ABB

ASEA BROWN BOVERI

January 28, 1993
LD-93-012

Docket 52-002

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

Subject: System 80+ Draft ITAAC Submittal

Dear Sirs:

This letter transmits draft System 80+ Certified Design Descriptions and associated ITAAC (Inspections, Tests, Analyses and Acceptance Criteria) for selected systems. A larger package comprising the remainder of the initial submittal will be transmitted on or about February 1, 1993.

The packages for each system contains the following items, as applicable:

- Certified Design Description
  - Text
  - System Diagram
- ITAAC Table
  - Design Commitment
  - Inspection, Test or Analysis
  - Acceptance Criteria
- Supplementary Material
  - Relevant Safety Analyses Assumptions
  - Relevant PRA Assumptions
  - CESSAR-DC Chapter 14 Test Description References
  - Amplifying Information Including CESSAR-DC Section References

The enclosed Certified Design Descriptions and ITAAC reflect guidance developed in industry/NRC meetings during 1992. Future submittals will update these packages to incorporate the approaches for addressing programmatic issues developed during the January 1993 industry/NRC review of the lead plant ITAAC and to reflect changes resulting from the industry review of System 80+ ITAAC which will be conducted during the period February 1st through 12th.

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ABB-CE has attempted to maintain consistent wording between the ITAAC design commitments and the Certified Design Description. Further, similar phraseology has been applied in various ITAAC when addressing the same issue (e.g. configuration checks, electrical power sources, etc.). Slight differences in wording should not be interpreted as an intent to convey different meanings.

Should you have questions on the enclosed material, please contact me or Mr. John Rec (203-285-2861) or Mr. George Hess (203-285-5218).

Very truly yours,

COMBUSTION ENGINEERING, INC.

C. B. Brinkman

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Acting Director
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1.3.6 CORE SUPPORT AND REACTOR VESSEL INTERNAL STRUCTURES

Design Description

The Reactor Vessel Core Support Structures are safety related systems consisting of the Core Support Barrel assembly and Upper Guide Structure assemblies. The core support structures support the fuel assemblies and provide a flow path within the Reactor Pressure Vessel.

Reactor Vessel Internal Structures are all structures within the reactor pressure vessel except the Core Support Structures, fuel, control element assemblies and instrumentation.

The Core Support Barrel (CSB) assembly is suspended from the reactor vessel flange. The CSB assembly provides support and location positioning for the fuel assembly lower end fittings. The CSB assembly contains internal structures that provide an instrumentation guide path from the lower vessel and hydraulic flow paths through the vessel from the inlet nozzles to the upper end of the fuel assemblies.

The Upper Guide Structure (UGS) assembly is supported from the CSB upper flange and extends into the CSB assembly to engage the top of the fuel assemblies. The UGS assembly provides an insertion path for the control element assemblies. The UGS assembly contains internal structures which provide a guide path and lateral support for the upper portion of the control element assemblies and extension shafts in the reactor vessel upper plenum region. The UGS assembly also provides guide paths for heated junction thermocouple assemblies.

A general conceptual illustration of both structures is shown in Figure 1.3.6-1.

The Core Support Barrel and Upper Guide Structure assemblies are fabricated in accordance with ASME Code Class NF requirements and the Seismic Category I classification.

The Reactor Vessel Core support structures and internal structures withstand the effects of flow induced vibration.

Inspections, Tests, Analyses and Acceptance Criteria

Table 1.3.6-1 specifies the inspections, tests, analyses and associated acceptance criteria for the Core Support and Reactor Vessel Internal Structures.

TABLE 1.3.6-1

CORE SUPPORT & REACTOR VESSEL INTERNAL STRUCTURES AND CONTROL ELEMENT DRIVE MECHANISMS
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration of the Reactor Vessel Core Support Structures is shown in Figure 1.3.6-1	1. Inspection of the as-built Reactor Vessel Core Support Structures will be performed.	1. The as-built configuration of the Reactor Vessel Core Support Structures is in accordance with Figure 1.3.6-1 for the components and equipment shown.
2. The Reactor Vessel Core Support Structures and internal structures withstand the effects of flow induced vibration.	2. Tests will be performed to subject the Reactor Vessel Core Support Structure to flow induced vibration. Visual inspection will be performed on the Reactor Vessel Core Support Structure.	2. The reactor vessel core support structures have no visible signs of damage, loose parts, or excessive wear.

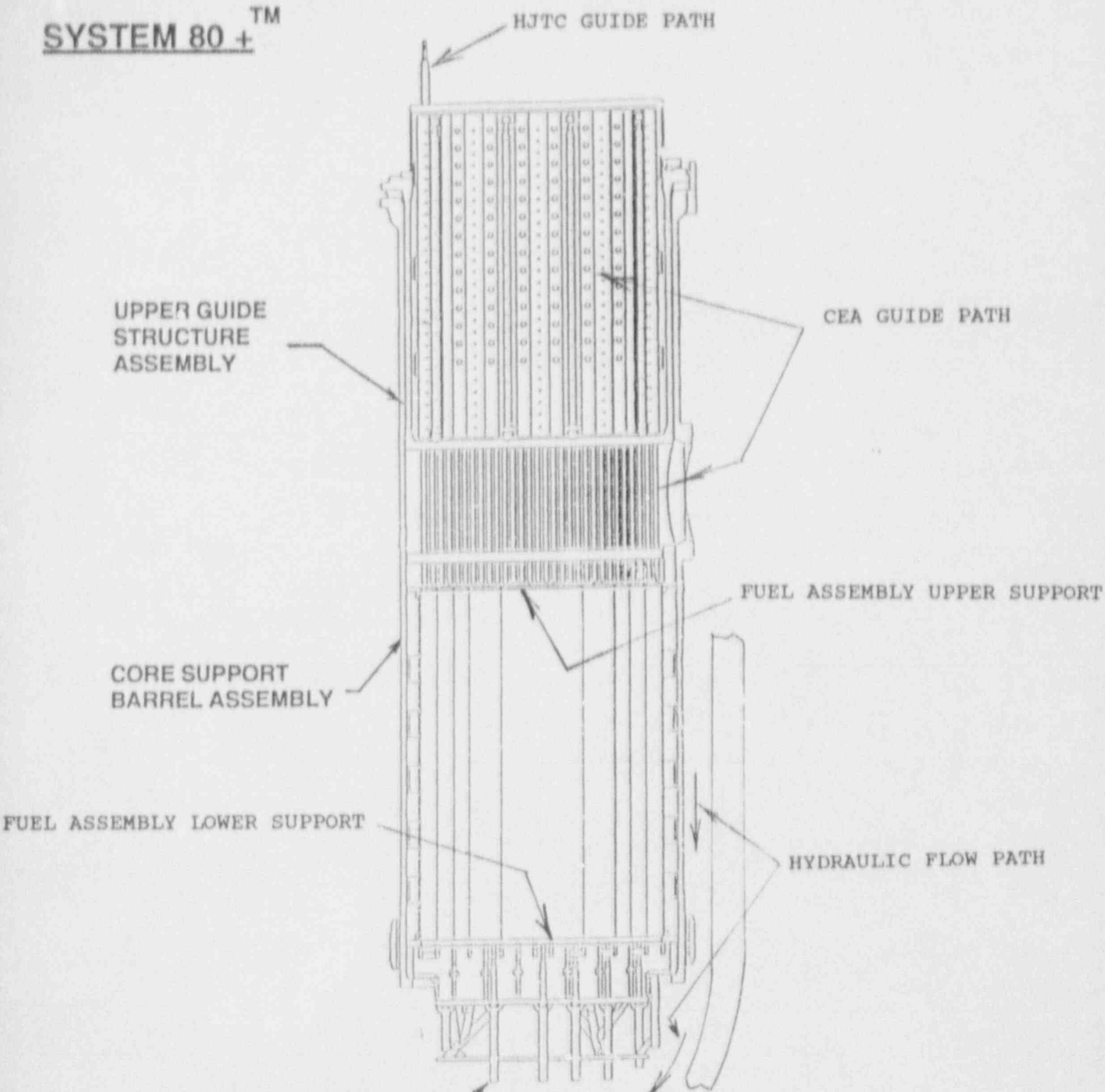


FIGURE 1.3.6-1
REACTOR VESSEL CORE SUPPORT STRUCTURES

1.3.6 CORE SUPPORT AND REACTOR VESSEL INTERNAL STRUCTURES ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   The supporting material would include a description of the CVAP Program which demonstrates compliance with Regulatory Guide 1.20 for a non-prototype Category I program.

   See CESSAR-DC Sections 3.9.2.4 and 3.9.3

2. Relationship of CS and RVIS ITAAC to the Safety Analysis

   None

3. Relationship of CS and RVIS ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to CS and RVIS ITAAC

   None

1.4.1 NUCLEAR DESIGN

Design Description

The nuclear design of the System 80+ reactor core is not within the scope of the certified design. The specific nuclear design that will be utilized in a facility which has referenced the System 80+ design will comply with nuclear design criteria as specified in 10 CFR 50.

The nuclear design of the reactor core for a referenced System 80+ plant meets the following criteria:

In the power operating range, the net prompt reactivity feedback (fuel temperature coefficient, moderator temperature coefficient and moderator pressure coefficient) is negative.

The values of the fuel temperature, moderator temperature and moderator pressure coefficients of reactivity are consistent with analyses that predict acceptable consequences for postulated accidents and anticipated operational occurrences.

The burnable poison loadings and reactivity worths are included in the plant core analyses.

The reactor core and associated coolant, control and protection systems ensure that xenon-induced power distribution oscillations do not cause the specified acceptable fuel design limits (SAFDLs) to be exceeded.

The potential amount and rate of reactivity insertion under normal operation and postulated reactivity accidents do not result in violation of the specified acceptable fuel design limits (SAFDLs), damage to the reactor coolant pressure boundary (RCPB), or disruption of the core or other reactor internals which impairs the effectiveness of safety injection.

The core power distribution and power peaking allow full power operation for the design cycle length and do not result in violation of the specified fuel design limits (SAFDLs) for postulated accidents.

The amount of reactivity available from insertion of withdrawn CEAs meets the excess CEA worth requirement for power operating conditions.

1.4.1 NUCLEAR DESIGN ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   CESSAR-DC Section 4.3

2. Relationship of NUCLEAR DESIGN ITAAC to the Safety Analysis

   No ITAAC are provided because the nuclear design is not within the scope of the certified design.

3. Relationship of NUCLEAR DESIGN ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to NUCLEAR DESIGN ITAAC

   None applicable before fuel load

1.4.2 FUEL SYSTEM

Design Description

The fuel system for System 80+ is not within the scope of the certified design. The specific fuel system that will be utilized in a facility which has referenced the System 80+ design will comply with fuel system design criteria as specified in 10 CFR 50.

The fuel system includes fuel assemblies, fuel assembly components, fuel rods, burnable poison components and control element assemblies. The fuel system for a referenced System 80+ plant meets the following criteria:

The fuel assembly and fuel assembly component (including the fuel rod and burnable poison rod) materials are compatible with the reactor environment.

Fuel system thermal-mechanical analyses are based on either worst tolerance assumptions or probabilistic analyses to determine statistically bounding results (i.e., upper 95% confidence)

The fuel assembly and fuel assembly component (excluding the fuel rod) stresses and cumulative fatigue damage factors do not exceed the limits for normal operation and design basis events.

The fuel rod and fuel assembly component analyses include consideration of metal thinning and associated temperature increases due to oxidation and the buildup of corrosion products to the extent that these influence the material properties and structural strength of the components.

The fuel rod internal hydrogen content is controlled during manufacture of the fuel rod.

Loss of fuel rod mechanical integrity due to collapse of the fuel rod cladding is not predicted to occur during the design lifetime of the fuel rod.

The fuel rod cladding stresses, strains and cumulative fatigue damage factors do not exceed the limits for normal operation and design basis events for which fuel damage does not occur.

Loss of fuel rod mechanical integrity due to excessive cladding pressure loading does not occur.

Loss of fuel rod and fuel assembly component mechanical integrity due to fretting wear resulting from fuel rod and fuel assembly component vibration does not occur in an environment free of foreign material.

The burnable poison rod cladding stresses and strains do not exceed the limits for normal operation and design basis events for which fuel damage does not occur.

Loss of burnable poison rod mechanical integrity due to excessive cladding pressure loading does not occur.

The Control Element Assembly (CEA) materials are compatible with the reactor environment.

The Control Element Assemblies (CEAs) are capable of insertion into the core during all modes of plant operation within the limits assumed in the plant analyses.

Bowing or swelling of fuel rods does not result in obstruction of control element pathways which would restrict Control Element Assembly (CEA) movement.

The reactivity worth of the CEAs is included in the plant core analyses.

The Control Element Assembly (CEA) cladding stresses and strains do not exceed the limits for normal operation and design basis events.

1.4.2 FUEL SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   CESSAR-DC Section 4.2

2. Relationship of NUCLEAR DESIGN ITAAC to the Safety Analysis

   None

3. Relationship of NUCLEAR DESIGN ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to NUCLEAR DESIGN ITAAC

   None

1.4.3 THERMAL AND HYDRAULIC DESIGN - REACTOR

Design Description

The thermal and hydraulic design of the System 80+ reactor core is not within the scope of the certified design. The specific reactor thermal and hydraulic design that will be utilized in a facility which has referenced the System 80+ design will comply with thermal and hydraulic design criteria as specified in 10 CFR 50.

The thermal and hydraulic design of the reactor core for a referenced System 80+ plant meets the following criteria:

The minimum departure from nucleate boiling ratio (MDNBR) does not occur on any fuel rod during normal operation and anticipated operational occurrences.

Flow instability within the fuel assembly flow channels does not occur during normal operation and anticipated operational occurrences.

The calculated peak temperature of the nuclear fuel in a fuel rod is less than the melting temperature of the nuclear fuel during normal operation and anticipated operational occurrences.

The primary coolant flow rate with the four reactor coolant pumps in operation is greater than or equal to the design minimum and less than or equal to the design maximum reactor coolant system (RCS) flow rates.

1.4.3 THERMAL AND HYDRAULIC DESIGN - REACTOR ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   CESSAR-DC Section 4.4

2. Relationship of NUCLEAR DESIGN ITAAC to the Safety Analysis

   No ITAAC are provided because the thermal and hydraulic design is not within the scope of the certified design.

3. Relationship of NUCLEAR DESIGN ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to NUCLEAR DESIGN ITAAC

   CESSAR-DC Section 14.2.12.1.57

1.5.1 REACTOR COOLANT SYSTEM

DESIGN DESCRIPTION

The reactor coolant system (RCS) removes heat generated in the reactor core and transfers the heat to the steam generators, where feedwater is boiled to steam. The RCS is located in the containment and is composed of a reactor vessel (RV), two steam generators (SG), four reactor coolant pumps (RCP), one pressurizer (PZR), four pressurizer safety valves, connecting piping, heaters and valves. The pumps circulate reactor coolant water in parallel loops through the RV to the SG's and back to the RCP suctions. The PZR serves as a surge volume and provides overpressure to prevent boiling in the core region and RCS loops. The reactor coolant system is a safety-related system to the extent that it forms the pressure boundary between the reactor coolant and the containment atmosphere. Figure 1.5.1-1 shows a simplified system configuration.

The RCS pressure boundary is constructed to Code Class 1 of ASME Code Section III. ASME Code portions of the RCS retain their integrity under internal pressures that will be experienced during service. Components, piping and supports classified as ASME Code Class 1 are Seismic Category I. Equipment that is designated as safety-related is qualified for the external environments where located.

RCS instrumentation indications and alarms shown on Figure 1.5.1-1 are available in the control room. Controls are available in the control room to start and stop the RCPs, open and close the pressurizer spray control valves, and energize or de-energize the pressurizer heaters.

The RCS is protected from overpressure by the PZR safety valves. Valve relief capacity is sufficient to limit RCS pressure to less than or equal to 110% of design pressure for all design basis events. PZR safety valves of the type installed in the plant have been tested at full flow. Instrumentation is provided in the control room to indicate a not fully closed safety valve. The RCS is protected by relief valves in the shutdown cooling system (SCS) when the RCS is connected to the SCS.

Fracture toughness of RCS materials is controlled by the ASME Code. Delta ferrite content is controlled. The initial charpy upper shelf energy of RV beltline material is no less than a minimum required energy. Reference nil-ductility transition temperatures (RT_{NDT}) are derived from Charpy V-notch tests of specimens taken from construction materials. The RT_{NDT} so derived must be equal to or less than the required RT_{NDT}. Controls are placed on residual chemical content in the reactor vessel beltline materials to limit the maximum predicted increase in RT_{NDT} over the life of the plant.

The inner surface of the RV, in the active core region, is equipped with capsule holders for accommodating material surveillance capsules. Specimens taken from

materials actually used in fabrication, as well as weldments typical of those used in the belt line region, are inserted in the holders before nuclear operation. The capsules contain Charpy V-notch specimen of base metal, weld metal and heat-affected zone material, and tensile specimen from base metal and weld metal.

The reactor coolant pump motor includes a flywheel for extended coastdown pumping during loss of power. Fracture toughness is assured by controlling the nil-ductility transition temperature and Charpy absorbed energy. Each flywheel retains its integrity at a design overspeed condition of 125 percent of normal operating speed.

Inspections, Tests, Analyses and Acceptance Criteria

Table 1.5.1-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the RCS.

TABLE 1.5.1-1

REACTOR COOLANT SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration of the RCS is shown in Figure 1.5.1-1.	1. Visual inspections of the as-built RCS configuration will be conducted.	1. The as-built configuration of the RCS is in accordance with Figure 1.5.1-1, for the components and equipment shown.
2. ASME Code portions of the RCS retain their integrity under internal pressures that will be experienced during service.	2. A pressure test will be conducted on those portions of the RCS required to be pressure tested by the ASME Code.	2. The results of the pressure test of ASME Code portions of the RCS conform with the requirements in the ASME Code Section III.
3. Overpressure protection limits RCS pressure to less than or equal to 110% of design pressure for all design basis event.	3. Inspection of the ASME Code-required Overpressure Protection Report will be performed.	4. RCS Pressure is limited to ≤2750 psia, for the design basis events evaluated in the Overpressure Protection Report.
4. Pressurizer safety valves of the type installed in the plant have been tested at full flow, with the inlet configuration used in the plant.	4. Inspection of the EPRI PWR Safety and Relief Valve Test Program, Report EPRI NP 2628-SR, and vendor and installation records for the safety valves, will be performed.	4. Type testing of pressurizer safety valves installed in the plant has been accomplished and the results accepted.
5. Low temperature overpressure protection (LTOP) for the RCS is provided by relief valves in the SCS.	5. See SCS ITAAC 1.5.2.	5. See SCS ITAAC 1.5.2.
6. Provisions are made on the inner surface of the RV for material surveillance specimens.	6. Inspection of the RV before closure for presence of capsule holders will be performed.	6. Capsule holders are in place.

TABLE 1.5.1-1 (Continued)

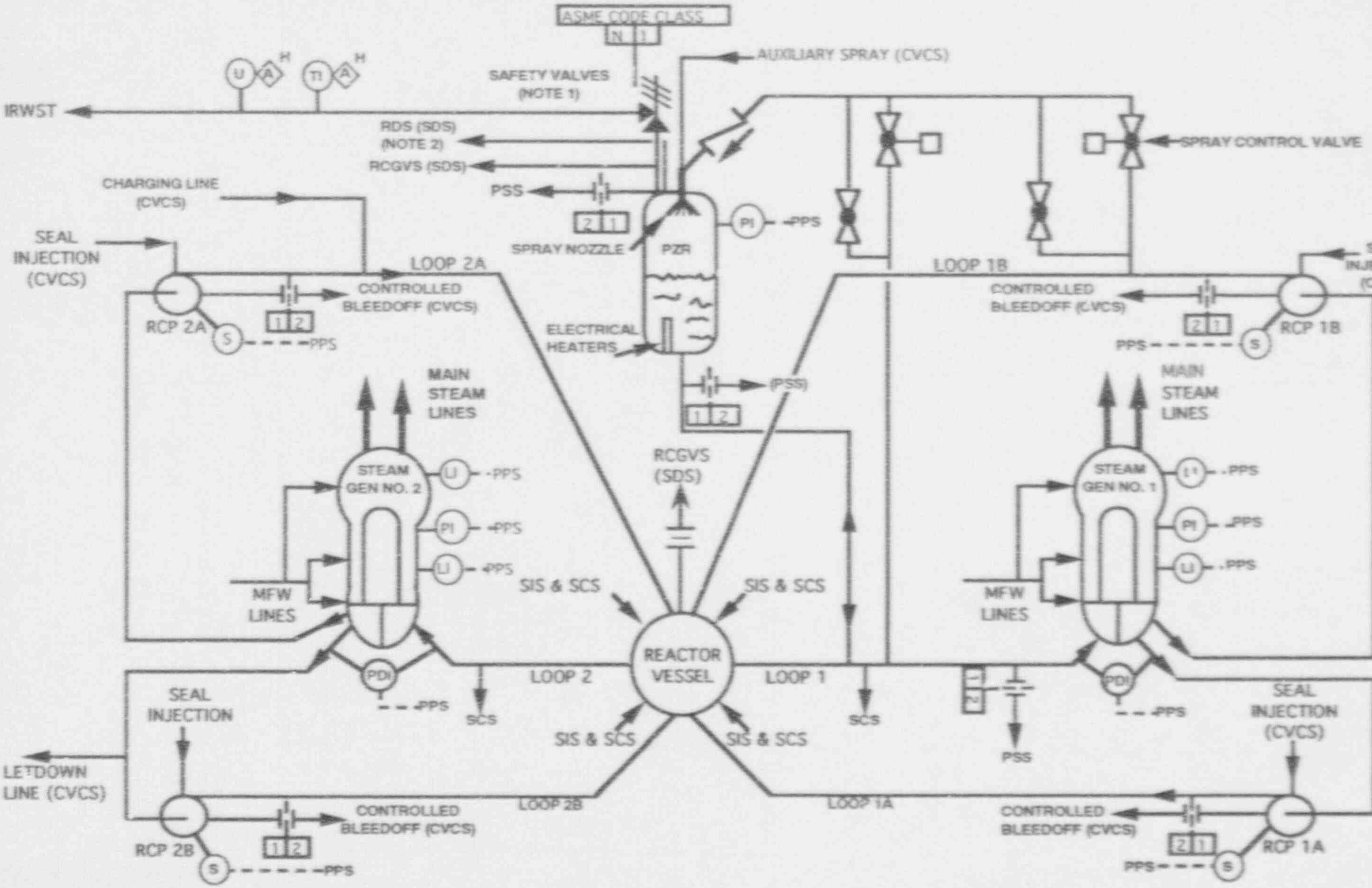
REACTOR COOLANT SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. RV material specimens made from the actual material from which the vessel was constructed are inserted in the capsule holders.	7. The process procedures and quality control records that trace fabrication of surveillance samples will be reviewed, and inspection of the RV for presence of specimens will be performed.	7. Surveillance specimens are made from material used in RV fabrication, and are inserted in the capsule holders.
8. Each RCP motor flywheel retains its integrity at 125% of normal operating speed.	8. Vendor test records will be inspected.	8. Each RCP flywheel was tested and passed a 125% overspeed test.
9. RCP motor flywheel material has sufficient ductility to prevent brittle fracture.	9. RCP material test reports will be inspected.	9. For the RCP motor flywheels: • nil-ductility transition temperature ≤10°F • Charpy absorbed energy ≥ 50 ft-lb
10. RCS instrumentation indications and alarms shown on Figure 1.5.1-1 are available in the Control Room. Controls are available to start and stop the RCPs, open and close the pressurizer spray valves, and energize or de-energize the pressurizer heaters.	10. Inspection of the control room for the availability of instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the RCS controls in the Control Room.	10. The instrumentation indications and alarms shown on Figure 1.5.1-1 are available in the Control Room. RCS controls operate as specified in the Certified Design Commitment.
11. Delta ferrite is controlled to within specific limits.	11. Material Test Reports and quality control records will be inspected.	11. • Weld rod and filler material: 5FN to 15FN • Clad: 5FN to 18FN • Castings: 5FN to 30FN

TABLE 1.5.1-1 (Continued)

REACTOR COOLANT SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12. RCS materials are limited to a maximum reference nil-ductility transition temperature RT_{NDT}.	12. Material Test Reports and quality control records will be inspected.	12. For RV belt line material, RT_{NDT} is: • forgings: ≤ +10°F • weld metal: ≤ -12 °F For other pressure-retaining materials, RT_{NDT} is: • ≤ +10°F
13. The initial RV beltline Charpy upper-shelf energy is no less than a minimum required energy.	13. Materials Test Reports and quality control records will be reviewed.	13. The initial RV beltline Charpy upper shelf energy is no less than 75 ft-lb.
14. Instrumentation is provided in the control room to alert operators of a not fully closed pressurizer safety valve.	14. Inspection of the control room for presence of temperature and acoustic alarms for each pressurizer safety valve exit line will be performed.	14. The temperature and acoustic alarms shown on Figure 1.5.1-1 are available in the control room.
15. The increase of RT_{NDT} of the RV beltline material over the life of the plant is limited by the control of residual chemical elements.	15. Review the RV beltline Material Test Reports for residual chemical elements.	15. Residual chemical elements in RV beltline materials are no greater than: Copper (in welds) 0.03 Copper (in forgings) 0.06 Nickel (in forgings) 1.00 Nickel (in welds) 0.10 Phosphorous 0.012



NOTES:
1. ONE OF FOUR SAFETY VALVES SHOWN
2. ONE OF TWO RDS LINES SHOWN

FIGURE 1.5.1-1
SYSTEM 80+ REACTOR COOLANT SYSTEM

1.5.1 REACTOR COOLANT SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   RCS Description: CESSAR-DC Section 5

2. Relationship of RCS ITAAC to the Safety Analysis

   None

3. Relationship of RCS ITAAC to PRA

   1) Each spray loop is connected to separate cold legs of the Reactor Coolant System.

   2) Both loops are connected to a common header prior to entering the pressurizer.

   3) The operation of the spray control valves can be accomplished manually.

4. CESSAR-DC Chapter 14 Tests Applicable to RCS ITAAC

   Pre-operational Tests: CESSAR-DC Section 14.2.12.1.1, .2, .3, .37, .55, .57, .58, .59

1.5.2 SHUTDOWN COOLING SYSTEM

Design Description

The Shutdown Cooling System (SCS) is a safety-related system which removes heat from the reactor coolant and transfers the heat to the component cooling water system. The SCS has two separate and redundant divisions. Each SCS division has the heat removal capacity to cool the reactor coolant from SCS entry conditions to cold shutdown conditions.

Each SCS division has an SCS pump, an SCS heat exchanger, valves, and connecting piping. Figure 1.5.2-1 shows a simplified system configuration.

The SCS is built to the ASME Code Section III class requirements shown on Figure 1.5.2-1. ASME Code portions of the SCS retain their integrity under internal pressures that will be experienced during service. Components, piping, and supports classified as ASME Code Class 1 or 2 are Seismic Category I. Equipment that is designated as safety-related is qualified for the environments where located.

SCS instrumentation indications and alarms shown on Figure 1.5.2-1 are available in the Control room. The SCS is controlled manually from the control room; remotely operated control valves in the SCS heat exchanger discharge line and bypass line can be positioned to control system flow.

The SCS discharge valves are capable of opening against a differential pressure at least equal to the maximum SCS pump discharge pressure. The SCS discharge valves to the reactor coolant system are not interlocked on reactor coolant pressure. Flow-limiting devices are installed downstream from the SCS pump discharges to limit runout flow.

The SCS pump and the Containment Spray System pump in a division are connected by piping and valves such that one pump can perform the other's function. The piping and valves in the SCS/CSS pump suction cross-connect line permit flow in either direction (i.e., no check valves).

The valves in the piping from the reactor coolant system (RCS) to the suction side of the SCS pumps are interlocked so the valves cannot be opened if reactor coolant pressure exceeds SCS design pressure. There is no auto-closure interlock which shuts the SCS suction isolation valves on increasing RCS pressure during SCS operation. The piping from the RCS to the SCS pump suction is oriented downward or horizontal, except for a short upward section connecting to the pump suction flange. Water is supplied to each SCS pump at a pressure greater than the net positive suction head (NPSH) required.

Low temperature overpressure protection (LTOP) for the RCS is provided by a relief valve located on each SCS suction line, as shown in Figure 1.5.2-1.

Each SCS division receives electrical power from its assigned Class 1-E bus.

A flow recirculation line around each SCS pump provides a minimum flow recirculation path. A piping line from downstream of the heat exchangers to the IRWST allows flow testing of the pumps during plant operation.

Outside containment, the two mechanical divisions of the SCS are separated by the divisional barrier well.

Inspections, Tests, Analyses and Acceptance Criteria

Table 1.5.2-1 specifies the inspections, tests, analyses and associated acceptance criteria for the SCS.

TABLE 1.5.2

SHUTDOWN COOLING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the SCS is shown in Figure 1.5.2-1.	1. Inspections of the as-built SCS configuration will be performed.	1. The as-built configuration of the SCS is in accordance with Figure 1.5.2-1 for the components and equipment shown.
2. Water is supplied to each SCS pump at a pressure greater than the net positive suction head (NPSH) required.	2. Tests to measure SCS pump NPSH will be performed. An analysis to determine NPSH available to each pump will be prepared based on test data and as-built data.	2. The calculated available NPSH exceeds SCS pump NPSH required by the vendor for the pump.
3. Relief valves are provided for low temperature overpressure protection (LTOP) of RCS.	3. Inspect as-built configuration for presence of relief valves.	3. A pressure relief valve is installed in each SCS train suction line.
5. Safety-related SCS components described in the Design Description for each division of the SCS are powered from their respective Class 1E busses.	5. A test of the power availability to the SCS safety related components will be conducted with power supplied from the permanently installed electrical power buses.	5.a) The SCS pump motor in each division is powered from one of the two Class 1E buses for that division. Each SCS pump derives its control power from the same Class 1E bus that provides motive power to the pump motor. b) The SCS pump motor in each division is not powered from the same Class 1E bus as the CS pump motor in that division.

TABLE 1.5.2 (Continued)

SHUTDOWN COOLING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. (Continued)	5. (Continued)	5.c) The motor for the SCS pump in each division is cooled by the CCWS for that division.
6. SCS instrumentation indications and alarms shown on Figure 1.5.2-1 are available in the Control Room. Controls are available in the control room to start and stop the SCS pumps, and open and close the SCS remotely-operated valves shown in Figure 1.5.2-1.	6. Inspection of the Control Room for the availability of instrumentation indications and alarms will be performed. Tests will be performed using the SCS controls in the Control Room.	6. The instrumentation indications and alarms shown on Figure 1.5.2-1 exist or can be retrieved in the Control Room. SCS controls operate as specified in the Certified Design Commitment.
7.a) Each shutdown cooling system has the heat removal capacity to cool the reactor coolant from SCS entry conditions to cold shutdown conditions.	7.a) Tests of as-built SCS configuration to measure the shutdown cooling flow at the combined discharge of the SCS heat exchanger and HX bypass line will be performed.	7.a) Flow through the SCS heat exchanger and HX bypass line can be adjusted while maintaining a nominal flow of 5000 gpm per division. Each SCS pump develops at least 400 feet of head at a flow rate no less than 5000 gpm.
b) Flow-limiting devices are installed downstream from the SCS pump discharges to limit runout flow.		b) With 5000 gpm flow through the SCS heat exchanger, combined SCS flow through the heat exchanger and bypass line does not exceed [later] gpm.

TABLE 1.5.2 (Continued)

SHUTDOWN COOLING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

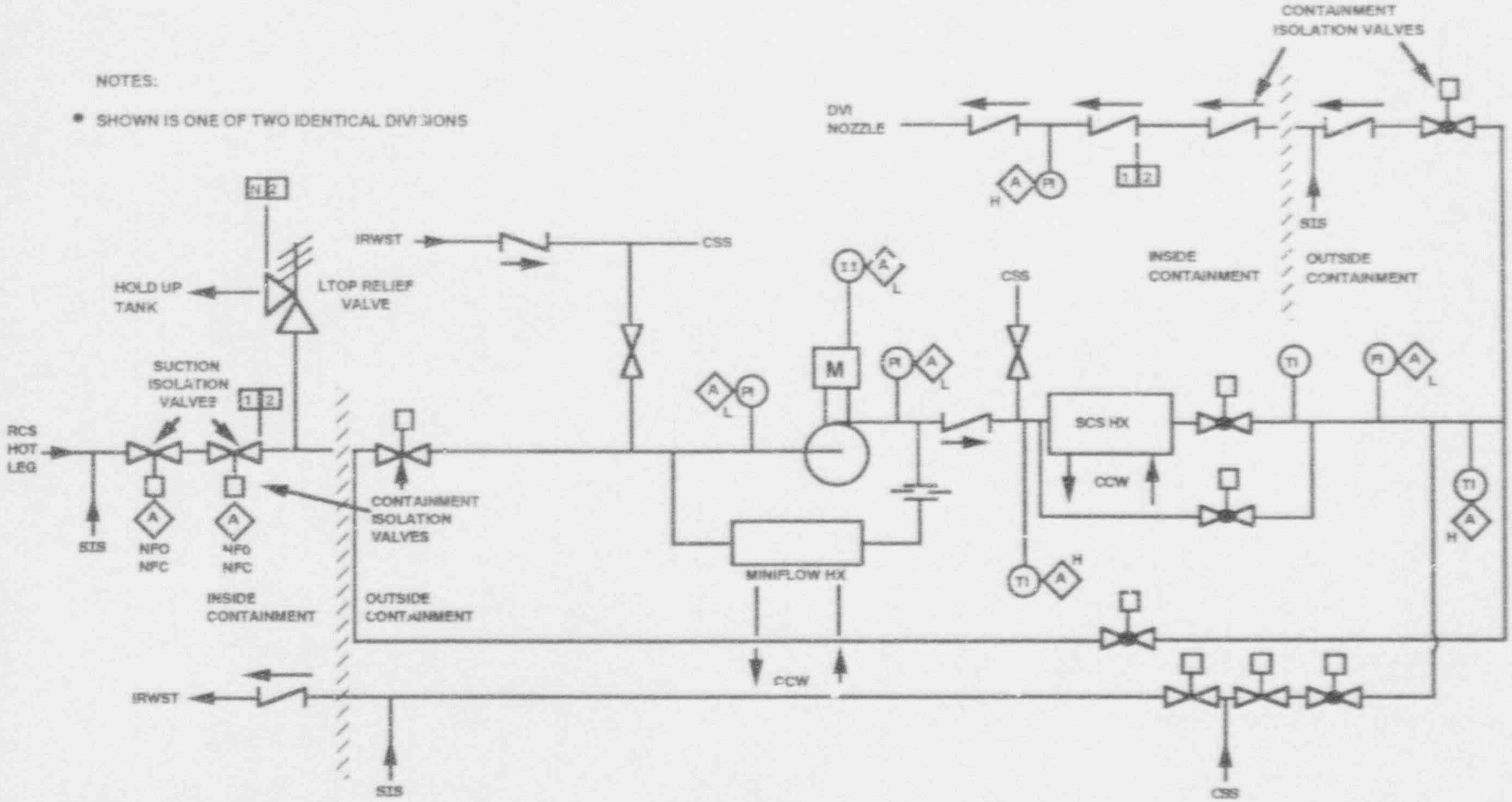
Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a) Remotely-operated SCS suction line isolation valves have independent interlocks to prevent opening if RCS pressure exceeds SCS design pressure.	8.a) Tests using simulated RCS pressure greater than the SCS design pressure will be performed by attempting to open the valves from the control room. Each valve will be tested independently.	8.a) The SCS suction isolation valves do not open.
b) There is no auto-closure interlock which shuts the SCS suction line isolation valves on increasing RCS pressure during SCS operation.	b) Tests of the component control circuits for the SCS suction line isolation valves will be performed using simulated RCS pressure signals.	b) The SCS suction line isolation valves do not close automatically when simulated RCS pressure increases.
9.a) The SCS discharge valves are capable of opening against a differential pressure at least equal to maximum SCS pump discharge pressure.	9.a) Functional tests will be performed with the SCS pumps running at minimum flow recirculation, by opening the SCS discharge valves from the control room.	9.a) The SCS discharge valves open.
b) The SCS discharge valves are not interlocked on RCS pressure.	b) Tests of the SCS discharge valves will be performed using simulated RCS pressure signals.	b) The SCS discharge valves do not close automatically as simulated RCS pressure is increased.
10. ASME Code portions of the SCS retain their integrity under internal pressures that will be experienced during service.	10. A pressure test will be conducted on those portions of the SCS required to be pressure tested by the ASME Code.	10. The results of the pressure test of ASME Code portions of the SCS conform with the requirements in the ASME Code Section III.

SHUTDOWN COOLING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The SCS pumps can be flow tested during plant operation.	11. Tests of the as-installed SCS will be performed by manually aligning suction and discharge valves to the IRWST and starting the SCS pumps manually.	11. The SCS pumps pump up to 5000 gpm each through the test loop.
12. The SCS pump and the CSS pump in a division are connected by piping and valves such that one pump can perform the other's function.	12. An inspection of the as-built piping will be performed. Functional testing using the SCS/CSS suction cross-connect line and the discharge cross connect line will be performed.	12. The SCS and CSS pumps suctions and discharges are cross-connected by lines. The valve(s) in the SCS/CSS pump suction cross-connect lines are not check valves.
13. The piping from the RCS to the SCS pump suction is oriented downward or horizontal, except for a short upward section connecting to the pump suction flange.	13. An inspection of the as-built piping will be performed.	13. The Certified Design Commitment is met.
14. A flow recirculation line around each SCS pump provides a minimum flow recirculation path.	14. The as-built system configuration will be inspected and minimum flow recirculation rate verified by a minimum flow measurement test.	14. Minimum flow recirculation rate meets or exceeds the pump vendor's requirements.
15. Outside containment, the two mechanical divisions of the SCS are physically separatedby the divisional barrier wall.	15. Visual inspections of SCS divisional mechanical separations will be performed.	15. Outside of containment, a divisional wall separates the two SCS mechanical divisions.

NOTES:

* SHOWN IS ONE OF TWO IDENTICAL DIVISIONS



DVI DIRECT VESSEL INJECTION
HX HEAT EXCHANGER
CCW COMPONENT COOLING WATER
CSS CONTAINMENT SPRAY SYSTEM
LTOP LOW TEMPERATURE OVERPRESSURE PROTECTION
IRWST INCONTAINMENT REFUELING WATER STORAGE TANK
NFO NOT FULLY OPENED (WITH CONCURRENT LOW RCS TEMPERATURE
NFC NOT FULLY CLOSED (WITH CONCURRENT HIGH RCS PRESSURE
RCS REACTOR COOLANT SYSTEM
SIS SAFETY INJECTION SYSTEM

FIGURE 1.5.2-1
SYSTEM 80+ SHUTDOWN COOLING SYSTEM

1.9.1.2 SHUTDOWN COOLING SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   System Description: CESSAR-DC Section 5.4.7

2. Relationship of SCS ITAAC to the Safety Analysis

   Basis: The head developed by the SCS pump is at least 400 feet at a flow rate no less than 5000 gpm.

   ITAAC: ITAAC #7 tests the SCS with the pump at its design point (5000 gpm).

3. Relationship of SFSR ITAAC to PRA

   1) The SCS has two separate and redundant divisions each with the heat removal capacity to cool the RCS to cold shutdown conditions.

   2) Each SCS division has one SCS pump and one SCS heat exchanger.

   3) The SCS pumps can be aligned to the IRWST via a valve.

   4) The SCS discharge valves to the RCS are not interlocked on RCS pressure and can be opened when the RCS pressure is less than or equal to the SCS pump shutoff head.

   5) The SCS discharge valves are capable of opening with a delta P equal to the SCS pump maximum discharge pressure.

   6) The SCS pump in each division can perform the functions of the Containment Spray (CS) pump in that division for containment spray operation.

   7) The valve isolating the SCS pump suction from the IRWST is capable of passing flow in either direction.

   8) The SCS pump in each division can perform the function of the CS pump in that division to provide IRWST inventory cooling.

   9) Installed instrumentation provides the capability to monitor cooldown rate and shutdown cooling flow.

   10) Each SCS division is electrically powered from its assigned Class 1-E bus.

11) The SCS interfaces with the CCWS to remove to RCS decay heat loads.

12) The SCS can be aligned for shutdown cooling operation from the control room.

13) The SCS pump motor in each division is powered from one of the two vital Class 1-E 4.16 Kv buses for that division. Each SCS pump derives its 125 VDC control power from the Class 1-E 125 VDC bus associated with the class 1-E 4.16 Kv bus that provides its motive power.

14) The SCS pump motor in a each division is not powered from the same Class 1-E 4.16 Kv bus as the CS pump motor in that division.

15) The motor for the SCS pump in each division is cooled by the CCWS for that division.

16) Installed instrumentation provides the capability to monitor the performance of the system and the major components from the control room.

4. CESSAR-DC Chapter 14 Tests Applicable to SCS ITAAC

Test Description: CESSAR-DC Section 14.2.12.1.21

1.9.1.1 NEW FUEL STORAGE RACKS

Design Description

The new fuel storage racks are safety related items that provide support and surround new fuel assemblies and maintain a geometric configuration to preclude nuclear criticality. The new fuel storage racks maintain the effective neutron multiplication factor below the required criticality limits during operation and for design basis and accident conditions.

The new fuel storage racks are fabricated in accordance with ASME Code Section III, Class 3 requirements.

The new fuel storage racks are Seismic Category I classification.

Inspections, Tests, Analyses and Acceptance Criteria

Table 1.9.1.1-1 specifies the inspections, tests, analyses and associated acceptance criteria for the new fuel storage racks.

TABLE 1.9.1.1-1

NEW FUEL STORAGE RACKS
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The new fuel storage racks maintain the effective neutron multiplication factor below the required criticality limits during operation and design basis accident conditions.	1. Analysis will be performed to calculate the effective neutron multiplication factor for the new fuel storage racks.	1. The calculated effective neutron multiplication factor for the new fuel storage racks is less than 0.95 for operation and design basis accident conditions (less than 0.98 for immersion in a uniform density aqueous foam or mist of optimum moderation density).
2. The new fuel storage racks are fabricated in accordance with ASME Code Section III, Class 3 requirements.	2. Inspection of the construction records and the as-built new fuel storage racks will be performed.	2. The new fuel storage racks meet the ASME Code specified physical examination criteria for the ASME Code Section III, Class 3 classification.

1.9.1.1 NEW FUEL STORAGE RACKS ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   The analysis specified in ITAAC 1 to calculate the effective neutron multiplication factor would be described.

   See CESSAR-DC, Section 9.1.1 for a discussion of the new fuel storage racks.

2. Relationship of NFSR ITAAC to the Safety Analysis

   None

3. Relationship of NFSR ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to NFSR ITAAC

   None

1.9.1.2 SPENT FUEL STORAGE RACKS

Design Description

The spent fuel storage racks are safety related items that provide support and surround spent fuel assemblies and maintain a geometric configuration to preclude nuclear criticality. The spent fuel storage racks maintain the effective neutron multiplication factor below the required criticality limits for normal operation and postulated accident conditions.

The spent fuel storage racks are fabricated in accordance with ASME Code, Section III, Class 3 requirements.

The spent fuel storage racks are Seismic Category I classification.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.1.2-1 specifies the inspections, tests, analyses and associated acceptance criteria for the spent fuel storage racks.

TABLE 1.9.1.2-1

SPENT FUEL STORAGE RACKS
Inspection, Tests, Analysis and Acceptance Criteria

Certified Design Commitment	Inspection, Test, Analysis	Acceptance Criteria
1. The spent fuel storage racks maintain the effective neutron multiplication factor below the required criticality limits for normal operation and postulated accident conditions.	1. Analysis will be performed to calculate the effective multiplication factor for the spent fuel storage racks for normal operation and postulated accident conditions.	1. The calculated effective neutron multiplication factor for the spent fuel storage racks is less than 0.95 for normal operation and postulated accident conditions.
2. The spent fuel storage racks are fabricated in accordance with ASME Code Section III, Class 3 requirements.	2. Inspections of the construction records and the as-built spent fuel storage racks will be performed.	2. The spent fuel storage racks meet the ASME Code specified physical examination criteria for the ASME Code Section III, Class 3 Classification.

1.9.1.2 SPENT FUEL STORAGE RACKS ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   The analysis specified in ITAAC 1 to calculate the effective neutron multiplication factor would be described.

   See CESSAR-DC Section 9.1.2 for a discussion of the spent fuel storage racks.

2. Relationship of SFSR ITAAC to the Safety Analysis

   None

3. Relationship of SFSR ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to SFSR ITAAC

   None

1.9.2.1 STATION SERVICE WATER SYSTEM

Design Description

The Station Service Water System (SSWS) is a safety-related system. It is an open loop system that takes suction from the Ultimate Heat Sink (UHS) and provides cooling water to remove heat from the Component Cooling Water System. The SSWS has the capacity to dissipate the heat loads of the CCWS during operation, shutdown, refueling, and design basis accident conditions.

The SSWS consists of two divisions. Each SSWS division is connected to its corresponding CCWS division through the component cooling water heat exchangers. Each SSWS division has heat dissipation capacity to achieve and maintain cold shutdown.

Each division of the SSWS consists of two station service water pumps, two station service water strainers, and associated piping, valves, controls, and instrumentation. The two mechanical divisions of the Station Service Water System are physically separated. A basic configuration for the Station Service Water System is shown in Figure 1.9.2.1-1.

The ASME code classifications for the pressure retaining components of the Station Service Water System are depicted in Figure 1.9.2.1-1. Components meeting ASME Code Class 3 requirements as depicted in the figure are safety related.

Components, piping and supports classified as ASME Code Class 3 are Seismic Category I. Equipment that is designated as safety related is qualified for the environments where located.

The station service water pumps are installed such that minimum available net positive suction head (NPSH) exceeds minimum required NPSH for each pump.

The instrumentation and alarms shown on Figure 1.9.2.1-1 are available in the Control Room. Controls are available in the Control Room to start and stop the station service water pumps. Controls are provided in the Control Room to manually align station service water flow to the component cooling water heat exchangers.

Safety related components of each SSWS division are powered from their respective divisional Class 1E busses.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.2.1-1 specifies the inspections, tests, analyses and associated acceptance criteria for the SSWS.

TABLE 1.9.2.1-1

STATION SERVICE WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the Station Service Water System is shown in Figure 1.9.2.1-1.	1. Inspections of the as-built SSWS configuration will be conducted.	1. The as-built configuration of the Station Service Water System is in accordance with Figure 1.9.2.1-1 for the components and equipment shown.
2. The two mechanical divisions of the SSWS are physically separated.	2. Inspections of divisional mechanical separations will be performed.	2. A divisional wall separates the two SSWS mechanical divisions.
3.a) The SSWS has the capacity to dissipate the heat loads of the component cooling water system during operation, shutdown, refueling, and design basis accident conditions.	3.a) Tests will be performed and analysis prepared to determine heat dissipation capacity on as-built CCWS serviced components and measured flow rates.	3.a) The heat dissipation capacity of the CCWS exceeds the heat generation capacity of the connected heat exchangers and coolers during operation, shutdown, refueling and design basis accident conditions.
b) Each division has heat dissipation to achieve and maintain cold shutdown.	b) Tests will be performed and analysis prepared for each division for heat dissipation capacity to achieve and maintain cold shutdown.	b) The heat dissipation capacity of each CCWS division exceeds the heat loads generated for achievement and maintenance of cold shutdown.
4. The ASME code portions of the Station Service Water System retain their integrity under internal pressures experienced during service.	4. A pressure test will be conducted on those portions of the Station Service Water System required to be pressure tested by the code.	4. The results of the pressure test of the ASME portions of the Station Service Water System conform with the requirements in the ASME Code Section III.

STATION SERVICE WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The station service water pumps are installed such that minimum available net positive suction head (NPSH) exceeds minimum required NPSH for each pump.	5. An analysis to determine NPSH available to each pump will be prepared based on as-built data and vendor pump records.	5. The calculated available NPSH exceeds SSW pump NPSH required by the vendor for the SSWS pump.
6. SSWS instrumentation and alarms shown on Figure 1.9.2.1-1 are available in the Control Room. Controls are available in the Control Room to start and stop the station service water pumps. Controls are provided in the Control Room to manually align station service water flow to the component cooling water heat exchangers.	6. Inspection of Control Room instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the SSWS controls in the Control Room.	6. The instrumentation indications and alarms shown in Figure 1.9.2.1-1 exist or can be retrieved in the Control Room. SSWS controls operate as specified in the Certified Design Commitment.
7. Safety related SSWS components described in the Design Description for each division of the SSWS are powered from their respective Divisional Class 1E busses.	7. A test of power availability to the safety-related SSWS components will be conducted with power supplied from the permanently installed electric power busses.	7. The Certified design Commitment is met.

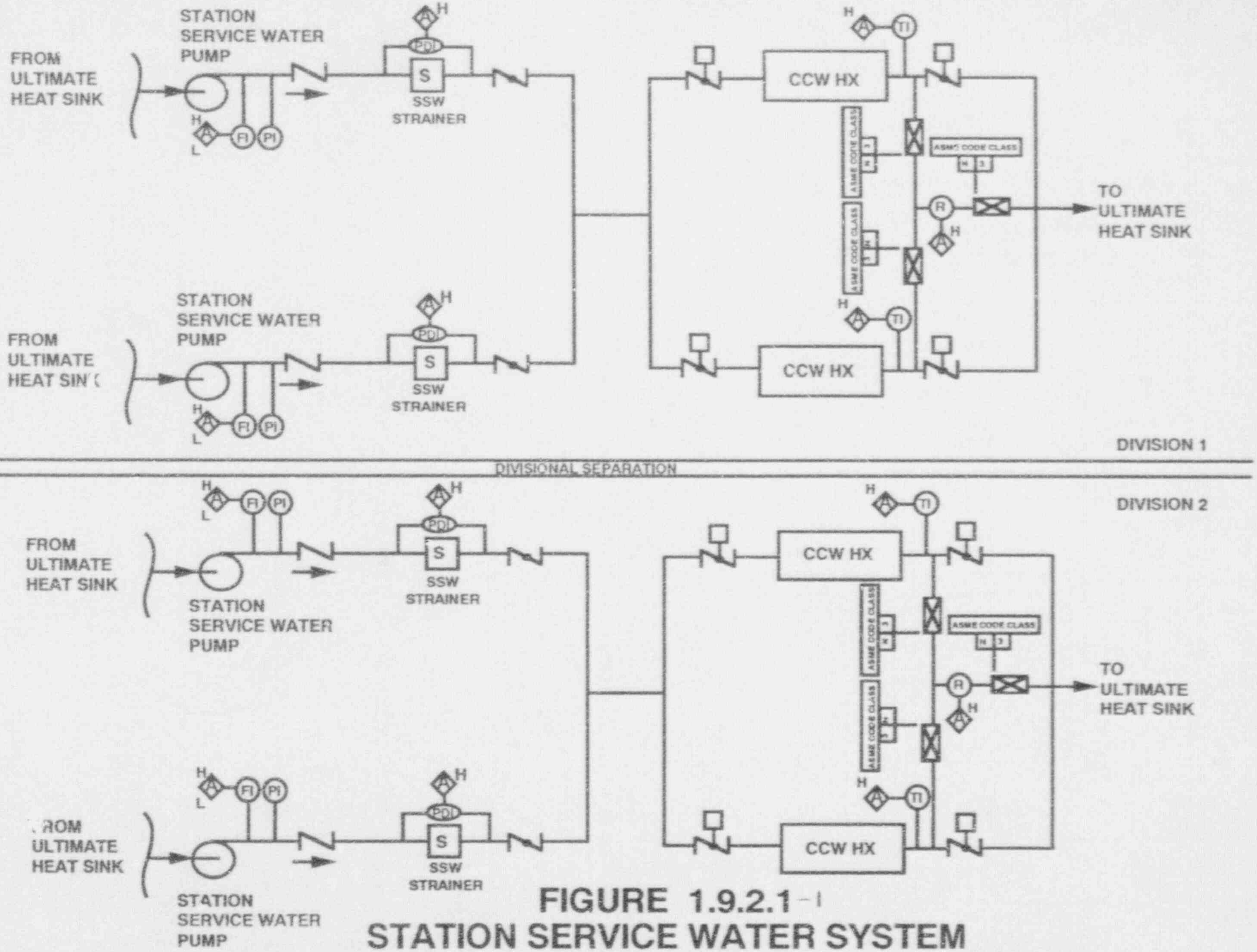


FIGURE 1.9.2.1-1
STATION SERVICE WATER SYSTEM

1.9.2.1 STATION SERVICE WATER SYSTEM

SUPPORTIVE INFORMATION

1. Amplifying Information

ITAAC 3

Confirmation of the SSWS heat dissipation capacity during operation, shutdown, refueling, and design basis accident conditions will be performed as part of the CCWS heat dissipation capacity analysis (See CCWS Tier 2 Amplifying Information).

The analysis will demonstrate that only one station service water pump matched with one component cooling water heat exchanger receiving component cooling water flow is required to operate during post-accident conditions. The analysis will also demonstrate that each division of the SSWS matched with one operating CCWS division has a heat dissipation capacity to achieve and maintain cold shutdown.

ITAAC 5

Confirmation of adequate pump NPSH will include an analysis with the following conditions:

- Station service water pump elevation.
- Station service water intake level at a minimum value.
- Maximum design basis station service water inlet temperature.

The calculated minimum available NPSH shall exceed NPSH required by the vendor for the SSWS pump.

ITAAC 7

Testing of Class 1E power availability to SSWS components will include confirmation of the following:

- Within a division, one station service water pump motor is powered from one Class 1E bus in that division and the other station service water pump motor is powered from the other Class 1E bus in that division
- Station service water pump control circuits of the two station service water pumps in a division are powered from separate Class 1E buses.

- The standby station service water pump in each division will automatically start if the running pump in that division trips.

- On a loss of offsite power (LOOP), both station service water pumps in each division will be aligned to the diesel generator for that division. The load sequencer will load and start one pump. If that pump trips, the standby pump will then be automatically loaded and started.

2. Relationship of SSWS ITAAC to the Safety Analysis

The SSWS ITAAC does not include any specific inspections,tests, and analyses which confirm that the as-built system configuration and performance match the bases used in the evaluation models for licensing analysis. However, it is assumed that the SSWS is available to support the CCWS and its assumed characteristics as detailed in the evaluation models.

3. Relationship of SSWS ITAAC to PRA

1) The SSWS has two redundant and separate safety related divisions with heat dissipation capacity to achieve and maintain safe shutdown.

2) Each SSWS division has two SSW pumps per division.

3) The SSWS interfaces with the CCWS to remove heat from CCWS connected loads.

4) SSWS components in a division receive electrical power from the Class 1E buses in their division.

5) The SSW pump motors in a division are powered from the 4.16KV Class 1E power system in their division. In a division, one SSW pump is powered from one Class 1E bus in that division and the other SSW pump motor is powered from the other Class 1E bus in that division.

6) SSW pump control circuits in a division which close and trip the SSW pump breakers when required are powered from the 125 VDC Class 1E power system in their division. The SSW pump control circuits of the two SSW pumps in a division are powered from separate 125 VDC Class 1E buses.

7) Manual Start and stop actuation of the SSW pumps is provided from the control room to override automatic actuation.

8) The two SSW divisions are physically separated and protected such that a fire or flood in one division will not affect the SSW pumps in the other division.

9) Installed instrumentation provides the capability to monitor the performance of the system and the major components from the control room.

4. CESSAR-DC Chapter 14 Tests Applicable to SSWS ITAAC

See CESSAR-DC Section 14.2.12.1.78

1.9.2.2 COMPONENT COOLING WATER SYSTEM

Design Description

The Component Cooling Water System (CCWS) is a safety-related closed loop cooling water system that, in conjunction with the Station Service Water System (SSWS) and the Ultimate Heat Sink (UHS), removes heat generated from the plant's safety related and non-safety related components and heat exchangers connected to the CCWS. The CCWS consists of two divisions. Each CCWS division is connected to its corresponding SSWS division through the component cooling water heat exchangers.

The CCWS has the capacity to dissipate the heat loads of connected condensers, coolers, and heat exchangers during operation, shutdown, refueling, and design basis accident conditions. Each division has heat dissipation capacity to achieve and maintain cold shutdown. The CCWS provides a minimum flow to each containment spray heat exchanger.

Each division of the CCWS includes two component cooling water heat exchangers, a component cooling water surge tank, two component cooling water pumps, piping, valves, controls, and instrumentation. Outside containment, the two mechanical divisions of the CCWS are physically separated. A basic conceptual configuration of the CCWS is shown in Figure 1.9.2.2-1. Equipment depicted in Tables 1.9.2.2-2 and 1.9.2.2-3 receives cooling water flow during the plant modes indicated.

The ASME code classifications for the pressure retaining components of the Component Cooling Water System are depicted in Figure 1.9.2.2-1. Components meeting ASME Code Class 3 requirements as depicted in the figure are safety-related. Additionally, cooling loops supplying component cooling water to the safety related components in Tables 1.9.2.2-2 and 1.9.2.2-3 are designated as safety related cooling loops and meet ASME Code Class 3 requirements.

Components, piping, and supports classified as ASME Code Class 3 are Seismic Category I. Equipment that is designated as safety related is qualified for the environments where located.

Component cooling water is supplied to each component cooling water pump at a pressure greater than the net positive suction head (NPSH) required.

The interface from ASME Code Class 3 component cooling water piping totally outside containment to cooling loops composed of non-ASME Code component cooling water piping is at two valves. ASME Code Class 3 requirements extend from the ASME Code Class 3 piping through both valves. These valves can be manually closed with controls in the Control Room and close automatically upon receipt of a

Safety Injection Actuation Signal (SIAS). Upon loss of motive power, these valves fail to closed positions.

The CCWS piping to the reactor coolant pumps and to the letdown heat exchanger has containment isolation valves. Containment isolation valves for the reactor coolant pumps can be operated to opened and closed positions with controls in the Control Room. Component cooling water to the reactor coolant pumps is not terminated on a Containment Isolation Actuation Signal (CIAS) or on a Safety Injection Actuation Signal (SIAS). Component cooling water flow to the letdown heat exchanger is automatically terminated on a CIAS or on an SIAS.

The instrumentation indications and alarms shown on Figure 1.9.2.2-1 are available in the Control Room. Controls are available in the Control Room to start and stop the component cooling water pumps. Controls are provided in the Control Room to manually align component cooling water flow to the component cooling water heat exchangers.

The following controls are available in the control room to manually initiate and/or terminate flow to components connected to the CCWS:

1) Component cooling water flow to each shutdown cooling heat exchanger can be initiated and terminated.

2) Component cooling water flow to each containment spray heat exchanger can be initiated and terminated.

3) Component cooling water flow to each spent fuel pool cooling heat exchanger can be initiated and terminated.

Automatic initiation or termination of component cooling water flow is provided for the following components connected to the CCWS:

1) Component cooling water to cooling loops composed of non-ASME code piping is terminated upon receipt of a component cooling water low-low surge tank level signal.

2) Component cooling water flow to each containment spray heat exchanger is initiated automatically upon receipt of a Containment Spray Actuation Signal (CSAS).

3) Component cooling water flow to each spent fuel pool cooling heat exchanger is terminated by a Safety Injection Actuation Signal (SIAS).

Makeup water to the CCWS is supplied by the Demineralized Water Makeup System (DWMS). A safety related makeup line of Seismic Category I construction is

provided to each division from the Station Service Water System via a spool piece which is normally removed.

Safety related components of each CCWS division are powered from their respective divisional Class 1E busses with the exception of containment isolation valves and associated containment isolation valve instrumentation and controls.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.2.2-1 specifies the inspections, tests, analyses and associated acceptance criteria for the CCWS.

TABLE 1.9.2.2-1

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the Component Cooling Water System is shown in Figure 1.9.2.2-1.	1. Inspections of the as-built CCWS configuration will be conducted.	1. The as-built configuration of the Component Cooling Water System is in accordance with Figure 1.9.2.2-1 for the components and equipment shown.
2. Outside containment, the two mechanical divisions of the CCWS are physically separated.	2. Inspections of divisional mechanical separations will be performed.	2. Outside containment, a divisional wall separates the two CCWS mechanical divisions.
3.a) The CCWS has the capacity to dissipate the heat loads of connected condensers, coolers, and heat exchangers during operation, shutdown, refueling, and design basis accident conditions.	3.a) Test will be performed and analysis prepared to determine heat dissipation capacity based on as-built CCWS serviced components and measured flow rates.	3.a) The heat dissipation capacity of the CCWS exceeds the heat generation capacity of the connected condensers, coolers, and heat exchangers during operation, shut-down, refueling and design basis accident conditions.
b) Each division has heat dissipation capacity to achieve and maintain cold shutdown.	b) Test will be performed and analysis prepared for each division for heat dissipation capacity to achieve and maintain cold shutdown.	b) The heat dissipation capacity of each CCWS division exceeds the heat loads generated for achievement and maintenance of cold shutdown.
c) The CCWS provides a minimum flow to each containment spray heat exchanger.	c) Test will be performed to confirm CCWS flow rate to the containment spray heat exchangers.	c) The CCWS provides at least 8000 gallons per minute to each containment spray heat exchanger.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The ASME code portions of the Component Cooling Water System retain their integrity under internal pressures experienced during service.	4. A pressure test will be conducted on those portions of the Component Cooling Water System required to be pressure tested by the ASME code.	4. The results of the pressure test of the ASME portions of the Component Cooling Water System conform with the requirements in the ASME Code Section III.
5. Component cooling water is supplied to each CCW pump at a pressure greater than the net positive suction head (NPSH) required.	5. Tests to measure CCWS pump NPSH will be performed. An analysis to determine NPSH available to each pump will be prepared based on test data, as-built data, and vendor pump records.	5. The calculated available NPSH exceeds CCW pump NPSH required by the vendor for the CCW pump.
6.a) The interface from ASME Code Class 3 component cooling water piping totally outside containment to cooling loops composed of non-ASME Code component cooling water piping is at two valves. ASME Code Class 3 requirements extend from the ASME Code Class 3 piping through both valves.	6.a) Inspections of the construction records and the as-built installation will be performed.	6.a) The interface is as described in the Certified Design Commitment.
b) These valves can be manually closed with controls in the Control Room and close automatically upon receipt of a Safety Injection Actuation Signal (SIAS).	b) A test of Control Room closure capabilities will be performed. A test will be performed using a simulated SIAS signal.	b) The valves can be manually closed from the Control Room and the valves close upon receipt of a simulated SIAS.

TABLE 1.9.2.2-1 (Continued)

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.c) Upon loss of motive power, these valves fail to closed positions.	6.c) A test using a simulated or actual loss of motive power to the valves will be performed.	6.c) The valves close on loss of motive power.
7.a) Containment isolation valves for the reactor coolant pumps can be operated to opened and closed positions with controls in the Control Room.	7.a) A test of containment isolation valve opening and closing capabilities will be performed.	7.a) The Certified Design Commitment is met.
b) Component cooling water to the reactor coolant pumps is not isolated on a Containment Isolation Actuation Signal (CIAS) or on a Safety Injection Action Signal (SIAS).	b) Tests will be performed using simulated CIAS and SIAS signals.	b) The Certified Design Commitment is met.
c) Component cooling water flow to the letdown heat exchanger is automatically isolated on a CIAS or on a SIAS.	c) Tests will be performed using simulated CIAS and SIAS signals.	c) The Certified Design Commitment is met.

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. CCWS instrumentation indications and alarms shown in Figure 1.9.2.2-1 are available in the Control Room. Controls are available in the Control Room to start and stop the component cooling water pumps. Controls are provided in the Control Room to manually align the component cooling water heat exchangers.	8. Inspection of the Control Room instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the CCWS controls in the Control Room.	8. The instrumentation indications and alarms shown in Figure 1.9.2.2-1 exist or can be retrieved in the Control Room. CCWS controls operate as specified in the Certified Design Commitment.
9.a) Controls are available in the Control Room to manually initiate and/or terminate flow to components connected to the CCWS.	9.a) Tests of initiation and termination, of component cooling water flow will be performed.	9.a) Controls are provided in the Control Room as specified below: 1) Component cooling water flow to each shutdown cooling heat exchanger can be initiated and terminated. 2) Component cooling water flow to each containment spray heat exchanger can be terminated. 3) Component cooling water flow to each spent fuel pool heat exchanger can be initiated and terminated.

TABLE 1.9.2.2-1 (Continued)

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.b) Automatic initiation or termination of component cooling flow is provided for components connected to the CCWS.	9.b) Tests will be performed using simulated SIAS and CSAS signals. A component cooling water surge tank low-low level signal will also be simulated.	9.b) Automatic initiation or termination of component cooling water flow is as specified below: 1) Component cooling water flow to cooling loops composed of non-ASME code piping is terminated automatically upon the receipt of a component cooling water surge tank low-low level signal. 2) Component cooling water flow to each containment spray heat exchanger is initiated automatically upon receipt of a Containment Spray Actuation Signal (CSAS). 3) Component cooling water flow to each spent fuel pool cooling heat exchanger is terminated automatically by a Safety Injection Actuation Signal (SIAS).

TABLE 1.9.2.2-1 (Continued)

COMPONENT COOLING WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. Safety related CCWS components described in the Design Description for each division of the CCWS are powered from their respective divisional Class 1E busses with the exception of containment isolation valves and associated containment isolation valve instrumentation and controls.	10. A test of power availability to the CCWS components described in the Design Description will be conducted with power supplied from the permanently installed electric power busses.	10. The Certified Design Commitment is met.

TABLE 1.9.2.2-2

COMPONENT COOLING WATER CONSUMERS

Division 1

Plant Mode/ Components	Normal Operation	Shutdown Cooling Initial	Shutdown Cooling Final	Refueling	Design Basis Accident
SAFETY RELATED			(Note a)		
Shutdown cooling heat exchanger	-	X	X	X	-
Containment spray heat exchanger	-	-	-	-	X
Spent fuel pool cooling heat exchanger	X (Note b)	-	X (Note b)	X	-
Diesel Generator	X	X	X	X	X
Pump Motor Coolers, Miniflow Heat Exchangers, and Essential Chilled Water Condensers	X	X	X	X	X

TABLE 1.9.2.2-2 (Continued)

COMPONENT COOLING WATER CONSUMERS

Division 1

Plant Mode/ Components	Normal Operation	Shutdown Cooling Initial	Shutdown Cooling Final	Refueling	Design Basis Accident
NON-SAFETY RELATED					
Reactor coolant pumps and pump motors	X	X	X	X	X
Charging pump motor coolers	X	X	X	X	X
Charging pump miniflow heat exchanger	X	X	X	X	X
Normal Chilled Water Condensers, Instrument Air Compressors, Let-down Heat Exchanger, Sample Heat Exchangers, Gas Stripper, and Boric Acid Con-centrator (Note c)	X	X	X	X	-

TABLE 1.9.2.2-3

COMPONENT COOLING WATER CONSUMERS

Division 2

Plant Mode/ Components	Normal Operation	Shutdown Cooling Initial	Shutdown Cooling Final	Refueling	Design Basis Accident
SAFETY RELATED			Note a		
Shutdown cooling heat exchanger	-	X	X	X	-
Containment spray heat exchanger	-	-	-	-	X
Spent fuel pool cooling heat exchangers	X (Note b)	-	X (Note b)	X	-
Diesel generator	X	X	X	X	X
Pump Motor Coolers, Miniflow Heat Exchangers, and Essential Chilled Water Condensers	X	X	X	X	X

TABLE 1.9.2.2-3 (Continued)

COMPONENT COOLING WATER CONSUMERS

Division 2

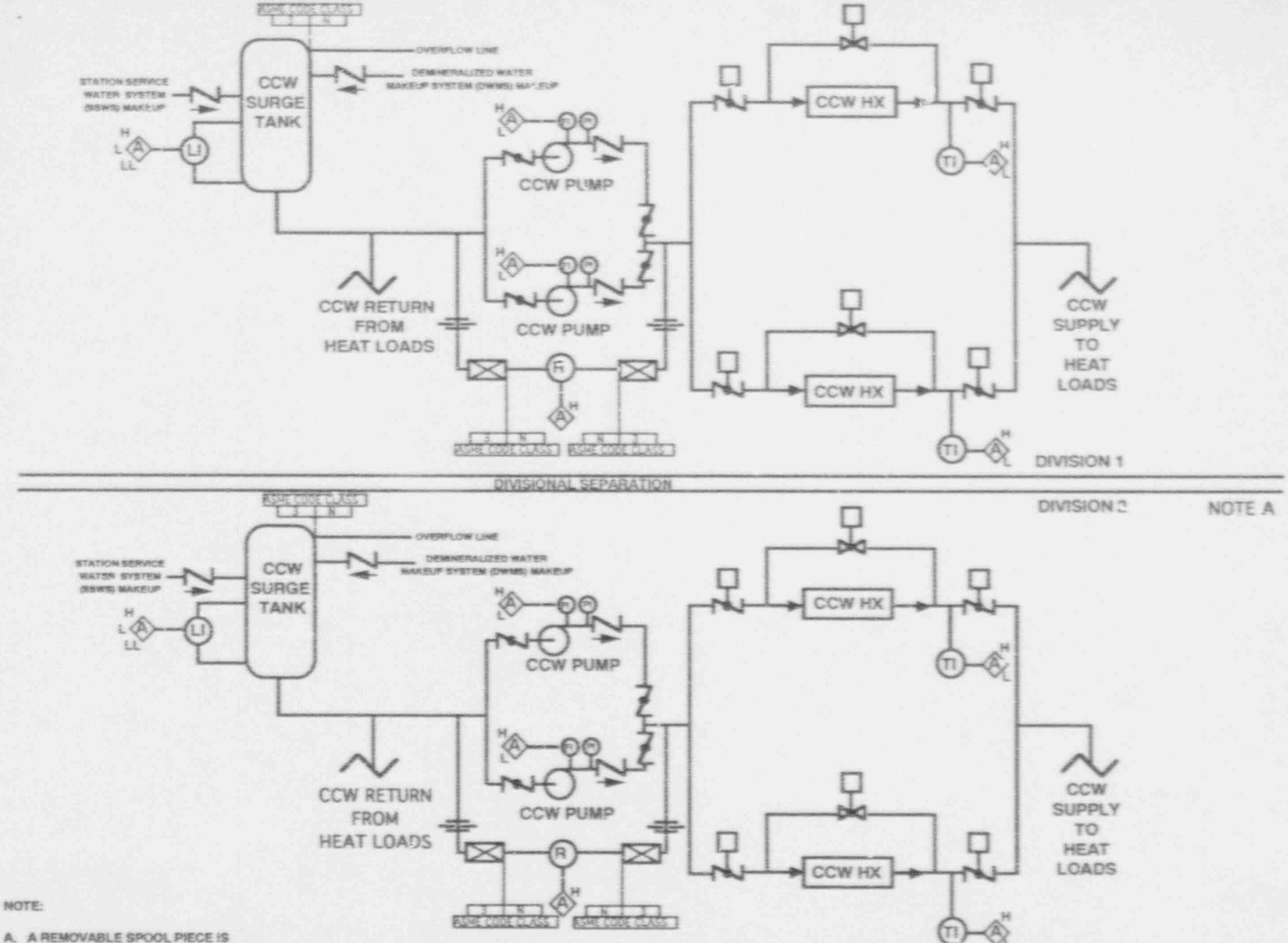
Plant Mode/ Components	Normal Operation	Shutdown Cooling Initial	Shutdown Cooling Final	Refueling	Design Basis Accident
NON-SAFETY RELATED					
Reactor coolant pumps and pump motors	X	X	X	X	X
Charging pump motor coolers	X	X	X	X	X
Charging pump miniflow heat exchanger	X	X	X	X	X
Normal Chilled Water Condensers, Instrument Air Compressors, Let-down Heat Exchanger, Sample Heat Exchangers, Gas Stripper, and Boric Acid Con-centrator (Note c)	X	X	X	X	-

NOTES FOR TABLES 1.9.2.2-2 AND 1.9.2.2-3

a. (X) = Equipment receives component cooling water flow in this mode
(-) = Equipment does not receive component cooling water flow in this mode

b. Either or both spent fuel pool cooling heat exchangers can receive flow during this operating mode.

c. Assignment of the Component Cooling Water source to the Letdown Heat Exchanger, Sample Heat Exchangers, Gas Stripper and Boric Acid Concentrator is dependent upon the divisional location of these components.



NOTE:

A. A REMOVABLE SPOOL PIECE IS LOCATED ON EACH STATION SERVICE WATER SYSTEM MAKEUP LINE TO EACH CCW SURGE TANK.

FIGURE 1.9.2.2-1

COMPONENT COOLING WATER SYSTEM

SYSTEM 80+™

1.9.2.2 COMPONENT COOLING WATER SYSTEM

SUPPORTIVE INFORMATION

1. Amplifying Information

ITAAC 3

Confirmation of the CCWS heat dissipation capacity during operation, shutdown, refueling, and design basis accident conditions will be performed. An analysis will be performed based upon the as built CCWS serviced components and measured flow rates. The analysis will be based on the following:

- CCWS flow to cooled components for each plant mode
- SSWS flow to each component cooling water heat exchanger
- Design basis station service water inlet temperature
- Vendor heat exchanger data

The analysis will demonstrate that only one component cooling water pump matched with one component cooling water heat exchanger is required to operate during post-accident conditions. The analysis will also demonstrate that each division has a heat dissipation capacity to achieve and maintain cold shutdown.

ITAAC 5

Confirmation of adequate pump NPSH will include testing and analysis with the following conditions:

- Component cooling water surge tank and component cooling water pump locations and elevations.
- Component cooling water surge tank water level at a minimum value with measured isolation valve closure times for cooling loops composed of non-ASME code component cooling water piping.
- Maximum design basis component cooling water temperature.
- Pressure losses for pump inlet piping and components.
- Both component cooling water pumps operating in a single divisions

The measured/calculated pump NPSH shall exceed the pump NPSH required by the vendor.

ITAAC 10

Testing of Class 1E power availability to CCWS components will include confirmation of the following:

- Within a division, one component cooling water pump motor is powered from one Class 1E bus in that division and the other component cooling water pump motor is powered from the other Class 1E bus in that division
- Component cooling water pump control circuits of the two component cooling pumps in a division are powered from separate Class 1E buses.
- The standby component cooling water pump in each division will automatically start if the running pump in that division trips.
- On a loss of offsite power (LOOP), both component cooling water pumps in each division will be aligned to the diesel generator for that division. The load sequencer will load and start one pump. If that pump trips, the standby pump will then be automatically loaded and started.

2. Relationship of CCWS ITAAC to the Safety Analysis

The CCWS ITAAC includes inspections,tests, and analyses which confirm that the as-built system configuration and performance match the bases used in the evaluation models for licensing analysis. The CCWS characteristics and their treatment in the ITAAC are described below:

a) **BASIS:** Minimum component cooling water flow rate of 8000 gallons per minute to each containment spray heat exchanger.

ITAAC: ITAAC 3c acceptance criterion requires the CCWS to provide at least 8000 gallons per minute to each containment spray heat exchanger.

3. Relationship of CCWS ITAAC to PRA

1) The CCWS has two redundant and separate safety related divisions with heat dissipation capacity to achieve and maintain safe shutdown.

2) Each CCWS division has two CCW pumps per division.

3) The supply and return lines to and from components in a division are completely separated from the supply and return lines in the redundant division.

4) The ESF Actuation System signals isolate the non-safety related portion of the CCWS following an accident condition, except cooling for the RCPs, charging pump motor coolers, and charging pump miniflow heat exchangers.

5) The CCWS interfaces with the SSWS to remove heat from CCWS connected loads.

6) Manual Start and stop actuation of the CCW pumps is provided from the control room to override automatic actuation.

7) The two divisions of CCWS are physically separated.

8) Installed instrumentation provides the capability to monitor the performance of the system and the major components from the control room.

4. CESSAR-DC Chapter 14 Tests Applicable to CCWS ITAAC

See CESSAR-DC Section 14.2.12.1.79

1.9.2.3 DEMINERALIZED WATER MAKEUP SYSTEM

Design Description

The Demineralized Water Makeup System (DWMS) supplies water to the Condensate Storage System for makeup and to systems in the plant that require demineralized makeup water.

The Demineralized Water Makeup System does not perform any safety functions. Failure of this system does not effect plant safety.

The DWMS includes transfer pumps, demineralizers, a vacuum degasifier, a storage tank, and associated piping, valves, and controls.

A basic configuration for the Demineralized Water Makeup System is shown in Figure 1.9.2.3. Two redundant demineralizer trains are provided.

The system is controlled from local control panels.

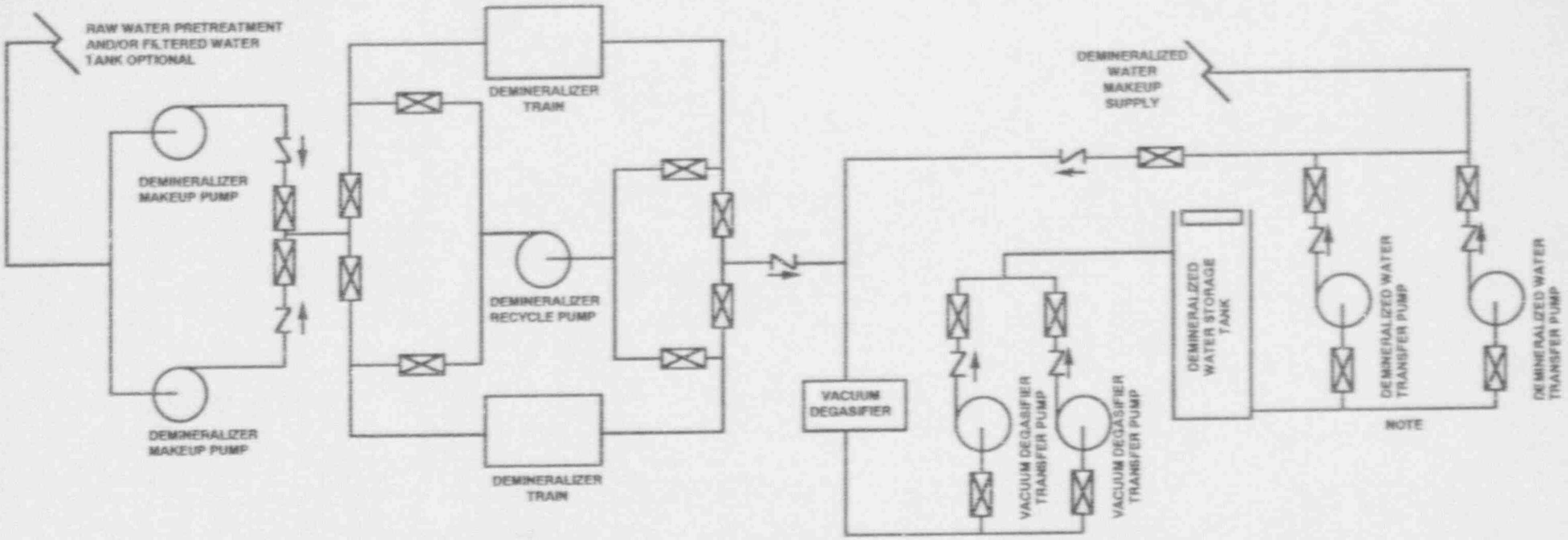
Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.2.3-1 specifies the inspections, tests, analyses and associated acceptance criteria DWMS.

TABLE 1.9.2.3-1

DEMINERALIZED WATER MAKEUP SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the Demineralized Water Makeup System is shown in Figure 1.9.2.3.	1. Inspections of the as-built system configuration will be performed.	1. The as-built configuration of the Demineralized Water Makeup System is in accordance with Figure 1.9.2.3 for the components and equipment shown.



NOTES:

1. ALL PIPING AND COMPONENTS SHOWN ARE NON-ASME CODE

2. TWO DEMINERALIZED WATER TRANSFER PUMPS ARE SHOWN. TWO PUMPS ARE THE MINIMUM NUMBER THAT CAN BE UTILIZED. HOWEVER, MORE PUMPS CAN BE PROVIDED AS NECESSARY.

FIGURE 1.9.2.3
DEMINERALIZED WATER MAKEUP SYSTEM

1.9.2.3 DEMINERALIZED WATER MAKEUP SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   N/A

2. Relationship of DWMS ITAAC to the Safety Analysis

   N/A

3. Relationship of DWMS ITAAC to PRA

   N/A

4. CESSAR-DC Chapter 14 Tests Applicable to DWMS ITAAC

   N/A

1.9.8.1 ESSENTIAL CHILLED WATER SYSTEM

Design Description

The Essential Chilled Water System (ECWS) is a safety-related system. It is a closed loop chilled water system that serves safety related HVAC cooling loads. The ECWS is a subsystem of the Chilled Water System (CWS) and provides chilled water to meet the cooling loads of the essential HVAC chilled water coils.

The Essential Chilled Water System consists of two divisions. The two mechanical divisions of the ECWS are physically separated. Each division consists of a chilled water refrigeration unit, a circulating chilled water pump, control valves, instrumentation and piping. A basic configuration of the ECWS is shown in Figure 1.9.8.1-1.

The ASME code classifications for the pressure retaining components of the Essential Chilled Water System are depicted in Figure 1.9.8.1. Components meeting ASME Code Class 3 requirements as depicted in the figure are safety related.

Components, piping and supports classified as ASME Code Class 3 are Seismic Category I. Equipment that is designated as safety related is qualified for the environment where located.

The ECWS can be actuated manually from the Control Room and is automatically actuated upon loss of the Normal Chilled Water System to furnish essential chilled water. Loss of water flow through the chillers and high chilled water outlet temperature are indicated by alarms in the Control Room.

Makeup water to the ECWS is supplied by the Demineralized Water Makeup System (DWMS). A safety related makeup line of Seismic Category I construction is provided to each division from the Station Service Water System via a spool piece which is normally removed.

Safety related components of each ECWS division are powered from their respective divisional Class 1E buses.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.8.1-1 specifies the inspections, tests, analyses and associated acceptance criteria for the ECWS.

TABLE 1.9.8.1-1

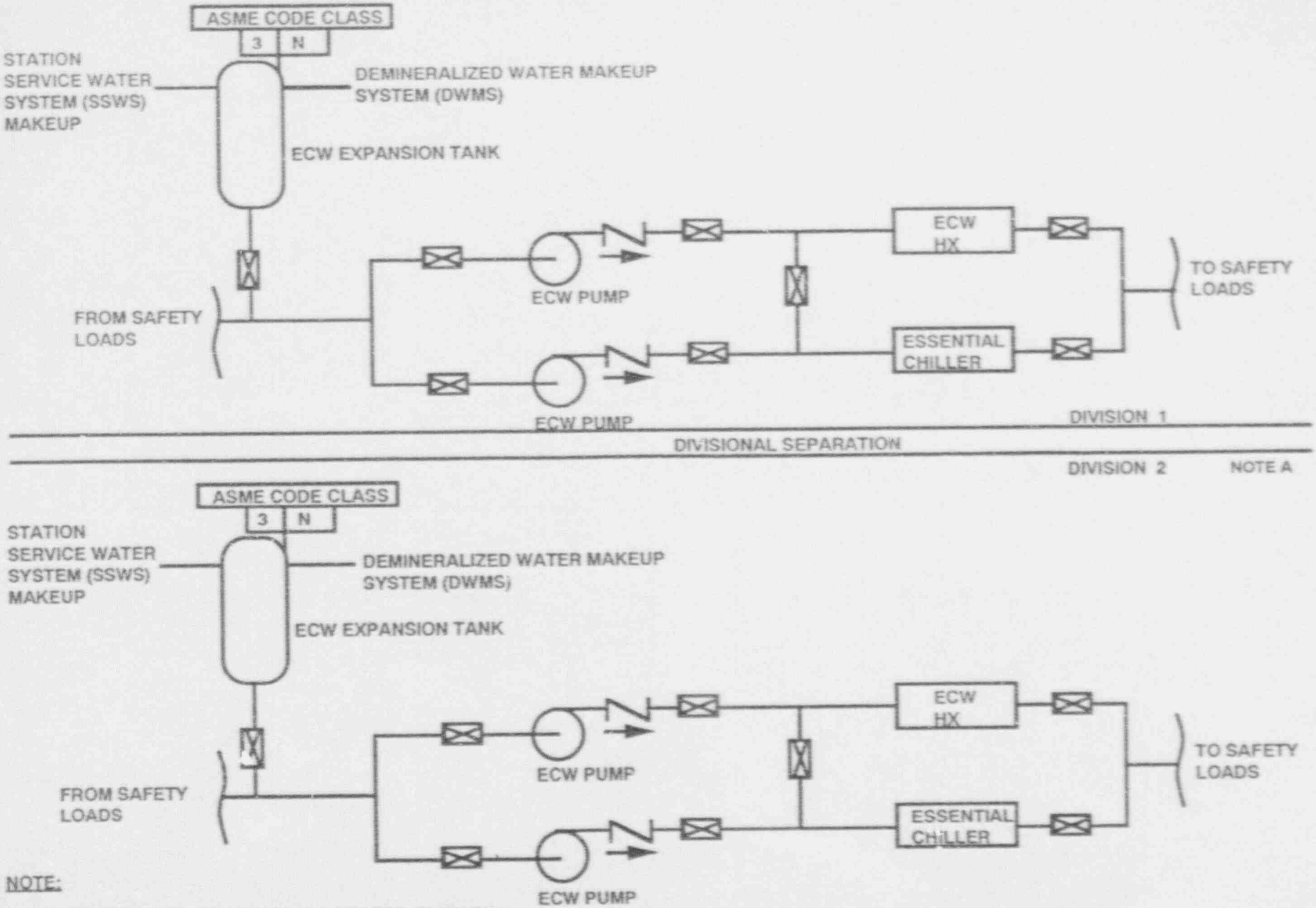
ESSENTIAL CHILLED WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the Essential Chilled Water System is shown in Figure 1.9.8.1.	1. Inspections of the as-built Essential Chilled Water System configuration will be conducted.	1. The as-built configuration of the Essential Chilled Water System is in accordance with Figure 1.9.8.1 for the components and equipment shown.
2. The two mechanical divisions of the ECWS are physically separated.	2. Inspections of divisional mechanical separations will be performed.	2. Outside containment, a divisional wall separates the two ECWS mechanical divisions.
3. The ECWS provides chilled water to meet the cooling loads of the essential HVAC chilled water coils.	3. Tests will be performed and analysis prepared to determine cooling capacity based on as-built ECWS serviced components and measured flow rates.	3. The cooling capacity of the ECWS exceeds the cooling requirements of connected HVAC cooling coils.
4. The ASME code portions of the Essential Chilled Water System retain their integrity under internal pressures experienced during service.	4. A pressure test will be conducted on those portions of the Essential Chilled Water System required to be pressure tested by the ASME code.	4. The results of the pressure test of the ASME portions of the Component Cooling Water System conform with the requirements in the ASME Code Section III.
5.a) The ECWS can be actuated manually from the Control Room and is automatically actuated upon loss of the Normal Chilled Water System to furnish essential chilled water.	5.a) Tests will be performed to actuate components of the ECWS using controls in the Control Room. A tests will also be performed using a signal which simulates loss of the Normal Chilled Water System.	5.a) Components of the ECWS can be actuated manually from the Control Room. The system is automatically actuated upon the loss of the Normal Chilled Water System.

TABLE 1.9.8.1-1 (Continued)

ESSENTIAL CHILLED WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b) Loss of water flow through the chillers and high chilled water outlet temperature are annunciated in the Control Room.	5.b) Inspection of the Control Room instrumentation alarms identified in the Certified Design Commitment will be performed. Alarm signals will be simulated.	5.b) The alarms indicated in the Certified Design Commitment are provided in the Control Room.
6. Safety related ECWS components described in the Design Description for each division of the ECWS are powered from their respective divisional Class 1E buses.	6. A test of power availability to the ECWS components described in the Design Description will be conducted with power supplied from the permanently installed electric power buses.	6. The Certified Design Commitment is met.



NOTE:

A. A REMOVABLE SPOOL PIECE IS LOCATED ON EACH STATION SERVICE WATER SYSTEM MAKEUP LINE TO EACH ECW EXPANSION LINE

FIGURE 1.9.8.1
ESSENTIAL CHILLED WATER SYSTEM

1.9.8.1 ESSENTIAL CHILLED WATER SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

ITAAC 3

Confirmation of the ECWS capacity to meet the cooling load demands of the full load of the essential HVAC chilled water coils will be performed based upon the as built ECWS serviced components and measured flow rates. The analysis will be based on the following:

- ECWS flow to HVAC cooling coils
- Measured ECWS/NCWS chiller outlet temperatures
- Measured normal chilled water flow to the essential chilled water heat exchanger
- Vendor heat exchanger data

2. Relationship of ECWS ITAAC to the Safety Analysis

N/A

3. Relationship of ECWS ITAAC to PRA

The PRA assumes that the Essential Chilled Water System is available for control room habitability and equipment qualification. The PRA also assumes that the ECWS is divisionally separate.

4. CESSAR-DC Chapter 14 Tests Applicable to ECWS ITAAC

See CESSAR-DC Section 14.2.12.1.77

1.9.8.2 NORMAL CHILLED WATER SYSTEM

Design Description

The Normal Chilled Water System(NCWS) is a non-safety system. It is a closed loop chilled water system that serves non-safety related HVAC cooling loads. The NCWS is a subsystem of the Chilled Water System (CWS) and provides chilled water to connected air handling units.

A basic configuration for the Normal Chilled Water System is shown in Figure 1.9.8.2-1 The Normal Chilled Water System is made up of two divisions. The system consists of chilled water refrigeration units, chilled water circulation pumps, expansion tanks, control valves, instrumentation, and piping.

The two NCWS divisions are connected through manually operated valves. The cross connection allows one NCWS to provide chilled water to the other division.

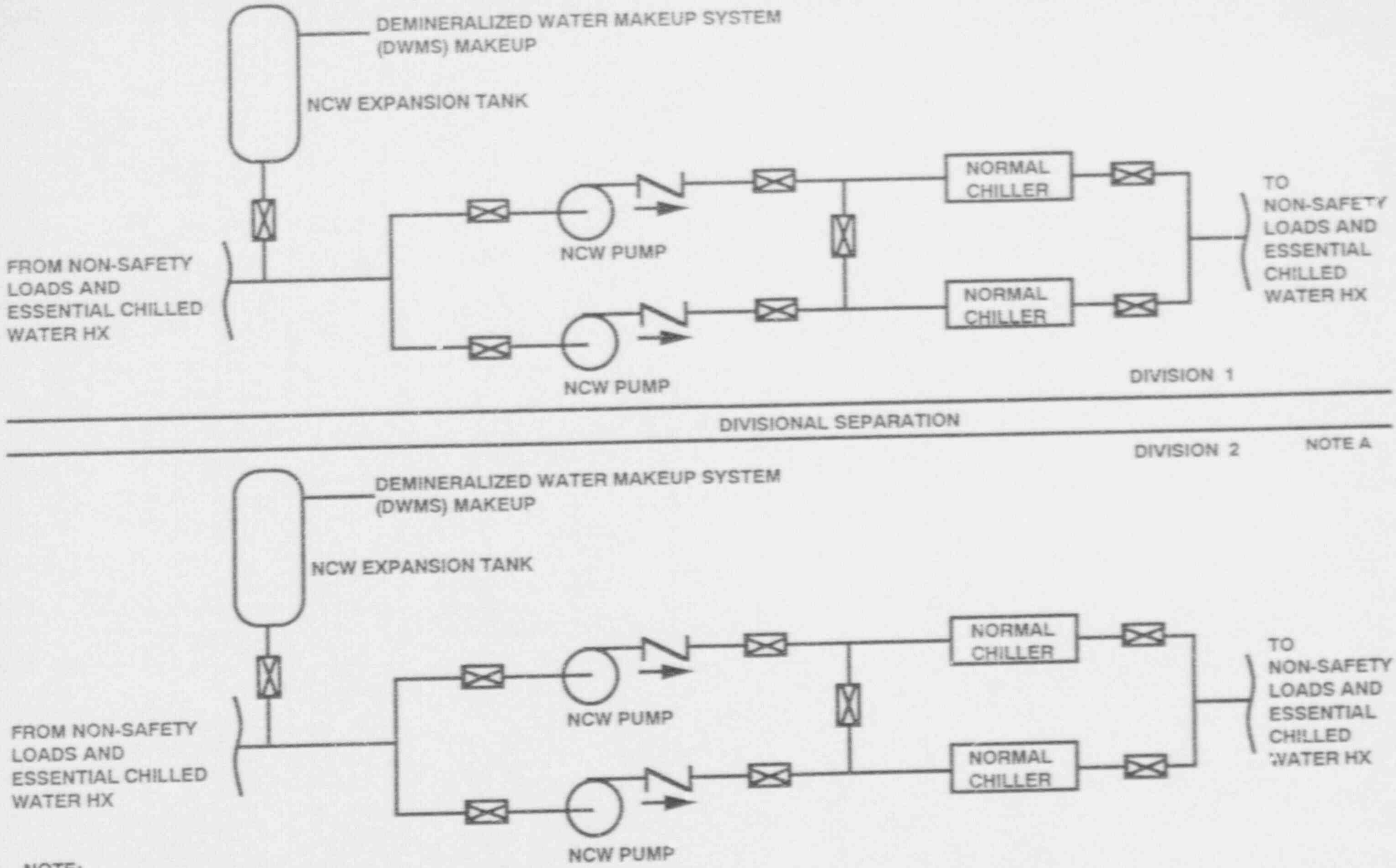
Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.8.2-1 specifies the inspections, tests, analyses and associated acceptance criteria for the Normal Chilled Water System.

TABLE 1.9.8.2-1

NORMAL CHILLED WATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration of the Normal Chilled Water System is shown in Figure 1.9.8.2-1.	1. Inspections of the as-built system configuration will be performed.	1. The as-built configuration of the Normal Chilled Water System is in accordance with Figure 1.9.8.2-1 for the components and equipment shown.
2. The two NCWS divisions are connected through manually operated valves.	2. Inspections of the as-built system configuration will be performed.	2. Manually operated valves are provided in the piping that connect the two NCWS divisions.



NOTE:

A. THE TWO NCWS DIVISIONS ARE CONNECTED TO EACH OTHER THROUGH NORMALLY CLOSED AND MANUALLY OPERATED VALVES.

FIGURE 1.9.8.2
NORMAL CHILLED WATER SYSTEM

1.9.8.2 NORMAL CHILLED WATER SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   N/A

2. Relationship of NCWS ITAAC to the Safety Analysis

   N/A

3. Relationship of NCWS ITAAC to PRA

   N/A

4. CESSAR-DC Chapter 14 Tests Applicable to NCWS ITAAC

   See CESSAR-DC Section 14.2.12.1.77

1.9.10 EQUIPMENT AND FLOOR DRAINAGE SYSTEM

Design Description

The Equipment and Floor Drainage System (EFDS) segregates and transports liquid wastes to the Liquid Waste Management System (LWMS)

Liquid wastes, valve and pump leakoffs, tank overflows, and tank drains are collected by the EFDS. The equipment and floor drains are separated according to waste types (equipment drains, floor drains, chemical wastes, and detergent wastes) to enable routing to the appropriate LWMS subsystem. Separate drain headers are provided for each drain type so that different types of liquid wastes are not mixed.

The drainage and collection systems used for radioactive liquid wastes are separate and not connected to the systems used for non-radioactive waste.

Two sumps are provided in the containment building to collect liquid waste. The containment floor drain sump is located in the holdup volume to collect floor drain wastes and leakage. The reactor cavity sump is located below the reactor vessel where no leakage is expected under operating conditions. The containment floor drain sump and the reactor cavity sump are provided with instrumentation to detect unidentified leakage inside containment.

The reactor building subsphere is divided into four quadrants each with a separate independent sump and safety-related sump pumps and instrumentation to collect leakage from the Engineered Safety Features (ESF) pumps and floor drainage within its respective quadrant. The sump pumps are ASME Code Class 3, Category 1 and are powered from their respective Class 1E busses

Floor drains in the Nuclear Annex are divisionally separated having no common drain lines between divisions. Each division's floor drains are directed to either the radioactive floor drain sump or the non-radioactive floor drain sump.

A separate CVCS area floor drain sump is provided in each division to collect and transport floor drainage to the floor drain waste tanks. Separate equipment drain sumps are provided in each division to collect CVCS equipment drainage in the Nuclear Annex.

Safety related backwater check valves are provided in drain lines from areas containing safety-related equipment to prevent backflow and flooding of those areas. The safety related check valves are fabricated in accordance with ASME Code Class 3 and Seismic Category I requirements.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.10-1 specifies the inspections, tests, analyses and associated acceptance criteria for the EFDS.

TABLE 1.9.10-1

EQUIPMENT AND FLOOR DRAINAGE SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the EFDS is shown in Figures 1.9.10-1 and 1.9.10-2.	1. Inspections of the as-built system configuration will be performed.	1. The as-built configuration of the EFDS is in accordance with Figures 1.9.10-1 and 1.9.10-2 for the components and equipment shown.
2. ASME Code portions of the EFDS retain their integrity under internal pressures that will be experienced during service.	2. A pressure test will be conducted on those portions of the EFDS required to be pressure tested by the ASME Code.	2. The results of the pressure test of ASME Code portions of the EFDS conform with the requirements in the ASME Code Section III.
3. The EFDS segregates the plant's liquid waste according to waste type, activity, and quality and routes the liquid waste to the LWMS subsystem receiving that class of waste.	3. System testing will be conducted after installation for each drain path.	3. Each equipment and floor drain and drain header are properly routed to their designed destination.
4. Reactor Building Subsphere safety-related sump pumps and associated instrumentation and controls are powered from their respective Class 1E busses and can be powered from the diesel generators.	4. A test of the power availability to the Reactor Building Subsphere safety-related sump pumps and associated instrumentation and controls will be conducted with power supplied from the permanently installed electrical power busses and diesel generators.	4. The Certified Design Commitment is met.

TABLE 1.9.10-1 (Continued)

EQUIPMENT AND FLOOR DRAINAGE SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. Safety-related backflow check valves are provided in drain lines from areas containing safety-related equipment.	5. An inspection will be performed on the backflow check valves.	5. Backflow check valves are installed in drain lines from areas containing safety related equipment.
6. Floor drains are divisionally separate having no common drain lines between divisions.	6. An inspection will be conducted on each division of floor drains.	6. A divisional wall separates floor drains in each division.
7. EFDS instrumentation indications and alarms shown in Figures 1.9.10-1 and 1.9.10-2 are available in the Control Room.	7. Inspection of the Control Room for the availability of instrumentation indications and alarms identified in the Certified Design Commitment will be performed.	7. The instrumentation indications and alarms shown in Figures 1.9.10-1 and 1.9.10-2 exist or can be retrieve in the Control Room.

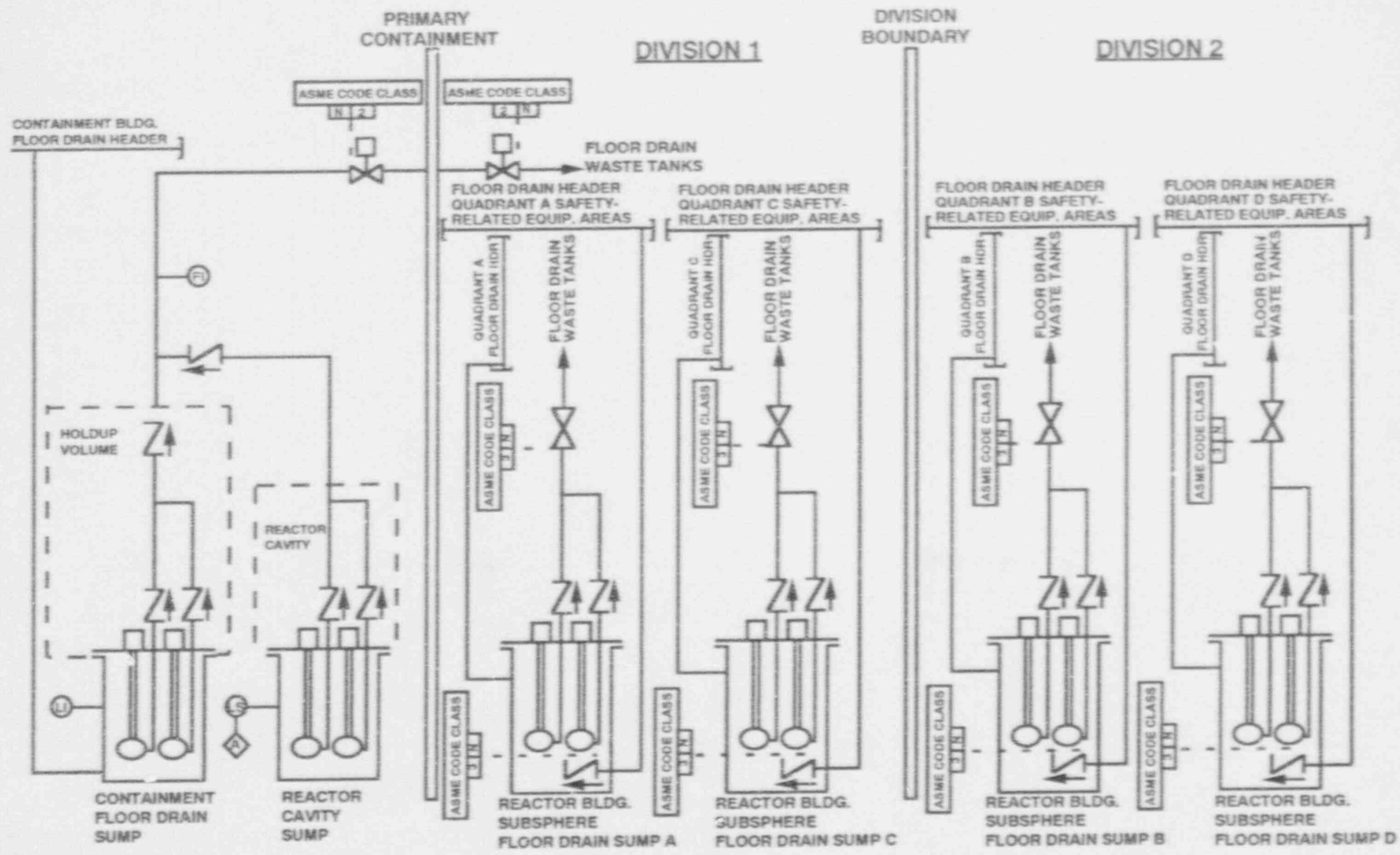


FIGURE 1.9.10-1
EQUIPMENT AND FLOOR DRAINAGE SYSTEM

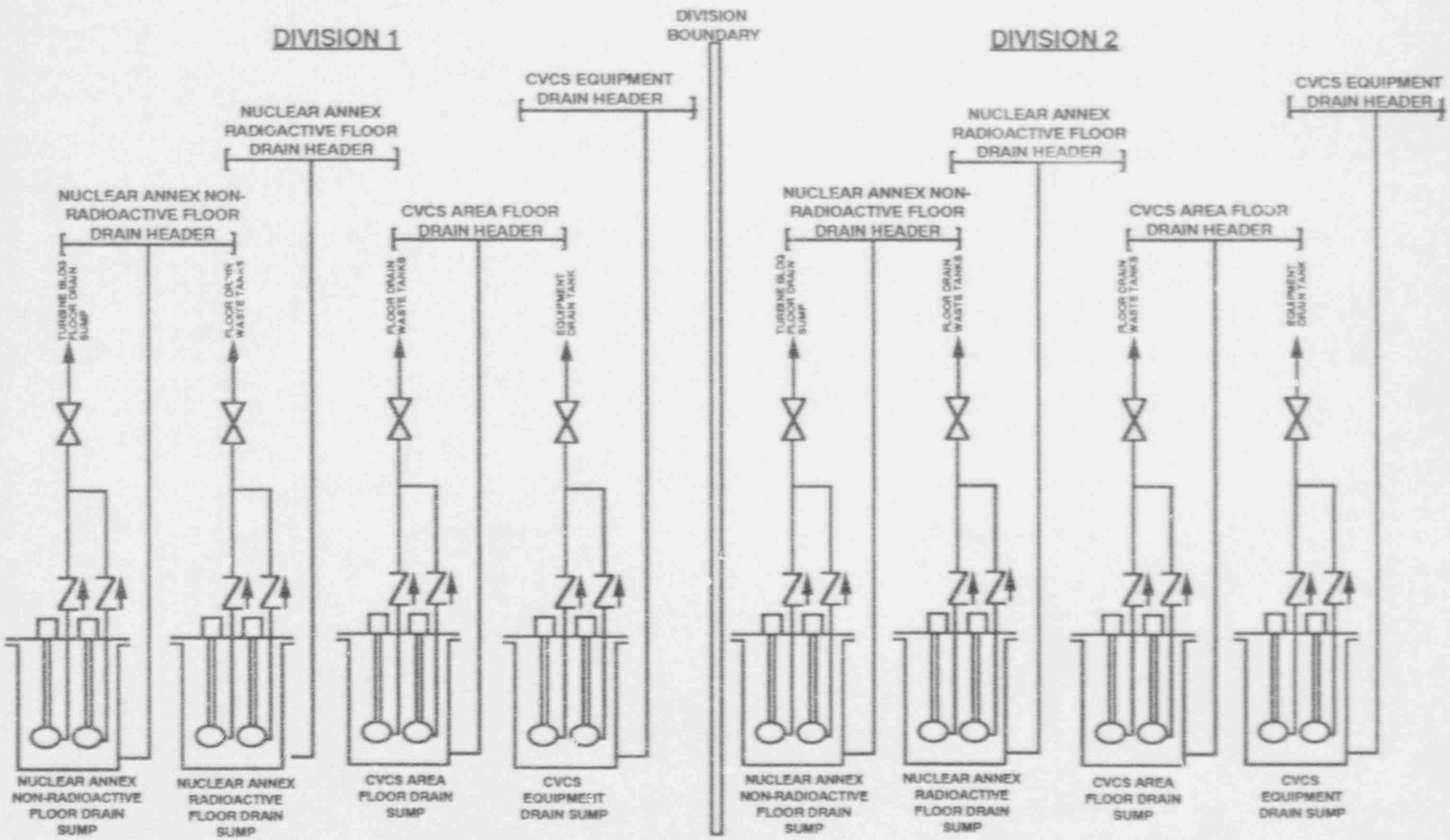


FIGURE 1.9.10-2
EQUIPMENT AND FLOOR DRAINAGE SYSTEM

1.9.10 EQUIPMENT AND FLOOR DRAINAGE SYSTEM

SUPPORTIVE INFORMATION

1. Amplifying Information

   Not Applicable

2. Relationship of EQUIPMENT AND FLOOR DRAINAGE SYSTEM ITAAC to the Safety Analysis

   Not Applicable

3. Relationship of EQUIPMENT AND FLOOR DRAINAGE SYSTEM ITAAC to PRA

   No direct downward flowpath that will allow drainage of radioactive liquids from containment.

4. CESSAR-DC Chapter 14 Tests Applicable to EQUIPMENT AND FLOOR DRAINAGE SYSTEM ITAAC

   Refer to CESSAR-DC Section 14.2.12.1.84.

1.9.11 CHEMICAL AND VOLUME CONTROL SYSTEM

Design Description

The chemical and volume control system (CVCS) does not perform accident mitigation or safety functions. Portions of the system form part of the reactor coolant pressure boundary.

Figure 1.9.11-1 shows a simplified system configuration.

The CVCS includes components, piping, instrumentation and controls to remove coolant water from the RCS, pass the coolant water through filters and ion exchangers, add and remove soluble boron from the coolant, provide spray water to the pressurizer, provide water to the RCP seals, collect controlled RCP seal bleedoff, provide water to the spent fuel pool and return water to the RCS. The letdown portion of the CVCS consists of piping and components from the RCS to the Volume Control Tank (VCT). The components include the regenerative heat exchanger (RHX), where the letdown flow is cooled by charging flow returning coolant to the RCS, the letdown heat exchanger where the letdown flow is cooled by component cooling water, parallel letdown flow control valves, parallel letdown flow orifices, filters and ion exchangers, and isolation valves. The volume control tank (VCT) receives the purified letdown flow. A separate line drains controlled bleedoff from the RCP seals to the VCT.

The charging portion of the CVCS consists of piping and components from the VCT to the RCS. The components include two parallel pumps, two parallel control valves, isolation and check valves. A branch line directs some of the charging flow to the RCPs for seal injection. The remaining charging flow is heated by letdown flow in the RHX, then goes to the RCS. A line from the chemical addition unit connects to the charging line upstream of the RHX. The auxiliary spray line branches from the charging line downstream of the RHX and is connected to the RCS pressurizer spray line.

The reactor drain tank (RDT) collects drainage, leakage, and relief fluids from the RCS (except the pressurizer safety valve discharge) and portions of systems within the reactor coolant pressure boundary (except the shutdown cooling system low temperature overpressure relief valves). The contents of the RDT can be pumped to the boron recovery and recycle portion of the CVCS. Borated and unborated makeup water can be supplied to the VCT. Borated water can also be supplied to the PCPS.

The CVCS is built to the ASME Code Section III Class requirements shown on Figure 1.9.11-1. Components, piping and supports classified as ASME Code Class 1, 2, or 3 are Seismic Category I.

The letdown line contains valves which close upon receipt of a safety injection actuation signal (SIAS) or by a containment isolation actuation signal (CIAS). The RCP controlled bleedoff line contains valves which close upon receipt of a containment spray actuation signal (CSAS). The RDT drain line and RDT reactor water makeup line contain valves which close upon receipt of a CIAS.

Control room alarms are provided for high RHX exit temperature, low letdown line pressure, and low VCT level. Valves in the letdown line are closed automatically on high temperature by a signal from a temperature indicator in the letdown line outside containment.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.11-1 specifies the inspections, tests, analyses and associated acceptance criteria for the CVCS.

TABLE 1.9.11-1

CHEMICAL AND VOLUME CONTROL SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the CVCS is shown in Figure 1.9.11-1. (NOTE 1)	1. Inspections of the as-built CVCS configuration will be performed.	1. The as-built CVCS configuration is in accordance with Figure 1.9.11-1, for the components and equipment shown.
2. ASME Code portions of the CVCS retain their integrity under internal pressures that will be experienced during service.	2. A pressure test will be conducted on those portions of the CVCS required to be pressure tested by the ASME Code.	2. The results of the pressure test of ASME Code portions of the CVCS conform with the requirements in the ASME Code Section III.
3.a) The letdown line is isolated by a safety injection actuation signal (SIAS).	3.a) Tests will be performed using a simulated SIAS. The response of the letdown isolation valves will be observed.	3.a) The two CVCS letdown isolation valves inside containment close upon receipt of a SIAS.
b) The letdown line is isolated by a containment isolation actuation signal (CIAS).	b) Tests will be performed using a simulated CIAS. The response of the letdown containment isolation valves will be observed.	b) The two letdown line containment isolation valves close upon receipt of a CIAS.
c) The RDT drain line and RDT reactor water makeup line are isolated by a CIAS.	c) Tests will be performed using a simulated CIAS. The response of the RDT drain and RWM line containment isolation valves will be observed.	c) The RDT drain and RWM line remote-operated containment isolation valves close upon receipt of a CIAS.

TABLE 1.9.11-1 (Continued)

CHEMICAL AND VOLUME CONTROL SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.d) The RCP seal controlled bleedoff line is isolated by a containment spray actuation signal (CSAS).	3.d) Tests will be performed using a simulated CSAS. The response of the RCP seal controlled bleedoff line isolation valves will be observed.	3.d) The RCP seal controlled bleedoff line isolation valves close upon receipt of a CSAS.
4. CVCS instrumentation indications and alarms shown on Figure 1.9.11-1 are available in the Control Room. Controls are available in the control room to start and stop the charging pumps, and open and close the CVCS remote-operated valves shown on Figure 1.9.11-1	4. Inspection of the Control Room for the availability of instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the CVCS controls in the Control Room.	4. The instrumentation indications and alarms shown on Figure 1.9.11-1 exist or can be retrieved in the Control Room. CVCS controls operate as specified in the Certified Design Commitment.
5. The letdown line has valves which close upon receipt of a high temperature signal.	5. Tests will be performed using a simulated a high temperature signal. The response of the letdown line isolation valves will be observed.	5. A letdown line isolation valve inside containment closes on receipt of a high temperature signal.

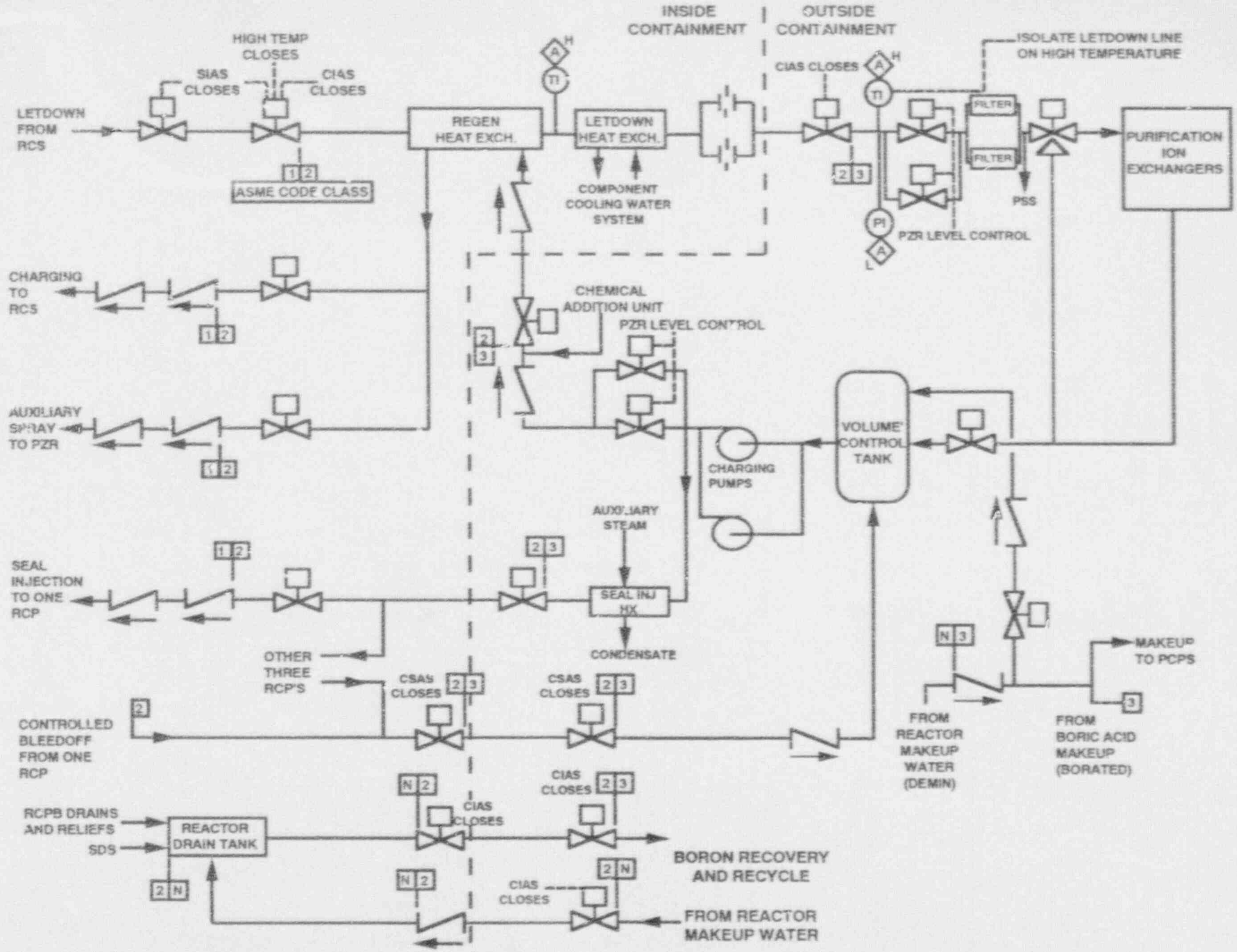


FIGURE 1.9.11-1

SYSTEM 80+ CHEMICAL AND VOLUME CONTROL SYSTEM

1.9.11 CHEMICAL AND VOLUME CONTROL SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   System Description: CESSAR-DC Section 9.3.4

2. Relationship of CVCS ITAAC to the Safety Analysis

   Basis: The letdown line is isolated on a SIAS.

   ITAAC: ITAAC 3 confirms that the letdown line is isolated on a SIAS.

   Basis: RCP seal bleedoff is isolated by a CSAS.

   ITAAC: ITAAC 3 confirms that the RCP seal bleedoff is isolated by a CSAS.

3. Relationship of CVCS ITAAC to PRA

   None

4. CESSAR-DC Chapter 14 Tests Applicable to SFSR ITAAC

   Preoperational Tests: CESSAR-DC Section 14.2.12.1.5 through 14.2.12.1.20, 14.2.12.1.60

1.9.20 COMMUNICATIONS SYSTEMS

Design Description

The Communications System provides communications between areas within the plant site including all vital areas of the plant. In addition, the Communications System provides means to communicate to plant personnel and offsite utility and regulatory officials.

The Communication System consists of the following subsystems:

1) Intraplant Portable, Wireless Communication System

2) Intraplant Private Automatic Business Exchange (PABX) Telephone System

3) Intraplant Public Address (PA) System

4) Intraplant Sound-Powered Telephone Systems

5) Offsite Communications System

6) Radio Communications System

The Intraplant Portable, Wireless Communication System provides the primary means of voice communication capability between plant personnel. In addition to portable and wireless transmitter/receivers, the system includes base stations, antennae, amplifiers and/or repeaters. Specialized system portable and wireless transmitter/receivers are provided for such applications as respirators and/or underwater diving work.

A Private Automatic Business Exchange (PABX) Telephone provides interplant communications. The Public Address (PA) System consists of audible speakers at locations in the plant.

The Sound-Powered Telephone System include the following circuits:

1) Maintenance Circuit - consists of phone jacks at locations in the plant which can be patched together to establish communications between areas.

2) Refueling Circuit - consists of phone jacks located in the areas required for refueling operations.

3) Emergency Circuit - consists of phone jacks connecting areas of the plant where shutdown operations are conducted.

Normal offsite communication is provided by the commercial telephone system and the utility private network. Utility private network lines are connected to specific telephones located in designated areas of the plant. The telephones connected to the utility private network are color coded to distinguish them from the PABX telephone system. The following networks to offsite entities are included as part of the utility private network phone system:

1) Emergency Notification System (ENS) - provides a communications link to the Nuclear Regulatory Commission (NRC)

2) Health Physics Network (HPN) - provides a communications link to NRC health physics personnel

3) Ringdown System - provides a communications link to offsite agencies.

The Portable, Wireless Communications System, PABX, PA, Sound-Powered Telephone System, and Offsite Communications System are separate networks. However, the PABX is connected to commercial telephone system and to the utility private network. The Portable, Wireless Communications System, PABX, PA, and Sound-Powered Telephone System receive power from Class 1E buses.

The Radio Communications System consisting of a security radio system and a crisis management radio system is provided.

Inspections, Tests, Analyses and Acceptance Criteria

Table 1.9.20-1 specifies the inspections, tests, analysis and associated acceptance criteria for the Communications Systems.

TABLE 1.9.20-1

COMMUNICATION SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a) The Portable, Wireless Communication System provides intraplant voice communication capability between plant personnel.	1.a) Test of the Portable, Wireless Communication System will be performed with plant background noise present.	1.a) Voice transmission and reception between locations are accomplished.
b) Specializ[illegible] system portable and wireless transmitter/receivers are provided for such applications as respirators and/or underwater diving work.	b) Tests of respirator and diving transmitters/receivers in their corresponding environment will be performed.	b) Voice transmission and reception using respirator and diving transmitters/receivers in their corresponding environment are accomplished.
2. The Private Automatic Business Exchange (PABX) Telephone System provides intraplant communications.	2. Tests of the PABX Telephone System from all terminals will be performed with plant background noise present.	2 Voice transmission and reception between plant terminals are accomplished.
3. The Public Address (PA) System is capable of alerting plant personnel by means of audible speakers located throughout the plant.	3. Tests of the PA System will be performed with plant background noise present.	3. Voice broadcast in areas where PA speakers are located is accomplished.
4. The Sound-Powered Telephone System include the following circuits:	4. Inspections and tests of individual circuit phone jacks will be performed with plant background noise present.	4. Interconnection and communication using the Sound-Powered Telephone System are accomplished in each circuit.
a) Maintenance Circuit - consists of phone jacks at locations in the plant which can be patched together to establish communications between areas.		

TABLE 1.9.20-1 (Continued)

COMMUNICATION SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.b) Refueling Circuit - consists of phone jacks located in the areas required for refueling operations.		
c) Emergency Circuit - consists of phone jacks connecting areas of the plant where shutdown operations are conducted.		
5. The following networks to offsite entities are included as part of the utility private network phone system: a) Emergency Notification System - provides a communications link to the Nuclear Regulatory Commission (NRC) b) Health Physics Network (HPN) - provides a communications link to NRC health physics personnel c) Ringdown System - provides a communications link to offsite agencies. The telephones connected to the utility private network are color coded to distinguish them from the PABX telephone system.	5. Inspections and tests of the utility private network phone terminals at installed locations will be performed with plant background noise present.	5. Utility private network telephones are color coded to distinguish them from PABX telephones. Communication links with the entities identified in the Certified Design Commitment is demonstrated using the utility private network phone terminals.

TABLE 1.9.20-1 (Continued)

COMMUNICATION SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The Portable, Wireless Communications System, PABX, PA, Sound-Powered Telephone System, and Offsite Communications System are separate networks.	6. Simulate failure of each communication system.	6. Each system in the Certified Design Commitment operates without reliance on operation of another communication system.
7. The PABX is connected to commercial telephone system and to the utility private network.	7. Test of the PABX Telephone System will be performed.	7. The capability to connect to PABX telephone terminals to the commercial telephone system and to the utility private network is demonstrated.
8. The Portable, Wireless Communications System, PABX, PA, and Sound-Powered Telephone System receive power from Class 1E buses.	8. A test of power availability to the systems described in the Certified Design Commitment will be conducted with power supplied from the permanently installed electrical power buses.	8. The Certified Design Commitment is met.
9. The Radio Communications System consisting of a security radio system and a crisis management radio system is provided.	9. An inspection of the security radio system and the crisis management radio system will be performed. Tests of each radio system will be performed.	9. Two way communication is demonstrated between participating entities for each system.

1.9.20 COMMUNICATIONS SYSTEMS

SUPPORTIVE INFORMATION

1. Amplifying Information

   N/A

2. Relationship of CS ITAAC to the Safety Analysis

   N/A

3. Relationship of CS ITAAC to PRA

   The PRA assumes that the Communications Systems exist.

4. CESSAR-DC Chapter 14 Tests Applicable to CS ITAAC

   See CESSAR-DC Section 14.2.12.1.87

1.9.21 LIGHTING SYSTEM

Design Description

The Lighting System provides illumination at locations in the plant and the plant site, including the vital areas. The Lighting System is composed of three subsystems: Normal Lighting System, Security Lighting System, and Emergency Lighting System.

The Normal Lighting System provides general illumination at locations in the plant. The Normal Lighting System receives power from non-Class 1E buses.

The Security Lighting System provides the illumination in isolation zones and the outdoor areas within the plant protected perimeter. The Security Lighting System receives power from the permanent non-safety buses. Portions of the Security Lighting System essential to maintaining plant protection are powered from an uninterruptible power supply. The Security Lighting System provides a minimum illumination of 0.2 foot-candles when measured horizontally at ground level.

The Emergency Lighting System provides illumination in the vital areas including the Control Room, Technical Support Center, Operations Support Center, the Remote Shutdown Panel Room, the stairway which provides access from the Control Room to the Remote Shutdown Panel Room, Sample Room, Hydrogen Recombiner Rooms, routes for personnel passage and egress, and areas where operator access is required post-accident or hazard. Emergency lighting in the Control Room is installed so that alternating lighting fixtures are fed from separate Class 1E divisions. The system provides a minimum illumination level of 10 foot-candles in areas of the plant where emergency operations are performed. For other areas of the plant covered by the Emergency Lighting System, the system provides a minimum illumination level of 2 foot-candles.

The Emergency Lighting System is designed as Seismic Category I. Components of the Emergency Lighting System are powered from Class 1E buses. The Emergency Lighting System employs two illumination methods:

A) AC fixtures powered from Class 1E AC power sources, and

B) DC self-contained, battery-operated lighting units.

The self-contained, battery-operated lighting units have the following provisions to function without AC power:

A) Battery life of at least 8 hours at rated load, and

B) Battery loading of each unit not greater than 80% of the rated capacity with additional derating for temperature variations and

C) A shutoff time delay to continue operation for a pre-set time interval following restoration of AC power and

D) Capability to lock the power supply breakers which supply the units in the "energized" position.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.21-1 ~~provides~~ specifies the inspections, tests and/or analyses and associated acceptance criteria.

LIGHTING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The Normal Lighting System provides general illumination at locations in the plant.	1. Inspections of the installed Normal Lighting System will be performed.	1. The Normal Lighting System has been installed.
2.a) The Security Lighting System provides illumination in isolation zones and outdoor areas within the plant protected perimeter.	2.a) Inspections of isolation zones and plant outdoor areas within the plant protected perimeter will be performed. Tests to measure illumination levels will also be performed.	2.a) The Security Lighting System maintains illumination levels ≥ 0.2 foot-candles when measured horizontally at ground level in isolation zones and outdoor areas within the plant protected perimeter.
b) The Security Lighting System receives power from the permanent non-safety buses.	b) A test of power availability for the Security Lighting System will be conducted with power supplied from the permanently installed electrical power busses.	b) The Certified Design Commitment is met.
c) Portions of the Security Lighting System essential to maintaining plant protection are powered from an uninterruptible power supply.	c) A test of power availability for the Security Lighting System will be conducted.	c) Portions of the Security Lighting System are powered from a battery power source.
3.a) The Emergency Lighting System illuminates vital areas as described in the Design Description, routes for personnel passage and egress, and other areas where operator access is required post-accident or hazard.	3.a) Inspections of areas as specified in the Design Description.	3.a) Emergency lighting is installed in the areas specified in the Design Description.

TABLE 1.9.21-1 (Continued)

LIGHTING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b) Components of the Emergency Lighting System are powered from Class 1E buses.	3.b) A test of power availability for the Emergency Lighting System will be conducted with power supplied from the permanently installed electrical power buses.	3.b) The Certified Design Commitment is met.
c) The Emergency Lighting System provides a minimum illumination level of 10 foot-candles in those areas of the plant where emergency operations are performed. For other areas of the plant covered by the Emergency Lighting System, the system provides a minimum illumination level of 2 foot-candles.	c) Tests to measure illumination levels will be performed at areas specified in the Design Description.	c) The Certified Design Commitment is met.
d) Emergency lighting in the Control Room is installed so that alternating lighting fixtures are powered from separate Class 1E divisions.	d) A test of power availability for the Emergency Lighting System will be conducted with power supplied from the permanently installed electrical power busses.	d) Alternating lighting fixtures in the control room are powered from separate Class 1E divisions.
4. Self-contained, battery-operated lighting units of the Emergency Lighting System have the following provisions to function without AC power:	4. Inspection and tests of self-contained, battery-operated lighting units, tests of the emergency lighting unit time delay, and inspections of the power supply breakers locking devices will be performed.	4. The Certified Design Commitment is met.

TABLE 1.9.21-1 (Continued)

LIGHTING SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. (Continued)		
a) Battery life of at least 8 hours at rated load.		
b) Battery loading of each unit not greater than 80% of the rated capacity with additional derating for temperature variations.		
c) A shutoff time delay to continued operation for a pre-set time interval following restoration of AC power.		
d) Capability to lock the power supply breakers which supply the units in the "energized" position.		

1.9.21 LIGHTING SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   ITAAC 2

   Security lighting will be provided in areas as detailed in the Security Plan. The Security plan will also detail which portions of the Security Lighting System are powered from an uninterruptible power source.

   ITAAC 3

   Vital areas, routes for personnel passage and egress, and other areas where operator access is required post-accident or hazard will be detailed in plant emergency procedures and hazards analysis. The plant emergency procedures and hazards analysis will identify areas where emergency lighting is needed.

2. Relationship of LS ITAAC to the Safety Analysis

   N/A

3. Relationship of LS ITAAC to PRA

   The PRA assumes that emergency lighting is available to allow operator access.

4. CESSAR-DC Chapter 14 Tests Applicable to LS ITAAC

   See CESSAR-DC Section 14.2 12.1.85 and 14.2.12.1.86

1.9.22 DIESEL GENERATOR SUPPORT SYSTEMS

Design Description

The Diesel generator support systems described below are safety-related.

1) Diesel Generator Engine Fuel Oil System - Storage tanks provide storage of no less than a seven day supply of fuel oil at full load plus a ten percent margin for performance testing and supplies the fuel oil to the diesel engine. Each day tank has a capacity to maintain at least 60 minutes of operation from the level where fuel oil is automatically added to the tank.

2) Diesel Generator Engine Cooling Water System - provides cooling water to the diesel engine.

3) Diesel Generator Starting Air System - provides start capability for the diesel generator engine by using compressed air to rotate the engine until combustion begins and the diesel engine accelerates under its own power. The starting air storage capacity for each diesel generator engine allows at least five successful engine starts without use of the starting air compressors.

4) Diesel Generator Engine Lube Oil System - delivers lubricating oil to the diesel generator engine.

5) Diesel Generator Engine Air Intake And Exhaust System - supplies air for combustion to the diesel engine and removes engine exhaust.

6) Diesel Generator Building Sump Pump System - removes leakage and equipment drainage from the diesel generator building.

Independent diesel generator support systems are provided for each diesel generator. Basic configurations for the diesel generator support systems are shown in Figures 1.9.22.1 through 1.9.22.6.

The ASME code classifications for the pressure retaining portions of the diesel generator support systems are depicted in Figures 1.9.22.1 through 1.9.22.6. Components meeting ASME Code Class 3 requirements as depicted in the figures are safety related.

Components, piping, and supports classified as ASME Code Class 3 are Seismic Category I. Equipment that is designated as safety related is qualified for the environments where located.

Safety related components of each division of the diesel generator support systems are powered from their associated divisional Class 1E buses.

Inspection, Tests, Analyses and Acceptance Criteria:

Table 1.9.22-1 specifies the inspections, tests, analyses and associated acceptance criteria for the Diesel Generator Engine Fuel Oil System.

TABLE 1.9.22-1

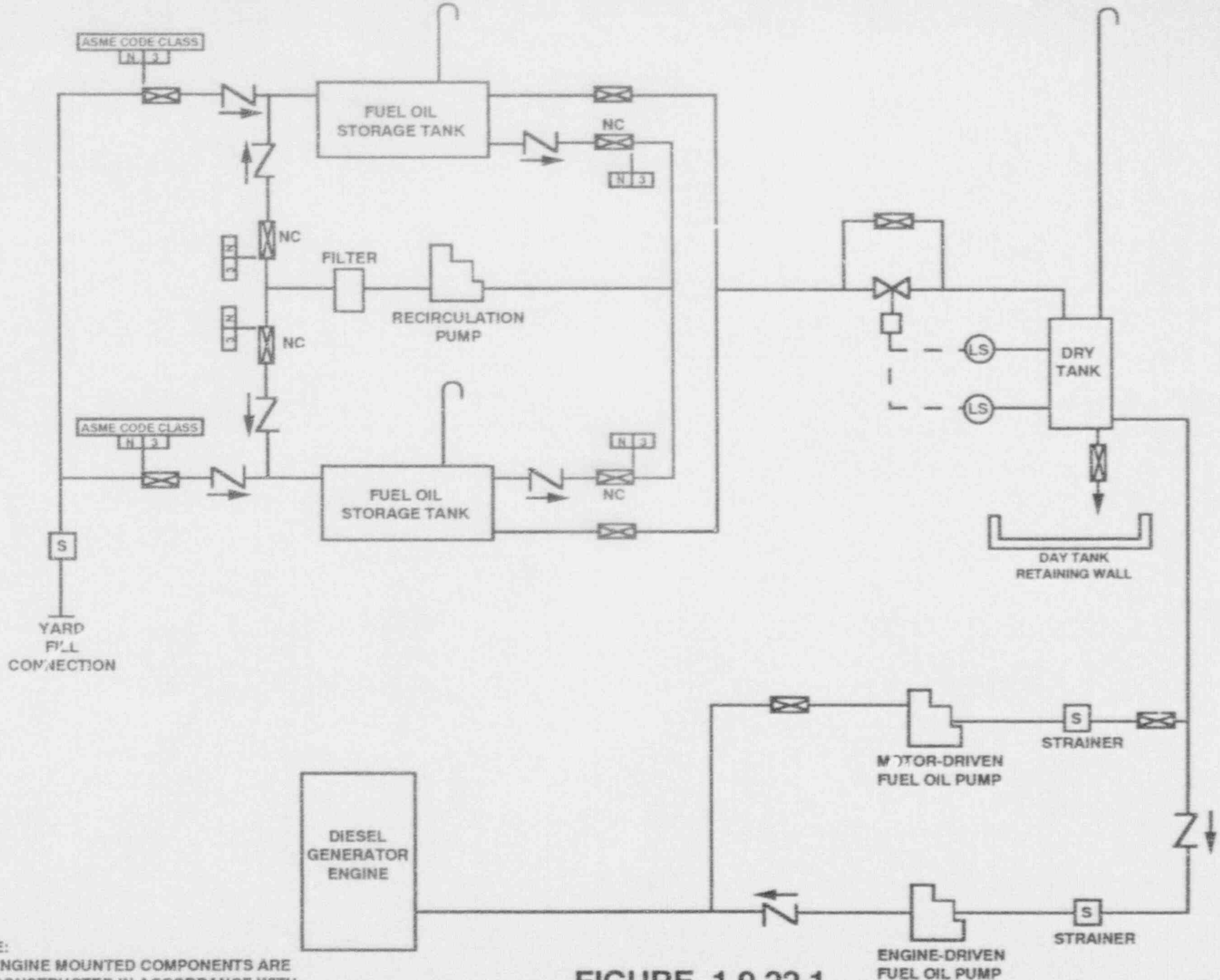
DIESEL GENERATOR SUPPORT SYSTEMS
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Basic configurations of the diesel generator support systems are shown in Figures 1.9.22.1 through 1.9.22.6.	1. Inspections of the as-built diesel generator support systems will be conducted.	1. The as-built configuration of the diesel generator support systems are in accordance with Figures 1.9.22.1 through 1.9.22.6 for the components and equipment shown.
2. Independent diesel generator support systems are provided for each diesel generator.	2. Inspections of the as-installed diesel support systems will be performed.	2. A divisional wall separates mechanical divisions of the diesel generators and their associated support systems.
3. Storage tanks for each diesel generator provide a combined storage of no less than a seven day supply of fuel oil at full load, plus a ten percent margin for performance testing.	3. An analysis will be prepared based upon as-procured diesel generator data.	3. The two storage tanks for each diesel generator meet the capacity requirements specified in the Certified Design Commitment.
4. Each day tank has a capacity to maintain at least 60 minutes of operation from the level where oil is automatically added to the tank.	4. Tests of the diesel generator will be performed at full load conditions.	4. The day tank provides at least 60 minutes of running time for the diesel generator without fuel oil being added automatically to the tank.
5. The starting air storage capacity for each diesel generator engine allows at least five successful engine starts without use of the starting air compressors.	5. Tests of the diesel generator engine starting capabilities will be performed.	5. The diesel generator engine starts at least five consecutive times without use of the starting air compressors.

TABLE 1.9.22-1 (Continued)

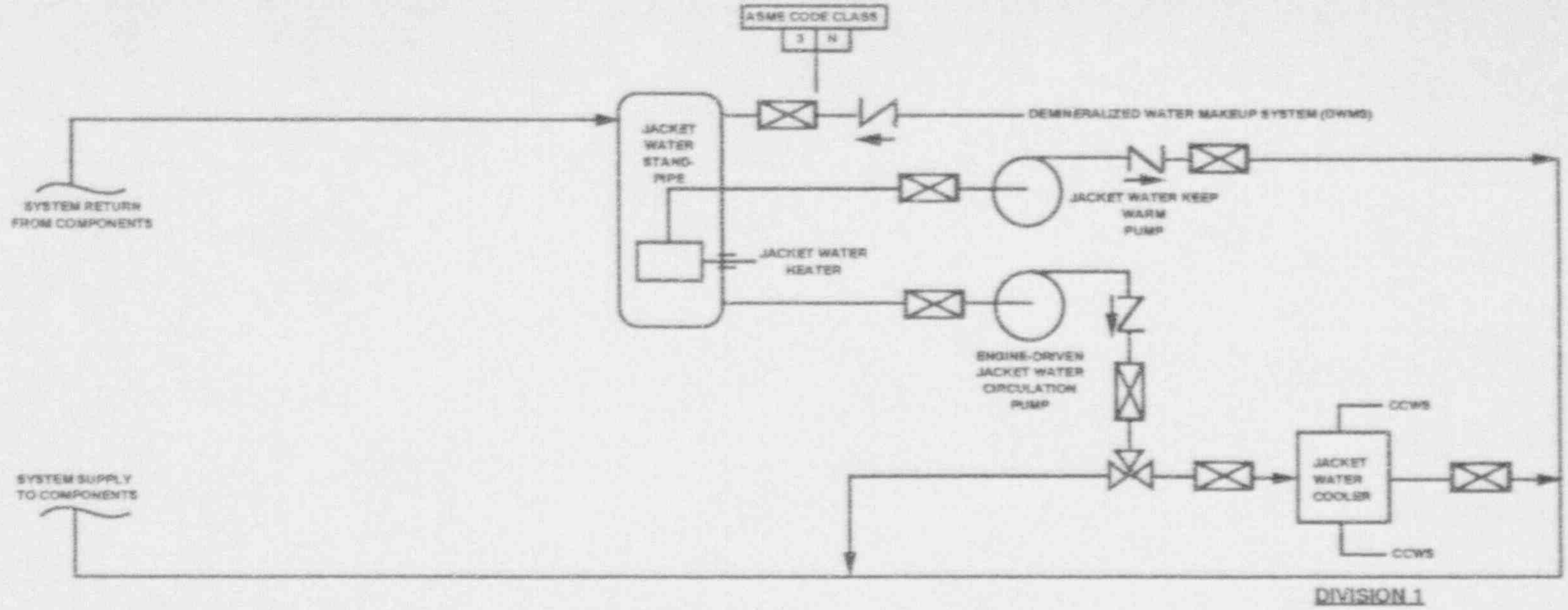
DIESEL GENERATOR SUPPORT SYSTEMS
Inspections, Tests, Analyses, and Acceptance Criteria

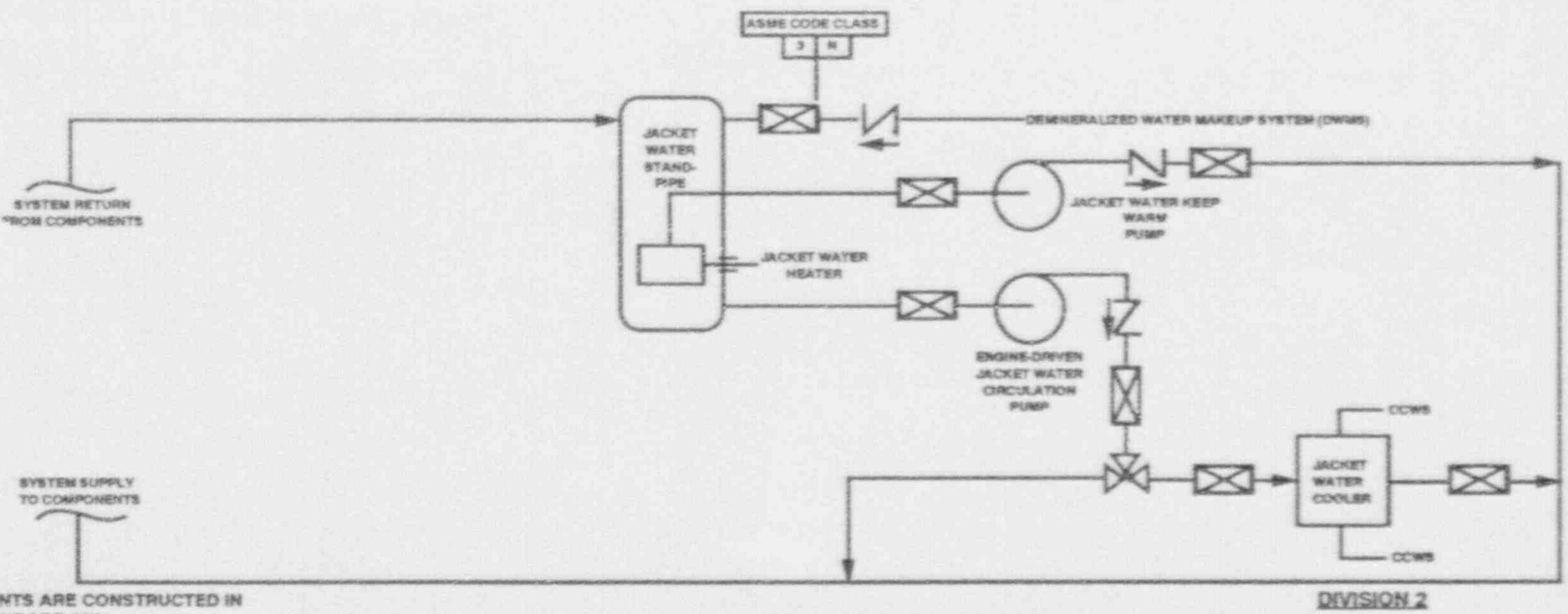
Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The ASME code portions of the diesel generator engine support systems retain their integrity under internal pressures experienced during service.	6. A pressure test will be conducted on those portions of the diesel generator support systems required to be pressure tested by the ASME code.	6. The results of the pressure test of the ASME portions of the diesel generator support systems conform with the requirements in the ASME Code Section III.
7. Safety related components described in the Design Description for each division of the diesel generator support systems are powered from their respective divisional Class 1E buses.	7. A test of power availability to the diesel generator support systems' components described in the Design Description will be conducted with power supplied from the permanently installed electric power buses.	7. The Certified Design Commitment is met.



NOTE:
A. ENGINE MOUNTED COMPONENTS ARE CONSTRUCTED IN ACCORDANCE WITH IEEE STANDARD 387

FIGURE 1.9.22.1
DIESEL GENERATOR ENGINE FUEL OIL SYSTEM
(DIVISIONAL CONFIGURATION)





NOTE:
A. ENGINE MOUNTED COMPONENTS ARE CONSTRUCTED IN ACCORDANCE WITH IEEE STANDARD 387

FIGURE 1.9.22.2
DIESEL GENERATOR ENGINE COOLING WATER SYSTEM

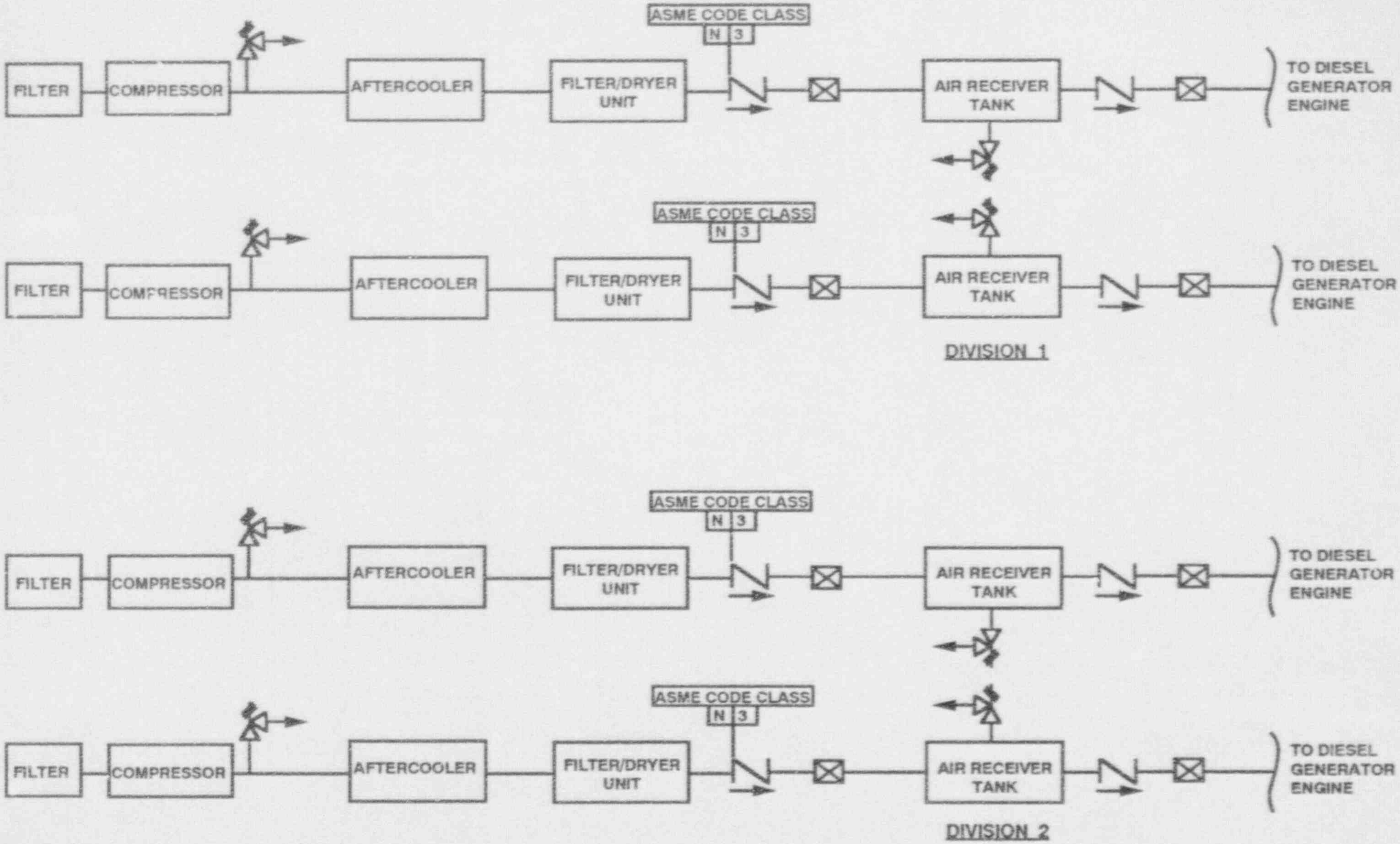


FIGURE 1.9.22.3
DIESEL GENERATOR ENGINE STARTING AIR SYSTEM

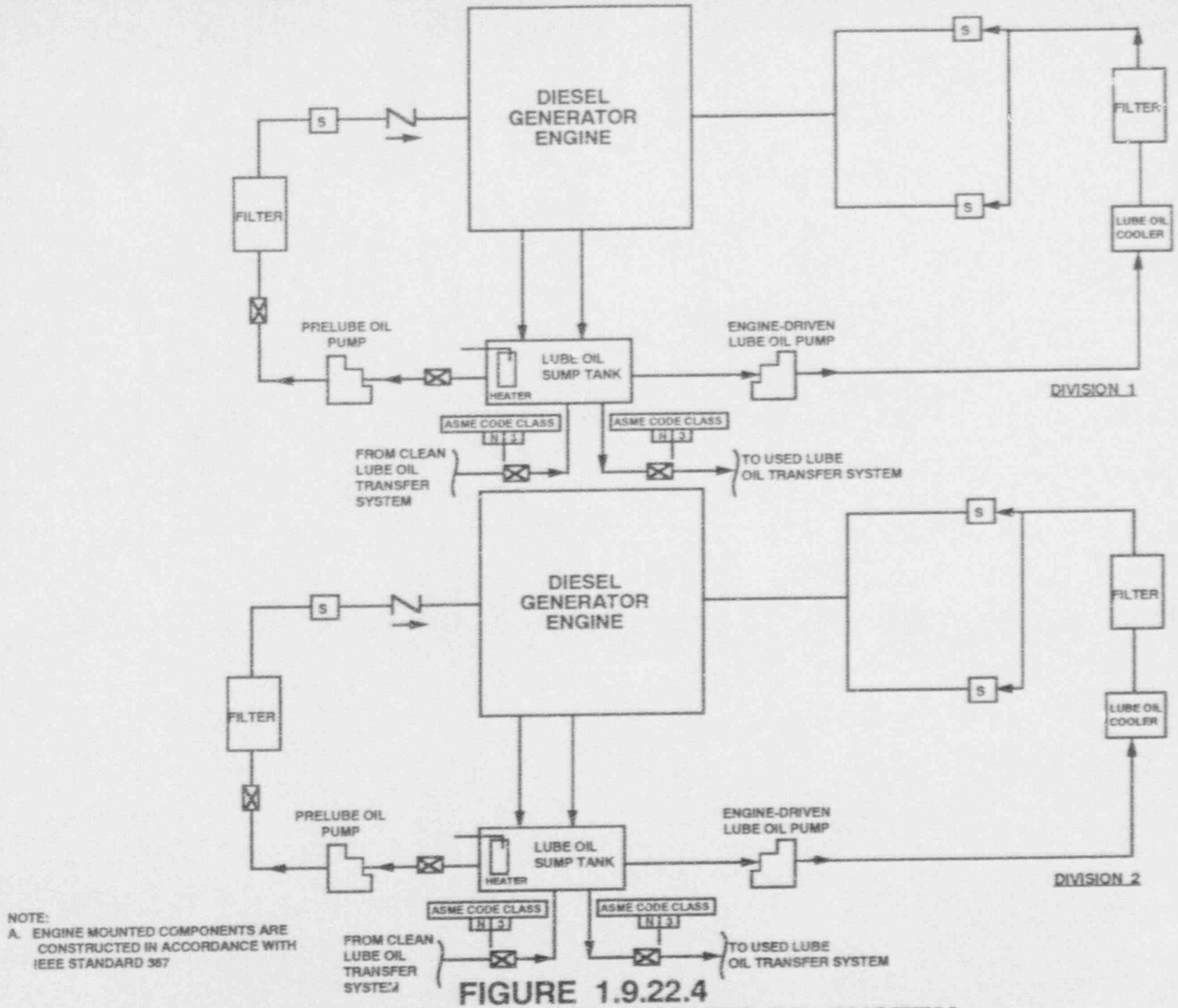
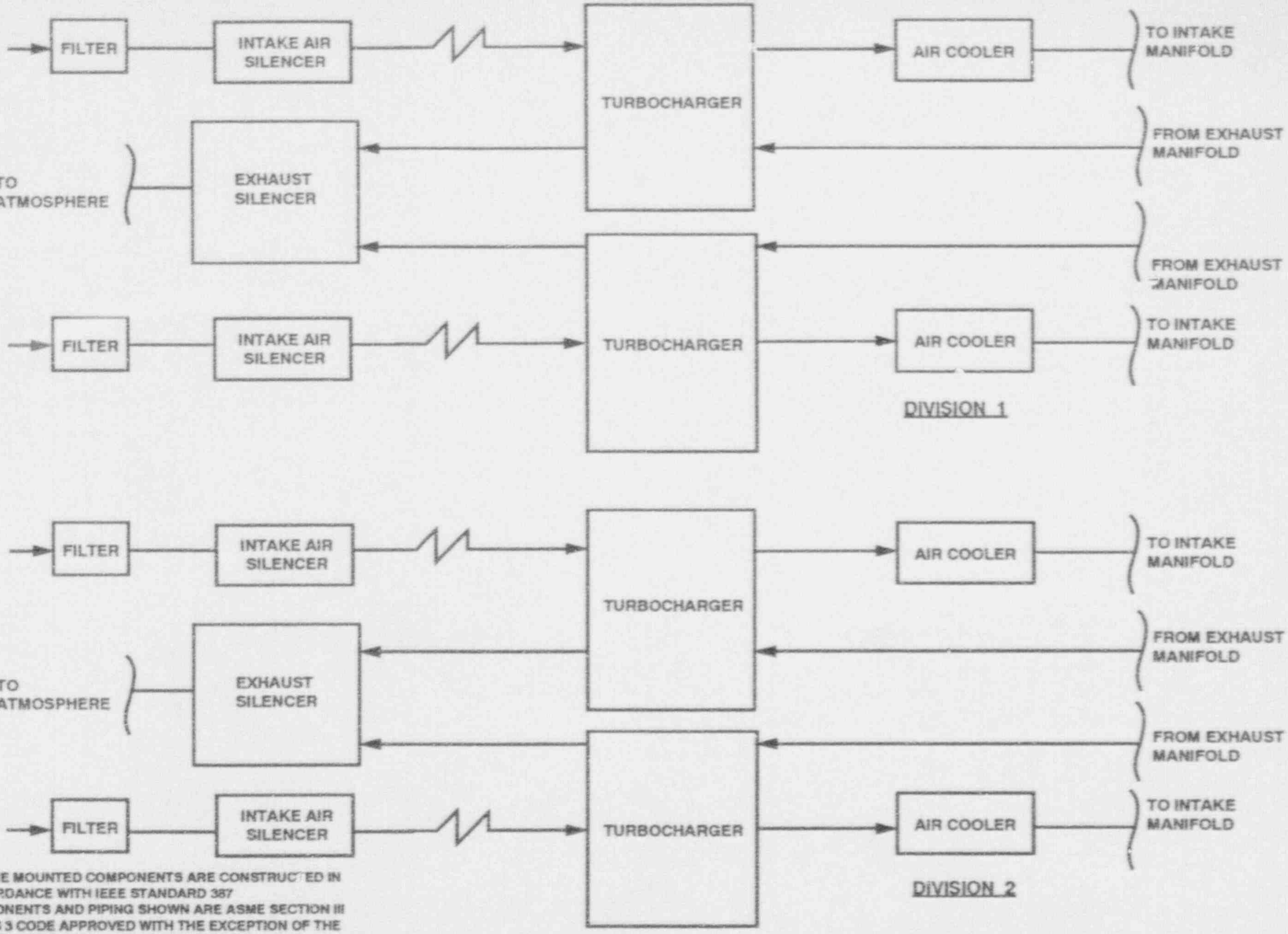


FIGURE 1.9.22.4
DIESEL GENERATOR ENGINE LUBE OIL SYSTEM



NOTES:

A. ENGINE MOUNTED COMPONENTS ARE CONSTRUCTED IN ACCORDANCE WITH IEEE STANDARD 387

B. COMPONENTS AND PIPING SHOWN ARE ASME SECTION III CLASS 3 CODE APPROVED WITH THE EXCEPTION OF THE INTAKE FILTER, INTAKE SILENCER, AND EXHAUST SILENCER. THESE COMPONENTS ARE SEISMICALLY QUALIFIED BY SHAKER TABLE TESTS OR ANALYSIS PERFORMED BY MANUFACTURER.

C. THE FINAL SYSTEM CONFIGURATION IS DEPENDENT UPON THE AS-PROCURED DIESEL GENERATOR ENGINE

FIGURE 1.9.22.5
DIESEL GENERATOR ENGINE AIR INTAKE AND EXHAUST SYSTEM

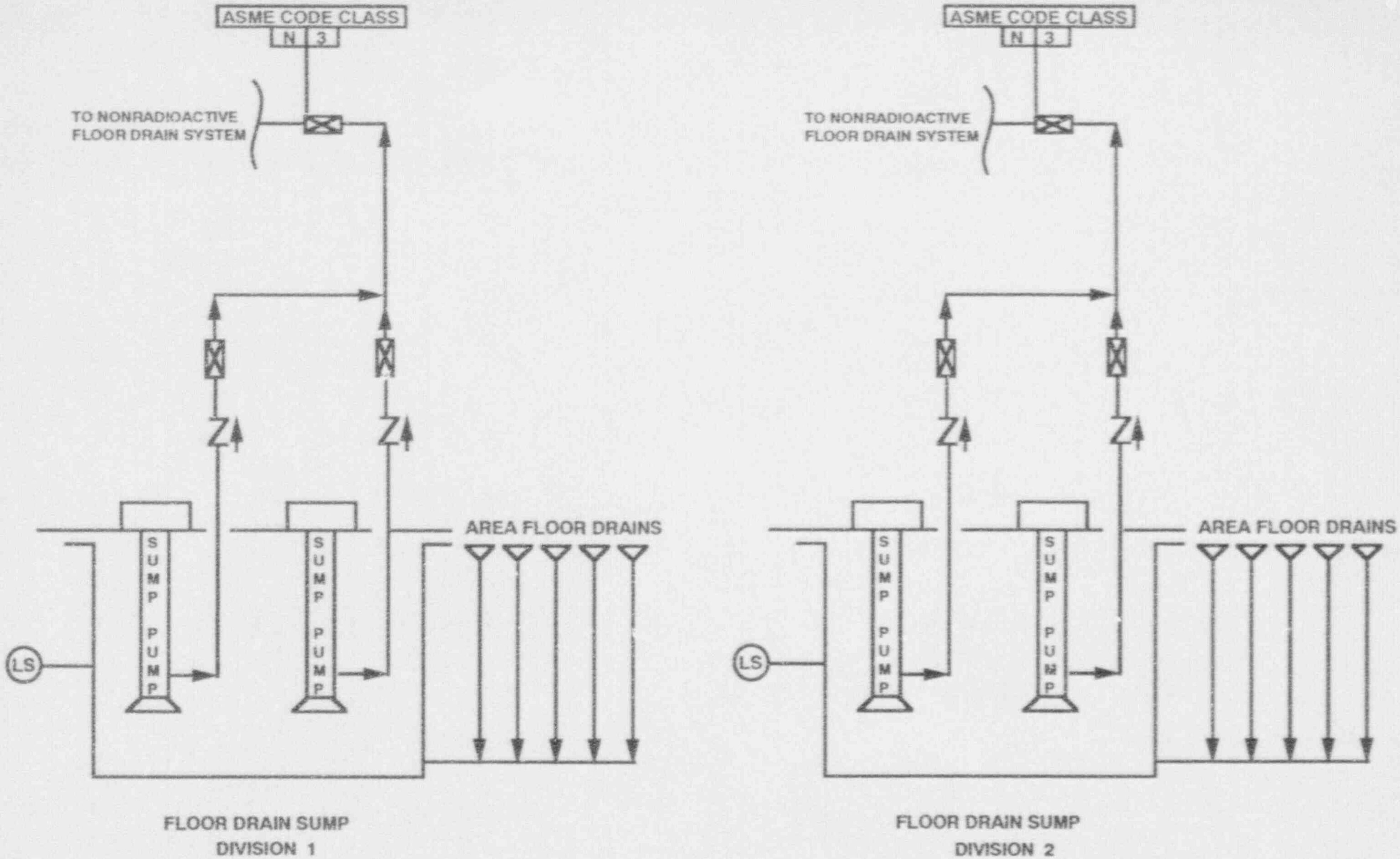


FIGURE 1.9.22.6
DIESEL GENERATOR BUILDING SUMP PUMP SYSTEM

1.9.22 DIESEL GENERATOR SUPPORT SYSTEMS

SUPPORTIVE INFORMATION

1. Amplifying Information

   ITAAC 3

   Confirmation that each pair of storage tanks are sized to provide a combined storage of no less than a seven day supply of fuel oil plus a ten percent margin will be performed. The analysis will be based on the following:

   - Fuel consumption rate at rated load or actual load as provided by the diesel generator engine manufacturer.
   - Time intervals at different loads, if applicable.

2. Relationship of DGSS ITAAC to the Safety Analysis

   N/A

3. Relationship of DGSS ITAAC to PRA

   The PRA for the diesel generator support systems assume the following:

   A. Each emergency diesel generator has two independent starting air systems.

   B. The starting air storage capacity for each emergency diesel generator is sufficient for starting the diesel generator for a minimum of five times.

   C. Each emergency diesel generator has an independent fuel oil storage system. The storage system has sufficient fuel that allows the emergency diesel generator to operate at full power for a time period of no less than seven days.

   D. Fuel oil is transferred from the storage system to the day tank of each emergency diesel generator. The day tank has sufficient capacity to allow the emergency diesel generator to operate at full load for approximately 60 minutes without being replenished.

   E. Transfer from the storage system to the day tanks is performed automatically.

4. CESSAR-DC Chapter 14 Tests Applicable to DGSS ITAAC

   See CESSAR-DC Section 14.2.12.1.95

1.9.24 ULTIMATE HEAT SINK

Design Description

The Ultimate Heat Sink (UHS) provides the source of cooling water that transfers heat from the Station Service Water System (SSWS) to the environment.

The Ultimate Heat Sink is not within the scope of the certified design. The site specific UHS will meet the interface requirements defined below.

Interface Requirements

The UHS meets Seismic Category I requirements and its function is not lost during or after any of the following events:

1. Natural phenomena including safe shutdown earthquake, tornado, flood, and drought.
2. Site related events including transportation accidents, oil spills, and fires.
3. Credible single failures of man-made structures.
4. Sabotage.

The UHS is capable of providing cooling to support operation, shutdown, refueling, and design basis accident conditions. The Ultimate Heat Sink is capable of providing an SSWS inlet temperature that does not exceed the maximum allowable temperature required for removing heat from the component cooling water heat exchanger during a design basis accident concurrent with a loss of offsite power.

For sites with severe winters, where ice formation in the Ultimate Heat Sink could occur, the function of the Ultimate Heat Sink is not impaired during winter months. Where required, the intake structures will be provided with a means of deicing to prevent flow blockage of the station service water pump inlets.

A site water chemistry analysis for the Ultimate Heat Sink will be performed to determine if a water treatment system is required to minimize corrosion and fouling of the Station Service Water System.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.9.24 specifies the inspections, tests, analyses and associated acceptance criteria for the Ultimate Heat Sink.

ULTIMATE HEAT SINK
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The UHS is capable of providing cooling to support operation, shutdown, refueling, and design basis accident conditions. The Ultimate Heat Sink is capable of providing an SSWS inlet temperature that does not exceed the maximum allowable temperature for removing heat from the component cooling water heat exchanger during a design basis accident coincident with a loss of offsite power.	1. Analyses will be performed to demonstrate UHS heat removal capacity based upon site meteorological conditions. The accident analysis shall extend from the start of the accident through a 30 day time period, shall be based on the worst case meteorological conditions for the site based on the guidelines given in Regulatory Guide 1.27, and shall consider no water makeup to the Ultimate Heat Sink for 30 days.	1. The facility specific SAR commits that the Ultimate Heat Sink is capable of providing cooling to support operation, shutdown, refueling, and design basis accident conditions and the accident analysis demonstrates that the UHS provides an SSWS inlet temperature that does not exceed the maximum allowable temperature for removing heat from the component cooling water heat exchanger during a design basis accident coincident with a loss of offsite power.
2. For sites with severe winters, where ice formation in the UHS could occur, the function of the UHS is not impaired during winter months.	2. An analysis will be performed based upon site meteorological conditions.	2. The facility specific SAR shows that the function of the UHS is not impaired due to subfreezing conditions or a method is provided to prevent flow blockage of the station service water pump inlet due to subfreezing conditions.
3. A site water chemistry analysis for the UHS will be performed to determine if a water treatment system is required to minimize corrosion and fouling of the SSWS.	3. An analysis of the site water chemistry will be performed.	3. The facility specific SAR commits to a water treatment system if water chemistry requirements are not met.

1.9.24 ULTIMATE HEAT SINK ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   N/A

2. Relationship of UHS ITAAC to the Safety Analysis

   The UHS ITAAC does not include any specific inspections,tests, and analyses which confirm that the as-built system configuration and performance match the buses used in the evaluation models for licensing analysis. However, it is assumed that the UHS is available to support the CCWS and its assumed characteristics as detailed in the evaluation models.

3. Relationship of UHS ITAAC to PRA

   The PRA assumes that the Ultimate Heat Sink exists.

4. CESSAR-DC Chapter 14 Tests Applicable to UHS ITAAC

   See CESSAR-DC Section 14.2.12.1.76

5. Status of DSER Items Related to the UHS ITAAC

   N/A

1.10.4 EMERGENCY FEEDWATER SYSTEM

Design Description

The emergency feedwater system (EFWS) is a safety-related system which supplies feedwater to the steam generators for events resulting in loss of normal feedwater and requiring heat removal through the steam generators.

The EFWS consists of two mechanical divisions, each with an emergency feedwater storage tank (EFWST), two EFW pumps, a cavitating flow-limiting venturi, valves, piping, instrumentation and controls. The pumps in each division are powered by diverse drivers. Each pump has a separate dedicated suction line from the EFWST in its division. The discharge lines from the two pumps in each division are joined together in a common header upstream of the cavitating venturi. Flow is delivered to the downcomer feedwater line to each steam generator (SG). Steam for the pump turbine driver in each division is taken from a main steam line between the steam generator associated with that division and the main steam isolation valves for that SG. A cross-connect line with isolation valves is provided between the two EFWSTs. Another cross-connect line with isolation valves is provided between EFWS pump discharges for the two divisions. A non-safety grade source of condensate makeup is arranged for gravity feed to either EFWST. Figure 1.10.4-1 shows a simplified system configuration.

Each EFWS pump delivers at least the minimum flow required for core decay heat removal using the steam generators, against steam generator feedwater nozzle pressures up to main steam safety valve lift pressure. Water is supplied to each EFW pump at a pressure greater than the net positive suction head (NPSH) required. Each EFWST has a volume above the EFW pump suction line penetrations to permit plant cooldown to shutdown cooling entry conditions following any design basis event. The cavitating flow-limiting venturis limit emergency feedwater flow to each SG with both EFWS pumps running in the division, against steam generator pressures down to 0 psig.

The EFWS is built to the ASME Code Section III class requirements shown on Figure 1.10.4-1. Components, piping, and supports classified as ASME Code Class 2 or 3 are Seismic Category I. Equipment that is designated as safety-related is qualified for the environments where located.

EFWS instrumentation indications and alarms shown on Figure 1.10.4-1 are available in the control room. Controls are available in the control room to start and stop the EFW pumps, and open and close the steam turbine supply valves, steam generator isolation valves, and flow control valves.

EFWS safety-related components and power-operated valves are supplied from the Class 1E electrical distribution busses. The EFWS is actuated by an emergency

feedwater actuation signal (EFAS) from the engineered safety features actuation system (ESFAS) or by an alternate feedwater actuation signal (AFAS) from the alternate protection system (APS). The EFAS or AFAS for each steam generator starts the motor driven pump, opens the steam supply valve to the turbine driver, which starts the turbine and pump, and opens the two steam generator isolation valves and the two EFW flow control valves in the actuated EFWS division (see Figure 1.10.4-1). The Engineered Safety Features Component Control System includes logic to close the isolation valves and flow control valves when SG water level has risen above a high level setpoint, and to re-open those valves when SG water level drops below a low level setpoint.

Outside the containment, the two mechanical divisions of the EFWS are separated by the divisional barrier wall, except for the cross-connect lines between EFWSTs and between divisional EFW pump discharge lines.

A flow recirculation line from each EFWS pump provides discharge back to the EFWSTs for minimum flow protection and flow testing of the pumps.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.10.4-1 specifies the inspections, tests, analyses and associated acceptance criteria for the EFWS.

TABLE 1.10.4-1

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration for the EFWS is shown in Figure 1.10.4-1.	1. Visual inspections of the as-built system configuration will be conducted.	1. The as-built configuration of the EFWS is in accordance with Figure 1.10.4-1 for the components and equipment shown.
2. ASME Code portions of the EFWS retain their integrity under internal pressures that will be experienced during service.	2. A pressure test will be conducted on those portions of the EFWS required to be pressure tested by the ASME Code.	2. The results of the pressure test of ASME Code portions of the EFWS conform with the requirements in the ASME Code Section III.
3. Water is supplied to each EFW pump at a pressure greater than the net positive suction head (NPSH) required.	3. Tests to measure EFW pump NPSH will be performed. An analysis to determine NPSH available to each EFW pump will be prepared based on as-built data.	3. The calculated available NPSH exceeds pump NPSH required by the vendor for the pump.
4.a) An emergency feedwater actuation signal (EFAS) actuates the EFWS components. An alternate feedwater actuation signal (AFAS) actuates the EFWS components.	4.a) Testing will be performed by generating a simulated EFAS for its corresponding steam generator. The test will be repeated using a simulated AFAS.	4.a) The motor-driven and turbine-driven pumps start, and the steam generator isolation and flow control valves open, in the division receiving the simulated EFAS. The same components actuate in response to a simulated AFAS.

TABLE 1.10.4-1 (Continued)

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.b) SG water level signals open and close the SG isolation and flow control valves.	4.b) Functional tests of each division will be performed by simulating high and low SG water level signals.	4.b) A simulated high SG water level signal closes the SG isolation valves and flow control valves in its associated division. A simulated low SG water level signal opens the SG isolation valves and flow control valves in its associated division.
5.a) Each EFWS pump delivers at least the minimum flow required for core decay heat removal to the steam generator(s) against a steam generator feedwater nozzle pressure up to main steam safety valve lift pressure.	5.a) EFWS functional tests of each EFWS pump will be performed to determine as-built system flow vs. steam generator pressure. Analyses will be performed to convert the test results to the conditions of the Certified Design Commitment.	5.a) Each EFWS pump delivers at least 500 gpm to the steam generator(s) against a steam generator feedwater nozzle pressure of 1217 psia.
b) Cavitating flow-limiting venturis limit maximum flow to each SG with both pumps in the division running, against a steam generator pressure of 0 psig.	b) EFWS functional tests will be performed with both pumps in a division running. Analyses will be used to convert the test results to the conditions of the Certified Design Commitment.	b) Maximum flow to each SG is 800 gpm with both pumps running against a steam generator pressure of 0 psig.
6. Each emergency feedwater storage tank has an internal volume above the EFW pump suction line penetrations to permit plant cooldown to shutdown cooling entry conditions following any design basis event.	6. Inspection of construction records for the EFWSTs will be performed and the internal volume of each tank available for emergency feedwater will be calculated.	6. Each EFWST internal volume is at least 350,000 gallons above the EFW pump suction line penetrations.

TABLE 1.10.4-1 (Continued)

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. EFWS instrumentation indications and alarms shown on Figure 1.10.4-1 are available in the Control Room. Controls are available in the control room to start and stop the EFW pumps, and open and close the EFW pump steam turbine supply valves, steam generator isolation valves, and flow control valves.	7. Inspection of the control room for the availability of instrumentation indications and alarms identified in the Certified Design Commitment will be performed. Tests will be performed using the EFW controls in the Control Room.	7. The instrumentation indications and alarms shown on Figure 1.10.4-1 exist or can be retrieved in the Control Room. EFW controls operate as specified in the Certified Design Commitment.
8. Safety-related EFWS components described in the Design Description for each division of the EFWS are powered from their respective Class 1E busses with the exception of containment isolation valves and associated containment isolation valve instrumentation and controls.	8. A test of the power availability to the safety related components for the EFWS will be conducted with power supplied from the permanently installed electrical power buses.	8. The Certified Design Commitment is met.
9. Outside containment, the two mechanical divisions of the EFWS are physically separated except for the cross-connect lines between EFWSTs and between divisional EFW pump discharge lines.	9. Visual Inspections of EFWS divisional mechanical separations will be performed.	9. Outside of containment, a divisional wall separates the two EFWS mechanical divisions.

TABLE 1.10.4-1 (Continued)

EMERGENCY FEEDWATER SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. The flow recirculation line from each EFW pump discharge back to its associated EFWST provides required EFW pump minimum flow and permits testing each EFW pump at full flow.	10. Tests of each EFW pump in the minimum flow and full flow test modes will be conducted with flow directed to the EFWST through the pump's recirculation lines.	10. Minimum recirculation flow meets or exceeds the pump vendor's required flow. Full flow from each pump (at least 500 gpm) is returned to the EFWSTs.

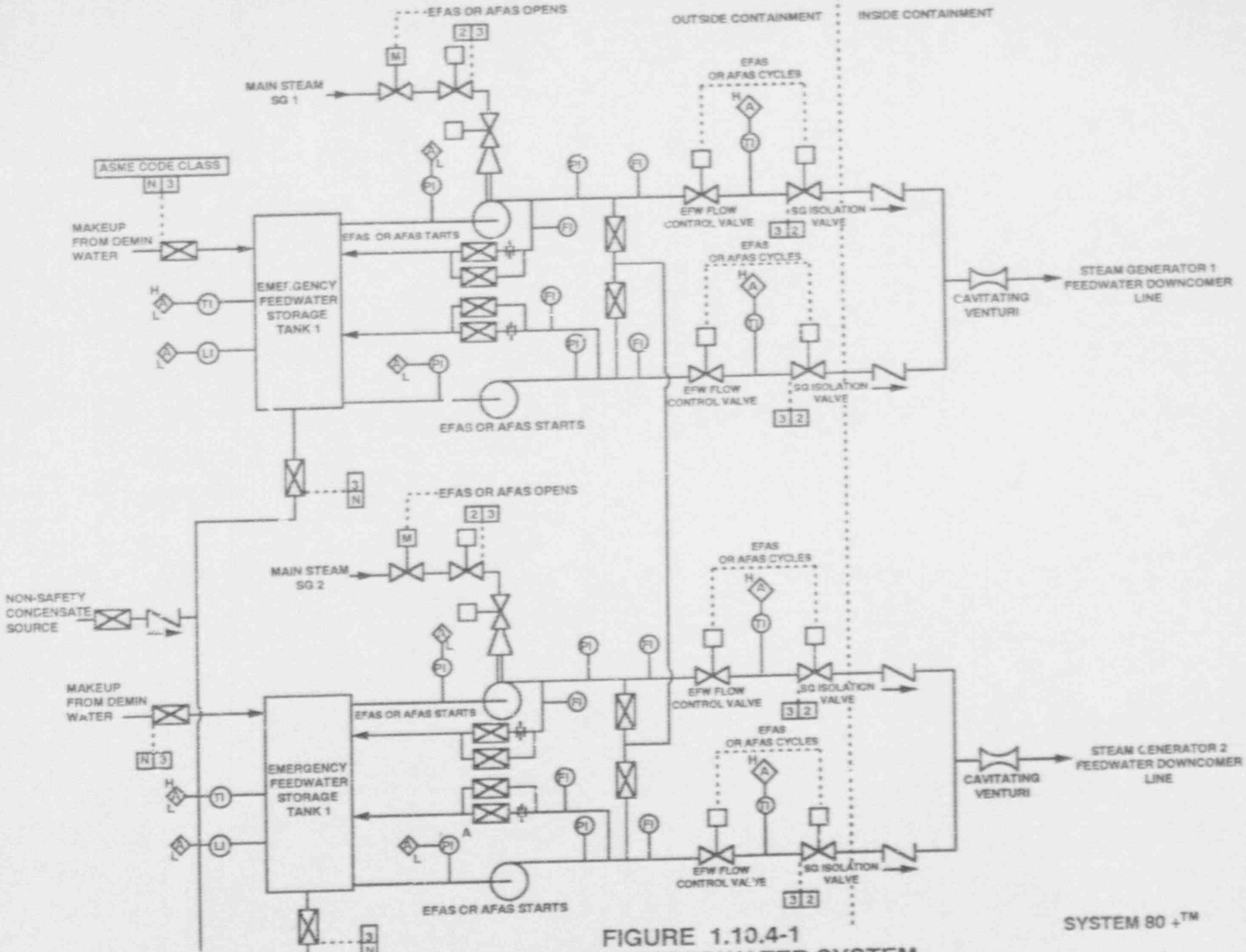


FIGURE 1.10.4-1
EMERGENCY FEEDWATER SYSTEM

1.10.4 EMERGENCY FEEDWATER SYSTEM ITAAC

SUPPORTIVE INFORMATION

1. Amplifying Information

   EFWS Description: CESSAR-DC Section 10.4.9

2. Relationship of EFWS ITAAC to the Safety Analysis

   1) **BASIS:** Minimum flow rate to a steam generator requiring emergency feedwater = 500 gallons per minute with steam generator pressure at 1200 psia.

      ITAAC: ITAAC 5 acceptance criterion requires the minimum flow of 500 gpm with steam generator feedwater nozzle pressure at 1217 psia which corresponds to design pressure of 1200 psia, 12 psi safety valve tolerance and 5 psi pressure difference between nozzle and steam pressure. At 1200 psia steam pressure, the flow would therefore exceed the analysis value of 500 gpm.

   2) **BASIS:** Maximum flow rate to a steam generator requiring emergency feedwater = 800 gpm at runout conditions.

      ITAAC: ITAAC 5 acceptance criterion requires maximum EFW flow to a SG of 800 gpm with steam generator pressure at 0 psig. During a steam line break inside containment which depressurizes the steam generator(s), there would likely be some pressure in the SG due to containment pressurization. Some pressure in the SG would also be likely in the case of a steam line break outside containment due to line losses between the SG and the break location. The ITAAC conditions bound the expected conditions during analyzed events.

   3) **BASIS:** Emergency feedwater storage tank capacity is 350,000 gallons each.

      ITAAC: ITAAC 6 acceptance criterion requires a minimum volume of 350,000 gallons per tank.

   4) **BASIS:** No single failure in the EFWS will prevent the system from performing as stated in 1) through 3) above.

      ITAAC: ITAAC 8 and 9, respectively, confirm the mechanical separation and electrical independence aspects of the EFWS. ITAAC 5 confirms that each EFWS pump is capable of meeting the system flow delivery requirements.

3. Relationship of EFWS ITAAC to PRA

1) The EFWS has two redundant divisions for supplying feedwater to the steam generators to achieve heat removal from the reactor to the entry conditions for using the SCS.

2) Each EFWS division has two EFW pumps, each with a pump driver diverse from the other.

3) In each EFWS division, the two EFW pump discharge pipes are joined together inside containment to a single pipe that connects to the SG downcomer feedwater line.

4) The EFW pumps in one division can supply feedwater to the SG in the other division through a pipe having at least two normally closed isolation valves installed.

5) Each EFW Storage Tank (EFWST) can be supplied by gravity flow from the Condensate Water Storage Tank (CST). This source is isolated by at least two normally closed isolation valves.

6) The EFW turbine-driven pump in each division is supplied steam from the SG in its division via a pipe connection located upstream of the MSIV.

7) The EFWS is actuated by a EFAS and a SPS actuation signal (Low SG Water Level).

8) Upon receipt of an actuation signal, the EFWS:

   a. Start the associated motor-driven pump,
   b. De-energizes the solenoid to open the associated turbine steam supply valve.
   c. Opens the associated EFW isolation valves to the appropriate SG.

9) Each EFW division provides at least 500 gpm to the downcomer line of either SG.

10) Installed instrumentation provides the capability to monitor the performance of the system and the major components from the control room.

11) Each EFW pump can deliver EFW flow to the SGs when the SG pressure is at the Main Steam Safety Valve (MSSV) setpoint.

12) Each EFWST has a useable volume of at least 350,000 gallons.

13) Each EFW division receives power from its associated Class 1-E buses.

14) Each EFW line has a cavitating venturi to limit EFW pump runout when feeding a "bad" steam generator.

4. CESSAR-DC Chapter 14 Tests Applicable to EFWS ITAAC

Pre-operational Tests: CESSAR-DC Section 14.2.12.1.36

1.11.2 GASEOUS WASTE MANAGEMENT SYSTEM

Design Description

The Gaseous Waste Management System (GWMS) is a non safety system which collects, stores, processes, samples, and monitors radioactive gaseous waste. Piping from the Reactor Drain Tank to the GWMS penetrates containment and is provided with containment isolation valves.

The GWMS is a charcoal delay system. The GWMS processes radioactive gases generated by the plant systems connected to it during plant operations. This system is not intended to process post-accident sources; therefore the inlet radioactive waste streams to the GWMS are isolated in post-accident conditions. A general conceptual illustration of the GWMS is shown in Figure 1.11.2-1.

The GWMS system contains conditioning equipment (including a cooler-condenser for humidity control and a charcoal guard bed) to minimize moisture and contamination in the charcoal adsorbers and charcoal adsorbers to delay passage of noble gases through the equipment.

The GWMS precludes the buildup of an explosive mixture of hydrogen and oxygen in the GWMS by the provision of parallel gas analyzers and nitrogen purge capability. Parallel gas analyzers monitor the concentration of hydrogen and/or oxygen in the GWMS. Nitrogen purge capability maintains the concentration of hydrogen and/or oxygen at less than 4% of the gases in the GWMS. The parallel gas analyzers provide signals to alarm both locally and in the control room exceeding a limit on the concentrations of hydrogen and oxygen.

The GWMS processes radioactive gaseous waste so that the concentration of the gaseous radioactive effluents discharged to unrestricted areas are within limits specified by 10CFR20, Appendix B, Table II during normal operating conditions and in the event of a GWMS leak or failure. Effluents from the GWMS are filtered through particulate and activated charcoal filters prior to release at the unit vent to the environment.

The GWMS can continuously monitor concentrations of radioactivity in processed gaseous waste prior to release to the environment. The radiation monitor activates controls to automatically isolate the GWMS discharge if the limits of 10CFR20, Appendix B, Table II will be exceeded.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 1.11.2-1 specifies the inspections, tests and/or analyses and their associated acceptance criteria for the GWMS.

TABLE 1.11.2-1

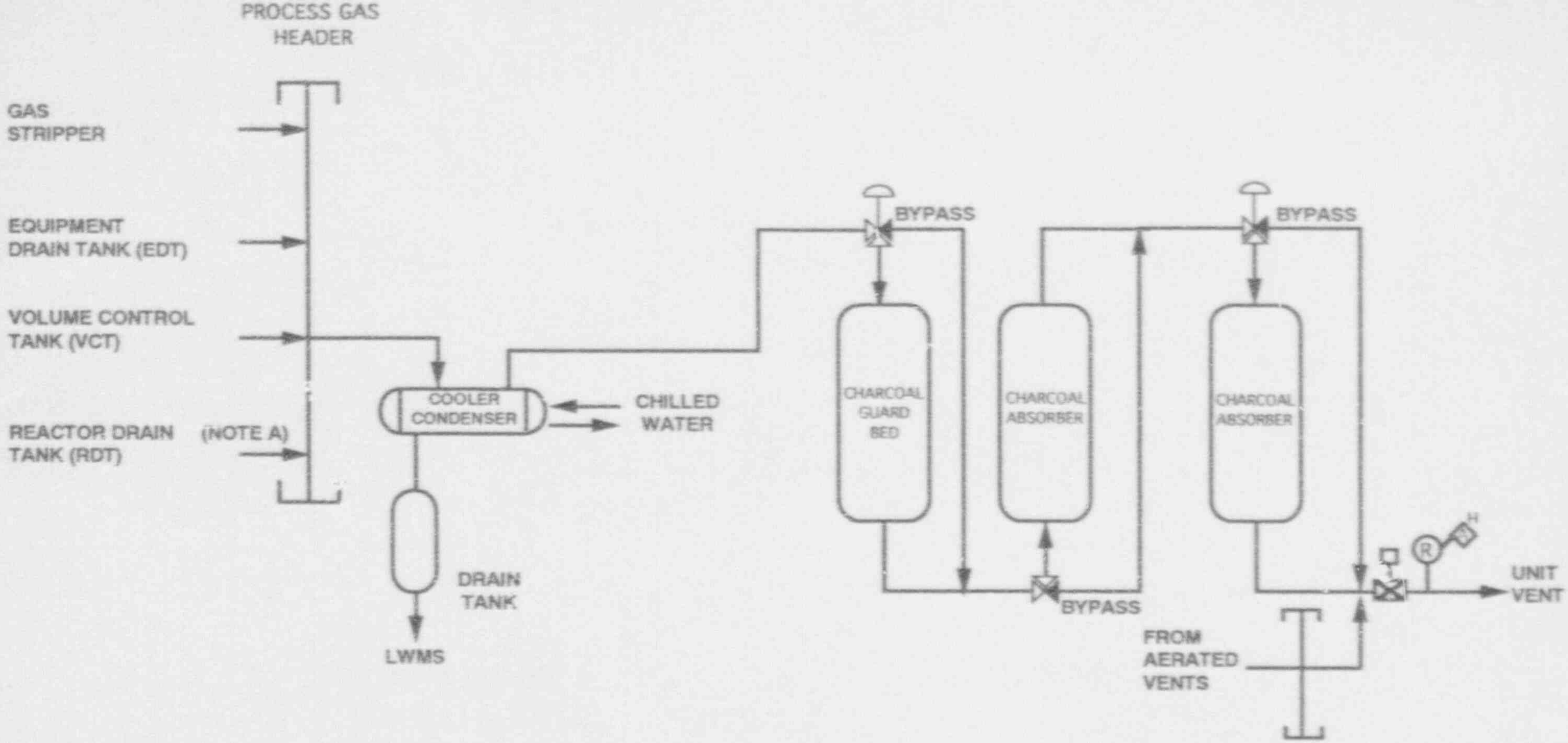
GASEOUS WASTE MANAGEMENT SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A basic configuration of the GWMS is shown in Figure 1.11.2-1.	1. An inspection of the as-built GWMS configuration will be conducted.	1. The as-built GWMS configuration is in accordance with Figure 1.11.2-1 for the components and equipment shown.
2. The GWMS processes radioactive gaseous waste so that the concentration of the radioactive gaseous effluents discharged to unrestricted areas within limits specified in 10CFR20, Appendix B, Table II.	2. Analysis of the as-built GWMS performance data will be performed. Testing of the GWMS components will be performed.	2. The concentration of radioactive isotopes in the gaseous effluents do not exceed 10CFR20, Appendix B, Table II limits.
3. The GWMS precludes a buildup of an explosive mixture of hydrogen and oxygen. The GWMS has:	3. The following inspections and tests are performed to verify that the GWMS can preclude a buildup of an explosive mixture of hydrogen and oxygen:	3. The GWMS precludes the buildup of an explosive mixture of hydrogen and oxygen:
a) Parallel gas analyzers for hydrogen and/or oxygen which alarm both locally and in the control room.	a) Inspection of as-built GWMS configuration will be performed. Tests of will be performed using signals that simulate exceedence of limits to verify the parallel gas analyzers alarm upon detection of high concentrations of hydrogen or oxygen in the GWMS.	a) Parallel gas analyzers which alarm both locally and in the control room are provided.

TABLE 1.11.2-1 (Continued)

GASEOUS WASTE MANAGEMENT SYSTEM
Inspections, Tests, Analyses, and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b) Nitrogen purge capability to maintain the hydrogen and/or oxygen concentrations at less than 4% of the gases in the GWMS.	3.b) Tests to measure nitrogen purge flow will be performed.	b) Nitrogen purge maintains hydrogen and/or oxygen concentrations at less than 4% of the gases in the GWMS.
c) The parallel gas analyzers provide signals to alarm both locally and in the control room upon exceeding a limit on the concentrations of hydrogen and oxygen.	c) Tests if alarms will be performed using simulated analyzer signals to the alarms.	c) Local and control room alarms function.
4. The GWMS can monitor concentration of radioactivity in processed gaseous waste prior to release to the environment.	4. Inspections of the as-built system will be performed.	4. Radiation monitoring capability is located downstream of the charcoal adsorbers.
5. The instrumentation indications and controls shown in Figure 1.11.2-1 are available in the main control room. The inlet radioactive gaseous waste streams to the GWMS can be isolated manually from the control room.	5. Inspections of the as-built system will be performed. Tests of the inlet waste stream isolation will be performed.	5. Instrumentation indications and controls shown in Figure 1.11.2-1 exist or can be retrieved control room. The GWMS inlet waste streams can be isolated by manual action.
6. Discharges of radioactive gaseous effluents to the environment are terminated automatically if the limits of 10CFR20, Appendix B, Table II will be exceeded.	6. Tests of the isolation capability using a signal that simulates exceedence of limits will be performed.	6. Discharge is terminated upon receipt of simulated signal.



NOTES:

A. CONTAINMENT ISOLATION VALVES AND ASSOCIATED PIPING ARE SAFETY CLASS 2

B. ALL COMPONENTS AND PIPING ARE SAFETY CLASS NNS UNLESS OTHERWISE NOTED.

FIGURE 1.11.2-1

GASEOUS WASTE MANAGEMENT SYSTEM FLOW DIAGRAM

1.11.2 GASEOUS WASTE MANAGEMENT SYSTEM

SUPPORTIVE INFORMATION

1. Amplifying Information

ITAAC 1

CESSAR-DC, Section 11.3 revised per DSER open item 11.3-5, provides a description of the methodology to verify compliance with 10 CFR 20, Appendix B limits. Included in the analysis are the following assumptions:

a) Minimum carrier gas flow rate of at least 1 scfm.

b) Minimum mass of charcoal in adsorber of at least 18,000 lbm.

c) Minimum charcoal adsorbtivity for Krypton and Xenon of at least:

18.5 cc/gm for Krypton
330 cc/gm for Xenon

d) Average atmospheric dispersion factor of 7.2×10^{-5} sec/m^3 during normal operation.

e) Two hour accident atmospheric dispersion factor of 1.0×10^{-3} sec/m^3 for accident conditions.

ITAACs 3

The parallel gas analyzers provide a high alarm at 3% hydrogen and 1% oxygen and a high-high alarm at 4% hydrogen concentration in the GWMS. The high alarm provides ample time for the operator to take remedial action to initiate the nitrogen purge systems to reduce the concentration of hydrogen or oxygen in the GWMS. The high-high alarm automatically initiates the nitrogen purge system to preclude a buildup of an explosive mixture of hydrogen and oxygen in the GWMS in accordance with 10CFR50, Appendix A, (General Design Criteria 3).

ITAAC 4, 5 and 6

This criteria ensures compliance with 10CFR50, Appendix A (General Design Criteria 60 and 64) which specify the requirement for a controlled monitored release pathway. In addition, leakage rates of processing equipment of the GWMS should be maintained within the limits specified in ANSI/ANS 55.4, Table 9 to ensure releases from the GWMS to the environment are controlled.

In adaition 10CFR50, Appendix I, which specifies maintaining general public exposure ALARA due to radioactive gaseous effluents, is an important design objective which must be met to verify compliance with 40CFR190 (an acceptance criteria in the Radiation Protection ITAAC). 40CFR190 specifies a limit for exposure to the general public (i.e., 25 mrem whole body, 75 thyroid, 25 any other organ) due to direct and scattered radiation, as well as radioactive effluents from a uranium fuel cycle. Although a failure to comply with 10CFR50, Appendix I would not result in automatic shutdown of a facility, a detailed report describing why the limits were exceeded and action to be taken would be required. However, a pattern of noncompliance could result in a civil penalty based on failure to control radioactive releases per 10CFR50, Appendix A (GDC 60) and would reflect unfavorably on the design of a radioactive waste management system.

To verify compliance with 10CFR50, Appendix I, an analysis using Regulatory Guide 1.109 methodology would be performed. The following site specific information would be required to perform the analysis:

a) land use survey, such as location of nearest food pathways (e.g., potable water source, garden, cow, goat, etc.)

b) Meteorological data (i.e., average annual atmospheric dispersion factor (X/Q) and deposition factor (D/Q)).

2. Relationship of the Gaseous Waste Management System ITAAC to the Safety Analysis

Section 15.7.1, "Gaseous Waste Management System Leak or Failure", of the CESSAR-DC is addressed in Section 11.3.7.2 of the CESSAR-DC.

3. Relationship of Gaseous Waste Management System ITAAC to PRA

N/A

4. CESSAR-DC Chapter 14 Tests Applicable to Gaseous Waste Management System ITAAC

14.2.12.1.116