52-003

Westinghouse Electric Corporation
Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

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

ATTENTION: T. R. QUAY

SUBJECT: AP600 PILOT ITAAC SUBMITTAL

Dear Mr. Quay:

Enclosed are pilot ITAAC for three AP600 systems: the Passive Containment Cooling System (PCS), the Normal Residual Heat Removal System (RNS) and the Non-Class 1E DC and UPS System (EDS). These ITAAC have been developed based on the AP600 ITAAC submitted December 15, 1992 with modifications to incorporate the lessons learned from the Evolutionary Plant ITAAC Reviews, the NRC technical staff review of the AP600 design and comments from an industry review group.

These pilot ITAAC are submitted to obtain NRC feedback on their format and content. We will schedule a meeting with the technical staff in the near term to discuss and resolve comments prior to completing the balance of the ITAAC.

Please contact me if you have any questions concerning this transmittal.

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

/nja

Enclosure

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E004

cc: T. Kenyon, NRC
T. Boyce, NRC
B. Grimes, NRC
N. Liparulo, Westinghouse (w/o enclosure)

2789A

3.3.7 NORMAL RESIDUAL HEAT REMOVAL SYSTEM

Design Description

The normal residual heat removal system (RNS) is a nonsafety-related system that removes heat from the core and reactor coolant system (RCS) at reduced RCS pressure and temperature conditions after shutdown. The RNS has two mechanical trains of equipment, with each train having a heat exchanger and a pump.

1) The functional arrangement of the RNS is as shown on Figure 3.3.7-1.

2) a) The ASME Section III Code Class for the RNS pressure retaining components shown on Figure 3.3.7-1 is as depicted on the Figure.

b) The as-built RNS ASME Code Section III Class 1, 2 or 3 piping depicted on Figure 3.3.7-1 meets applicable ASME Section III Code requirements for RNS design conditions.

c) The RNS piping designed to meet LBB criteria is the piping from the RCS hot leg connection up to the RCS side of each of the inner RNS suction hot leg isolation valves (RNS-PL-V001A and B).

3) a) The RNS piping shown within the ASME Code Section III boundary on Figure 3.3.7-1 is classified Seismic Category 1.

b) The RNS mechanical and electrical equipment identified in Table 3.3.7-1 is classified Seismic Category 1.

4) a) The electrical equipment identified in Table 3.3.7-2 is Class 1E.

b) The Class 1E loads for the equipment identified in Table 3.3.7-2 are powered from their respective Class 1E division.

c) Separation is provided between RNS Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions. The Class 1E separation design descriptions and ITAAC are provided in the Certified Design Material Section 2.10, Nuclear Island Buildings.

5) The RNS provides the following safety-related functions:

a) Preservation of the RCS pressure boundary integrity at the RNS suction and discharge interface with the RCS. The RCS pressure boundary integrity ITAAC is provided in the Certified Design Material Section 2.1.2, Reactor Coolant System.

b) Containment integrity by isolation of the RNS lines penetrating the containment. The containment isolation design description and ITAAC are provided in the Certified Design Material Section 2.2.2, Containment System.

c) A flow path for long term, post-accident makeup to the RCS.

6) The RNS provides the following defense-in-depth (DID) functions:

a) Low temperature overpressure protection for the RCS during refueling, startup, and shutdown operations.

b) Heat removal from the reactor coolant during refueling and shutdown operation.

c) Low pressure makeup flow from the IRWST to the RCS for scenarios following actuation of the automatic depressurization system (ADS).

7) a) Safety-related displays of the RNS parameters identified in Table 3.3.7-3 can be retrieved in the main control room (MCR).

b) Controls exist in the MCR to place those remote-operated valves identified in Table 3.3.7-3 in the safety related position(s) shown on Table 3.3.7-4, using the protection and safety monitoring system (PMS).

8) a) The motor operated valves identified in Table 3.3.7-4 have an active safety-related function to change position to that indicated in the table.

b) Upon loss of motive power, the active safety-related valves identified in Table 3.3.7-4 assume the "loss of motive power position" indicated in the table.

9) The RNS isolation valves identified in Table 3.3.7-5 have independent interlocks to prevent opening the valves if reactor coolant pressure is greater than the interlock set pressure. The PMS interlock design descriptions and ITAAC are provided in the Certified Design Material Section 2.5.5, Protection and Safety Monitoring System.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.3.7-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the RNS system.

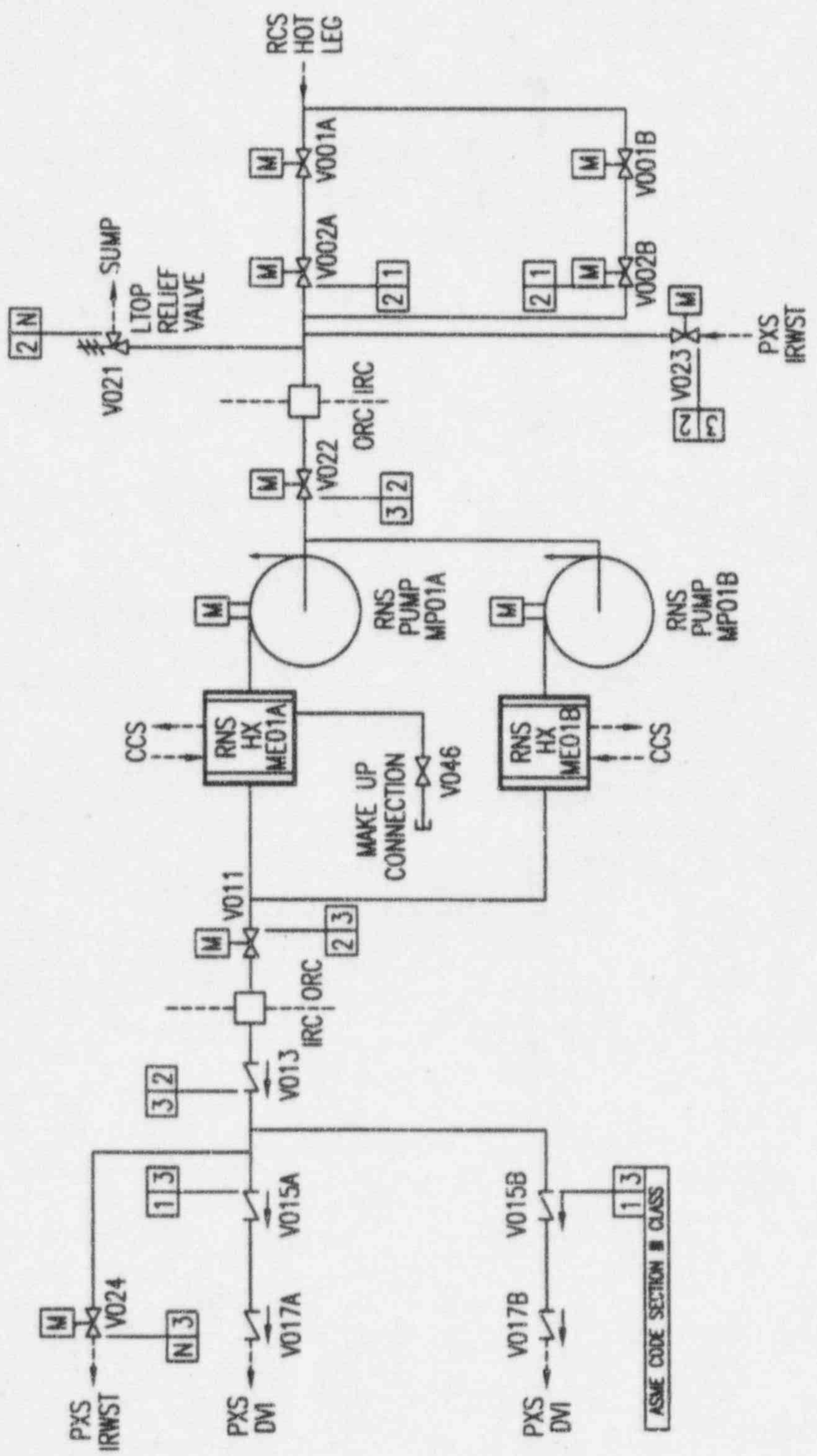

Figure 3.3.7 AP600 Normal Residual Heat Removal System Simplified Sketch

Table 3.3.7-1

Major Seismic Category 1 Equipment

Equipment List	Equipment No.
RNS Pump	RNS-MP-01A
RNS Pump	RNS-MP-01B
RNS Heat Exchanger (Tube Side)	RNS-ME-01A
RNS Heat Exchanger (Tube Side)	RNS-ME-01B
RCS Inner Hot Leg Suction Isolation Valve and Motor Operator	RNS-PL-V001A
RCS Inner Hot Leg Suction Isolation Valve and Motor Operator	RNS-PL-V001B
RCS Outer Hot Leg Suction Isolation Valve and Motor Operator	RNS-PL-V002A
RCS Outer Hot Leg Suction Isolation Valve and Motor Operator	RNS-PL-V002B
RNS Discharge Containment Isolation Valve and Motor Operator	RNS-PL-V011
RNS Discharge Containment Isolation Valve	RNS-PL-V013
RNS Discharge RCS Pressure Boundary Valve	RNS-PL-V015A
RNS Discharge RCS Pressure Boundary Valve	RNS-PL-V015B
RNS Discharge RCS Pressure Boundary Valve	RNS-PL-V017A
RNS Discharge RCS Pressure Boundary Valve	RNS-PL-V017B
RNS Hot Leg Suction Pressure Relief Valve	RNS-PL-V021
RNS Suction Header Containment Isolation Valve and Motor Operator	RNS-PL-V022
RNS Suction from IRWST Isolation Valve and Motor Operator	RNS-PL-V023
IRWST Discharge Isolation Valve and Motor Operator	RNS-PL-V024

Table 3.3.7-2

Class 1E Equipment

Equipment List	Equipment No.
RCS Inner Hot Leg Suction Isolation Valve Motor Operator	RNS-PL-V001A
RCS Inner Hot Leg Suction Isolation Valve Motor Operator	RNS-PL-V001B
RCS Outer Hot Leg Suction Isolation Vaive Motor Operator	RNS-PL-V002A
RCS Outer Hot Leg Suction Isolation Valve Motor Operator	RNS-PL-V002B
RNS Discharge Containment Isolation Valve Motor Operator	RNS-PL-V011
RNS Suction Header Containment Isolation Valve Motor Operator	RNS-PL-V022
RNS Suction from IRWST Isolation Valve and Motor Operator	RNS-PL-V023

Table 3.3.7-3

Main Control Room Displays, Alarms, and Controls

Parameter	Equipment No.	Safety-Related Display	Alarm	Control PMS
RCS Outer Hot Leg Suction Isolation Valve Position	RNS-PL-V002A	Yes	No	Yes
RCS Outer Hot Leg Suction Isolation Valve Position	RNS-PL-V002B	Yes	No	Yes
RNS Discharge Containment Isolation Valve Position	RNS-PL-V011	Yes	No	Yes
RNS Suction Header Containment Isolation Valve Position	RNS-PL-V022	Yes	No	Yes
RNS Suction from IRWST Isolation Valve Position	RNS-PL-V023	Yes	No	Yes

Table 3.3.7-4

Active Safety-Related Valves

Equipment List	Equipment No.	Safety Related Position	Loss of Motive Power Position
RCS Inner Hot Leg Suction Isolation Valve	RNS-PL-V001A	Closed	As-is
RCS Inner Hot Leg Suction Isolation Valve	RNS-PL-V001B	Closed	As-is
RCS Outer Hot Leg Suction Isolation Valve	RNS-PL-V002A	Closed	As-is
RCS Outer Hot Leg Suction Isolation Valve	RNS-PL-V002B	Closed	As-is
RNS Discharge Containment Isolation Valve	RNS-PL-V011	Closed	As-is
RNS Suction Header Containment Isolation Valve	RNS-PL-V022	Closed	As-is
RNS Suction from IRWST Isolation Valve	RNS-PL-V023	Closed	As-is

Table 3.3.7-5

Valves Subject to Prevent Open Interlock

Equipment List	Equipment No.
RCS Inner Hot Leg Suction Isolation Valve	RNS-PL-V001A
RCS Inner Hot Leg Suction Isolation Valve	RNS-PL-V001B
RCS Outer Hot Leg Suction Isolation Valve	RNS-PL-V002A
RCS Outer Hot Leg Suction Isolation Valve	RNS-PL-V002B

Table 3.3.7-6 (Sheet 1 of 4)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1) The functional arrangement of the RNS is as shown on Figure 3.3.7-1.	Inspection of the as-built system will be performed.	The as-built RNS conforms with the functional arrangement as shown on Figure 3.3.7-1.
2.a) The ASME Code Section III components shown on Figure 3.3.7-1 retain their pressure boundary integrity under design internal pressures that will be experienced during service.	i) A hydrostatic test will be performed on those ASME Code components of the RNS required to be hydrostatically tested by the ASME Code Section III. ii) Inspections, including nondestructive examination (NDE) of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	i) The results of the hydrostatic test of the ASME Code components of the RNS conform with the requirements in the ASME Code Section III. ii) A report exists and concludes that the pressure boundary integrity requirements of the ASME Code Section III are met for the quality of pressure boundary welds.
2.b) The as-built RNS ASME Code Section III Class 1, 2 or 3 piping depicted on Figure 3.3.7-1 meets the applicable ASME Section III Code requirements for the RNS design conditions.	A reconciliation analysis using the as designed and as-built information will be performed, or an analysis of the as-built condition will be performed.	The as-built piping stress report exists and includes the ASME Code Certified Stress Report and documentation of the results of the as-built analysis.
2.c) For the RNS piping identified in the design description as qualified for LBB, the as-built piping and materials are reconciled with the bases for the LBB acceptance criteria.	Inspection for the existence of a LBB evaluation report will be performed.	An LBB evaluation report exists which documents that the leak-before-break acceptance criteria are met by the as-built RNS piping and piping materials.

Table 3.3.7-6 (Sheet 2 of 4)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a) The Seismic Category 1 piping shown within the ASME Code Section III boundary on Figure 3.3.7-1 can withstand design basis dynamic loads without loss of its safety function.	Inspection for the existance of a Seismic Category 1 analysis will be performed.	A report exists and concludes that the Seismic Category 1 piping, including associated anchorage, can withstand seismic design basis dynamic loads without loss of its safety function.
3.b) The Seismic Category 1 mechanical and electrical equipment identified in Table 3.3.7-1 can withstand design basis dynamic loads without loss of its safety function.	Type tests, analyses or a combination of type tests and analyses of Seismic Category 1 mechanical and electrical equipment will be performed.	A report exists and concludes that the Seismic Category 1 equipment, including associated anchorage, can withstand seismic design basis dynamic loads without loss of its safety function.
4.a) The Class 1E electrical equipment identified in Table 3.3.7-2 can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform its safety function.	Type tests, analyses or a combination of type tests and analyses of Class 1E equipment will be performed.	A report exists and concludes that Class 1E electrical equipment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform its safety function.
4.b) The Class 1E loads for the equipment identified in Table 3.3.7-2 are powered from their respective Class 1E division.	Testing will be performed on the RNS by providing a simulated test signal in one Class 1E division at a time.	Within the RNS, a simulated test signal exists at the equipment when the assigned Class 1E division is provided the test signal.
5) The RNS provides the following safety-related functions:		
5.c) A flow path for long term, post-accident makeup to the RCS.	Testing will be performed to verify the makeup flow path from the auxiliary building connection to the RCS.	A flow path exists for long term, post-accident makeup to the RCS.

Table 3.3.7-6 (Sheet 3 of 4)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6) The RNS provides the following DID functions:		
6.a) Low temperature overpressure protection for the RCS during refueling, startup, and shutdown operations.	Shop testing of the LTOP relief valve set pressure will be performed. Inspection to determine the relief area of the valve will be performed.	The LTOP relief valve set pressure is not greater than 563 psig and the valve vent area is greater than or equal to 5.4 square inches.
6.b) Heat removal from the reactor coolant during refueling and shutdown operation.	Inspection for the existence of a report that determines the heat removal capability of the RNS heat exchangers will be performed.	A report exists and concludes that the heat removal capability of each RNS heat exchanger is greater than or equal to 12.6 million BTU/hr-F.
6.c) Low pressure makeup flow from the IRWST to the RCS for scenarios following actuation of the ADS.	Testing will be performed by manually aligning a flow path from the IRWST, through the RNS, to the RCS and measuring the flow rate in the common return line downstream of the RNS heat exchangers.	Each RNS pump and flow path provides a flow rate of greater than or equal to 925 gpm at atmospheric RCS pressure.
7.a) Safety-related displays of the RNS parameters identified in Table 3.3.7-3 can be retrieved in the MCR.	Inspection will be performed for retrievability of the parameters in the MCR.	Indications of the RNS parameters identified in Table 3.3.7-3 can be retrieved in the MCR.
7.b) Controls exist in the MCR to place those remote-operated valves identified in Table 3.3.7-3 in the position(s) shown in Table 3.3.7-4, using the PMS.	Testing will be performed using the RNS controls in the MCR.	RNS controls in the MCR operate to place those remote-operated valves identified in Table 3.3.7-3 in the position(s) shown in Table 3.3.7-4, via the PMS.

Table 3.3.7-6 (Sheet 4 of 4)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a) The motor operated valves identified in Table 3.3.7-4 have an active safety-related function to change position to that indicated in the table.	i) Stroke testing of the installed valves will be performed at ambient pressure and temperature conditions. ii) Tests or type tests of motor-operated valves will be performed under design basis differential pressure, system pressure, fluid temperature, ambient temperature, minimum voltage and minimum and/or maximum stroke times.	i) Each RNS valve changes position to that indicated in Table 3.3.7-3 upon receiving an actuation signal. ii) A test report exists and concludes that each motor-operated valve changes position to that indicated in Table 3.3.7-3 under design basis conditions.
8.b) Upon loss of motive power, the active safety-related valves identified in Table 3.3.7-4 assume the indicated "loss of motive power" position.	Testing of the installed valves will be performed under the conditions of loss of motive power.	Upon loss of motive power, each active safety-related valve identified in Table 3.3.7-4 assumes the indicated "loss of motive power" position.

3.2.3 PASSIVE CONTAINMENT COOLING SYSTEM

Design Description

The passive containment cooling system (PCS) is a safety-related system that provides for containment heat removal by wetting the external surface of the containment and providing a flow of cooling air over the containment vessel. Following an actuation signal, water flows by gravity from the passive containment cooling water storage tank (PCCWST) to the containment dome promoting heat transfer to the atmosphere.

1) The functional arrangement of the PCS is as shown on Figure 3.2.3-1.

2.a) The ASME Section III Code Class for the PCS pressure retaining components shown on Figure 3.2.3-1 is as depicted on the Figure.

2.b) The as-built PCS ASME Code Section III Class 1, 2, or 3 piping depicted on Figure 3.2.3-1 meets applicable ASME Section III Code requirements for the PCS design conditions.

3.a) The PCS piping shown within the ASME Code Section III boundary on Figure 3.2.3-1 is classified Seismic Category 1.

3.b) The PCS structures and mechanical and electrical equipment identified in Table 3.2.3-1 are classified Seismic Category 1.

4.a) The electrical equipment identified in Table 3.2.3-2 is Class 1E.

4.b) The Class 1E loads for the equipment identified in Table 3.2.3-2 are powered from their respective Class 1E division.

4.c) Separation is provided between PCS Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions. The Class 1E separation design descriptions and ITAAC are provided in the Certified Design Material Section 2.10, Nuclear Island Buildings.

5) The PCS provides the following safety-related functions:

a) Delivery of water to the outside of the containment vessel.

b) Wetting of the outside surface of the containment vessel.

c) A natural circulation air flow path from the air inlets to the discharge structure.

d) Drainage of the excess water from the outside of the containment vessel through the two upper annulus drains.

e) A PCCWST initial inventory of at least 72 hours of outside containment vessel water flow.

f) A PCCWST water makeup flow path for long term makeup.

6.a) Safety-related displays of the PCS parameters identified in Table 3.2.3-3 can be retrieved in the main control room (MCR).

6.b) The PCS alarms identified Table 3.2.3-3 are provided in the MCR.

6.c) Controls exist in the MCR to place those remote-operated valves identified in Table 3.2.3-3 in the safety related position(s) shown on table 3.2.3-4 using the protection and safety monitoring system (PMS).

6.d) Controls exist in the MCR to place those remote-operated isolation valves identified in Table 3.2.3-3 in the safety related position(s) shown in table 3.2.3-4 using the diverse actuation system (DAS).

7.a) The valves identified in Table 3.2.3-4 have an active safety-related function to change position to that indicated in the table.

7.b) Upon loss of motive power, the active safety-related valves identified in Table 3.2.3-4 assume the "loss of motive power position" indicated in the table.

8) The PCS isolation and isolation block valves identified in Table 3.2.3-5 actuate as indicated upon receipt of a signal from the protection and safety monitoring system (PMS). The PCS isolation valves identified in Table 3.2.3-5 also actuate as indicated upon receipt of a signal from the diverse actuation system (DAS). The PMS and DAS actuation signal design descriptions and ITAAC are provided in the Certified Design Material Section 2.5.5, Protection and Safety Monitoring and 2.5.1, Diverse Actuation System respectively.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.2.3-6 specifies the inspections, tests, analyses, and associated acceptance criteria for the PCS system.

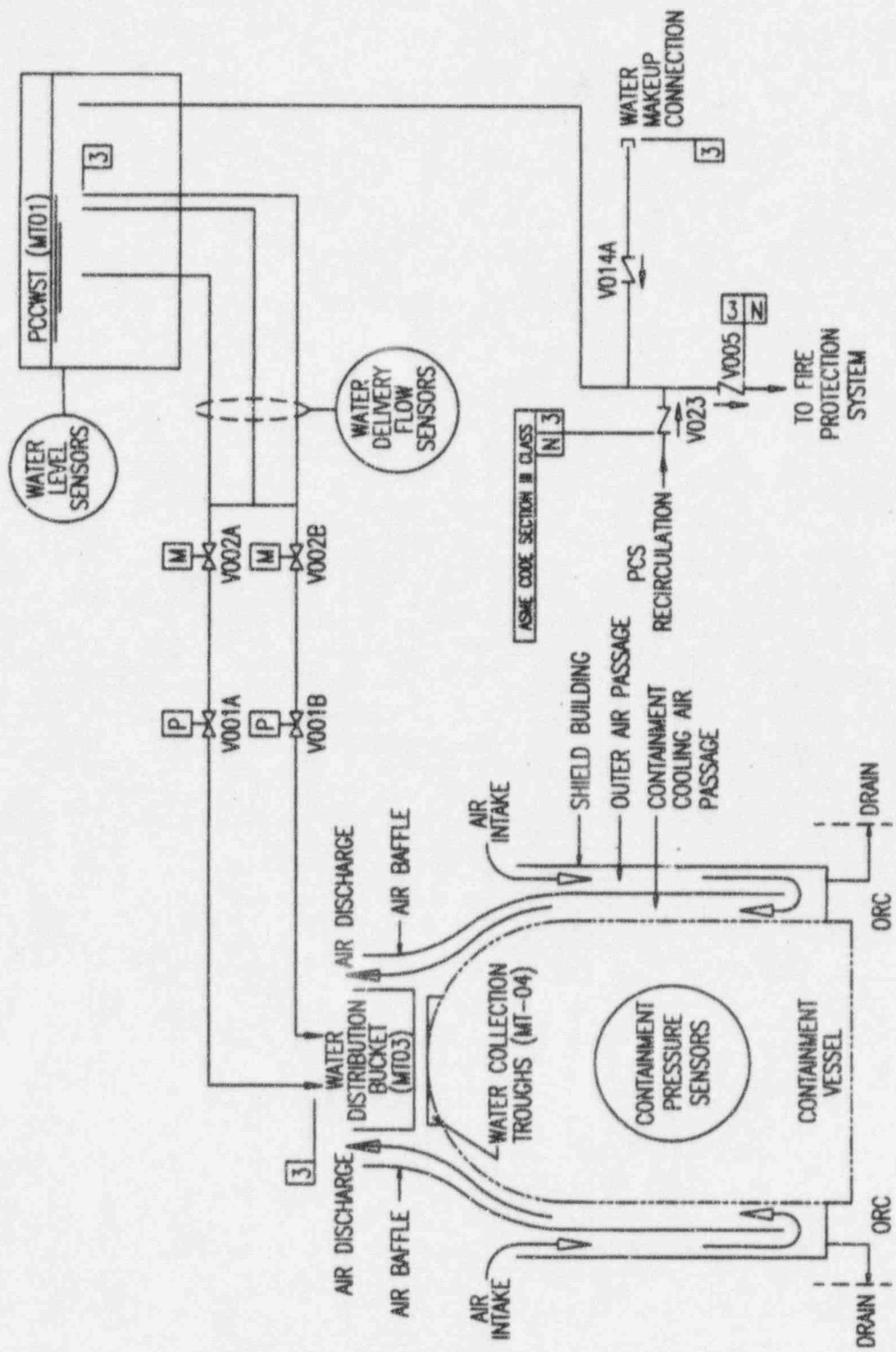

Figure 3.2.3-1 Passive Containment Cooling System

Table 3.2.3-1

Major Seismic Category 1 Structures and Equipment

Equipment List	Equipment No.
Passive Containment Cooling Water Storage Tank	PCS-MT-01
Water Distribution Bucket	PCS-MT-03
Water Collection Troughs	PCS-MT-04
PCCWST Isolation Valve and Pneumatic Operator	PCS-PL-V001A
PCCWST Isolation Valve and Pneumatic Operator	PCS-PL-V001B
PCCWST Isolation Block Valve and Motor Operator	PCS-PL-V002A
PCCWST Isolation Block Valve and Motor Operator	PCS-PLV-002B
PCS Recirculation Loop Isolation Valve	PCS-PL-V023
PCCWST Supply to Fire Protection System Isolation Valve	PCS-PL-V005
Water Makeup Isolation Valve	PCS-PL-V014A

Table 3.2.3-2

Class 1E Equipment

Equipment List	Equipment No.
PCCWST Isolation Block Valve Motor Operator	PCS-PL-V002A
PCCWST Isolation Block Valve Motor Operator	PCS-PL-V002B
PCS Water Delivery Flow Sensor	PCS-FT-001
PCS Water Delivery Flow Sensor	PCS-FT-002
PCS Water Delivery Flow Sensor	PCS-FT-003
Containment Pressure Sensor	PCS-PT-005
Containment Pressure Sensor	PCS-PT-006
Containment Pressure Sensor	PCS-PT-007
Containment Pressure Sensor	PCS-PT-008
PCCWST Water Level Sensor	PCS-LT-010
PCCWST Water Level Sensor	PCS-LT-011
HI Range Containment Pressure Sensor	PCS-PT-012
HI Range Containment Pressure Sensor	PCS-PT-013
HI Range Containment Pressure Sensor	PCS-PT-014

Table 3.2.3-3

Main Control Room Displays, Alarms, and Controls

Parameter/Position	Equipment No.	Safety-Related Display	Alarm	Control PMS/DAS
PCCWST Isolation Valve Position	PCS-PL-V001A	No	No	Yes/Yes
PCCWST Isolation Valve Position	PCS-PL-V001B	No	No	Yes/Yes
PCCWST Isolation Block Valve Position	PCS-PL-V002A	Yes	No	Yes/No
PCCWST Isolation Block Valve Position	PCS-PL-V002B	Yes	No	Yes/No
PCS Water Delivery Flow	PCS-FT-001	Yes	No	NA
PCS Water Delivery Flow	PCS-FT-002	Yes	No	NA
PCS Water Delivery Flow	PCS-FT-003	Yes	No	NA
Containment Pressure	PCS-PT-005	Yes	Yes	NA
Containment Pressure	PCS-PT-006	Yes	Yes	NA
Containment Pressure	PCS-PT-007	Yes	Yes	NA
Containment Pressure	PCS-PT-008	Yes	Yes	NA
PCCWST Water Level	PCS-LT-010	Yes	Yes	NA
PCCWST Water Level	PCS-LT-011	Yes	Yes	NA
HI Range Containment Pressure	PCS-PT-012	Yes	No	NA
HI Range Containment Pressure	PCS-PT-013	Yes	No	NA
HI Range Containment Pressure	PCS-PT-014	Yes	No	NA

NA = Not Applicable

Table 3.2.3-4

Active Safety-Related Valves

Valve List	Equipment No.	Safety Related Position	Loss of Motive Power Position
PCCWST Isolation Valve	PCS-PL-V001A	Open	Open
PCCWST Isolation Valve	PCS-PL-V001B	Open	Open
PCCWST Isolation Block Valve	PCS-PL-V002A	Open	As Is
PCCWST Isolation Block Valve	PCS-PL-V002B	Open	As Is

Table 3.2.3-5

Equipment Receiving an Actuation Signal

Equipment List	Equipment No.	Actuates To
PCCWST Isolation Valve	PCS-PL-V001A	Open
PCCWST Isolation Valve	PCS-PL-V001B	Open
PCCWST Isolation Block Valve	PCS-PL-V002A	Open
PCCWST Isolation Block Valve	PCS-PL-V002B	Open

Table 3.2.3-6 (Sheet 1 of 5)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1) The functional arrangement of the PCS is as shown on Figure 3.2.3-1.	Inspection of the as-built system will be performed.	The as-built PCS conforms with the functional arrangement as shown on Figure 3.2.3-1.
2.a) The ASME Code Section III components shown on Figure 3.2.3-1 retain their pressure boundary integrity under design internal pressures that will be experienced during service.	i) A hydrostatic test will be performed on those ASME Code components of the PCS required to be hydrostatically tested by the ASME Code Section III. ii) Inspections, including NDE of the as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	i) The results of the hydrostatic test of the ASME Code components of the PCS conform with the requirements in the ASME Code Section III. ii) A report exists and concludes that the pressure boundary integrity requirements of the ASME Code Section III are met for the quality of pressure boundary welds.
2.b) The as-built PCS ASME Code Section III Class 1, 2 or 3 piping depicted on Figure 3.2.3-1 meets the applicable ASME Section III Code requirements for the PCS design conditions.	A reconciliation analysis using the as designed and as-built information will be performed, or an analysis of the as-built condition will be performed.	The as-built piping stress report exists and includes the ASME Code Certified Stress Report and documentation of the results of the as-built analysis.

Table 3.2.3-6 (Sheet 2 of 5)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a) The Seismic Category 1 piping within the ASME Code Section III boundary shown on Figure 3.2.3-1 can withstand design basis dynamic loads without loss of its safety function.	Inspection for the existence of a Seismic Category 1 analysis will be performed.	A report exists and concludes that the Seismic Category 1 piping, including associated anchorage, can withstand seismic design basis dynamic loads without loss of its safety function.
3.b) The Seismic Category 1 structures and mechanical and electrical equipment identified in Table 3.2.3-1 can withstand design basis dynamic loads without loss of its safety function.	Type tests, analyses or a combination of type tests and analyses of Seismic Category 1 structures and mechanical and electrical equipment will be performed.	A report exists and concludes that the Seismic Category 1 structures and equipment, including associated anchorage, can withstand seismic design basis dynamic loads without loss of its safety function.
4.a) The Class 1E electrical equipment identified in Table 3.2.3-2 can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform its safety function.	Type tests, analyses or a combination of type tests and analyses of Class 1E equipment will be performed.	A report exists and concludes that Class 1E electrical equipment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform its safety function.
4.b) The Class 1E loads for the equipment identified in Table 3.2.3-2 are powered from their respective Class 1E division.	Testing will be performed on the PCS by providing a simulated test signal in one Class 1E division at a time.	Within the PCS, a simulated test signal exists at the equipment when the assigned Class 1E division is provided the test signal.
5) The PCS provides the following safety-related functions:		

Table 3.2.3-6 (Sheet 3 of 5)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.a) Delivery of water to the outside of the containment vessel.	Testing will be performed to measure the PCCWST delivery rate from each of the two parallel flow paths delivering separately.	Each of the two flow paths delivers greater than or equal to: • 220 gpm at a PCCWST water level of 29.2 feet ± 0.5 feet above the bottom of the tank • 95 gpm at a PCCWST water level of 17.2 feet ± 0.5 feet above the bottom of the tank • 50 gpm at a PCCWST water level of 1.2 feet ± 0.5 feet above the bottom of the tank
5.b) Wetting of the outside containment vessel.	Inspection for the existence of a report that documents the wetted surface of the containment vessel from either of the two parallel flow paths delivering separately will be performed.	A report exists and concludes that the containment vessel at the upper spring line has greater than 35% of its circumference wetted with a PCCWST water level of 1.2 feet ± 0.5 feet above the bottom of the tank with either, but not both, of the flow paths aligned to deliver flow.
5.c) A natural circulation air flow path from the air inlets to the discharge structure.	Inspections of the air flow path segments will be performed.	Flow paths exist at each of the following locations • the air inlets • the base of the outer annulus • the base of the inner annulus • the discharge structure
5.d) Drainage of the excess water from the outside of the containment vessel through the two upper annulus drains.	Testing will be performed to verify the upper annulus drain flow performance.	With a water flow of 230 +10/-0 gpm into the upper annulus for at least 3 hours, the water level in the annulus does not exceed 10 inches above either drain.

Table 3.2.3-6 (Sheet 4 of 5)

Inspections, Tests, Analyses and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.e) A PCCWST initial inventory of at least 72 hours of outside containment vessel water flow.	Inspection and analysis will be performed to measure the PCCWST operating volume.	The operating volume of the PCCWST is greater than or equal to 350,000 gallons.
5.f) A PCCWST water makeup flow path for long term makeup.	Testing will be performed to verify the makeup flow path by manually aligning a flow path from the makeup connection to the PCCWST.	Water is discharged into the PCCWST when water is added to the makeup flow path connection.
6.a) Safety-related displays of the PCS parameters identified in Table 3.2.3-3 can be retrieved in the MCR.	Inspection will be performed for the retrievability of the parameters in the MCR.	Indications of the PCS parameters identified in Table 3.2.3-3 can be retrieved in the MCR.
6.b) The PCS alarms identified in Table 3.2.3-3 are provided in the MCR.	Testing of the PCS alarms will be performed using signals simulating an alarm condition.	The PCS alarms identified in Table 3.2.3-3 actuate in response to signals simulating an alarm condition.
6.c) Controls exist in the MCR to place those remote-operated valves identified in Table 3.2.3-3 in the position(s) shown in Table 3.2.3-4, using the PMS.	Testing will be performed using the PCS controls in the MCR.	PCS controls in the MCR operate to place those remote-operated valves identified in Table 3.2.3-3 in the position(s) shown in Table 3.2.3-4, via the PMS.
6.d) Controls exist in the MCR to place those remote-operated valves identified in Table 3.2.3-3 in the position(s) shown in Table 3.2.3-4, using the DAS.	Testing will be performed using the PCS controls in the MCR at the DAS.	PCS controls in the MCR at the DAS operate to place those remote-operated valves identified in Table 3.2.3-3 in the position(s) shown in Table 3.2.3-4.

Table 3.2.3-6 (Sheet 5 of 5)		
Inspections, Tests, Analyses and Acceptance Criteria		
Design Commitment	**Inspections, Tests, Analyses**	**Acceptance Criteria**
7.a) The valves identified in Table 3.2.3-4 have an active safety-related function to change position to that indicated in the table.	i) Testing of installed valves will be performed at a PCCWST overflow water level condition and at ambient temperature. ii)Tests or type tests of motor-operated valves will be performed under design basis differential pressure, system pressure, fluid temperature, ambient temperature, minimum voltage and minimum and/or maximum stroke times.	i) Each PCS valve changes position to that indicated in Table 3.2.3-4 upon receiving an actuation signal. ii) A test report exists and concludes that each motor-operated valve changes position to that indicated in Table 3.2.3-4 under design basis conditions.
7.b) Upon loss of motive power, the active safety-related valves identified in Table 3.2.3-4 assume "loss of motive power" position indicated in the table.	Testing of the installed valves will be performed under the conditions of loss of motive power.	Upon loss of motive power, each active safety-related valve identified in Table 3.2.3-4 assumes the position indicated in the table.

3.6.2 NON-CLASS 1E DC AND UPS SYSTEM

Design Description

The non-class 1E DC and uninterruptible power supply (UPS) system (EDS) is a nonsafety-related system that provides electrical power to plant defense-in-depth (DID) systems equipment. The EDS is one of the plant DID systems. The EDS consists of two subsystems which are located in the annex building. Each subsystem represents two separate power supply trains and consists of two load groups. Load groups 1 and 3 constitute subsystem 1, and load groups 2 and 4 constitute subsystem 2. Only load groups 1, 2, and 3 supply power to the DID systems functions.

1) The functional arrangement of the EDS is as shown on Figure 3.6.2-1.

2) The EDS provides the following DID functions:

   a. EDS load group 1 battery charger supplies its DC switchboard bus load while maintaining its corresponding battery charged.

   b. EDS load group 2 battery charger supplies its DC switchboard bus load while maintaining its corresponding battery charged.

   c. EDS load group 3 battery charger supplies its DC switchboard bus load while maintaining its corresponding battery charged.

   d. EDS load group 1 battery supplies its DC switchboard bus load for a period of 1 hour without recharging.

   e. EDS load group 2 battery supplies its DC switchboard bus load for a period of 1 hour without recharging.

   f. EDS load group 3 battery supplies its DC switchboard bus load for a period of 1 hour without recharging.

   g. EDS load group 1 inverter supplies its AC load.

   h. EDS load group 2 inverter supplies its AC load.

   i. EDS load group 3 inverter supplies its AC load.

Inspections, Tests, Analyses, and Acceptance Criteria

Table 3.6.2-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the EDS.

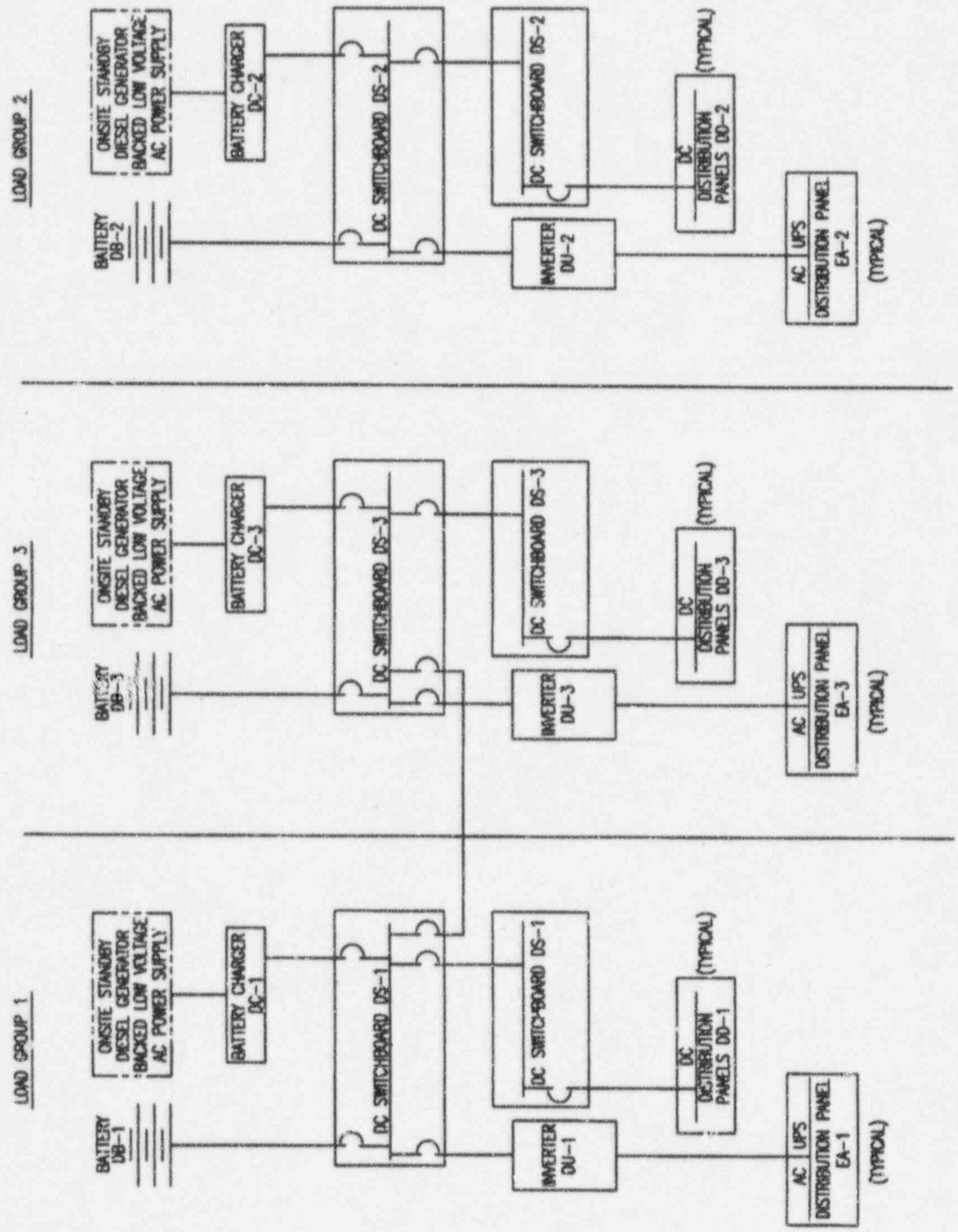

Figure 3.6.2-1 Non-Class 1E DC and UPS System

TABLE 3.6.2-1: Inspections, Tests, Analyses and Acceptance Criteria (Sheet 1 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1) The functional arrangement of the EDS is as shown on Figure 3.6.2-1.	Inspection of the as-built system will be performed.	The as-built EDS conforms with the functional arrangement as shown on Figure 3.6.2-1.
2) The EDS provides the following DID functions:		
2a) EDS load group 1 battery charger supplies its corresponding DC switchboard bus load while maintaining its corresponding battery charged.	Testing of the as-built battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads.	The battery charger provides a steady state output current of at least 600 amps.
2b) EDS load group 2 battery charger supplies its corresponding DC switchboard bus load while maintaining its corresponding battery charged.	Testing of the as-built battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads.	The battery charger provides a steady state output current of at least 600 amps.
2c) EDS load group 3 battery charger supplies its corresponding DC switchboard bus load while maintaining its corresponding battery charged.	Testing of the as-built battery charger will be performed by applying a simulated or real load, or a combination of simulated or real loads	The battery charger provides a steady state output current of at least 600 amps.
2d) EDS load group 1 battery supplies its corresponding DC switchboard bus load for a period of 1 hour without recharging.	Testing of the as-built battery will be performed by applying a simulated or real load, or a combination of simulated or real loads. The test will be conducted on a battery that has been fully charged.	The battery terminal voltage is greater than or equal to 105 volts after a period of no less than 1 hour, with an equivalent load of 600 ± 5 amps. The battery has been connected to a battery charger maintained at 135 ± 1 volts for a period of no less than 24 hours prior to the test.

TABLE 3.6.2-1: Inspections, Tests, Analyses and Acceptance Criteria (Sheet 2 of 2)

2e) EDS load group 2 battery supplies its corresponding DC switchboard bus load for a period of 1 hour without recharging.	Testing of the as-built battery will be performed by applying a simulated or real load, or a combination of simulated or real loads. The test will be conducted on a battery that has been fully charged.	The battery terminal voltage is greater than or equal to 105 volts after a period of no less than 1 hour, with an equivalent load of 600 ± 5 amps. The battery has been connected to a battery charger maintained at 135 ± 1 volts for a period of no less than 24 hours prior to the test.
2f) EDS load group 3 battery supplies its corresponding DC switchboard bus load for a period of 1 hour without recharging.	Testing of the as-built battery will be performed by applying a simulated or real load, or a combination of simulated or real loads. The test will be conducted on a battery that has been fully charged.	The battery terminal voltage is greater than or equal to 105 volts after a period of no less than 1 hour, with an equivalent load of 600 ± 5 amps. The battery has been connected to a battery charger maintained at 135 ± 1 volts for a period of no less than 24 hours prior to the test.
2g) EDS load group 1 inverter supplies its corresponding AC load.	Testing of the as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads.	The inverter provides a steady state line-to-line output voltage of 208 ± 2% volts at a frequency of 60 ± 0.5% Hz, under a resistive load equivalent to 45 ±1 kW.
2h) EDS load group 2 inverter supplies its corresponding AC load.	Testing of the as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads.	The inverter provides a steady state line-to-line output voltage of 208 ± 2% volts at a frequency of 60 ± 0.5% Hz, under a resistive load equivalent to 45 ±1 kW.
2i) EDS load group 3 inverter supplies its corresponding AC load.	Testing of the as-built inverter will be performed by applying a simulated or real load, or a combination of simulated or real loads.	The inverter provides a steady state line-to-line output voltage of 208 ± 2% volts at a frequency of 60 ± 0.5% Hz, under a resistive load equivalent to 45 ±1 kW.