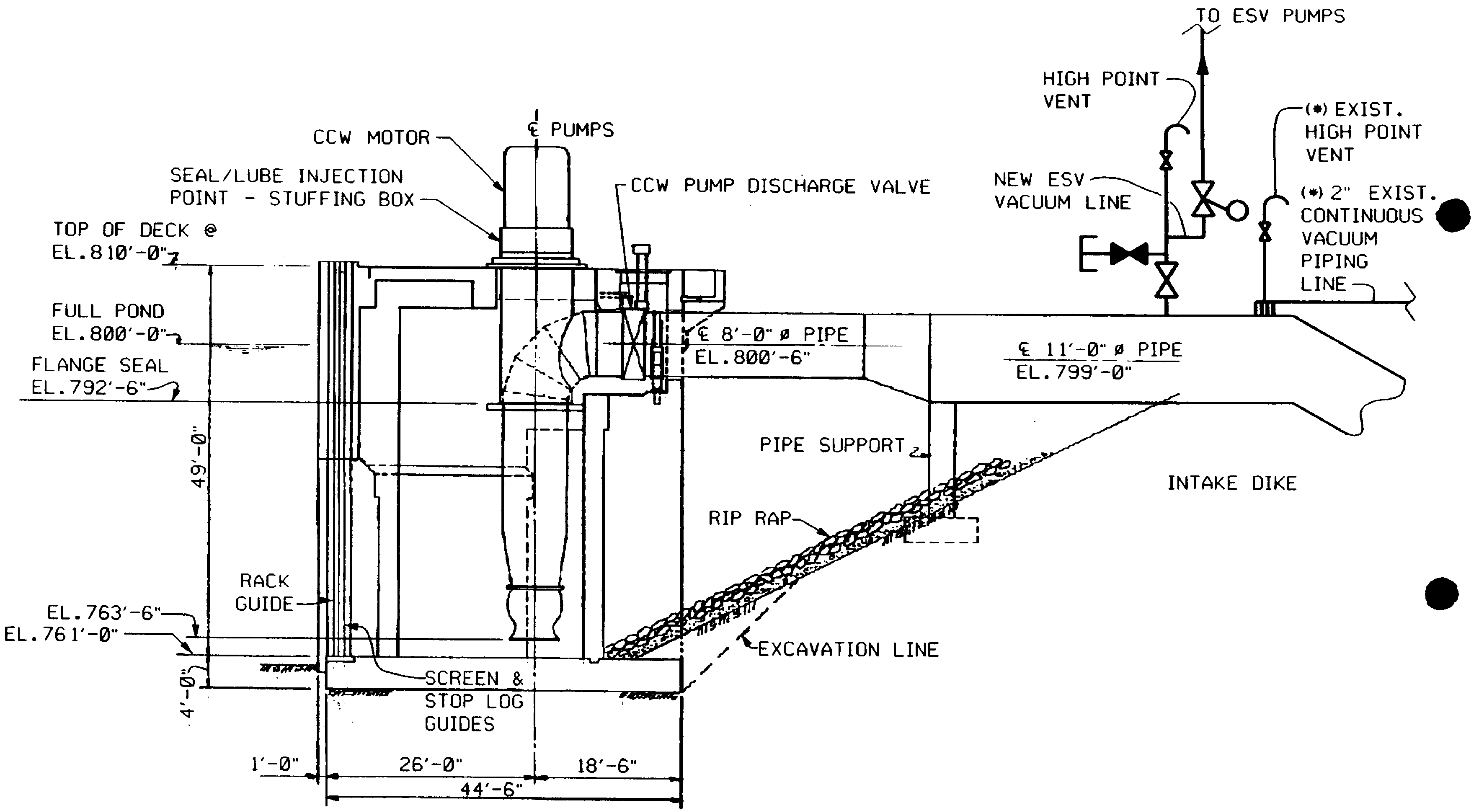
   Therefore, a Technical Specification is required to address the equipment added by the Oconee Service Water project.

12.0 Affected UFSAR Sections

The following table provides a summary of expected UFSAR changes for the Service Water Project:

UFSAR Section	Title/Description of Change
2.4.2.2	Flood design consideration: trench level is below the intake dike height
3.1.1	Add new SSCs from OSW Project to QA-1 list.
3.2.1.1.2	Add new/reclassified Class 2 structures to Class 2 structures list.
3.2.2	System Quality Group Classification: Add new equipment and portions of systems that can withstand a maximum hypothetical earthquake (MHE).
3.4	Flood design consideration: trench level is below the intake dike height
3.7.3.8	SSW and ESV pipe is a QA-1, seismically designed, buried line.
3.8.5, 3.8.5.1, 3.8.5.2	List new/reclassified Class 2 structures
Table 3-2	System component classification: Add several new components to this list.
Table 3-68	Add ESV Pump and Motor Add Seismic Qualification Reference
7.5.2	Display Instrumentation: Add information for ESV tank vacuum instrumentation.
8.3.1.5.1	Power cable derating and installation changes to additional ICEA P-46-426 recommendations.
8.3.1.5.2	Power cable derating and installation changes to additional ICEA P-46-426 recommendations.
Table 8-1	Loads to be supplied from Emergency Power Sources: Delete CCW pumps; Add ESV pumps, heat tracing, and instrumentation
9.2.2	(and related subsections) Cooling Water Systems: Several changes to describe the revised design basis for CCW, LPSW, and HPSW Systems; add new descriptions of the new ESV and SSW Systems.
9.5.1.4.3	Cable and pipe will be in same trench in appropriately evaluated cases.
9.6.4.6.1	Safe Shutdown Systems: Add ESV and SSW Systems.
Table 9-4	Cooling Water Systems component data: Add data for ESV pumps
Figure 9-9	CCW System Summary Flow Diagram: Revise to show ESV System connections and to delete CCW inlet mid-point vents.
Figure 9-10	Show SSW changes on flow diagram.
Figure 9-11	Show SSW changes on flow diagram.

Figure 9-42	New figure for ESV System
Figure 9-43	New figure for SSW System
16.9.7	Selected Licensee Commitment for Keowee Lake Level: Delete requirements associated with siphon sources, minimum number of CCW pumps operating, and gravity flow.
16.9.8	Selected Licensee Commitment for HPSW Pump Requirements to Support LPSW: Delete entire section since LPSW no longer dependent on HPSW.



(*) TO BE DELETED

FIGURE 1 - CCW INTAKE AND FIRST SIPHON

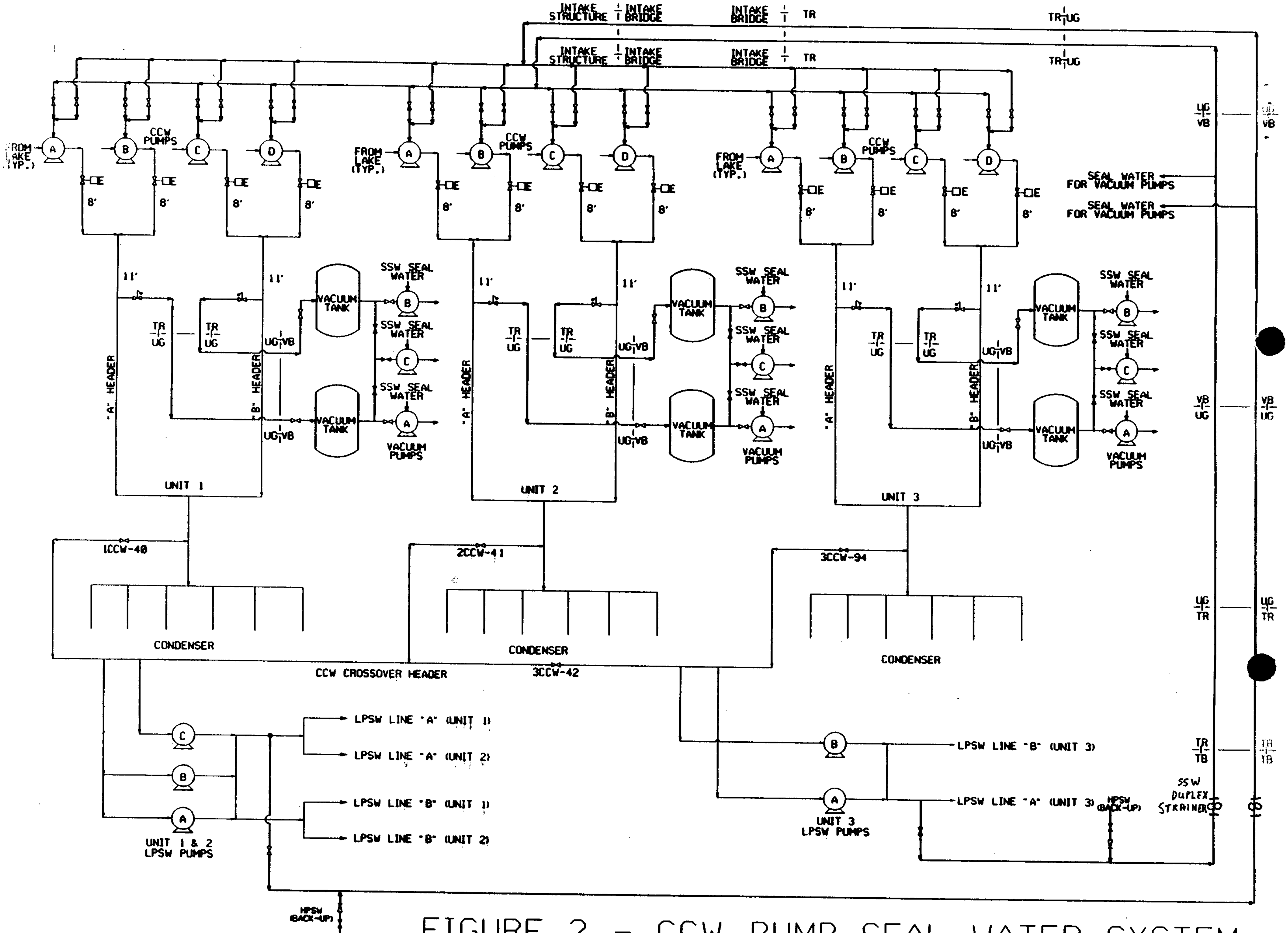


FIGURE 2 - CCW PUMP SEAL WATER SYSTEM

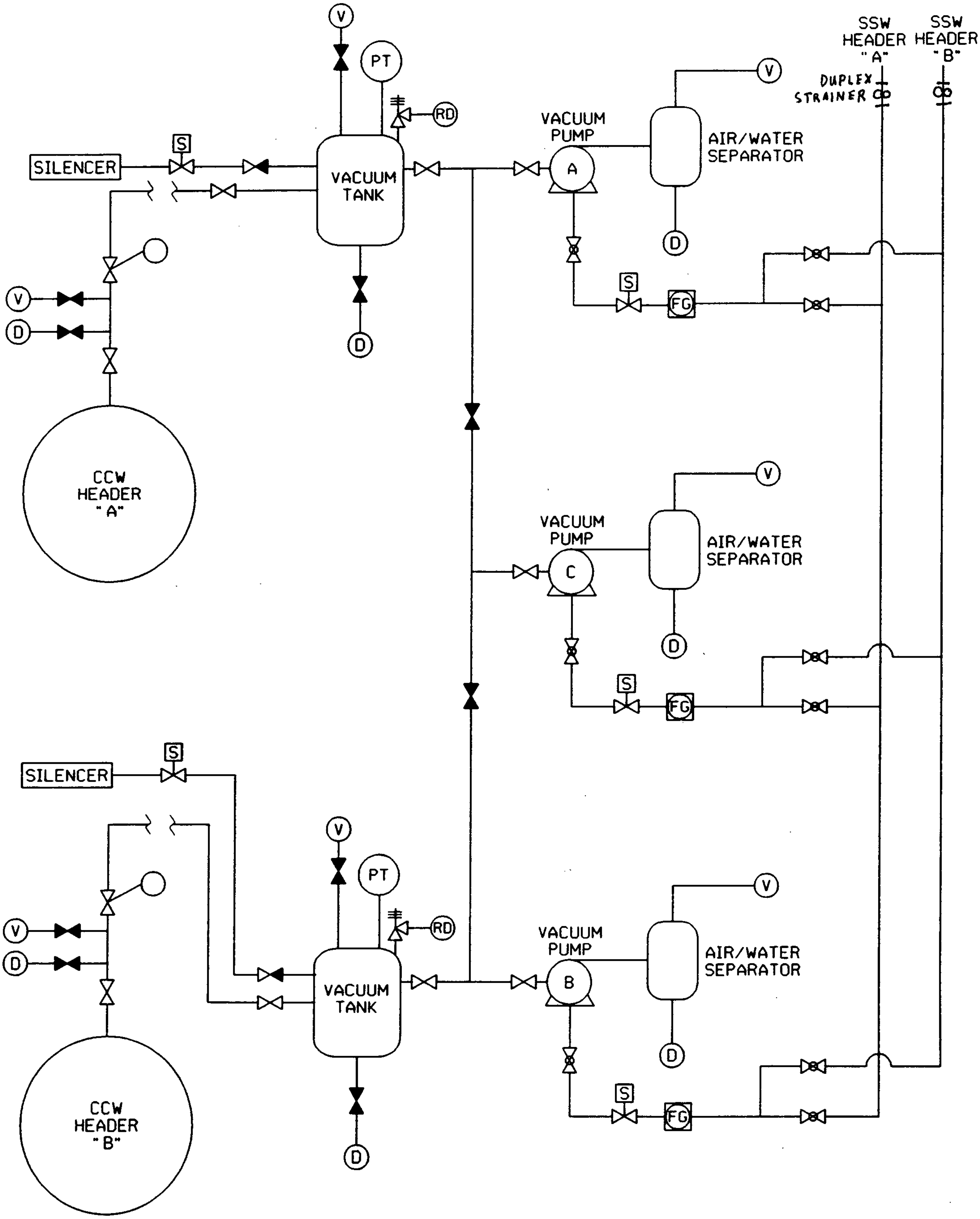


FIGURE 3 - ESSENTIAL SIPHON VACUUM SYSTEM

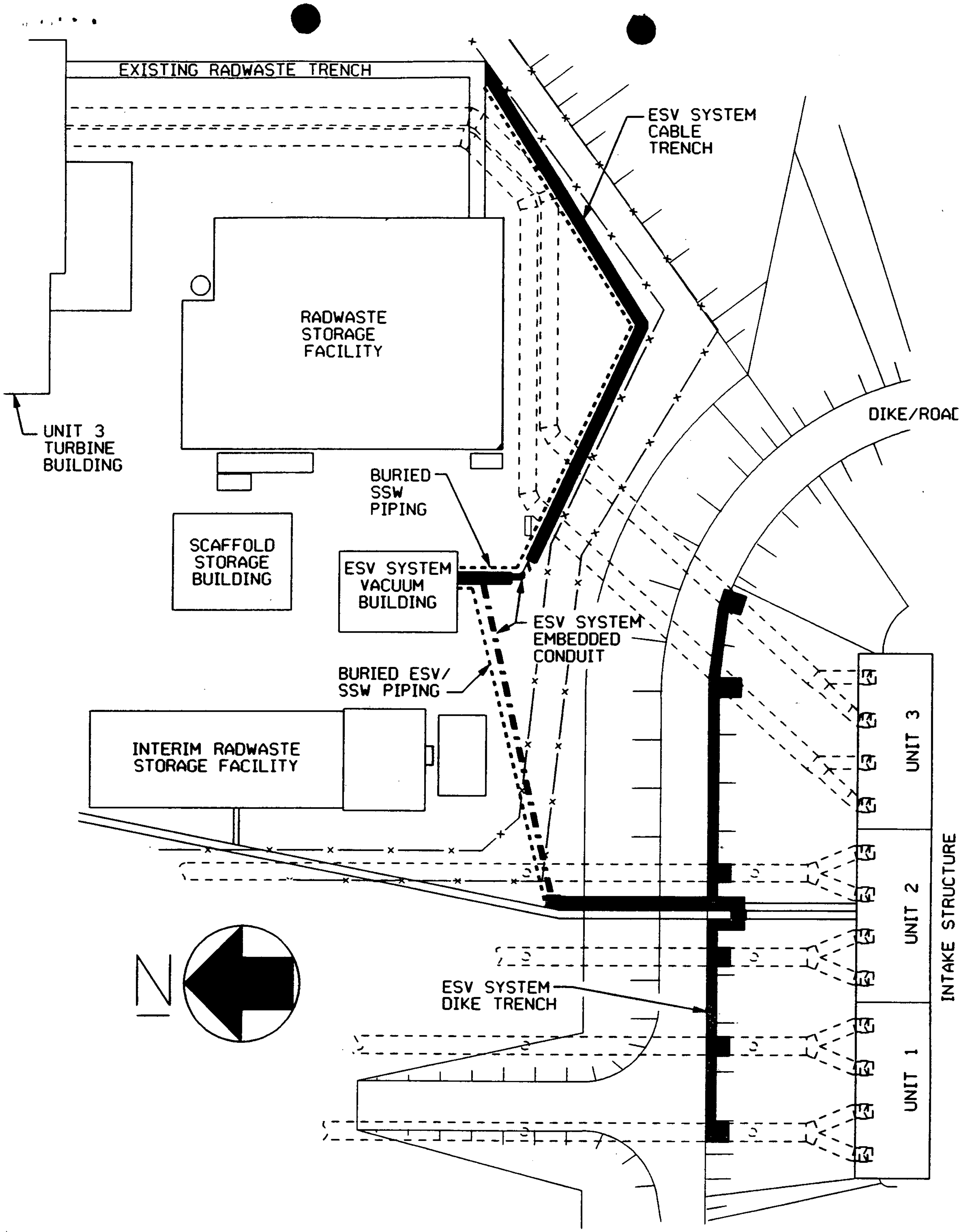


FIGURE 4 - PARTIAL SITE PLAN

ATTACHMENT 4

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by NRC regulations in 10CFR50.92. This ensures that operation of the facility in accordance with the proposed amendment will not:

A. Involve a significant increase in the probability or consequences of an accident previously evaluated?

NO.

This Technical Specification change does not create any conditions or events which lead to accidents previously evaluated in the UFSAR. The new ECCW System Technical Specification 3.19, along with the new ECCW Surveillance requirements specified in Technical Specification Table 4.1-2, are conservative in nature. No existing Technical Specification requirements are being deleted with this revision. Surveillance and operability requirements are being added for the upgraded ECCW System.

The ECCW System is only required following the occurrence of loss of offsite power (LOOP) events. The most limiting of these LOOP events is the loss of coolant accident concurrent with the LOOP (LOCA/LOOP). Therefore, the ECCW System is not considered to be an accident initiator. As a result, the proposed new ECCW Technical Specification requirements will not result in any increase in the probability of any design basis accidents or events evaluated in the UFSAR.

The credit for restarting a CCW pump within 1.5 hours following a LOOP, to ensure suction to LPSW is maintained, is being replaced by credit for maintaining the ECCW siphon using the new siphon support systems (ESV System and SSW System) in conjunction with the upgraded ECCW System. Therefore, obsolete requirements specified in Selected Licensee Commitments (SLCs) 16.9.7 and 16.9.8 will be revised or deleted accordingly. Replacement of the CCW pump restart during a LOOP with the ability to maintain ECCW siphon flow will not create any conditions or events which lead to accidents previously evaluated in the UFSAR.

The modifications to upgrade the ECCW System were performed to improve the reliability of the ECCW System. The proposed new ECCW Technical Specification provides additional surveillance and operability requirements to ensure that the upgraded ECCW System will function reliably during the design basis events which require its operation. Therefore, these proposed new Technical Specification requirements will not increase the consequences of any accidents previously evaluated in the UFSAR.

B. Create the possibility of a new or different kind of accident from the accident previously evaluated?

NO.

No accidents different than those already evaluated in the UFSAR are postulated. The upgraded ECCW System will more reliably perform its design function of supplying water to the suction of the Low Pressure Service Water (LPSW) System as evaluated in the UFSAR. The new Technical Specification requirements will increase the reliability of the upgraded ECCW System. In addition, the ECCW System is not an accident initiator since it is used following certain design basis events such as a LOCA/LOOP.

C. Involve a significant reduction in a margin of safety?

NO.

The proposed Technical Specifications address equipment which will function in certain design basis events, such as a LOCA/LOOP, to ensure a reliable water supply to the LPSW System. The LPSW System must function to remove decay heat from primary systems and the reactor building during a LOCA/LOOP. The proposed Technical Specifications addressing the upgraded ECCW System will further enhance the reliability of the ECCW System and will result in greater assurance that the LPSW System can perform its safety functions. No plant safety limits, set points, or design parameters are adversely affected. The fuel, fuel cladding, and Reactor Coolant System are not impacted. The proposed Technical Specifications provide additional, conservative, operational requirements beyond the current Technical Specifications which address the ECCW System.

Duke has concluded based on this information that there are no significant hazards considerations involved in this amendment request.

ATTACHMENT 5

ENVIRONMENTAL IMPACT ANALYSIS

Pursuant to 10CFR51.22 (b), an evaluation of the proposed amendments has been performed to determine whether or not it meets the criteria for categorical exclusion set forth in 10CFR51.22 (c) 9 of the regulations. The proposed amendment does not involve:

1) A significant hazards consideration.

This conclusion is supported by the No Significant Hazards Consideration Evaluation which is contained in Attachment 4.

2) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

This amendment will not significantly change the types or amounts of any effluents that may be released offsite.

3) A significant increase in the individual or cumulative occupational radiation exposure.

This amendment will not significantly increase the individual or cumulative occupation radiation exposure.

In summary, this amendment request meets the criteria set forth in 10CFR51.22 (c) 9 of the regulations for categorical exclusion from an environmental impact statement.