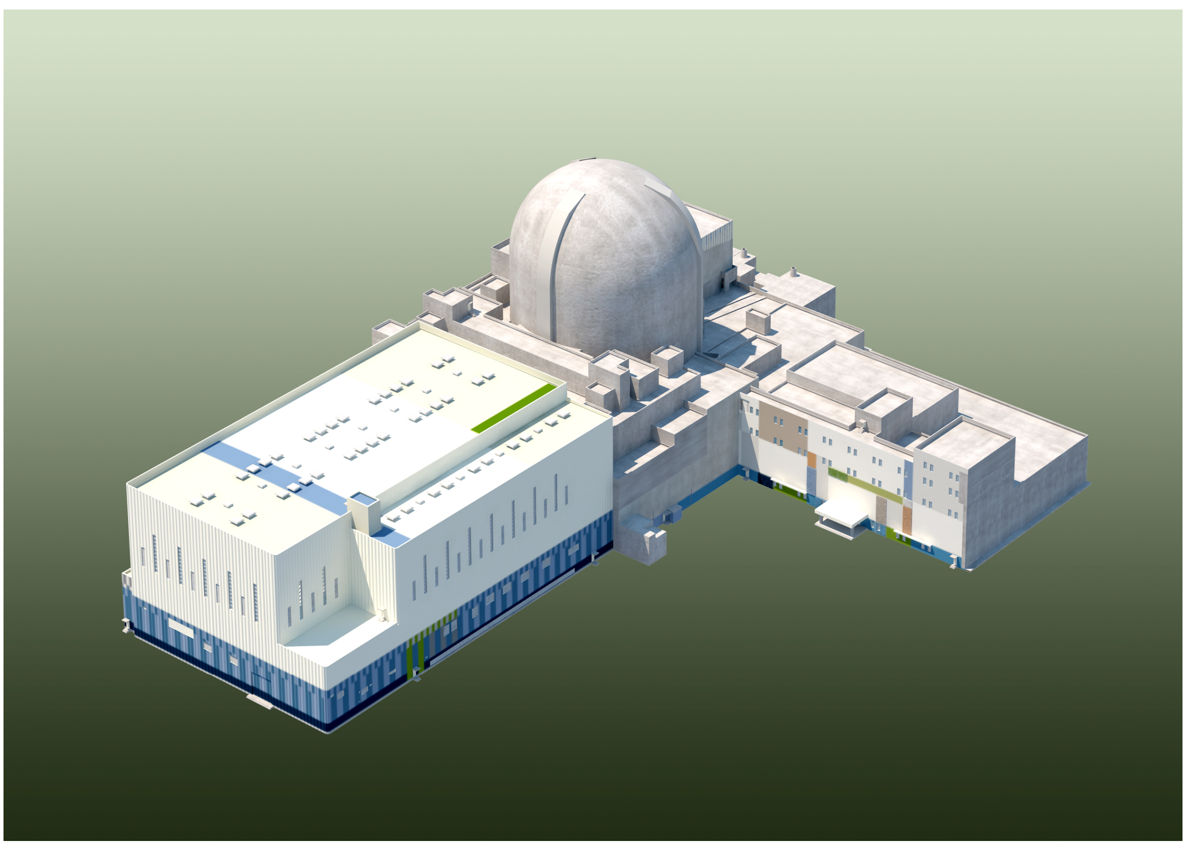
APR1400
DESIGN CONTROL DOCUMENT TIER 1

APR1400-K-X-FS-13001
REVISION 0
SEPTEMBER 2013



KOREA ELECTRIC POWER CORPORATION
KOREA HYDRO & NUCLEAR POWER CO., LTD

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ACRONYM AND ABBREVIATION LIST

AAC	Alternate Alternating Current
AB	Auxiliary Building
AC	Alternating Current
ACC	Analysis Computer Cabinet
ACP	Auxiliary Charging Pump
ACU	Air Cleaning Unit
AFAS	Auxiliary Feedwater Actuation Signal
AFW	Auxiliary Feedwater
AFWS	Auxiliary Feedwater System
AFWST	Auxiliary Feedwater Storage Tank
AHU	Air Handling Unit
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AOO	Anticipated Operational Occurrence
AOV	Air-Operated Valve
APC	Auxiliary Process Cabinet
ARMS	Area Radiation Monitoring System
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
BAMP	Boric Acid Makeup Pump
BAST	Boric Acid Storage Tank
BISI	Bypassed and Inoperable Status Indication
BOP	Balance Of Plant
CCF	Common Cause Failure
CCS	Component Control System
CCW	Component Cooling Water
CCWS	Component Cooling Water System
CEA	Control Element Assembly
CEACP	CEA Change Platform

CEAE	CEA Elevator
CEDM	Control Element Drive Mechanism
CET	Core Exit Thermocouple
CFR	Code of Federal Regulations
CFS	Cavity Flooding System
CGID	Commercial Grade Item Dedication
CHCS	Containment Hydrogen Control System
CIAS	Containment Isolation Actuation Signal
CIS	Containment Isolation System
CIV	Containment Isolation Valve
COL	Combined License
COLSS	Core Operating Limit Supervisory System
CPC	Core Protection Calculator
CPCS	Core Protection Calculator System
CPIAS	Containment Purge Isolation Actuation Signal
CRE	Control Room Envelope
CREVAS	Control Room Emergency Ventilation Actuation Signal
CS	Containment Spray
CSAS	Containment Spray Actuation Signal
CSB	Core Support Barrel
CSP	Containment Spray Pump
CSS	Containment Spray System
CVCS	Chemical and Volume Control System
CW	Circulating Water
CWS	Circulating Water System
DAC	Design Acceptance Criteria
DAW	Dry Active Waste
DBA	Design Basis Accident
DBE	Design Basis Event

DC	1) Direct Current 2) Design Certification
DCD	Design Control Document
DFOT	Diesel Fuel Oil Tank
DIS	Diverse Indication System
DMA	Diverse Manual ESF Actuation
DNBR	Departure from Nucleate Boiling Ratio
DPS	Diverse Protection System
DRCS	Digital Rod Control System
DVI	Direct Vessel Injection
EAB	Exclusion Area Boundary
ECSBS	Emergency Containment Spray Backup System
ECWS	Essential Chilled Water System
EDG	Emergency Diesel Generator
EDT	Equipment Drain Tank
EFDS	Equipment and Floor Drainage System
EHC	Electro-Hydraulic Control
EMI	Electromagnetic Interference
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EOST	Electrical Overspeed Trip
EPRI	Electric Power Research Institute
ERDS	Emergency Response Data System
ESD	Electrostatic Discharge
ESF	Engineered Safety Features
ESFAS	Engineered Safety Features Actuation System (or Signal)
ESF-CCS	Engineered Safety Features-Component Control System
ESW	Essential Service Water
ESWS	Essential Service Water System
FHEVAS	Fuel Handling Area Emergency Ventilation Actuation Signal

FP	Fire Protection
FPD	Flat Panel Display
FPS	Fire Protection System
FTS	Fuel Transfer System
FWCS	Feedwater Control System
GCB	Generator Circuit Breaker
GDC	General Design Criteria (of 10 CFR 50, Appendix A)
GTG	Gas Turbine Generator
GWMS	Gaseous Waste Management System
HA	Human Action
HFE	Human Factors Engineering
HI	Hydrogen Igniter
HJTC	Heated Junction Thermo couple
HSI	Human-System Interface
HVAC	Heating, Ventilation, and Air Conditioning
HVT	Holdup Volume Tank
HX	Heat Exchanger
I&C	Instrumentation and Control
ICI	In-Core Instrumentation
IHA	Integrated Head Assembly
IPS	Information Processing System
IRWST	In-Containment Refueling Water Storage Tank
ISV	1) Integrated System Validation 2) Intermediate Stop Valve
ITAAC	Inspections, Tests, Analyses, and Acceptance Criteria
ITP	Interface and Test Processor
IWSS	In-Containment Water Storage System
LBB	Leak Before Break
LC	Load Center
LCS	Local Control Station

LLHS	Light Load Handling System
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
LPD	Local Power Density
LPZ	Low Population Zone
LTOP	Low Temperature Overpressure Protection
LWMS	Liquid Waste Management System
MCC	Motor Control Center
MCR	Main Control Room
MG	Motor-Generator
MG Set	Motor-Generator Set
MOST	Mechanical Overspeed Trip
MOV	Motor-Operated Valve
MSADV	Main Steam Atmospheric Dump Valve
MSIS	Main Steam Isolation Signal
MSIV	Main Steam Isolation Valve
MSLB	Main Steam Line Break
MSR	Moisture Separator Reheater
MSS	Main Steam System
MSSV	Main Steam Safety Valve
MSV	Main Steam Valve
MSVH	Main Steam Valve House
MT	Main Transformer
MTP	Maintenance and Test Panel
NDE	Nondestructive Examination
NFE	New Fuel Elevator
NFS	Nuclear Fuel System
NI	Nuclear Island
NNS	Non-Nuclear Safety
NPCS	NSSS Process Control System

NPSH	Net Positive Suction Head
NPSHA	Net Positive Suction Head Available
NR	Narrow Range
NSSS	Nuclear Steam Supply System
NUREG	U.S. Nuclear Regulatory Commission Regulation
OHLHS	Overhead Heavy Load Handling System
OM	Operator Module
OSC	Operational Support Center
PAR	Passive Autocatalytic Recombiner
PCB	Power Circuit Breaker
P-CCS	Process-Component Control System
PCS	Power Control System
PCWS	Plant Chilled Water System
PERMSS	Process and Effluent Radiation Monitoring and Sampling System
PLCS	Pressurizer Level Control System
PMWP	Probable Maximum Winter Precipitation
PNS	Permanent Non-Safety
POSRV	Pilot Operated Safety Relief Valve
PPASS	Process and Post-Accident Smapling System
PPCS	Pressurizer Pressure Control System
PPS	1) Plant Protection System 2) Preferred Power Supply
PSC	Piping System and Components
PX	Primary Sampling System
PZR	Pressurizer
QA	Quality Assurance
QIAS	Qualified Indication and Alarm System
QIAS-N	Qualified Indication and Alarm System – Non-Safety
QIAS-P	Qualified Indication and Alarm System – P
RAP	Reliability Assurance Program

RCB	Reactor Containment Building
RCFC	Reactor Containment Fan Cooler
RCGVS	Reactor Coolant Gas Vent System
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RFI	Radio Frequency Interference
RM	Refueling Machine
RMWT	Reactor Makeup Water Tank
R/O	Reverse Osmosis
RPS	Reactor Protection System
RRS	Reactor Regulating System
RSR	Remote Shutdown Room
RSSH	Resin Sluice Supply Header
RSPT	Reed Switch Position Transmitter
RTSS	Reactor Trip Switchgear System
RV	Reactor Vessel
SBCS	Steam Bypass Control System
SBO	Station Blackout
SC	Shutdown Cooling
SCP	Shutdown Cooling Pump
SCS	Shutdown Cooling System
SDCHX	Shutdown Cooling Heat Exchanger
SFHM	Spent Fuel Handling Machine
SFP	Spent Fuel Pool
SFPCCS	Spent Fuel Pool Cooling and Cleanup System
SG	Steam Generator
SGBS	Steam Generator Blowdown System
SI	Safety Injection
SIAS	Safety Injection Actuation Signal
SIS	Safety Injection System

SIT	1) Safety Injection Tank 2) Structural Integrity Test
SOV	Solenoid-Operated Valve
SRDC	Safety-Related Divisional Cabinet
SSC	Structures, Systems, and Components
SSE	Safe Shutdown Earthquake
SWMS	Solid Waste Management System
TDH	Total Dynamic Head
T/G	Turbine-Generator
TGBCCW	Turbine Generator Building Closed Cooling Water
TGBOCWS	Turbine Generator Building Open Cooling Water System
TSC	Technical Support Center
TSP	Tri-sodium Phosphate
UAT	Unit Auxiliary Transformer
UGS	Upper Guide Structure
UHS	Ultimate Heat Sink
US NRC	United States Nuclear Regulatory Commission
V&V	Verification and Validation
VCT	Volume Control Tank
WR	Wide Range

1.0 Introduction

1.1 Definitions

The following definitions apply to terms used in the Design Descriptions and associated Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC):

Acceptance Criteria means the performance, physical condition, or analysis result for a structure, system or component that demonstrates the Design Commitment is met.

Analysis means a calculation, mathematical computation, or engineering or technical evaluation. Engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems or components.

As-built means the physical properties of a structure, system, or component following the completion of its installation or construction activities at its final location at the plant site. In cases where it is technically justifiable, determination of physical properties of the as-built structure, system, or component may be based upon measurements, inspections, or tests that occur prior to installation, provided that subsequent fabrication, handling, installation, and testing do not alter the properties.

Basic Configuration (for a Building) means the arrangement of building features (e.g., floors, ceilings, walls, basemat and doorways) and of the structures, systems, or components within, as specified in the building Design Description.

Channel means an arrangement of components and modules are required to generate a single protective action signal when required by a plant condition. A channel loses its identity where single protective action signals are combined.

Design Commitment means that portion of the Design Description that is verified by ITAAC.

Design Description means that portion of the design that is certified.

Division (for electrical systems) is the designation applied to a given safety-related system or set of components which are physically, electrically, and functionally independent from other redundant sets of components.

Division (for mechanical systems or equipment) is the designation applied to a specific set of safety-related components within a system.

Exists, when used in the Acceptance Criteria, means that the item is present and meets the design description.

Functional Arrangement (for a System) means the physical arrangement of systems and components to provide the service for which the system is intended, and which is described in the system Design Description.

Inspect or Inspection mean visual observations, physical examinations, or reviews of records based on visual observation or physical examination that compare the structure, system, or component condition to one or more Design Commitments. Examples include walkdowns, configuration checks, measurements of dimensions, or non-destructive examinations.

Inspect for Retrievability means to visually observe that the specified information appears on a monitor, display, or alarm when summoned by the operator.

Operate means the actuation and running of equipment.

Qualified for Harsh Environment means that 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 the safety function. These environmental conditions include applicable time-dependent temperature and pressure profiles, humidity, chemical effects, radiation, aging, submergence, and their synergistic effects which have a significant effect on the equipment performance. Equipment identified in the Design Description as being Qualified for Harsh Environment includes the:

a. equipment itself

b. sensors, switches and lubricants that are an integral part of the equipment

c. electrical components connected to the equipment (wiring, cabling and terminations)

Items b and c are Qualified for Harsh Environment only when they are necessary to support operation of the equipment to meet its safety-related function listed in the Design Description and to the extent such equipment is located in a harsh environment during or following a design basis accident.

Test means the actuation or operation, or establishment of specified conditions, to evaluate the performance or integrity of as-built structures, systems, or components, unless explicitly stated otherwise.

Type Test means a test on one or more sample components of the same type and manufacturer to qualify other components of that same type and manufacturer. A type test is not necessarily a test of the as-built structures, systems or components.

1.2 General Provisions

The following general provisions are applicable to the Design Descriptions and the associated ITAAC:

1.2.1 Treatment of Individual Items

The absence of any discussion or depiction of an item in the Design Description or accompanying Figures shall not be construed as prohibiting a licensee from utilizing such an item, unless it would prevent an item from performing its safety function as discussed or depicted in the Design Description or accompanying Figures.

When the term “operate”, “operates”, or “operation” is used with respect to an item discussed in the Acceptance Criteria, it refers to the actuation and running of the item. When the term “exist”, “exists”, or “existence” is used with respect to an item discussed in the Acceptance Criteria, it means that the item is present and meets the Design Description.

Many of the Acceptance Criteria include the words “A report exists and concludes that…” When these words are used, it indicates that the ITAAC for that Design Commitment will be met when it is confirmed that appropriate documentation exists and the documentation shows that the Design Commitment is met. Appropriate documentation can be a single document or a collection of documents that show that the stated acceptance criteria are met. Examples of appropriate documentation include design reports, test reports, inspection reports, analysis reports, evaluation reports, design and manufacturing procedures, certified data sheets, commercial dedication procedures and records, quality assurance records, calculation notes, and equipment qualification data packages.

1.2.2 Implementation of ITAAC

The ITAAC are provided in tables with the following three column format:

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria

Each Design Commitment (DC) in the left-hand column of the ITAAC tables has an associated Inspections, Tests, or Analyses (ITA) requirement specified in the middle column of the tables.

The identification of a separate ITA entry for each Design Commitment shall not be construed to require that separate inspections, tests, or analyses must be performed for each Design Commitment. Instead, the activities associated with more than one ITA entry may be combined, and a single inspection, test, or analysis may be sufficient to implement more than one ITA entry.

An ITA may be performed by the licensee of the plant, or by its authorized vendors, contractors, or consultants. Furthermore, an ITA may be performed by more than a single individual or group, may be implemented through discrete activities separated by time, and may be performed at any time prior to fuel load (including before issuance of the Combined License for those ITAAC that do not necessarily pertain to as-built equipment). Additionally, an ITA may be performed as part of the activities that are required to be performed under 10 CFR Part 50 (including, for example, the Quality Assurance (QA) program required under Appendix B to Part 50); therefore, an ITA need not be performed as a separate or discrete activity.

Each ITA has an associated Acceptance Criteria (AC) in the third column of the tables that demonstrate that the Design Commitment in the first column has been met.

1.2.3 System Design Description Discussion of Matters Related to Operations

In some cases, the Design Descriptions in this document refer to matters that relate to operation, such as normal valve or breaker alignment during normal operation modes. Such discussions are provided solely to place the Design Description provisions in context (e.g., to explain automatic features for opening or closing valves or breakers upon off-normal conditions). Such discussions shall not be construed as requiring operators during operation to take any particular action (e.g., to maintain valves or breakers in a particular position during normal operation).

1.2.4 Interpretation of Figures

In many but not all cases, the Design Descriptions in Section 2 include one or more Figures. The Figures may represent a functional diagram, general structural representation, or other general illustration. For instrumentation and control (I&C) systems, Figures also represent aspects of the relevant logic of the system or part of the system. Unless specified explicitly, the Figures are not indicative of the scale, location, dimensions, shape, or spatial relationships of as-built structures, systems, and components. In particular, the

as-built attributes of structures, systems, and components may vary from the attributes depicted on the Figures, provided that those safety functions discussed in the Design Description pertaining to the Figure are not adversely affected.

1.2.5 Rated Reactor Core Thermal Power

The rated reactor core thermal power for the APR1400 certified design is 3,983 megawatts thermal (MWt).

1.3 Figure Legend, Acronym and Abbreviation List

The conventions presented in this section are employed for figures used in the Design Descriptions. The acronyms and abbreviations presented in this section are used in the Design Control Document. The figure legend and acronym and abbreviation list are provided for information only and are not part of the Tier 1 Design Control Document.

INSTRUMENTATION

FLOW INSTRUMENT	F
TEMPERATURE INSTRUMENT	T
RADIATION INSTRUMENT	R
DIFFERENTIAL PRESSURE INSTRUMENT	PD
PRESSURE INSTRUMENT	P
LEVEL INSTRUMENT	L
CURRENT(ELECTRIC) INSTRUMENT	I
MOISTURE OR HUMIDITY DETECTOR	M
ULTRASONIC INSTRUMENT	U
SMOKE DETECTOR	ζ
SPEED	S
ANALYZER	A
ALARM	A

Figure 1.3-1 Figure Legend of the Instrumentation

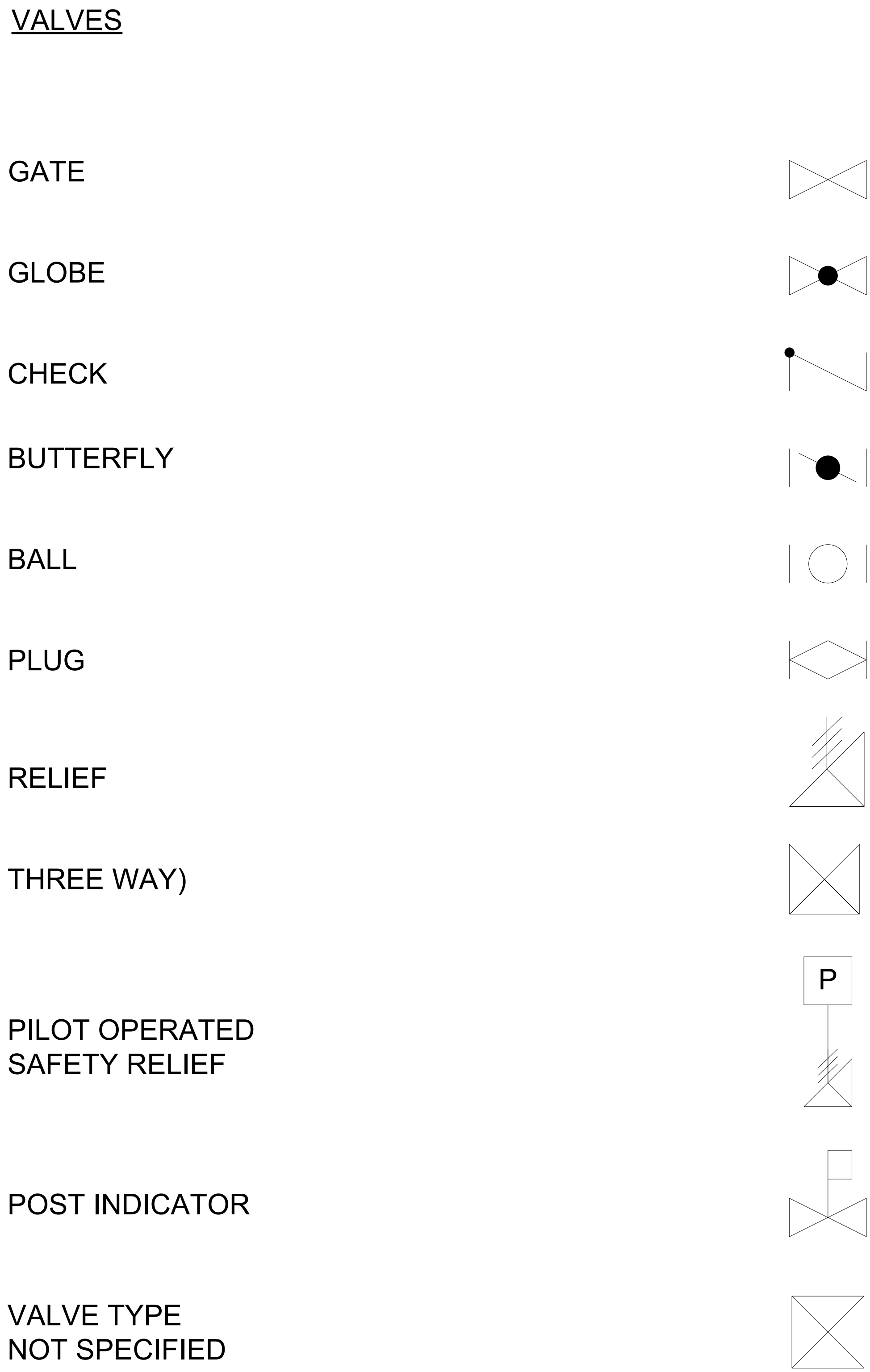
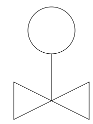


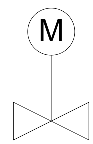
Figure 1.3-2 Figure Legend of Valves

VALVE OPERATORS

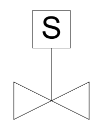
OPERATOR OF
UNSPECIFIED TYPE



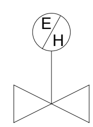
MOTOR OPERATOR



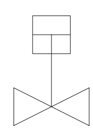
SOLENOID OPERATOR



HYDRAULIC OPERATOR



PNEUMATIC OPERATOR
(DIAPHRAM)



PNEUMATIC OPERATOR
(CYLINDER)

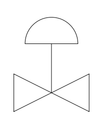


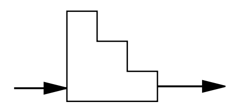
Figure 1.3-3 Figure Legend of the Valve operators

FAIL POSITION INDICATIONS FOR VALVES

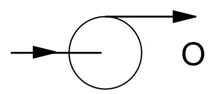
FAIL LOCKED IN PLACE	FL
FAILS CLOSED	FC
FAILS OPEN	FO

MECHANICAL EQUIPMENT

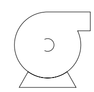
POSITIVE DISPLACEMENT PUMP



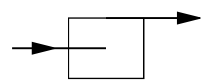
CENTRIFUGAL PUMP



OR

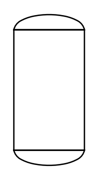


PUMP TYPE NOT SPECIFIED

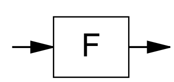


HEADER

TANK



FILTER



STRAINER

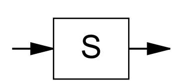


Figure 1.3-4 Figure Legend of the Valve Position and the Mechanical Equipment

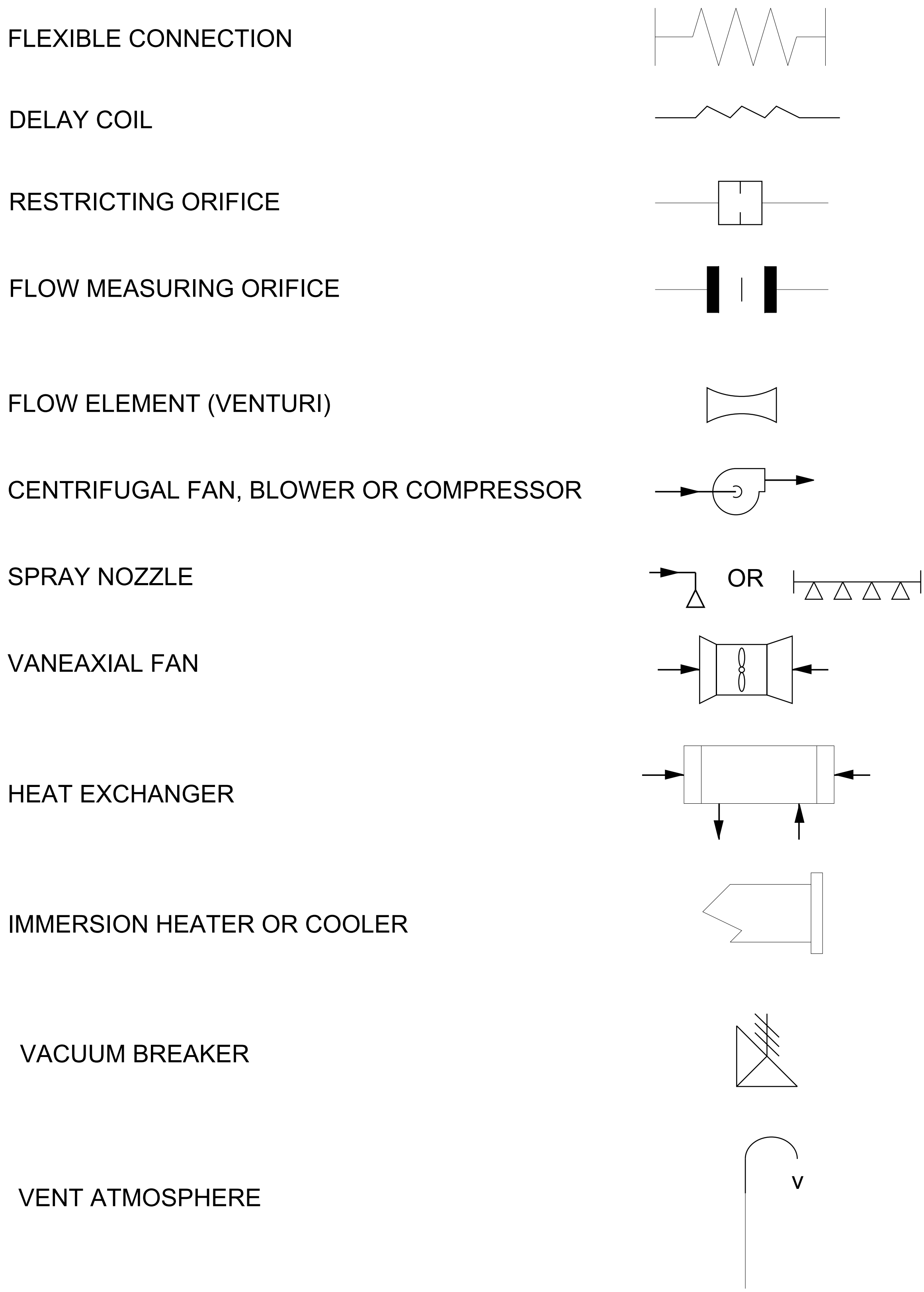


Figure 1.3-5 Figure Legend of the Mechanical Equipment

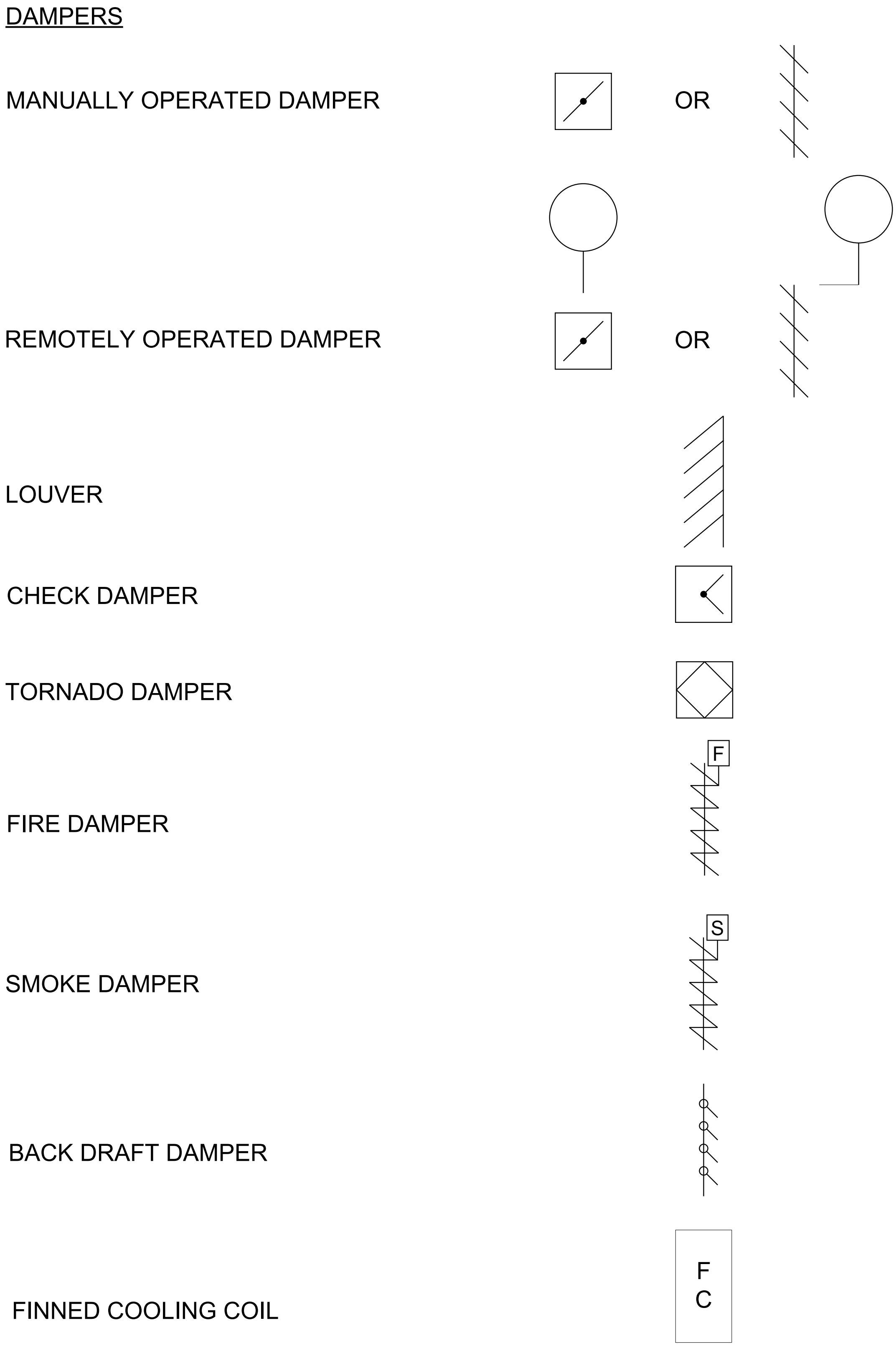


Figure 1.3-6 Figure Legend of the Dampers

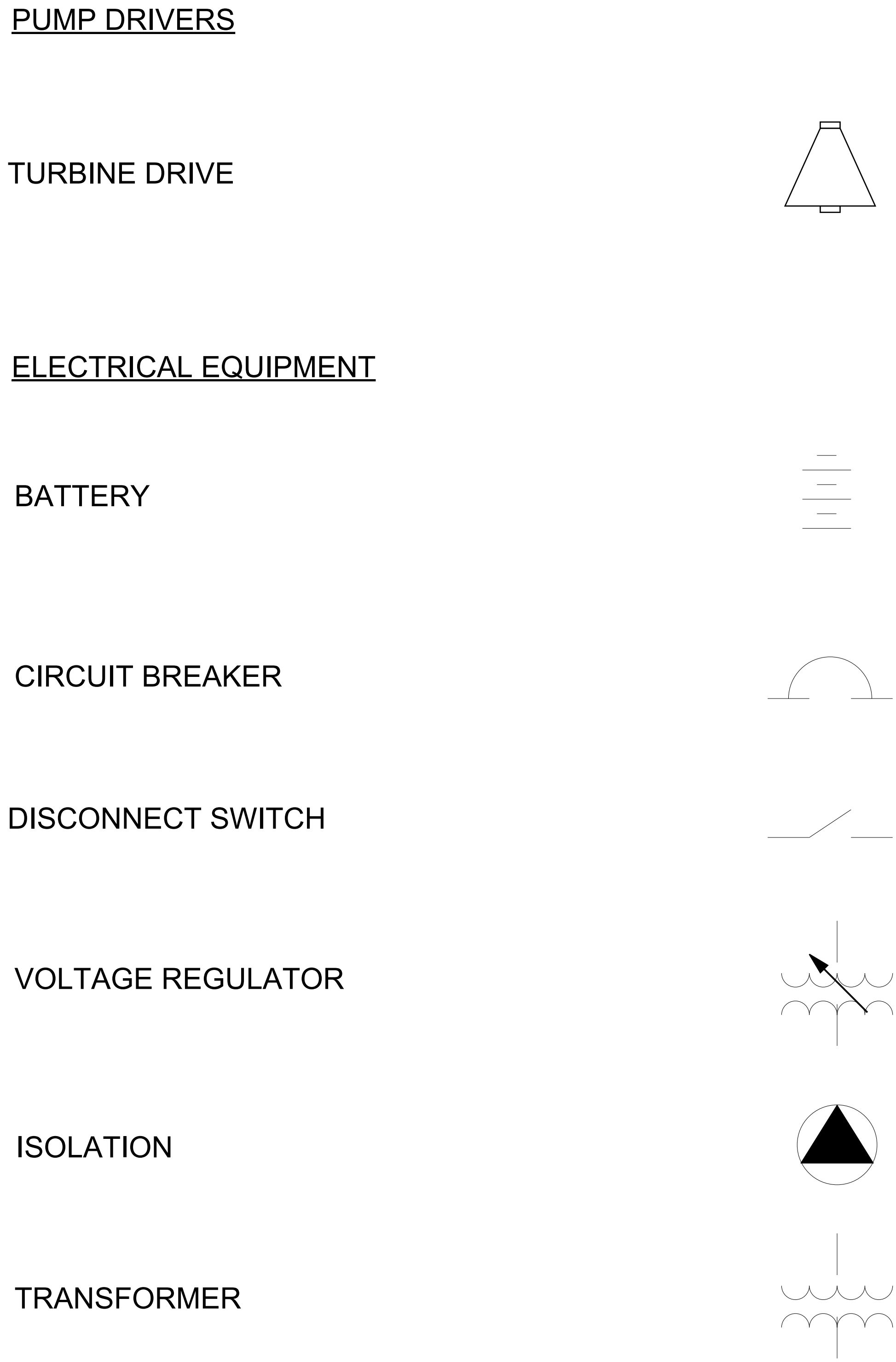


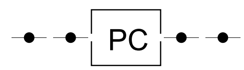
Figure 1.3-7 Figure Legend of the Pump Drivers and the Electrical Equipment

MISCELLANEOUS

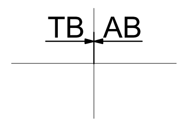
A SYSTEM OR COMPONENT
THAT IS NOT PART OF THE
DEFINED SYSTEM

CONTAINMENT

CONTAINMENT PENETRATION

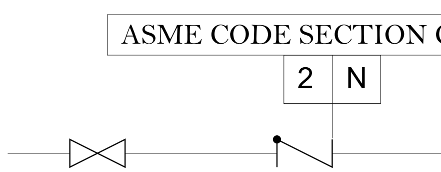


BUILDING SEPARATION



ASME CODE CLASS BREAK

A ASME CODE CLASS BREAK IS IDENTIFIED BY A SINGLE LINE TO THE DESIGNATED LOCATION FOR THE CLASS BREAK, AS SHOWN IN THE EXAMPLE BELOW.



(NOTE1)

NOTES :

1. THE HEADER, “ASME CODE SECTION CLASS”, MUST APPEAR AT LEAST ONCE ON EACH FIGURE ON WHICH ASME CODE SECTION CLASS BREAKS ARE SHOWN. BUT NEED NOT APPEAR AT EVERY CLASS BREAK SHOWN ON A FIGURE.

N INDICATES NON-ASME CODE SECTION CLASS

Figure 1.3-8 Figure Legend of the Miscellaneous

2.0 Design Description and ITAAC

2.1 Site Parameters

This section provides the major site parameters postulated for the Certified Design. These site parameters are applied for the design of the SSCs important to safety of the Certified Design.

2.1.1 Design Description

The site characteristics of the actual site for the Certified Design will be bounded by the postulated site parameters identified in Table 2.1-1. In case of deviation, the COL applicant is to justify that the facilities installed at the actual site will be acceptable regardless of site-specific parameters which may fall outside the postulated site parameters.

2.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

This section contains no ITAAC.

Table 2.1-1 (1 of 3)

Site Parameters

Ground Water	
Maximum Elevation of Groundwater	0.61 m (2 feet) below plant grade(1) in the vicinity of the SSCs important to safety
Flood (or Tsunami) Level	
Maximum Flood Elevation:	0.3 m (1 foot) below plant grade in the vicinity of the SSCs important to safety
Precipitation	
Maximum Precipitation Rate [1 mi^2] 100-Year Snowpack Roof Load Extreme Winter Precipitation Roof Load Depth of 48-Hour Probable Maximum Winter Precipitation (PMWP)	- 492.7 mm (19.4 in) over 1-hour - 157 mm (6.2 in) in 5 minutes - 2.873 kPa (60 lbf/ft^2) - 5.985 kPa (125 lbf/ft^2) - 914.4 mm (36 in)
Design Ambient Temperatures	
HVAC Outdoor Design Temperature - 1 % Exceedance Values · Maximum · Minimum - 0 % Exceedance Values · Maximum · Minimum	 43.3 °C (100 °F) dry bulb and 25 °C (77 °F) coincident wet bulb -23.3 °C (-10 °F) 46.1 °C (115 °F) dry bulb and 26.7 °C (80 °F) coincident wet bulb -40.0 °C (-40 °F)
Ambient Design Temperature for Cooling Tower - Ambient 5 % Exceedance Values for CWS · Maximum · Minimum - Ambient 0 % Exceedance Values for ESWS · Maximum · Minimum	 26.1 °C (79 °F) non-concurrent wet bulb -20.6 °C (-5 °F) 27.2 °C (81 °F) non-concurrent wet bulb -40.0 °C (-40 °F)
Extreme Wind	
50-Year 3-Second Wind Gust Speed	64.8 m/s (145 mph)
Importance Factors	1.15 (2)

Table 2.1-1 (2 of 3)

Tornado	
Maximum Tornado Wind Speed	102.8 m/s (230 mph)
Translational Speed	20.6 m/s (46 mph)
Maximum Rotational Speed	82.2 m/s (184 mph)
Radius of Maximum Rotational Speed	45.7 m (150 feet)
Pressure Drop	8.274 kPa (1.2 psi)
Rate of Pressure Drop	3.447 kPa/s (0.5 psi/s)
Missile Spectra	Table 2 (Region I) of NRC RG 1.76 (2007)
Hurricane	
Maximum 3-Second Wind Gust Speed	116 m/s (260 mph)
Missile Spectra	Table 1 of NRC RG 1.221 (2011)
Soil Properties	
Minimum Allowable Static Bearing Capacity	718.2 kPa (15 ksf) (3)
Minimum Allowable Dynamic Bearing Capacity	2,872.8 kPa (60 ksf) (3)
Minimum Shear Wave Velocity	304.8 m/s (1,000 ft/sec)
Liquefaction Potential (yes/no)	No
Maximum Differential Settlement inside Building	1/2 inch in 50 ft in any direction
Maximum Differential Settlement between Buildings	1/2 in
Minimum Soil Angle of Internal Friction	35 degrees
Slope Failure Potential (yes/no)	No
Fault Displacement Potential (yes/no)	No
Seismology	
Safe Shutdown Earthquake (SSE)	0.3g peak ground acceleration
Certified Seismic Design Response Spectra Referencing SSE	See Figures 2.1-1 and 2.1-2
Meteorology	
Accident Release χ/Q Values at EAB · 0-2 hr	1.00×10^{-3} s/m^3
Accident Release χ/Q Values at LPZ · 0-8 hr · 8-24 hr · 24-96 hr · 96-720 hr	2.20×10^{-4} s/m^3 1.60×10^{-4} s/m^3 1.00×10^{-4} s/m^3 8.00×10^{-5} s/m^3

Table 2.1-1 (3 of 3)

Meteorology (Cont'd)	
Annual Average χ/Q Values at Site Boundary · Undepleted/No Decay · Undepleted/2.26-Day Decay · Depleted/8.00-Day Decay · D/Q	 2.00×10^{-5} s/m^3 1.99×10^{-5} s/m^3 1.84×10^{-5} s/m^3 2.00×10^{-7} /m^2
Inventory of Radionuclides Which Could Potentially Seep into the Groundwater	See Table 2.1-2

(1) Plant grade represents the level of ground adjacent to the nuclear island buildings and is established plant elevation of 98 ft - 8 in.

(2) 100-year recurrence interval; value to be used for design of seismic Category I and II structures only.

(3) Bearing capacity is defined at the foundation level of the Nuclear Island Structures.

Table 2.1-2 (1 of 2)

Inventory of Radionuclides Which Could Potentially Seep into the Groundwater

Nuclide	Holdup Tank (Bq)	Holdup Tank[1] (Bq/cc)
Br 84	1.40E+05	8.81E-05
I 131	3.60E+07	2.26E-02
I 132	2.60E+06	1.64E-03
I 133	2.20E+07	1.38E-02
I 134	1.50E+06	9.43E-04
I 135	9.20E+06	5.79E-03
Rb 88	4.50E+06	2.83E-03
Cs 134	1.40E+06	8.81E-04
Cs 136	1.50E+07	9.43E-03
Cs 137	2.10E+06	1.32E-03
Na 24	3.50E+07	2.20E-02
Cr 51	1.50E+08	9.43E-02
Mn 54	1.30E+08	8.18E-02
Fe 55	1.00E+08	6.29E-02
Fe 59	1.80E+07	1.13E-02
Co 58	3.10E+08	1.95E-01
Co 60	4.70E+07	2.96E-02
Zn 65	4.20E+07	2.64E-02
Sr 89	8.70E+06	5.47E-03
Sr 90	1.10E+06	6.92E-04
Sr 91	4.10E+05	2.58E-04
Y 91m	7.50E+06	4.72E-03
Y 91	3.20E+07	2.01E-02
Y 93	8.20E+08	5.16E-01
Zr 95	2.60E+07	1.64E-02
Nb 95	1.50E+07	9.43E-03
Mo 99	3.60E+07	2.26E-02
Tc 99m	1.10E+06	6.92E-04
Ru 103	4.30E+08	2.70E-01

Table 2.1-2 (2 of 2)

Nuclide	Holdup Tank (Bq)	Holdup Tank [1] (Bq/cc)
Ru 106	7.60E+09	4.78E+00
Ag 110m	1.10E+08	6.92E-02
Te 129m	9.40E+06	5.91E-03
Te 129	4.70E+05	2.96E-04
Te 131m	2.00E+06	1.26E-03
Te 131	5.30E+04	3.33E-05
Te 132	9.80E+06	6.16E-03
Ba 137m	2.10E+06	1.32E-03
Ba 140	3.80E+08	2.39E-01
La 140	7.10E+07	4.47E-02
Ce 141	7.90E+06	4.97E-03
Ce 143	6.00E+06	3.77E-03
Ce 144	3.30E+08	2.08E-01
W 187	3.50E+06	2.20E-03
Np 239	9.80E+06	6.16E-03
H-3	7.20E+12	4.53E+03

(1) Volume of the holdup tank is 420,000 gal.

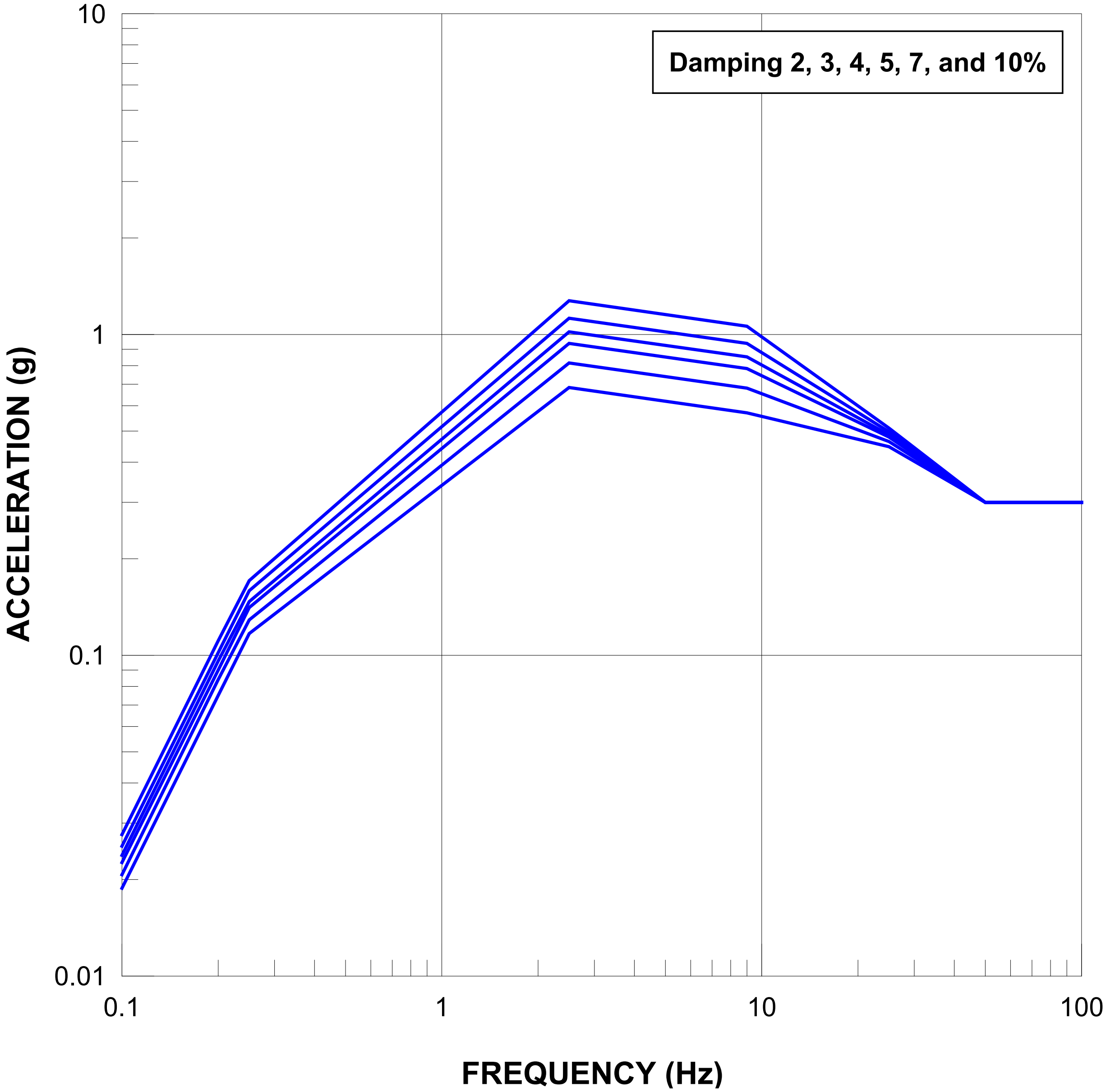


Figure 2.1-1 Horizontal Certified Seismic Design Response Spectra

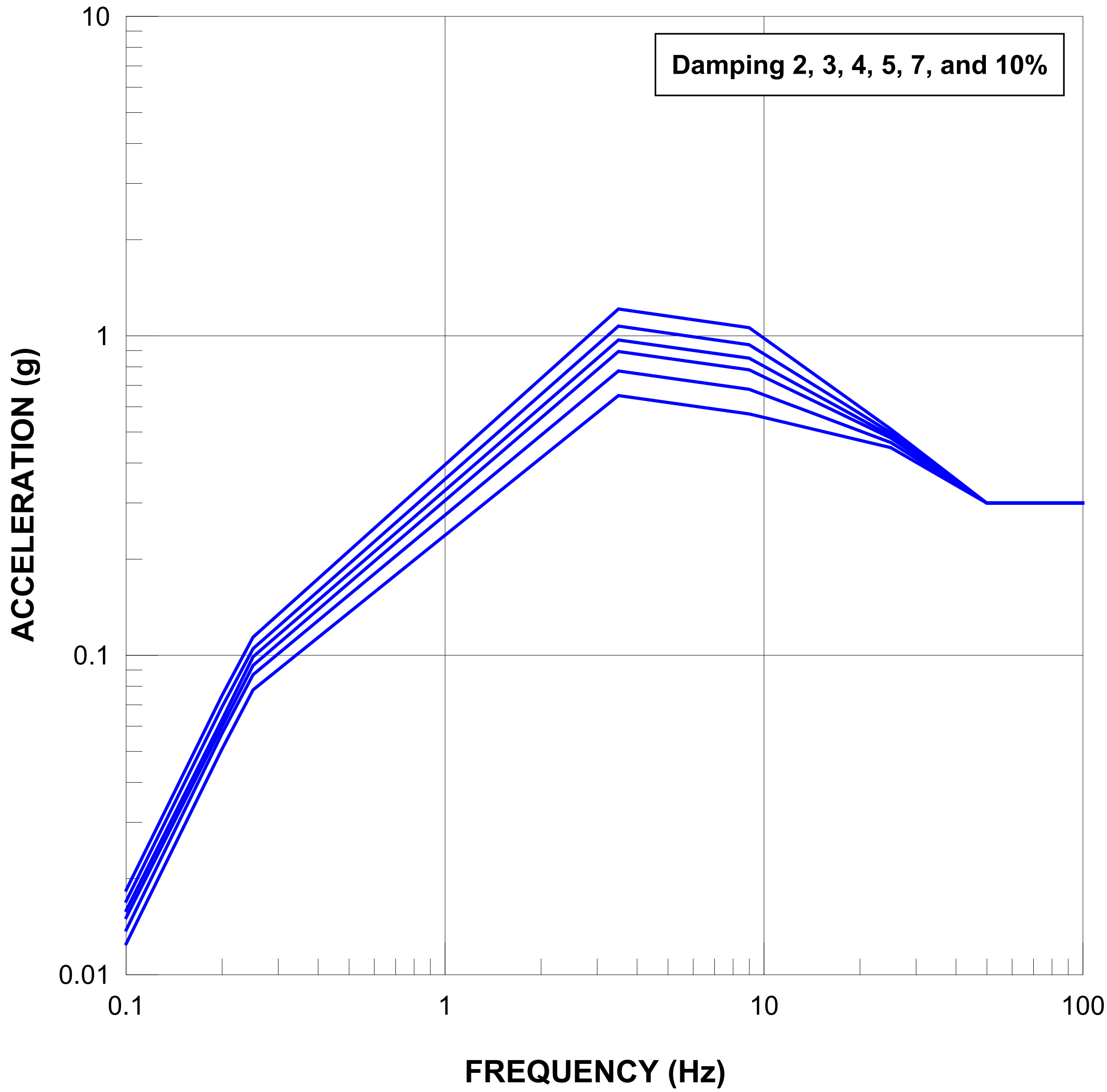


Figure 2.1-2 Vertical Certified Seismic Design Response Spectra

2.2 Structural and System Engineering

This section provides discussions on building structures and structural aspects of major components. The nuclear island (NI) structures, emergency diesel generator building, turbine generator building, compound building and structural aspects of reactor pressure vessel and in-core instrument guide tube system are discussed. In addition, the protection against internal and external hazards is discussed.

2.2.1 Nuclear Island Structures

2.2.1.1 Design Description

The nuclear island (NI) structures house, protect, and support plant equipment and provide personnel and equipment access, support for systems and components under operating loads, radiation shielding, structural components to withstand loads due to design basis external and internal events, physical separation between divisions of safety-related equipment, and barriers to minimize or prevent the release of radioactive materials. The NI structures are safety related structures that consist of the reactor containment building (RCB) and the auxiliary building (AB). The NI structures are designed to withstand the effect of an aircraft impact.

The RCB and AB are structurally separated but founded on a common reinforced concrete basemat which is embedded below the finished plant grade level.

The RCB structure is composed of a prestressed concrete containment, and reinforced concrete internal structures with steel structures.

The containment is a steel lined prestressed concrete structure which consists of a right cylinder with a hemispherical dome on the reinforced concrete common basemat. The cylinder and dome of the containment is prestressed by a post-tensioning system consisting of horizontal and inverted "U" vertical tendons. There are three buttresses equally spaced around the cylinder to anchor horizontal tendon. There is no structural connection between free standing portion of the containment and adjacent structures other than penetrations and their supports. The containment retains its integrity at pressure and temperature conditions associated with the most limiting design basis accident without exceeding the design leakage rate. Access to the containment is provided through

personnel air locks and an equipment hatch. Penetrations are provided for electrical and mechanical components and for the transport of nuclear fuel.

The containment internal structures consist of reinforced concrete and structural steels that support reactor vessel and reactor coolant system. The primary shield wall supports and laterally surrounds the reactor vessel. The secondary shield wall laterally surrounds the primary shield wall and is structurally connected to the primary shield wall by reinforced concrete slabs, beams and walls. The secondary shield wall supports steam generators and pressurizer. The containment internal structures enclose a reactor cavity area below the reactor vessel which can be flooded during a postulated accident. An indirect gas vent path is provided between the reactor cavity and the free volume of the containment.

The reactor cavity has a corium debris chamber. And the reactor cavity floor is constructed with a fill concrete on steel liner plate. The reactor cavity floor area is free from obstructions to corium debris spreading.

The AB is a reinforced concrete structure which consists of the electrical and control area, the fuel handling area, the chemical and volume control system area, the main steam valve house and the emergency diesel generator area. The AB laterally surrounds the RCB and is divided by divisional walls.

The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads associated with:

- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrodynamic loads, and equipment loads, including the effects of temperature and equipment vibration)
- External events (including rain, snow, wind, flood, hurricane, hurricane generated missiles, and earthquake)
- Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

Seismic classification of the building is shown in Table 2.2.1-3.

1. The basic configuration of the NI structure is as shown in Figure 2.2.1-1 through Figure 2.2.1-13.

2.a The containment is designed and constructed to meet the requirements of ASME Section III, Div.2.

2.b The containment penetrations are designed and constructed to meet ASME Section III.

2.c The containment and its penetrations retain their pressure boundary integrity associated with the design pressure.

2.d The containment and its penetrations maintain the containment leakage rate less than or equal to the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident.

3. The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads.

4. The key dimensions of the NI structures are described in Table 2.2.1-1.

2.2.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for nuclear island structures are specified in Table 2.2.1-2.

Table 2.2.1-1 (1 of 10)

Definition of Wall Thicknesses for Nuclear Island Structure

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)(2)	Applicable Radiation Shielding Wall (Yes/No)
Reactor Containment Building				
Containment Structures				
Cylindrical Shell	Not Applicable	From 78'-0" to 254'-6"	4'-6"	Yes
Hemispherical Dome	Not Applicable	From 254'-6" to 333'-6"	4'-0"	Yes
Common Basemat	N-S direction portion within 18'-9" from the center of RCB	From 55'-0" to 66'-0"	11'-0"	No
	E-W direction portion within 21'-1"(East) or 40'-7"(West) from the center of RCB	From 55'-0" to 66'-0"	11'-0"	No
	N-S direction portion from 18'-9" to 42'-6" from the center of RCB	From 55'-0" to 78'-0"	23'-0"	No
	East direction portion from 21'-1" to 42'-6" from the center of RCB	From 55'-0" to 76'-0"	21'-0"	No
	West direction portion from 40'-7" to 42'-6" from the center of RCB	From 55'-0" to 78'-0"	23'-0"	No
	N-S direction portion from 42'-6" to 84'-0" from the center of RCB	From 45'-0" to 78'-0"	33'-0"	No
	E-W direction portion from 42'-6" to 84'-0" from the center of RCB	From 45'-0" to 78'-0"	33'-0"	No

Table 2.2.1-1 (2 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Containment Internal Structure				
Primary Shield Wall	Not Applicable	From 69'-0" to 94'-3 1/2"	12'-10 3/4"(East), 9'-8 5/8"(North/South)	Yes
		From 94'-3 1/2" to 114'-6"	9'-1"(East), 6'-9"(North/South)	Yes
		From 114'-6" to 130'-0"	6'-9"	Yes
Secondary Shield Wall	Not Applicable	From 100'-0" to 156'-0"	4'-0"	Yes
Fill Slab	Not Applicable	From 66'-0" to 69'-0" From 78'-0 to 81'-0" From 78'-0 to 100'-0" From 76-0 to 80'-0"	3'-0" 3'-0" 22'-0" 4'-0"	No
IRWST Wall	Not Applicable	From 81'-0" to 97'-0"	3'-0"	No
IRWST Slab	Not Applicable	From 97'-0" to 100'-0"	3'-0"	No
Refueling Pool Wall	E-W direction	From 130'-0"to 156'-0"	6'-2"	Yes
	N-S direction	From 130'-0" to 156'-0"	5'-0"(West), 6'-0"(East)	Yes
Refueling Pool Slab	Not Applicable	From 126'-0" to 130'-0" From 107'-6" to 114'-6"	4'-0" 7'-0"	No No
Hold-up Volume Tank Wall	Not Applicable	From 80'-0" to 100'-0"	6'-2"(North/South)	No

Table 2.2.1-1 (3 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Containment Internal Structure				
Steam Generator Compartment Wall	Not Applicable	From 156'-0" to 186'-11" From 156'-0" to 191'-0"	4'-0"(Circular) 4'-1 3/"~ 5'-0"(straight)	Yes
Floors	Not Applicable	From 112'-0" to 114'-0" From 134'-6" to 136'-6" From 133'-6" to 136'-6" From 154'-0" to 156'-0" From 153'-0" to 156'-0" From 152'-0" to 156'-0"	2'-0" 2'-0" 3'-0" 2'-0" 3'-0" 4'-0"	No
Auxiliary Building				
Common basemat	Not Applicable	45'-0" & 55'-0"	10'-0"	No
Column Line 12 Wall	From AA to AK	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line 12 Wall	From AA to AK	From 156'-0" to 195'-0"	3'-0"	Yes
Column Line 13 Wall	From AA to AC From AI to AK	From 120'-0" to 137'-6"	2'-6"	No
Column Line 13 Wall	From AE to AG	From 174'-0" to 195'-0"	3'-0"	No
Column Line 14 Wall	From AA to AK	From 55'-0" to 213'-0"	3'-0"	Yes
Column Line 15 Wall	From AA to AK	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line 15 Wall	From AA to AK	From 156'-0" to 213'-0"	3'-0"	Yes

Table 2.2.1-1 (4 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 17 Wall	From AB to AD From AH to AJ	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line 17 Wall	From AA to AB From AJ to AK	From 137'-0" to 156'-0"	7'-0"	No
Column Line 17 Wall	From AA to AD From AH to AK	From 156'-0" to 174'-0"	4'-0"	No
Column Line 17 Wall	From AA to AC From AI to AK	From 174'-0" to 195'-0"	3'-0"	No
Column Line 18 Wall	From AC to AD From AH to AI	From 55'-0" to 175'-0"	4'-0"	Yes
Column Line 18 Wall	From AC to AD From AH to AI	From 174'-0" to 195'-0"	3'-0"	No
Column Line 19 Wall	From AA to AD From AH to AK	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line 20 Wall	From AC to AD From AH to AI	From 55'-0" to 175'-0"	4'-0"	Yes
Column Line 21 Wall	From AB to AC From AI to AJ	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line 21 Wall	From AI to AK	From 137'-0" to 174'-0"	1'-6"	Yes

Table 2.2.1-1 (5 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 22 Wall	From AB to AC From AI to AJ	From 55'-0" to 226'-6"	2'-3"	Yes
Column Line 22 Wall	From AC to AD From AH to AI	From 55'-0" to 78'-0"	2'-6"	No
Column Line 22 Wall	From AC to AD From AH to AI	From 100'-0" to 137'-6"	4'-0"	Yes
Column Line 23 Wall	From AA to AF From AI to AK	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line 23 Wall	From AF to AI	From 55'-0" to 100'-0"	4'-0"	Yes
Column Line 23 Wall	From AF to AI	From 100'-0" to 156'-0"	7'-0"	Yes
Column Line 23 Wall	From AA to AF	From 137'-6" to 156'-0"	3'-0"	Yes
Column Line 23 Wall	From AI to AJ	From 137'-6" to 156'-0"	4'-0"	No
Column Line 23 Wall	From AF to AK	From 156'-0" to 213'-6"	3'-0"	Yes
Column Line 24 Wall	From AC to AF	From 55'-0" to 78'-0"	3'-0"	Yes
Column Line 24 Wall	From AB to AD	From 78'-0" to 100'-0"	4'-0"	No
Column Line 24 Wall	From AD to AF	From 78'-0" to 100'-0"	3'-0"	Yes
Column Line 24 Wall	From AA to AD	From 100'-0" to 156'-0"	3'-0"	Yes
Column Line 24 Wall	From AD to AE	From 100'-0" to 137'-6"	4'-0"	Yes
Column Line 24 Wall	From AE to AF	From 100'-0" to 120'-0"	3'-6"	Yes

Table 2.2.1-1 (6 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Column Line 24.5 Wall	From AF to AI	From 55'-0" to 100'-0"	5'-0"	Yes
Column Line 24.5 Wall	From AF to AI	From 100'-0" to 156'-0"	7'-0"	Yes
Column Line 25 Wall	From AB to AJ	From 55'-0" to 100'-0"	3'-0"	Yes
Column Line 25 Wall	From AD to AF	From 100'-0" to 120'-0"	3'-6"	Yes
Column Line 25 Wall	From AD to AE	From 120'-0" to 137'-6"	3'-6"	Yes
Column Line 25 Wall	From AE to AF	From 120'-0" to 137'-6"	3'-9"	Yes
Column Line 25 Wall	From AD to AE	From 137'-6" to 156'-0"	3'-0"	No
Column Line 26 Wall	From A AA to AK	From 55'-0" to 213'-6"	4'-0"	No

Table 2.2.1-1 (7 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Column Line AA Wall	From 12 to 17 From 20 to 26	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line AA Wall	From 17 to 20	From 55'-0" to 175'-0"	5'-0"	Yes
Column Line AB Wall	From 12 to 15	From 55'-0" to 100'-0"	3'-0"	Yes
Column Line AB Wall	From 15 to 22	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line AB Wall	From 23 to 26	From 55'-0" to 137'-6"	3'-0"	Yes
Column Line AB Wall	From 22 to 23	From 78'-0" to 156'-0"	3'-6"/3'-0"	Yes
Column Line AB Wall	From 12 to 18	From 137'-6" to 156'-0"	4'-0"	No
Column Line AB Wall	From 12 to 17	From 156'-0" to 195'-0"	3'-0"	Yes
Column Line AB Wall	From 20 to 22	From 137'-6" to 156'-0"	3'-6"	Yes
Column Line AB Wall	From 20 to 22	From 156'-0" to 180'-0"	3'-0"	Yes
Column Line AC Wall	From 12 to 14	From 55'-0" to 100'-0"	2'-6"	Yes
Column Line AC Wall	From 15 to 26	From 55'-0" to 68'-0"	4'-0"	Yes
Column Line AC Wall	From 15 to 23	From 68'-0" to 137'-6"	4'-0"	Yes
Column Line AC Wall	From 23 to 26	From 100'-0" to 156'-0"	3'-0"	Yes
Column Line AC Wall	From 12 to 14	From 137'-6" to 156'-0"	2'-6"	No
Column Line AC Wall	From 15 to 18	From 137'-6" to 156'-0"	4'-0"	No
Column Line AC Wall	From 20 to 22	From 137'-6" to 169'-6"	3'-0"	Yes
Column Line AC Wall	From 24 to 26	From 137'-6" to 156'-0"	3'-0"	No
Column Line AC Wall	From 15 to 17	From 156'-0" to 195'-0"	3'-0"	No

Table 2.2.1-1 (8 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness [(1)]	Applicable Radiation Shielding Wall (Yes/No)
Column Line AD Wall	From 15 to 17 From 22 to 26	From 55'-0" to 120'-0" From 55'-0" to 156'-0"	3'-0"	Yes
Column Line AD Wall	From 12 to 15	From 78'-0" to 100'-0"	2'-6"	No
Column Line AD Wall	From 12 to 15	From 137'-6" to 156'-0"	2'-6"	No
Column Line AD Wall	From 12 to 15	From 156'-0" to 174'-0"	2'-0"	Yes
Column Line AE Wall	From 12 to 15 From 22 to 23	From 55'-0" to 195'-0" From 55'-0" to 156'-0"	3'-0"	Yes
Column Line AE Wall	From 24 to 25	From 100'-0" to 137'-6"	4'-0"	Yes
Column Line AE Wall	From 24 to 25	From 100'-0" to 137'-6"	4'-0"	Yes
Column Line AE Wall	From 23 to 26	From 137'-6" to 156'-0"	3'-0"	Yes
Column Line AF Wall	From 12 to 15	From 55'-0" to 156'-0"	2'-6"	No
Column Line AF Wall	From 22 to 26	From 55'-0" to 120'-0"	4'-0"	Yes
Column Line AF Wall	From 22.5 to 25.5	From 120'-0" to 156'-0"	8'-7"	Yes
Column Line AF Wall	From 22 to 26	From 156'-0" to 213'-6"	4'-0"	Yes
Column Line AF Wall	From 13 to 15	From 174'-0" to 195'-0"	3'-0"	No
Column Line AG Wall	From 12 to 15 From 22 to 23	From 55'-0" to 195'-0"	3'-0"	Yes
Column Line AG Wall	From 25 to 26	From 55'-0" to 171'-0"	3'-0"	Yes
Column Line AH Wall	From 15 to 17	From 55'-0" to 120'-0"	3'-0"	Yes
Column Line AH Wall	From 12 to 15	From 78'-0" to 100'-0"	2'-6"	No

Table 2.2.1-1 (9 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness (1)	Applicable Radiation Shielding Wall (Yes/No)
Column Line AH Wall	From 23 to 24.5	From 55'-0" to 156'-0"	5'-6"	Yes
Column Line AH Wall	From 12 to 15	From 137'-6" to 156'-0"	2'-6"	No
Column Line AI Wall	From 12 to 14	From 55'-0" to 100'-0"	2'-6"	Yes
Column Line AI Wall	From 15 to 23	From 55'-0" to 156'-0"	4'-0"	Yes
Column Line AI Wall	From 23 to 25	From 55'-0" to 156'-0"	5'-6"	Yes
Column Line AI Wall	From 12 to 14	From 137'-6" to 156'-0"	2'-6"	Yes
Column Line AI Wall	From 15 to 17	From 156'-0" to 195'-0"	3'-0"	No
Column Line AI Wall	From 17 to 18	From 156'-0" to 195'-0"	4'-0"	No
Column Line AI Wall	From 20 to 22	From 156'-0" to 195'-0"	3'-0"	Yes
Column Line AI Wall	From 22 to 23	From 156'-0" to 195'-0"	3'-6"	No
Column Line AJ Wall	From 12 to 15	From 55'-0" to 100'-0"	3'-0"	Yes
Column Line AJ Wall	From 15 to 22	From 55'-0" to 137'-6"	4'-0"	Yes
Column Line AJ Wall	From 23 to 26	From 55'-0" to 137'-6"	3'-0"	Yes
Column Line AJ Wall	From 22 to 23	From 78'-0" to 156'-0"	3'-6"/3'-0"	Yes
Column Line AJ Wall	From 12 to 18	From 137'-6" to 156'-0"	4'-0"	No
Column Line AJ Wall	From 12 to 17	From 156'-0" to 195'-0"	3'-0"	No
Column Line AJ Wall	From 20 to 22	From 137'-6" to 174'-0"	2'-0"	Yes

Table 2.2.1-1 (10 of 10)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness [1]	Applicable Radiation Shielding Wall (Yes/No)
Column Line AK Wall	From 12 to 17 From 20 to 26	From 55'-0" to 156'-0" From 55'-0" to 174'-0"	4'-0"	Yes
Column Line AK Wall	From 17 to 20	From 55'-0" to 175'-0"	5'-0"	Yes
Column Line AK Wall	From 20 to 23	From 174'-0" to 216'-9"	4'-0"	Yes
Column Line AK Wall	From 23 to 26	From 174'-0" to 213'-6"	4'-0"	Yes
Floors	Not Applicable	68'-0"	Variable From 2'-0" to 2'-6"	Yes
Floors	Not Applicable	78'-0"	Variable From 1'-6" to 3'-3"	Yes
Floors	Not Applicable	100'-0"	Variable From 1'-6" to 4'-0"	Yes
Floors	Not Applicable	120'-0"	Variable From 1'-6" to 6'-1"	Yes
Floors	Not Applicable	137'-6"	Variable From 1'-6" to 4'-6"	Yes
Floors	Not Applicable	156'-0"	Variable From 1'-0" to 3'-0"	Yes
Floors	Not Applicable	174'-0"	Variable From 1'-0" to 1'-6"	Yes
Floors	Not Applicable	From 195'-0" to 216'-9"	Variable From 1'-6" to 2'-9"	Yes

(1) Tolerance for the thickness of the walls and slabs is -1/4 inch, and -1 inch.

(2) Reduction of the basemat thickness is less than - 5 % of specified thickness.

Table 2.2.1-2 (1 of 2)

Nuclear Island Structures ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The basic configuration of the NI structures is as shown in Figures 2.2.1-1 through 2.2.1-13.	1. Inspection of the basic configuration of the as-built nuclear island structures will be conducted.	1. The nuclear island structures conform with the basic configuration as shown in Figures 2.2.1-1 through 2.2.1-13.
2.a The containment is designed and constructed to meet the requirements of ASME Section III, Div.2.	2.a Inspection of the containment in accordance with the ASME Code, Section III will be conducted.	2.a The ASME Code design report(s) or data report(s) exist and conclude that the containment complies with the requirements of ASME Section III.
2.b The containment penetrations are designed and constructed to meet ASME Section III.	2.b Inspection of the containment penetration in accordance with the ASME Code, Section III will be conducted.	2.b The ASME Code design report(s) or data report(s) exist and conclude that the containment penetrations comply with the requirements of ASME Section III.
2.c The containment and its penetrations retain their pressure boundary integrity associated with the design pressure.	2.c. Structural integrity test of the as-built containment will be conducted in accordance with ASME Code.	2.c The results of the structural integrity test on the containment and its penetrations conform with the pressure testing acceptance criteria in ASME Section III, Div.2.
2.d The containment and its penetrations maintain the containment leakage rate less than or equal to the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident.	2.d Inspection and leak rate testing on the containment and its penetrations will be conducted.	2.d The results of the inspection and leak rate testing demonstrate that the containment leakage rate is less than or equal to the maximum allowable limits specified in 10 CFR 50, Appendix J.

Table 2.2.1-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The NI structures are seismic Category I, and are designed and constructed to withstand the structural design basis loads.	3. A structural analysis will be performed to reconcile the as-built NI structures with the structural design basis loads.	3. A report exists and concludes that the NI structures can withstand the design basis loads.
4. The key dimensions of the NI structures are described in Table 2.2.1-1.	4. Inspection will be performed to verify that the as-built wall and slab thickness conform with the structural configuration.	4. A report exists and concludes that the NI structure as-built wall and slab thickness conform with the structural configuration as described in Table 2.2.1-1.

Table 2.2.1-3

Seismic Classification of the Building

Structure	Seismic Category
Reactor Containment Building	I
Auxiliary Building	I
Emergency Diesel Generator Building Block	I
Turbine Generator Building	II
Compound Building	II
Essential Service Water Supplier Structure	I
Component Cooling Water Heat Exchanger Building	I

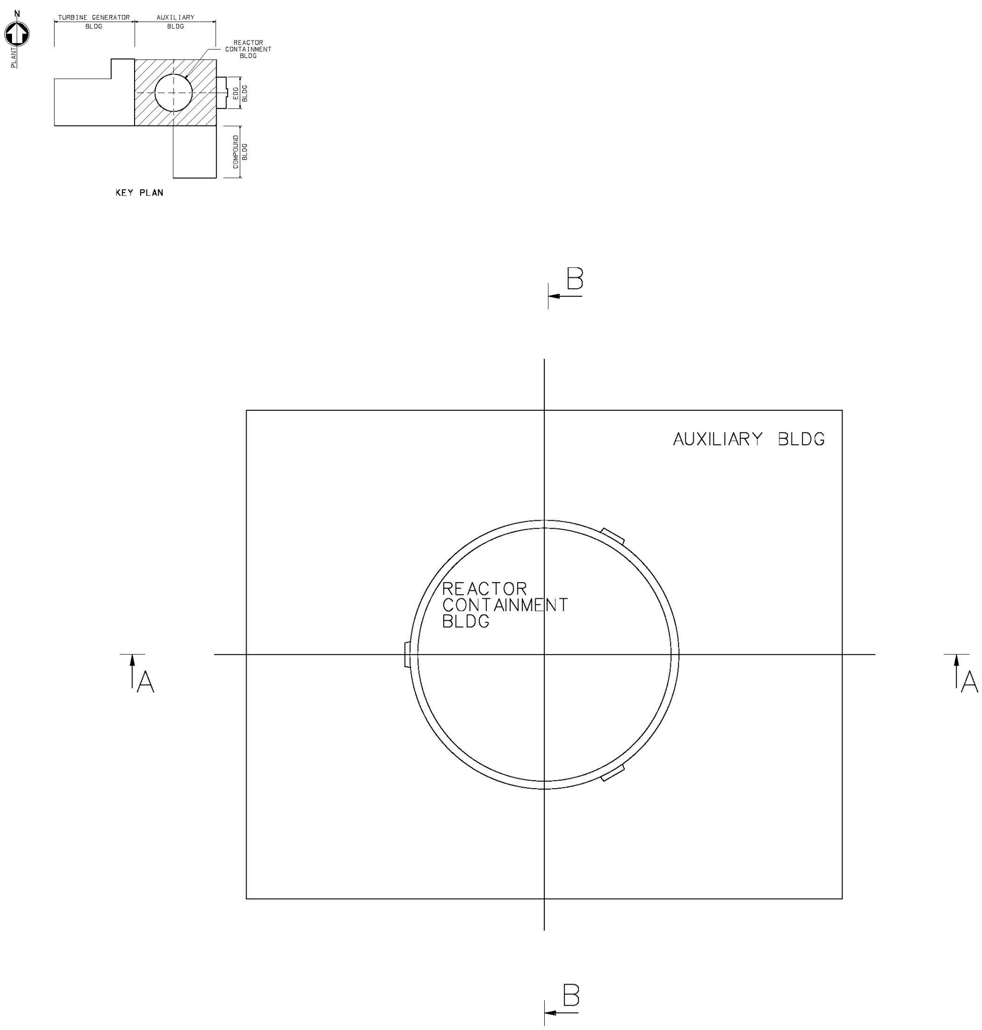


Figure 2.2.1-1 Nuclear Island Structure Plan View

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-2 Nuclear Island Structure Section A-A

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Figure 2.2.1-3 Nuclear Island Structure Section B-B

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-4 Nuclear Island Structure Plan at Level 1

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-5 Nuclear Island Structure Plan at Level 2

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-6   Nuclear Island Structure Plan at Level 3

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-7 Nuclear Island Structure Plan at Level 4

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-8 Nuclear Island Structure Plan at Level 5

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-9 Nuclear Island Structure Plan at Level 6

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-10 Nuclear Island Structure Plan at Level 7

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-11 Nuclear Island Structure Plan at Roof

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-12 Reactor Containment Building Section A-A

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2.2.1-13 Reactor Containment Building Section B-B

2.2.2 Emergency Diesel Generator Building

2.2.2.1 Design Description

The emergency diesel generator (EDG) building block is located adjacent to east side of the Nuclear Island with seismic isolation gap, and comprises two buildings, one that houses additional two generators and the other for the diesel fuel oil tank (DFOT). Both EDG and DFOT buildings are single-story structures which are composed of reinforced concrete basemat, shearwalls and slabs. The two basemats are horizontally separated by seismic isolation gap.

The EDG building block is designed and constructed to withstand the structural design basis loads associated with:

- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, and equipment loads, including the effects of temperature and equipment vibration)
- External events (including rain, snow, wind, flood, hurricane generated missiles, and earthquake)
- Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

1. The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.
2. The EDG building block is designed and constructed to withstand the structural design basis loads.
3. The key dimensions of the EDG building block are described in Table 2.2.2-1.

2.2.2.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the EDG building block are specified in Table 2.2.2-2.

Table 2.2.2-1

Definition of Wall Thicknesses for Emergency Diesel Generator Building

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness [1]	Applicable Radiation Shielding Wall (Yes/No)
EDG Building				
Basemat	Not Applicable	100'-0"	4'-0"	No
Column Line 26.1 Wall	From AC.8 to AH.2	From 100'-0" to 135'-0"	3'-0"	No
Column Line 28 Wall	From AC.8 to AH.2	From 100'-0" to 135'-0"	3'-0"	No
Column Line AC.8 Wall	From 26.1 to 28	From 100'-0" to 135'-0""	3'-0"	No
Column Line AF Wall	From 26.1 to 28	From 100'-0" to 135'-0""	2'-6"	No
Column Line AH.2 Wall	From 26.1 to 28	From 100'-0" to 135'-0""	3'-0"	No
Floors	Not Applicable	121'-6"	2'-0"	No
Floors	Not Applicable	135'-0"	Variable From 1'-6" to 3'-0"	No
DFOT Building				
Basemat	Not Applicable	63'-0"	4'-0"	No
Column Line 26.1 Wall	From AA.1 to AC.6	From 63'-0" to 100'-0"	2'-6"	No
Column Line 27 Wall	From AA.1 to AC	From 63'-0" to 97'-6"	2'-6"	No
Column Line 28 Wall	From AA.1 to AC.6	From 63'-0" to 100'-0"	4'-0"	No
Column Line AA.1 Wall	From 26.1 to 28	From 63'-0" to 97'-6"	4'-0"	No
Column Line AC.6 Wall	From 26.1 to 28	From 63'-0" to 100'-0"	4'-0"	No
Floors	Not Applicable	97'-6"	2'-0"	No
Floors	Not Applicable	100'-0"	3'-0"	No

(1) Tolerance for the thickness of the walls and slabs is -1/4 inch and - 1 inch.

Table 2.2.2-2

Emergency Diesel Generator Building ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.	1. Inspection of the basic configuration of the as-built EDG building block will be conducted.	1. The EDG building block conforms with the basic configuration as shown in Figures 2.2.2-1 and 2.2.2-2.
2. The EDG building block is designed and constructed to withstand the structural design basis loads.	2. A structural analysis will be performed to reconcile the as-built EDG structure with the structural design basis loads.	2. A report exists and concludes that the EDG building block can withstand the structural design basis loads.
3. The key dimensions of the EDG building block are as described in Table 2.2.2-1.	3. Inspection will be performed to verify that the as-built wall and slab thickness conform to the structural configuration.	3. A report exists and concludes that the EDG building block as-built wall and slab thickness conform with the structural configuration as described in Table 2.2.2-1.

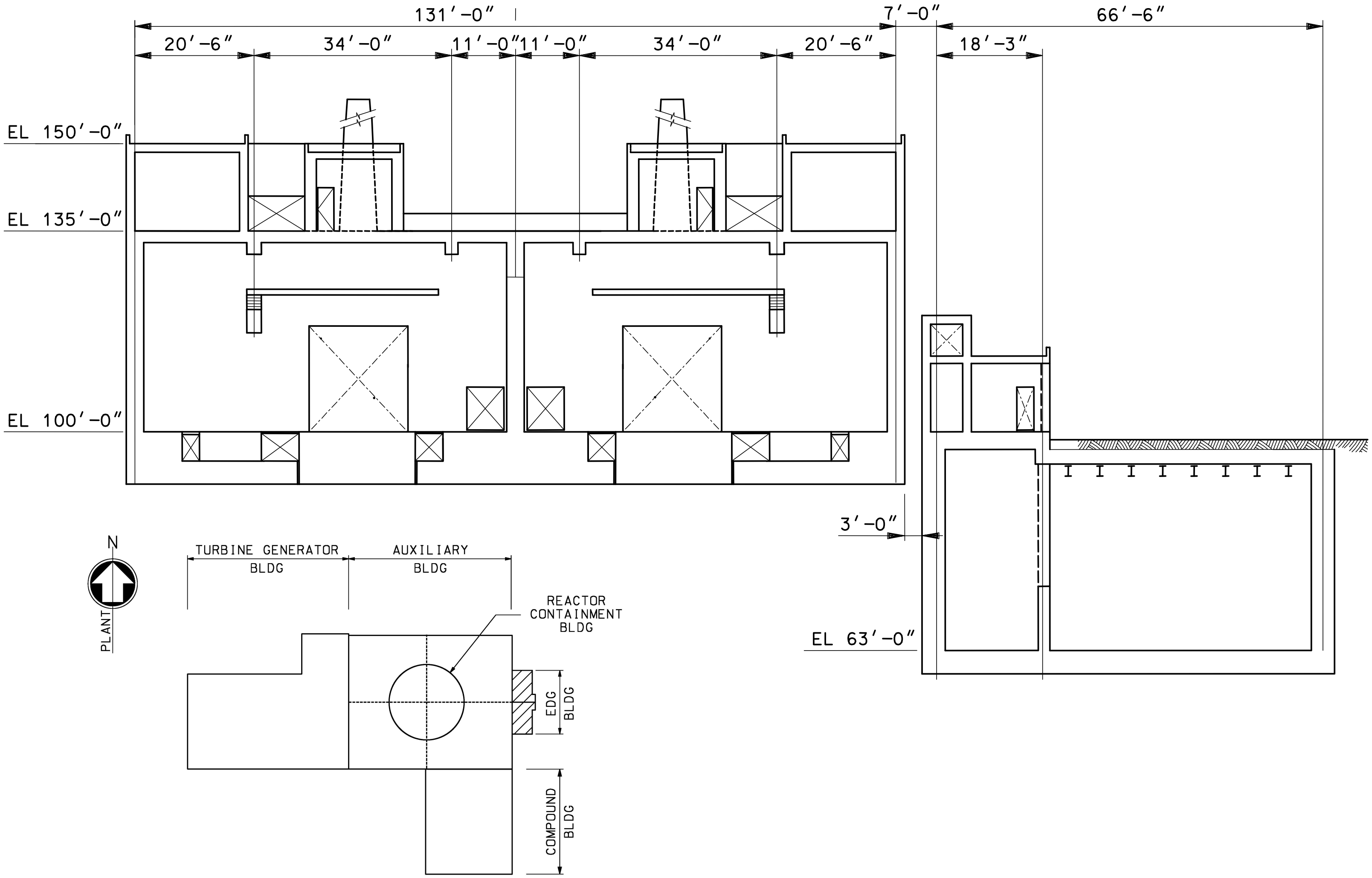


Figure 2.2.2-1 Emergency Diesel Generator Building Block Section

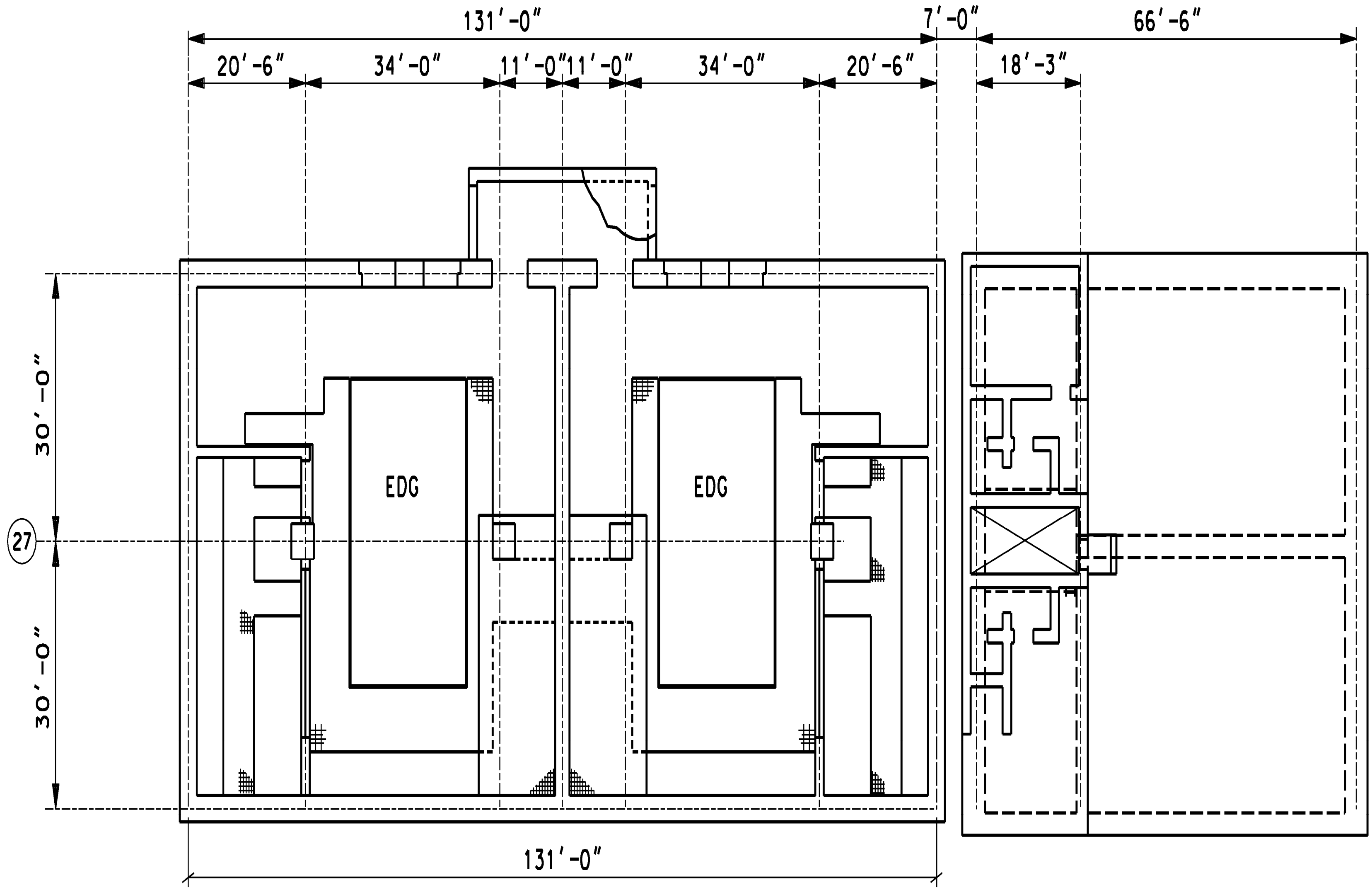


Figure 2.2.2-2 Emergency Diesel Generator Building Block Plan

2.2.3 Turbine Generator Building

2.2.3.1 Design Description

The turbine generator building is a non safety-related seismic Category II structure located adjacent to the auxiliary building that houses the high pressure turbine, low pressure turbine, and generator driven with high temperature and pressure steam which is generated from steam generator, and also houses some related auxiliary system. The building is primarily composed of basemat, underground shear wall, turbine generator pedestal, and superstructure, and is supported by a reinforced concrete foundation which is separated from the adjacent auxiliary building structures.

1. The seismic Category II turbine generator building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.

2.2.3.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the turbine generator building is specified in Table 2.2.3-1.

Table 2.2.3-1

Turbine Generator Building ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category II turbine generator building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.	1. Analyses and inspections of the design and as-built configuration of seismic Category II structure will be performed to verify that the turbine generator building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.	1. A report exists and concludes that the as-built seismic Category II turbine generator building structure does not impair the ability of the safety related SSCs to perform their safety-related functions.

2.2.4 Compound Building

2.2.4.1 Design Description

The compound building is a non safety-related seismic Category II reinforced concrete structure which is located adjacent to the auxiliary building. The compound building houses the access control area, the hot machine shop, the radwaste treatment and drum removal areas, and the operation support center (OSC). The building is composed of reinforced concrete shear walls, interior walls, concrete slabs, girders and columns. The exterior shear walls and roof slabs play a role as a radiation shielding and missile protection.

1. The seismic Category II compound building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.

2.2.4.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the compound building is specified in Table 2.2.4-1.

Table 2.2.4-1

<u>Compound Building ITAAC</u>

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category II compound building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.	1. Analyses and inspections of the design and as-built configuration of seismic Category II structure will be performed to verify that the compound building structure does not impair the ability of the safety-related SSCs to perform their safety-related functions.	1. A report exists and concludes that the as-built seismic Category II compound building structure does not impair the ability of the safety related SSCs to perform their safety-related functions.

2.2.5 Protection against Hazards

2.2.5.1 Design Descriptions

2.2.5.1.1 External Flooding

The NI structures and EDG building block are designed to withstand the external flooding. The safety-related SSCs housed in the structures are ascertained to maintain their safety functions during the external flooding condition.

The key characteristics of the protective provisions against external flooding hazards are as follows:

- The external walls below the postulated flood level or groundwater level are designed with a sufficient thickness to prevent in-leakage.
- The penetrations in the exterior walls below the postulated flood level/or groundwater level are featured to be water sealed.
- Water stops are installed at all construction joints of the exterior walls and basemats below the postulated flood level or groundwater level to prevent seepage into the structures.

2.2.5.1.2 Internal Flooding

The safety-related components are protected from the effect of internal flooding due to postulated piping failure. The internal flooding sources are considered high-energy or moderate-energy piping failure, non-seismically designed component or tank failure, including the operation of fire protection system.

The design considerations such as plant arrangement, physical or distance separation, flood barrier including watertight doors and various openings and penetrations are applied to satisfy the design concepts on the internal flooding protection. Openings and penetrations through flood barriers are minimized and the safety-related equipment are located above the internal flood level so that flooding events do not affect them.

The key characteristics of the protective provisions against internal flooding hazards are as follows:

- Divisional flood barriers are provided in the nuclear island against the internal flooding.
- Watertight doors are provided in the nuclear island to protect against internal flooding.
- Penetrations in the flood barrier are sealed up to internal design flood levels.
- Safety-related electrical, instrumentation and control equipment are located above the internal design flood level.

2.2.5.1.3 Fire Barrier

The plant is subdivided into separate fire areas by fire-rated barriers, i.e., walls, floors, and ceilings, to confine the effects of fire hazards to a single area, thereby minimizing the potential for adverse effects from fires on redundant SSC important to safety.

The key characteristics of the protective provisions against fire hazards are as follows:

- The redundant trains of systems, components and cables important to safety, except for the control room complex and inside containment, are separated from each other by fire barriers having a 3-hour rating.
- Openings and penetrations through fire barriers are protected by components, i.e., fire doors, fire dampers, penetration seals, having fire resistance equivalent to that of the barrier.
- MCR complex and RSR are separated from each other and other fire areas by 3-hour rated fire barriers.

2.2.5.1.4 Internally Generated Missiles (Inside and Outside Containment)

Missile protection is provided for safety-related equipment so that internally generated missiles do not cause the release of significant amount of radioactivity or prevent the safe and orderly shutdown of the reactor.

The key characteristics of the protective provisions against internally generated missiles are as follows:

- Minimizing the sources of missiles by equipment design features that prevent missile generation

- Orientation of physical separation of potential missile source away from the safety-related equipment and component

- Containing the potential missiles through the use of protective shields barriers near the missile source of the safety-related facility and equipment

- Hardening of the safety-related equipment and components to withstand missile impact

2.2.5.2 Inspection, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for protection against hazards are specified in Table 2.2.5-1.

Table 2.2.5-1 (1 of 4)

Protection against Hazards ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The key characteristics of the protective provisions against external flooding hazards are as follows: - The external walls below the postulated flood level or groundwater level are designed with a sufficient thickness to prevent in-leakage. - The penetrations in the exterior walls below the postulated flood level/ or groundwater level are featured to be watersealed. - Water stops are installed at all construction joints of the exterior walls and basemats below the postulated flood level or groundwater level to prevent seepage into the structures.	1. Inspection of the as-built protective provisions against external flooding hazards will be conducted.	1. The as-built nuclear island structure including EDG structure confirms to the following protective provisions: - The external walls below the postulated flood level/ or groundwater level are designed with a thickness of greater than or equal to 0.60 m (2 ft) to prevent in-leakage. - The penetrations in the exterior walls below the postulated flood level/ or groundwater level are featured to be watersealed. - Water stops are installed at all construction joints of the exterior walls and basemats below the postulated flood level/ or groundwater level to prevent seepage into the structures.

Table 2.2.5-1 (2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. The key characteristics of the protective provisions against internal flooding hazards are as follows: - Divisional flood barriers are provided in the nuclear island against the internal flooding. - Watertight doors are provided in the nuclear island to protect against internal flooding. - Penetrations in the flood barrier are sealed up to internal design flood levels. - Safety-related electrical, instrumentation and control equipment are located above the internal design flood level.	2. Inspection of the as-built protective provisions against internal flooding hazards will be conducted.	2. The as-built nuclear island structure including EDG structure confirms to the following criteria: - Divisional flood barriers exist in accordance with the approved design specifications and drawings. - Watertight doors exist according to flood barrier drawings - Penetrations in the flood barrier are sealed up to the internal design flood levels. - Safety-related electrical, instrumentation, and control equipment in nuclear island are located above the internal design flood level.

Table 2.2.5-1 (3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The key characteristics of the protective provisions against fire hazards are as follows: - The redundant trains of systems, components and cables important to safety, except for the control room complex and inside containment, are separated from each other by fire barriers having a 3-hour rating. - Openings and penetrations through fire barriers are protected by components, i.e., fire doors, fire dampers, penetration seals, having fire resistance equivalent to that of the barrier. - MCR complex and RSR are separated from each other and other fire areas by 3-hour rated fire barriers.	3. Inspection of the as-built protective provisions against fire hazards will be conducted. Especially, testing will be performed on doors and penetration seals.	3. The as-built 3-hour rated fire barriers are confirmed to the following criteria to preserve the safety shutdown capability of plant following a fire: - Fire barriers that define the boundaries of fire area should achieve the separation of redundant trains of safe shutdown from each other so that both are not subject to damage from a single fire. - Openings and penetrations through fire barriers are protected by components, i.e., fire doors, fire dampers, penetration seals, having fire resistance equivalent to that of the barrier. - Barriers having a 3-hour rating should separate panels providing alternative and dedicated shutdown capability from the control room complex.

Table 2.2.5-1 (4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The key characteristics of the protective provisions against internally generated missiles are as follows: - Minimizing the sources of missiles by equipment design features that prevent missile generation - Orientation of physical separation of potential missile source away from safety-related equipment and component - Containing the potential missiles through the use of protective shields barriers near the missile source of safety-related facility and equipment - Hardening of safety-related equipment and components to withstand missile impact	4. Inspection of the as-built protective provisions against internally missile will be conducted.	4. The as-built nuclear island structure including EDG building confirms to the following criteria: - Minimizing the sources of missiles by equipment design features that prevent missile generation - Orientation of physical separation of potential missile source away from safety-related equipment and component - Containing the potential missiles through the use of protective shields barriers near the missile source of safety-related facility and equipment - Hardening of safety-related equipment and components to withstand missile impact

2.2.6 Reactor Vessel Internals

2.2.6.1 Design Description

The reactor vessel internals consist of a core support barrel (CSB) assembly and an upper guide structure (UGS) assembly. The reactor vessel internals are safety-related.

The 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 structural elements 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 CSB assembly contains a grid structure which supports the core and provides flow distribution from the lower plenum region to the bottom of the fuel assemblies. The core shroud is part of the CSB assembly and provides an envelope to direct the primary coolant flow through the core. Instrumentation nozzles in the grid structure provide a guide path for in-core instrumentation from the reactor vessel lower head to the fuel assemblies.

The UGS assembly is supported by 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 (CEA). The UGS assembly contains structural elements which provide both a guide path and lateral support for the upper portion of the CEA and extensions shafts in the reactor vessel upper plenum region. The UGS assembly also provides guide paths for heated junction thermocouple (HJTC) assemblies.

1. The functional arrangement of the reactor vessel internals is as described in the Design Description of Subsection 2.2.6.1 and in Table 2.2.6-1 and as shown in Figures 2.2.6-1 and 2.2.6-2.

2. The ASME Code components identified in Table 2.2.6-1 are designed and constructed in accordance with ASME Section III Subsection NG requirements.

3. The seismic Category I components identified in Table 2.2.6-1 can withstand seismic design basis loads without loss of safety function.

4. The reactor vessel internals withstand the effects of flow induced vibration caused by the operation of the reactor coolant pumps.

2.2.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.6-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the reactor vessel internals.

Table 2.2.6-1

Identification of Reactor Vessel Internals

Component Name	Location	ASME Section III Class	Seismic Category
Core Support Barrel Assembly [(1)]	Reactor Containment Building	CS	I
Upper Guide Structure Assembly [(1)]	Reactor Containment Building	CS	I

(1) Core Support Structures (CS) only

Table 2.2.6-2 (1 of 2)

Reactor Vessel Internals ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the reactor vessel internals is as described in the Design Description of Subsection 2.2.6.1 and in Table 2.2.6-1 and as shown in Figures 2.2.6-1 and 2.2.6-2.	1. Inspection of the as-built reactor vessel internals will be performed.	1. The as-built reactor vessel internals conform with the functional arrangement as described in the Design Description of Subsection 2.2.6.1 and in Table 2.2.6-1 and as shown in Figures 2.2.6-1 and 2.2.6-2.
2. The ASME Code components identified in Table 2.2.6-1 are designed and constructed in accordance with ASME Section III Subsection NG requirements.	2. Inspection of the fabricated components will be performed.	2. The ASME Section III design report or data report exists and concludes that the fabricated components identified in Table 2.2.6-1 are designed and constructed in accordance with ASME Section III Subsection NG requirements.
3. The seismic Category I components identified in Table 2.2.6-1 can withstand seismic design basis loads without loss of safety function.	3.a Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	3.a The as-built seismic Category I components identified in Table 2.2.6-1 are located in the seismic Category I structure.
	3.b Type tests, analyses or a combination of type tests and analyses of seismic Category I components will be performed .	3.b A report exists and concludes that the seismic Category I components identified in Table 2.2.6-1 can withstand seismic design basis loads without loss of safety function.
	3.c Inspections will be performed to verify that the as-built seismic Category I components are seismically bounded by the tested or analyzed conditions.	3.c A report exists and concludes that the as-built seismic Category I components identified in Table 2.2.6-1 are seismically bounded by the tested or analyzed conditions.

Table 2.2.6-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The reactor vessel internals withstand the effects of flow induced vibration caused by the operation of the reactor coolant pumps.	4. Pre- and post-test visual inspection will be performed on the reactor vessel internals.	4. The results of the inspection demonstrate that the reactor vessel internals retain their integrity with no observable damage or loose parts.

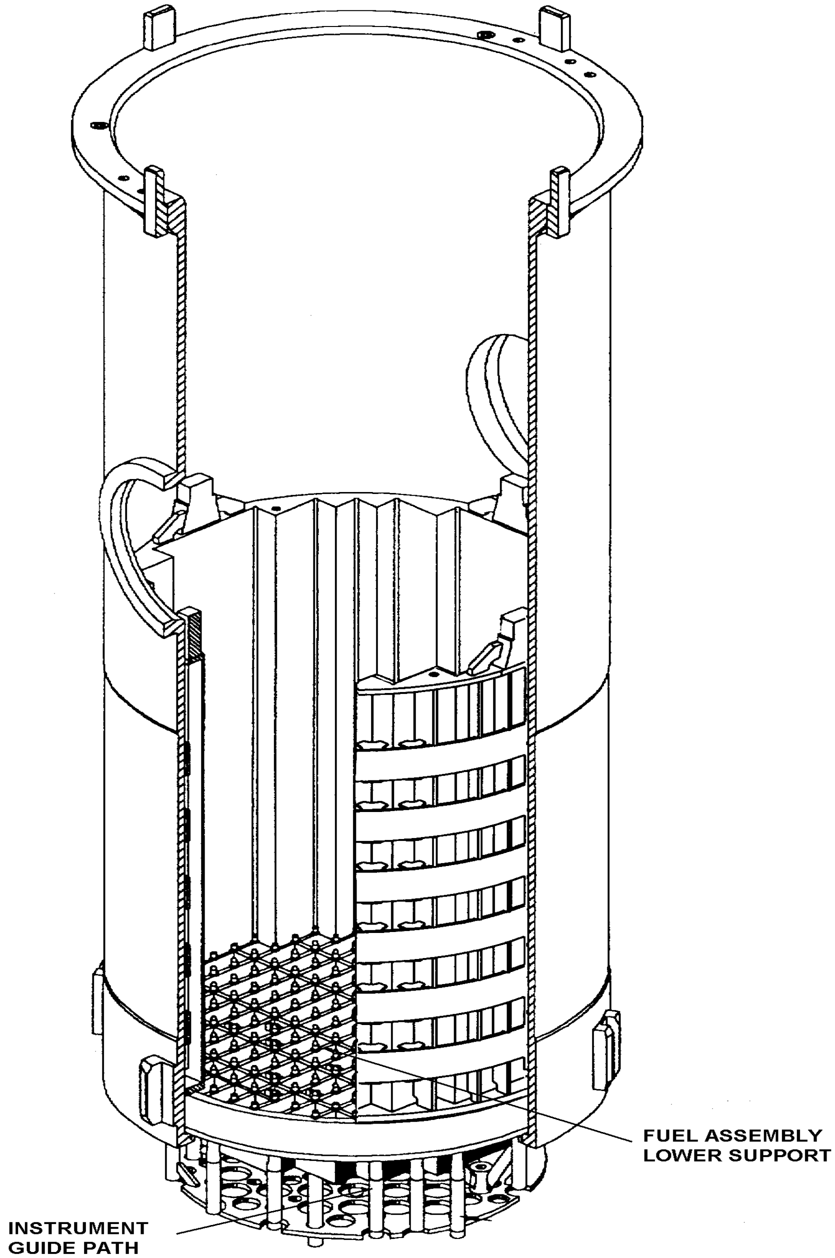


Figure 2.2.6-1 Core Support Barrel Assembly

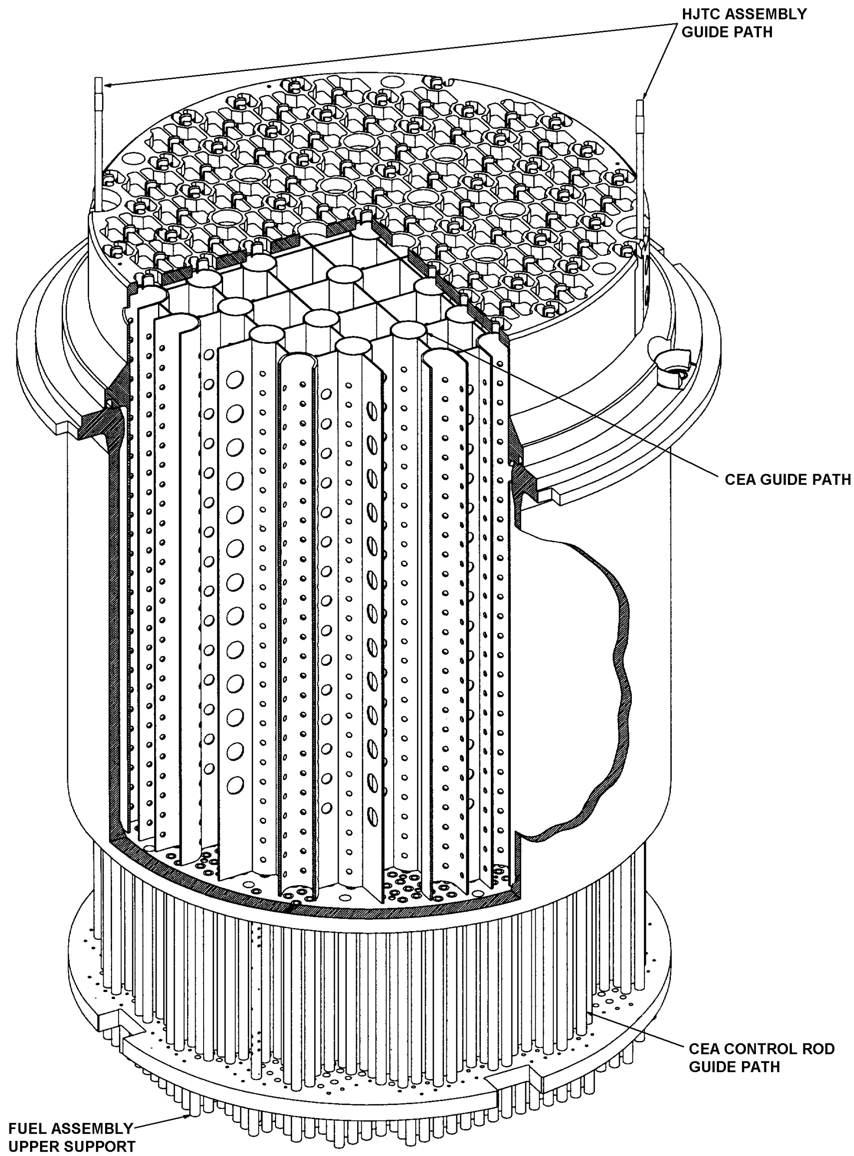


Figure 2.2.6-2 Upper Guide Structure Assembly

2.2.7 In-core Instrument Guide Tube System

2.2.7.1 Design Description

The in-core instrument (ICI) guide tube system is safety-related and consists of guide tubes, supports, seal housings and a seal table.

The ICI guide tubes serve as a guide path and provide support for the in-core detector assemblies. The ICI guide tubes connect to the bottom of the reactor vessel and terminate in a seal housing assembly located at the seal table. Pressure retaining seals are installed between the seal housing and the in-core instrument at the seal housing.

The ICI guide tube supports and seal table support the ICI guide tubes and provide spacing between tubes. The seal table also seals the ICI chase from water ingress during refueling.

1. The functional arrangement of the ICI guide tubes, seal housings, supports, and seal table is as described in the Design Description of Subsection 2.2.7.1 and in Table 2.2.7-1 and as shown in Figure 2.2.7-1.

2. The ASME Code components identified in Table 2.2.7-1 are designed and constructed in accordance with ASME Section III requirements.

3. The ICI guide tubes and seal housings identified in Table 2.2.7-1 retain their pressure boundary integrity at their design pressure.

4. The seismic Category I components identified in Table 2.2.7-1 can withstand seismic design basis loads without loss of safety function.

2.2.7.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.2.7-2 specifies the ITAAC for the ICI guide tube system.

Table 2.2.7-1

Identification of ICI Guide Tube System

Component Name	Location	ASME Section III Class	Seismic Category
ICI Guide Tube Supports	Reactor Containment Building	1	I
ICI Guide Tube	Reactor Containment Building	1	I
ICI Seal Housing	Reactor Containment Building	1	I
ICI Seal Table	Reactor Containment Building	1	I

Table 2.2.7-2 (1 of 2)

ICI Guide Tube System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the ICI guide tubes, seal housings, supports and seal table is as described in the Design Description of Subsection 2.2.7.1 and in Table 2.2.7-1 and as shown in Figure 2.2.7-1.	1. Inspection of the as-built ICI guide tube system will be performed.	1. The as-built ICI guide tube system conforms with the functional arrangement as described in the Design Description of Subsection 2.2.7.1 and in Table 2.2.7-1 and as shown in Figure 2.2.7-1.
2. The ASME Code components identified in Table 2.2.7-1 are designed and constructed in accordance with ASME Section III requirements.	2. Inspection of the as-built components will be performed as documented in the ASME design reports.	2. The ASME Section III design reports and data report(s) exist and conclude that the as-built components identified in Table 2.2.7-1 are designed and constructed in accordance with ASME Section III requirements.
3. The ICI guide tubes and seal housings identified in Table 2.2.7-1 retain their pressure boundary integrity at their design pressure.	3. A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	3. A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.2.7-1 conform with the ASME Section III requirements.

Table 2.2.7-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The seismic Category I components identified in Table 2.2.7-1 can withstand seismic design basis loads without loss of safety function.	4.a Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	4.a The as-built seismic Category I components identified in Table 2.2.7-1 are located in the seismic Category I structure.
	4.b Type tests, analyses or a combination of type tests and analyses of seismic Category I components will be performed.	4.b A report exists and concludes that the seismic Category I components identified in Table 2.2.7-1 can withstand seismic design basis loads without loss of safety function.
	4.c Inspections will be performed to verify that the as-built seismic Category I components including anchorage are seismically bounded by the tested or analyzed conditions.	4.c A report exists and concludes that the as-built seismic Category I components identified in Table 2.2.7-1 including anchorage are seismically bounded by the tested or analyzed conditions.

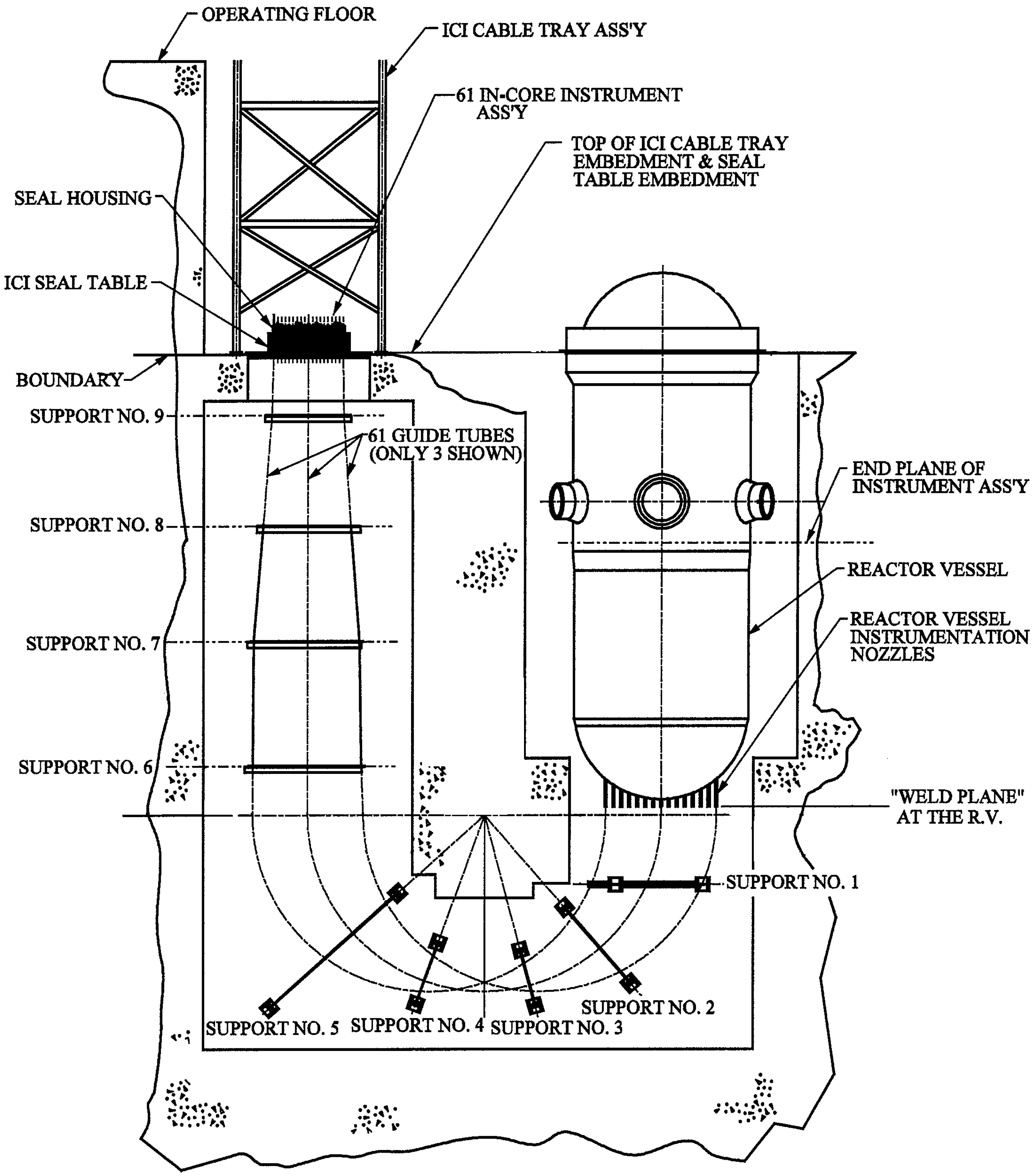


Figure 2.2.7-1 Configuration of ICI Guide Tube System

2.3 Piping Systems and Components

2.3.1 Design Description

There are four areas related to piping systems and components (PSC) which are addressed in the certified plant design:

a. Piping stress analysis

b. Analysis of protection against the dynamic effects of piping rupture

c. Evaluation of leak-before-break (LBB)

d. Analysis of component stress

Piping Stress Analysis

The analysis and design of piping and piping supports are in accordance with the requirements of the ASME Section III based on Code classification and ASME Service Level. The piping stress analysis is based on the requirements of ASME Section III Subsections NB (Class 1), NC (Class 2), or ND (Class 3). Stress analysis of piping and supports considers design basis loads and load combinations applicable to each system. ASME Section III Class 1 piping subject to fatigue analysis in both air and reactor coolant environment is evaluated for failure over the design life of the plant.

Analysis of Protection against the Dynamic Effects of Piping Rupture

Structures, components, and systems required for safe shutdown are protected from the dynamic and environmental effects of postulated piping failures inside and outside the containment where consideration of these dynamic effects is not eliminated by LBB. Each postulated piping failures shall be documented in a pipe break analysis report. Design of features which protect these items consider, as applicable, pipe whip, jet impingement, flooding, compartment pressurization, and environmental conditions in the area where the piping is located.

Evaluation of Leak-Before-Break (LBB)

The following piping systems are designed to meet leak-before-break (LBB) criteria:

a. Reactor coolant loop (RCL) piping, hot and cold legs,

b. Pressurizer surge line,

c. Shutdown cooling (SC) line from the reactor coolant system to the second isolation valve, and

d. Direct vessel injection (DVI) line from the reactor vessel to the safety injection tank and the second isolation valve.

The LBB evaluations consider normal and abnormal loads and load combinations to demonstrate compliance with the LBB design criteria.

LBB acceptance criteria are established and LBB evaluations including material properties are performed for each piping system designed to meet LBB criteria. For each piping system qualified for LBB, the as-built piping and materials will be reconciled with the bases for the LBB acceptance criteria.

Analysis of Component Stress

Design and analysis of components are performed in accordance with the requirements of the ASME Section III on the basis of Code classification and ASME Service Level. For the component stress analysis, the requirements of the ASME Section III Subsection NB (Class 1), NC (Class 2), or ND (Class 3) code are applied. Design basis loads and load combination applicable to each system are considered in the stress analysis of components. ASME Section III Class 1 pressure boundary components are also subject to fatigue usage evaluations over the design life of the plant.

Piping system and components are designed as follows:

1. The ASME Section III Class 1 piping systems and components for systems (PSC) identified in Table 2.3-1 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design-basis loads.

2. The ASME Section III Class 1 piping systems and components for systems (PSC) identified in Table 2.3-1 are evaluated for fatigue usage factor in both air and reactor coolant environments.

3. The ASME Section III Class 2 and 3 piping systems and components (PSC) for systems identified in Table 2.3-1 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design-basis loads.

4. For each piping system qualified for LBB identified in Table 2.3-1, the as-built piping and materials will be reconciled with the basis used for LBB acceptance criteria.

5. SSCs required for safe shutdown are protected from the dynamic and environmental effects of postulated high energy piping failures inside and outside the containment where consideration of these dynamic effects is not eliminated by LBB.

2.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for piping systems and components is specified in Table 2.3-2.

Table 2.3-1

Systems with ASME Section III Class 1, 2, and 3 Piping Systems and Components

Tier 1 Section (1)	System Name	ASME Section III			LBB
		1	2	3	
2.4.2	Reactor Coolant System	V			V
2.4.3	In-containment Water Storage System	-	V	-	-
2.4.4/ 2.4.5	Safety Injection/Shutdown Cooling System	V	V	-	V
2.4.6	Reactor Coolant Gas Vent System	V	V	V	-
2.4.7	Chemical and Volume Control System	V	V	V	
2.6.2	Emergency Diesel Generator System	-	-	V	-
2.7.1.2	Main Steam System	-	V	V	-
2.7.1.4	Condensate and Feedwater System	-	V	-	-
2.7.1.5	Auxiliary Feedwater System	-	V	V	-
2.7.1.8	Steam Generator Blowdown System	-	V	-	-
2.7.2.1	Essential Service Water System	-	-	V	-
2.7.2.2	Component Cooling Water System	-	V	V	-
2.7.2.3	Essential Chilled Water System	-	-	V	-
2.7.2.5	Radioactive Drain System	-	V	V	-
2.7.2.6	Process and Post-Accident Sampling System	-	V	V	-
2.7.4.3	Spent Fuel pool Cooling and Cleanup System	-	V	V	-
2.7.6.2	Gaseous Radwaste System	-	V	-	-
2.11.2	Containment Spray System	-	V	-	-

(1) The design acceptance criteria (DAC) are applied to piping design. Piping DAC is identified with [DAC] in each system ITAAC.

Table 2.3-2 (1 of 2)

Piping Systems and Components ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The ASME Section III Class 1 Piping systems and components (PSC) for systems identified in Table 2.3-1 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design-basis loads.	1. An inspection of the stress report(s) for the ASME Section III Class 1 PSC for systems identified in Table 2.3-1 will be performed.	1. The stress report(s) exist and conclude that the design of the ASME Section III Class 1 PSC for systems identified in Table 2.3-1 comply with the requirements of ASME Section III.
2. The ASME Section III Class 1 Piping systems and components (PSC) for systems identified in Table 2.3-1 are evaluated for fatigue usage factor in both air and reactor coolant environments.	2. Fatigue analysis of the ASME Section III Class 1 PSC identified in Table 2.3-1 will be performed.	2. Report(s) exist and conclude that the fatigue usage factors for ASME Section III Class 1 PSC for systems identified in Table 2.3-1 are evaluated for both air and reactor coolant environments.
3. The ASME Section III Class 2 and 3 piping systems and components (PSC) for systems identified in Table 2.3-1 are designed to retain their pressure integrity and functional capability under internal design and operating pressures and design-basis loads.	3. An inspection of the stress reports for the ASME, Section III Class 2 and 3 PSC for systems identified in Table 2.3-1 will be performed.	3. The stress reports exist and conclude that the design of the ASME Section III Class 2 and 3 PSC for systems identified in Table 2.3-1 comply with the requirements of the ASME Section III.
4. For each piping system qualified for LBB identified in Table 2.3-1, the as-built piping and materials will be reconciled with the basis used for LBB acceptance criteria.	4. Inspection of the as-built piping qualified for LBB identified in Table 2.3-1 will be performed.	4. An LBB evaluation report exists which documents that LBB acceptance criteria are met by the as-built piping and piping materials.

Table 2.3-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. SSCs required for safe shutdown are protected from the dynamic effects of postulated high energy piping failures inside and outside the containment where consideration of these dynamic effects is not eliminated by LBB.	5. Dynamic and environmental effects analysis will be performed for the piping systems.	5. Pipe break analysis report(s) exist and conclude that for each postulated piping failure of systems: (A) piping stresses in the containment penetration area are within allowable stress limits, (B) pipe whip restraints and jet shield designs can mitigate pipe break loads, (C) loads on safety-related SSCs are within design load limits, and (D) SSCs are protected or qualified to withstand the environmental effects of postulated failures.

2.4 Reactor Systems

2.4.1 Nuclear Fuel System

2.4.1.1 Design Description

The nuclear fuel system (NFS) generates heat by a controlled nuclear reaction and transfers the heat generated to the reactor coolant. The NFS consists of an arrangement in the reactor vessel of fuel assemblies and control element assemblies (CEAs). The NFS has the safety-related functions of providing a barrier against the release of radioactive material generated by nuclear reactions in the nuclear fuel and providing a means to make the reactor core subcritical.

The reactor core has a maximum of 241 fuel assemblies and a minimum of 93 CEAs.

Each fuel assembly has fuel rods, grids, guide thimbles, instrument tube, top nozzle, and bottom nozzle. Each guide thimble and instrument tube provides a channel for insertion of a CEA element or an in-core instrument.

In each fuel assembly, 236 locations are occupied by fuel rods or rods containing burnable neutron absorber material or other non-fuel material. Each fuel rod has fissile material in the form of ceramic pellet. The fuel pellets in each fuel rod are contained within a cylindrical, sealed metal tube.

CEA is composed of 4 element full strength, 4 element part strength, or 12 element full strength, containing neutron absorbing material within a cylindrical, sealed metal tube.

The fuel assembly and CEA are designed to preclude damage during normal operation or during anticipated operational occurrences.

The fuel assemblies and CEAs are classified as seismic Category I.

To meet above functional requirements, NFS is designed as follows:

1. The functional arrangement of the fuel assemblies, the CEAs, and the nuclear fuel system arrangement is as described in the Design Description of Subsection 2.4.1.1 and as shown in Figures 2.4.1-1, 2.4.1-2 and 2.4.1-3.

2.4.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the nuclear fuel system are specified in Table 2.4.1-1.

Table 2.4.1-1

Nuclear Fuel System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the fuel assemblies, the CEAs, and the nuclear fuel system arrangement is as described in the Design Description of Subsection 2.4.1.1 and as shown in Figures 2.4.1-1, 2.4.1-2 and 2.4.1-3.	1. Inspection of the as-built fuel assemblies, CEAs, and nuclear fuel system arrangement will be performed.	1. The as-built fuel assemblies the CEAs, and the nuclear fuel system arrangement conform with the functional arrangement as describe in the Description of Subsection 2.4.1.1 and as shown in Figures 2.4.1-1, 2.4.1-2 and 2.4.1-3.

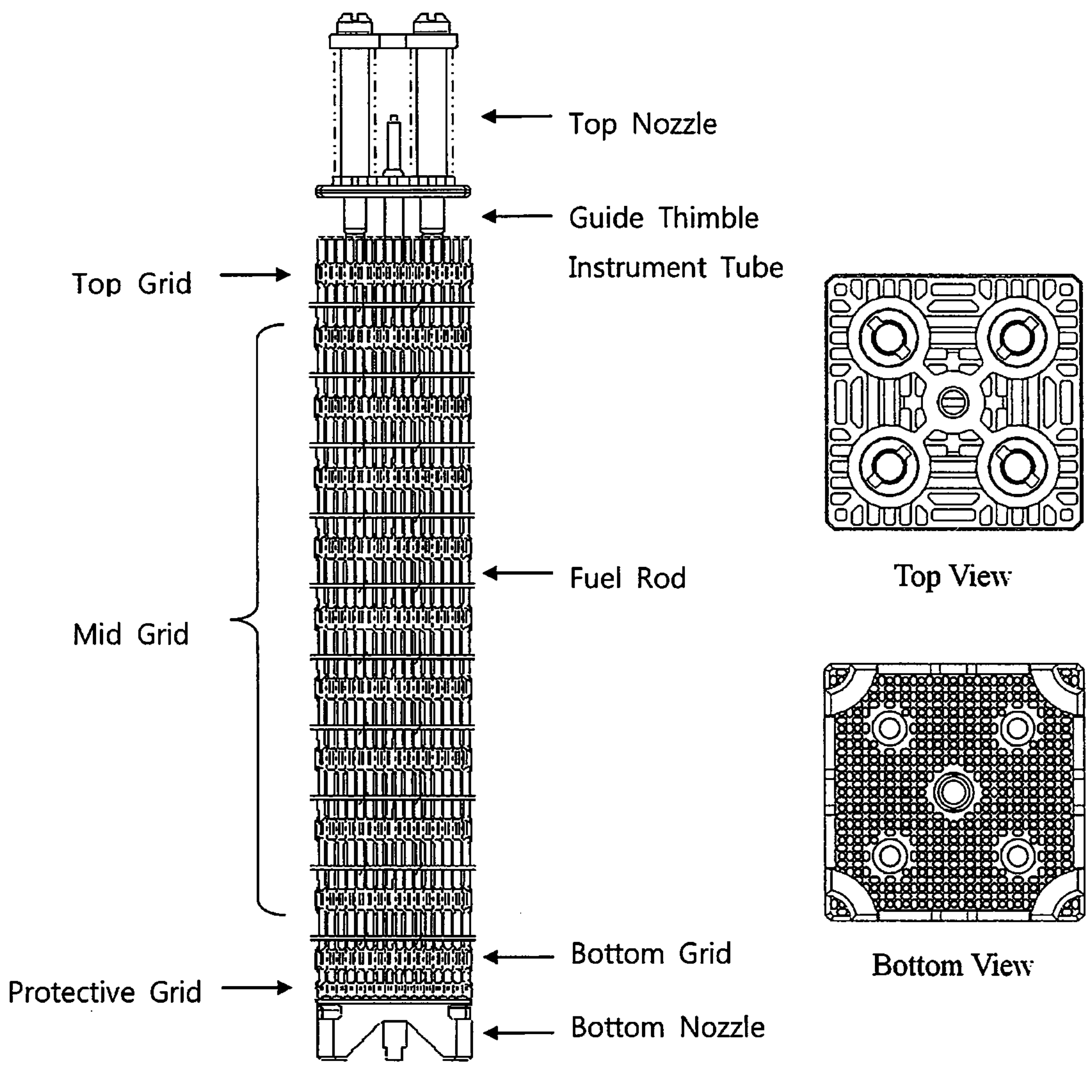


Figure 2.4.1-1 Fuel Assembly

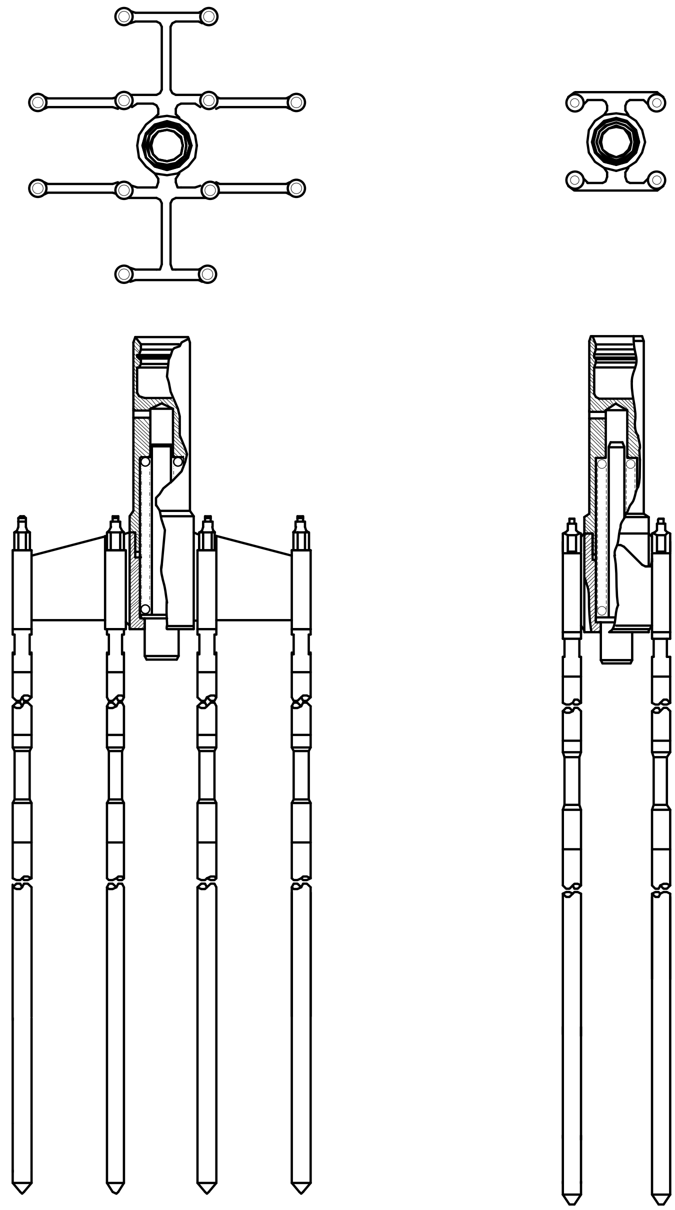


Figure 2.4.1-2 Control Element Assemblies

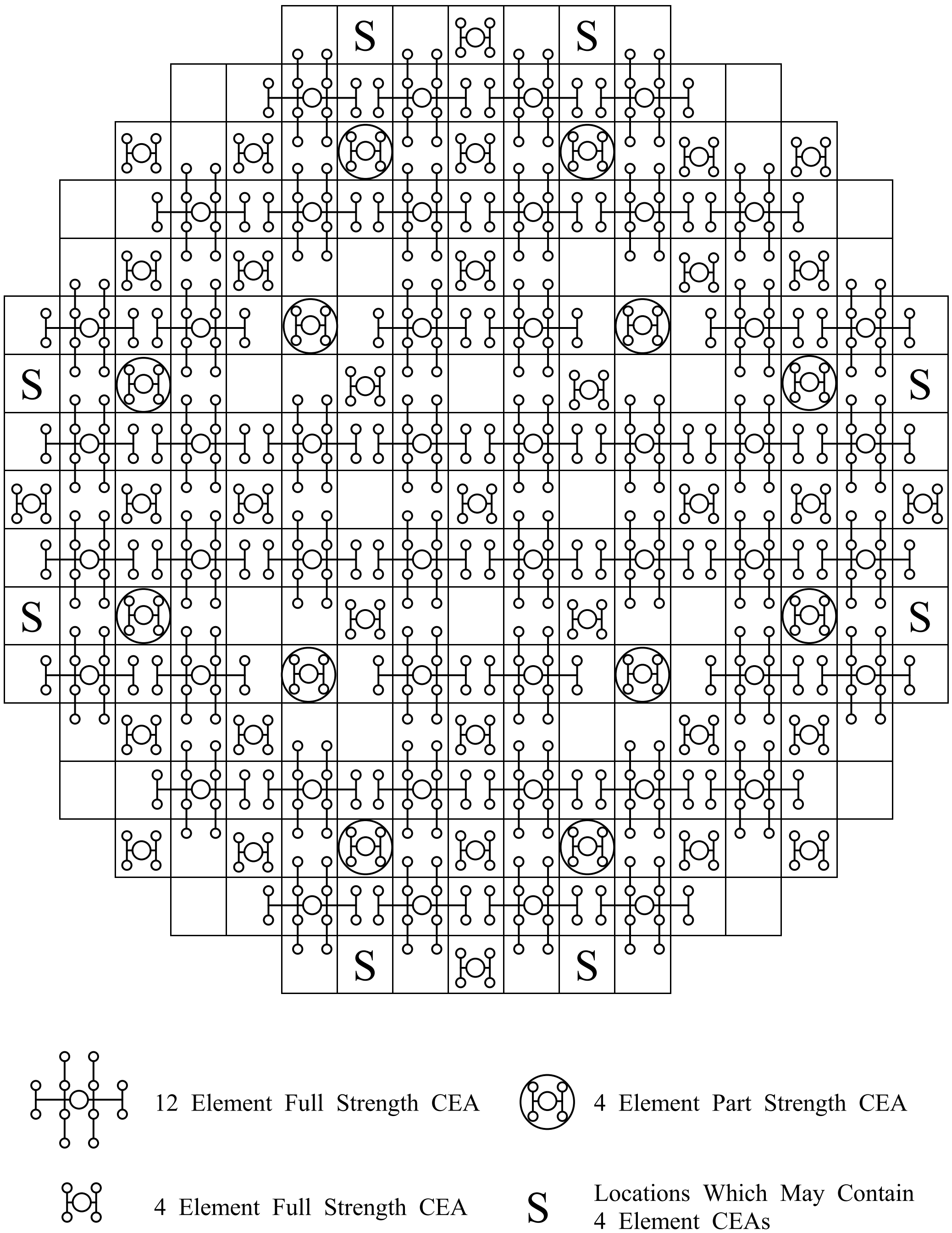


Figure 2.4.1-3 Nuclear Fuel System Arrangement

2.4.2 Reactor Coolant System

2.4.2.1 Design Description

The reactor coolant system (RCS) is a safety-related system which removes the heat generated in the reactor core and transfers the heat to the steam generators. The RCS forms part of the pressure and fission product boundary between the reactor coolant and the reactor containment building (RCB) atmosphere.

The RCS is located in the RCB and consists of a reactor vessel (RV), two vertical U-tube steam generators (SGs), four reactor coolant pumps (RCPs), one pressurizer (PZR), four pressurizer pilot operated safety relief valves (POSRVs), ninety three control element drive mechanisms (CEDMs), piping, heaters, controls, instrumentation, and valves.

The safety-related functions of the RCS are as follows:

a. To form a barrier against the uncontrolled release of reactor coolant and radioactive materials to the containment.

b. In conjunction with other systems, to provide sufficient cooling during all plant evolutions and anticipated operational occurrences to preclude significant reactor core damages.

c. To provide protection of the RCS from overpressure by pressure relief devices for all design basis events (DBEs).

The RCS is designed as follows:

1. The functional arrangement of the RCS is as described in the Design Description of Subsection 2.4.2.1 and Table 2.4.2-1 and as shown in Figures 2.4.2-1 and 2.4.2-2.

2.a The ASME Code components identified in Table 2.4.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.4.2-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.2-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.2-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.2-2 retain their pressure boundary integrity under at their design pressure.

4.b The ASME Code piping identified in Table 2.4.2-1 retains its pressure boundary integrity under at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.2-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs and AOVs identified in Table 2.4.2-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs and AOVs identified in Table 2.4.2-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the reactor coolant pumps and to open and close MOVs and AOVs listed in Table 2.4.2-2.

8.b All controls required by the design exist in the RSR to start and stop the reactor coolant pumps and to open and close MOVs and AOVs listed in Table 2.4.2-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.2-2 and 2.4.2-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.2-2 and 2.4.2-3.

8.e All controls required by the design exist in the MCR to energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.

8.f All controls required by the design exist in the RSR to energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.

9.a The pressurizer POSRVs provide overpressure protection for reactor coolant pressure boundary components in the RCS.

9.b Each RCP motor has a flywheel which retains its integrity at a design overspeed condition.

9.c Each RCP has rotating inertia to slow the pump flow coastdown when electrical power is disconnected.

9.d The RCPs circulate coolant at a rate which removes heat generated in the reactor core.

9.e The RCS provides properly rated pressurizer backup heaters to control system pressure.

10. The RV is equipped with holders for at least six capsules for accommodating material surveillance specimens.

11. RV material specimens taken from materials actually used in fabrication of the beltline region are inserted in the capsules and include Charpy V-notch

specimens of base metal, weld metal and heat-affected zone material and tensile and 1/2T compact tension specimens from base metal and weld metal.

12. CEDMs release the CEAs upon termination of electrical power to the CEDM.

2.4.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.2-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the reactor coolant system.

Table 2.4.2-1

Reactor Coolant System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Reactor vessel	Containment	1	I
Pressurizer	Containment	1	I
Steam generators (primary/secondary)	Containment	1/2	I
Pressurizer piping downstream of and excluding pressurizer pilot operated safety relief valves	Containment	- (1)	No
Reactor coolant piping drain piping upstream of and including the second drain stop valve	Containment	1	I
Reactor coolant piping	Containment	1	I
Pressurizer surge line piping	Containment	1	I
Pressurizer spray line piping	Containment	1	I
Control element drive mechanisms	Containment	1	I

(1) Dash (-) indicates not applicable.

Table 2.4.2-2 (1 of 2)

Reactor Coolant System Components List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Reactor Vessel	RV	1	I	-/Yes	-/-[(2)]	-/-	-	-	-
Steam Generator (primary/secondary)	SG # 1&2	1	I	-/Yes	-/-	-/-	-	-	-
Pressurizer	PZR	1	I	-/Yes	-/-	-/-	-	-	-
Reactor Coolant Pumps	RCP 1A, 1B 2A, 2B	1	I	No/Yes	Yes/Yes	Yes/Yes	-[(2)]	-	-
PZR Backup Heaters	Bank No.1, No.2	1	I	Yes/Yes	Yes/Yes	Yes/Yes	PPCS, PLCS	-	-
Pilot Operated Safety Relief Valves (POSRVs) Main Valves	RC-200, 201 202, 203	1	I	-/Yes	Yes/Yes	-/-	-	Open/Close	
POSRV Motor Operated Isolation Valves (MOV)	RC-120, 121 122, 123 124, 125 126, 127	1	I	No/Yes	Yes/Yes	-/-	-	-	As is
POSRV Double Motor Operated Pilot Valves (MOV)	RC-130, 131 132, 133 134, 135 136, 137	1	I	Yes[(3)]/Yes	Yes/Yes	-/-	-	Open/Close	As is
POSRV Spring-Loaded Pilot Valves	RC-300, 301 302, 303 304, 305 306, 307	1	I	-/Yes	Yes/Yes	-/-	-	Open/Close	

Table 2.4.2-2 (2 of 2)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
PZR Spray Control Valve (AOV)	RC-100E, 100F	1	I	No/No	Yes/Yes	-/-	PPCS	-	Closed
PZR Spray Bypass Valve (Manual)	RC-236, 237	1	I	-/No	-/-	-/-	-	-	-
PZR Spray Isolation Valve (MOV)	RC-442, 443	1	I	No/No	Yes/ Yes	-/-	-	-	As Is
PZR Spray Check Valve	RC-244	1	I	-/No	-/-	-/-	-	-	-
Controlled Bleedoff Isolation Valve (MOV)	RC-430, 431, 432, 433	2	I	No/No	Yes/Yes	-/-	-	-	As Is
Control Element Drive Mechanism	CEDM # 1 ~ 93	1	I	Yes [4]/Yes	Yes/Yes	-	PPS, RPS, DPS, RPCS	-	-

(1) The column “Item No.” is information only (not part of certified design).
(2) Dash(-) indicates not applicable.
(3) For motor operated pilot valves.
(4) For Reed Switch Position Transmitter (RSPT)

Table 2.4.2-3 (1 of 2)

Reactor Coolant System Instruments List

Instrument Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E /Harsh Envir. Qual.	Display / Alarm at MCR	Display / Alarm at RSR
PZR Pressure (NR)	P-101A, B, C, D	-[2]	I	Yes/Yes	Yes/Yes	-/-
PZR Pressure (WR)	P-102A, B, C, D	-	I	Yes/Yes	Yes/Yes	Yes [4]/Yes
PZR Pressure (Restricted Range)	P-103A, 104B,105C, 106D	-	I	Yes/Yes	Yes/Yes	-/-
RCP Discharge Pressure	P-190A, B	-	I	Yes/Yes	Yes/No	-/-
S/G Differential Pressure	P-115A, B, C, D P-125A, B, C, D	-	I	Yes/Yes	Yes/Yes	-/-
Hot Leg Temperature (NR)	T-112A, B, C, D T-113A, B, C, D	-	I	Yes/Yes	Yes/Yes	-/-
Hot Leg Temperature (WR)	T-132A, B T-133A, B	-	I	Yes/Yes	Yes/No	Yes/No
Cold Leg Temperature (NR)	T-122A, B, C, D T-123A, B, C, D	-	I	Yes/Yes	Yes/Yes	-/-
Cold Leg Temperature (WR)	T-142A, B T-143A, B	-	I	Yes/Yes	Yes/No	Yes/No
PZR Level	L-110A, B, L-103C [3]	-	I	Yes/Yes	Yes/Yes	Yes/No
RCP Speed	S-113A, B, C, D S-123A, B, C, D S-133A, B, C, D S-143A, B, C, D	-	I	Yes/Yes	Yes/Yes	-/-

Table 2.4.2-3 (2 of 2)

Instrument Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E /Harsh Envir. Qual.	Display / Alarm at MCR	Display / Alarm at RSR
Refueling Water Level (NR)	L-105, 106	-	II	No/No	Yes/Yes	-/-
Refueling Water Level (WR)	L-115, 116	-	II	No/No	Yes/No	-/-
SG Pressure	P-1013A, B, C, D P-1023A, B, C, D	-	I	Yes/Yes	Yes/Yes	Yes/Yes
SG Level (NR)	L-1114A, B, C, D L-1124A, B, C, D	-	I	Yes/Yes	Yes/Yes	-/-
SG Level (WR)	L-1113A, B, C, D L-1123A, B, C, D	-	I	Yes/Yes	Yes/Yes	Yes Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

(3) No alarm.

(4) Trend is displayed instead of indication.

Table 2.4.2-4 (1 of 7)

Reactor Coolant System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the RCS is as described in the Design Description of Subsection 2.4.2.1 and in Table 2.4.2-1 and as shown in Figures 2.4.2-1 and 2.4.2-2.	1. Inspection of the as-built RCS will be conducted.	1. The as-built RCS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.2.1 and in Table 2.4.2-1 and as shown in Figures 2.4.2-1 and 2.4.2-2.
2.a The ASME Code components identified in Table 2.4.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.4.2-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping, including supports identified in Table 2.4.2-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.4.2-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.2-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.2-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.2-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.2-1.

Table 2.4.2-4 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.4.2-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.4.2-2 conform with the ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.2-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.4.2-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Table 2.4.2-2 and 2.4.2-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Table 2.4.2-2 and 2.4.2-3, including anchorages, are seismically bounded by the tested or analyzed conditions.

Table 2.4.2-4 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.4.2-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure.	5.b.i The as-built seismic Category I piping including supports identified in Table 2.4.2-1 is located in the seismic Category I structure.
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.4.2-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.4.2-2 and 2.4.2-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.4.2-4 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 is powered from respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.4.2-2 and 2.4.2-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs and AOVs identified in Table 2.4.2-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type testes of MOVs and AOVs will be preformed to demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each as-built MOV or AOV changes position as indicated in Table 2.4.2-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built MOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each as-built MOV or AOV changes position as indicated in Table 2.4.2-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs and AOVs identified in Table 2.4.2-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs and AOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV or AOV identified in Table 2.4.2-2 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to start and stop the reactor coolant pumps and to open and close MOVs and AOVs listed in Table 2.4.2-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the reactor coolant pumps and open and close MOVs and AOVs identified in Table 2.4.2-2.
8.b All controls required by the design exist in the RSR to start and stop the reactor coolant pumps and to open and close MOVs and AOVs s listed in Table 2.4.2-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the reactor coolant pumps and open and close MOVs and AOVs identified in Table 2.4.2-2.

Table 2.4.2-4 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.2-2 and 2.4.2-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.2-2 and 2.4.2-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.2-2 and 2.4.2-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.2-2 and 2.4.2-3.
8.e All controls required by the design exist in the MCR to energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.	8.e Tests will be performed using the controls in the MCR.	8.e All controls in the MCR energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.
8.f All controls required by the design exist in the RSR to energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.	8.f Tests will be performed using the controls in the RSR.	8.f All controls in the RSR energize and de-energize the pressurizer backup heaters listed in Table 2.4.2-2.
9.a The pressurizer POSRVs provide overpressure protection for reactor coolant pressure boundary components in the RCS.	9.a.i Testing and analysis in accordance with ASME Section III will be performed to confirm set pressure.	9.a.i The POSRV set pressure equals 173.7 ± 1.3 kg/cm^2A (2,470 ± 18 psia).
	9.a.ii Type tests of flow capacity of the POSRVs will be performed in accordance with ASME Section III.	9.a.ii The minimum valve capacity is 244,900 kg/hr (540,000 lb/hr) steam.
	9.a.iii Type tests of the POSRVs at full flow and full pressure will be performed.	9.a.iii The POSRVs are type tested at a pressure which does not exceed the set pressure by more than 3 %.
	9.a.iv Test for actuation time of the POSRVs will be performed.	9.a.iv Maximum opening time (including dead time) of the POSRVs is 0.5/5 seconds (hydraulic/manual). Maximum closing time (including dead time) of the POSRVs is 0.9/9 seconds (hydraulic/manual).

Table 2.4.2-4 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.b Each RCP motor has a flywheel which retains its integrity at a design overspeed condition.	9.b.i Shop testing of each RCP flywheel will be performed at the vendor facility at overspeed condition.	9.b.i Each RCP flywheel has passed an overspeed test of no less than 125 % of operating speed.
	9.b.ii The stress analysis for RCP flywheel will be performed.	9.b.ii The analysis shows that the flywheel is properly designed to withstand normal conditions, anticipated transients, the design basis loss of coolant accident, and the safe shutdown earthquake without loss of structural integrity.
9.c Each RCP has rotating inertia to slow the pump flow coastdown when electrical power is disconnected.	9.c Analysis of RCP rotating inertia will be performed.	9.c The rotating inertia of each RCP and motor assembly is no less than 6,717 kg-m^2 (159,400 lb-ft^2)
9.d The RCPs circulate coolant at a rate which removes heat generated in the reactor core.	9.d Testing to measure RCS flow with four RCPs operating at normal zero power pressure and temperature conditions will be performed.	9.d Pre-core total measured RCS flow rate is between 1,953,000 L/min (516,000 gpm) and 2,058,000 L/min (544,000 gpm)
9.e The RCS provides rated pressurizer backup heaters to control system pressure.	9.e Inspections will be performed to verify the rated capacity of the as-built pressurizer backup heater groups No.1 and No.2.	9.e Each as-built pressurizer backup heater group (No.1 and No.2) has a rated capacity of at least 300 kW.
10. The RV is equipped with holders for at least six capsules for accommodating material surveillance specimens.	10. Inspection of the RV for presence of capsules will be performed.	10. At least six capsules are in the reactor vessel.

Table 2.4.2-4 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. RV material specimens taken from materials actually used in fabrication of the beltline region are inserted in the capsules, and include Charpy V-notch specimens of base metal, weld metal, and heat-affected zone material and tensile and 1/2T compact tension specimens from base metal and weld metal.	11. Inspection of RV material specimens will be performed.	11. RV material specimens are made from material used in RV fabrication, and include Charpy V-notch specimens of base metal, weld metal, and heat-affected zone material and tensile and 1/2T compact tension specimens from base metal and weld metal.
12. CEDMs release the CEAs upon termination of electrical power to the CEDM.	12. Tests will be performed on the as-built CEDMs to confirm scramability.	12. Maximum drop time for 90 % insertion of the CEA is 4.0 seconds.

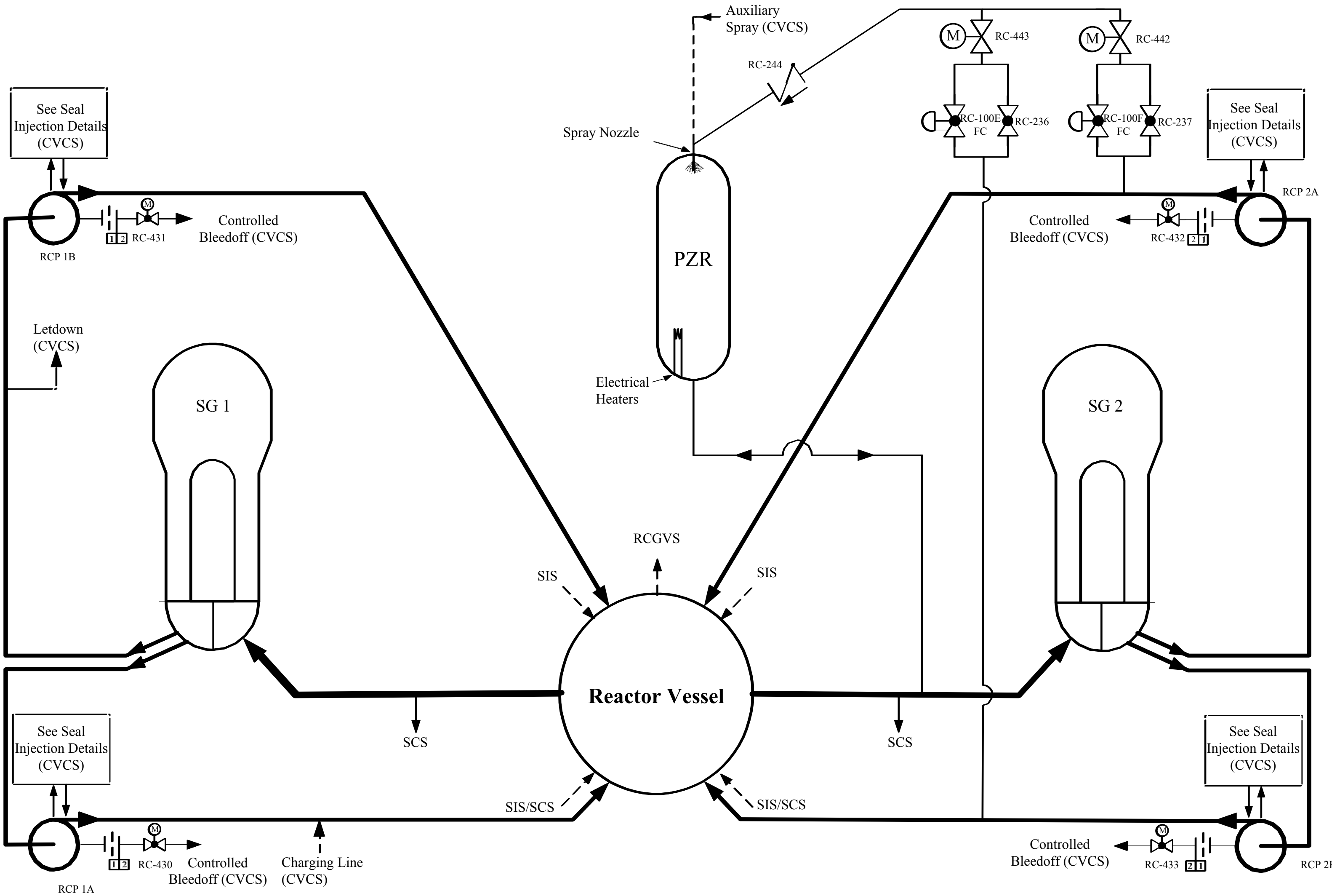


Figure 2.4.2-1 Reactor Coolant System

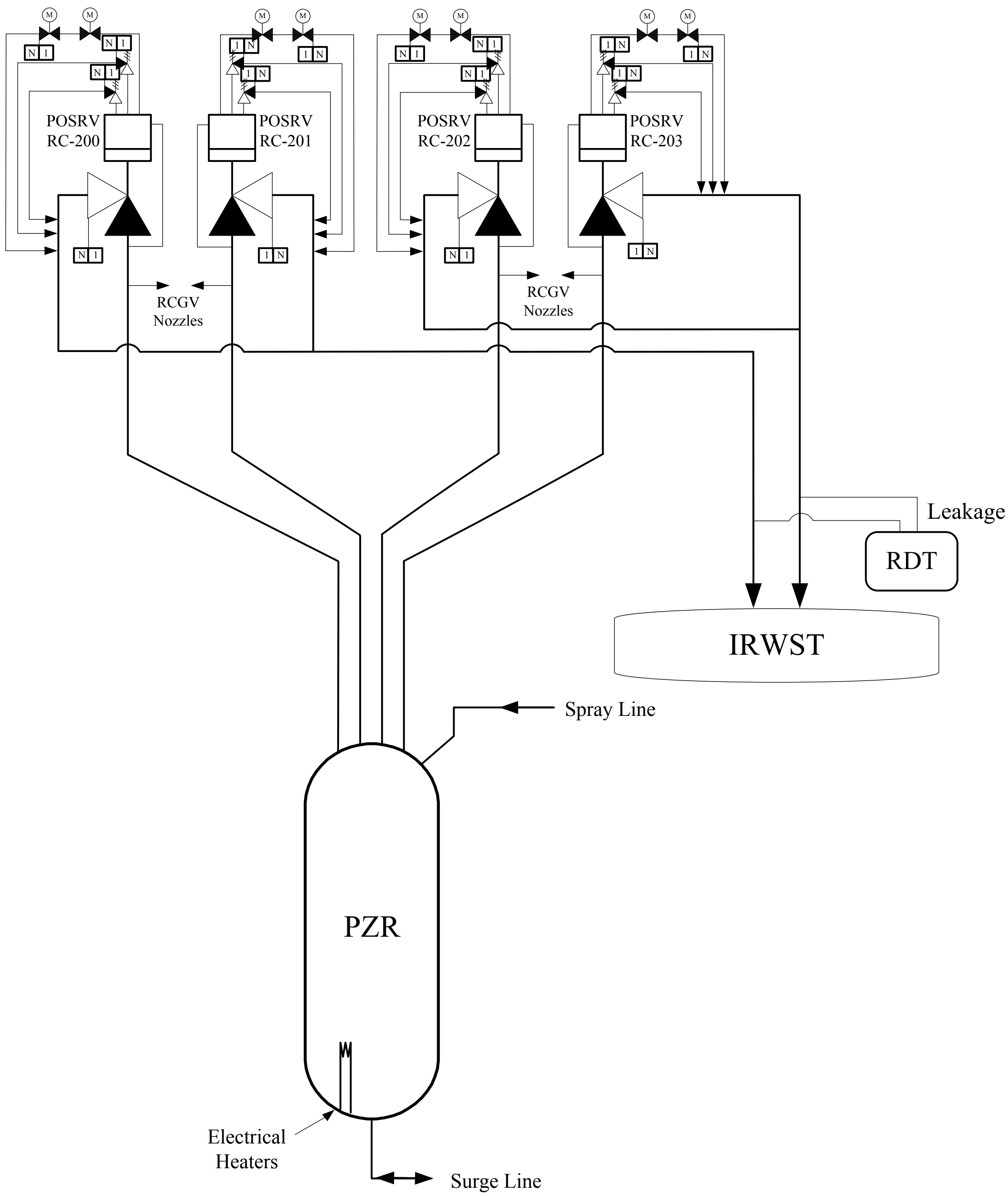


Figure 2.4.2-2 Reactor Coolant System (Pressurizer)

2.4.3 In-containment Water Storage System

2.4.3.1 Design Description

The in-containment water storage system (IWSS) is a safety-related system and includes the in-containment refueling water storage tank (IRWST) which is an integral part of containment building structures, the holdup volume tank (HVT) which is also an integral part of the containment building structures, and the cavity flooding system (CFS).

The IRWST provides borated water for the safety injection system (SIS) and the containment spray system (CSS). It is the primary heat sink for discharges from the safety depressurization and vent system. It is the source of water for the CFS, and for filling the refueling pool via the shutdown cooling system (SCS).

The HVT collects water released in containment during design basis events (DBEs) and returns water to the IRWST through spillways. It receives water discharged from the IRWST and transfers the water to the reactor cavity area by the CFS.

The CFS is used to provide water to flood the reactor cavity in response to beyond DBEs.

The IWSS is located in the containment.

1. The functional arrangement of the IWSS is as described in the Design Description of Subsection 2.4.3.1 and in Table 2.4.3-1 and as shown in Figure 2.4.3-1.

2.a The ASME Code components identified in Table 2.4.3-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.4.3-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.3-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.3-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.3-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.4.3-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.3-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs and SOVs identified in Table 2.4.3-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs and SOVs identified in Table 2.4.3-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close MOVs and SOVs identified in Table 2.4.3-2.

8.b All controls required by the design exist in the RSR to open and close MOVs and SOVs identified in Table 2.4.3-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.3-2 and 2.4.3-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.3-2 and 2.4.3-3.

9.a The IRWST has sufficient water volume above the low-low water level to provide the acceptable water volume for DBE.

9.b The IRWST has sufficient water volume.

9.c The IWSS provides post-LOCA pH control with tri-sodium phosphate (TSP).

9.d The IRWST sump for each SIS/CSS division has a strainer.

9.e The IWSS has four trash racks located at the entrances to HVT.

9.f The IWSS has 12 swing panels on the side walls of four vent stacks.

2.4.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria of the IWSS are specified in Table 2.4.3-4.

The ITAAC related to the CIVs and the piping between the CIVs of the IWSS are described in Table 2.11.3-2.

Table 2.4.3-1

In-containment Water Storage System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
In-containment refueling water storage tank	Containment	-	I
Holdup Volume Tank	Containment	-	I
Tri-Sodium Phosphate Baskets	Containment	-	I
IRWST Sump Strainers	Containment	-	I
Swing Panels	Containment	-	I
In-containment refueling water storage tank spillway	Containment	2	I
Holdup volume tank spillway including the power operated valves IW-V001, 002	Containment	2	I
Reactor cavity spillway including the power operated valves IW-V003, V004	Containment	2	I
IRWST level instrument penetration piping upstream of and including the isolation valves IW-V010, 011, 022, 023, 024, 025, 026, 027	Auxiliary Bldg.	2	I
HVT level instrument penetration piping upstream of and including the isolation valves IW-V012, 013, 014, 015, 016, 017, 028, 029, 030, 031	Auxiliary Bldg.	2	I
Reactor cavity level instrument penetration piping upstream of and including the isolation valves, IW-V018, 019, 020, 021, 032, 033, 034, 035	Auxiliary Bldg.	2	I
Containment penetration piping of CVCS BAMP suction line upstream of and including the isolation valves, IW-V005, 006	Auxiliary Bldg.	2	I

Table 2.4.3-2 (1 of 2)

In-containment Water Storage System Component List

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
In-Containment Water Storage Tank (IRWST)	IW-TK01	-	I	-	-	-	-	-	-
Holdup Volume Tank (HVT)	IW-TK02	-	I	-	-	-	-	-	-
IRWST Sump Strainers	IW-ST01A/B/C/D	-	I	-	-	-	-	-	-
Swing Panel	IW-SP01A/B/C/D, SP02A/B/C/D, SP03A/B/C/D	-	I	-	-/Yes	-/Yes	-	Open	-
Tri-Sodium Phosphate (TSP) Baskets	-	-	I	-	-	-	-	-	-
HVT Spillway Isolation Valves (MOV)	IW-V001, 002	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Closed/Open	As Is
Reactor Cavity Spillway Isolation Valves (MOV)	IW-V003, 004	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Closed/Open	As Is
HVT Manual Isolation Valves	IW-V1001, 1002	2	I	No/No	-	-	-	Open	-

Table 2.4.3-2 (2 of 2)

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Boric Acid Make-up Pump Suction Piping Containment Isolation Valves (MOV)	IW-V005, 006	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	As Is
IRWST Level Instrument Isolation Valves (SOV)	IW-V010, 011, 022, 023, 024, 025, 026, 027	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
HVT Level Instrument Isolation Valves (SOV)	IW-V012, 013, 014, 015, 016, 017, 028, 029, 030, 031	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
Reactor Cavity Level Instrument Isolation Valves (SOV)	IW-V018, 019, 020, 021, 032, 033, 034, 035	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.3-3

In-containment Water Storage System Instrument List

Instrument Name	Item No. [1]	Location	ASME Section III Classification	Seismic Category	Electrical Class 1E/Harsh Environ. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
IRWST Level	L-390, 391, 392, 393	Auxiliary Bldg.	-	I	Yes/Yes	Yes/Yes	Yes/Yes
IRWST Temperature	T-390, 391, 392, 393	Containment	-	I	Yes/Yes	Yes/Yes	Yes/Yes
IRWST Pressure	P-390, 391, 392, 393	Containment	-	I	Yes/Yes	Yes/No	Yes/No
HVT Level	L-394, 395, 396, 397 (Wide Range)	Auxiliary Bldg.	-	I	Yes/Yes	Yes/No	Yes/No
	L-403 (Narrow Range)	Auxiliary Bldg.	-	II	No/No	No/Yes	No/Yes
Reactor Cavity Level	L-397, 398, 399, 400	Auxiliary Bldg.	-	I	Yes/Yes	Yes/No	Yes/No
Swing Panel Position Switch	Z-012 thru 023	Containment	-	II	No/No	No/Yes	No/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.3-4 (1 of 6)

In-containment Water Storage System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the IWSS is as described in the Design Description of Subsection 2.4.3.1 and in Table 2.4.3-1 and as shown in Figure 2.4.3-1.	1. Inspection of the as-built IWSS will be performed.	1. The as-built IWSS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.3.1 and in Table 2.4.3-1 and as shown in Figure 2.4.3-1.
2.a The ASME Code components identified in Table 2.4.3-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.4.3-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.4.3-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.4.3-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.3-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.3-2.

Table 2.4.3-4 (2 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.3-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.3-1.
4.a The ASME Code components identified in Table 2.4.3-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.4.3-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.3-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.4.3-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 can withstand seismic design basis loads without loss of safety function.

Table 2.4.3-4 (3 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 including anchorage are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.4.3-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.4.3-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.4.3-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

Table 2.4.3-4 (4 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.4.3-2 and 2.4.3-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
6.b Each of the Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.4.3-2 and 2.4.3-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs and SOVs identified in Table 2.4.3-2 perform an active safety function to change position as indicated in the table.	7.a.i Test or type tests of MOVs and SOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV or SOV changes position as indicated in Table 2.4.3-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built MOVs and SOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV or SOV changes position as indicated in Table 2.4.3-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs and SOVs identified in Table 2.4.3-2 assume the indicated loss of motive power position.	7.b Test of the as-built MOVs and SOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV or SOV identified in Table 2.4.3-2 assumes the indicated loss of motive power position.

Table 2.4.3-4 (5 of 6)

Design Commitment		Inspections, Tests, Analyses		Acceptance Criteria	
8.a	All controls required by the design exist in the MCR to open and close MOVs and SOVs identified in Table 2.4.3-2.	8.a	Tests will be performed using the controls in the MCR.	8.a	All controls in the as-built MCR open and close MOVs and SOVs identified in Table 2.4.3-2.
8.b	All controls required by the design exist in the RSR to open and close MOVs and SOVs identified in Table 2.4.3-2.	8.b	Test will be performed using the controls in the RSR.	8.b	All control in the as-built RSR open and close MOVs and SOVs identified in Table 2.4.3-2.
8.c	All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.3-2 and 2.4.3-3.	8.c	Inspections will be performed on the displays and alarms in the MCR.	8.c	All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.3-2 and 2.4.3-3.
8.d	All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.3-2 and 2.4.3-3.	8.d	Inspections will be performed on the displays and alarms in the RSR.	8.d	All Displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.3-2 and 2.4.3-3.
9.a	The IRWST has sufficient water volume above the low-low water level to provide the acceptable water volume for DBE.	9.a	Inspection of the IRWST will be performed to provide the acceptable water volume.	9.a	The IRWST has a useable volume of at least 993.24 m^3 (35,076 ft^3).
9.b	The IRWST has sufficient water volume.	9.b	Inspection of the IRWST will be performed to provide water for flooding the refueling pool.	9.b	The IRWST has a minimum water volume of at least 2,456.74 m^3 (86,759 ft^3).
9.c	The IWSS provides post-LOCA pH control with tri-sodium phosphate (TSP).	9.c	Inspection will be performed for the capacity of the TSP baskets.	9.c	The TSP basket located in HVT has the following combined capacity of TSP: ≥ 26,976 kg (59,472 pounds).
9.d	The IRWST sump for each SIS/CSS division has a strainer.	9.d.i	Inspection will be performed for the existence of a strainer in the IRWST sump for each SIS/CSS division.	9.d.i	A strainer exists in the IRWST sump for each SIS/CSS division.
		9.d.ii	Inspection and analysis will be performed to verify the minimum surface area and maximum hole size of the strainer.	9.d.ii	Each IRWST sump strainer has a minimum surface area of greater than equal to 55.74 m^2 (600 ft^2) and the strainer perforated plate hole size is a maximum hole diameter of 2.38 mm (3/32 inches).

Table 2.4.3-4 (6 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	9.d.iii Inspection will be performed to verify that the strainers remain submerged below the surface of the water in the IRWST.	9.d.iii The top of each strainer remains submerged under design basis accident condition.
9.e The IWSS has four trash racks located at the entrances to HVT.	9.e.i Inspection will be performed for the existence of a trash rack at each entrance to HVT.	9.e.i A trash rack exists at each entrance to HVT.
	9.e.ii Inspection will be performed to verify the maximum grid opening of the trash rack.	9.e.ii The trash rack has a maximum grid opening of 38.1 × 38.1 mm (1.5 × 1.5 inches).
9.f The IWSS has 12 swing panels on the side walls of four vent stacks.	9.f.i Inspection will be performed for the existence of three swing panels on each vent stack located on the concrete slab of the IRWST.	9.f.i Three swing panels exist on each vent stack located on the concrete slab of the IRWST.
	9.f.ii Inspection will be performed to verify the minimum effective opening area of each swing panel.	9.f.ii Each swing panel has a minimum effective opening area of at least 2.86 m^2 (30.8 ft^2).

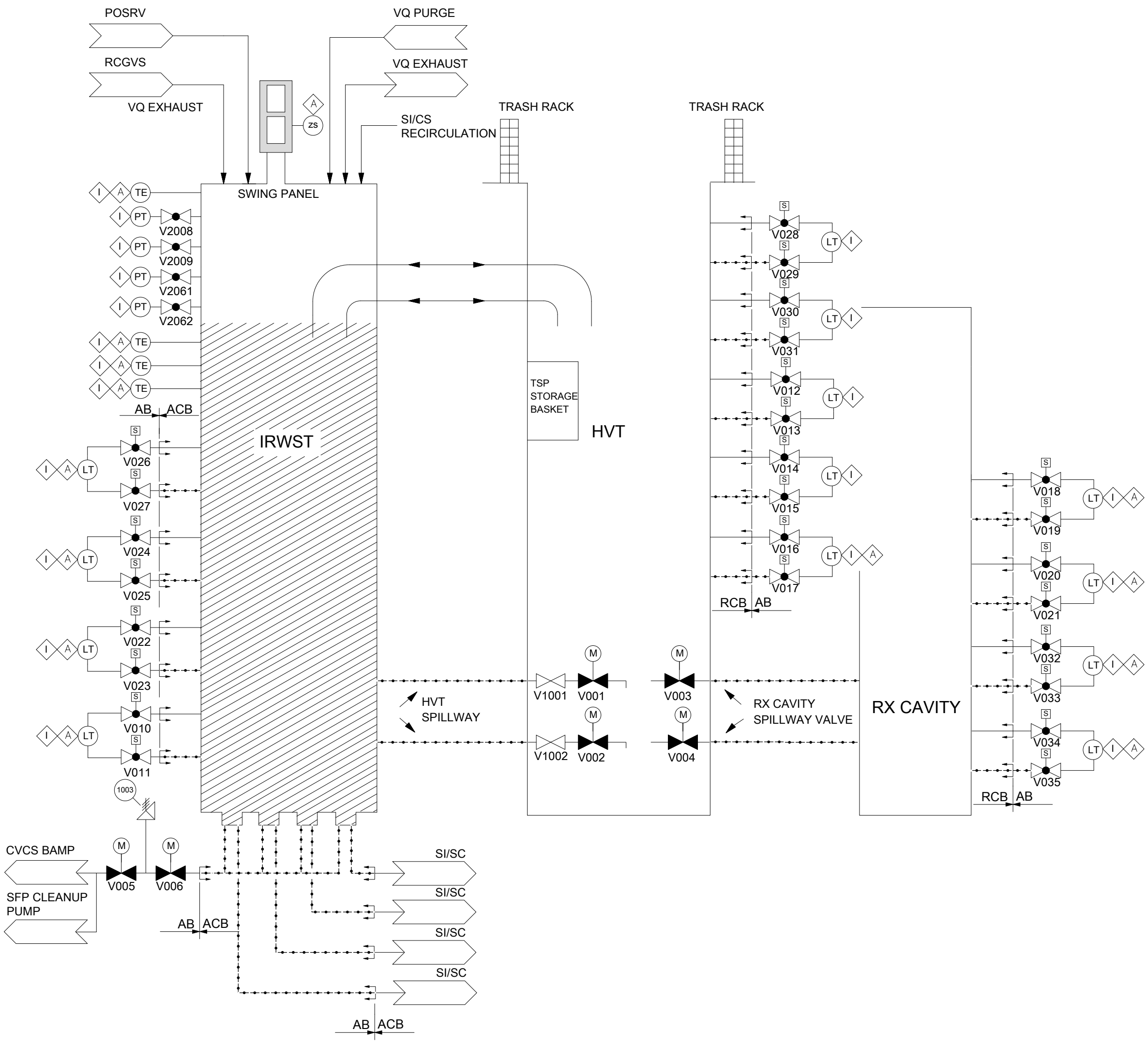


Figure 2.4.3-1 In-Containment Water Storage System

2.4.4 Safety Injection System

2.4.4.1 Design Description

The safety injection system (SIS) is a safety-related system which injects borated water into the reactor vessel to provide core cooling and reactivity control in response to design basis accidents. The SIS also provides core cooling during feed and bleed operation, in conjunction with the pilot operated safety relief valves (POSRVs). The major components of the SIS are four identical safety injection pumps (SIPs), four identical safety injection tanks (SITs), and associated valves.

The SIS is located in the auxiliary building and containment building.

1. The functional arrangement of the SIS is as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.

2.a The ASME Code components identified in Table 2.4.4-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports, and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.4-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.4-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.4-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.4-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.4.4-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.4-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, SOVs, AOVs and check valves identified in Table 2.4.4-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs, SOVs and AOVs identified in Table 2.4.4-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the SIPs, and to open and close MOVs, SOVs, and AOVs identified in Table 2.4.4-2.

8.b All controls required by the design exist in the RSR to start and stop the SIPs, and to open and close MOVs, SOVs, and AOVs identified in Table 2.4.4-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.4-2 and 2.4.4-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.4-2 and 2.4.4-3.

9.a The SIS provides RCS makeup, boration, and safety injection during design basis accidents.

9.b The SI pumps have sufficient net positive suction head (NPSH).

9.c The SI pumps deliver full flow to the reactor vessel by minimizing the delay time for SI flow to reactor vessel after an ESF-SIAS or DPS-SIAS.

9.d The SI pumps can be tested at full flow during plant operation.

9.e The SIS can be manually realigned for simultaneous hot leg injection and direct vessel injection (DVI).

9.f The pumps identified in Table 2.4.4-2 start after receiving an ESF-SIAS or DPS-SIAS.

9.g A confirmatory-open interlock is provided to automatically open the SIT discharge valve upon receipt of an ESF-SIAS or DPS-SIAS.

2.4.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.4-4 specifies the inspections, tests, analyses, and acceptance criteria for the SIS.

Table 2.4.4-1 (1 of 2)

Safety Injection System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Safety Injection Pump	Auxiliary Building	2	I
Safety Injection Tank	Containment Building	2	I
SI piping and valves between the DVI penetration and including the check valves SI-540, 541, 542, 543 upstream of the DVI penetration	Containment Building	1	I
SI piping and valves upstream of and excluding the check valves SI-540, 541, 542, 543 upstream of the DVI penetration	Containment Building/ Auxiliary Building	2	I
Hot leg injection piping downstream of and including the check valves SI-523, 533	Containment Building	1	I
Hot leg injection piping upstream of and excluding the check valves SI-523, 533	Containment Building/ Auxiliary Building	2	I
SIT piping and valves on the RCS side of and including the check valves SI-215, 225, 235, 245	Containment Building	1	I

Table 2.4.4-1 (2 of 2)

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
SIT piping and valves on the SIT side of and excluding the check valves SI-215, 225, 235, 245	Containment Building	2	I
Piping and valves on the RCS side of and including leakage drain isolation valves SI-618, 628, 638, 648	Containment Building	1	I
SIT nitrogen supply piping up and including valves SI-612, 622, 632, 642, 619, 629, 639, 649	Containment Building	2	I
SIT nitrogen vent piping up and including valves SI-613, 623, 633, 643, 605, 606, 607, 608	Containment Building	2	I
SIP mini-flow line	Containment Building/ Auxiliary Building	2	I
SIT filling piping excluding the piping between the valve SI-290 and SI-293	Containment Building/ Auxiliary Building	2	I
SIT filling piping between the valve SI-290 and SI-293	Auxiliary Building	3	I
Piping from IRWST to SIP	Containment Building/ Auxiliary Building	2	I

Table 2.4.4-2 (1 of 4)

Safety Injection System Component List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Safety Injection Pump	SIP - 01, 02 03, 04	2	I	Yes/No	Yes/Yes	Yes/Yes (SIP #1, 2 only)	ESF-SIAS, DPS-SIAS, Remote Manual	Start	Stop
Safety Injection Tank	SIT - 01, 02 03, 04	2	I	-/-	-	-	-	-	-
IRWST Return Line Check V/V	SI - 100, 101	2	I	-/- [(2)]	-	-	-	Open	-
SI Line Check V/V	SI - 113, 123 133, 143	2	I	-/-	-	-	-	Open	-
SIT Check V/V	SI - 215, 225 235, 245	1	I	-/-	-	-	-	Open	-
SI Line Check V/V	SI - 217, 227 237, 247	1	I	-/-	-	-	-	Open	-
SI Pump Orifice Bypass V/V (Manual)	SI - 218, 219 254, 255	2	I	-/-	-	-	-	-	-
SIT Fill Line Isolation V/V (Manual)	SI - 290	2	I	-/-	-	-	-	Closed	-
SIT Fill Line Isolation V/V (Manual)	SI - 293	2	I	-/-	-	-	-	Closed	-

Table 2.4.4-2 (2 of 4)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
SI Combined Miniflow Line Isolation V/V (MOV)	SI - 302, 303	2	I	Yes/No	Yes/Yes	-	Remote Manual	Open	As Is
IRWST Isolation V/V (MOV)	SI - 304, 305 308, 309	2	I	Yes/No	Yes/Yes	Yes/Yes (SI-304/305 only)	Remote Manual	Open	As Is
SI Hot Leg Injection Line Isolation V/V (MOV)	SI - 321, 331	2	I	Yes/No	Yes/Yes	-	Remote Manual	Open	As Is
IRWST Return Line Isolation V/V (MOV)	SI-395	2	I	Yes/Yes	Yes/Yes	-	Remote Manual	Closed	As Is
SI Pump Discharge Check V/V	SI - 404, 405 434, 446	2	I	-/-	-	-	-	Open	-
SIT Fill Line Relief V/V	SI - 474	2	1	-/Yes	-	-	-	Open	-
SI Miniflow Check V/V	SI - 424, 426 448, 451	2	I	-/-	-	-	-	Open	-
SI Hot Leg Injection Line Check V/V	SI - 522, 523 532, 533	1	I	-/-	-	-	-	Open	-
SI Line Check V/V	SI - 540, 541 542, 543	1	I	-/-	-	-	-	Open	-

Table 2.4.4-2 (3 of 4)

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
SI Low Flow Control V/V (MOV)	SI - 602, 603	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open	As Is
SI Hot Leg Isolation V/V (MOV)	SI - 604, 609	2	I	Yes/No	Yes/Yes	-	Remote Manual	Open	As Is
SIT Atmospheric Vent Isolation V/V (SOV)	SI - 605, 606 607, 608 613, 623 633, 643	2	I	Yes/Yes	Yes/Yes	Yes/Yes	Remote Manual	Closed	Closed
SIT Fill & Drain Isolation V/V (AOV)	SI - 611, 621 631, 641	2	I	Yes/Yes	Yes/Yes	-	ESF-SIAS, DPS-SIAS, Remote Manual	Closed	Closed
SIT N_2 Supply Isolation V/V (AOV)	SI - 612, 619 622, 629 632, 639 642, 649	2	I	No/No	Yes/Yes	-	Remote Manual	Closed	Closed
SIT Discharge Isolation V/V (MOV)	SI - 614, 624 634, 644	1	I	Yes/Yes	Yes/Yes	Yes/Yes	ESF-SIAS, DPS-SIAS, Above Low Pressurizer Pressure (P-103A, 104B) Setpoint Remote Manual	Open	As Is

Table 2.4.4-2 (4 of 4)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
SI Line Isolation V/V (MOV)	SI - 616, 626 636, 646	2	I	Yes/No	Yes/Yes	Yes/Yes (SI-626/646 only)	ESF-SIAS, DPS-SIAS, Remote Manual	Open	As Is
SI Check V/V Leakage Isolation V/V (AOV)	SI - 618, 628 638, 648	1	I	Yes/Yes	Yes/Yes	-	ESF-SIAS, DPS-SIAS, Remote Manual	Closed	Closed
SIT Fill Line Isolation V/V (AOV)	SI - 682	2	1	Yes/No	Yes/Yes	-	ESF-SIAS, DPS-SIAS, Remote Manual	Closed	Closed
SIS Fill Isolation V/V (Manual)	SI - 700, 701 714, 715	2	I	-/-	-	-	-	-	-
SIS Fill Check V/V	SI - 704, 705 706, 707	2	I	-/-	-	-	-	-	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.4-3

Safety Injection System Instrument List

Instrument Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E /Harsh Envir. Qual.	Display / Alarm at MCR	Display / Alarm at RSR
SI Pump Discharge Flow	F - 306, 307 308, 309	-	II	-/- [2]	No/Yes	-
SI DVI Flow	F - 341A, 321B 331C, 311D	2	I	Yes/No	Yes/No	Yes/No (F-341A/ 321B only)
SI Hot Leg Injection Flow	F - 390C, 391D	2	I	Yes/No	Yes/No	-
SIT Level (Wide Range)	L - 341A, 321B 331C, 311D	2	I	Yes/Yes	Yes/No	-
SIT Level (Narrow Range)	L - 312, 313 322, 323 332, 333 342, 343	-	II	-/-	Yes/Yes	-
SI Pump Discharge Pressure	P - 306, 307 308, 309	-	II	-/-	Yes/No	Yes/No (P-308/ 309 only)
SI DVI Pressure	P - 319, 329 339, 349	-	II	-/-	Yes/Yes	-
SI Hot Leg Injection Pressure	P - 390, 391	-	II	-/-	Yes/Yes	-
SIT Pressure (Wide Range)	P - 341A, 321B 331C, 311D	2	I	Yes/Yes	Yes/No	Yes/No
SIT Pressure (Narrow Range)	P - 312, 313 322, 323 332, 333 342, 343	-	II	-/-	Yes/Yes	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash (-) indicates not applicable.

Table 2.4.4-4 (1 of 7)

Safety Injection System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SIS is as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.	1. Inspection of the as-built system will be conducted.	1. The as-built SIS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.4.1 and in Table 2.4.4-1 and as shown in Figure 2.4.4-1.
2.a The ASME Code components identified in Table 2.4.4-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports.	2.a The ASME Section III design reports exist and conclude that the as-built components identified in Table 2.4.4-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports , and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.4-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design reports exist and conclude that the as-built piping including supports, and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.4-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.4-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.4-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.4-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.4-1.

Table 2.4.4-4 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.4.4-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.4.4-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.4-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.4.4-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure(s).	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 are located in the seismic Category I structure(s).
	5.a.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 including anchorages, are seismically bounded by the tested or analyzed conditions.

Table 2.4.4-4 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.4.4-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.4.4-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.4.4-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspection will be performed on the as-built Class 1E components, instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components, instruments and the associated wiring, cables, and terminations identified in Tables 2.4.4-2 and 2.4.4-3 as being qualified for a harsh environment are bounded by type tests, analyses or a combination of type tests and analyses.

Table 2.4.4-4 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the as-built Class 1E components and instruments identified in Tables 2.4.4-2 and 2.4.4-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspections of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, SOVs, AOVs and check valves identified in Table 2.4.4-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs, SOVs and AOVs will be performed that demonstrate the capability of the valve to operate under their design conditions.	7.a.i A test report exists and concludes that each MOV, SOV or AOV changes position as indicated in Table 2.4.4-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs, SOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each as-built MOV, SOV or AOV changes position as indicated in Table 2.4.4-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each as-built check valve changes position as indicated in Table 2.4.4-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs, SOVs and AOVs identified in Table 2.4.4-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs, SOVs and AOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV, SOV or AOV identified in Table 2.4.4-2 assumes the indicated loss of motive power position.

Table 2.4.4-4 (5 of 7)

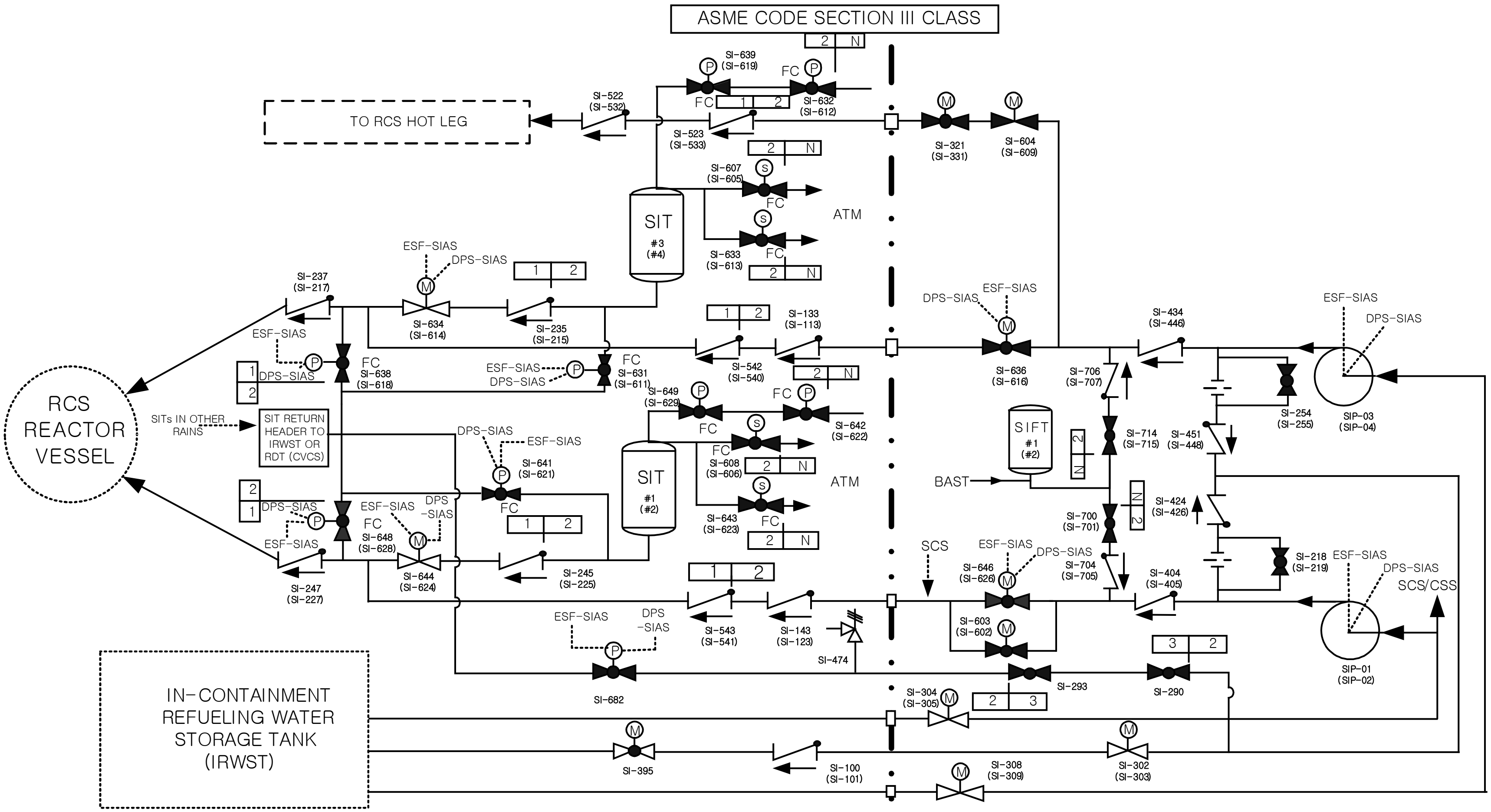
Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to start and stop the SIPs, and to open and close MOVs, SOVs, and AOVs indicated in Table 2.4.4-2.	8.a Tests will be performed using controls in the MCR.	8.a All controls in the as-built MCR start and stop the SIPs, and open and close MOVs, SOVs, and AOVs indicated in Table 2.4.4-2.
8.b All controls required by the design exist in the RSR to start and stop the SIPs, and to open and close MOVs, SOVs, and AOVs indicated in Table 2.4.4-2.	8.b Tests will be performed using controls in the RSR.	8.b All controls in the as-built RSR start and stop the SIPs, and open and close MOVs, SOVs, and AOVs indicated in Table 2.4.4-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.4-2 and 2.4.4-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.4-2 and 2.4.4-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.4-2 and 2.4.4-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.4-2 and 2.4.4-3.

Table 2.4.4-4 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.a The SIS provides RCS makeup, boration, and safety injection during design basis accidents.	9.a.i A discharge test with low tank pressure condition for each as-built SIT will be conducted.	9.a.i A report exists and concludes that the total water volume injected from each as-built SIT into the reactor vessel is ≥ 50.7 m^3(1,790 ft^3). The water volume injected from each SIT into reactor vessel at large flow rate (prior to flow switching to small flow rate) is ≥ 22.7 m^3 (800 ft^3).
	9.a.ii Tests and analyses of the as-built SIT system will be performed to calculate the resistance coefficients.	9.a.ii Resistance coefficient K of the as-built SIT including the discharge line is greater than or equal to 10 and less than or equal to 25 before flow turndown and greater than or equal to 80 and less than or equal to 120 after flow turndown.
	9.a.iii The as-built SI pump injection test will be performed. Analysis will be performed to convert the test results from the test conditions to the design condition.	9.a.iii A report exists and concludes that each as-built SI pump has a pump differential pressure of no less than or equal to 123.8 kg/cm^2D (1,761 psid) at the minimum flow, and injects no less than or equal to 4,115 L/min (1,087 gpm) and no more than or equal to 4,198 L/min (1,109 gpm) of IRWST water into the reactor vessel at atmospheric pressure.
	9.a.iv Inspections of the as-built SITs will be performed.	9.a.iv The nominal internal volume per the as-built SIT is greater than or equal to 68.1 m^3 (2,406 ft^3).
9.b The SI pumps have sufficient net positive suction head (NPSH).	9.b Tests to measure the as-built SI pump suction pressure will be performed. Inspections and analysis to determine NPSH to each SI pump will be performed.	9.b A report exists and concludes that the as-built NPSH available to each SI pump is greater than the NPSH required.

Table 2.4.4-4 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.c The SI pumps deliver full flow to the reactor vessel by minimizing the delay time for SI flow to reactor vessel after an ESF-SIAS or DPS-SIAS.	9.c Testing will be performed using signals simulating an ESF-SIAS or DPS-SIAS	9.c The as-built SI pumps initiates and begins to deliver flow to the reactor vessel within 40 seconds following receipt of a signal simulating ESF-SIAS or DPS-SIAS, including emergency diesel generator start time and load time.
9.d The SI pumps can be tested at full flow during plant operation.	9.d Testing of the SIS will be performed by manually aligning SI flow to the IRWST and manually starting each SI pump.	9.d Each as-built SI pump has a flow capacity of at least 3,407 L/min (900 gpm) to the IRWST through the test line.
9.e The SIS can be manually realigned for simultaneous hot leg injection and direct vessel injection (DVI).	9.e Testing will be performed with the system manually aligned for simultaneous DVI and hot leg injection.	9.e Each as-built SI pump injects no less than or equal to 4,115 L/min (1,087 gpm) and no more than or equal to 4,198 L/min (1,109 gpm) through each hot leg and DVI line with the RCS at atmospheric pressure.
9.f The pumps identified in Table 2.4.4-2 start after receiving an ESF-SIAS or DPS-SIAS.	9.f Tests will be performed on the as-built pumps in Table 2.4.4-2 using simulated signals.	9.f The as-built pumps in Table 2.4.4-2 start after receiving a simulated ESF-SIAS or DPS-SIAS.
9.g A confirmatory-open interlock is provided to automatically open the SIT discharge valve upon receipt of an ESF-SIAS or DPS-SIAS.	9.g Tests will be performed using simulated signals.	9.g The as-built SIT discharge valves in Table 2.4.4-2 automatically opens upon receipt of simulated ESF-SIAS or DPS-SIAS.



NOTE:
1. SIS CONSISTS OF FOUR MECHANICAL DIVISIONS AND ONLY TWO OF FOUR DIVISIONS ARE SHOWN.
2. THE COMPONENT NAMES IN PARENTHESES REFER TO TH OTHER DIVISION.

Figure 2.4.4-1 Safety Injection System

2.4.5 Shutdown Cooling System

2.4.5.1 Design Description

The shutdown cooling system (SCS) is a safety-related system which removes decay heat from the reactor coolant system (RCS) and transfers the heat to the component cooling water system (CCWS) during a planned reactor shutdown operation and an accident.

The SCS is designed such that the shutdown cooling pumps (SCPs) are identical and functionally interchangeable with containment spray pumps (CSPs) for containment spray function. Provisions are made to control the valves used in the SCS/CSS interconnection. The SCS consists of heat exchangers and two pumps. One SCS pump is capable of meeting the safety-grade cooldown criteria and two SCS pumps are required to meet the normal cooldown design criteria.

The SCS is located in the containment building and auxiliary building.

1. The functional arrangement of the SCS is as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.

2.a The ASME Code components identified in Table 2.4.5-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports, and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.5-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.5-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.5-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.5-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.4.5-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.5-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non- Class 1E division.

7.a MOVs and check valves identified in Table 2.4.5-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs identified in Table 2.4.5-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the SCPs, and to open and close MOVs identified in Table 2.4.5-2.

8.b All controls required by the design exist in the RSR to start and stop the SCPs, and to open and close MOVs identified in Table 2.4.5-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.5-2 and 2.4.5-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.5-2 and 2.4.5-3.

9.a The SCS cools the reactor by removing decay heat and other residual heat from the reactor core and the RCS during the normal plant shutdown and cool down conditions.

9.b The SCS suction line relief valves provide RCS low temperature overpressure protection (LTOP).

9.c Each SCP has sufficient net positive suction head (NPSH) in each operating configuration.

9.d Each SCP has a full flow test capability during a normal plant operating condition when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST.

9.e A containment spray actuation signal (CSAS) or engineered safety features-safety injection actuation signal (ESF-SIAS) starts SCP only when SCP is aligned for containment spray pump (CSP) function.

2.4.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.5-4 specifies the inspections, tests, analyses, and acceptance criteria for the SCS.

Table 2.4.5-1

Shutdown Cooling System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
SCS suction piping and valves on the RCS side from RCS hot leg up to including the motor operated valves SI-653, 654	Containment Building	1	I
All SCS piping and valves not mentioned above up to and including the valves interfacing with systems of a lower classification.	Containment Building/ Auxiliary Building	2	I
Shutdown Cooling Pump Miniflow Heat Exchanger	Auxiliary Building	3 (Shell)/ 2 (Tube)	I (Shell)/ I (Tube)
Shutdown Cooling Heat Exchanger	Auxiliary Building	3 (Shell)/ 2 (Tube)	I (Shell)/ I (Tube)
Shutdown Cooling Pump	Auxiliary Building	2	I

Table 2.4.5-2 (1 of 3)

Shutdown Cooling System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Shutdown Cooling Pump	SCP - 01, 02	2	I	Yes/No	Yes/Yes	Yes/Yes	CSAS or ESF-SIAS [3], Remote Manual	Start	Stop
SCS Suction Line Isolation Valve (MOV)	SI - 651, 652 653, 654	1	I	Yes/Yes	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
SCS Suction Line Isolation Valve (MOV)	SI - 655, 656	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
SCS Suction Line Relief Valve	SI - 179, 189	2	I	-/Yes	-/-	-/-	-	Open	-
Shutdown Cooling Heat Exchanger	SDCHX - 01, 02	3 (Shell) /2 (Tube)	I (Shell) /I (Tube)	-/No	/-	-/-	-	-	-
SCS Line Isolation Valve (MOV)	SI - 600, 601	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
Shutdown Cooling Heat Exchanger Outlet Flow Control Valve (MOV)	SI - 310, 311	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
Shutdown Cooling Heat Exchanger Bypass Flow Control Valve (MOV)	SI - 312, 313	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is

Table 2.4.5-2 (2 of 3)

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
CSP Suction Check Valve	SI - 157, 158	2	I	-/No	-/-	-/-	-	Open	-
SCP Suction Check Valve	SI - 159, 160	2	I	-/No	-/-	-/-	-	Open	-
SCP Miniflow Heat Exchanger	SCP MFHX - 01, 02	3 (Shell) /2 (Tube)	I (Shell) /I (Tube)	-/No	-/-	-/-	-	-	-
SCS Line Check Valve	SI - 168, 178	2	I	-/No	-/-	-/-	-	Open	-
SCP Discharge Check Valve	SI - 568, 569	2	I	-/No	-/-	-/-	-	Open	-
SCS Test Return Line Isolation Valve (MOV)	SI - 314, 315 688, 693	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
SCS/CSS Pump Suction Cross Connect Valve (MOV)	SI - 340, 342	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
SCS/CSS Pump Discharge Cross Connect Valve (MOV)	SI - 341, 343	2	I	Yes/No	Yes/Yes	No/No	Remote Manual	Open/Closed	As Is

Table 2.4.5-2 (3 of 3)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
SCS Warmup Line Flow Control Valve (MOV)	SI - 690, 691	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open/Closed	As Is
IRWST Return Line Isolation Valve (MOV)	SI - 300, 301	2	I	Yes/No	Yes/Yes	Yes/Yes	Remote Manual	Open /Closed	As Is

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

(3) SCP starts on ESF-SIAS or CSAS only when the SCP is aligned for CSP function.

Table 2.4.5-3

Shutdown Cooling System Instruments List

Instrument Name	Item No [1]	ASME Section III Class	Seismic Category	Class 1E /Harsh Envir. Qual.	Display / Alarm at MCR	Display / Alarm at RSR
SCP suction line pressure	P-300, 301	-	II	No/No	Yes/No	-/- [2]
SCP discharge line pressure	P-302, 305	-	II	No/No	Yes/Yes	-/-
SDCHX inlet temperature	T-300A, 303B	2	I	Yes/No	Yes/Yes	Yes/No
SDCHX outlet temperature	T-301A, 304B	2	I	Yes/No	Yes/Yes	Yes/No
SDCHX outlet temperature	T-302A, 305B	2	I	Yes/No	Yes/No	-/-
SCP flowrate	F-302A, 305B	2	I	Yes/No	Yes/Yes	Yes/No

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.5-4 (1 of 6)

Shutdown Cooling System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SCS is as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.	1. Inspection of the as-built system will be conducted.	1. The as-built SCS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.5.1 and in Table 2.4.5-1 and as shown in Figure 2.4.5-1.
2.a The ASME Code components identified in Table 2.4.5-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports.	2.a The ASME Section III design reports exist and conclude that the as-built components identified in Table 2.4.5-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME code piping including supports, and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.5-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design reports exist and conclude that the as-built piping including supports, and design features described in the design basis to limit potential gas accumulation, identified in Table 2.4.5-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.5-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.5-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.5-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.5-1.

Table 2.4.5-4 (2 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.4.5-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.4.5-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.5-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping in Table 2.4.5-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure(s).	5.a.i ASME Code data report(s) exist and conclude that the as-built seismic Category I components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 are located in a seismic Category I structure(s).
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 including anchorages, are seismically bounded by the tested or analyzed conditions.

Table 2.4.5-4 (3 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.4.5-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.4.5-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.4.5-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspection will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.4.5-2 and 2.4.5-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.4.5-4 (4 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.4.5-2 and 2.4.5-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspections of the as-built Class 1E division s will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs and check valves identified in Table 2.4.5-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs will be performed that demonstrate the capability of the valve to operate under their design conditions.	7.a.i A test report exists and concludes that each MOV changes position as indicated in Table 2.4.5-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each as-built MOV changes position as indicated in Table 2.4.5-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each as-built check valve changes position as indicated in Table 2.4.5-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs identified in Table 2.4.5-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV identified in Table 2.4.5-2 assumes the indicated loss of motive power position.

Table 2.4.5-4 (5 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to start and stop the SCPs, and to open and close MOVs identified in Table 2.4.5-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the SCPs, and open and close MOVs identified in Table 2.4.5-2.
8.b All controls required by the design exist in the RSR to start and stop the SCPs, and to open and close MOVs identified in Table 2.4.5-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the SCPs, and open and close MOVs identified in Table 2.4.5-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.5-2 and 2.4.5-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.5-2 and 2.4.5-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.5-2 and 2.4.5-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.5-2 and 2.4.5-3.
9.a The SCS cools the reactor by removing decay heat and other residual heat from the reactor core and the RCS during the normal plant shutdown and cool down conditions.	9.a.i An analysis will be performed to determine the heat removal capability of the shutdown cooling heat exchanger (SDCHX).	9.a.i A report exists and concludes that the product of the overall heat transfer coefficient and the effective heat transfer area of each SDCHX is no less than 1.45×10^6 kcal/hr-°C (3.2×10^6 Btu/hr-°F).
	9.a.ii Tests will be performed to confirm that the as-built SCS can provide flow through the SDCHX when the pump suction is aligned to the RCS hot leg and the discharge is aligned to DVI.	9.a.ii Each as-built SCP is sized to deliver 18,927 L/min (5,000 gpm) at a discharge head of 140.2 m (460 ft) excluding flow through miniflow heat exchanger.

Table 2.4.5-4 (6 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9.b The SCS suction line relief valves provide RCS low temperature overpressure protection (LTOP).	9.b.i Inspections will be conducted on the as-built SCP suction relief valves to confirm that the rating value of the ASME Code name plate is greater than or equal to system relief requirements.	9.b.i The rating capacity recorded on the ASME Code name plate of the as-built valve is not less than the flow required to provide low temperature overpressure protection for the as-built RCS, as determined by the LTOP system evaluation based on the pressure-temperature curves developed for the as-procured reactor vessel material.
	9.b.ii Tests and analysis in accordance with the ASME Section III will be performed to confirm set pressure.	9.b.ii A report exists and concludes that LTOP relief valve has a capacity greater than or equal to 29,337 L/min (7,750 gpm) at a set pressure less than or equal to 37.3 kg/cm^2G (530 psig) to provide LTOP for the RCS.
9.c Each SCP has sufficient net positive suction head (NPSH) in each operating configuration.	9.c Tests to measure the as-built SCP suction pressure will be performed. Inspections and analysis to determine NPSHA to each SCP will be performed.	9.c The as-built NPSHA in each operating configuration to each SCP is greater than the NPSH required.
9.d Each SCP has a full flow test capability during a normal plant operating condition when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST.	9.d Testing of SCP will be performed when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST.	9.d SCP can deliver flow to IRWST of 18,927 L/min (5,000 gpm) when it takes suction from the IRWST.
9.e A containment spray actuation signal (CSAS) or engineered safety features-safety injection actuation signal (ESF-SIAS) starts SCP only when SCP is aligned for containment spray pump (CSP) function.	9.e Testing of simulated CSAS or ESF-SIAS when SCP is aligned for CSP function will be performed.	9.e SCP will start when receiving CSAS or ESF-SIAS when SCP is aligned for CSP function.

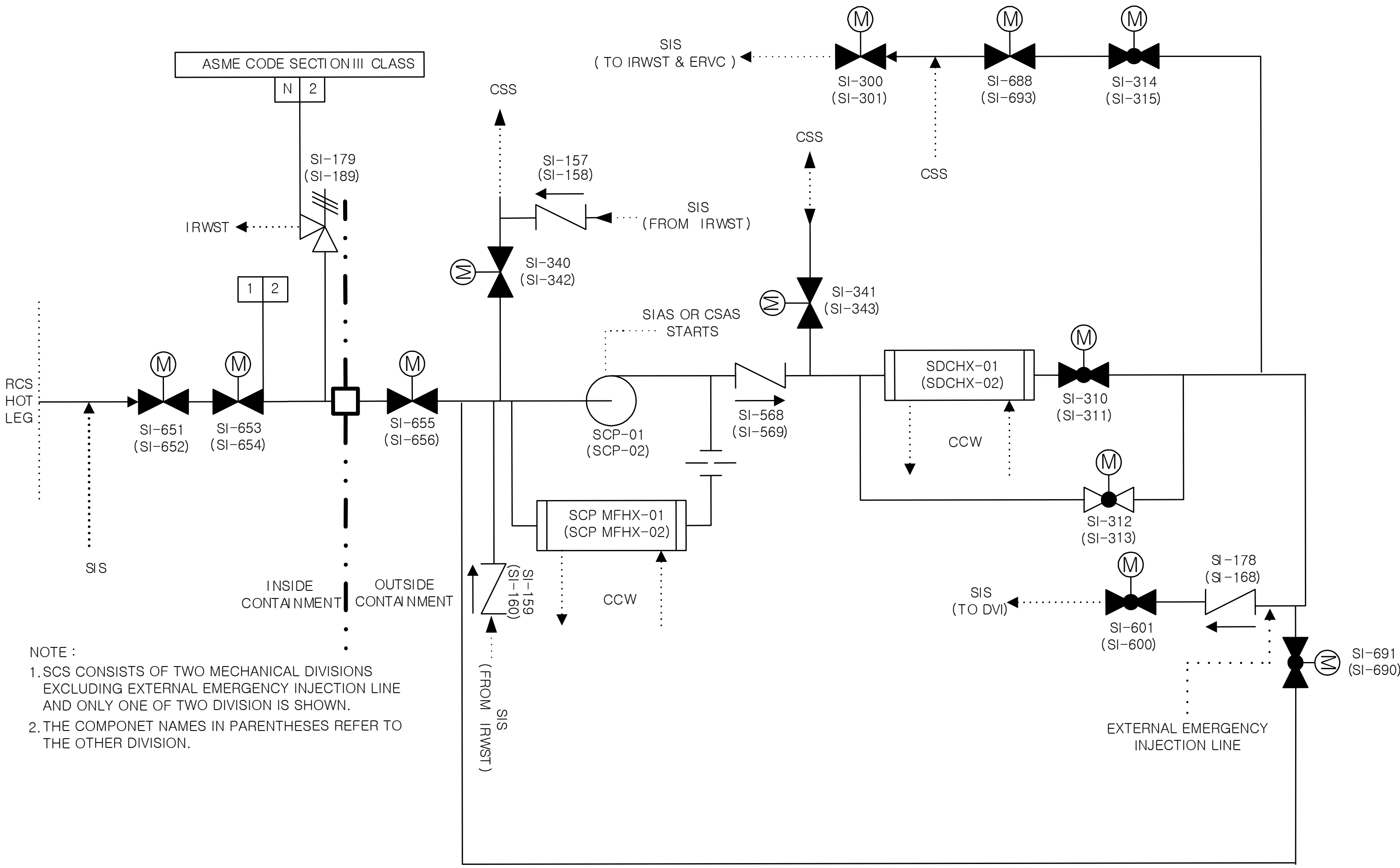


Figure 2.4.5-1 Shutdown Cooling System

2.4.6 Reactor Coolant System High Point Vents

2.4.6.1 Design Description

The reactor coolant gas vent system (RCGVS) is used to discharge non-condensible gases and steam from the high point of the reactor coolant system (RCS). The RCGVS is a safety-related system and provides a safety-grade means of remotely venting non-condensible gases from the reactor vessel closure head and the pressurizer steam space during post-accident conditions when large quantities of non-condensible gases accumulate in these high spots.

The RCGVS provides a safety-grade means to depressurize the RCS in the event that pressurizer main spray and auxiliary spray systems are unavailable.

The RCGVS effluent from the pressurizer or the reactor vessel closure head is transported to the in-containment refueling water storage tank (IRWST) through the RCGVS sparger for the safety vent function. The IRWST provides a water reservoir to condense the steam effluent and collect the RCS discharge. The RCGVS effluent from the pressurizer or the reactor vessel closure head is transported to the reactor drain tank (RDT) or the IRWST for the non-safety gas vent operation during plant startup and shutdown.

The RCGVS consists of piping, valves and instrumentation to vent non-condensible gases and/or steam from the RCS to either the RDT or the IRWST.

1. The functional arrangement of the RCGVS is as described in the Design Description of Subsection 2.4.6.1 and in Table 2.4.6-1 and as shown in Figure 2.4.6-1.

2.a The ASME Code components identified in Table 2.4.6-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.4.6-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.6-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.6-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.6-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.4.6-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.6-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a SOVs identified in Table 2.4.6-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, SOVs indicated in Table 2.4.6-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close SOVs identified in Table 2.4.6-2.

8.b All controls required by the design exist in the RSR to open and close SOVs identified in Table 2.4.6-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.6-2 and 2.4.6-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.6-2 and 2.4.6-3.

2.4.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria of the RCGVS are specified in Table 2.4.6-4.

Table 2.4.6-1

Reactor Coolant System High Point Vents Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Pressurizer gas vent piping upstream of and including the vent isolation valves RG-V412 and 413	Containment	1	I
Reactor vessel upper head gas vent piping upstream of and including the vent isolation valves RG-V416 and 417	Containment	1	I
RCGVS gas vent piping from downstream of the vent isolation valves RG-V412, 413, 416, 417 (excluding) to the vent isolation valves RG-V418, 419, 420 (including)	Containment	2	I
RCGVS gas vent piping from downstream of the vent isolation valves RG-V418 to RDT	Containment	-	II
RCGVS gas vent piping from downstream of the vent isolation valves RG-V419, 420 to the IRWST anchor wall	Containment	-	II
RCGVS gas vent piping from downstream of the IRWST anchor wall to the end point of RCGVS sparger	Containment	3	I

Table 2.4.6-2

Reactor Coolant System High Point Vents Component List

Component Name	Item No. (1)	ASME Section III Class	seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Pressurizer Gas Vent Isolation Valves (SOV)	RG-V410, 411, 412, 413	1	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open/ Closed	Closed
Reactor Vessel Upper Head Gas Vent Isolation Valves (SOV)	RG-V414, 415 416, 417	1	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open/ Closed	Closed
Gas Vent to RDT Valves (SOV)	RG-V418	2	I	No/No	Yes/Yes	Yes/Yes	-	-	Closed
Gas Vent to IRWST Valves (SOV)	RG-V419, 420	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Closed
RCGVS Vacuum Breaker Valve	RG-V1421	3	I	No/No	-	-	-	-	-

(1) The column “Item No.” is information only (not part of certified design).

Table 2.4.6-3

Reactor Coolant System High Point Vents Instrument List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Reactor Coolant Gas Vent Pressure	P-106	Containment	-	II	No/No	Yes/Yes	Yes/Yes
Discharge to the RDT Line Temperature	T-106	Containment	-	II	No/No	Yes/Yes	Yes/Yes
Discharge to the IRWST Line Temperature	T-107, 108	Containment	-	II	No/No	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.6-4 (1 of 5)

Reactor Coolant System High Point Vents ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the RCGVS is as described in the Design Description of Subsection 2.4.6.1 and in Table 2.4.6-1 and as shown in Figure 2.4.6-1.	1. Inspection of the as-built RCGVS will be performed.	1. The as-built RCGVS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.6.1 and in Table 2.4.6-1 and as shown in Figure 2.4.6-1.
2.a The ASME Code components identified in Table 2.4.6-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.4.6-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.4.6-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.4.6-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.6-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.6-2.

Table 2.4.6-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.6-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.6-1.
4.a The ASME Code components identified in Table 2.4.6-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as built components identified in Table 2.4.6-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.6-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.4.6-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 can withstand seismic design basis loads without loss of safety function.

Table 2.4.6-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.4.6-2 and 2.4.6-3, including anchorages are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.4.6-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as built seismic Category I piping including supports identified in Table 2.4.6-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.4.6-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.6 2 and 2.4.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.4.6-2 and 2.4.6-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.4.6-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.4.6-2 and 2.4.6-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a SOVs identified in Table 2.4.6-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of SOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each SOV changes position as indicated in Table 2.4.6-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built SOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each as-built SOV changes position as indicated in Table 2.4.6-2 under pre-operational test conditions.
7.b After loss of motive power, SOVs identified in Table 2.4.6-2 assume the indicated loss of motive power position.	7.b Test of the as-built SOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built SOV identified in Table 2.4.6-2 assumes the indicated loss of motive power position.

Table 2.4.6-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to open and close SOVs identified in Table 2.4.6-2	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR open and close SOVs identified in Table 2.4.6-2.
8.b All controls required by the design exist in the RSR to open and close SOVs identified in Table 2.4.6-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR open and close SOVs identified in Table 2.4.6-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.6-2 and 2.4.6-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.6-2 and 2.4.6-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.6-2 and 2.4.6-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.6-2 and 2.4.6-3.

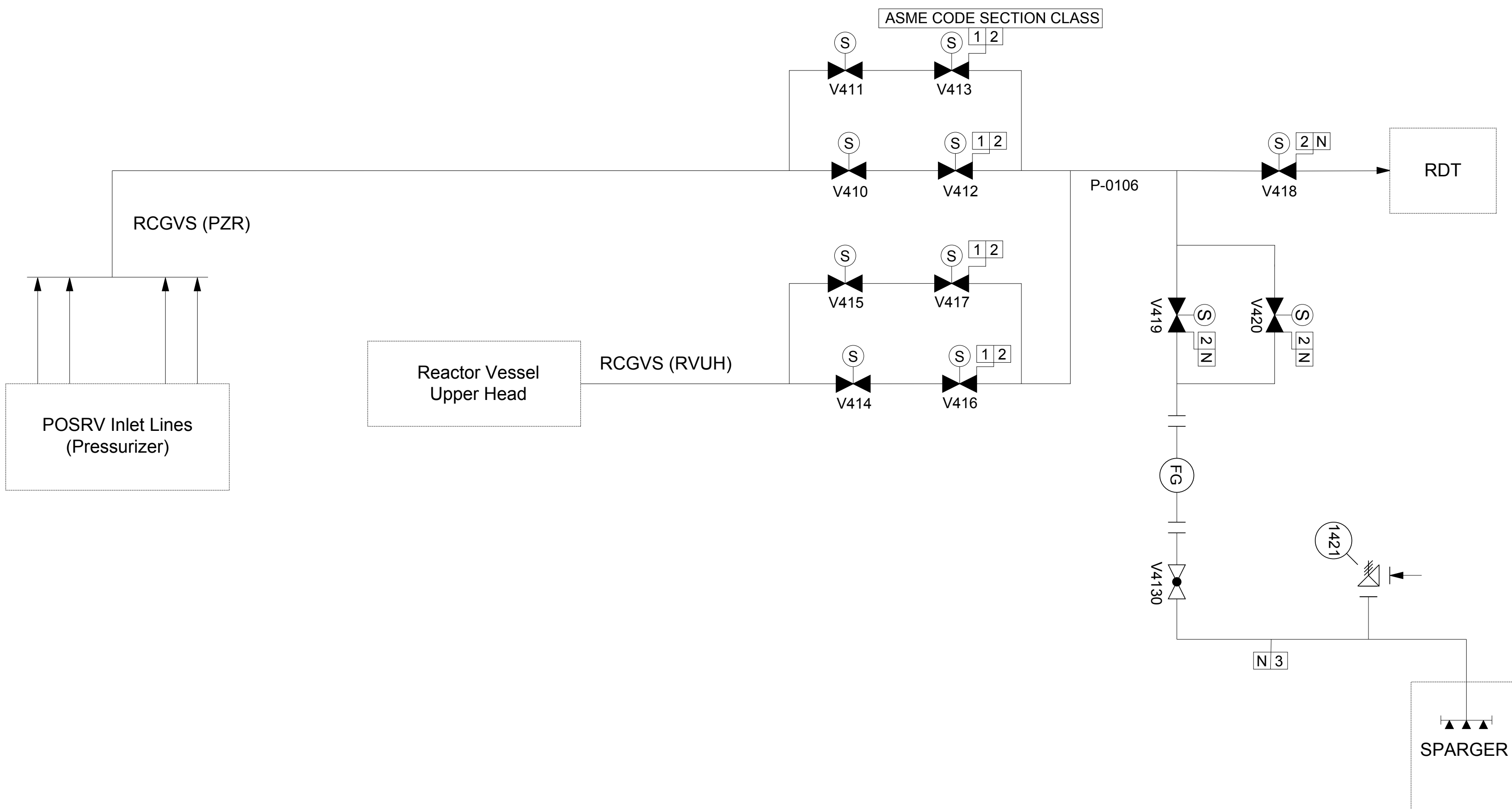


Figure 2.4.6-1 Reactor Coolant System High Point Vents

2.4.7 Chemical and Volume Control System

2.4.7.1 Design Description

The chemical and volume control system (CVCS) controls the purity, volume, and chemistry of the reactor coolant. The portions of the CVCS which accomplish reactor normal makeup and normal reactivity control are classified at least safety Class 3.

The CVCS maintains the required volume of water in reactor coolant system (RCS) in conjunction with the pressurizer level control system. The CVCS also provides backup spray water to the pressurizer and cooling water to the RCP seals.

Major portion of CVCS is located in the auxiliary building and reactor containment building, except the holdup tank (HT), reactor makeup water tank (RMWT), and boric acid storage tank (BAST) are located in the yard and surrounded by a dike.

1. The functional arrangement of the CVCS is as described in the Design Description of Subsection 2.4.7.1 and in Table 2.4.7-1 and as shown in Figure 2.4.7-1.

2.a The ASME Code components identified in Table 2.4.7-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.4.7-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.4.7-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.7-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.4.7-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.4.7-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.4.7-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, AOVs, and check valves identified in Table 2.4.7-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs, AOVs, and SOV identified in Table 2.4.7-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the charging pumps and auxiliary charging pump, and to open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.

8.b All controls required by the design exist in the RSR to start and stop the charging pumps and auxiliary charging pump, and to open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.7-2 and 2.4.7-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.7-2 and 2.4.7-3.

9.a The CVCS provides makeup capability to maintain the RCS volume.

9.b The CVCS supplies seal water to the RCP seals.

9.c The CVCS provides pressurizer auxiliary spray water for depressurization.

2.4.7.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.7-4 specifies the ITAAC for the CVCS.

The ITAAC associated with the CVCS equipment, components, and piping that comprise a portion of the containment isolation system are described in Table 2.11.3-2.

Table 2.4.7-1 (1 of 2)

Chemical and Volume Control System Equipment and Piping Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Regenerative heat exchanger	Containment	2	I
Letdown heat exchanger	Containment	2	I
Volume control tank	Auxiliary building	3	I
Charging pumps and auxiliary charging pump	Auxiliary building	3	I
Charging pump mini-flow heat exchanger	Auxiliary building	3	I
Letdown piping and valves from RCS to and including valve CV-516 prior to regenerative heat exchanger	Containment	1	I
Letdown piping and valves from and excluding valve CV-516 to and excluding valves CV-522 downstream to letdown heat exchanger	Containment	2	I
All CVCS containment isolation valves and piping between the valves	Containment and Auxiliary building	2	I
Letdown piping and valves from and excluding valve CV-523 to and including valves CV-520, CV-521, CV-413, CV-421, and CV-422 prior to purification ion exchanger			
Letdown piping and valves from and including valve CV-415 downstream to letdown strainer to and including volume control tank	Auxiliary building	3	I
RCP seal CBO piping and valves from 4 RCP's to and excluding valve CV-506	Containment	2	I
RCP seal CBO piping and valves from and excluding valve CV-505 to and excluding volume control tank	Auxiliary building	3	I
RCP seal injection piping and valves from seal injection tee to and excluding valve CV-255 downstream to seal injection filter	Auxiliary building	3	I
RCP seal injection piping and valves from and excluding valve CV-835 to and excluding valves CV-787/802/807/812	Containment	2	I
RCP seal injection piping and valves from and including valves CV-787/802/807/812 to 4 RCP's	Containment	1	I
Charging piping and valves from and excluding volume control tank to and excluding valve CV-524	Auxiliary building	2/3	I

Table 2.4.7-1 (2 of 2)

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Charging piping and valves from and excluding valve CV-747 prior to regenerative heat exchanger to and excluding valve CV-240	Containment	2	I
Charging piping and valves from and including valve CV-240 to RCS	Containment	1	I
Auxiliary spray piping and valves from and including valve CV-203 to the penetration into the RCS	Containment	1	I
Boric acid makeup piping and valves from and including boric acid storage tank to and excluding charging pumps/volume control tank	Auxiliary building	3	I

Table 2.4.7-2 (1 of 2)

Chemical and Volume Control System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Environ. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Charging Pumps	CP	3	I	Yes/- [2]	Yes/Yes	Yes/Yes	-	-	-
Auxiliary Charging Pump	ACP	3	I	Yes/-	Yes/Yes	Yes/Yes	-	-	-
IRWST Makeup Line Check Valve	CV-189	2	I	-/-	-/-	-/-	-	Closed	-
Pressurizer Auxiliary Spray Valve (SOV)	CV-203	1	I	Yes/-	Yes/Yes	Yes/Yes	-	-	Closed
Seal Injection Containment Isolation Valve (MOV)	CV-255	2	I	Yes/Yes	Yes/Yes	-/-	-	Closed	As Is
SCS Purification Line Isolation Valve	CV-362	2	I	-/-	Yes/-	-/-	-	Closed	-
SCS Purification Line Check Valve	CV-363	2	I	-/-	-/-	-/-	-	Closed	-
RSSH [3] to Reactor Drain Header Check Valve	CV-494	2	I	-/-	-/-	-/-	-	Closed	-
VCT Discharge Isolation Valves (MOV)	CV-501 CV-504	3 3	I I	Yes/- Yes/-	Yes/Yes Yes/Yes	-/- -/-	- -	- -	As Is As Is
RCP CBO Line Containment Isolation Valves (AOV)	CV-505 CV-506	2 2	I I	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	CSAS CSAS	Closed Closed	Closed Closed
RCP CBO Relief Isolation Valve (MOV)	CV-507	2	I	Yes/-	Yes/Yes	Yes/Yes	-	-	As Is

Table 2.4.7-2 (2 of 2)

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Environ. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
IRWST Makeup Line Containment Isolation Valve (MOV)	CV-509	2	I	Yes/Yes	Yes/Yes	-/-	CIAS	Closed	As Is
Letdown Isolation Valves (AOV)	CV-515 CV-516	1 1	I I	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	SIAS SIAS	Closed Closed	Closed Closed
Letdown Containment Isolation Valves (AOV)	CV-522 CV-523	2 2	I I	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	CIAS CIAS	Closed Closed	Closed Closed
Charging Containment Isolation Valve (MOV)	CV-524	2	I	Yes/Yes	Yes/Yes	-/-	-	Closed	As Is
BAST Gravity Valves (MOV)	CV-534 CV-536	3 3	I I	Yes/- Yes/-	Yes/Yes Yes/Yes	-/- -/-	- -	- -	As Is As Is
Charging Flow Restricting Valves (MOV)	CV-576 CV-577	2 2	I I	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	- -	Closed Closed	As Is As Is
RDT Effluent Containment Isolation Valves (AOV)	CV-560 CV-561	2 2	I I	Yes/Yes Yes/Yes	Yes/Yes Yes/Yes	-/- -/-	CIAS CIAS	Closed Closed	Closed Closed
RSSH to Reactor Drain Header Isolation Valve (AOV)	CV-580	2	I	Yes/Yes	Yes/Yes	-/-	CIAS	Closed	Closed
Charging Line Check Valve	CV-747	2	I	-/-	-/-	-/-	-	Closed	-
Seal Injection Containment Isolation Check Valve	CV-835	2	I	-/-	-/-	-/-	-	Closed	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash (-) indicates not applicable.

(3) RSSH : Resin Sluice Supply Header (from RMWT).

Table 2.4.7-3

Chemical and Volume Control System Instruments List

Instrument Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Environ. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
Reactor Drain Tank Pressure	P-268	- [(2)]	II	-/-	Yes/Yes	-/-
Reactor Drain Tank Temperature	T-268	-	II	-/-	Yes/Yes	-/-
Reactor Drain Tank Level	L-268	-	II	-/-	Yes/Yes	-/-
Letdown Line Flow	F-202	3	I	-/-	Yes/Yes	Yes/-
Charging Line Flow	F-212B	3	I	Yes/-	Yes/Yes	Yes/-
Volume Control Tank Level	L-226 L-227	-	I I	-/- -/-	Yes/Yes Yes/Yes	-/- Yes/-
Boronometer	A-203	-	II	-/-	Yes/Yes	-/-
Process Radiation Monitor	R-204	-	II	-/-	Yes/Yes	-/-
Letdown Line Pressure	P-220	-	II	-/-	Yes/Yes	-/-
Charging Pump Suction Header Pressure	P-211	-	II	-/-	Yes/Yes	-/-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.4.7-4 (1 of 5)

Chemical and Volume Control System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CVCS is as described in the Design Description of Subsection 2.4.7.1 and in Table 2.4.7-1 and as shown in Figure 2.4.7-1.	1. Inspection of the as-built CVCS will be conducted.	1. The as-built CVCS conforms with the functional arrangement as described in the Design Description of Subsection 2.4.7.1 and in Table 2.4.7-1 and as shown in Figure 2.4.7-1.
2.a The ASME Code components identified in Table 2.4.7-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.4.7-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.4.7-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.4.7-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.4.7-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.4.7-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.4.7-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.4.7-1.

Table 2.4.7-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.4.7-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.4.7-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.4.7-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.4.7-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.4.7-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.4.7-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.4.7-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.4.7-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.4.7-2 and 2.4.7-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.4.7-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.4.7-2 and 2.4.7-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, AOVs, and check valves identified in Table 2.4.7-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs and AOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV or AOV changes position as indicated in Table 2.4.7-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV or AOV changes position as indicated in Table 2.4.7-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each as-built check valve changes position as indicated in Table 2.4.7-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs, AOVs, and SOV identified in Table 2.4.7-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs, AOVs, and SOV will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOVs, AOVs, or SOV identified in Table 2.4.7-2 assumes the indicated loss of motive power position.

Table 2.4.7-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to start and stop the charging pumps and auxiliary charging pump, and to open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the charging pumps and auxiliary charging pump, and open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.
8.b All controls required by the design exist in the RSR to start and stop the charging pumps and auxiliary charging pump, and to open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the charging pumps and ACP, and open and close MOVs, AOVs, and SOV identified in Table 2.4.7-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.7-2 and 2.4.7-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.4.7-2 and 2.4.7-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.7-2 and 2.4.7-3.	8.d Inspection will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.4.7-2 and 2.4.7-3.
9.a The CVCS provides makeup capability to maintain the RCS volume.	9.a A test of as-built CVCS will be performed to measure the makeup flow rate.	9.a Each as-built CVCS charging pump delivers a flow rate to the RCS of greater than or equal to 586.7 L/min (155 gpm) at normal operating pressure of RCS.
9.b The CVCS supplies seal water to the RCP seals.	9.b A test of as-built CVCS will be performed by aligning a flow path to each RCP.	9.b Each as-built CVCS charging pump provides a flow rate of greater than or equal to 25.0 L/min (6.6 gpm) to each RCP.
9.c The CVCS provides pressurizer auxiliary spray water for depressurization.	9.c A test of the as-built CVCS will be performed by aligning a flow path to the pressurizer auxiliary spray.	9.c The as-built CVCS charging pump provides spray flow to the pressurizer.

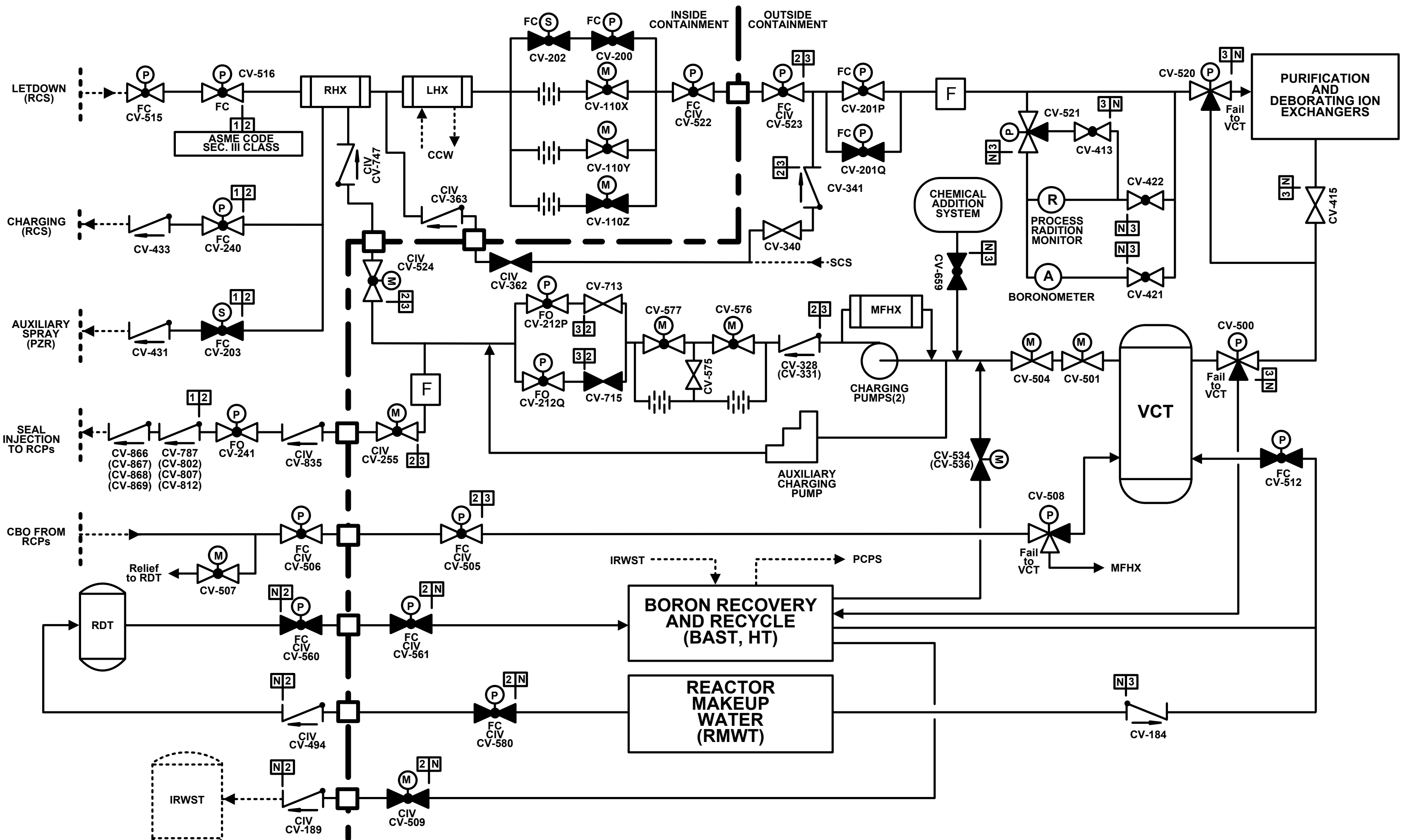


Figure 2.4.7-1 Chemical and Volume Control System

2.5 Instrumentation and Control

2.5.1 Reactor Trip System and Engineered Safety Features Initiation

2.5.1.1 Design Description

The reactor trip system (RTS) consists of four channels of sensors, auxiliary process cabinet-safety (APC-S) cabinets, ex-core neutron flux monitoring system (ENFMS) cabinets, core protection calculator system (CPCS) cabinets, the reactor protection system (RPS) portion of plant protection system (PPS) cabinets, and reactor trip switchgear system (RTSS) cabinets.

The engineered safety features (ESF) system consists of four channels of sensors, APC-S cabinets, the engineered safety features actuation system (ESFAS) portion of the PPS cabinets and engineered safety feature-component control system (ESF-CCS) cabinets. The ESF initiation is performed in sensors, APC-S cabinets and the ESFAS portion of the PPS cabinets.

The Subsection 2.5.1 describes the RTS and ESF initiation. The ESF-CCS is described in Subsection 2.5.4.

The RTS and ESF initiation equipment is located in the auxiliary building and reactor containment building.

The operator module (OM), the maintenance and test panel (MTP), and the interface and test processor (ITP) which are part of the safety I&C system, provide monitoring and testing for the safety-related plant components and instrumentation.

The RTS and ESF initiation is designed as follows:

1. The seismic Category I equipment, identified in Table 2.5.1-1 can withstand seismic design basis loads without loss of safety function.

2. The Class 1E equipment identified in Table 2.5.1-1 can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. .

3.a Class 1E equipment identified in Table 2.5.1-1 is powered from its respective Class 1E train.

3.b Redundant Class 1E channels listed in Table 2.5.1-1 and associated field equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.

4.a The PPS provides an automatic reactor trip (RT) and ESF initiation signals, as indicated in Tables 2.5.1-2 and 2.5.1-3, if plant process signals reach predetermined setpoints.

4.b Once reactor trip is initiated (automatically or manually), the reactor trip breakers remain open until completion of the protective action, and shall not automatically return to normal when the initiation signals of the safety-related functions reset.

4.c Manual reactor trip switches are provided in the MCR and the RSR for reactor trip.

5. The OM in the MCR displays the status information for variables listed in Tables 2.5.1-2 and 2.5.1-3.

6. Each local coincidence logic (LCL) receives trip signals from four channels of bistable processors (BPs) and utilizes 2-out-of-4 coincidence logic to perform RPS and ESF initiation functions identified in Tables 2.5.1-2 and 2.5.1-3.

7.a The PPS provides manual trip bypasses on the MTP switch panel, for RT and ESF initiation identified in Tables 2.5.1-2 and 2.5.1-3, respectively.

7.b The PPS automatically removes the operating bypasses listed in Table 2.5.1-4 when permissive conditions are not met.

7.c The PPS provides indications of the bypassed or inoperable status indication (BISI) on the OM in the MCR for the variables identified in Tables 2.5.1-2 and 2.5.1-3 for RT and ESF initiation.

8. Each PPS channel is controlled from either the MCR or the RSR as selected from master transfer switches.

9. The PPS utilizes a 2-out-of-4 coincidence logic when no channels are in trip channel bypass. The PPS converts to a 2-out-of-3 coincidence logic whenever a trip channel bypass is present.

10. Accuracy, response time testing, surveillance testing, and maintenance are considered to determine setpoints for variables of RT and ESF initiation.

11. RTS and ESF initiation software is implemented according to the software life cycle process.

12. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics.

13. The cabinets listed in Table 2.5.1-1 have key locks and door open alarms, and are located in a vital area of the facility.

14. The RT logic of the PPS is designed to fail to a safe state such that loss of electrical power to a channel of PPS results in a trip condition for that channel but the ESFAS logic of the PPS is designed to fail to a safe state such that loss of electrical power to a channel of PPS does not result in ESF initiation for that channel.

15. Redundant safety equipment listed in Table 2.5.1-1 is provided with means of identification.

16. The input signals of PPS through APC-S or ENFMS are derived from RT and ESF measurement instrumentation that measures monitored variables identified in Tables 2.5.1-2 and 2.5.1-3.

17. The PPS provides RT and ESF initiation signals to meet the required response time for trip and initiation conditions identified in Tables 2.5.1-2 and 2.5.1-3.

18. The Class 1E equipment listed in Table 2.5.1-1 is protected from accident related hazards such as missiles, pipe breaks, and flooding.

19. The RTS and ESF initiation instrumentation (referenced in Tables 2.5.1-2 and 2.5.1-3) is provided with required range to monitor the normal operating, anticipated operational occurrence (AOO), and postulated accident (PA) events.

20. The Class 1E instrument identified in Table 2.5.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

21 The PPS providing RTS and ESF initiation signals has the testing functions.

22 A single channel of RTS and ESF initiation is bypassed to allow testing, maintenance or repair and this capability does not prevent the RTS and ESF initiation from performing its safety function.

23. Input sensors from each channel of the RTS and ESF initiation as identified in Tables 2.5.1-2 and 2.5.1-3 are compared continuously in the information processing system (IPS) to allow detection of out-of-tolerance sensors.

24. Two sets of RTSS which consists of four RTSGs are diverse each other.

2.5.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.5.1-5 specifies the inspections, tests, analyses, and associated acceptance criteria for the RTS and ESF initiation.

Table 2.5.1-1

Reactor Trip System and Engineered Safety Features Initiation Equipment Location and Classification

Equipment Name	Location	Seismic Category	Class 1E/ Harsh Envir. Qual.
PPS Cabinets, Channel A/B/C/D	Auxiliary Building	I	Yes/No
OMs, Channel A/B/C/D	Auxiliary Building	I	Yes/No
RTSS Cabinets, Channel A/B/C/D	Auxiliary Building	I	Yes/No
CPCS Cabinets, Channel A/B/C/D	Auxiliary Building	I	Yes/No
ENFMS Cabinets, Channel A/B/C/D	Auxiliary Building	I	Yes/No
APC-S Cabinets, Channel A/B/C/D	Auxiliary Building	I	Yes/No
MCR Manual Reactor Trip Switch, Channel A/B/C/D	Auxiliary Building	I	Yes/No
RSR Manual Reactor Trip Switch, Channel A/B	Auxiliary Building	I	Yes/No
Ex-core Neutron Detectors, Channel A/B/C/D	Reactor Containment Building	I	Yes/Yes
MTP, Channel A/B/C/D	Auxiliary Building	I	Yes/No
ITP, Channel A/B/C/D	Auxiliary Building	I	Yes/No

Table 2.5.1-2

Reactor Trip System Variables

Trip Condition	Process Variable Input	Response Time Requirement
Variable Overpower	Ex-core Neutron Flux	Yes
High Logarithmic Power Level	Ex-core Neutron Flux	Yes
High Local Power Density (from CPCS)	Ex-core Neutron Detectors CEA subgroup position (2)	Yes Yes
Low Departure from Nucleate Boiling Ratio (from CPCS)	Ex-core Neutron Detectors Cold leg temperature (1) Hot leg temperature (1) Pressurizer Pressure (1) RCP speed (1) CEA subgroup position (2)	Yes Yes Yes Yes Yes Yes
High Pressurizer Pressure	PZR Pressure (NR) (1)	Yes
Low Pressurizer Pressure	PZR Pressure (WR) (1)	Yes
High Steam Generator 1 Level	SG Level (NR) (1)	Yes
High Steam Generator 2 Level	SG Level (NR) (1)	Yes
Low Steam Generator 1 Level	SG Level (WR) (1)	Yes
Low Steam Generator 2 Level	SG Level (WR) (1)	Yes
Low Steam Generator 1 Pressure	SG Pressure (1)	Yes
Low Steam Generator 2 Pressure	SG Pressure (1)	Yes
High Containment Pressure	Containment Pressure (NR) (3)	Yes
Low Reactor Coolant Flow 1	SG Differential Pressure (1)	Yes
Low Reactor Coolant Flow 2	SG Differential Pressure (1)	Yes

(1) Instruments as listed in Table 2.4.2-3

(2) Instruments (Reed Switch Position Transmitter) as listed in Table 2.4.2-2

(3) Instruments as listed in Table 2.11.2-3

Table 2.5.1-3

Engineered Safety Features Initiation Variables

Initiation Condition	Process Variable Input	Response Time Requirement
Safety Injection Actuation Signal		
Low Pressurizer Pressure High Containment Pressure	PZR Pressure (WR) (1) Containment Pressure (NR) (2)	Yes Yes
Containment Isolation Actuation Signal		
High Containment Pressure Low Pressurizer Pressure	Containment Pressure (NR) (2) PZR Pressure (WR) (1)	Yes Yes
Containment Spray Actuation Signal		
High-High Containment Pressure	Containment Pressure (WR) (2)	Yes
Main Steam Isolation Signal		
Low Steam Generator Pressure High Containment Pressure High Steam Generator Level	SG Pressure (1) Containment Pressure (NR) (2) SG Level (NR) (1)	Yes Yes Yes
Auxiliary Feedwater Actuation Signal-1		
Low Steam Generator 1 Level	SG 1 Level (WR) (1)	Yes
Auxiliary Feedwater Actuation Signal-2		
Low Steam Generator 2 Level	SG 2 Level (WR) (1)	Yes

(1) Instruments as listed in Table 2.4.2-3

(2) Instruments as listed in Table 2.11.2-3

Table 2.5.1-4

Reactor Trip System and Engineered Safety Features Initiation Bypasses

Bypass	Indication (MCR / RSR)
Low Pressurizer Pressure Trip Operating Bypass	Yes/Yes
High Logarithmic Power Trip Operating Bypass	Yes/Yes
DNBR Trip and LPD Trip Operating Bypass	Yes/Yes
Trip Channel Bypass	Yes/Yes

Table 2.5.1-5 (1 of 10)

Reactor Trip System and Engineered Safety Features Initiation ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category I equipment, identified in Table 2.5.1-1 can withstand seismic design basis loads without loss of safety function.	1.a Inspections will be performed to verify that the as-built seismic Category I equipment identified in Table 2.5.1-1 is located in a seismic Category I structure.	1.a The as-built seismic Category I equipment identified in Table 2.5.1-1 is located in a seismic Category I structure.
	1.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment identified in Table 2.5.1-1 will be performed.	1.b A report exists and concludes that the seismic Category I equipment identified in Table 2.5.1-1 can withstand seismic design basis loads without loss of safety function.
	1.c Inspections and analyses will be performed to verify the as-built seismic Category I equipment identified in Table 2.5.1-1, including anchorages, is seismically bounded by the tested or analyzed conditions.	1.c A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.5.1-1, including anchorages, is seismically bounded by the tested or analyzed conditions.
2. The Class 1E equipment identified in Table 2.5.1-1 can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	2.a Type tests, analyses, or a combination of type tests and analyses will be performed.	2.a A report exists and concludes that the Class 1E equipment identified in Table 2.5.1-1 can withstand the electrical surge, EMI, RFI, and ESD conditions that would exist before, during, and following a design basis accident without loss of its safety function, for the time required to perform the safety function.
	2.b Inspection and analysis will be performed on the as-built Class 1E equipment identified in Table 2.5.1-1.	2.b The as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.5.1-1 are bounded by type tests or a combination of type tests and analyses.

Table 2.5.1-5 (2 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a Class 1E equipment identified in Table 2.5.1-1 is powered from its respective Class 1E channel.	3.a Tests of the as-built Class 1E equipment will be performed using a simulated test signal.	3.a The Class 1E equipment identified in Table 2.5.1-1 is powered from its respective Class 1E channel.
3.b Redundant Class 1E channels listed in Table 2.5.1-1 and associated field equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.	3.b.i Inspection for separation of the as-built redundant Class 1E channels listed in Table 2.5.1-1 and associated field equipment will be performed.	3.b.i The physical separation of as-built redundant Class 1E channels identified in Table 2.5.1-1 and associated field equipment is provided by distance or barriers in accordance with NRC RG 1.75.
	3.b.ii Analyses, tests or a combination of analyses and tests of the as-built redundant Class 1E channels listed in Table 2.5.1-1and associated field equipment will be performed to verify its electrical independence.	3.b.ii A report exists and concludes that independence of as-built redundant Class 1E channels listed in Table 2.5.1-1 and associated field equipment is achieved by independent power sources and electrical circuits for each channel, and by fiber optic cable interfaces, conventional isolators, or other proven isolation methods or devices at interfaces between redundant channels, and at interfaces between safety and non-safety systems.
	3.b.iii Testing, analysis or combination of testing and analysis will be performed for the electrical isolation devices.	3.b.iii A report exists and concludes that the electrical isolation devices prevent credible faults from propagating into a safety system channel.

Table 2.5.1-5 (3 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The RTS provides an automatic reactor trip (RT) and ESF initiation signals, as indicated in Tables 2.5.1-2 and 2.5.1-3, if plant process signals reach predetermined setpoints.	4.a A test of the as-built PPS will be performed using simulated test signals.	4.a Each as-built RTSS opens upon receipt of the automatic reactor trip signal identified in Table 2.5.1-2 from respective channel of the as-built RTS, and as-built ESF initiation signals are sent to ESF-CCS upon receipt of the automatic ESF initiation signal identified in Table 2.5.1-3.
4.b Once reactor trip is initiated (automatically or manually), the reactor trip breakers remain open until completion of the protective action, and shall not automatically return to normal when the initiation signals of the safety-related functions reset.	4.b. A test of the as-built RT system will be performed by returning simulated signals to a level within the predetermined limits of plant process signals at the as-built PPS input for RT functions as identified in Tables 2.5.1-2 after the as-built reactor trip breakers are opened.	4.b. As-built reactor trip breakers remain open upon receipt of simulated signals returned to a level within the predetermined limits of plant process signals for RT functions as identified in Table 2.5.1-2 after the as-built reactor trip breakers are opened.
4.c Manual reactor trip switches are provided in the MCR and the RSR for reactor trip.	4.c A test will be performed to verify the actuation of the as-built RTSS using the as-built manual initiation switches in the MCR and RSR.	4.c Each as-built RTSS opens upon receipt of the corresponding as-built manual reactor trip signal in the MCR and RSR.

Table 2.5.1-5 (4 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The OM in the MCR displays the status information for the variables listed in Tables 2.5.1-2 and 2.5.1-3.	5. A test of the as-built OM in the MCR will be performed to demonstrate the display capability.	5. The as-built OM in the MCR have ability to display variables listed in Tables 2.5.1-2 and 2.5.1-3.
6. Each local coincidence logic (LCL) receives trip signals from four channels of bistable processors (BPs) and utilizes 2-out-of-4 coincidence logic to perform RPS and ESF initiation functions identified in Tables 2.5.1-2 and 2.5.1-3.	6. A test will be performed using simulated input signals for RPS and ESFAS process inputs to each channel of the BPs.	6. Each channel of LCL receives RPS and ESFAS trip signals from four channels of BP, performs 2-out-of-4 coincidence logic for each RPS and NSSS ESFAS initiation function identified in Tables 2.5.1-2 and 2.5.1-3 and sends the RPS initiation signals to the RTSS and ESFAS initiation signals to the ESF-CCS.
7.a The PPS provides manual trip bypasses on the MTP switch panel, for RT and ESF initiation identified in Tables 2.5.1-2 and 2.5.1-3 respectively.	7.a A test of the as-built PPS system will be performed on the MTP switch panel by initiating manual bypass for RT and the ESF initiation as identified in Tables 2.5.1-2 and 2.5.1-3.	7.a Trip signals are manually bypassed on the MTP switch panel as identified in Tables 2.5.1-2 and 2.5.1-3 for RT and ESF initiation.
7.b The PPS automatically removes the operating bypasses listed in Table 2.5.1-4 when permissive conditions are not met.	7.b A test of the as-built PPS operating bypasses listed in Table 2.5.1-4 will be performed.	7.b The as-built PPS operating bypasses listed in Table 2.5.1-4 are accepted only when the variables are within operating bypass permissive range. When a variable exceeds the permissive setpoint, the operating bypass is automatically removed.
7.c The PPS provides indications of the bypassed or inoperable status indication (BISI) on the OM in the MCR for the variables identified in Tables 2.5.1-2 and 2.5.1-3 for RT and ESF initiation.	7.c A test of the as-built PPS system will be performed on the as-built OM in the MCR by initiating manual bypass for variables identified in Tables 2.5.1-2 and 2.5.1-3 for RT and the ESF initiation.	7.c The as-built OM provides indications of the bypassed or inoperable status indication (BISI) for the variables identified in Tables 2.5.1-2 and 2.5.1-3 for RT and ESF initiation.

Table 2.5.1-5 (5 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. Each PPS channel is controlled from either the MCR or the RSR as selected from master transfer switches.	8. A test of the as-built PPS will be performed to demonstrate the transfer function between the MCR and the RSR.	8. The as-built master transfer switches transfer controls between the MCR and the RSR separately for each as-built PPS channel, as follows: - Controls at the RSR are disabled when controls are active in the MCR. - Controls at the MCR are disabled when controls are active in the RSR.
9. The PPS utilizes a 2-out-of-4 coincidence logic when no channels are in trip channel bypass. The PPS converts to a 2-out-of-3 coincidence logic whenever a trip channel bypass is present.	9. A test will be performed using simulated input signals for RPS and ESFAS process inputs to each channel of the BPs.	9. If a trip channel bypass is present, the PPS will perform a coincidence signal utilizing 2-out-of-3 logic.
10. Accuracy, response time testing, surveillance testing, and maintenance are considered to determine setpoints for variables of RT and ESF initiation.	10. Inspection will be performed for the setpoint calculations for RT and ESF initiation listed in Tables 2.5.1-2 and 2.5.1-3 respectively.	10. A report exists and concludes that the setpoints for RT and ESF actuations listed in Tables 2.5.1-2 and 2.5.1-3 respectively account for accuracy, response time testing, surveillance testing, and maintenance.

Table 2.5.1-5 (6 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. RTS and ESF initiation software is implemented according to the software lifecycle process.	11.a An inspection will be performed for the requirements phase result summary report.	11.a The requirements phase result summary report exists and concludes that the plant requirements phase activities o are performed.
	11.b An inspection will be performed for the design phase result summary report.	11.b The design requirements phase result summary report exists and concludes that the design phase activities are performed.
	11.c An inspection will be performed for the implementation phase result summary report.	11.c The implementation phase result summary report exists and concludes that the implementation phase activities are performed.
	11.d An inspection will be performed for the test phase result summary report.	11.d The test phase result summary report exists and concludes that the test phase activities are performed.
	11.e An inspection will be performed for the installation and checkout phase result summary report.	11.e The installation phase result summary report exists and concludes that the installation and checkout phase activities are performed.
12. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics.	12. Inspection, test and vendor assessment will be performed for the commercial grade items.	12. A report exists and concludes that the commercial grade items can perform the intended functions and meet the critical characteristics.

Table 2.5.1-5 (7 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
13. The cabinets listed in Table 2.5.1-1 have key locks and door open alarms, and are located in a vital area of the facility.	13.a A test of the as-built cabinets listed in Table 2.5.1-1 for key lock capability, and a test of door open alarms, will be performed.	13.a Each as-built cabinet listed in Table 2.5.1-1 has key locking capability, and alarms are received in the as-built MCR when cabinet doors are opened.
	13.b Inspection of the cabinets listed in Table 2.5.1-1 will be performed.	13.b The cabinets listed in Table 2.5.1-1 are located in a vital area of the facility.
14. The RT logic of the PPS is designed to fail to a safe state such that loss of electrical power to a channel of PPS results in a trip condition for that channel but the ESFAS logic of the PPS is designed to fail to a safe state such that loss of electrical power to a channel of PPS does not result in ESF initiation for that channel.	14. A test will be performed by disconnecting the electrical power to each channel of the as-built PPS.	14. Each channel of the as-built RT logic of the as-built PPS fails to a safe state upon loss of electrical power to the channel and does not result in ESF initiation.
15. Redundant safety equipment listed in Table 2.5.1-1 is provided with means of identification.	15. An inspection of the as-built equipment for conformance with the identification requirements will be performed.	15. The as-built equipment listed in Table 2.5.1-1 and related field equipment complies with the labeling and color coding requirements.
16. The input signals of PPS through APC-S or ENFMS are derived from RT and ESF measurement instrumentation that measures monitored variables identified in Tables 2.5.1-2 and 2.5.1-3.	16. Tests will be performed to verify the electrical continuity between the as-built PPS and the as-built RT and ESF measurement instrumentation that measures monitored variables identified in Tables 2.5.1-2 and 2.5.1-3.	16. The input signals of PPS through APC-S and ENFMS are derived from RT and ESF measurement instrumentation that measures monitored variables identified in Tables 2.5.1-2 and 2.5.1-3.

Table 2.5.1-5 (8 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
17. The PPS provides RT and ESF initiation signals to meet the required response time for trip and initiation conditions identified in Tables 2.5.1-2 and 2.5.1-3.	17.a Type tests and analyses will be performed on PPS to verify that the PPS initiates RT and the ESF initiation signals identified in Tables 2.5.1-2 and 2.5.1-3 within response time requirements described in the design basis.	17.a A report exists and concludes that the PPS initiates the RT and the ESF f initiation signals identified in Tables 2.5.1-2 and 2.5.1-3 within the response time requirements as described in the design basis.
	17.b Inspections will be performed on the as-built RTS and ESF initiation signals identified as monitored variables in Tables 2.5.1-2 and 2.5.1-3 with response time requirements.	17.b The as-built RTS and ESF initiation signals identified as monitored variables in Tables 2.5.1-2 and 2.5.1-3 with response time requirements are bounded by the tests.
18. The Class 1E equipment listed in Table 2.5.1-1 is protected from accident related hazards such as missiles, pipe breaks, and flooding.	18. Inspections and analyses will be performed on the locations of the as-built Class 1E equipment listed in Table 2.5.1-1.	18. A report exists and concludes that the as-built equipment listed in Table 2.5.1-1 is protected from accident related hazards such as missiles, pipe breaks and flooding.
19. The RTS and ESF initiation instrumentation (referenced in Tables 2.5.1-2 and 2.5.1-3) is provided with required range to monitor the normal operating, anticipated operational occurrence (AOO), and postulated accident (PA) events.	19. An inspection of the as-built RTS and ESF initiation instrumentation ranges will be performed.	19. The ranges of the as-built RTS and ESF initiation instrumentation (referenced in Tables 2.5.1-2 and 2.5.1-3) that is required to function during normal operation, AOO and PA conditions meet design requirements.

Table 2.5.1-5 (9 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
20. The Class 1E instruments identified in Table 2.5.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	20.a Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E instruments located in a harsh environment.	20.a A report exists and concludes that the Class 1E instrument identified in Table 2.5.1-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	20.b Inspections will be performed on the as-built Class 1E instruments identified in Table 2.5.1-1 and the associated wiring, cables, and terminations located in a harsh environment.	20.b A report exists and concludes that the as-built Class 1E instruments and the associated wiring, cables, and terminations identified in Table 2.5.1-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
21. The PPS providing RTS and ESF initiation signals has the testing functions.	21. Type tests and analyses of the PPS providing RTS and ESF initiation signals will be performed using simulated failure condition.	21. A report exists and concludes that the PPS providing RTS and ESF initiation signals has the testing functions to facilitate recognition, location, replacement, repair and adjustment of malfunctioning components or modules.

Table 2.5.1-5 (10 of 10)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
22. A single channel of RTS and ESF initiation is bypassed to allow testing, maintenance or repair and this capability does not prevent the RTS and ESF initiation from performing its safety function.	22. A test will be performed on the 2-out-of-4 voting logic in the as-built RTS and ESF initiation by providing simulated process signals, identified in Tables 2.5.1-2 and 2.5.1-3, to at least two of three non-bypassed channels of the as-built RTS and ESF initiation input under the manual single division bypass operation from the as-built the maintenance and test panel (MTP) in the MCR.	22. When the 2-out-of-4 voting logic in the non-bypassed divisions of each as-built RTS and ESF initiation receives at least two of three actuation signals, identified in Tables 2.5.1-2 and Table 2.5.1-3, from the respective non-bypassed channels, the 2-out-of-4 voting logic in the non-bypassed divisions of each as-built RTS and ESF initiation provides the actuation signal for the reactor trip and automatic ESF functions identified in the tables.
23. Input sensors from each channel of the RTS and ESF initiation as identified in Tables 2.5.1-2 and 2.5.1-3 are compared continuously in the information processing system (IPS) to allow detection of out-of-tolerance sensors.	23. A test of the as-built IPS will be performed by providing The simulated inputs for each monitored variable identified in Tables 2.5.1-2 and 2.5.1-3 which includes one out-of-tolerance , at the as-built RTS and ESF initiation input.	23. An alarm for the out-of-tolerance sensor detection is displayed on the as-built IPS in the MCR when the IPS receives simulated input signals for each monitored variable identified in Tables 2.5.1-2 and 2.5.1-3 which includes one out-of-tolerance signal.
24. Two sets of RTSS which consists of four RTSGs are diverse each other.	24. Inspection of the as-built RTSS equipment will be performed.	24. Two sets of the as-built RTSS which consists of four RTSGs are diverse each other.: One set of RTSGs is supplied from a different manufacturer than the other set of RTSGs.

2.5.2 Diverse Actuation System

2.5.2.1 Design Description

The diverse actuation system (DAS) is a non-safety system which provides a diverse mechanism to decrease risk from the anticipated transients without scram (ATWS) events. The DAS also assists the mitigation of the effects of a postulated software common cause failure (CCF) within the plant protection system (PPS) and the engineered safety features-component control system (ESF-CCS).

The DAS consists of the diverse protection system (DPS), the diverse manual ESF actuation (DMA) switches, and the diverse indication system (DIS).

The DAS equipment are located in the auxiliary building as described in Table 2.5.2-1.

The DPS initiates reactor trip, turbine trip, auxiliary feedwater actuation, and safety injection actuation. The DPS consists of four channels of non-safety equipment.

The DMA switches are provided to permit the operator to actuate ESF systems from the MCR after a postulated software CCF of the PPS and ESF-CCS.

The DIS provides functions to monitor critical variables and to control heated junction thermocouple (HJTC) heater power when the CCF of digitalized safety I&C systems occurs.

1. The seismic Category I equipment identified in Table 2.5.2-1 can withstand seismic design basis loads without loss of protective function.

2. The DPS is physically separate, electrically independent, and diverse from the PPS and ESF-CCS including a diverse method for the reactor trip, the turbine trip, the auxiliary feedwater actuation and safety injection actuation.

3. The DPS provides the automatic functions as shown in Table 2.5.2-2, if plant process signals exceed predetermined setpoints.

4. The DPS utilizes a 2-out-of-4 coincidence logic for the initiation of automatic functions shown in Table 2.5.2-2.

5. The DPS cabinets listed in Table 2.5.2-1 are located in separate rooms.

6. The DPS software is implemented according to the software lifecycle process.

7. The DMA Switches in the MCR are used to provide the functions identified in Table 2.5.2-3.

8. The DIS provides functions to monitor critical variables and to control HJTC heater power identified in Table 2.5.2-4.

2.5.2.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.5.2-5 specifies the inspections, tests, analyses, and associated acceptance criteria for the DAS.

Table 2.5.2-1

Diverse Actuation System Equipment Location and Classification

Equipment Name	Location	Seismic Category	Class 1E Hardware/ Harsh Environmental Qualification
DPS Cabinets (CH. N1~N4)	Auxiliary Building	II	No / No
DPS-OM	Auxiliary Building	II	No / No
DIS HSI Equipment	Auxiliary Building	II	No / No
DIS Cabinet	Auxiliary Building	Non-Seismic	No / No
DMA Switches [1]	Auxiliary Building	I	Yes / No

(1) The DMA switches are listed in Table 2.5.2-3.

Table 2.5.2-2

DPS Automatic Functions and Actuation Signals

Function	Trip/Initiation Condition	Process Variable Input
Reactor Trip Initiation	High Pressurizer Pressure	PZR Pressure (NR) (1)
	High Containment Pressure	Containment Pressure (2)
Auxiliary Feedwater Actuation Signal (AFAS) Initiation	Low Steam Generator Level	SG Level (WR) (1)
Safety Injection Actuation Signal (SIAS) Initiation	Low Pressurizer Pressure	PZR Pressure (WR) (1)
Turbine Trip Initiation	DPS Reactor Trip	N/A

(1) Instruments as listed in Table 2.4.2-3.

(2) Instruments as listed in Table 2.11.2-3.

Table 2.5.2-3

Functions Manually Actuated by the DMA Switches

Function	Actuation Type
Auxiliary Feedwater Actuation Signal (AFAS) Initiation	Manual (MCR)
Safety Injection Actuation Signal (SIAS) Initiation	Manual (MCR)
Main Steam Isolation Signal (MSIS) Initiation	Manual (MCR)
Containment Spray Actuation Signal (CSAS) Initiation	Manual (MCR)
Containment Isolation Actuation Signal (CIAS) Initiation	Manual (MCR)

Table 2.5.2-4 (1 of 2)

Variables Monitored and Controlled by the DIS

No	Parameter Description	Display/ Control at MCR
1	Representative Core Exit Temperature	Yes/No
2	Reactor Vessel Water Level-Head	Yes/No
3	Reactor Vessel Water Level-Plenum	Yes/No
4	Upper Head Temperature	Yes/No
5	Upper Head Temperature Saturation Margin	Yes/No
6	Upper Head Pressure Saturation Margin	Yes/No
7	RCS Temperature Saturation Margin	Yes/No
8	RCS Pressure Saturation Margin	Yes/No
9	CET Temperature Saturation Margin	Yes/No
10	CET Pressure Saturation Margin	Yes/No
11	Containment Pressure (Accident Monitoring Instrumentation)	Yes/No
12	Containment Temperature	Yes/No
13	Containment Water Level	Yes/No
14	Containment Hydrogen Concentration	Yes/No
15	IRWST Temperature	Yes/No
16	IRWST Level	Yes/No
17	IRWST Hydrogen Concentration	Yes/No
18	PZR Level	Yes/No
19	PZR Pressure	Yes/No
20	RCS Temperature (Th)	Yes/No
21	RCS Temperature (Tc)	Yes/No
22	Reactor Power	Yes/No
23	Steam Generator 1 Level Protective (WR)	Yes/No
24	Steam Generator 2 Level Protective (WR)	Yes/No
25	Steam Generator 1 Pressure Protective (WR)	Yes/No
26	Steam Generator 2 Pressure Protective (WR)	Yes/No
27	SI Flow to DVI 1A	Yes/No
28	SI Flow to DVI 2B	Yes/No
29	CS Pump 1 Flow	Yes/No
30	Charging Line Flow	Yes/No

Table 2.5.2-4 (2 of 2)

No	Parameter Description	Display/ Control at MCR
31	AFW Flowrate to Steam Generator 1	Yes/No
32	AFW Flowrate to Steam Generator 2	Yes/No
33	AFWST A Level	Yes/No
34	AFWST B Level	Yes/No
35	Aux. Building Sump Level	Yes/No
36	SIT 1 Pressure (WR)	Yes/No
37	Containment Air Radiation (Iodine)	Yes/No
38	HJTC Heater Power Control	Yes/Yes

ABBREVIATIONS:

AFW : Auxiliary Feedwater
AFWST : Auxiliary Feedwater Storage Tank
Aux. : Auxiliary
CET : Core Exit Thermocouple
CS : Containment Spray
DIS : Diverse Indication System
DVI : Direct Vessel Injection
HJTC : Heated Junction Thermocouple
IRWST : In-containment RefuelingWater Storage Tank
PZR : Pressurizer
RCS : Reactor Coolant System
SG : Steam Generator
SI : Safety Injection
SIT : Safety Injection Tank
Tc : Cold Leg Temperature
Th : Hot Leg Temperature
WR : Wide Range

Table 2.5.2-5 (1 of 3)

Diverse Actuation System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category I equipment identified in Table 2.5.2-1 can withstand seismic design basis loads without loss of protective function.	1.i Inspections will be performed to verify that the as-built seismic Category I equipment identified in Table 2.5.2-1 is located in a seismic Category I structure.	1.i The as-built seismic Category I equipment identified in Table 2.5.2-1 is located in a seismic Category I structure.
	1.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment in Table 2.5.2-1 will be performed.	1.ii A report exists and concludes that the seismic Category I equipment identified in Table 2.5.2-1 can withstand seismic design basis loads without loss of protective function.
	1.iii Inspections and analyses will be performed to verify the as-built seismic Category I equipment identified in Table 2.5.2-1, including anchorages, is seismically bounded by the tested or analyzed conditions.	1.iii A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.5.2-1, including anchorages, is seismically bounded by the tested or analyzed conditions.

Table 2.5.2-5 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. The DPS is physically separate, electrically independent, and diverse from the PPS and ESF-CCS including a diverse method for the reactor trip, the turbine trip, the auxiliary feedwater actuation and safety injection actuation.	2. Inspection of the as-built DPS, PPS and ESF-CCS equipment and design documentation will be performed.	2. The as-built DPS: - is physically separated from the the as-built PPS and ESF-CCS, - utilizes diverse software and hardware from the the as-built PPS and ESF-CCS, - is powered from diverse power buses from the the as-built PPS and ESF-CCS, and - initiates reactor trip, turbine trip, auxiliary feedwater actuation, and safety injection actuation by diverse methods from the the as-built PPS and ESF-CCS. - is developed by diverse design group from the design group (s) which developed the PPS and ESF-CCS software.
3. The DPS provides the automatic functions as shown in Table 2.5.2-2, if plant process signals exceed predetermined setpoints.	3. A test of the as-built DPS will be performed using simulated test signals.	3. The as-built DPS initiates the functions identified in Table 2.5.2-2 when the plant process signals reach predetermined setpoint.
4. The DPS utilizes a 2-out-of-4 coincidence logic for automatic initiation of protective functions shown in Table 2.5.2-2.	4. A test of the as-built DPS will be performed using simulated test signals.	4. The DPS coincidence logic produces an initiation when any two channels are in a trip state for a protective function.
5. The DPS cabinets listed in Table 2.5.2-1 are located in separate rooms.	5. Inspection of the as-built DPS equipment will be performed.	5. The DPS cabinets are located in separate rooms.

Table 2.5.2-5 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The DPS software is implemented according to the software lifecycle process.	6.i. An inspection will be performed for the requirements phase result summary report of DPS software.	6.i. The requirements phase result summary report exists and concludes that the plant requirements phase activities of DPS software are performed.
	6.ii An inspection will be performed for the design phase result summary report of DPS software.	6.ii The design requirements phase result summary report exists and concludes that the design phase activities of DPS software are performed.
	6.iii An inspection will be performed for the implementation phase result summary report of DPS software.	6.iii The implementation phase result summary report exists and concludes that the implementation phase activities of DPS software are performed.
	6.iv An inspection will be performed for the test phase result summary report of DPS software.	6.iv The test phase result summary report exists and concludes that the test phase activities of DPS software.
	6.v An inspection will be performed for the installation and checkout phase result summary report of DPS software.	6.v The installation phase result summary report exists and concludes that the installation and checkout phase activities of DPS software are performed.
7. The DMA switches in the MCR are used to provide the functions identified in Table 2.5.2-3.	7. An operational test of the as-built DMA switches in Table 2.5.2-3 will be performed.	7. The DMA switches in the MCR are used to provide the functions identified in Table 2.5.2-3.
8. The DIS provides functions to monitor critical variables and to control HJTC heater power identified in Table 2.5.2-4.	8. A test of the as-built DIS will be performed using simulated test signals.	8. The DIS monitors critical variables and control HJTC heater power identified in Table 2.5.2-4.

2.5.3 Qualified Indication and Alarm System

2.5.3.1 Design Description

The qualified indication and alarm system (QIAS) is a monitoring system that is used to display safety-related information and non-safety information.

The QIAS consists of the two subsystems as follows:

a. QIAS - P, Channels A and B

b. QIAS - N

In this section, QIAS-N which is non-safety system is not described.

The QIAS-P equipment is located in the auxiliary building. Additionally, QIAS-P provides signals for NRC RG 1.97 Type A variables to conventional indicators in the MCR.

1. The seismic Category I equipment, identified in Table 2.5.3-1, can withstand seismic design basis loads without loss of its safety function.

2. QIAS-P equipment, identified in Table 2.5.3-1, can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a postulated accidents without loss of its safety function for the time required to perform the safety function.

3.a Class 1E equipment identified in Table 2.5.3-1 is powered from its respective Class 1E channel.

3.b Class 1E equipment identified in Table 2.5.3-1, and associated equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.

4. The QIAS-P monitors and displays the NRC RG 1.97, Type A, B, C variables identified in Table 2.5.3-2.

5. NRC RG 1.97 Type A variables, identified in Table 2.5.3-2, are displayed using conventional indicators in the MCR.

6. The QIAS-P software is implemented according to the software lifecycle process.

7. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics.

2.5.3.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the QIAS-P are specified in Table 2.5.3-3.

Table 2.5.3-1

Qualified Indication and Alarm System-P Equipment Classification and Location

Equipment Name	Seismic Category	Class 1E	Qualified for Harsh Environment	Location
QIAS-P Processor, Channel A	I	Yes	No	Auxiliary Building
QIAS-P Processor, Channel B	I	Yes	No	Auxiliary Building
QIAS-P Flat Panel Display (FPD), Channel A	I	Yes	No	MCR
QIAS-P FPD, Channel B	I	Yes	No	MCR
Conventional Indicators, Channel A	I	Yes	No	MCR
Conventional Indicators, Channel B	I	Yes	No	MCR

Table 2.5.3-2

NRC RG 1.97 Type A, B, C Variables

Type	Variable
Type A	Reactor coolant cold leg temperature (wide range) Reactor coolant hot leg temperature (wide range) Pressurizer level Pressurizer pressure (wide range) Steam generator pressure Steam generator level (wide range)
Type B	Pressurizer pressure (wide range) Pressurizer level Reactor coolant cold leg temperature (wide range) Reactor coolant hot leg temperature (wide range) Steam generator pressure Steam generator level (wide range) Core exit temperature Degree of subcooling Reactor vessel coolant level Reactor coolant system pressure (wide range) IRWST level IRWST temperature Holdup volume tank level Containment level Containment pressure (wide range) Reactor cavity level Containment isolation valve position Logarithmic reactor power Control rod position
Type C	Core exit temperature Reactor coolant system pressure (wide range) Containment upper operating area radiation Containment pressure (extended wide range) Containment operating area radiation Spent fuel pool radiation Containment area radiation

Table 2.5.3-3 (1 of 3)

Qualified Indication and Alarm System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category I equipment, identified in Table 2.5.3-1, can withstand seismic design basis loads without loss of its safety function.	1.a Inspections will be performed to verify that the as-built seismic Category I equipment identified in Table 2.5.3-1 is located in a seismic Category I structure.	1.a The as-built seismic Category I equipment identified in Table 2.5.3-1 is located in a seismic Category I structure.
	1.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment identified in Table 2.5.3-1 will be performed.	1.b A report exists and concludes that the seismic Category I equipment identified in Table 2.5.3-1 can withstand seismic design basis loads without loss of its safety function.
	1.c Inspections and analyses will be performed to verify the as-built seismic Category I equipment identified in Table 2.5.3-1, including anchorages, is seismically bounded by the tested or analyzed conditions.	1.c A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.5.3-1, including anchorages, is seismically bounded by the tested or analyzed conditions.
2. The QIAS-P equipment, identified in Table 2.5.3-1, can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform the safety function.	2.a Type tests, analyses, or a combination of type tests and analyses will be performed on the as-built QIAS-P equipment.	2.a A report exists and concludes that the QIAS-P equipment, identified in Table 2.5.3-1, can withstand the electrical surge, EMI, RFI, and ESD conditions (as applicable) that would exist before, during, and following a design basis accident without loss of its safety function, for the time required to perform the safety function.
	2.b Inspection will be performed on the as-built QIAS-P.	2.b The as-built QIAS-P and the associated wiring, cables, and terminations identified in Table 2.5.3-1 are bounded by type tests or a combination of type tests and analyses.

Table 2.5.3-3 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a Class 1E equipment identified in Table 2.5.3-1 is powered from its respective Class 1E channel.	3.a Tests of the as-built Class 1E equipment will be performed using a simulated test signal.	3.a The Class 1E equipment identified in Table 2.5.3-1 is powered from its respective Class 1E channel.
3.b Class 1E equipment identified in Table 2.5.3-1, and associated field equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.	3.b.i Inspection for separation of the as-built redundant Class 1E equipment identified in Table 2.5.3-1, and associated field equipments will be performed.	3.b.i The physical separation of as-built redundant Class 1E equipment identified in Table 2.5.3-1, and associated field equipment is provided by distance or barriers in accordance with NRC RG 1.75.
	3.b.ii Analyses, tests or a combination of analyses and tests of the as-built redundant Class 1E equipment identified in Table 2.5.3-1, and associated field equipment will be performed to verify its electrical independence.	3.b.ii A report exists and concludes that independence of as-built redundant Class 1E equipment identified in Table 2.5.3-1, and associated field equipment is achieved by independent power sources and electrical circuits for each channel, and by fiber optic cable interfaces, conventional isolators, or other proven isolation methods or devices at interfaces between redundant channels, and at interfaces between safety and non-safety systems.
	3.b.iii Testing, analysis or combination of testing and analysis will be performed for the electrical isolation devices.	3.b.iii A report exists and concludes that the electrical isolation devices prevent credible faults from propagating into a safety system channels.
4. The QIAS-P monitors and displays the NRC RG 1.97, Type A, B, C variables identified in Table 2.5.3-2.	4. Test of the as-built QIAS-P equipment will be performed to demonstrate the monitoring and display capability for each QIAS-P channel using actual or simulated input signals.	4. The QIAS-P monitors and displays the NRC RG 1.97, Type A, B, C variables identified in Table 2.5.3-2.

Table 2.5.3-3 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. NRC RG 1.97 Type A variables, identified in Table 2.5.3-2, are displayed using conventional indicators in the MCR.	5. A test of the as-built conventional indicators will be performed to demonstrate the display capability for each NRC RG 1.97 Type A variable, using actual or simulated input signals.	5. The as-built conventional indicators in the MCR have the ability to display the NRC RG 1.97 Type A variables, identified in Table 2.5.3-2.
6. The QIAS-P software is implemented according to the software lifecycle process.	6.a An inspection will be performed for the requirements phase result summary report of QIAS-P software.	6.a The requirements phase result summary report exists and concludes that the plant requirements phase activities of QIAS-P software are performed.
	6.b An inspection will be performed for the design phase result summary report of QIAS-P software.	6.b The design requirements phase result summary report exists and concludes that the design phase activities of QIAS-P software are performed.
	6.c An inspection will be performed for the implementation phase result summary report of QIAS-P software.	6.c The implementation phase result summary report exists and concludes that the implementation phase activities of QIAS-P software are performed.
	6.d An inspection will be performed for the test phase result summary report of QIAS-P software.	6.d The test phase result summary report exists and concludes that the test phase activities of QIAS-P software are performed.
	6.e An inspection will be performed for the installation and checkout phase result summary report of QIAS-P software.	6.e The installation phase result summary report exists and concludes that the installation and checkout phase activities of QIAS-P software are performed.
7. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics..	7. Inspection, test and vendor assessment will be performed for the commercial grade items.	7. A report exists and concludes that the commercial grade items can perform the intended functions and meet the critical characteristics.

2.5.4 Engineered Safety Features - Component Control System

2.5.4.1 Design Description

The engineered safety features (ESF) system consists of sensors, auxiliary process cabinet-safety (APC-S), the engineered safety features actuation system (ESFAS) portion of the plant protection system (PPS) and engineered safety features-component control system (ESF-CCS). The sensors, APC-S and the ESFAS portion of PPS are described in Subsection 2.5.1. Subsection 2.5.4 describes the ESF-CCS.

The ESF-CCS provides automatic actuation of ESF systems. The ESF-CCS performs the nuclear steam supply system (NSSS) ESFAS function, balance of plant (BOP) ESFAS function, and emergency diesel generator (EDG) load sequencing function.

The ESF-CCS generates the NSSS ESFAS actuation signals upon receipt of ESFAS initiation signals from the PPS. The ESF-CCS generates the BOP ESFAS actuation signals upon receipt of initiation signals from the process and effluent radiation monitoring system (RMS).

The ESF-CCS generates the EDG load sequencing signals upon receipt of loss of power to Class 1E train buses, safety injection actuation signal (SIAS), containment spray actuation signal (CSAS), and auxiliary feedwater actuation signal (AFAS).

The ESF-CCS provides the capability for manual actuation of ESF systems and manual control of ESF components.

The ESF-CCS consists of four channels of group controller cabinets and loop controller cabinets. The ESF-CCS equipment and manual control components are identified in Table 2.5.4-1. The ESF-CCS components are located in auxiliary building.

The ESF-CCS design incorporates the following features: processors arranged in primary and standby processor configurations within each ESF-CCS channel. ESFAS functions are divided into ESF-CCS distributed segments which receive the ESFAS signals from the PPS through the fiber optic cable. Separation is provided between protection ESFAS processing function and auxiliary functions of human-system interfaces, data communication and automatic testing. Safety data link support the transmission of protection data on a continuous cyclical basis independent of plant transients.

1. The seismic Category I equipment identified in Table 2.5.4-1 can withstand seismic design basis loads without loss of safety function.

2. Redundant Class 1E channels listed in Table 2.5.4-1 and associated field equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.

3. The Class 1E equipment identified in Table 2.5.4-1 is powered from its respective Class 1E train.

4. Each ESF-CCS channel receives initiation signals from four channels of PPS and utilizes 2-out-of-4 actuation logic to perform NSSS ESFAS actuation functions identified in Table 2.5.4-2.

5. Each ESF-CCS channel receives initiation signals from two channels of RMS as shown in Table 2.7.6.4-2 and Table 2.7.6.5-2 and utilizes 1-out-of-2 actuation logic to perform the BOP ESFAS actuation functions identified in Table 2.5.4-2.

6. Upon receipt of SIAS, CSAS, or AFAS signals, the ESF-CCS initiates an automatic start of the diesel generators and automatic load sequencing of ESF loads identified in Table 2.5.4-2.

7. Upon detecting loss of power to Class 1E train buses, the ESF-CCS initiates startup of the diesel generators, shedding of electrical loads, transfer of Class 1E bus connections to the diesel generators, and sequencing to the reloading of safety-related loads to the Class 1E buses.

8. Each ESF-CCS channel is controlled from either the MCR or RSR, as selected from master transfer switches.

9. Once a BOP ESFAS actuation has been actuated (automatically or manually), the actuation logic is latched in the actuated state and is not reset automatically when the BOP ESFAS actuation signal has been cleared. Once the initiating condition is cleared, the BOP ESFAS actuations can be manually reset.

10. Loss of power in an ESF-CCS channel results in the respective ESF-CCS channel output assuming fail-safe output condition.

11. Manual actuation switches are provided in the MCR and the RSR for the ESF manual actuations identified in Table 2.5.4-3.

12. The operator modules (OMs) in the MCR display ESFAS actuation status, remote manual ESF actuation status, and ESF-CCS status information including the test status for actuations identified in Tables 2.5.4-2 and 2.5.4-3.

13. The component interface module (CIM) provides the state based priority logic.

14. The CIM logic provides the highest priority for the DMA switches.

15. The ESF-CCS software is implemented according to the software lifecycle process.

16. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics.

17. The ESF-CCS equipment and components identified in Table 2.5.4-1 can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform the safety function.

18. Redundant safety equipment and components of the ESF-CCS listed in Table 2.5.4-1 and related field equipment are provided with means of identification.

19. The Class 1E equipment listed in Table 2.5.4-1 is protected from accident related hazards such as missiles, pipe breaks and flooding.

20. The cabinets listed in Table 2.5.4-1 have key locks and door position alarms, and are located in a vital area of the facility.

21. The ESF-CCS provides ESF actuation within required response time for ESF functions identified in Tables 2.5.4-2.

22. The ESF-CCS has the testing functions.

2.5.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the ESF-CCS are specified in Table 2.5.4-4.

Table 2.5.4-1

ESF-CCS Equipment and Manual Control Component Name and Classification

Equipment & Component name	Seismic Category	Class 1E	Qualified for Harsh Environment
Group controller cabinet, Channel A/B/C/D	I	Yes	No
Loop controller cabinet, Channel A/B/C/D	I	Yes	No
ESFAS manual switch, Channel A/B/C/D	I	Yes	No
Control channel gateway, Channel A/B/C/D	I	Yes	No
ESF-CCS soft control module, Channel A/B/C/D	I	Yes	No
Minimum inventory switch, Channel A/B/C/D	I	Yes	No
Control panel multiplexer, Channel A/B/C/D	I	Yes	No
Component interface module, Channel A/B/C/D	I	Yes	No

Table 2.5.4-2 (1 of 2)

Functions Automatically Actuated by ESF-CCS

No.	Function	Systems Actuated	Response Time Requirement
1	Safety injection actuation [NSSS ESFAS] (1)	Aux feedwater system, Traveling screen and screen wash system, Chemical and volume control system, Component cooling water system, Control room HVAC system, Safety injection system	Yes
2	Containment spray actuation [NSSS ESFAS] (1)	Chemical and volume control system, Component cooling water system, Containment spray system, Instrument air system	Yes
3	Containment isolation actuation [NSSS ESFAS] (1)	Chemical and volume control system, Component cooling water system, Containment hydrogen control system, Containment monitoring system, Fire protection system, Gaseous radwaste system, In-Containment water storage system, Main steam system, Nitrogen system, Plant chilled water system, Primary sampling system, Process sampling system, Radiation monitoring system, Radioactive drain system, Reactor containment building purge system, Service water system, Steam generator blowdown system	Yes
4	Main steam isolation [NSSS ESFAS] (1)	Feedwater system, Main steam system, Process sampling system, Steam generator blowdown system,	Yes
5	Auxiliary feedwater actuation steam generator 1 level [NSSS ESFAS] (1)	Aux feedwater system, Aux feedwater pump turbine system, Main steam system, Process sampling system, Steam generator blowdown system	Yes
6	Auxiliary feedwater actuation steam generator 2 level [NSSS ESFAS] (1)	Aux feedwater system, Aux feedwater pump turbine system, Main steam system, Process sampling system, Steam generator blowdown system	Yes
7	Fuel handling area emergency ventilation actuation [BOP ESFAS] (2)	Fuel handling area HVAC system	Yes

Table 2.5.4-2 (2 of 2)

No.	Function	Systems Actuated	Response Time Requirement
8	Containment purge isolation actuation [BOP ESFAS] (2)	Reactor containment building purge system	Yes
9	Control room emergency ventilation actuation [BOP ESFAS] (3)	Control room HVAC system	Yes
10	EDG load sequencer	EDG system, 4.16kV Class 1E system, Safety injection system, Containment spray system, Chemical and volume control system, Component cooling water system, Essential service water system, Aux feedwater system, Essential chilled water system	Yes

(1) Parameters as listed in Table 2.5.1-4.

(2) Parameters as listed in Table 2.7.6.5-2.

(3) Parameters as listed in Table 2.7.6.4-2.

Table 2.5.4-3

ESF-CCS Manual Actuation Switches

Function	Systems Actuated
A. Main Control Room 1. NSSS ESF actuation • Containment spray actuation signal (CSAS) • Safety injection actuation signal (SIAS) • Main steam isolation signal (MSIS) • Containment isolation actuation signal (CIAS) • Auxiliary feedwater actuation signal (AFAS-1) • Auxiliary feedwater Actuation Signal (AFAS -2) 2. BOP ESF actuation • Fuel handling area emergency ventilation actuation signal (FHEVAS) • Control room emergency ventilation actuation signal (CREVAS) • Containment purge isolation actuation signal (CPIAS) B. Remote Shutdown Room 1. NSSS ESF Actuation • MSIS	Actuated systems are same to the systems shown in Table 2.5.4-2.

Table 2.5.4-4 (1 of 7)

Engineered Safety Features Component Control System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The seismic Category I equipment identified in Table 2.5.4-1 can withstand seismic design basis loads without loss of safety function.	1.a Inspections will be performed to verify that the as-built seismic Category I equipment identified in Table 2.5.4-1 is located in a seismic Category I structure.	1.a The as-built seismic Category I equipment identified in Table 2.5.4-1 is located in a seismic Category I structure.
	1.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment identified in Table 2.5.4-1 will be performed.	1.b A report exists and concludes that the seismic Category I equipment identified in Table 2.5.4-1 can withstand seismic design basis loads without loss of safety function.
	1.c Inspections and analyses will be performed to verify the as-built seismic Category I equipment identified in Table 2.5.4-1, including anchorages, is seismically bounded by the tested or analyzed conditions.	1.c A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.5.4-1, including anchorages, is seismically bounded by the tested or analyzed conditions
2. Redundant Class 1E channels listed in Table 2.5.4-1 and associated field equipment are physically separated and electrically independent from each other and physically separated and electrically independent from non-Class 1E equipment.	2.a Inspection for separation of the as-built redundant Class 1E channels listed in Table 2.5.4-1 and associated field equipment will be performed.	2.a The physical separation of as-built redundant Class 1E channels identified in Table 2.5.4-1 and associated field equipment is provided by distance or barriers in accordance with NRC RG 1.75.

Table 2.5.4-4 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	2.b Analyses, tests or a combination of analyses and tests of the as-built redundant Class 1E channels listed in Table 2.5.4-1and associated field equipment will be performed to verify its electrical independence.	2.b A report exists and concludes that independence of as-built redundant Class 1E channels listed in Table 2.5.4-1 and associated field equipment is achieved by independent power sources and electrical circuits for each channel, and by fiber optic cable interfaces, conventional isolators, or other proven isolation methods or devices at interfaces between redundant channels, and at interfaces between safety and non-safety systems.
	2.c Testing, analysis or combination of testing and analysis will be performed for the electrical isolation devices.	2.c A report exists and concludes that the electrical isolation devices prevent credible faults from propagating into a safety system channel.
3. The Class 1E equipment identified in Table 2.5.4-1 is powered from its respective Class 1E train.	3. A test of the as-built ESF-CCS will be performed by providing a simulated test signal in only one Class 1E train at a time.	3. The Class 1E equipment identified in Table 2.5.4-1 is powered from its respective Class 1E train.
4. Each ESF-CCS channel receives initiation signals from four channels of PPS and utilizes 2-out-of-4 actuation logic to perform NSSS ESFAS actuation functions identified in Table 2.5.4-2.	4. A test will be performed using simulated input signals for ESFAS signal input to each channel of the as-built ESF-CCS.	4. Each ESF-CCS channel receives ESFAS signal from four channels of PPS, performs 2-out-of-4 actuation logic for each NSSS ESFAS actuation function identified in Table 2.5.4-2 and sends the command signals to the ESF components.

Table 2.5.4-4 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. Each ESF-CCS channel receives initiation signals from two channels of RMS as shown in Table 2.7.6.4-2 and Table 2.7.6.5-2 and utilizes 1-out-of-2 actuation logic to perform the BOP ESFAS actuation functions identified in Table 2.5.4-2.	5. A test will be performed using simulated input signals for initiation input to each channel of the as-built ESF-CCS.	5. Each ESF-CCS channel receives initiation signals from two channels of RMS, performs 1-out-of-2 actuation logic for each BOP ESFAS actuation function identified in Table 2.5.4-2 and sends the command signals to the ESF components.
6. Upon receipt of SIAS, CSAS, or AFAS signals, the ESF-CCS initiates an automatic start of the diesel generators and automatic load sequencing of ESF loads identified in Table 2.5.4-2.	6. A test will be performed using simulated input signals for initiation input to each channel of the as-built ESF-CCS.	6. Each ESF-CCS channel receives SIAS, CSAS, or AFAS signals and initiate an automatic start of the diesel generators and automatic load sequencing of ESF loads identified in Table 2.5.4-2.
7. Upon detecting loss of power to Class 1E train buses, the ESF-CCS initiates startup of the diesel generators, shedding of electrical loads, transfer of Class 1E bus connections to the diesel generators, and sequencing to the reloading of safety-related loads to the Class 1E buses.	7. A test will be performed using simulated input signals for initiation input to each channel of the as-built ESF-CCS.	7. Each ESF-CCS channel receives loss of power to Class 1E train buses, and initiate an automatic start of the diesel generators, shedding of electrical loads, transfer of Class 1E bus connections to the diesel generators, and sequencing to the reloading of safety-related loads to the Class 1E buses.
8. Each ESF-CCS channel is controlled from either the MCR or RSR, as selected from master transfer switches.	8. A test of the as-built system for one control within each ESF-CCS channel will be performed to demonstrate the transfer of control capability between the MCR and the RSR.	8. The as-built master transfer switches transfer controls between the MCR and the RSR separately for each as-built ESF-CCS channel, as follows: a. Controls at the RSR are disabled when controls are active in the MCR. b. Controls at the MCR are disabled when controls are active in the RSR.

Table 2.5.4-4 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. Once a BOP ESFAS actuation has been actuated (automatically or manually), the actuation logic is latched in the actuated state and is not reset automatically when the BOP ESFAS actuation signal has been cleared. Once the initiating condition is cleared, the BOP ESFAS actuations can be manually reset.	9.a A test will be performed by returning simulated signals to a level within the predetermined limits of plant process signals at the as-built RMS input for BOP ESFAS functions as identified in Tables 2.5.4-2 and 2.5.4-3 after simulating the BOP ESFAS actuation.	9.a BOP ESFAS actuation signal of the as-built ESF-CCS remains upon return of simulated signals to a level within the predetermined limits of plant process signals for BOP ESFAS functions as identified in Tables 2.5.4-2 and 2.5.4-3 after simulating the ESF actuation
	9.b Tests of the as-built BOP ESFAS reset function will be performed manually to reset the actuated BOP ESFAS function.	9.b The BOP ESFAS actuation can be manually reset once the initiating condition is cleared.
10. Loss of power in an ESF-CCS channel results in the respective ESF-CCS channel output assuming fail-safe output condition.	10. A test will be performed simulating loss of power in each as-built ESF-CCS channel.	10. Loss of power in each ESF-CCS channel results in the assumed fail-safe output condition.
11. Manual ESF actuation switches are provided in the MCR and the RSR for the ESF manual actuations identified in Table 2.5.4-3.	11. A test will be performed to verify the actuation of the as-built ESF-CCS manual actuation using the manual ESF actuation switches in the MCR and RSR.	11. Each as-built ESF-CCS manual actuation identified in Table 2.5.4-3 actuates upon receipt of a signal from its respective manual ESF actuation switch in the MCR and RSR.
12. The operator modules (OM) in the MCR display ESFAS actuation status, remote manual ESF actuation status, and ESF-CCS status information including the test status for actuations identified in Table 2.5.4-2 and Table 2.5.4-3.	12. A test of the as-built OM in the MCR will be performed to demonstrate the display capability.	12. The as-built OM in the MCR display ESFAS actuation status, remote manual ESF actuation status, and ESF-CCS status information including the test status for actuations identified in Table 2.5.4-2 and Table 2.5.4-3.

Table 2.5.4-4 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
13. The component interface module (CIM) provides the state based priority logic.	13. A test will be performed using simulated input signals to the as-built CIM.	13. When the input signals conflict, the signals which is the safe state have the priority over other commands.
14. The CIM logic provides the highest priority for the DMA switches.	14. A test will be performed using simulated input signals to the CIM.	14. The DMA switches have the highest priority over other commands.
15. The ESF-CCS software is implemented according to the software lifecycle process.	15.a An inspection will be performed for the requirements phase result summary report of ESF-CCS software.	15.a The requirements phase result summary report exists and concludes that the plant requirements phase activities of ESF-CCS software are performed.
	15.b An inspection will be performed for the design phase result summary report of ESF-CCS software.	15.b The design requirements phase result summary report exists and concludes that the design phase activities of ESF-CCS software are performed.
	15.c An inspection will be performed for the implementation phase result summary report of ESF-CCS software.	15.c The implementation phase result summary report exists and concludes that the implementation phase activities of ESF-CCS software are performed.
	15.d An inspection will be performed for the test phase result summary report of ESF-CCS software.	15.d The test phase result summary report exists and concludes that the test phase activities of ESF-CCS software are performed.

Table 2.5.4-4 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	15.e An inspection will be performed for the installation and checkout phase result summary report of ESF-CCS software.	15.e The installation phase result summary report exists and concludes that the installation and checkout phase activities of ESF-CCS software are performed.
16. The commercial grade item dedication (CGID) is performed according to EPRI TR-106439 for ensuring that the items can perform the intended functions and meet the critical characteristics.	16. Inspection, test and vendor assessment will be performed for the commercial grade items.	16. A report exists and concludes that the commercial grade items can perform the intended functions and meet the critical characteristics.
17. The ESF-CCS equipment and components identified in Table 2.5.4-1 can withstand the electrical surge, electromagnetic interference (EMI), radio frequency interference (RFI), and electrostatic discharge (ESD) conditions that would exist before, during, and following a design basis accident without loss of its safety function for the time required to perform the safety function.	17.a Type tests, analyses, or a combination of type tests and analyses will be performed.	17.a A report exists and concludes that the ESF-CCS equipment identified in Table 2.5.4-1 can withstand the electrical surge, EMI, RFI, and ESD conditions that would exist before, during, and following a design basis accident without loss of its safety function, for the time required to perform the safety function.
	17.b Inspection and analysis of the as-built Class 1E equipment installation configuration and environment will be performed identified in Table 2.5.4-1.	17.b The as-built Class 1E equipment and the associated wiring, cables, and terminations identified in Table 2.5.4-1 are bounded by type tests or a combination of type tests and analyses.
18. Redundant safety equipment and components of the ESF-CCS listed in Table 2.5.4-1 and related field equipment are provided with means of identification.	18. An inspection of the as-built equipment for conformance with the identification requirements will be performed.	18. The as-built equipment listed in Table 2.5.4-1 and related field equipment complies with the labeling and the color coding requirements.

Table 2.5.4-4 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
19. The Class 1E equipment listed in Table 2.5.4-1 is protected from accident related hazards such as missiles, pipe breaks and flooding.	19. Inspections and analyses will be performed on the locations of the as-built Class 1E equipment listed in Table 2.5.4-1.	19. A report exists and concludes that the as-built equipment listed in Table 2.5.4-1 is protected from accident related hazards such as missiles, pipe breaks and flooding.
20. The cabinets listed in Table 2.5.4-1 have key locks and door position alarms, and are located in a vital area of the facility.	20.a A test of the as-built cabinets listed in Table 2.5.4-1 for key lock capability, and a test of door position alarms, will be performed.	20.a Each as-built cabinet listed in Table 2.5.4-1 has key locking capability, and alarms are received in the as-built MCR when cabinet doors are opened.
	20.b Inspection of the cabinets listed in Table 2.5.4-1 will be performed.	20.b The cabinets listed in Table 2.5.4-1 are located in a vital area of the facility.
21. The ESF-CCS provides ESF actuation within required response time for ESF functions identified in Tables 2.5.4-2.	21.a Type tests and analyses will be performed on ESF-CCS to verify that the ESF-CCS can actuate the ESF functions identified in Tables 2.5.4-2 within response time requirements described in the design basis.	21.a A report exists and concludes that the ESF-CCS can actuate the ESF functions identified in Tables 2.5.4-2 within response time requirements described in the design basis.
	21.b Inspections will be performed on the as-built ESF-CCS to determine if the response time of ESF actuation functions identified in Table 2.5.4-2 meets response time requirements.	21.b The as-built ESF actuation functions identified in Table 2.5.4-2 with response time requirements are bounded by type tests or a combination of type tests and analyses.
22. The ESF-CCS has the testing functions.	22. Type tests and analyses of the ESF-CCS will be performed using simulated failure condition.	22. A report exists and concludes that the ESF-CCS has the testing functions to facilitate recognition, location, replacement, repair and adjustment of malfunctioning components or modules.

2.5.5 Control System Not Required for Safety

2.5.5.1 Design Description

Control system which is not required for safety consists of power control system (PCS) and process-component control system (P-CCS).

The PCS includes the reactor regulating system (RRS), the digital rod control system (DRCS), and the reactor power cutback system (RPCS). The P-CCS includes NSSS process control system (NPCS) and BOP control systems. The NPCS consists of the feedwater control system (FWCS), the steam bypass control system (SBCS), the pressurizer pressure control system (PPCS), the pressurizer level control system (PLCS), and other miscellaneous NSSS control systems which include reactor makeup control function of the chemical and volume control system (CVCS).

The PCS and P-CCS provide control of functions to maintain the plant within its normal operating range for all normal modes of plant operation.

Control and display interface devices for the PCS and P-CCS are provided in the main control room (MCR) and in the remote shutdown room (RSR) for control and monitoring of the PCS and P-CCS.

1. The major controllers of the PCS and NPCS are arranged in separate controller groups as identified in Table 2.5.5-1.

2. The digital equipment and software used in the PCS and P-CCS are diverse from those of the plant protection system (PPS) and the engineered safety features-component control system (ESF-CCS).

3. The PCS and P-CCS are controlled from either the MCR or RSR, as selected from master transfer switches.

2.5.5.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the PCS and P-CCS are specified in Table 2.5.5-2.

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Table 2.5.5-1

Controller Group Arrangement of the PCS and NPCS

Control Function Description	Controller Group Distribution
SG1 feedwater control (FWCS 1)	Each control is in a separate controller group
SG2 feedwater control (FWCS 2)	Each control is in a separate controller group
Pressurizer pressure control (PPCS)	Each control is in a separate controller group
Pressurizer level control (PLCS)	Each control is in a separate controller group
Turbine bypass control (SBCS Main)	Each control is in a separate controller group
Turbine bypass control (SBCS Permissive)	Permissive is in a separate controller group
Reactor makeup control (CVCS)	Each control is in a separate controller group
Control rod control (RRS)	Each control is in a separate controller group
Control rod control (DRCS)	Each control is in a separate controller group

Table 2.5.5-2

Control System Not Required for Safety ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The major controllers of PCS and NPCS are arranged in separate controller groups as identified in Table 2.5.5-1.	1. Inspection of the as-built PCS and NPCS will be performed.	1. The as-built PCS and NPCS are arranged in separate controller groups as identified in Table 2.5.5-1.
2. The digital equipment and software used in the PCS and P-CCS are diverse from those of the plant protection system (PPS) and the engineered safety features-component control system (ESF-CCS).	2. Inspection of the as-built PCS and P-CCS equipment will be performed. Inspection of the design documentation will be performed to confirm that the software is developed by diverse design groups.	2. The as-built digital equipment and software used in the PCS and P-CCS are diverse from those of the PPS and ESF-CCS based on: • PCS and P-CCS use a platform which is diverse from the platform used in the PPS and ESF-CCS and • The design group(s) which developed the PCS and P-CCS software is diverse from the design group(s) which developed the PPS and ESF-CCS software.
3. The PCS and P-CCS are controlled from either the MCR or RSR, as selected from master transfer switches.	3. A test of the as-built system will be performed to demonstrate the transfer of control capability between the MCR and RSR.	3. The as-built master transfer switches transfer controls between the MCR and the RSR for as-built PCS and P-CCS, as follows: • Controls at the RSR are disabled when controls are active in the MCR for the as-built PCS and P-CCS. • Controls at the MCR are disabled when controls are active in the RSR for the as-built PCS and P-CCS.

2.6 Electric Power

2.6.1 AC Electric Power Distribution System

2.6.1.1 Design Description

The ac electric power distribution system consists of the transmission system, the plant switchyard, main transformer (MT), two unit auxiliary transformers (UATs), two standby auxiliary transformers (SATs), a main generator (MG), a generator circuit breaker (GCB), isolated phase bus, switchgears, load centers (LCs), and motor control centers (MCCs). The electric power distribution system also includes the power, control, instrumentation cables and raceways, and electrical protection devices, such as circuit breakers and fuses.

The Class 1E ac electric power distribution system consists of two independent, redundant divisions. Each division consists of two independent trains.

Four emergency diesel generators (EDGs) provide Class 1E power to the four independent Class 1E trains respectively, during a LOOP or a LOOP concurrent with DBA. One AAC generator provides power to the permanent non-safety buses during a LOOP or to one Class 1E train during SBO.

During plant normal operation, the MG supplies power through the GCB and MT to the transmission system, and to the UATs. When the GCB is open, power is backed from the transmission system through the MT to the UATs. In the event of a loss of preferred power supply through the UATs, medium voltage (non-Class 1E 13.8 kV and Class 1E & non-Class 1E 4.16 kV) buses are powered from the SATs after performing an automatic bus transfer from the normal offsite preferred power supply to the alternate offsite preferred power supply.

The ac electric power distribution system is designed as follows:

1. The functional arrangement of ac electric power distribution system is as described in the Design Description of Subsection 2.6.1.1 and as shown in Figure 2.6.1-1.

2. The seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.

3.a All controls required by the design exist in the MCR to operate the electric power distribution system, specifically to open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.

3.b All controls required by the design exist in the RSR to operate the electric power distribution system, specifically to open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.

3.c All displays and alarms required by the design exist in the MCR as defined in Table 2.6.1-2.

3.d All displays and alarms required by the design exist in the RSR as defined in Table 2.6.1-2.

4. Class 1E medium voltage switchgears, load centers, and motor control centers are located in the auxiliary building and EDG building with seismic Category I structures and in their respective train areas.

5. MT and UATs are separated from the SATs.

6. MT, UATs, and SATs are provided with their own oil pit, drain, fire deluge system.

7.a The MG, UATs, MT, and GCB power feeders are separated from the SATs power feeders.

7.b The MG, UAT, MT, and GCB instrumentation and control circuits are separated from the SATs instrumentation and control circuits.

8. If the normal preferred offsite power supply is not available, Class 1E 4.16 kV medium voltage buses are automatically transferred to the alternate preferred offsite power supply.

9. Instrumentation and control power for Class 1E medium voltage switchgear and load centers is supplied from the Class 1E dc power system in the same train.

10.a Independence is provided between each of the four trains of Class 1E distribution equipment and circuits.

10.b Independence is provided between Class 1E distribution equipment and circuits and non-Class 1E distribution equipment and circuits.

10.c The Class 1E distribution equipment of independent trains, identified in Table 2.6.1-1, is located in separate rooms in the auxiliary building.

11. Class 1E electric power distribution system equipment and circuits are rated to withstand fault currents for the time required to clear the fault from its power source.

12. Equipment and circuits of independent trains including raceway are uniquely identified by their train color and identifying nomenclature.

13. Class 1E electric power distribution system cables are routed in seismic Category I structures and in their respective raceway trains.

14. Class 1E equipment is not prevented from performing its safety functions by design basis harmonic distortion waveforms.

15. Protection is provided for Class 1E equipment from degraded voltage condition.

16. There are no automatic connections between Class 1E trains.

17. Class 1E qualified isolation devices provide independence between Class 1E electric power distribution equipment and non-Class 1E loads.

18. The MT power circuit breaker (PCB) in the switchyard opens in the event of electrical faults in the MT, MG, GCB, UATs, and associated equipment and circuits.

19. The UATs and SATs are designed and sized to meet the worst case loading conditions for all modes of plant operation and accident conditions.

20. Overcurrent protection is set for proper coordination of Class 1E ac electric distribution system.

21. The post-fire safe-shutdown circuit analysis provides assurance that one success path of shutdown SSCs remains free of fire damage.

2.6.1.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.6.1-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the ac electrical power distribution system.

Table 2.6.1-1

AC Electric Power Distribution System Safety-related Equipment Characteristics

Equipment Name	Seismic Category	Class 1E/Harsh Environ. Qual.
Class 1E 4.16 kV Switchgear 1A	I	Yes/No
Class 1E 4.16 kV Switchgear 1B	I	Yes/No
Class 1E 4.16 kV Switchgear 1C	I	Yes/No
Class 1E 4.16 kV Switchgear 1D	I	Yes/No
Class 1E 480 V Load Center 1A	I	Yes/No
Class 1E 480 V Load Center 1B	I	Yes/No
Class 1E 480 V Load Center 1C	I	Yes/No
Class 1E 480 V Load Center 1D	I	Yes/No
Class 1E Motor Control Center 1A, 2A, 3A, 4A, 5A	I	Yes/No
Class 1E Motor Control Center 1B, 2B, 3B, 4B, 5B	I	Yes/No
Class 1E Motor Control Center 1C, 2C, 3C, 4C	I	Yes/No
Class 1E Motor Control Center 1D, 2D, 3D, 4D	I	Yes/No

Table 2.6.1-2

AC Electric Power Systems Equipment Alarms/Displays and Control

Equipment Name	Alarm/Display at MCR	Alarm/Display at RSR	Control at MCR/RSR
Class 1E 4.16 kV Switchgear 1A	Yes/Yes	Yes/Yes	Yes/Yes (Breaker open and close)
Class 1E 4.16 kV Switchgear 1B	Yes/Yes	Yes/Yes	Yes/Yes (Breaker open and close)
Class 1E 4.16 kV Switchgear 1C	Yes/Yes	Yes/Yes	Yes/Yes (Breaker open and close)
Class 1E 4.16 kV Switchgear 1D	Yes/Yes	Yes/Yes	Yes/Yes (Breaker open and close)
Class 1E 480 V Load Center 1A	Yes/Yes	Yes/Yes	No/No
Class 1E 480 V Load Center 1B	Yes/Yes	Yes/Yes	No/No
Class 1E 480 V Load Center 1C	Yes/Yes	Yes/Yes	No/No
Class 1E 480 V Load Center 1D	Yes/Yes	Yes/Yes	No/No
Class 1E Motor Control Center 1A, 2A, 3A, 4A, 5A	Yes/No	Yes/No	No/No
Class 1E Motor Control Center 1B, 2B, 3B, 4B, 5B	Yes/No	Yes/No	No/No
Class 1E Motor Control Center 1C, 2C, 3C, 4C	Yes/No	Yes/No	No/No
Class 1E Motor Control Center 1D, 2D, 3D, 4D	Yes/No	Yes/No	No/No
Unit Auxiliary Transformer 1M, 1N	Yes/No	Yes/No	No/No
Standby Auxiliary Transformer 2M, 2N	Yes/No	Yes/No	No/No
Main Transformer	Yes/No	Yes/No	No/No
Generator Circuit Breaker	Yes/Yes	Yes/Yes	Yes/Yes (Breaker open and close)

Table 2.6.1-3 (1 of 6)

AC Electric Power Distribution System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of ac electric power distribution system is as described in the Design Description of Subsection 2.6.1.1 and as shown in Figure 2.6.1-1.	1. Inspection of the as-built ac electric power system will be performed.	1. The as-built ac electric power system conforms with the functional arrangement as described in the Design Description of Subsection 2.6.1.1 and as shown in Figure 2.6.1-1.
2. The seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I equipment is located in seismic Category I structures.	2.a The as-built seismic Category I equipment identified in Table 2.6.1-1 is located in seismic Category I structures.
	2.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	2.b A report exists and concludes that the seismic Category I equipment identified in Table 2.6.1-1 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I equipment including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built as-built equipment including anchorage are seismically bounded by the tested or analyzed conditions.
3.a All controls required by the design exist in the MCR to operate the electric power distribution system, specifically to open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.	3.a Tests will be performed using the electric power distribution system controls in the MCR.	3.a All electric power distribution system controls in the as-built MCR open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.

Table 2.6.1-3 (2 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b All controls required by the design exist in the RSR to operate the electric power distribution system, specifically to open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.	3.b Tests will be performed using the electric power distribution system controls in the RSR.	3.b All electric power distribution system controls in the as-built RSR open and close the 4.16 kV circuit breakers for the Class 1E buses identified in Table 2.6.1-2.
3.c All displays and alarms required by the design exist in the MCR as defined in Table 2.6.1-2.	3.c Inspections will be performed on the displays and alarms in the MCR.	3.c All displays and alarms exist and can be retrieved in the MCR as defined in Table 2.6.1-2.
3.d All displays and alarms required by the design exist in the RSR as defined in Table 2.6.1-2.	3.d Inspections will be performed on the displays and alarms in the RSR.	3.d All displays and alarms exist and can be retrieved in the RSR as defined in Table 2.6.1-2.
4. Class 1E medium voltage switchgears, load centers, and motor control centers are located in the auxiliary building and EDG building with seismic Category I structures and in their respective train areas.	4. Inspection of the as-built Class 1E medium voltage switchgears, load centers, and motor control centers will be performed.	4. The as-built Class 1E medium voltage switchgears, load centers, and motor control centers are located in the auxiliary building and EDG building with seismic Category I structures and in their respective train areas.
5. MT and UATs are separated from the SATs.	5. Inspection and analysis of the as-built MT and UATs will be performed.	5. The as-built MT and UATs are separated from the SATs by analyzed distance or by fire barriers.
6. MT, UATs, and SATs are provided with their own oil pit, drain, fire deluge system.	6. Inspection of the as-built MT, UATs and SATs will be performed.	6. The as-built MT, UATs, and SATs are provided with their own oil pit, drain, fire deluge system.

Table 2.6.1-3 (3 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.a The MG, UATs, MT, and GCB power feeders are separated from the SATs power feeders.	7.a Inspection and analysis of the as-built MG, UATs, MT, GCB, and SATs power feeders will be performed.	7.a The as-built MG, UATs, MT, and GCB power feeders are separated from the SATs power feeders by analyzed distance or by fire barriers.
7.b The MG, UAT, MT, and GCB instrumentation and control circuits are separated from the SATs instrumentation and control circuits.	7.b Inspection and analysis of the as-built MG, UATs, MT, GCB, and SATs instrumentation and control circuits will be performed.	7.b The as-built MG, UATs, MT, and GCB instrumentation and control circuits are separated from the SATs instrumentation and control circuits by analyzed distance or by fire barriers.
8. If the normal preferred offsite power supply is not available, Class 1E 4.16 kV medium voltage buses are automatically transferred to the alternate preferred offsite power supply.	8. Tests will be performed to verify that as-built Class 1E 4.16 kV medium voltage buses are automatically transferred to the alternate preferred offsite power supply.	8. Each as-built Class 1E 4.16 kV medium voltage buses are automatically transferred to the alternate preferred offsite power supply.
9. Instrumentation and control power for Class 1E medium voltage switchgear and load centers is supplied from the Class 1E dc power system in the same train.	9. Inspection of the as-built Class 1E medium voltage switchgear and load centers will be performed.	9. Instrumentation and control power for the as-built Class 1E switchgear and load centers of each train are supplied control power from their respective Class 1E trains.
10.a Independence is provided between each of the four trains of Class 1E distribution equipment and circuits.	10.a Tests will be performed on the as-built Class 1E distribution equipment and circuits by providing a test signal in only one train at a time.	10.a The test signal is present in the as-built Class 1E train under test.
10.b Independence is provided between Class 1E distribution equipment and circuits and non-Class 1E distribution equipment and circuits.	10.b Tests will be performed on the as-built Class 1E and non-Class 1E distribution equipment and circuits by providing a test signal in only one train for Class 1E or one division for non-Class 1E at a time.	10.b The test signal is present in the as-built Class 1E train or non-Class 1E division under test.

Table 2.6.1-3 (4 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.c The Class 1E distribution equipment of independent trains , identified in Table 2.6.1-1, is located in separate rooms in the auxiliary building.	10.c Inspection of the as-built Class 1E distribution equipment will be performed.	10.c The as-built Class 1E distribution equipment of independent trains , identified in Table 2.6.1-1, is located in separate rooms in the auxiliary building.
11. Class 1E electric power distribution system equipment and circuits are rated to withstand fault currents for the time required to clear the fault from its power source.	11.a Analyses will be performed to verify the Class 1E distribution equipment and circuits are sized to withstand the maximum fault currents for the time required to clear the fault from its power source	11.a A report exists and concludes that the Class 1E distribution equipment and circuits are sized to carry the worst case load currents for the time required to clear the fault from its power source.
	11.b Inspections will be performed to verify that the ratings of as-built Class 1E distribution equipment and circuits bound the results of the analyses to carry the worst-case load currents for the time required to clear the fault from its power source.	11.b The ratings of as-built Class 1E distribution equipment and circuits bound the results of the analyses to carry the worst-case load currents for the time required to clear the fault from its power source.
12. Equipment and circuits of independent trains including raceway are uniquely identified by their train color and identifying nomenclature.	12. Inspection of the as-built Class 1E equipment and circuits of independent trains including raceway will be performed.	12. The as-built Class 1E equipment and circuits of independent trains including raceway are uniquely identified by their train color and identifying nomenclature.
13. Class 1E electric power distribution system cables are routed in seismic Category I structures and in their respective raceway trains.	13. Inspection of the as-built electric power distribution system cables and raceways will be performed.	13. The as-built Class 1E train cables are routed in seismic Category I Structures and in their respective raceway trains.
14. Class 1E equipment is not prevented from performing its safety functions by design basis harmonic distortion waveforms.	14. Analysis of the as-built electric power distribution system to determine harmonic distortions will be performed.	14. A report exists and concludes that harmonic distortion waveforms do not exceed acceptable voltage distortion limits on the Class 1E electric power distribution system.

Table 2.6.1-3 (5 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
15. Protection is provided for Class 1E equipment from degraded voltage condition.	15.a Analyses will be performed to verify that the Class 1E medium voltage switchgears are protected from degraded voltage conditions.	15.a A report exists and concludes that the Class 1E medium voltage switchgears are protected from degraded voltage conditions by degraded voltage relays.
	15.b Inspections and tests will be performed to verify that the as-built protection system bounds the result of analyses for the protection of the Class 1E medium voltage switchgears from degraded voltage conditions.	15.b The as-built protection system bounds the result of analyses for the protection of the Class 1E medium voltage switchgears from degraded voltage conditions.
16. There are no automatic connections between Class 1E trains.	16. Inspection of the as-built Class 1E trains will be performed.	16. The as-built Class 1E trains have no automatic connections between Class 1E trains.
17. Class 1E qualified isolation devices provide independence between Class 1E electric power distribution equipment and non-Class 1E loads.	17.a Type tests, analyses, or a combination of type tests and analyses will be performed to verify the qualification of isolation devices.	17.a A report exists and concludes that the Class 1E electric power distribution equipment is isolated from as-built non-Class 1E loads by Class 1E qualified isolation devices in accordance with NRC RG 1.75
	17.b Inspection of the as-built Class 1E electric power distribution equipment will be performed.	17.b Class 1E qualified isolation devices are provided between the as-built Class 1E electric power distribution equipment and non-Class 1E loads.
18. The MT power circuit breaker (PCB) in the switchyard opens in the event of electrical faults in the MT, MG, GCB, UATs, and associated equipment and circuits.	18. Tests will be performed to verify that the as-built power circuit breaker trip signal is actuated by a simulated electrical fault trip signal for faults in the MT, MG, GCB, UATs, and associated equipment and circuits.	18. The as-built power circuit breaker (PCB) in the switchyard opens in the event of electrical faults in the MT, MG, GCB, UATs, and associated equipment and circuits.

Table 2.6.1-3 (6 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
19. The UATs and SATs are designed and sized to meet the worst case loading conditions for all modes of plant operation and accident conditions.	19.a Analyses will be performed to verify that the as-built UATs and SATs are sized for the worst case loading conditions for all modes of plant operation and accident conditions.	19.a A report exists and concludes that the as-built UATs and SATs are designed and sized for the worst case loading conditions for all modes of plant operation and accident conditions.
	19.b Inspections will be performed to verify that the ratings of as-built UATs and SATs meet the size requirements determined by the analysis for the worst case loading conditions for all modes of plant operation and accident conditions.	19.b The ratings of the as-built UATs and SATs bound the size requirements determined by the analysis.
20. Overcurrent protection is set for proper coordination of Class 1E ac electric distribution system.	20.a Analysis of the as-built Class 1E ac electrical distribution system overcurrent protection will be performed to verify proper coordination.	20.a A report exists and concludes that the as-built Class 1E ac electric distribution system overcurrent protection coordinates.
	20.b Inspections and tests will be performed on the Class 1E ac electrical distribution system to verify that the as-built overcurrent protection devices setting is in accordance with the results of the analysis for proper coordination.	20.b A report exists and concludes that the as-built Class 1E ac electrical distribution system overcurrent protection devices is set in accordance with the results of the analysis for proper coordination.
21. The post-fire safe-shutdown circuit analysis provides assurance that one success path of shutdown SSCs remains free of fire damage.	21. Analysis of post-fire safe shutdown circuit and supporting breaker coordination will be performed.	21. A report exists and concludes that the post-fire safe-shutdown circuit analysis provides assurance that one success path of shutdown SSCs remains free of fire damage.

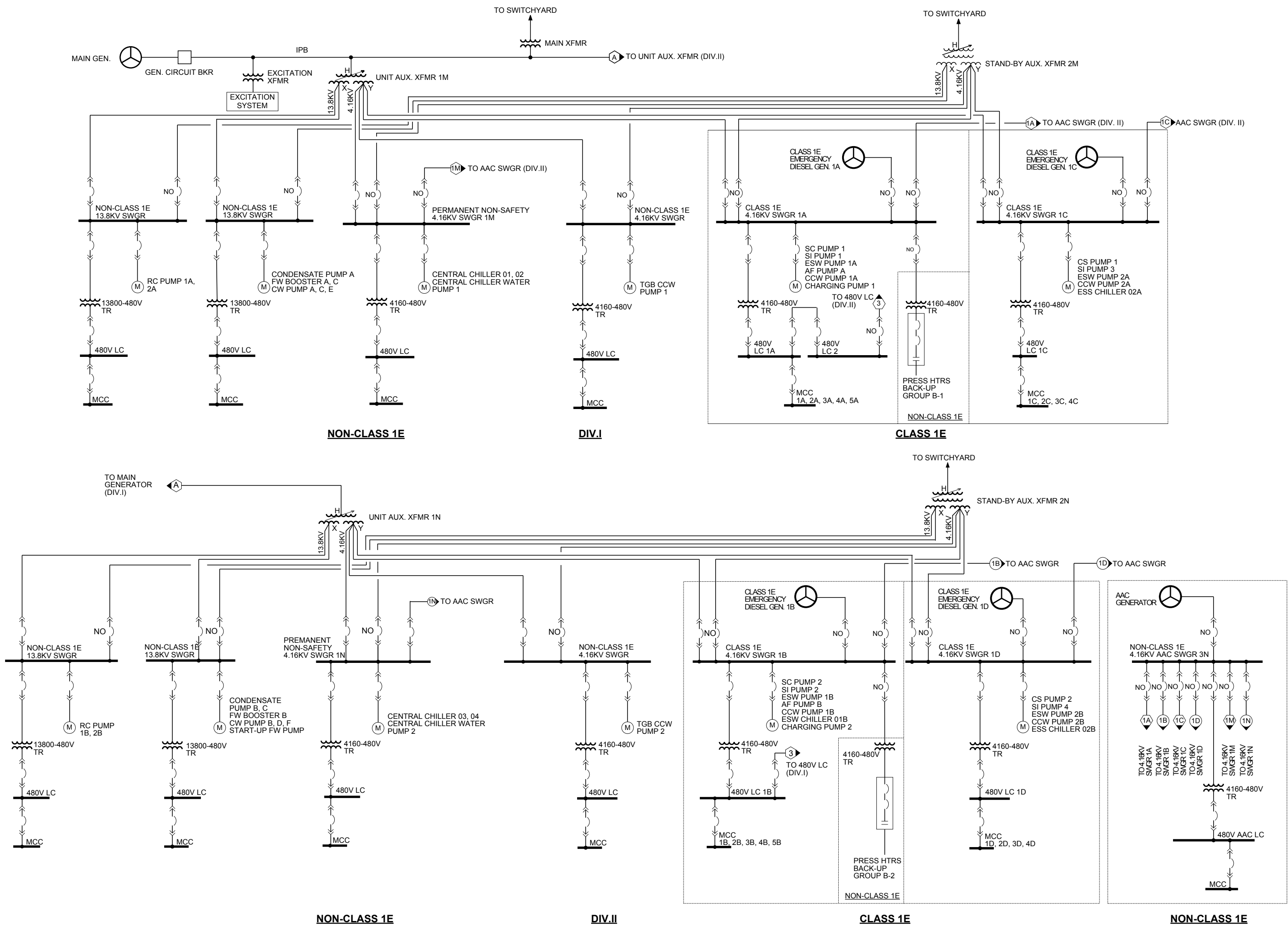


Figure 2.6.1-1 AC Electrical Power Distribution System

2.6.2 Emergency Diesel Generator System

2.6.2.1 Design Description

The emergency diesel generator (EDG) system is a safety-related system which has four diesel generators and their respective support systems such as fuel oil, lube oil, engine cooling, starting air, and combustion air intake and exhaust systems. Four EDGs provide Class 1E power to the four independent Class 1E trains, respectively, during a LOOP or a LOOP concurrent with DBA. EDGs are normally in stand-by mode.

The EDG system is designed as follows:

1. The functional arrangement of the EDG system is as described in the Design Description of Subsection 2.6.2.1 and in Tables 2.6.2-1 and 2.6.2-2.

2.a The ASME Code components identified in Table 2.6.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports, identified in Table 2.6.2-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.6.2-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.6.2-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.6.2-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.6.2-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I diesel engines and generators can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I components identified in Table 2.6.2-2 can withstand seismic design basis loads without loss of safety function.

5.c The seismic Category I piping including supports identified in Table 2.6.2-1 can withstand seismic design basis loads without loss of safety function.

6.a All controls required by the design exist in the MCR and EDG room to start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.

6.b All controls required by the design exist in the RSR to start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.

6.c All displays required by the design exist in the MCR as defined in Table 2.6.2-2.

6.d All displays required by the design exist in the RSR as defined in Table 2.6.2-2.

7. Each mechanical division of EDG and its support systems (A, B, C & D) is physically separated from the other divisions.

8.a Each diesel fuel oil transfer pump is capable of transferring oil from the diesel fuel oil storage tank to its corresponding day tank at sufficient pressure and flow to cover the maximum demand at EDG continuous rated load while simultaneously increasing day tank level.

8.b The diesel fuel oil transfer pumps have sufficient net positive suction head (NPSH).

9. Each EDG has fuel storage capacity to provide fuel to its EDG for a period of seven days with the EDG supplying the power requirements for the most limiting design basis event.

10. Each day tank provides fuel oil for at least 60 minutes plus a minimum additional margin of 10 percent at EDG rated load.

11. One transfer pump in each train is designed to automatically supply diesel fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.

12. Each lube oil makeup tank provides lube oil to its respective EDG for seven continuous days of EDG full power rated operation.

13. The starting air system receiver tanks of each EDG have a combined air capacity for five starts of the EDG without replenishing air to the receiver tanks.

14. The air intakes for EDG combustion are separated from the EDG exhaust ducts.

15. A loss of power to a Class 1E medium voltage safety bus automatically starts its respective EDG and load sheds the Class 1E bus within the affected train. Following attainment of required voltage and frequency, the EDG automatically connects to its respective bus. After the EDG connects to its respective bus, the non-accident loads are automatically sequenced onto the bus.

16. The Class 1E auxiliary power for EDG support systems is supplied from the same train, respectively.

17. For a loss of power to a Class 1E medium voltage safety bus concurrent with a design basis event condition (SIAS/CSAS/AFAS), each EDG automatically starts and load shedding of the Class 1E bus within the affected train occurs. Following attainment of required voltage and frequency, the EDG automatically connects to its respective bus, and the accident loads are sequenced onto the bus.

18. When running for a test mode, an EDG is capable of responding to an automatic start signal.

19. Each Class 1E EDG is designed and sized to supply power to its train's safety-related loads after a LOOP or a LOOP concurrent with LOCA conditions.

20. When the Class 1E EDG is started by an ESF actuation signal, all Class 1E EDG protection systems, except for overspeed and generator differential current, are bypassed.

2.6.2.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.6.2-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the EDG system.

Table 2.6.2-1 (1 of 2)

Emergency Diesel Generator System Piping List

Piping Name	Location	ASME Section III Class	Seismic Category
EDG fuel oil transfer pump suction lines from EDG fuel oil storage tank to EDG fuel oil transfer pumps	EDG/Aux. Building	3	I
EDG fuel oil transfer pump discharge lines up to EDG fuel oil day tank	EDG/Aux. Building	3	I
EDG fuel oil day tanks outlet lines up to EDG	EDG/Aux. Building	3	I
EDG Cooling water system HT water expansion tank outlet lines up to EDG	EDG/Aux. Building	3	I
EDG Cooling water system HT water engine outlet lines up to three-way thermostat valve	EDG/Aux. Building	3	I
EDG Cooling water system HT/CC water heat exchanger outlet lines up to EDG	EDG/Aux. Building	3	I
EDG Cooling water system HT water engine outlet lines up to preheating HT water pump suction line isolation valve	EDG/Aux. Building	3	I
EDG Cooling water system LT water expansion tank outlet lines up to three-way thermostat valve	EDG/Aux. Building	3	I
EDG Cooling water system LT water expansion tank outlet lines up to EDG	EDG/Aux. Building	3	I
EDG Cooling water system CC/LT water heat exchanger inlet lines from lube oil/LT water heat exchanger	EDG/Aux. Building	3	I
EDG Cooling water system CC/LT water heat exchanger outlet lines up to three-way thermostat valve	EDG/Aux. Building	3	I
EDG Cooling water system three-way thermostat valve outlet lines up to lube oil/LT water heat exchanger	EDG/Aux. Building	3	I
EDG Cooling water system lube oil/LT water heat exchanger inlet lines from EDG	EDG/Aux. Building	3	I
EDG starting system air receiver inlet lines from air receiver inlet check valves	EDG/Aux. Building	3	I
EDG starting system starting air receiver discharge lines up to over speed air rack	EDG/Aux. Building	3	I

Table 2.6.2-1 (2 of 2)

Piping Name	Location	ASME Section III Class	Seismic Category
EDG starting system over speed air rack outlet lines up to EDG	EDG/Aux. Building	3	I
EDG starting system over speed air receiver inlet lines from starting air receiver	EDG/Aux. Building	3	I
EDG starting system starting air receiver discharge lines up to air starting valve	EDG/Aux. Building	3	I
EDG lubrication system lube oil/LT water heat exchanger inlet lines from EDG	EDG/Aux. Building	3	I
EDG lubrication system lube oil/LT water heat exchanger outlet lines up to three-way thermostat valve	EDG/Aux. Building	3	I
EDG lubrication system three-way thermostat valve outlet lines up to EDG	EDG/Aux. Building	3	I
EDG combustion air intake and exhaust system piping	EDG/Aux. Building	N/A	I

Table 2.6.2-2 (1 of 3)

Emergency Diesel Generator System Components List

Component Name	Item No. (1), (2)	Location (2)	ASME Section Class	Seismic Category	Class 1E/Qual. for Harsh Envir.	Display/ Control at MCR	Display/ Control at RSR	Active Safety Function	Position at Loss of Motive Power
EDG Engines and Generators	DG-DG01 A/B/C/D	EDG/Aux. Building	3	I	Yes/No	Yes/Yes	Yes/Yes	Start	-
EDG fuel oil storage tanks	DO-TK01 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
EDG fuel oil transfer pumps 01	DO-PP01 A/B/C/D	EDG/Aux. Building	3	I	Yes/No	No/No	No/No	Start	-
EDG fuel oil transfer pumps 02	DO-PP02 A/B/C/D	EDG/Aux. Building	3	I	Yes/No	No/No	No/No	Start	-
EDG fuel oil day tanks	DO-TK02 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
EDG fuel oil transfer pump discharge line check valves	DO-CV-1005 A/B/C/D DO-CV-1007 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
HT water expansion tanks	DG-TK01 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
HT/CC water heat exchangers	DG-HE03 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
HT water thermostat valves	DG-3W-4217 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open/Close	-
LT water expansion tanks	DG-TK10 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-

Table 2.6.2-2 (2 of 3)

Component Name	Item No. (1), (2)	Location (2)	ASME Section Class	Seismic Category	Class 1E/Qual. for Harsh Envir.	Display/ Control at MCR	Display/ Control at RSR	Active Safety Function	Position at Loss of Motive Power
LT/CC water heat exchangers	DG-HE02 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
LT water thermostat valves	DG-3W-4250 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open/Close	-
Lube oil/LT water heat exchangers	DG-HE30 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
Lube oil/LT water heat exchanger thermostat valves	DG-3W-4114 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open/Close	-
Starting Air receiver inlet check valves	DG-CV-4022 A/B/C/D DG-CV-4030 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
Starting air receivers	DG-TK40 A/B/C/D DG-TK41 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
Starting Air receiver relief valves	DG-RV-5023 A/B/C/D DG-RV-5031 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open	-
Starting Air receiver discharge line isolation valves	DG-GV-4048 A/B/C/D DG-GV-4049 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open/Close	-
Overspeed air receiver inlet check valves	DG-CV-4043 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-

Table 2.6.2-2 (3 of 3)

Component Name	Item No. (1), (2)	Location (2)	ASME Section Class	Seismic Category	Class 1E/Qual. for Harsh Envir.	Display/ Control at MCR	Display/ Control at RSR	Active Safety Function	Position at Loss of Motive Power
Overspeed air receivers	DG-TK42 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	-	-
Overspeed air receiver relief valves	DG-RV-4041 A/B/C/D	EDG/Aux. Building	3	I	-/No	No/No	No/No	Open	-
Air intake filters	DG-FT50 A/B/C/D	EDG/Aux. Building	N/A	I	-/No	No/No	No/No	-	-
Air intake silencers	DG-SL01 A/B/C/D	EDG/Aux. Building	N/A	I	-/No	No/No	No/No	-	-
Air exhaust silencers	DG-SL03 A/B/C/D	EDG/Aux. Building	N/A	I	-/No	No/No	No/No	-	-

(1) The column "Item No." is information only (not part of certified design).

(2) Train A and B are located in EDG building.
Train C and D are located in Auxiliary building.

(3) Dash(-) indicates not applicable.

Table 2.6.2-3 (1 of 7)

Emergency Diesel Generator System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the EDG system is as described in the Design Description of Subsection 2.6.2.1 and in Tables 2.6.2-1 and 2.6.2-2.	1. Inspection of the as-built EDG system will be performed.	1. The as-built EDG system conforms with the functional arrangement described in the Design Description of Subsection 2.6.2.1 and in Tables 2.6.2-1 and 2.6.2-2.
2.a The ASME Code components identified in Table 2.6.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.6.2-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.6.2-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.6.2-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.6.2-2 meet ASME Section III requirements.	3.a Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.6.2-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.6.2-1 meet ASME Section III requirements.	3.b Inspection of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.6.2-1.

Table 2.6.2-3 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.6.2-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be performed on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.6.2-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.6.2-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be performed on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.6.2-1conform with ASME Section III requirements.
5.a The seismic Category I diesel engines and generators can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I diesel engines and generators are located in the seismic Category I structures.	5.a.i The as-built four seismic Category I diesel engines and generators are located in the seismic Category I structures.
	5.a.ii Qualification of the four seismic Category I diesel engines and generators will be performed under all expected environmental condition.	5.a.ii A qualification report exists and concludes that the four seismic Category I diesel engines and generators can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I diesel engines and generators including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I diesel engines and generators including anchorages are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I components identified in Table 2.6.2-2 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	5.b.i The as-built seismic Category I components identified in Table 2.6.2-2 are located in the seismic Category I structure.

Table 2.6.2-3 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.b.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I components identified in Table 2.6.2-2 can withstand seismic design basis loads without loss of safety function.
	5.b.iii Inspections will be performed to verify that the as-built seismic Category I components including anchorage are seismically bounded by the tested or analyzed conditions.	5.b.iii A report exists and concludes that the as-built seismic Category I identified in Table 2.6.2-2 including anchorage are seismically bounded by the tested or analyzed conditions.
5.c The seismic Category I piping including supports identified in Table 2.6.2-1 can withstand seismic design basis loads without loss of safety function.	5.c.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.c.i The as-built seismic Category I piping including supports identified in Table 2.6.2-1 is located in the seismic Category I structure(s).
	5.c.ii Inspection and analysis of seismic Category I piping including supports will be performed.	5.c.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.6.2-1 can withstand seismic design basis loads without loss of safety function.
6.a All controls required by the design exist in the MCR and EDG room to start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.	6.a Tests will be performed using the EDG controls in the MCR and EDG room.	6.a All controls in the as-built MCR and EDG room start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.
6.b All controls required by the design exist in the RSR to start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.	6.b Tests will be performed using the EDG controls in the RSR.	6.b All controls in the as-built RSR start and stop each EDG and to synchronize each EDG to its respective Class 1E bus.

Table 2.6.2-3 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.c All displays required by the design exist in the MCR as defined in Table 2.6.2-2.	6.c Inspections will be performed on the displays in the MCR.	6.c All displays exist and can be retrieved in the as-built MCR as defined in Table 2.6.2-2.
6.d All displays required by the design exist in the RSR as defined in Table 2.6.2-2.	6.d Inspections will be performed on the displays in the RSR.	6.d All displays exist and can be retrieved in the as-built RSR as defined in Table 2.6.2-2.
7. Each mechanical division of EDG and its support systems (A, B, C & D) is physically separated from the other divisions.	7. Inspection of the as-built mechanical divisions will be performed.	7. Each mechanical division of the EDG is physically separated by a divisional wall or a fire barrier.
8.a Each diesel fuel oil transfer pump is capable of transferring oil from the diesel fuel oil storage tank to its corresponding day tank at sufficient pressure and flow to cover the maximum demand at EDG continuous rated load while simultaneously increasing day tank level.	8.a.i Analysis of each diesel fuel oil transfer pump will be performed to determine the required flow rate to support the maximum demand of the EDG at continuous rated load while simultaneously increasing day tank level.	8.a.i A report exists and concludes that each fuel oil transfer pump is sized to transfer fuel oil from the fuel oil storage tank to its as- built corresponding day tank, at a flow rate to support the maximum demand of the Class 1E EDG at continuous rated load while simultaneously increasing day tank level.
	8.a.ii Test of each diesel fuel oil transfer pump will be performed to verify that the fuel oil transfer pump flow rate bounds the analysis.	8.a.ii A report exists and concludes that each diesel fuel oil transfer pump flow rate bounds the analysis.
8.b The diesel fuel oil transfer pumps have sufficient net positive suction head (NPSH).	8.b Test to measure the as-built diesel fuel oil transfer pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	8.b A report exists and concludes that as-built calculated NPSH available exceeds each diesel fuel oil transfer pump's NPSH required.
9. Each EDG has fuel storage capacity to provide fuel to its EDG for a period of seven days with the EDG supplying the power requirements for the most limiting design basis event.	9. Inspections and analyses will be performed to determine fuel storage capacities and EDG fuel consumption.	9. A report exists and concludes that each EDG has fuel storage capacity to operate the EDG for seven days with the EDG supplying power during the most limiting design basis event.

Table 2.6.2-3 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. Each day tank provides fuel oil for at least 60 minutes plus a minimum additional margin of 10 percent at EDG rated load.	10. Inspections and tests will be performed to determine day tank capacities and EDG fuel consumption.	10. A report exists and concludes that each day tank's capacity is sufficient to provide fuel oil for at least 60 minutes plus a minimum additional margin of 10 percent at EDG rated load.
11. One transfer pump in each train is designed to automatically supply diesel fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.	11. Tests will be performed on the as-built fuel oil transfer pump in each train by providing a test signal of a simulated fuel oil day tank level in only one train at a time.	11. The as-built transfer pump in each train starts automatically to supply diesel fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.
12. Each lube oil makeup tank provides lube oil to its respective EDG for seven continuous days of EDG full power rated operation.	12. Inspections and tests will be performed to determine lube oil makeup tank capacities and EDG lube oil consumption.	12. A report exists and concludes that each lube oil makeup tank provides lube oil to its respective EDG for seven continuous days of EDG full power rated operation.
13. The starting air system receiver tanks of each EDG have a combined air capacity for five starts of the EDG without replenishing air to the receiver tanks.	13. Tests will be performed with the EDGs and their air start systems.	13. Each EDG can be started five times without replenishing air to the receiver tanks.
14. The air intakes for EDG combustion are separated from the EDG exhaust ducts.	14. Inspection and analysis of the as-built EDG air intakes and air exhaust will be performed.	14. The air intake and air exhaust for each EDG are separated by analyzed distance and orientation. The air intakes and exhausts of the four EDGs are separated by the location of the EDGs on opposite sides of the nuclear island structures.

Table 2.6.2-3 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
15. A loss of power to a Class 1E medium voltage safety bus automatically starts its respective EDG and load sheds the Class 1E bus within the affected train. Following attainment of required voltage and frequency, the EDG automatically connects to its respective train bus. After the EDG connects to its respective bus, the non-accident loads are automatically sequenced onto the bus.	15. Test for the actuation and connection of each EDG will be performed using a signal that simulates a loss of power.	15. The as-built EDGs automatically start on receiving a LOOP signal, attain the rated voltage and frequency within 17 seconds, automatically connect to their respective train bus, and sequence their non-accident loads onto their train bus.
16. The Class 1E auxiliary power for EDG support systems is supplied from the same train, respectively.	16.a Inspection of each as-built Class 1E EDG support system will be performed.	16.a A report exists and concludes that auxiliary power for each as-built Class 1E EDG support system is provided by the same train of the Class 1E power system.
	16.b Test of each as-built Class 1E EDG support system will be performed to verify that auxiliary power is provided by the same train of the Class 1E power system.	16.b A test report exists and concludes that the auxiliary power for each as-built Class 1E EDG support system is provided by the same train of the Class 1E power system.
17. For a loss of power to a Class 1E medium voltage safety bus concurrent with a design basis event condition (SIAS/CSAS/ AFAS), each EDG automatically starts and load shedding of the Class 1E bus within the affected train occurs. Following attainment of required voltage and frequency, the EDG automatically connects to its respective bus and the accident loads are sequenced onto the bus.	17. Test of the as-built EDG systems will be performed by providing simulated SIAS/CSAS/AFAS and loss of power signals.	17. When SIAS/CSAS/AFAS and loss of power signals exist, the EDG automatically starts and load shedding of the Class 1E bus within the affected train occurs. Following attainment of required voltage and frequency within 17 seconds, the EDG automatically connects to its train bus. The SI, CS, and AF loads are sequenced to the buses by load sequencer.

Table 2.6.2-3 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
18. When running for a test mode, an EDG is capable of responding to an automatic start signal.	18. Tests will be performed with each EDG in a test mode configuration. An automatic start signal will be simulated.	18. When running in a test mode, each EDG resets to its automatic control mode upon receipt of a simulated automatic start signal.
19. Each Class 1E EDG is designed and sized to supply power to its train's safety-related loads after a LOOP or a LOOP concurrent with LOCA conditions.	19.a Analyses will be performed to verify that each Class 1E EDG is capable of supplying power to its train safety-related loads after a LOOP or a LOOP concurrent with LOCA conditions.	19.a A report exists and concludes that each Class 1E EDG is designed and sized to supply power to its train's safety-related loads after a LOOP or a LOOP concurrent with LOCA conditions.
	19.b Inspections will be performed to verify that the rating of each as-built Class 1E EDG is in accordance with the size requirements of the analysis.	19.b The rating of each Class 1E EDG bounds the size requirements of the analysis.
20. When the Class 1E EDG is started by an ESF actuation signal, all Class 1E EDG protection systems, except for overspeed and generator differential current, are bypassed.	20. Tests will be performed to verify the as-built Class 1E EDG protection systems.	20. A report exists and concludes that the as-built Class 1E EDG protection systems, except for overspeed and generator differential current, are bypassed when the Class 1E EDG is started by an ESF actuation signal.

2.6.3 DC Power System

2.6.3.1 Design Description

The Class 1E 125 Vdc system consists of four independent subsystems, train A, B, C, and D, each corresponding to one of the four reactor protection instrumentation channels A, B, C, and D. The non-Class 1E dc power system is also comprised of two separate subsystems, divisions I and II. Each Class 1E and non-Class 1E dc power system is provided with its own battery, two battery chargers (normal and standby), a dc control center, and dc distribution panels. The Class 1E dc power system supplies reliable continuous power to the plant safety system dc loads and the Class 1E I&C system.

The 125 Vdc batteries are located in their separate respective channelized rooms within the auxiliary building.

The Class 1E dc power system is designed as follows:

1. The functional arrangement of the Class 1E dc power system is as described in the Design Description of Subsection 2.6.3.1 and as shown in Figure 2.6.3-1.

2. The seismic Category I equipment identified in Table 2.6.3-1 can withstand seismic design basis loads without loss of safety function.

3. The raceway systems for Class 1E dc power system cables are designed to meet seismic Category I requirements.

4. Class 1E dc power system cables are routed in seismic Category I structures and in their respective raceways.

5. The Class 1E dc power system operating voltage is within the terminal voltage range of the Class 1E equipment.

6. Each Class 1E battery is sized to supply its Design Basic Event (DBE) loads, at the end-of-installed-life, for pertinent required hours without recharging.

7. Each Class 1E battery charger is sized to supply its respective Class 1E steady-state loads while charging its respective Class 1E battery.

8. Class 1E dc power system distribution panels and dc control centers are identified according to their Class 1E trains.

9. Class 1E dc power system cables are identified according to their Class 1E trains.

10. Independence is provided between Class 1E dc system trains and between Class 1E and non-Class 1E equipment cables.

11.a All displays and alarms required by the design exist in the MCR as defined in Table 2.6.3-2.

11.b All displays and alarms required by the design exist in the RSR as defined in Table 2.6.3-2.

12. Each of the four Class 1E dc power trains has a main circuit protection device which has selective coordination with downstream protective devices.

2.6.3.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.6.3-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the dc power system.

Table 2.6.3-1

DC Power System Equipment Characteristics

Piping Name	Seismic Category	Class 1E/Harsh Environ. Qual.
Class 1E 125 Vdc Battery 1A	I	Yes/No
Class 1E 125 Vdc Battery 1B	I	Yes/No
Class 1E 125 Vdc Battery 1C	I	Yes/No
Class 1E 125 Vdc Battery 1D	I	Yes/No
Class 1E 125 Vdc Battery Charger 1A	I	Yes/No
Class 1E 125 Vdc Battery Charger 1B	I	Yes/No
Class 1E 125 Vdc Battery Charger 1C	I	Yes/No
Class 1E 125 Vdc Battery Charger 1D	I	Yes/No
Class 1E 125 Vdc Standby Battery Charger 2A	I	Yes/No
Class 1E 125 Vdc Standby Battery Charger 2B	I	Yes/No
Class 1E 125 Vdc Standby Battery Charger 2C	I	Yes/No
Class 1E 125 Vdc Standby Battery Charger 2D	I	Yes/No
Class 1E 125 Vdc Control Center 1A	I	Yes/No
Class 1E 125 Vdc Control Center 1B	I	Yes/No
Class 1E 125 Vdc Control Center 1C	I	Yes/No
Class 1E 125 Vdc Control Center 1D	I	Yes/No

Table 2.6.3-2

DC Power System Equipment Alarms/Displays and Control Functions

Equipment Name	Alarm/Display at MCR	Alarm/Display at RSR	Control at MCR/RSR
Class 1E 125 Vdc Battery 1A	Yes	Yes	N/A
Class 1E 125 Vdc Battery 1B	Yes	Yes	N/A
Class 1E 125 Vdc Battery 1C	Yes	Yes	N/A
Class 1E 125 Vdc Battery 1D	Yes	Yes	N/A
Class 1E 125 Vdc Battery Charger 1A	Yes	Yes	N/A
Class 1E 125 Vdc Battery Charger 1B	Yes	Yes	N/A
Class 1E 125 Vdc Battery Charger 1C	Yes	Yes	N/A
Class 1E 125 Vdc Battery Charger 1D	Yes	Yes	N/A
Class 1E 125 Vdc Standby Battery Charger 2A	Yes	Yes	N/A
Class 1E 125 Vdc Standby Battery Charger 2B	Yes	Yes	N/A
Class 1E 125 Vdc Standby Battery Charger 2C	Yes	Yes	N/A
Class 1E 125 Vdc Standby Battery Charger 1D	Yes	Yes	N/A
Class 1E 125 Vdc Control Center 1A	Yes	Yes	N/A
Class 1E 125 Vdc Control Center 1B	Yes	Yes	N/A
Class 1E 125 Vdc Control Center 1C	Yes	Yes	N/A
Class 1E 125 Vdc Control Center 1D	Yes	Yes	N/A

Table 2.6.3-3 (1 of 3)

DC Power System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the Class 1E dc power system is as described in the Design Description of Subsection 2.6.3.1 and as shown in Figure 2.6.3-1.	1. Inspection of the as-built Class 1E dc power system will be performed.	1. The as-built Class 1E dc power system conforms with the functional arrangement as described in the Design Description of Subsection 2.6.3.1 and as shown in Figure 2.6.3-1.
2. The seismic Category I equipment identified in Table 2.6.3-1 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I equipment are located in seismic Category I structures.	2.a The as-built seismic Category I equipment identified in Table 2.6.3-1 are located in seismic Category I structures.
	2.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	2.b A report exists and concludes that the seismic Category I equipment identified in Table 2.6.3-1 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I equipment including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.6.3-1including anchorage are seismically bounded by the tested or analyzed conditions.
3. The raceway systems for Class 1E dc power system cables are designed to meet seismic Category I requirements.	3. Inspections will be performed to verify that the as-built raceway systems for Class 1E dc power system cables are supported by a seismic Category I designed support system.	3. A report exists and concludes that the as-built raceway systems for Class 1E dc power system cables are supported by a seismic Category I designed support system.
4. Class 1E dc power system cables are routed in seismic Category I structures and in their respective raceways.	4.a Inspection of the as-built Class 1E dc power system cables and raceways will be performed.	4.a A report exists and concludes that the as-built Class 1E dc power system cables are routed in seismic Category I structures and in their respective raceways.

Table 2.6.3-3 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	4.b Analysis of the as-built raceway systems for Class 1E dc power system cables will be performed using analytical assumptions which bound the seismic design basis requirements.	4.b A report exists and concludes that the as-built raceway systems for Class 1E dc power system cables meet seismic Category I requirements.
	4.c Inspections will be performed to verify that the as-built raceway systems for Class 1E dc power system cables are seismically bounded by the analyzed conditions.	4.c A report exists and concludes that the as-built raceway systems for Class 1E dc power system cables are seismically bounded by the analyzed conditions.
5. The Class 1E dc power system operating voltage is within the terminal voltage range of the Class 1E equipment.	5. Analyses will be performed.	5. A report exists and concludes that the Class 1E dc power system operating voltage is within the terminal voltage range of the Class 1E equipment.
6. Each Class 1E battery is sized to supply its Design Basic Event (DBE) loads, at the end-of-installed-life, for pertinent required hours without recharging.	6. Analysis of each as-built Class 1E battery will be performed to verify that the Class 1E battery has the capacity to carry its DBE duty cycle.	6. A report exists and concludes that the capacity of each as-built Class 1E battery meets the analyzed battery design duty cycle capacity.
7. Each Class 1E battery charger is sized to supply its respective Class 1E steady-state loads while charging its respective Class 1E battery.	7. Analysis of each Class 1E battery charger will be performed to verify that it has the capacity to supply its respective Class 1E normal steady-state loads while charging its respective Class 1E battery	7. A report exists and concludes that the capacity of each Class 1E battery charger meets its respective Class 1E normal steady-state loads while charging its respective Class 1E battery.
8. Class 1E dc power system distribution panels and dc control centers are identified according to their Class 1E trains.	8. Inspection of the as-built Class 1E dc distribution panels and dc control centers will be performed.	8. The as-built Class 1E dc power system distribution panels and dc control centers are identified according to their Class 1E trains.
9. Class 1E dc power system cables are identified according to their Class 1E trains.	9. Inspection of the as-built Class 1E dc power system cables will be performed.	9. The as-built Class 1E dc power system cables are identified according to their Class 1E trains.

Table 2.6.3-3 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10. Independence is provided between Class 1E dc system trains and between Class 1E and non-Class 1E equipment cables.	10. Inspection of the as-built Class 1E dc power system will be performed.	10. Physical separation or electrical isolation exists in accordance with RG 1.75 between Class 1E dc system trains and between Class 1E and non-Class 1E equipment cables.
11.a All displays and alarms required by the design exist in the MCR as defined in Table 2.6.3-2.	11.a Inspections will be performed on the displays and alarms in the MCR.	11.a All displays and alarms exist and can be retrieved in the MCR as defined in Table 2.6.3-2.
11.b All displays and alarms required by the design exist in the RSR as defined in Table 2.6.3-2.	11.b Inspections will be performed on the displays and alarms in the RSR.	11.b All displays and alarms exist and can be retrieved in the RSR as defined in Table 2.6.3-2.
12. Each of the four Class 1E dc power trains has a main circuit protection device which has selective coordination with downstream protective devices.	12.a Analyses will be performed to verify the main circuit protection devices have selective coordination with the downstream protective devices.	12.a A report exists and concludes that each of the four Class 1E dc power trains has a main circuit protection device which has selective coordination with the downstream protective devices.
	12.b Inspection of the as-built main circuit protection devices in the as-built dc control centers will be performed.	12.b The as-built main circuit protection device in each of the four Class 1E dc power trains is the same as that used in the coordination analysis.

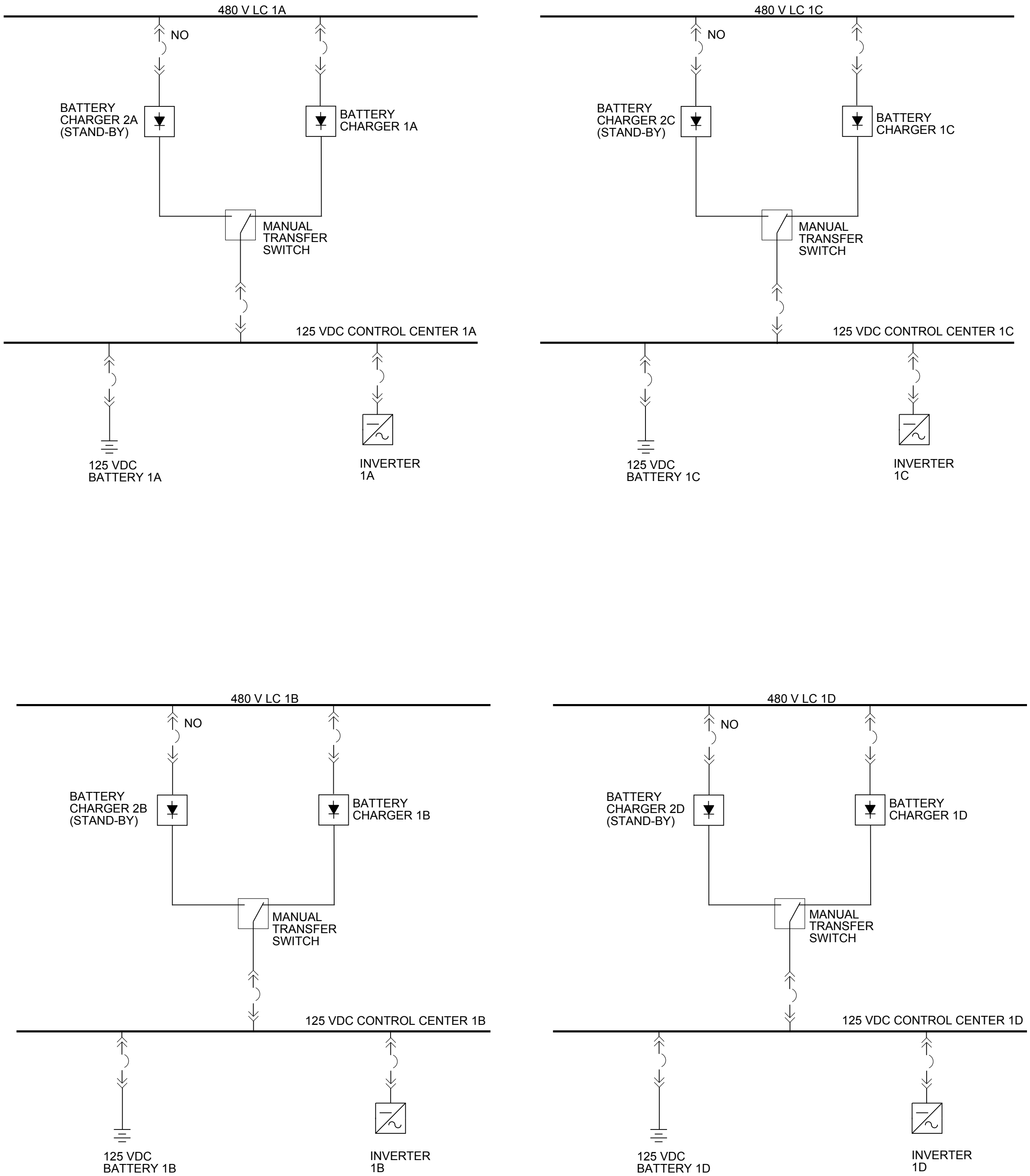


Figure 2.6.3-1 Class 1E DC Power System

2.6.4 Instrumentation and Control Power System

2.6.4.1 Design description

The instrumentation and control (I&C) power system consists of Class 1E and non-Class 1E power systems. The Class 1E 120 Vac I&C power system is separated into four subsystems, trains A, B, C, and D that supply power to the plant protection system channels A, B, C, and D. The Class 1E I&C power system includes four separate and independent 120 Vac power distribution panel, and each system is powered from a 125 Vdc control center via a 125 Vdc/120 Vac static inverter.

The Class 1E I&C power system is designed as follows:

1. The functional arrangement of the I&C power system is as described in the Design Description of Subsection 2.6.4.1 and as shown in Figure 2.6.4-1.

2. The seismic Category I equipment identified in Table 2.6.4-1 can withstand seismic design basis loads without loss of safety function.

3.a All displays and alarms required by the design exist in the MCR as defined in Table 2.6.4-2.

3.b All displays and alarms required by the design exist in the RSR as defined in Table 2.6.4-2.

4. When dc input power to the Class 1E inverter power supply unit is lost, input to the Class 1E inverter power supply unit is provided by the regulating transformer without interruption of power supply to the loads.

5. Class 1E I&C power system equipment identified in Table 2.6.4-1 is located in their respective areas.

6. Independence is provided among the four trains of Class 1E I&C power system equipment and circuits.

7. Independence is provided between Class 1E I&C power system equipment & circuits and non-Class 1E I&C power supply equipment & circuits.

8. Class 1E I&C power supply equipment and circuits of redundant train are uniquely identified by their train color and character.

9. Class 1E I&C power system cables are routed in seismic Category I structures and in their respective train raceways.

10. The Class 1E I&C power system equipment and circuits are rated to withstand fault currents for the time required to clear the fault from its power source.

11. The rating of the Class 1E I&C power system circuit breakers and fuses are designed to interrupt the fault currents.

2.6.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.4-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the I&C power system.

Table 2.6.4-1

Instrument and Control Power System Equipment Characteristics

Piping Name	Seismic Category	Class 1E/ Harsh Environ. Qual.
Class 1E Inverter 1A	I	Yes/No
Class 1E Inverter 1B	I	Yes/No
Class 1E Inverter 1C	I	Yes/No
Class 1E Inverter 1D	I	Yes/No
Class 1E Regulating Transformer 1A	I	Yes/No
Class 1E Regulating Transformer 1B	I	Yes/No
Class 1E Regulating Transformer 1C	I	Yes/No
Class 1E Regulating Transformer 1D	I	Yes/No
Class 1E 120 Vac Distribution Panel (included IN 1A)	I	Yes/No
Class 1E 120 Vac Distribution Panel (included IN 1B)	I	Yes/No
Class 1E 120 Vac Distribution Panel (included IN 1C)	I	Yes/No
Class 1E 120 Vac Distribution Panel (included IN 1D)	I	Yes/No

Table 2.6.4-2

Instrument and Control Power System Equipment Alarms/Displays and Control Functions

Equipment Name	Alarm/Display at MCR	Alarm/Display at RSR	Control at MCR/RSR
Class 1E Inverter 1A	Yes/Yes	Yes/Yes	N/A / N/A
Class 1E Inverter 1B	Yes/Yes	Yes/Yes	N/A / N/A
Class 1E Inverter 1C	Yes/Yes	Yes/Yes	N/A / N/A
Class 1E Inverter 1D	Yes/Yes	Yes/Yes	N/A / N/A
Class 1E Regulating Transformer 1A	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E Regulating Transformer 1B	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E Regulating Transformer 1C	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E Regulating Transformer 1D	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E 120 Vac Distribution Panel (included IN 1A)	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E 120 Vac Distribution Panel (included IN 1B)	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E 120 Vac Distribution Panel (included IN 1C)	N/A / N/A	N/A / N/A	N/A / N/A
Class 1E 120 Vac Distribution Panel (included IN 1D)	N/A / N/A	N/A / N/A	N/A / N/A

Table 2.6.4-3 (1 of 3)

Instrument and Control Power System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the I&C power system is as described in the Design Description of Subsection 2.6.4.1 and as shown in Figure 2.6.4-1.	1. Inspection of the as-built I&C power system will be performed.	1. The as-built I&C power system conforms with the functional arrangement as described in the Design Description of Subsection 2.6.4.1 and as shown in Figure 2.6.4-1.
2. The seismic Category I equipment identified in Table 2.6.4-1 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I equipment are located in the seismic Category I structure.	2.a The as-built seismic Category I equipment identified in Table 2.6.4-1 are located in the seismic Category I structure.
	2.b Type tests, analyses, or a combination of type tests and analyses of seismic Category I equipment will be performed.	2.b A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.6.4-1 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I equipment including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I equipment identified in Table 2.6.4-1 including anchorage are seismically bounded by the tested or analyzed conditions.
3.a All displays and alarms required by the design exist in the MCR as defined in Table 2.6.4-2.	3.a Inspections will be performed on the displays and alarms in the MCR.	3.a All displays and alarms exist and can be retrieved in the MCR as defined in Table 2.6.4-2.
3.b All displays and alarms required by the design exist in the RSR as defined in Table 2.6.4-2.	3.b Inspections will be performed on the displays and alarms in the RSR.	3.b All displays and alarms exist and can be retrieved in the RSR as defined in Table 2.6.4-2.

Table 2.6.4-3 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. When dc input power to the Class 1E inverter power supply unit is lost, input to the Class 1E inverter power supply unit is provided by the regulating transformer without interruption of power supply to the loads.	4. Tests will be performed to verify that when dc input power to the as-built Class 1E inverter power supply unit is lost, input to the Class 1E inverter power supply unit is provided by the Class 1E regulating transformer without interruption of power supply to the loads.	4. When dc input power to the as-built Class 1E inverter power supply unit is lost, input to the Class 1E inverter power supply unit automatically transfers to regulating transformer without interruption of power supply to the loads.
5. Class 1E I&C power system equipment identified in Table 2.6.4-1 is located in their respective areas.	5. Inspection of the as-built Class 1E I&C power system equipment will be performed.	5. The as-built Class 1E I&C power system equipment identified in Table 2.6.4-1 is located in their respective areas.
6. Independence is provided among the four trains of Class 1E I&C power system equipment and circuits.	6.a Tests will be performed on the as-built Class 1E I&C power supply equipment and circuits by providing a test signal in only one Class 1E train at a time.	6.a The test signal exists in the as-built Class 1E train under test.
	6.b Inspection of the as-built Class 1E train in the Class 1E I&C power supply system will be performed.	6.b Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between the Class 1E trains.
7. Independence is provided between Class 1E I&C power system equipment & circuits and non-Class 1E I&C power supply equipment & circuits.	7.a Tests will be performed on the as-built Class 1E & non-Class 1E I&C power system equipment and circuits by providing a test signal in only one train for Class 1E or one division for non-Class 1E at a time.	7.a The test signal in the as-built Class 1E train or non-Class 1E division under test.
	7b. Inspection of the as-built Class 1E I&C power system train will be performed	7b. Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between the as-built Class 1E I&C power system train and non-Class 1E divisions.

Table 2.6.4-3 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8. Class 1E I&C power supply equipment and circuits of redundant train are uniquely identified by their train color and character.	8. Inspection of the as-built Class 1E I&C power supply equipment and circuits of redundant train will be performed.	8. The as-built Class 1E I&C power supply equipment and circuits of redundant train are uniquely identified by their train color and character.
9. Class 1E I&C power system cables are routed in seismic Category I structures and in their respective train raceways.	9. Inspection of the as-built Class 1E I&C power system cables and raceways will be performed.	9. The as-built Class 1E train cables are routed in seismic Category I structures and in their respective train raceways.
10. The Class 1E I&C power system equipment and circuits are rated to withstand fault currents for the time required to clear the fault from its power source.	10. Analysis for the as-built electric power distribution system to determine fault currents will be performed.	10. A report exists and concludes that the as-built electric power distribution system exists and concludes that Class 1E equipment and circuits can withstand the analyzed fault currents for the time required.
11. The rating of the Class 1E I&C power system circuit breakers and fuses are designed to interrupt the fault currents.	11.a Analyses will be performed to verify the Class 1E I&C power system breakers and fuses are designed to interrupt the fault currents.	11.a A report exists and concludes that the rating of the Class 1E I&C power system breakers and fuses are designed to interrupt the fault currents.
	11.b Inspections will be performed to verify that the interrupting ratings of as-built Class 1E I&C power system breakers and fuses bound the requirements of the analysis.	11.b The as-built Class 1E I&C power system breakers and fuses have interrupting ratings that bound the requirements of the analysis.

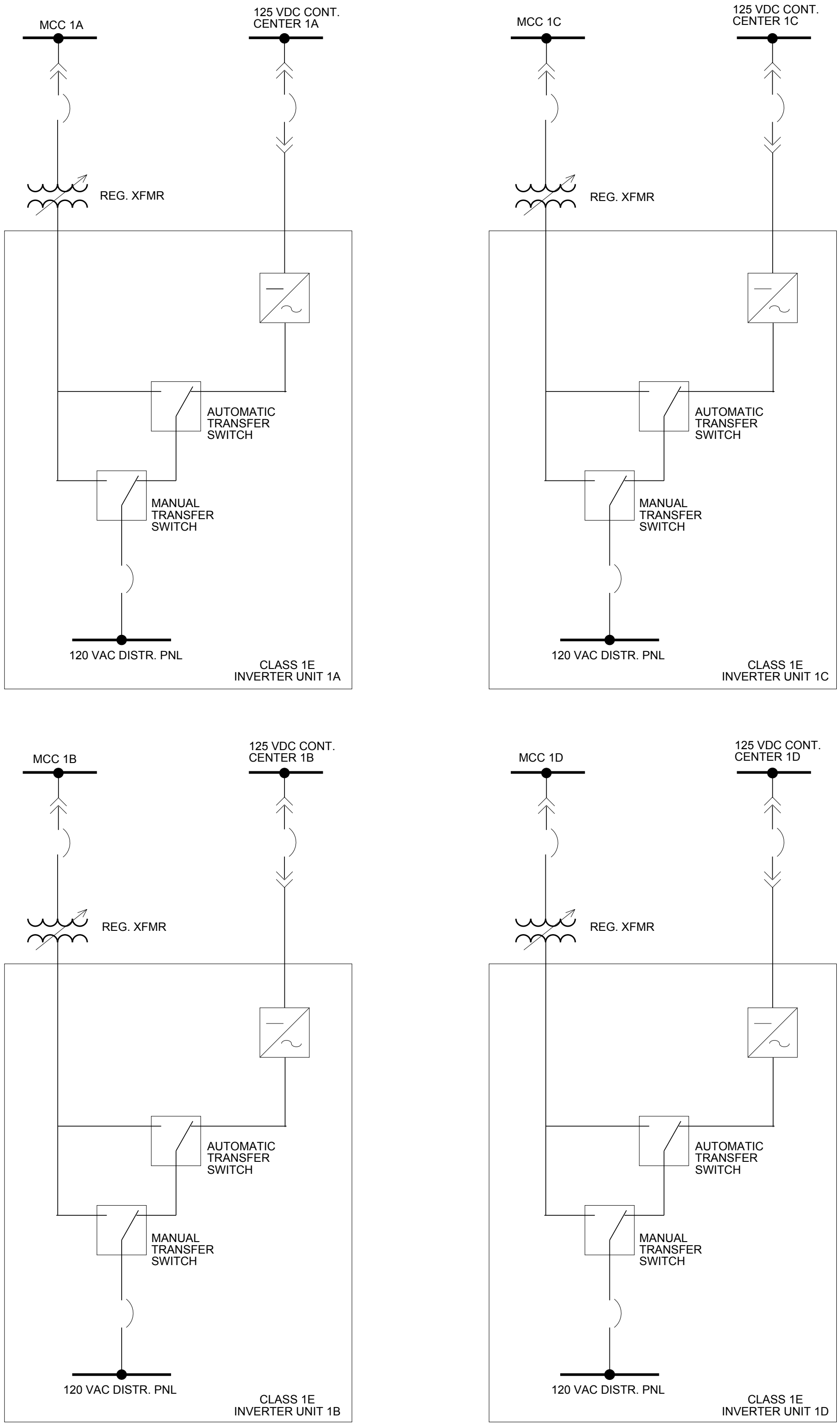


Figure 2.6.4-1 Instrumentation and Control Power System

2.6.5 Containment Electrical Penetration Assemblies

2.6.5.1 Design Description

Containment electrical penetration assemblies (EPAs) are provided for electrical cables passing through the containment. Containment EPAs are classified as seismic Category I.

Containment EPA is designed as follows:

1. The electric power, control, and instrumentation cables pass through the wall of reactor containment building (RCB) via the EPAs.
2. Each EPA can withstand the seismic design basis loads without loss of safety function.
3. Each EPA as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
4. Independence is provided between trains of EPAs and between EPAs containing Class 1E cables and EPAs containing non-Class 1E cables.
5. The primary and secondary protection devices for each EPA are designed and sized to protect EPA from overload and fault current.

2.6.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.5-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the containment EPAs.

Table 2.6.5-1 (1 of 2)

Containment Electrical Penetration Assemblies ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The electric power, control, and instrumentation cables pass through the wall of reactor containment building (RCB) via the EPAs.	1. Inspection of the as-built electric power, control and instrumentation cables that pass through the as-built wall of reactor containment building (RCB) will be performed.	1. A report exists and concludes that the as-built electric power, control, and instrumentation cables pass through the as-built wall of reactor containment building (RCB) via the as-built EPAs.
2. Each EPA can withstand the seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that each as-built EPA is located in a seismic Category I structure.	2.a A report exists and concludes that each as-built EPA is located in a seismic Category I structure.
	2.b Type tests, analyses, or a combination of type tests and analyses of each EPA will be performed using analytical assumptions, or will be performed under conditions which bound the seismic design basis requirements.	2.b A report exists and concludes that each EPA can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that each as-built EPA, including anchorages, is seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that each as-built EPA, including anchorages, is seismically bounded by the tested or analyzed conditions.

Table 2.6.5-1 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. Each EPA as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	3.a Type tests, analyses, or a combination of type tests and analyses will be performed on each EPA located in a harsh environment.	3.a A report exists and concludes that each EPA as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	3.b Inspections will be performed on each as-built EPA located in a harsh environment.	3.b A report exists and concludes that each as-built EPA as being qualified for a harsh environment is bounded by the tested or analyzed conditions.
4. Independence is provided between trains of EPAs and between EPAs containing Class 1E cables and EPAs containing non-Class 1E cables.	4. Inspection of the as-built EPAs will be performed.	4. Physical separation exists in accordance with NRC RG 1.75 between as-built trains of EPA and between EPAs containing Class 1E cables and EPAs containing non-Class 1E cables.
5. The primary and secondary protection devices for each EPA are designed and sized to protect EPA from overload and fault current.	5.a Analyses will be performed to verify that the primary and secondary protection devices are sized to protect EPA from overload and fault current.	5.a A report exists and concludes that the as-built primary and secondary protection devices are designed and sized to protect EPA from overload and fault current.
	5.b Inspection of the rating of the primary and secondary protection devices will be performed.	5.b A report exists and concludes that the as-built primary and secondary protection for each EPA meets the protective device selection and setting requirements of the analysis.

2.6.6 Alternate AC Source

2.6.6.1 Design Description

The alternate ac (AAC) source supplies power to safety-related loads to maintain the plant in a safe shutdown condition during station blackout (SBO). The AAC source also provides power to the permanent non-safety (PNS) buses during a loss of offsite power (LOOP) condition. The AAC source can be connected to Class 1E trains and PNS trains as shown on Figure 2.6.1-1. The AAC source is a gas turbine generator (GTG) that is independent from the EDGs and the offsite power sources.

The AAC source is designed as follows:

1. The functional arrangement of the AAC source is as described in the Design Description of Subsection 2.6.6.1.

2. The AAC source is sized with sufficient capacity to accommodate SBO or LOOP conditions.

3. The AAC source is connected to the Class 1E train A or train B bus through two in series (one Class 1E circuit breaker at the Class 1E bus and the other non-Class 1E circuit breaker at the non-Class 1E AAC bus) circuit breakers during SBO condition.

4. The AAC source can be started and connected manually to the Class 1E train A or train B bus within 10 minutes in the event of SBO.

5. The AAC source is installed in the separate building.

6. The GTG has sufficient fuel oil storage capacity to supply power to the required SBO loads for 24 hours.

7. The GTG fuel oil system is non safety-related and independent from that of the Class 1E EDGs.

8.a Each fuel oil transfer pump is capable of transferring oil from the fuel oil storage tank to its corresponding day tank at sufficient pressure and flow to cover the maximum demand at GTG continuous rated load while simultaneously increasing day tank level.

8.b The fuel oil transfer pumps have sufficient net positive suction head (NPSH).

9. One fuel oil transfer pump is designed to automatically supply fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.

10. The air intakes for the GTG combustion are separated from the GTG exhaust ducts.

2.6.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.6-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the AAC source.

Table 2.6.6-1 (1 of 3)

Alternate AC Source ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the AAC source is as described in the Design Description of Subsection 2.6.6.1.	1. Inspection of the as-built AAC source will be performed.	1. The as-built AAC source conforms with the functional arrangement described in the Design Description of Subsection 2.6.6.1.
2. The AAC source is sized with sufficient capacity to accommodate SBO or LOOP conditions.	2.a Analyses will be performed to verify that the AAC source is capable of supplying power for SBO or LOOP conditions.	2.a The calculated size of AAC source has the sufficient capacity to accommodate SBO or LOOP loads.
	2.b Inspections will be performed to verify that the rating of the as-built AAC source is consistent with the analysis.	2.b The rating of the as-built AAC source is consistent with the analysis.
3. The AAC source is connected to the Class 1E train A or train B bus through two in series (one Class 1E circuit breaker at the Class 1E bus and the other non-Class 1E circuit breaker at the non-Class 1E AAC bus) circuit breakers during SBO condition.	3. Inspection of the connection between as-built Class 1E train bus and as-built AAC source will be performed.	3. The as-built AAC source is connected to the Class 1E train A or train B bus through two in series (one Class 1E circuit breaker at the Class 1E bus and the other non-Class 1E circuit breaker at the non-Class 1E AAC bus) circuit breakers.
4. The AAC source can be started and connected manually to the Class 1E train A or train B bus within 10 minutes in the event of SBO.	4. Tests will be performed to verify that the as-built AAC source is started and connected manually to the as-built Class 1E train bus within 10 minutes of a simulated SBO event.	4. The result of the test concludes that the as-built AAC source is started and connected manually to the Class 1E train A or train B bus within 10 minutes of a simulated SBO event.
5. The AAC source is installed in the separate building.	5. Inspection of the location of the as-built AAC source will be performed.	5. The as-built AAC source is located in the dedicated building which is separated from the EDGs.

Table 2.6.6-1 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The GTG has sufficient fuel oil storage capacity to supply power to the required SBO loads for 24 hours.	6.a Analyses will be performed to determined the required GTG fuel oil storage tank capacity needed to supply power to the required SBO loads for 24 hours.	6.a A report exists and concludes the required GTG fuel oil storage tank capacity needed to supply power to the required SBO loads for 24 hours.
	6.b Inspection of the GTG fuel oil storage tank will be performed to verify that the capacity bounds the analysis.	6.b The as-built GTG fuel oil storage tank capacity bounds the analysis.
7. The GTG fuel oil system is non safety-related and independent from that of the Class 1E EDGs.	7. Inspections will be performed.	7. The as-built GTG fuel oil system is independent and separated from that of the EDG.
8.a Each fuel oil transfer pump is capable of transferring oil from the fuel oil storage tank to its corresponding day tank at sufficient pressure and flow to cover the maximum demand at GTG continuous rated load while simultaneously increasing day tank level.	8.a An analysis and test of each fuel oil transfer pump will be performed to determine the maximum demand at GTG continuous rated load while simultaneously increasing day tank level.	8.a A report exists and concludes that the size and flow rate of each as-built GTG fuel oil transfer pump bounds the analysis.
8.b The fuel oil transfer pumps have sufficient net positive suction head (NPSH).	8.b Test to measure the as-built fuel oil transfer pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	8.b A report exists and concludes that the as-built calculated NPSH available exceeds each fuel oil transfer pump's NPSH required.

Table 2.6.6-1 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. One fuel oil transfer pump is designed to automatically supply fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.	9. Tests will be performed on the as-built fuel oil transfer pump by providing a test signal of a simulated fuel oil day tank level.	9. The as-built fuel oil transfer pump starts automatically to supply fuel oil from the storage tank to the day tank prior to actuation of low level alarm and stops automatically on a fuel oil day tank high-level signal.
10. The air intakes for the GTG combustion are separated from the GTG exhaust ducts.	10. Inspection and analysis of the as-built GTG air intakes and air exhaust will be performed.	10. The air intake and air exhaust are separated by analyzed distance and orientation.

2.6.7 Lightning Protection and Grounding System

2.6.7.1 Design Description

The grounding and lightning protection system is provided for personnel and equipment protection from the effects of transient overvoltage that can occur in electrical systems due to electrical faults or lightning strikes. The grounding and lightning protection system is divided into subsystems such as neutraling grounding, equipment grounding, instrumentation grounding, and lightning protection, and connected to the plant ground grid. The ground conductor spacing and quantity are designed to be sufficient to limit touch voltages to tolerable values.

1. The functional arrangement of the grounding and lightning protection system is as described in the Design Description of Subsection 2.6.7.1.

2. Lightning protection systems are provided for buildings, structures and transformers located outside of the buildings. Surge arrestors are provided for main transformers, auxiliary transformers.

3. Neutral grounding is installed at the ground bus of main generator, main transformer, unit auxiliary transformers, standby auxiliary transformers, load center transformers, low voltage dry-type distribution transformers, EDGs, and AAC GTG.

4. Equipment grounding is installed around all metal structures such as buildings, tanks, transformers, transmission structures, equipment enclosure, raceway, etc.

5. Instrumentation grounding system is a separate radial ground systems which consist of instrumentation ground bus and insulated cables.

6. The plant ground grid consists of buried, interconnected bare copper conductors and ground rods forming a plant ground grid that is designed to limit personnel step and touch voltages to an acceptable level during a ground fault.

2.6.7.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.7-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the grounding and lightning system.

Table 2.6.7-1 (1 of 2)

Grounding and Lightning Protection System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the grounding and lightning protection system is as described in the Design Description of Subsection 2.6.7.1.	1. Inspection of the as-built grounding and lightning protection system will be performed.	1. The as-built grounding and lightning protection system conforms with the functional arrangement as described in the Design Description of Subsection 2.6.7.1.
2. Lightning protection systems are provided for buildings, structures and transformers located outside of the buildings. Surge arrestors are provided for main transformers, and auxiliary transformers.	2. Inspection of the as-built lightning protection systems will be performed.	2. A report and drawings exist and confirm that lightning protection systems are provided for buildings, structures and transformers located outside of the buildings. Surge arrestors are provided for main transformers, and auxiliary transformers.
3. Neutral grounding is installed at the ground bus of main generator, main transformer, unit auxiliary transformers, standby auxiliary transformers, load center transformers, low voltage dry-type distribution transformers, EDGs, and AAC GTG.	3. Inspection of the as-built neutral grounding system will be performed.	3. A report and drawings exist on that neutral grounding is installed at the ground bus of main generator, main transformer, unit auxiliary transformer, standby auxiliary transformer and load center.
4. Equipment grounding is installed around all metal structures such as buildings, tanks, transformers, transmission structures, equipment enclosure, raceway, etc.	4. Inspection of the as-built equipment grounding system will be performed.	4. A report and drawings exist and confirm that equipment grounding is installed around all metal structures such as buildings, tanks, transformers, transmission structures, equipment enclosure, raceway, etc.
5. Instrumentation grounding system is a separate radial ground systems which consist of instrumentation ground bus and insulated cables.	5. Inspection of the as-built instrumentation grounding system will be performed.	5. A report and drawings exist and confirm that instrumentation grounding system is a separate radial ground systems which consist of instrumentation ground bus and insulated cables.

Table 2.6.7-1 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The plant ground grid consists of buried, interconnected bare copper conductors and ground rods forming a plant ground grid that is designed to limit personnel step and touch voltages to an acceptable level during a ground fault.	6.a Analyses will be performed to design a plant ground grid that limits personnel step and touch voltages to an acceptable level.	6.a A report and drawings exist and confirm that the plant ground grid design limits personnel step and touch voltages to an acceptable level.
	6.b Inspection of the as-built plant ground grid will be performed to verify that the plant ground grid conforms to the analysis.	6.b The as-built plant ground grid design conforms to the analysis.

2.6.8 Lighting Systems

2.6.8.1 Design Description

The plant lighting system is non-Class 1E and consists of two subsystems which are normal lighting and emergency lighting. Emergency lighting system is divided into emergency ac and dc lighting system.

1. The functional arrangement of the lighting system is as described in the Design Description of Subsection 2.6.8.1.

2. The normal lighting system provides normal levels of illumination throughout the plant and is powered from the non-Class 1E ac buses.

3. The emergency ac lighting system is powered from the Class 1E ac buses backed-up by the Class 1E emergency diesel generators.

4.a There are two configurations for lighting fixture used within the emergency dc lighting system, lighting fixtures powered from non-Class 1E station battery and self-contained battery pack unit lighting fixtures.

4.b The emergency dc lighting fixtures equipped with self-contained rechargeable battery pack are powered from Class 1E or non-Class 1E ac in accordance with area designation. The emergency illumination level is at least 0.1 foot-candle at the floor level for 8 hours.

5. The emergency illumination levels in MCR and RSR are minimum 10 foot-candle for 8 hours.

2.6.8.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.8-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the lighting system.

Table 2.6.8-1 (1 of 2)

Lighting Systems ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the lighting system is as described in the Design Description of Subsection 2.6.8.1.	1. Inspection of the as-built lighting system will be performed.	1. The as-built lighting system conforms with the functional arrangement as described in the Design Description of Subsection 2.6.8.1.
2. The normal lighting system provides normal levels of illumination throughout the plant and is powered from the non-Class 1E ac buses.	2. Inspection of the as-built normal lighting system will be performed.	2. A report and drawings exist and conclude that the normal lighting system provides normal levels of illumination throughout the plant and is powered from the non-Class 1E ac buses.
3. The emergency ac lighting system is powered from the Class 1E ac buses backed-up by the Class 1E emergency diesel generators.	3. Inspection of the as-built emergency ac lighting will be performed.	3. A report and drawings exist and conclude that the emergency ac lighting system is powered from the Class 1E ac buses backed-up by the Class 1E emergency diesel generators.
4.a There are two configurations for lighting fixture used within the emergency dc lighting system, lighting fixtures powered from non-Class 1E station battery and self-contained battery pack unit lighting fixtures.	4.a Inspection of the as-built emergency dc lighting will be performed.	4.a A report and drawings exist and conclude that there are two configurations for lighting fixture used within the emergency dc lighting system, lighting fixtures powered from non-Class 1E station battery and self-contained battery pack unit lighting fixtures.

Table 2.6.8-1 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.b The emergency dc lighting fixtures equipped with self-contained rechargeable battery pack are powered from Class 1E or non-Class 1E ac in accordance with area designation. The emergency illumination level is at least 0.1 foot-candle at the floor level for 8 hours.	4.b.i Inspection of the as-built emergency dc lighting will be performed.	4.b.i The as-built emergency dc lighting fixture equipped with self-contained rechargeable battery pack are powered from Class 1E or non-Class 1E ac in accordance with area designation.
	4.b.ii Test of the emergency dc self-contained battery pack lighting units will be performed.	4.b.ii The illumination level is at least 0.1 foot-candle at the floor level for 8 hours.
5. The emergency illumination levels in MCR and RSR are minimum 10 foot-candle for 8 hours.	5. Test of the as-built emergency lighting system in MCR and RSR are will be performed.	5. The as-built emergency illumination levels in MCR and RSR are minimum 10 foot-candle for 8 hours as required by NUREG-0700.

2.6.9 Communication Systems

2.6.9.1 Design Description

The plant communication systems are non safety-related systems that provide effective intra-plant and plant-to-offsite communications. The following buildings contain communications systems:

- Reactor containment building
- Turbine generator building
- Auxiliary building
- Compound building
- Emergency diesel generator building
- Alternate ac diesel generator building

The communication systems consist of the following independent subsystems:

- Page phone system
- Evacuation alarm address system
- Public address system
- Sound powered telephone system
- Telephone system
- Plant time synchronizing system
- LAN system
- Wireless communication system

1. The functional arrangement of the communication systems are as described in the Design Description of Subsection 2.6.9.1.

2. Communication systems provide communication facilities between various plant buildings and offsite areas during both normal and emergency operations.

3. Communication systems are provided to ensure a reliable means of intra-plant communication.

2.6.9.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.6.9-1 describes the inspections, tests, analyses, and associated acceptance criteria for the communication systems.

Table 2.6.9-1

Communication Systems ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the communication systems are as described in the Design Description of Subsection 2.6.9.1.	1. Inspection of the as-built communication systems will be performed.	1. The as-built communication systems conform with the functional arrangement as described in the Design Description of Subsection 2.6.9.1.
2. Communication systems provide communication facilities between various plant buildings and offsite areas during both normal and emergency operations.	2. Test of the as-built communication systems between plant buildings and offsite areas will be performed.	2. The as-built communication systems between plant buildings and offsite areas have been established.
3. Communication systems are provided to ensure a reliable means of intra-plant communication.	3. Test of the as-built communication systems between plant buildings (intra-plant communications) will be performed.	3. The as-built communication systems between plant buildings (intra-plant communications) have been established.

2.7 Plant Systems

2.7.1 Power Generation Systems

2.7.1.1 Turbine Generator

2.7.1.1.1 Design Description

The turbine generator (T/G) is a non safety-related system and converts the energy of the steam produced from the steam generators into mechanical rotor power and then electrical energy.

The T/G is located within the turbine building and consists of:

- One (1) double-flow high pressure (HP) turbine
- Three (3) double-flow low pressure (LP) turbines
- A generator and exciter
- Two (2) sets of moisture separator and reheaters
- Associated piping, valves, control system
- Auxiliary systems

The main stop valves (MSVs) and control valves (CVs) are arranged in series at the HP turbine inlet and control the steam flow entering the HP turbine. The intermediate stop valves (ISVs) and intercept valves (IVs) are arranged in series at the inlet to the LP turbines, and control steam flow to the LP turbines. The non-return check valves are installed in the extraction lines to the feedwater heaters.

1. The functional arrangement of the T/G system is as described in the Design Description of Subsection 2.7.1.1.1 and as shown in Figure 2.7.1.1-1.

2.a The mechanical overspeed trip (MOST) system initiates the T/G trip reaching at an overspeed setpoint.

2.b The electrical overspeed trip (EOST) system initiates the T/G trip by an EOST signal.

3. Controls generate the electrical signals in the main control room (MCR) for T/G trip.

4. The MSVs, CVs, ISVs, and IVs close reacting to a T/G trip signal.

5. The non-return check valves on extraction lines close reacting to T/G trip signal.

6. The input signal from plant control system on reactor trip initiates a T/G trip.

2.7.1.1.2 Inspection, Tests, Analyses, and Acceptance Criteria

Table 2.7.1.1-1 describes the ITAAC for the T/G.

Table 2.7.1.1-1

Turbine Generator ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the T/G system is as described in the Design Description of Subsection 2.7.1.1.1 and as shown in Figure 2.7.1.1-1.	1. Inspection of the as-built T/G system configuration will be conducted.	1. The as-built T/G conforms with the functional arrangement as described in the Design Description of Subsection 2.7.1.1.1 and as shown on Figure 2.7.1.1-1.
2.a The mechanical overspeed trip (MOST) system initiates the T/G trip reaching at an overspeed setpoint.	2.a A trip test will be conducted on the as-built main turbine MOST system to ensure the T/G trip reaching an overspeed setpoint.	2.a The as-built MSVs, CVs, ISVs, and IVs close when the MOST system initiates the T/G trip reaching a setpoint for overspeed protection.
2.b The electrical overspeed trip (EOST) system initiates the T/G trip by an EOST signal.	2.b A trip test will be conducted on the as-built main turbine EOST system by an actual or simulated trip signal.	2.b The as-built MSVs, CVs, ISVs, and IVs close when the EOST system initiates the T/G trip by an actual or simulated EOST signal.
3. Controls generate the electrical signals in the main control room (MCR) for T/G trip.	3. Tests will be conducted on the as-built T/G system by controls in the MCR.	3. Controls in the as-built MCR close the MSVs, CVs, ISVs, and IVs.
4. The MSVs, CVs, ISVs, and IVs close reacting to a T/G trip signal.	4. Tests will be conducted on the as-built MSVs, CVs, ISVs, and IVs by an actual or simulated turbine trip signal.	4. Each MSV, CV, ISV, and IV closes within about 0.3 seconds reaching to an actual or simulated trip signal.
5. The non-return check valves on the extraction lines close reacting to a T/G trip signal.	5. Tests will be conducted on the as-built extraction non-return check valves by an actual or simulated turbine trip signal	5. The non-return check valve closes within about 0.6 second reaching to T/G trip signal.
6. The input signal from plant control system on reactor trip initiates a T/G trip.	6. A test of the as-built system will be conducted by a simulated reactor trip signal.	6. The as-built control logic generates a T/G trip by a simulated reactor trip signal.

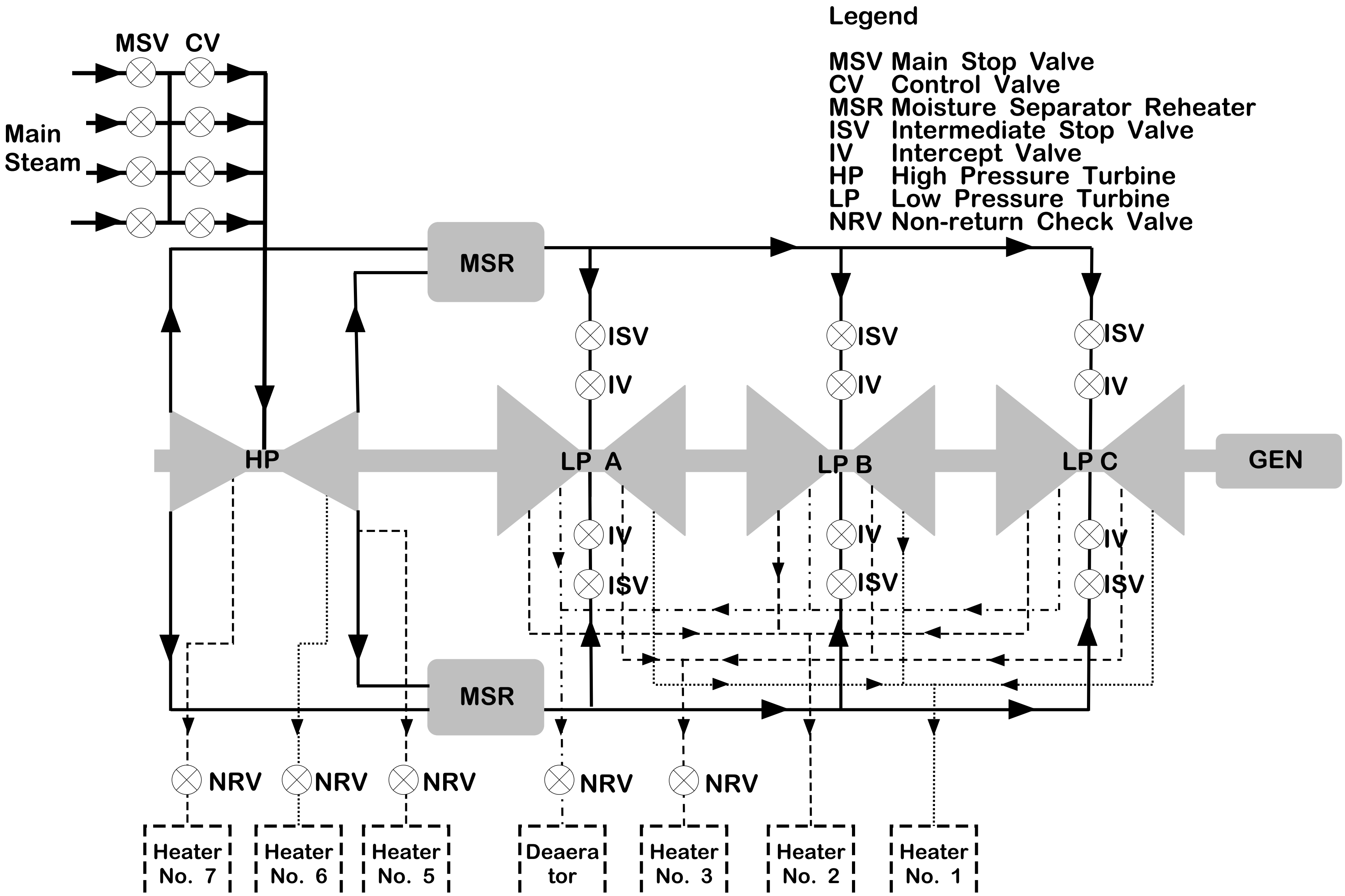


Figure 2.7.1.1-1 Typical Arrangement of T/G system

2.7.1.2 Main Steam System

2.7.1.2.1 Design Description

The main steam system (MSS) transports steam from the steam generators to the power conversion system and removes heat from the reactor coolant system (RCS).

The safety-related portion of the MSS consists of the main steam piping and valves located between the steam generator outlet nozzles in the containment up to and including the main steam isolation valves (MSIVs) in the main steam valve houses (MSVHs). The non safety-related portions of the MSS, downstream of the isolation valves, are located in the auxiliary building and the turbine building.

The MSS has the following safety-related functions:

- To supply steam to the auxiliary feedwater pump turbine
- To protect the steam generator and pressure boundary components in the MSS from over pressurization
- To cooldown the Reactor Coolant System through a controlled discharge of steam to the atmosphere
- To isolate the containment and steam generator

The MSS has the following non safety-related functions:

- To supply steam to the main turbine
- To provide a flow path to the turbine bypass system

The MSS is designed as follows:

1. The functional arrangement of the MSS is as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1 and as shown in the Figure 2.7.1.2-1.

2.a The ASME Code components identified in Table 2.7.1.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.1.2-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.2-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.2-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.1.2-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.1.2-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports identified in Table 2.7.1.2-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components identified in Tables 2.7.1.2-2 and 2.7.1.2-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, AOVs, and electro-hydraulic valves identified in Table 2.7.1.2-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs, AOVs and electro-hydraulic valves identified in Table 2.7.1.2-2, assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close MOVs, AOVs and electro-hydraulic valves listed in Table 2.7.1.2-2.

8.b All controls required by the design exist in the RSR to open and close MOVs, AOVs and electro-hydraulic valves listed in Table 2.7.1.2-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.2-2 and 2.7.1.2-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.2-2 and 2.7.1.2-3.

9. Each mechanical division of the MSS is physically separated from the other divisions.

10. The MSSVs, identified in the Table 2.7.1.2-2, provide overpressure protection for the secondary side of the steam generators and for pressure boundary components in the MSS.

11. The MSIVs and MSIV bypass valves identified in Table 2.7.1.2-2 close on receipt of an MSIS within the required response time.

2.7.1.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.1.2-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the MSS.

Table 2.7.1.2-1

Main Steam System Equipment and Piping Location/Characteristics

Equipment & Piping Name	Location	ASME Section III Class	Seismic Category
MSADV (Electro-Hydraulic)	MSVH	2	I
MSADV isolation valve (MOV)	MSVH	2	I
AF pump turbine steam supply valve (AOV)	MSVH	2	I
AF pump warmup valve (AOV)	MSVH	2	I
MS line drain isolation valve (AOV)	MSVH	2	I
MSIV (Electro-Hydraulic)	MSVH	2	I
MSIVBV (Electro-Hydraulic)	MSVH	2	I
MSIVBV flow control valve (MOV)	MSVH	2	I
MSSV (Spring-loaded Valve)	MSVH	2	I
Piping from SG outlet up to and including MSVH penetration anchor wall	CB, MSVH	2	I
Piping from outlet of MSADVs and MSSVs	MSVH, Atmospheric	NNS	II

Table 2.7.1.2-2 (1 of 2)

Main Steam System Components List

Component Name	Item No. [1]	ASME Code Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
MSADV (Electro-Hydraulic)	MS-V101, 102, 103,104	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open-Close (Modulation)	Close
MSADV isolation valve (MOV)	MS-V105,106, 107,108	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	-	As-is
AF pump turbine steam supply valve (AOV)	MS-V109,110	2	I	Yes/Yes	Yes/Yes	Yes/Yes	AFAS	Close	Open
AF pump warmup valve (AOV)	MS-V111,112	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
MS line drain isolation valve (AOV)	MS-V090, 091, 092, 093	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MSIV (Electro-Hydraulic)	MS-V011, 012, 013, 014	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MSIVBV (Electro-Hydraulic)	MS-V015, 016, 017, 018	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MSIVBV flow control valve (MOV)	MS-V019, 020, 021, 022	2	I	No/Yes	Yes/Yes	Yes/Yes	-	-	As-is

Table 2.7.1.2-2 (2 of 2)

Component Name	Item No. [1]	ASME Code Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
MSSV (Spring-loaded Valve)	MS-V1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320	2	I	N/A / Yes	No/Yes	No/Yes	-	Open/Close	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.1.2-3

Main Steam System Instrument List

Instrument Name	Item No. (1)	Location	ASME Section III Classification	Seismic Category	Electrical Class 1E/ Harsh Environ. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Steam Generator No.1 Pressure Transmitter	PT-1013A, 1013B, 1013C, 1013D	RCB	3	I	Yes/Yes	Yes/No	Yes/No
Steam Generator No.2 Pressure Transmitter	PT-1023A, 1023B, 1023C, 1023D	RCB	3	I	Yes/Yes	Yes/No	Yes/No
Steam Generator No.1 Flow Transmitter	FT-1011X, 1011Y, 1012X, 1012Y	RCB	NNS	II	No/No	Yes/No	Yes/No
Steam Generator No.2 Flow Transmitter	FT-1021X, 1021Y, 1022X, 1022Y	RCB	NNS	II	No/No	Yes/No	Yes/No
Main Steam Line Pressure Transmitter	PT-1024, 1027	MSVH	NNS	II	No/No	Yes/No	Yes/No
Main Steam Line Temperature Transmitter	TE-001, 002, 003, 004	MSVH	NNS	II	No/No	Yes/No	Yes/No
MSSV Leak monitoring sensor	XE-1301X/Y ~ 1320 X/Y	MSVH	NNS	II	No/No	No/Yes	No/Yes
Main Steam Common Header Pressure Indicator	PI-020	TGB	NNS	III	- /No	- / -	- / -
Main Steam Common Header Temperature Element	TE-021	TGB	NNS	III	No /No	Yes / No	Yes / No

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.1.2-4 (1 of 6)

Main Steam System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the MSS is as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1 and as shown in the Figure 2.7.1.2-1.	1. Inspection of the as-built MSS will be conducted.	1. The as-built MSS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.1.2.1 and in Table 2.7.1.2-1 and as shown in Figure 2.7.1.2-1.
2.a The ASME Code components identified in Table 2.7.1.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.1.2-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.1.2-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.1.2-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.2-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and conclude that the ASME Section III requirements are met for non destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.1.2-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.2-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.1.2-1.

Table 2.7.1.2-4 (2 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.1.2-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and conclude that the results of the hydrostatic test of the as-built components identified in Table 2.7.1.2-2 conform with the ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.1.2-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and conclude that the results of the hydrostatic test of the as-built piping identified in Table 2.7.1.2-1 conform with the ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 can withstand Seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.1.2-2 and 2.7.1.2-3 including anchorages are seismically bounded by the tested or analyzed conditions.

Table 2.7.1.2-4 (3 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping, including supports identified in Table 2.7.1.2-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping, including supports located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping, including supports identified in Table 2.7.1.2-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.7.1.2-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Table 2.7.1.2-2 and 2.7.1.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Table 2.7.1.2-2 and 2.7.1.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Table 2.7.1.2-2 and 2.7.1.2-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
6.b Each of the Class 1E components and instruments identified in Table 2.7.1.2-2 and 2.7.1.2-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Table 2.7.1.2-2 and 2.7.1.2-3 powered from the Class 1E division under test.

Table 2.7.1.2-4 (4 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.c Separation is provided between Class 1E divisions , and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, AOVs, and electro-hydraulic valves identified in table 2.7.1.2-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs, AOVs, and electro-hydraulic valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV, AOV, or electro-hydraulic valve changes position as indicated in Table 2.7.1.2-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs, AOVs and electro-hydraulic valves will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV, AOV, or elector-hydraulic valve changes position as indicated in Table 2.7.1.2-2 under pre-operational test conditions.
7.b After loss of motive power, the MOVs, AOVs and electro-hydraulic valves, identified in Table 2.7.1.2-2, assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs, AOVs and electro-hydraulic valves will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV, AOV, or electro-hydraulic valve identified in Table 2.7.1.2-2 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to open and close the MOVs, AOVs and electro-hydraulic valves listed in Table 2.7.1.2-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR open and close the MOVs, AOVs and electro-hydraulic valves listed in Table 2.7.1.2-2.
8.b All controls required by the design exist in the RSR to open and close the MOVs, AOVs and electro-hydraulic valves listed in Table 2.7.1.2-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR open and close the MOVs, AOVs and electro-hydraulic valves identified in Table 2.7.1.2-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.2-2.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.1.2-2.

Table 2.7.1.2-4 (5 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.2-2.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.1.2-2.
9. Each mechanical division of the MSS is physically separated from the other divisions.	9. Inspections of the as-built mechanical divisions will be performed.	9. Each mechanical division of the MSS is physically separated by a divisional wall or a fire barrier.
10. The MSSVs, identified in the Table 2.7.1.2-2, provide overpressure protection for the secondary side of the steam generators and for pressure boundary components in the MSS.	10.a Testing and analysis of the MSSVs, identified in Table 2.7.1.2-2, will be performed to confirm the requirement of the MSSV relief capacity in accordance with ASME Section III.	10.a A report exists and concludes that the total rated capacity of the MSSVs identified in Table 2.7.1.2-2 is greater than or equal to pass 8.62×10^6 kg/hr (19×10^6 1b/hr) at a steam generator pressure of 92.81 kg/cm^{2}A (1,320 psia) (110 % of steam generator design pressure).
	10.b Testing and analysis of the MSSVs, identified in Table 2.7.1.2-2, will be performed to confirm the requirement of the maximum capacity limit of each MSSV.	10.b A report exists and concludes the maximum capacity limit of each MSSV is no greater than 0.907×10^6 kg/hr (2.0×10^6 lb/hr) at a steam generator pressure of 70.31 kg/cm^{2}A (1,000 psia).
	10.c Testing and analysis of the MSSVs, identified in Table 2.7.1.2-2, will be performed to confirm each MSSV lift setpoint and MSSV relief capacity in accordance with ASME Section III.	10.c A report exists and concludes the lift settings of the MSSVs, identified in Table 2.7.1.2-2, are as follows: - First stage : 82.54 kg/cm^2 G (1,174 psig)±1% - Second stage: 84.72 kg/cm^2 G (1,205 psig)±1% - Third stage: 86.48 kg/cm^2 G (1,230 psig)±1%

Table 2.7.1.2-4 (6 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The MSIVs and MSIV bypass valves identified in Table 2.7.1.2-2 close on receipt of an MSIS within the required response time.	11. Test will be performed using a simulated actuation signal an MSIS under preoperational test conditions.	11. A report exists and concludes the as-built MSIVs and MSIV bypass valves close within the required response time under preoperational test conditions.

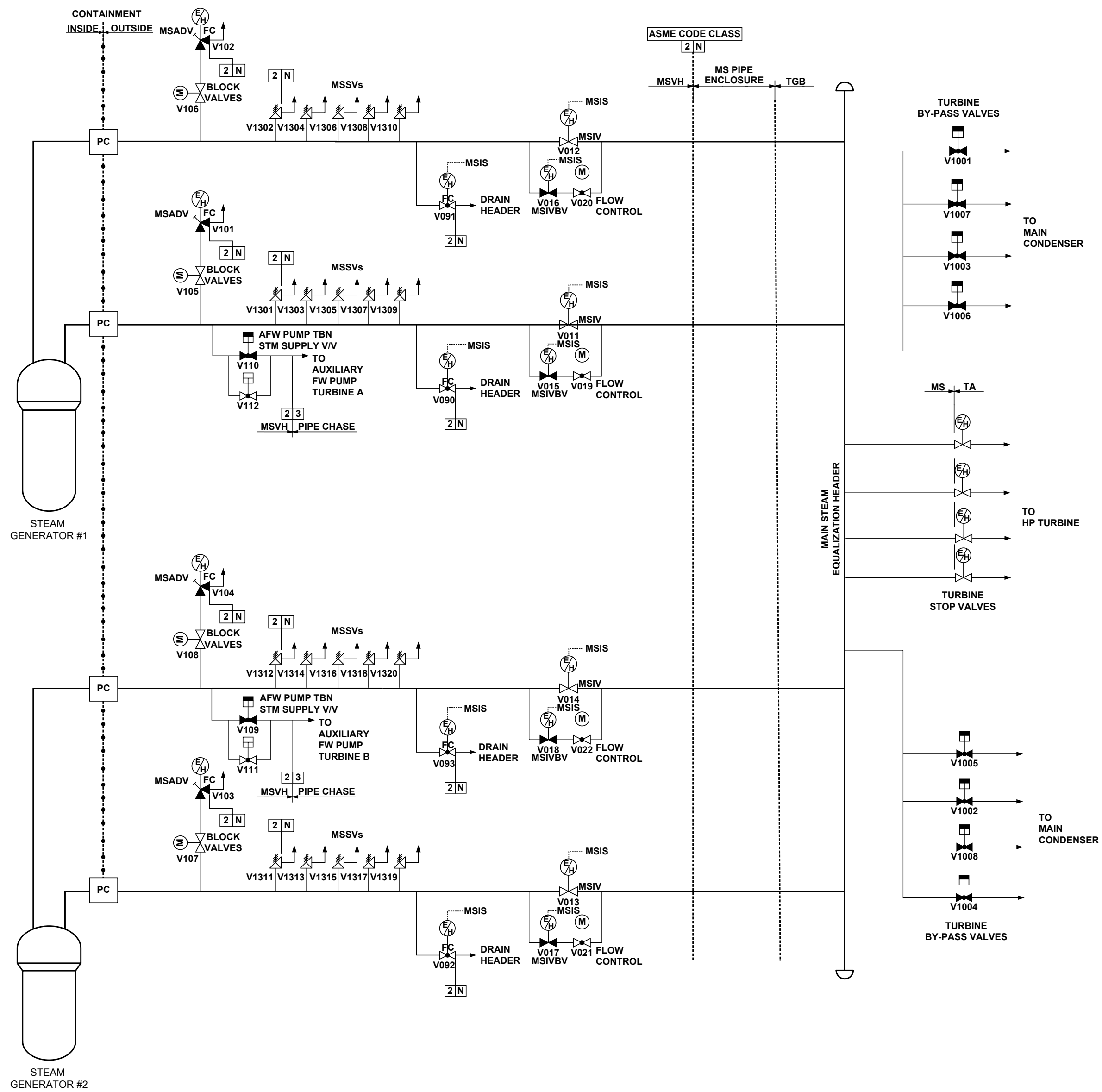


Figure 2.7.1.2-1 Main Steam System

2.7.1.3 Turbine Bypass System

The turbine bypass system does not perform safety functions, so that ITAAC is not provided.

2.7.1.4 Condensate and Feedwater System

2.7.1.4.1 Design Description

The condensate and feedwater system delivers feedwater from the condenser hotwells to the steam generators during startup, shutdown, normal operation, and hot standby operation.

The safety-related function of the feedwater system is to isolate feedwater to the steam generators after receipt of a main steam isolation signal (MSIS).

The safety related portions of the feedwater system are located in the main steam valve houses of the auxiliary building and reactor containment building. Non safety-related portion is located in the turbine building.

The condensate and feedwater system is designed as follows:

1. The functional arrangement of the condensate and feedwater system is as described in the Design Description of Subsection 2.7.1.4.1 and in Table 2.7.1.4-1 and as shown in Figure 2.7.1.4-1.

2.a The ASME Code components identified in Table 2.4.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME code piping including supports identified in Table 2.7.1.4-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.4-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.4-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.1.4-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.1.4-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.1.4-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a AOVs, electro- hydraulic valves and check valves identified in Table 2.7.1.4-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.

8.b All controls required by the design exist in the RSR to open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.

9. The main feedwater isolation valves close on receipt of an MSIS within the required response time.

2.7.1.4.2 Inspection, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the condensate and feedwater systems are specified in Table 2.7.1.4-4.

Table 2.7.1.4-1

Condensate and Feedwater System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location[1]	ASME Section III Class	Seismic Category
The portion of the piping from MSVH to S/G inlet including feedwater chemical injection line	RCB and MSVH	2	I
Main Feedwater Check Valve (outside containment)	MSVH	2	I
Main Feedwater Check Valve (inside containment)	RCB	2	I
Main Feedwater Isolation Valve (electro-hydraulic)	MSVH	2	I
Chemical Injection Valve (AOV)	MSVH	2	I
Chemical Injection Check Valve	MSVH	2	I

(1) RCB : Reactor Containment Building, MSVH : Main Steam Valve House

Table 2.7.1.4-2

Condensate and Feedwater System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Main Feedwater Check Valve (outside Containment)	FW-V1035, V1039, V1042, V1046	2	I	-/Yes	No/No	No/No	-	Close	-
Main Feedwater Check Valve (inside Containment)	FW-V1036, V1037, V1040, V1043, V1044, V1047	2	I	-/Yes	No/No	No/No	-	Close	-
Main Feedwater Isolation Valve (Electro-Hydraulic)	FW-V121, V122, V123, V124, V131 ,V132, V133, V134	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
Chemical Injection Valve (AOV)	FW-V138, V139	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
Chemical Injection Check Valve	FW-V1050, V1052	2	I	-/Yes	No/No	No/No	-	Close	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash (-) indicates not applicable.

Table 2.7.1.4-3 (1 of 2)

Condensate and Feedwater System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
S/G 1 Channel A Narrow Range Level	L-1111Y	RCB [2]	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 1 Channel A Narrow Range Level	L-1114A	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel A Wide Range Level	L-1113A	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel A Temp.	T-1113	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 1 Channel B Narrow Range Level	L-1114B	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel B Wide Range Level	L-1115X	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 1 Channel B Wide Range Level	L-1113B	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel B Temp.	T-1114	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 1 Channel C Narrow Range Level	L-1114C	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel C Wide Range Level	L-1115Y	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 1 Channel C Wide Range Level	L-1113C	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel C Temp.	T-1115	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 1 Channel D Narrow Range Level	L-1111X	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 1 Channel D Narrow Range Level	L-1114D	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel D Wide Range Level	L-1113D	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 1 Channel D Temp.	T-1116	RCB	NNS	II	No/No	Yes/No	Yes/No

Table 2.7.1.4-3 (2 of 2)

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
S/G 2 Channel A Narrow Range Level	L-1121Y	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 2 Channel A Narrow Range Level	L-1124A	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel A Wide Range Level	L-1123A	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel A Temp.	T-1123	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 2 Channel B Narrow Range Level	L-1124B	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel B Wide Range Level	L-1125X	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 2 Channel B Wide Range Level	L-1123B	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel B Temp.	T-1124	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 2 Channel C Narrow Range Level	L-1124C	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel C Wide Range Level	L-1125Y	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 2 Channel C Wide Range Level	L-1123C	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel C Temp.	T-1125	RCB	NNS	II	No/No	Yes/No	Yes/No
S/G 2 Channel D Narrow Range Level	L-1121X	RCB	NNS	II	No/No	Yes/Yes	Yes/Yes
S/G 2 Channel D Narrow Range Level	L-1124D	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel D Wide Range Level	L-1123D	RCB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
S/G 2 Channel D Temp.	T-1126	RCB	NNS	II	No/No	Yes/No	Yes/No

(1) The column “Item No.” is information only (not part of certified design).

(2) RCB : Reactor Containment Building

Table 2.7.1.4-4 (1 of 5)

Condensate and Feedwater System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the condensate and feedwater system is as described in the Design Description of Subsection 2.7.1.4.1 and in Table 2.7.1.4-1 and as shown in Figure 2.7.1.4-1.	1. Inspection of the as-built condensate and feedwater system will be performed.	1. The as-built condensate and feedwater system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.1.4.1 and in Table 2.7.1.4-1 and as shown in Figure 2.7.1.4-1
2.a The ASME Code components identified in Table 2.4.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports or data reports.	2.a The ASME Section III design reports or data reports exist and conclude that the as-built components identified in Table 2.7.1.4-2 are designed and constructed in accordance with ASME section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.1.4-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design reports exist and conclude that the as-built piping including supports identified in Table 2.7.1.4-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.4-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.1.4-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.4-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.1.4-1.

Table 2.7.1.4-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.1.4-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.1.4-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.1.4-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.1.4-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Table 2.7.1.4-2 and 2.7.1.4-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Table 2.7.1.4-2 and 2.7.1.4-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Table 2.7.1.4-2 and 2.7.1.4-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Table 2.7.1.4-2 and 2.7.1.4-3 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.7.1.4-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.7.1.4-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structures.	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.1.4-1 is located in the seismic Category I structures.
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.1.4-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.1.4-2 and 2.7.1.4-3 as being qualified for a harsh environment are bounded by type tests, analyses or a combination of type tests and analyses.

Table 2.7.1.4-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.7.1.4-2 and 2.7.1.4-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Table 2.7.1.4-2 and 2.7.1.4-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a AOVs, electro- hydraulic valves and check valves identified in Table 2.7.1.4-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of AOVs, electro-hydraulic valves and check valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each AOV, electro-hydraulic valve or check valve changes position as indicated in Table 2.7.1.4-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built AOVs and electro-hydraulic valves will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each AOV or electro- hydraulic valves changes position as indicated in Table 2.7.1.4-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.1.4-2 under pre-operational test conditions.
7.b After loss of motive power, AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2 assume the indicated loss of motive power position.	7.b Test of the as-built AOVs and electro-hydraulic valves will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built AOV or electro-hydraulic valve identified in Table 2.7.1.4-2 assumes the indicated loss of motive power position.

Table 2.7.1.4-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.
8.b All controls required by the design exist in the RSR to open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR open and close AOVs and electro-hydraulic valves identified in Table 2.7.1.4-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.1.4-2 and 2.7.1.4-3.
9. The main feedwater isolation valves close on receipt of an MSIS within the required response time.	9. Test will be performed using a simulated actuation signal of an MSIS.	9. A report exists and concludes the as-built MFIVs close within the required response time after receipt of an MSIS simulated actuation signal.

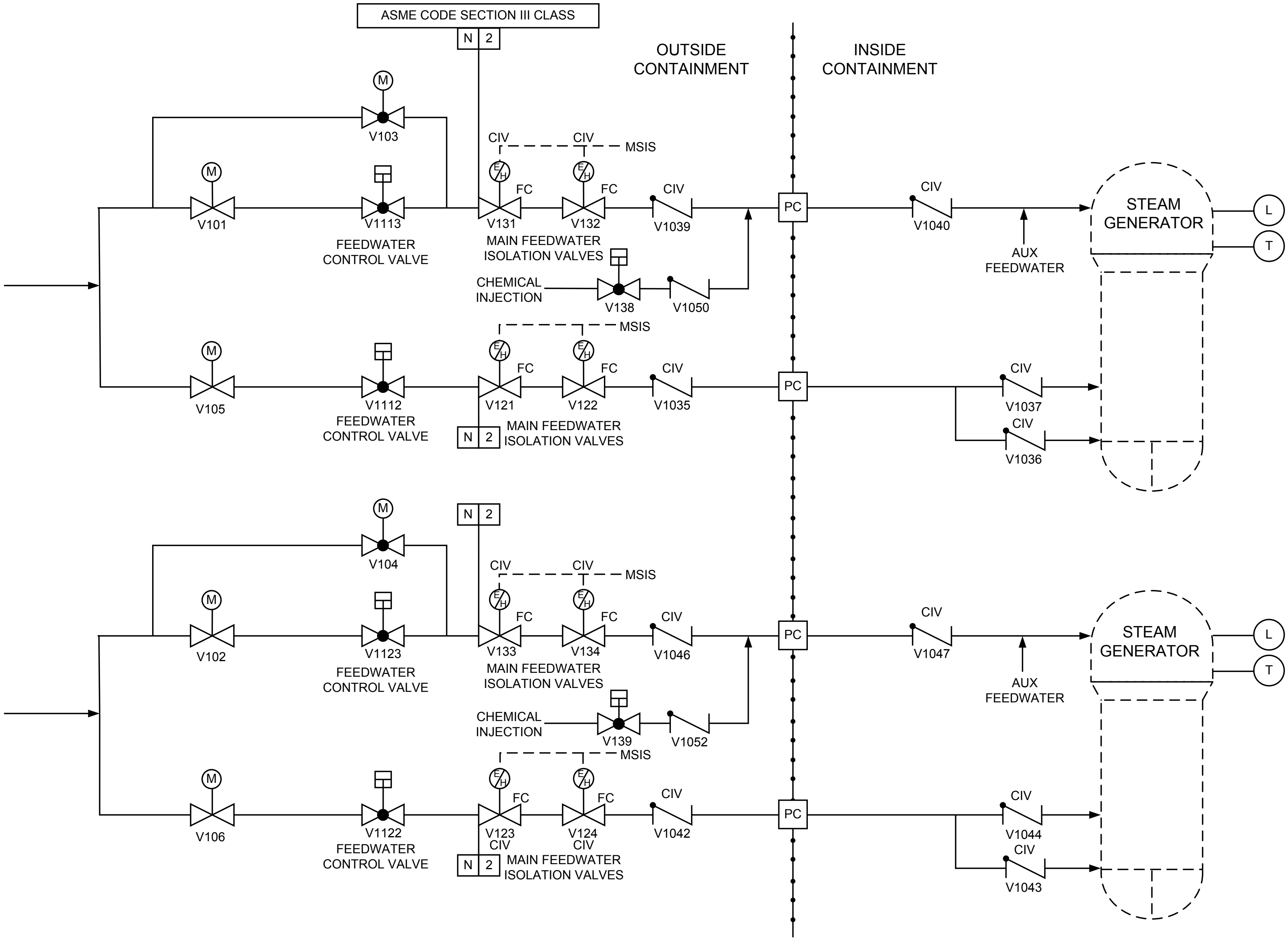


Figure 2.7.1.4-1 Condensate and Feedwater System

2.7.1.5 Auxiliary Feedwater System

2.7.1.5.1 Design Description

The auxiliary feedwater system (AFWS) is a safety-related system. The AFWS supplies auxiliary feedwater (AFW) to the steam generators for removal of residual heat from the reactor core when the feedwater system is inoperable for transient condition or postulated accidents.

The AFWS is designed to be either manually actuated or automatically actuated by an auxiliary feedwater actuation signal (AFAS) from the engineered safety feature actuation system (ESFAS) or diverse protection system (DPS).

AFW flow to the affected steam generator is terminated manually by operator action within 30 minutes after the initiation of the secondary side pipe rupture event.

The AFWS is located within the auxiliary building and containment.

The AFWS consists of two 100 percent capacity motor-driven pumps, two 100 percent capacity turbine-driven pumps, two 100 percent auxiliary feedwater storage tanks (AFWSTs), valves, two cavitating flow-limiting venturis, and instrumentation. One motor-driven pump and one turbine-driven pump are configured into one mechanical division and joined together inside containment to feed their respective steam generator through a common auxiliary feedwater (AFW) header which connects to the steam generator downcomer feedwater line. Each common AFW header contains a cavitating venturi to restrict the maximum AFW flow rate to each steam generator.

The functional requirements of the AFWS are designed as follows:

1. The functional arrangement of the AFWS is as described in the Design Description of Subsection 2.7.1.5.1 and in Table 2.7.1.5-1 and as shown in Figure 2.7.1.5-1.

2.a The ASME Code components identified in Table 2.7.1.5-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.1.5-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.5-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.5-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.1.5-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.1.5-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.1.5-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, AOVs, and check valves identified in Table 2.7.1.5-2 perform an active safety function to change position as indicated in the table.

7.b AFW modulating valves (SOVs) identified in Table 2.7.1.5-2 perform an active safety function to control the SG water level as indicated in the table.

7.c After loss of motive power, MOVs, AOVs, and SOVs indicated in Table 2.7.1.5-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the AFW pumps, and to open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.

8.b All controls required by the design exist in the RSR to start and stop the AFW pumps, and to open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.

9. The two mechanical divisions of the AFWS (A/C & B/D) are physically separated.

10.a The AFW pumps have sufficient net positive suction head (NPSH).

10.b Each AFWST has sufficient capacity for eight hours of operation at hot standby condition and subsequent cooldown of the reactor coolant system within six hours to condition that permit operation of the shutdown cooling system.

11.a The AFWS is actuated by an auxiliary feedwater actuation signal (AFAS) from the ESFAS or DPS.

11.b The ESF-CCS includes logic to close the AFW isolation valves when SG water level has risen above a high level setpoint, and to re-open the AFW isolation valves when SG water level drops below a low level setpoint.

12.a Each AFW pump delivers the minimum flow to its respective steam generator for removal of core decay heat against a steam generator feedwater nozzle pressure.

12.b The cavitating flow-limiting venturis limit maximum flow to each steam generator with both AFW pumps running in the division against a steam generator pressure.

2.7.1.5.2 Inspection, Tests, Analyses, and Acceptance Criteria

Table 2.7.1.5-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the AFWS.

Table 2.7.1.5-1 (1 of 2)

Auxiliary Feedwater System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
AFW motor driven pump	AB (1)	3	I
AFW turbine driven pump	AB	3	I
AFW modulating valve (SOV)	AB	3	I
AFW isolation valve (MOV)	AB	2	I
AFW pump discharge check valve	AB	3	I
AFW isolation check valve	RCB (2)	2	I
AFW miniflow check valve	AB	3	I
Chemical injection check valve	AB	3	I
AFW pump turbine steam isolation valve (AOV)	AB	3	I
AFW pump turbine steam line drain valve (AOV)	AB	3	I
Main steam supply check valve	AB	3	I
Auxiliary steam supply check valve	AB	3	I
Auxiliary Feedwater Storage Tank	AB	-	I
AFWST makeup line up to and including AFWST inlet manual valve	AB	3	I
AFW pump suction line from AFWST (AX-TK01A) to AFW pumps (AFW-PP01A, AFW-PP02A)	AB	3	I
AFW pump suction line from AFWST (AX-TK01A) to AFW pumps (AFW-PP01B, AFW-PP02B	AB	3	I
AFWST cross connection line up to and including AFWST connection manual valve	AB	3	I
Non safety backup supply line up to and including AFW pump suction manual valve	AB	3	I
Motor-driven AFW pump A (AFW-PP02A) discharge line up to and excluding AFW isolation valve	AB	3	I
Motor-driven AFW pump B (AFW-PP02B) discharge line up to and excluding AFW isolation valve	AB	3	I
Turbine-driven AFW pump C (AFW-PP01A) discharge line up to and excluding AFW isolation valve	AB	3	I
Turbine-driven AFW pump D (AFW-PP01B) discharge line up to and excluding AFW isolation valve	AB	3	I

Table 2.7.1.5-1 (2 of 2)

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Motor-driven AFW pump A (AFW-PP02A) Recirculation line to AFWST	AB	3	I
Motor-driven AFW pump B (AFW-PP02B) Recirculation line to AFWST	AB	3	I
Turbine-driven AFW pump C (AFW-PP01A) Recirculation line to AFWST	AB	3	I
Turbine-driven AFW pump D (AFW-PP01B) Recirculation line to AFWST	AB	3	I
Turbine-driven AFW pump C (AFW-PP01A) turbine steam inlet line up to and including AFW steam supply check valve (AT-V1022A)	AB	3	I
Turbine-driven AFW pump D (AFW-PP01B) turbine steam inlet line up to and including AFW steam supply check valve (AT-V1022B)	AB	3	I
Auxiliary steam inlet line up to and including Turbine-driven AFW pump C (AFW-PP01A) manual isolation valve	AB	3	I
Auxiliary steam inlet line up to and including Turbine-driven AFW pump D (AFW-PP01B) manual isolation valve	AB	3	I
Turbine-driven AFW pump C (AFW-PP01A) turbine steam inlet drain line up to and including AFW pump turbine steam inlet drain line manual isolation valve	AB	3	I
Turbine-driven AFW pump D (AFW-PP01B) turbine steam inlet drain line up to and including AFW pump turbine steam inlet drain line manual isolation valve	AB	3	I

(1) AB : Auxiliary Building

(2) RCB : Reactor Containment Building

Table 2.7.1.5-2 (1 of 2)

Auxiliary Feedwater System Components List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
AFW motor driven pump	AFW-PP02A/B	3	I	Yes/Yes	Yes/Yes	Yes/Yes	AFAS	Start	-
AFW turbine driven pump	AFW-PP01A/B	3	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Start	-
AFW modulating valve (SOV)	AFW-V035~038	3	I	Yes/Yes	Yes/Yes	Yes/Yes	AFAS	Control the SG water level	Open
AFW isolation valve (MOV)	AFW-V043~046	2	I	Yes/Yes	Yes/Yes	Yes/Yes	AFAS	Open/Close	As is
AFW pump discharge check valve (CV)	AFW-V1003A/B AFW-V-1004A/B	3	I	-/Yes	-/-	-	-	Open/Close	-
AFW isolation check valve (CV)	AFW-V1007A/B AFW-V-1008A/B	2	I	-/Yes	-/-	-	-	Open/Close	-
AFW miniflow check valve (CV)	AFW-V1012A/B AFW-V1014A/B	3	I	-/Yes	-/-	-	-	Open/Close	-

Table 2.7.1.5-2 (2 of 2)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control at Display/ MCR	Control at Display/ RSR	Control Signal	Active Safety Function	Loss of Motive Power
Chemical injection check valve (CV)	AFW-V1022A/B AFW-V1024A/B	3	I	-/Yes	-/-	-	-	Open/Close	-
AFW pump turbine steam isolation valve (AOV)	AT-V009/010	3	I	Yes/Yes	Yes/Yes	Yes/Yes	AFAS	Open/Close	Open
AFW pump turbine steam line drain valve (AOV)	AT-V007/008	3	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open/Close	Open
Main steam supply check valve (CV)	AT-V1020A/B	3	I	- /Yes	-/-	-	-	Open/Close	-
Auxiliary steam supply check valve (CV)	AT-V1022A/B	3	I	-/Yes	-/-	-	-	Open/Close	-
AFWST makeup check valve (CV)	AFW-V1600	-	II	-/No	-/-	-	-	Open/Close	-
Auxiliary feedwater storage tank	AX-TK01A/B	-	I	-/Yes	-/-	-	-	No	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.1.5-3

Auxiliary Feedwater System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
AFW pump turbine speed	S-3035C/3036D	AB [2]	3	I	Yes/Yes	Yes/No	Yes/No
AFW pump suction pressure	P-0005A, 0006B, 0007C, 0008D	AB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
AFW pump discharge pressure	P-0023A, 0024B, 0025C, 0026D	AB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
AFW flow modulating valve position	Z-0035A, 0036B, 0037C, 0038D	AB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
AFW flow to S/G	F-0047A, 0048B, 0049C, 0050D	AB	3	I	Yes/Yes	Yes/No	Yes/No
AFW line back leakage temperature	T-0053A/C, 0054B/D	RCB [3]	3	I	Yes/Yes	Yes/Yes	Yes/Yes
AFW turbine steam drip leg level	L-0003C, 0004D	AB	3	I	Yes/Yes	Yes/Yes	Yes/Yes
AFW turbine inlet steam pressure	P-0013C, 0014D	AB	3	I	Yes/Yes	Yes/No	Yes/No
Auxiliary feedwater storage tank water level	L-003A, 006B/C/D, 004B, 005A/C/D	AB	3	I	Yes/Yes	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) AB : Auxiliary Building

(3) RCB : Reactor Containment Building

Table 2.7.1.5-4 (1 of 7)

Auxiliary Feedwater System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the AFWS is as described in the Design Description of Subsection 2.7.1.5.1 and in Table 2.7.1.5-1 and as shown in Figure 2.7.1.5-1.	1. Inspection of the as-built AFWS will be conducted.	1. The as-built AFWS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.1.5.1 and in Table 2.7.1.5-1 and as shown in Figure 2.7.1.5-1.
2.a The ASME Code components identified in Table 2.7.1.5-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.1.5-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.1.5-2 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.1.5-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.5-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.1.5-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.5-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.1.5-1.

Table 2.7.1.5-4 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.1.5-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.1.5-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.1.5-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.1.5-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.7.1.5-4 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.7.1.5-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.1.5-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.1.5-1 can withstand seismic design basis loads without loss of safety function
6.a The Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspection will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instrument and the associated wiring, cables, and terminations identified in Table 2.7.1.5-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.7.1.5-4 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.1.5-2 and 2.7.1.5-3 are powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, AOVs, and check valves identified in Table 2.7.1.5-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs and AOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV or AOV changes position as indicated in Table 2.7.1.5-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV or AOV changes position as indicated in Table 2.7.1.5-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.1.5-2 under pre-operational test conditions.
7.b AFW modulating valves (SOVs) identified in Table 2.7.1.5-2 perform an active safety function to control the SG water level as indicated in the table.	7.b.i Tests or type testes of SOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.b.i A test report exists and concludes that each SOV controls the SG water level as indicated in Table 2.7.1.5-2 under design conditions.
	7.b.ii Tests and/or analyses of the as-built AFW modulating valves (SOVs) will be performed under pre-operational test conditions.	7.b.ii Upon receipt of the actuating signal, each AFW modulating valve (SOV) controls the SG water level indicated in Table 2.7.1.5-2 under pre-operational test conditions.

Table 2.7.1.5-4 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.c After loss of motive power, MOVs, AOVs, and SOVs indicated in Table 2.7.1.5-2 assume the indicated loss of motive power position.	7.c Tests of the as-built MOVs, AOVs, and SOVs will be performed under the conditions of loss of motive power.	7.c Upon loss of motive power, each as-built MOV, AOV, or SOVs identified in Table 2.7.1.5-2 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to start and stop the AFW pumps, and to open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the AFW pumps, and open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.
8.b All controls required by the design exist in the RSR to start and stop the AFW pumps, and to open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the AFW pumps, and open and close MOVs, AOVs, and SOVs identified in Table 2.7.1.5-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.1.5-2 and 2.7.1.5-3.
9. The Two mechanical divisions of the AFWS (A/C & B/D) are physically separated.	9. Inspection of the as-built mechanical divisions will be performed.	9. The two mechanical divisions of the AFWS are physically separated by a divisional wall or a fire barrier.

Table 2.7.1.5-4 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
10.a The AFW pumps have sufficient net positive suction head (NPSH).	10.a Test to measure the as-built AFW pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	10.a A report exists and concludes that the as-built calculated NPSH available exceeds each AFW pump's NPSH required.
10.b Each AFWST has sufficient capacity for eight hours of operation at hot standby condition and subsequent cooldown of the reactor coolant system within six hours to condition that permit operation of the shutdown cooling system.	10.b Inspections and analyses will be performed to verify the minimum required volume of each of the as-built AFWSTs.	10.b Each AFWST capacity exceeds the minimum required volume of 1,524,165 liters (400,000 gallons)
11.a The AFWS is actuated by an AFAS from the ESFAS or DPS	11.a Tests will be performed by generating a signal simulating an AFAS for its corresponding steam generator. The test will be repeated using a signal simulating DPS.	11.a The as-built motor-driven and turbine-driven pumps start, and the as-built auxiliary feedwater isolation and AFW modulating valves open, in the division receiving the signal simulating an AFAS. The same components actuate in response to a signal simulating DPS. Flow is delivered to the steam generator(s) in no more than 60 seconds following an AFAS from the ESFAS or DPS.
11.b The ESF-CCS includes logic to close the AFW isolation valves when SG water level has risen above a high level setpoint, and to re-open the AFW isolation valves when SG water level drops below a low level setpoint.	11.b Tests of each as-built AFW isolation valve will be performed using signals simulating high and low SG water level.	11.b A signal simulating high SG water level signal closes the as-built AFW isolation valves in its associated division. The as-built AFW isolation valves close within 14 seconds after receipt of a signal. A signal simulating low SG water level signal opens the AFW isolation valves in its associated division.

Table 2.7.1.5-4 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12.a Each AFW pump delivers the minimum flow to its respective steam generator for removal of core decay heat against a steam generator feedwater nozzle pressure.	12.a A test of each AFW pump will be performed to determine the system flow against steam generator pressure under preoperational condition. Analysis will be performed to convert the test results to the design conditions.	12.a A test report exists and concludes that each AFW pump delivers minimum flow of 2,461 L/min (650 gpm) to its respective steam generator against a steam generator feedwater nozzle pressure of 87.18 kg/cm^2A (1,240 psia).
12.b The cavitating flow-limiting venturis limit maximum flow to each steam generator with both AFW pumps running in the division against a steam generator pressure.	12.b A test will be performed with both pumps in a division running under preoperational condition. Analysis will be used to convert the test results to the design conditions.	12.b A test report exists and concludes that the maximum flow to each SG is less than or equal to 3,596 L/min (950 gpm) with both pumps running against a steam generator pressure of 0 kg/cm^2G (0 psig).

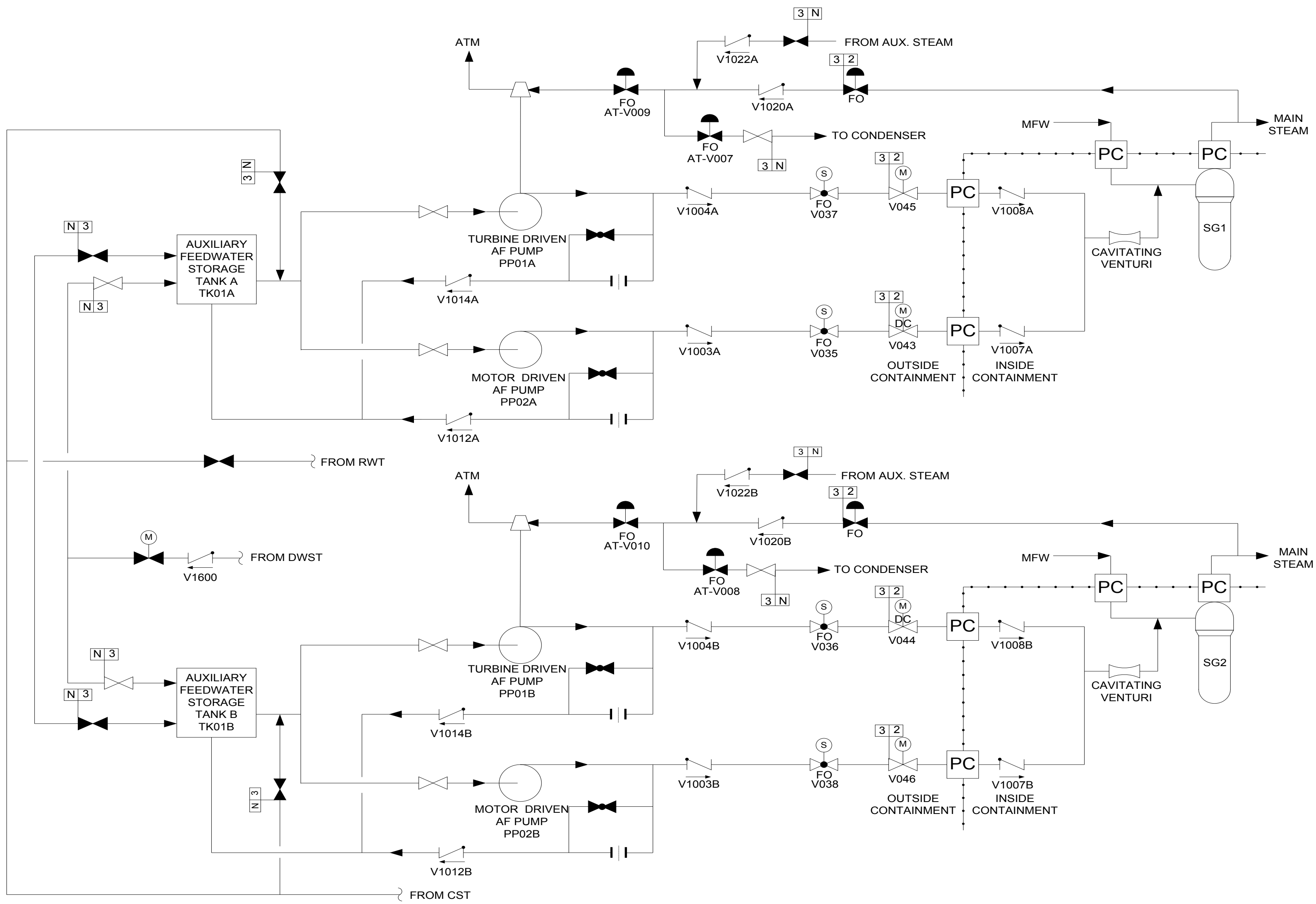


Figure 2.7.1.5-1 Auxiliary Feedwater System

2.7.1.6 Condenser Vacuum System

Since the condenser vacuum system does not perform safety functions, no ITAAC items are provided.

2.7.1.7 Circulating Water System

Since the circulating water system does not perform safety functions, no ITAAC items are provided.

2.7.1.8 Steam Generator Blowdown System

2.7.1.8.1 Design Description

The steam generator blowdown system (SGBS) removes and processes steam generator fluid containing impurities, and returns the water to the feedwater and condensate system.

The SGBS performs a safety-related function of isolating the secondary side of the SG using two isolation valves in series in the blowdown line from each SG.

The safety related portions of the SGBS components and piping are located in the containment and the auxiliary building.

1. The functional arrangement of the SGBS is as described in the Design Description of Subsection 2.7.1.8.1 and in Table 2.7.1.8-1 and as shown in Figure 2.7.1.8-1.

2.a The ASME Code components identified in Table 2.7.1.8-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.1.8-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.8-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.8-1 meet ASME Section III requirements.

4.a. The ASME Code components identified in Table 2.7.1.8-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.1.8-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components identified in Tables 2.7.1.8-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping, including supports identified in Table 2.7.1.8-1 can withstand seismic design basis loads without loss of its safety function.

6.a The Class 1E components identified in Table 2.7.1.8-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components identified in Tables 2.7.1.8-2 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions.

7.a MOVs and AOVs identified in Table 2.7.1.8-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs and AOVs identified in Table 2.7.1.8-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close MOVs and AOVs identified in Table 2.7.1.8-2.

8.b All controls required by the design exist in the RSR to open and close MOVs and AOVs identified in Table 2.7.1.8-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.8-2.

8.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.1.8-2.

9. Each mechanical division of the SGBS (Divisions I, II) is physically separated from the other division.

2.7.1.8.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the steam generator blowdown system are specified in Table 2.7.1.8-3.

The ITAAC related to the CIVs and the piping between the CIVs of the SGBS are described in Table 2.11.3-2.

Table 2.7.1.8-1

Steam Generator Blowdown System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
The SGBS piping and valves from the SG blowdown nozzles to the outermost containment isolation valves, SD-V007 and V008	Containment Building	2	I

Table 2.7.1.8-2

Steam Generator Blowdown System Component List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Hot Leg Blowdown Valve (MOV)	SD-V001, V002	2	I	No/Yes	Yes/Yes	Yes/Yes	-	-	As is
Cold Leg Blowdown Valve (MOV)	SD-V003, V004	2	I	No/Yes	Yes/Yes	Yes/Yes	-	-	As is
Containment Isolation Valve (AOV)	SD-V005, V006	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS/ MSIS/ AFAS/ DPS-AFAS	Close	Close
Containment Isolation Valve (MOV)	SD-V007, V008	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS/ MSIS/ AFAS/ DPS-AFAS	Close	As is
Containment Isolation Valve (Gate)	SD-V1113	2	I	-/Yes	No/No	No/No	-	Close	-
	SD-V1114	2	I	-/Yes	No/No	No/No	-	Close	-
Containment Isolation Valve (Check)	SD-V1115	2	I	-/Yes	No/No	No/No	-	Close	-
	SD-V1116	2	I	-/Yes	No/No	No/No	-	Close	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.1.8-3 (1 of 4)

Steam Generator Blowdown System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SGBS is as described in the Design Description of Subsection 2.7.1.8.1 and in Table 2.7.1.8-1 and as shown in Figure 2.7.1.8-1.	1. Inspection of the as-built SGBS will be performed.	1. The as-built SGBS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.1.8.1 and in Table 2.7.1.8-1 and as shown in Figure 2.7.1.8-1.
2.a The ASME Code components identified in Table 2.7.1.8-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports.	2.a The ASME Section III design reports exist and conclude that the as-built components identified in Table 2.7.1.8-2 are designed and constructed in accordance with Code Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.1.8-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design reports exist and conclude that the as-built piping including supports identified in Table 2.7.1.8-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.1.8-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.1.8-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.1.8-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.1.8-1.

Table 2.7.1.8-3 (2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.1.8-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.1.8-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.1.8-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and conclude that the results of the hydrostatic test of the as-built piping identified in Table 2.7.1.8-1 conform with ASME Section III requirements.
5.a The seismic Category I components identified in Tables 2.7.1.8-2 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components identified in Tables 2.7.1.8-2 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components will be performed..	5.a.ii A report exists and concludes that the seismic Category I components identified in Table 2.7.1.8-2 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components identified in Table 2.7.1.8-2 including anchorage are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.7.1.8-1 can withstand seismic design basis loads without loss of its safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in a seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.1.8-1 is located in a seismic Category I structure(s).

Table 2.7.1.8-3 (3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.7.1.8-1 can withstand seismic design basis loads without a loss of its safety function.
6.a The Class 1E components identified in Table 2.7.1.8-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components identified in Table 2.7.1.8-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and the associated wiring, cables, and terminations identified in Table 2.7.1.8-2 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
6.b Each of the Class 1E components identified in Tables 2.7.1.8-2 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components identified in Tables 2.7.1.8-2 powered from the Class 1E train division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E divisions.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and between Class 1E division and non-Class 1E division.

Table 2.7.1.8-3 (4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.a MOVs and AOVs identified in Table 2.7.1.8-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs and AOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV or AOV changes position as indicated in Table 2.7.1.8-2 under design conditions.
	7.a.ii Tests and/or analyses of as-built MOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each as-built MOV or AOV changes position as indicated in Table 2.7.1.8-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs and AOVs identified in Table 2.7.1.8-2 assume the indicated loss of motive power position.	7.b Test of the as-built MOVs and AOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV or AOV identified in Table 2.7.1.8-2 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to open and close the MOVs and AOVs identified in Table 2.7.1.8-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR to open and close the MOVs and AOVs identified in Table 2.7.1.8-2.
8.b All controls required by the design exist in the RSR to open and close the MOVs and AOVs identified in Table 2.7.1.8-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the RSR to open and close the MOVs and AOVs identified in Table 2.7.1.8-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.1.8-2.	8.c Inspections will be performed on the displays and alarms in the MCR for the SGBS.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.1.8-2.
8.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.1.8-2.	8.d Inspections will be performed on the displays and alarms in the RSR for the SGBS.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Table 2.7.1.8-2.
9. Each mechanical division of the SGBS (Divisions I, II) is physically separated from the other division	9. Inspection of the as-built mechanical divisions of SGBS will be performed.	9. Each mechanical division of the SGBS is physically separated by a divisional wall or a fire barriers.

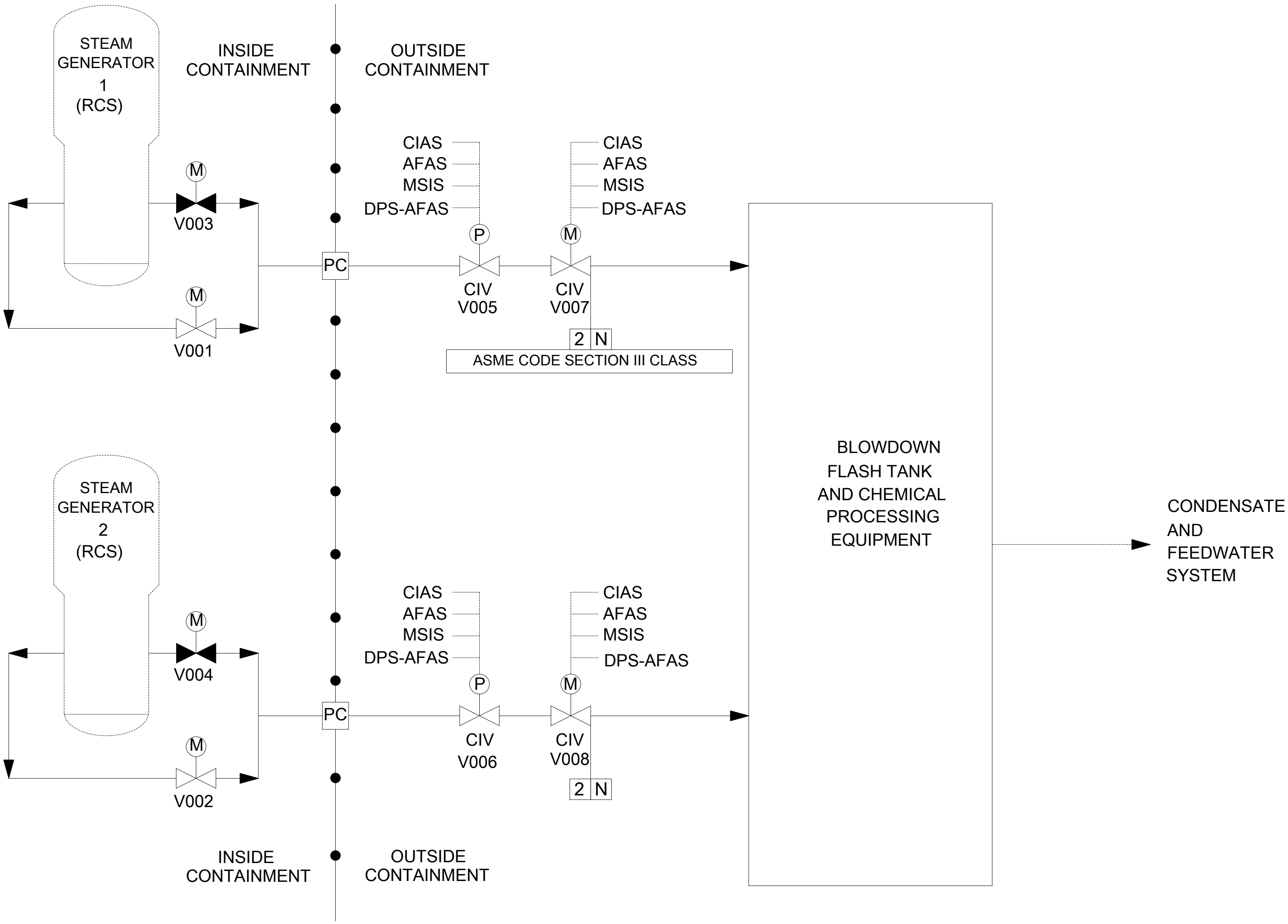


Figure 2.7.1.8-1 Steam Generator Blowdown System

2.7.1.9 Auxiliary Steam System

Since the auxiliary steam does not perform safety functions, no ITTAC items are provided.

2.7.2 Cooling Water System

2.7.2.1 Essential Service Water System

2.7.2.1.1 Design Description

The essential service water system (ESWS), in conjunction with the ultimate heat sink (UHS), provides cooling water to remove heat from the component cooling water system (CCWS).

The ESWS is a safety-related system and provides cooling water to the CCW heat exchangers.

The ESWS consists of two independent, redundant, once-through, safety-related divisions. Each division cools one of two divisions of the CCWS, which cools 100 percent of the safety related loads. Each division of the ESWS consists of two pumps, three CCW heat exchangers, three debris filters, and associated piping, valves, controls and instrumentation.

To meet above functional requirement, the ESWS is designed as follows:

1. The functional arrangement of the ESWS is as described in the Design Description of Subsection 2.7.2.1.1 and in Table 2.7.2.1-1 and as shown in Figure 2.7.2.1-1.

2.a The ASME Code components identified in Table 2.7.2.1-2 are designed and constructed in accordance with ASME Section III requirements.

2.b. The ASME Code piping including supports identified in Table 2.7.2.1-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.1-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.1-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.2.1-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.2.1-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.2.1-1 can withstand seismic design basis loads without loss of safety function.

6.a Each of the Class 1E components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 is powered from its respective Class 1E division.

6.b Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E division.

7.a MOVs and check valves identified in Table 2.7.2.1-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs identified in Table 2.7.2.1-2 assume the indicated loss of motive power position.

8.a All controls required by design exist in the MCR to start and stop the ESW pumps, and to open and close MOVs identified in Table 2.7.2.1-2.

8.b All controls required by design exist in the RSR to start and stop the ESW pumps, and to open and close MOVs identified in Table 2.7.2.1-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.

9. The two mechanical divisions of the ESWS (A/C & B/D) are physically separated.

10. The ESWS has the capacity to remove heat from the CCWS during power operation, shutdown, refueling, and design basis accident conditions.

11. The ESW pumps have sufficient net positive suction head (NPSH).

2.7.2.1.2 Inspections, Tests, Analysis, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the ESWS are specified in Table 2.7.2.1-4.

Table 2.7.2.1-1

Essential Service Water System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
ESW pumps	ESW Intake Structure	3	I
ESW Debris Filters	CCW HX Building	3	I
Essential service water supply piping and valves to CCW heat exchangers	CCW HX Building /ESW Intake Structure	3	I
Essential service water return piping and valves from CCW heat exchangers	CCW HX Building /ESW Intake Structure	3	I

Table 2.7.2.1-2

Essential Service Water System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
ESW pumps	SX-PP01A, PP01B, PP02A, PP02B	3	I	Yes/No	Yes/Yes	Yes/Yes	EDG Load Sequence Disch. Press. Low	Start	-
ESW debris filters	SX-FT01A, FT02A, FT03A, FT01B, FT02B, FT03B	3	I	No/No	No/No	No/No	-	-	-
ESW pump discharge line check	SX-1001, 1002, 1003, 1004	3	I	-/-	-/-	-/-	-	Open/ Close	-
ESW pump discharge isolation (MOV)	SX-045, 046, 047, 048	3	I	Yes/No	Yes/Yes	Yes/Yes	-	Open	As Is

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.2.1-3

Essential Service Water System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Classification	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
ESW pump discharge pressure	P-035A, 036B, 039C, 040D	ESW Intake Structure	-	I	Yes//No	Yes/Yes	Yes/Yes
CCW heat exchanger inlet/outlet temperature	T-051, 052 T-071A/072B/ 073C/074 D(2)	CCW HX Building	-	I	No//No	Yes/No	No/No
ESW pump discharge flow	F-049A, 050B, 051C, 052D	ESW Intake Structure	-	I	Yes//No	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) CCW heat exchanger inlet temperatures are located in the basin of cooling tower.

(3) Dash(-) indicates not applicable.

Table 2.7.2.1-4 (1 of 5)

Essential Service Water System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the ESWS is as described in the Design Description of Subsection 2.7.2.1.1 and in Table 2.7.2.1-1 and as shown in Figure 2.7.2.1-1.	1. Inspection of the as-built ESWS will be performed.	1. The as-built ESWS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.1.1 and in Table 2.7.2.1-1 and as shown in Figure 2.7.2.1-1.
2.a The ASME Code components identified in Table 2.7.2.1-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.2.1-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.2.1-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.2.1-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.1-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.2.1-2.

Table 2.7.2.1-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.1-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.2.1-1.
4.a The ASME Code components identified in Table 2.7.2.1-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.2.1-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.2.1-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and conclude that the results of the hydrostatic test of the as-built piping identified in Table 2.7.2.1-1 conform with ASME Code Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 can withstand seismic design basis loads without loss of safety function.

Table 2.7.2.1-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 including anchorage are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.7.2.1-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.2.1-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.2.1-1 can withstand seismic design basis loads without loss of safety function.
6.a Each of the Class 1E components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 is powered from its respective Class 1E division.	6.a Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.a The test signal exists at the Class 1E components and instruments identified in Tables 2.7.2.1-2 and 2.7.2.1-3 powered from the Class 1E division under test.
6.b Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E division.	6.b Inspection of the as-built Class 1E divisions will be performed.	6.b Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.

Table 2.7.2.1-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.a MOVs and check valves identified in Table 2.7.2.1-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV changes position as indicated in Table 2.7.2.1-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built MOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV changes position as indicated in Table 2.7.2.1-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.2.1-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs identified in Table 2.7.2.1-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOVs identified in Table 2.7.2.1-2 assumes the indicated loss of motive power position.
8.a All controls required by design exist in the MCR to start and stop the ESW pumps, and to open and close MOVs identified in Table 2.7.2.1-2.	8.a Test will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the ESW pumps, and open and close MOVs identified in Table 2.7.2.1-2.
8.b All controls required by design exist in the RSR to start and stop the ESW pumps, and to open and close MOVs identified in Table 2.7.2.1-2.	8.b Test will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the ESW pumps, and open and close MOVs identified in Table 2.7.2.1-2.

Table 2.7.2.1-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.2.1-2 and 2.7.2.1-3.
9. The two mechanical divisions of the ESWS (A/C & B/D) are physically separated.	9. Inspection of the as-built mechanical divisions will be performed.	9. The two mechanical divisions of the ESWS are separated by a divisional wall or a fire barrier.
10. The ESWS has the capacity to remove heat from the CCWS during power operation, shutdown, refueling, and design basis accident conditions.	10. Testing will be performed to measure the as-built ESW pumps flow rates.	10. The as-built ESW pumps deliver at least 75,708 L/min (20,000 gpm) of ESW to the CCW heat exchangers during power operation, refueling, and design basis accident conditions and the as-built ESW pumps deliver at least 104,477 L/min (27,600 gpm) of ESW to the CCW heat exchangers during shutdown operation.
11. The ESW pumps have sufficient net positive suction head (NPSH).	11. Test to measure the as-built ESW pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	11. A report exists and concludes that the as-built calculated available NPSH available exceeds each ESW pump's NPSH required.

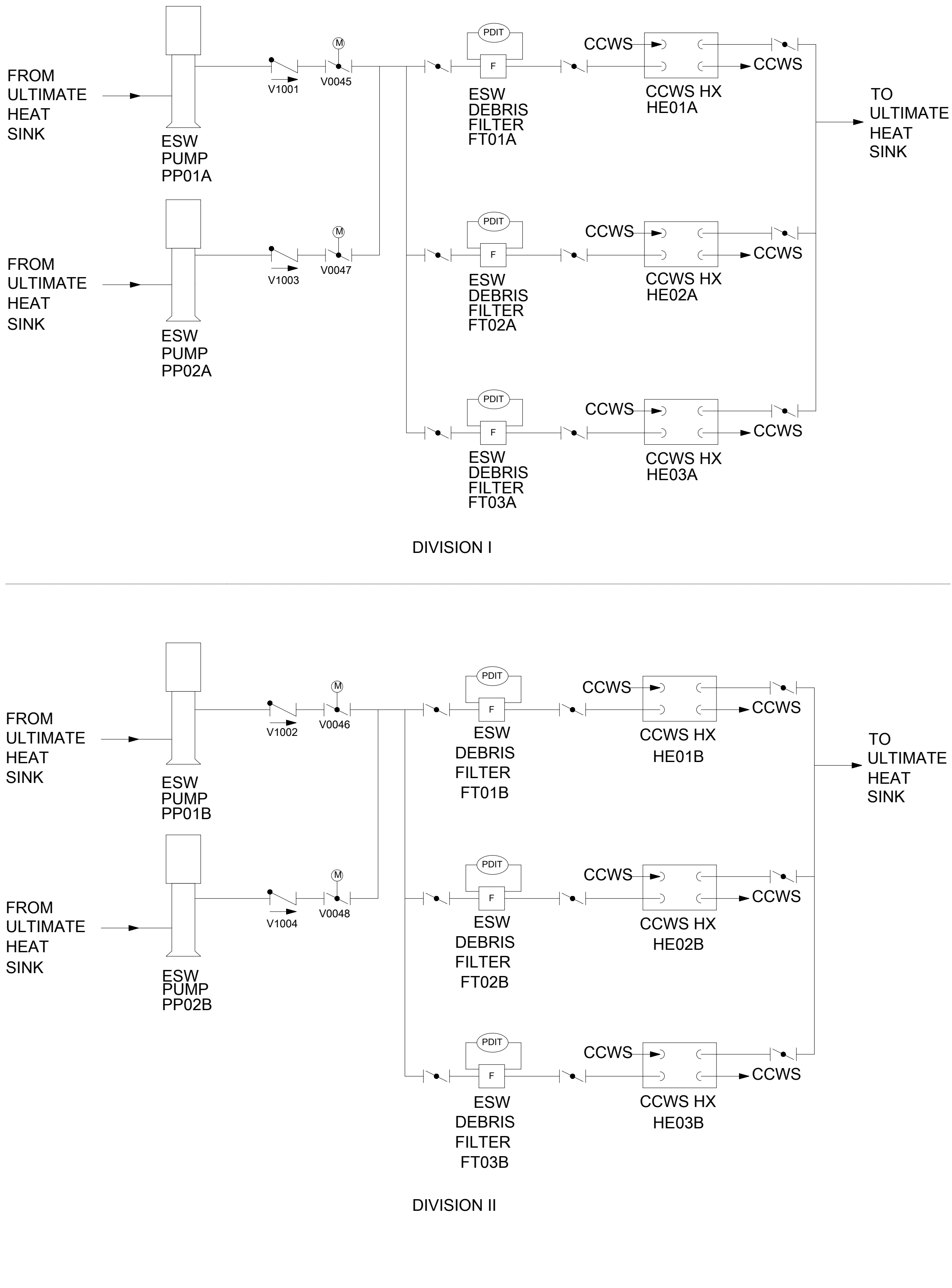


Figure 2.7.2.1-1 Essential Service Water System

2.7.2.2 Component Cooling Water System

2.7.2.2.1 Design Description

The component cooling water system (CCWS) is a closed loop cooling water system that, in conjunction with the essential service water system (ESWS) and the ultimate heat sink (UHS), removes heat generated from the plant's safety-related and non safety-related components connected to the CCWS.

The CCWS is a safety-related system and has the following the safety-related functions:

- Removes decay heat and waste heat from safety-related equipment necessary for achieving plant safe shutdown and transfer it to the ESWS
- Protect against leakage of service water into the nuclear island systems
- Protect against release of radiological contamination into the ultimate heat sink

The CCWS consists of two separate, independent, redundant, closed loop, and safety related divisions. Either division of the CCWS is capable of supporting 100 percent of the cooling functions required for a safe reactor shutdown. Each division of the CCWS includes three heat exchangers, a surge tank, two CCW pumps, a chemical addition tank, a CCW radiation monitor, piping, valves, controls, and instrumentation.

To meet above functional requirement, the CCWS is designed as follows:

1. The functional arrangement of the CCWS is as described in the Design Description of Subsection 2.7.2.2.1 and in Table 2.7.2.2-1 and as shown in Figure 2.7.2.2-1.

2.a The ASME Code components identified in Table 2.7.2.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.2.2-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.2-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.2-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.2.2-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.2.2-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.2.2-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, AOVs, and check valves identified in Table 2.7.2.2-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs and AOVs identified in Table 2.7.2.2-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the CCW pumps and CCW makeup pumps, and to open and close MOVs and AOVs identified in Table 2.7.2.2-2.

8.b All controls required by the design exist in the RSR to start and stop the CCW pumps and CCW makeup pumps, and to open and close MOVs and AOVs identified in Table 2.7.2.2-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.

9. The two mechanical divisions of the CCWS (A/C & B/D) are physically separated.

10. The CCWS pumps and CCWS makeup pumps have sufficient net positive suction head (NPSH).

11. The CCWS, in conjunction with the ESWS and UHS, has the capacity to dissipate the heat loads of connected components during power operation, shutdown, refueling and design basis accident conditions for at least 7 days operation without surge tank makeup.

2.7.2.2.2 Inspection, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the CCWS are specified in Table 2.7.2.2-4.

The ITAAC related CIVs and the piping between the CIVs of the CCWS are described in Table 2.11.3-2.

Table 2.7.2.2-1 (1 of 2)

Component Cooling Water System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
CCW heat exchangers	CCWHX Building	3	I
CCW pumps	Auxiliary Building	3	I
CCW surge tanks	Auxiliary Building	3	I
CCW makeup pumps	Auxiliary Building	3	I
Component cooling water supply and return piping and valves excluding the following a) through h) below:	Auxiliary Building, CCWHX Building	3	I
a) Containment penetration piping of RCP cooler supply line between and including the valves, CC-V231 and CC-V1099 in the division I	Containment Building	2	I
b) Containment penetration piping of RCP cooler return line between and including the valves, CC-V249, CC-V250, and, CC-V1100 in the division I	Containment Building	2	I
c) RCP cooler supply and return piping between the valves, CC-V1099, CC-V249, and CC-V1100 in the division I	Containment Building	-	II
d) Non-essential supply and return piping between the valve CC-V145 and CC-V147 in the division I excluding the following e) through g) below:	Auxiliary Building	-	II
e) Containment penetration piping of letdown heat exchanger supply line between and including the valves CC-V296, CC-V297, and CC-V1685 in the division I	Containment Building	2	I

Table 2.7.2.2-1 (2 of 2)

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
f) Containment penetration piping of letdown heat exchanger return line between and including the valve CC-V301, CC-V302, and CC-V1686 in the division I	Containment Building	2	I
g) Letdown heat exchanger supply and return piping between the valves, CC-V297, CC-V301, CC-V1685, and CC-V1686 in the division I	Containment Building	-	II
h) Non-essential supply and return piping between the valve CC-V146 and CC-V148 in the auxiliary building of the division II	Auxiliary Building	-	II
i) Non-essential supply and return piping in the compound building of the division II	Containment Building	-	III

Table 2.7.2.2-2 (1 of 3)

Component Cooling Water System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
CCW heat exchangers	CC-HE01A, HE01B, HE02A, HE02B, HE03A, HE03B	3	I	-/-	-/-	-/-	-	-	-
CCW pumps	CC-PP01A, PP01B, PP02A, PP02B	3	I	Yes/No	Yes/Yes	Yes/Yes	EDG Load Sequence, Disch. Pres. Low	Start	-
CCW makeup pumps	CC-PP03A, PP03B	3	I	Yes/No	Yes/Yes	Yes/Yes	CCWSTLAS[3]	Start	-
CCW surge tanks	CC-TK01A, TK01B	3	I	-/-	-/-	-/-	-	-	-
CCW makeup isolation (MOV)	CC-011, 012	3	I	Yes/No	Yes/Yes	Yes/Yes	CCWSTLAS[3]	Open	As Is
CCW heat exchangers outlet jogging control (MOV)	CC-021, 022, 023, 024, 025, 026, 031, 032, 033, 034, 035, 036	3	I	Yes/No	Yes/Yes	Yes/Yes	SIAS	Open	As Is
CCW heat exchanger bypass (MOV)	CC-027, 028, 037, 038	3	I	Yes/No	Yes/Yes	Yes/Yes	SIAS	Close	As Is
Containment spray heat exchangers inlet isolation (MOV)	CC-097, 098	3	I	Yes/Yes	Yes/Yes	Yes/Yes	SIAS, CSAS	Open	As Is

Table 2.7.2.2-2 (2 of 3)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Essential chiller condenser outlet isolation (MOV)	CC-131, 132, 383, 384	3	I	Yes/No	Yes/Yes	Yes/Yes	Chiller pump start/stop	Open/ Close	As Is
Essential chiller condenser outlet control (MOV)	CC-901, 902, 905, 906	3	I	Yes/No	Yes/Yes	Yes/Yes	Chiller condenser pressure	Modulate	Open
Non-essential header inlet and outlet isolation (MOV)	CC-143, 144, 145, 146, 147, 148, 149, 150	3	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, CCWSTLLAS	Close	As Is
EDG cooler inlet isolation (MOV)	CC-181, 182, 191, 192	3	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, EDG Start	Open	As Is
RCP cooler isolation (MOV)	CC-231, 249, 250	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CCWSTLLAS(4)	Close	As Is
Letdown heat exchanger inlet and outlet isolation (MOV)	CC-296, 297, 301, 302	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As Is
SC heat exchangers inlet isolation (MOV)	CC-351, 352	3	I	Yes/Yes	Yes/Yes	Yes/Yes	SIAS	Close	As Is
SFP cooling heat exchangers isolation (MOV)	CC-389, 390	3	I	Yes/No	Yes/Yes	Yes/Yes	-	Open	As Is

Table 2.7.2.2-2 (3 of 3)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
CCW pump discharge check	CC-1001, 1002, 1003, 1004	3	I	-/No	-/-	-/-	-	Open	-
RCP common line check	CC-1099	2	I	-/Yes	-/-	-/-	-	Open/ Close	-
Containment penetration piping bypass check	CC-1100, 1685, 1686	2	I	-/Yes	-/-	-/-	-	Close	-
CCW surge tank vacuum relief	CC-1107, 1108	3	I	-/-	-/-	-/-	-	-	-
CCW surge tank relief	CC-1111, 1112	3	I	-/-	-/-	-/-	-	-	-
CCW makeup pump discharge check	CC-1303, 1304, 1309, 1310	3	I	-/No	-/-	-/-	-	Open	-
CCW makeup pump bypass check	CC-1325, 1326	3	I	-/No	-/-	-/-	-	Close	-
Demineralized water makeup line check	CC-1317, 1318, 1319, 1320	3	I	-/No	-/-	-/-	-	Close	-
Nitrogen supply line check	CC-1109, 1110	3	I	-/No	-/-	-/-	-	Close	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

(3) CCWSTLAS: CCW surge tank low water level actuation signal

(4) CCWSTLLAS: CCW surge tank low-low water level actuation signal

Table 2.7.2.2-3 (1 of 2)

Component Cooling Water System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
CCW surge tank level	L-011A, 012B	Auxiliary Building	-	I	Yes/No	Yes/Yes	Yes/Yes
CCW surge tank make-up flow	F-003, 004	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
CCW surge tank level	L-009C, 010D	Auxiliary Building	-	I	Yes/No	No/Yes	No/Yes
CCW pump common discharge header pressure	P-053C, 054D	Auxiliary Building	-	I	Yes/No	Yes/Yes	Yes/Yes
CCW pump discharge flow	F-047A, 048B, 049C, 050D	Auxiliary Building	-	I	Yes/No	Yes/Yes	Yes/Yes
Combined CCW heat exchanger inlet temperature	T-055, 056	CCWHX Building	-	I	No/No	Yes/No	Yes/No
SFP cooling heat exchanger outlet flow	F-395, 396	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
Letdown heat exchanger outlet temperature and flow	T-299, F-300	Containment Building	-	II	No/No	Yes/Yes	Yes/Yes
Shutdown cooling heat exchangers outlet temperature	T-077, 078	Auxiliary Building	-	I	No/No	Yes/No	Yes/No
Charging pump MFHX outlet temperature	T-128	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
Charging pump MFHX outlet flow	F-399	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
Essential chiller condensers outlet flow	F-135, 136, 387, 388	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes

Table 2.7.2.2-3 (2 of 2)

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Containment spray heat exchangers outlet flow	F-103, 104	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
Containment spray MFHX outlet flow	F-121, 122	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
Shutdown cooling heat exchangers outlet flow	F-355, 356	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
Shutdown cooling MFHX outlet flow	F-373, 374	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
EDG cooler outlet flow	F-189, 190, 401,402	Auxiliary Building	-	II	No/No	Yes/Yes	Yes/Yes
CCW heat exchanger outlet flow	F-071A, 072B, 073C, 074D	CCWHX Building	-	I	Yes/No	Yes/No	Yes/No
RCP cooler CCW flow	F-245A/B, 246A/B, 247A/B, 248A/B	Containment Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
RCP cooler CCW temperature	T-167, 168, 173, 174, 181 ,182, 191, 192	Containment Building	-	I	No/Yes	Yes/No	Yes/No
Combined CCW heat exchanger outlet temperature	T-069A, 070B, 071C, 072D	CCWHX Building	-	I	Yes/No	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.2.2-4 (1 of 7)

Component Cooling Water System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CCWS is as described in the Design Description of Subsection 2.7.2.2.1 and in Table 2.7.2.2-1 and as shown in Figure 2.7.2.2-1.	1. Inspection of the as-built CCWS will be performed.	1. The as-built CCWS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.2.1 and in Table 2.7.2.2-1 and as shown in Figure 2.7.2.2-1.
2.a The ASME Code components identified in Table 2.7.2.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.2.2-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.2.2-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.2.2-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.2-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.2.2-2.

Table 2.7.2.2-4 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.2-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.2.2-1.
4.a The ASME Code components identified in Table 2.7.2.2-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.2.2-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.2.2-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.2.2-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 can withstand seismic design basis loads without loss of safety function.

Table 2.7.2.2-4 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 including anchorage are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.7.2.2-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.2.2-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.2.2-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

Table 2.7.2.2-4 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.2.2-2 and 2.7.2.2-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
6.b Each of the Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.2.2-2 and 2.7.2.2-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, AOVs and check valves identified in Table 2.7.2.2-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs and AOVs will be performed that demonstrate the capability of the valve to operate under its design conditions	7.a.i A test report exists and concludes that each MOV or AOV changes position as indicated in Table 2.7.2.2-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built MOVs and AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV or AOV changes position as indicated in Table 2.7.2.2-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.2.2-2 under pre-operational test conditions.

Table 2.7.2.2-4 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.b After loss of motive power, MOVs and AOVs identified in Table 2.7.2.2-2 assume the indicated loss of motive power position.	7.b Test of the as-built MOVs and AOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOVs or AOVs identified in Table 2.7.2.2-2 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to start and stop the CCW pumps and CCW makeup pumps, and to open and close MOVs and AOVs identified in Table 2.7.2.2-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the CCW pumps and CCW makeup pumps, and open and close MOVs and AOVs identified in Table 2.7.2.2-2.
8.b All controls required by the design exist in the RSR to start and stop the CCW pumps and CCW makeup pumps, and to open and close MOVs and AOVs identified in Table 2.7.2.2-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the CCW pumps and CCW makeup pumps, and open and close MOVs and AOVs identified in Table 2.7.2.2-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.2.2-2 and 2.7.2.2-3.
9. The two mechanical divisions of the CCWS (A/C & B/D) are physically separated.	9. Inspection of the as-built mechanical divisions will be performed.	9. The two mechanical divisions of the CCWS are physically separated by a divisional wall or a fire barrier.
10. The CCWS pumps and CCWS makeup pumps have sufficient net positive suction head (NPSH).	10. Test to measure the as-built CCW pump and CCW makeup pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	10. A report exists and concludes that the as-built calculated NPSH available exceeds each CCW pump's and CCW makeup pump's NPSH required.

Table 2.7.2.2-4 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The CCWS, in conjunction with the ESWS and UHS, has the capacity to dissipate the heat loads of connected components during power operation, shutdown, refueling and design basis accident conditions for at least 7 days operation without surge tank makeup.	11.a A test of the as-built CCW pump will be performed to measure the flow rates to the CCW heat exchangers.	11.a The as-built CCW Pump identified in Table 2.7.2.2-2 delivers at least 43,532L/min (11,500 gpm) of CCW to the CCW heat exchangers during power operation and design basis accident conditions and at least 40,504L/min (10,700 gpm) of CCW to the CCW heat exchangers during shutdown and refueling operations.
	11.b Analyses will be performed to determine the heat removal capacities of the as-built CCW heat exchangers.	11.b A report exists and concludes that the product of the overall heat transfer coefficient and the effective heat exchange area, UA, of each CCW heat exchanger identified in Table 2.7.2.2-2 is greater than or equal to 7.5×10^6 cal/hr-°C (16.53×10^6 Btu/hr-°F).
	11.c Inspections and analyses will be performed to confirm the as-built CCW surge tank volume of 7 days operation without makeup.	11.c The as-built CCW surge tank volume is greater than or equal to the design volume of 32,200 L (8,500 gal).
	11.d Tests will be performed to determine the flow rate to the CS heat exchanger.	11.d The as-built CCW pump delivers at least 30,283 L/min (8,000 gpm) of CCW to the as-built CS heat exchanger.
	11.e Tests will be performed to determine the flow rate to the SC heat exchanger.	11.e The as-built CCW pump delivers at least 41,640 L/min (11,000 gpm) of CCW to the as-built SC heat exchanger.
	11.f Tests will be performed to determine the flow rate to each essential chiller condenser.	11.f The as-built CCW pump delivers at least 7,874 L/min (2,800 gpm) of CCW to one of two as-built essential chiller condensers.

Table 2.7.2.2-4 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	11.g Tests will be performed to determine the flow rate to the SFPC heat exchanger.	11.g The as-built CCW pump delivers at least 13,249 L/min (3,500 gpm) of CCW to the as-built SFPC heat exchanger.
	11.h Tests will be performed to determine the flow rate to each emergency diesel generator.	11.h The as-built CCW pump delivers at least 18,170 L/min (2,400 gpm) and 14,612 L/min (1,930 gpm) of CCW to the as-built emergency diesel generator A/B and C/D respectively.
	11.i Tests will be performed to determine the flow rate to each RCP coolers.	11.i The as-built CCW pump delivers at least 1,675 L/min (442.5 gpm) of CCW to each as-built RCP coolers.

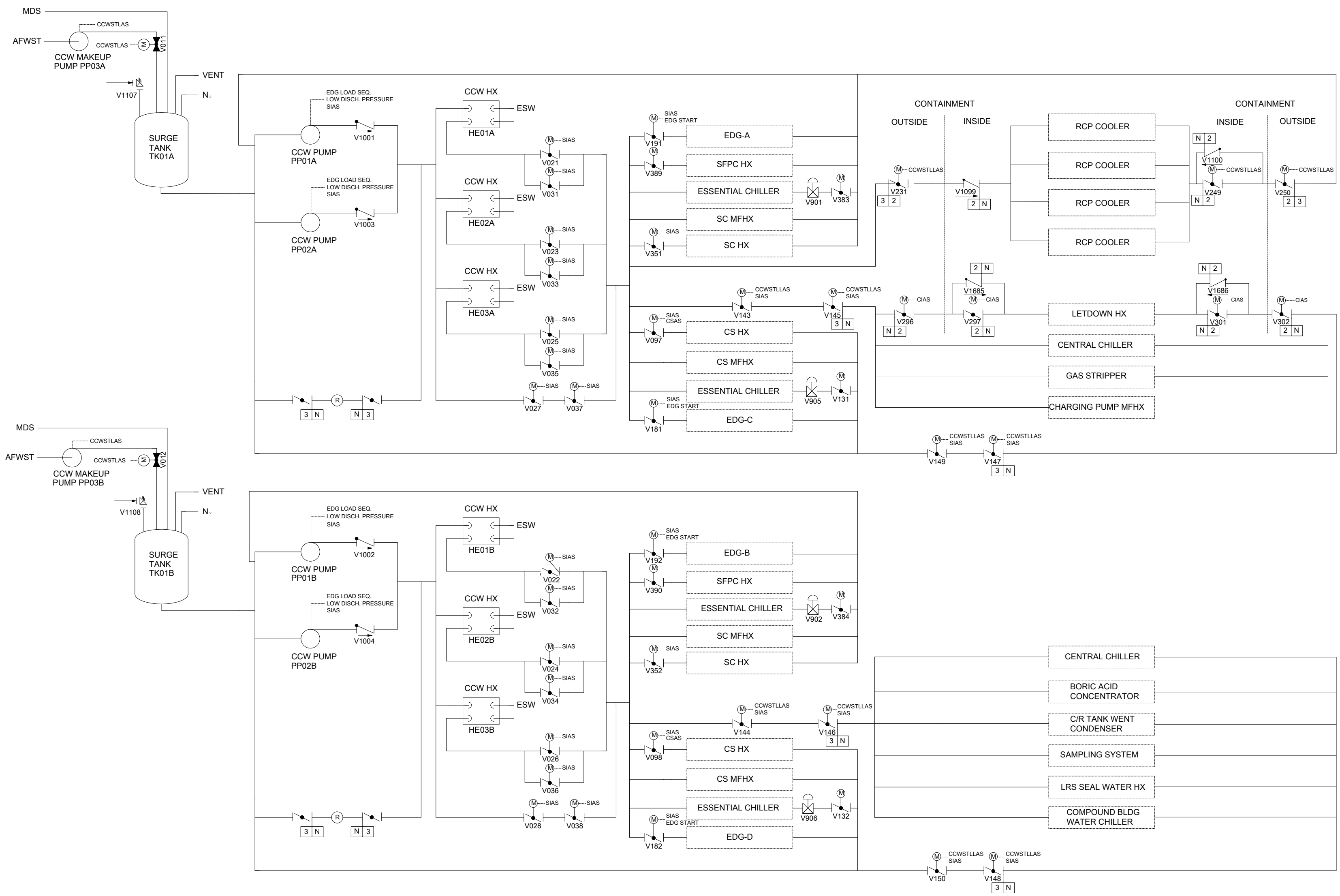


Figure 2.7.2.2-1 Component Cooling Water System

2.7.2.3 Essential Chilled Water System

2.7.2.3.1 Design Description

The essential chilled water system (ECWS) is a safety-related closed loop chilled water system that serves safety-related HVAC cooling loads. The ECWS has the safety-related function that provides chilled water to safety-related air handling units and cubicle coolers.

The ECWS consists of two divisions. Each division includes two essential chillers, two ECW pumps, an ECW compression tank, an ECW makeup pump, an ECW air separator, piping, valves, controls and instrumentation. The ECWS is located in the auxiliary building.

Makeup water to the ECWS is supplied from the demineralized water makeup system. A safety-related seismic Category I makeup line is also provided to each division from the auxiliary feedwater system.

The ECWS is designed as follows:

1. The functional arrangement of the ECWS is as described in the Design Description of Subsection 2.7.2.3.1 and in Table 2.7.2.3-1 and as shown in Figure 2.7.2.3-1.

2.a The ASME Code components identified in Table 2.7.2.3-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.2.3-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.3-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.3-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.2.3-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.2.3-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Tables 2.7.2.3-1 can withstand seismic design basis loads without loss of safety function.

6.a Each of the Class 1E components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 is powered from its respective Class 1E division.

6.b Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E division.

7.a AOVs and check valves identified in Table 2.7.2.3-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, AOVs identified in Table 2.7.2.3-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.

8.b All controls required by the design exist in the RSR to start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.

9. The two mechanical divisions of the ECWS are physically separated.

10. The ECW pumps and ECW makeup pumps have sufficient net positive suction head (NPSH).

11. The ECW compression tank accommodates water volume due to thermal expansion and contraction, and 7 day system operation without normal makeup.

2.7.2.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.2.3-4 specifies the inspections, tests, analyses, and associated acceptance criteria for the essential chilled water system.

Table 2.7.2.3-1

Essential Chilled Water System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Essential chiller unit	Auxiliary Building	3	I
ECW pump	Auxiliary Building	3	I
ECW makeup pump	Auxiliary Building	3	I
ECW compression tank	Auxiliary Building	3	I
Essential chilled water supply and return piping and valves for the division I	Auxiliary Building	3	I
Essential chilled water supply and return piping and valves for the division II	Auxiliary Building	3	I
ECW makeup pump discharge piping to ECW compression tank	Auxiliary Building	3	I

Table 2.7.2.3-2 (1 of 2)

Essential Chilled Water System Components List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
ECW pump	WO-PP01A, PP02A, PP01B, PP02B	3	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
ECW makeup pump	WO-PP03A, PP03B	3	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
Essential chiller unit	WO-CH01A, CH02A CH01B, CH02B	3	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
ECW compression tank	WO-TK01A, TK01B	3	I	-/-	-/-	-/-	-	-	-
ECW air separator	WO-TK02A, TK02B	3	I	-/-	-/-	-/-	-	-	-
Makeup line check valves	WO-V1003A, V1032A, V1003B, V1032B	3	I	-/-	-/-	-/-	-	Open	-
Nitrogen supply check valves	WO-V1031A, V1031B	3	I	-/-	-/-	-/-	-	Open	-
ECW pump discharge check valves	WO-V1010A, V1014A, V1010B, V1014B	3	I	-/-	-/-	-/-	-	Open	-
ECW makeup pump discharge check valves	WO-V1011A, V1011B	3	I	-/-	-/-	-/-	-	Open	-
ECW compression tank relief valves	WO-V1001A, V1001B	3	I	-/-	-/-	-/-	-	Open	-

Table 2.7.2.3-2 (2 of 2)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Control room supply AHU chilled water 3-way valves (AOV)	WO-V0906A, V0906B, V0906C, V0906D	3	I	Yes/No	-/-	-/-	-	Open	Open
EDG room normal supply AHU chilled water 3-way valves (AOV)	WO-V0917A, V0917B, V0918A, V0918B	3	I	Yes/No	-/-	-/-	-	Open	Open

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.2.3-3

Essential Chilled Water System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
ECW compression tank level	LS-001A, 002B 003C, 004D	Auxiliary Building	3	I	Yes/No	No/Yes	No/Yes

(1) The column "Item No." is information only (not part of certified design).

Table 2.7.2.3-4 (1 of 5)

Essential Chilled Water System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the ECWS is as described in the Design Description of Subsection 2.7.2.3.1 and in Table 2.7.2.3-1 and as shown in Figure 2.7.2.3-1.	1. Inspection of the as-built ECWS will be performed.	1. The as-built ECWS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.3.1 and in Table 2.7.2.3-1 and as shown in Figure 2.7.2.3-1.
2.a The ASME Code components identified in Table 2.7.2.3-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports.	2.a The ASME Section III design reports or data reports exist and conclude that the as-built components identified in Table 2.7.2.3-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.2.3-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report or data reports. [DAC]	2.b The ASME Section III design reports or data reports exist and conclude that the as-built piping including supports identified in Table 2.7.2.3-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.3-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.2.3-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.3-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.2.3-1.

Table 2.7.2.3-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.2.3-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.2.3-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.2.3-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.2.3-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.7.2.3-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.7.2.3-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure.	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.2.3-1 is located in the seismic Category I structure.
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.2.3-1 can withstand seismic design basis loads without loss of safety function.
6.a Each of the Class 1E components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 is powered from its respective Class 1E division.	6.a Test will be performed by providing a test signal in only one Class 1E division at a time.	6.a The test signal exists at the Class 1E components and instruments identified in Tables 2.7.2.3-2 and 2.7.2.3-3 powered from the Class 1E division under test.
6.b Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.b Inspection of the as-built Class 1E divisions will be performed.	6.b Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a AOVs and check valves identified in Table 2.7.2.3-2 perform an active safety function to change position as indicated in the table.	7.a.i Test or type test of AOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each AOV changes position as indicated in Table 2.7.2.3-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built AOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each AOV changes position as indicated in Table 2.7.2.3-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.2.3-2 under pre-operational test conditions.

Table 2.7.2.3-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.b After loss of motive power, AOVs identified in Table 2.7.2.3-2 assume the indicated loss of motive power position.	7.b Test of the as-built AOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built AOV identified in Table 2.7.2.3-2 assumes the indicated loss of motive position.
8.a All controls required by the design exist in the MCR to start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.
8.b All controls required by the design exist in the RSR to start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the essential chillers and pumps identified in Table 2.7.2.3-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.2.3-2 and 2.7.2.3-3.
9. The two mechanical divisions of the ECWS are physically separated.	9. Inspections of the as-built mechanical divisions will be performed.	9. The two mechanical divisions of the ECWS are physically separated by a divisional wall or a fire barrier.
10. The ECW pumps and ECW makeup pumps have sufficient net positive suction head (NPSH).	10. Test to measure the as-built ECW pump and ECW makeup pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	10. A report exists and concludes that the as-built calculated NPSH available is minimum 25 percent greater than each ECW pump’s and ECW makeup pump’s NPSH required.

Table 2.7.2.3-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The ECW compression tank accommodates liquid volume due to thermal expansion and contraction, and 7 day system operation without normal makeup.	11. Inspection and analysis will be performed on the as-built ECW compression tank size to verify that tank accommodates water volume due to thermal expansion and contraction, and 7 day system operation without normal makeup.	11. A report exists and concludes that the as-built ECW compression tank size is sufficient to accommodate the water volume due to thermal expansion and contraction, and 7 day system operation without normal makeup.

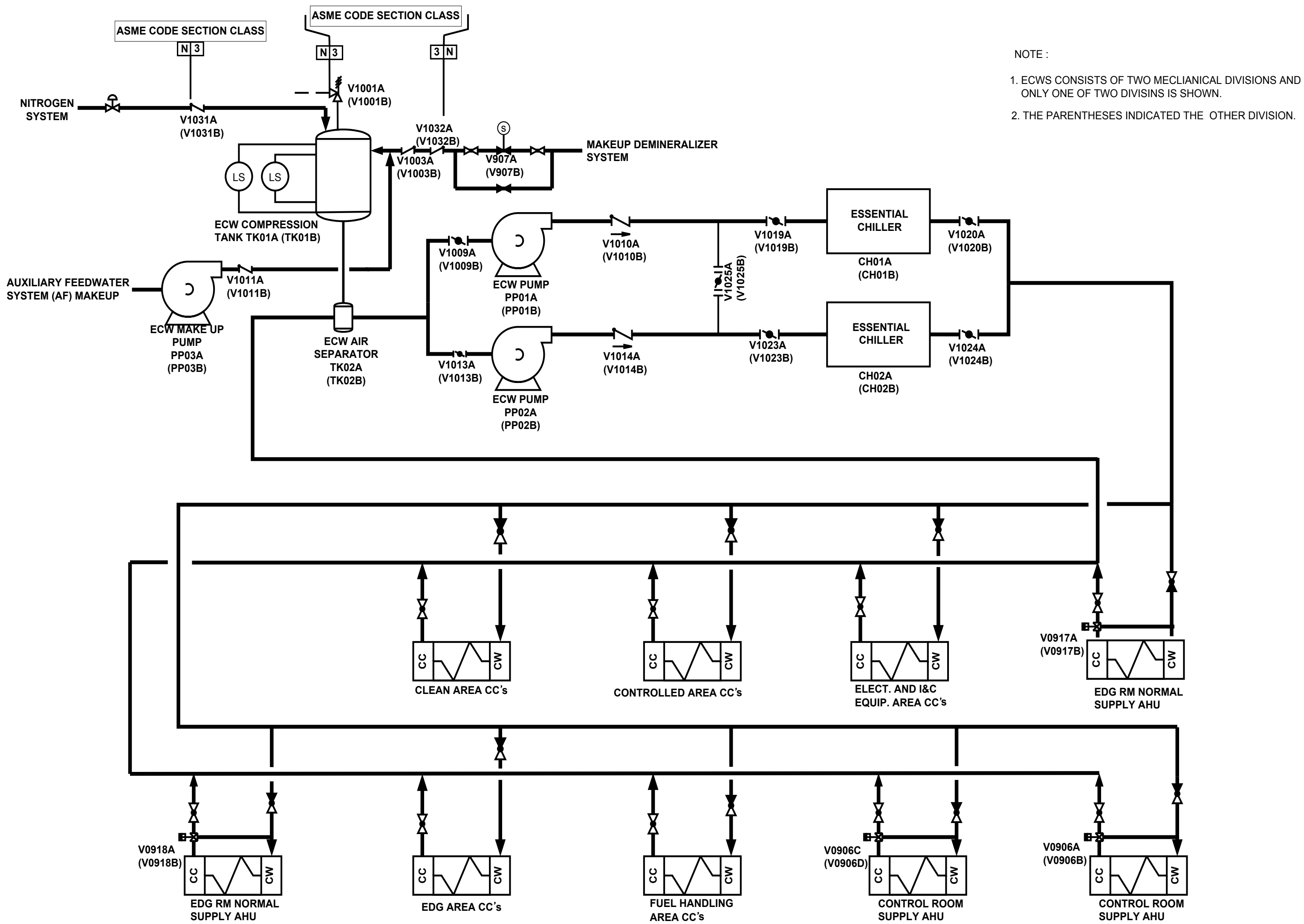


Figure 2.7.2.3-1 Essential Chilled Water System

2.7.2.4 Plant Chilled Water System

2.7.2.4.1 Design Description

The plant chilled water system (PCWS) is a non safety-related closed loop chilled water system that serves non safety-related HVAC cooling loads, with the exception of containment isolation valves (CIVs) and the piping between the CIVs that are safety-related, ASME Section III Class 2 and seismic Category I as described in Subsection 2.11.3. The PCWS performs the containment isolation function for the PCW lines penetrating the containment. The PCWS provides cooling source to all of non safety-related HVAC equipment cooling coils and process equipment.

The PCWS consists of central chilled water subsystem and compound building chilled water subsystem. The central chilled water subsystem is located in the auxiliary building and the compound building chilled water subsystem is located in the compound building. The central chilled water subsystem consists of four chillers, two chilled water pumps, an air separator, a compression tank, a chemical additive tank, associated piping, controls and instrumentation. The compound building chilled water subsystem consists of three chillers, two chilled water pumps, an air separator, a compression tank, a chemical additive tank, associated piping, controls and instrumentation.

To meet the above functional requirements, the PCWS is designed as follows:

1. The functional arrangement of the PCWS is as described in the Design Description of Subsection 2.7.2.4.1 and in Table 2.7.2.4-1 and as shown in Figures 2.7.2.4-1 and 2.7.2.4-2.

2.7.2.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.2.4-2 describes the ITAAC for the PCWS.

The ITAAC related to the CIVs and the piping between the CIVs of the PCWS are described in Table 2.11.3-2.

Table 2.7.2.4-1

Plant Chilled Water System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
PCW containment isolation valves, V012, V013, V014, V015, and V1043 and the piping between the containment isolation valves	Auxiliary Building & Reactor Containment Building	2	I

Table 2.7.2.4-2

Plant Chilled Water System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PCWS is as described in the Design Description of Subsection 2.7.2.4.1 and in Table 2.7.2.4-1 and as shown in Figures 2.7.2.4-1 and 2.7.2.4-2.	1. Inspection of the as-built PCWS will be performed.	1. The as-built PCWS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.4.1 and in Table 2.7.2.4-1 and as shown in Figures 2.7.2.4-1 and 2.7.2.4-2.

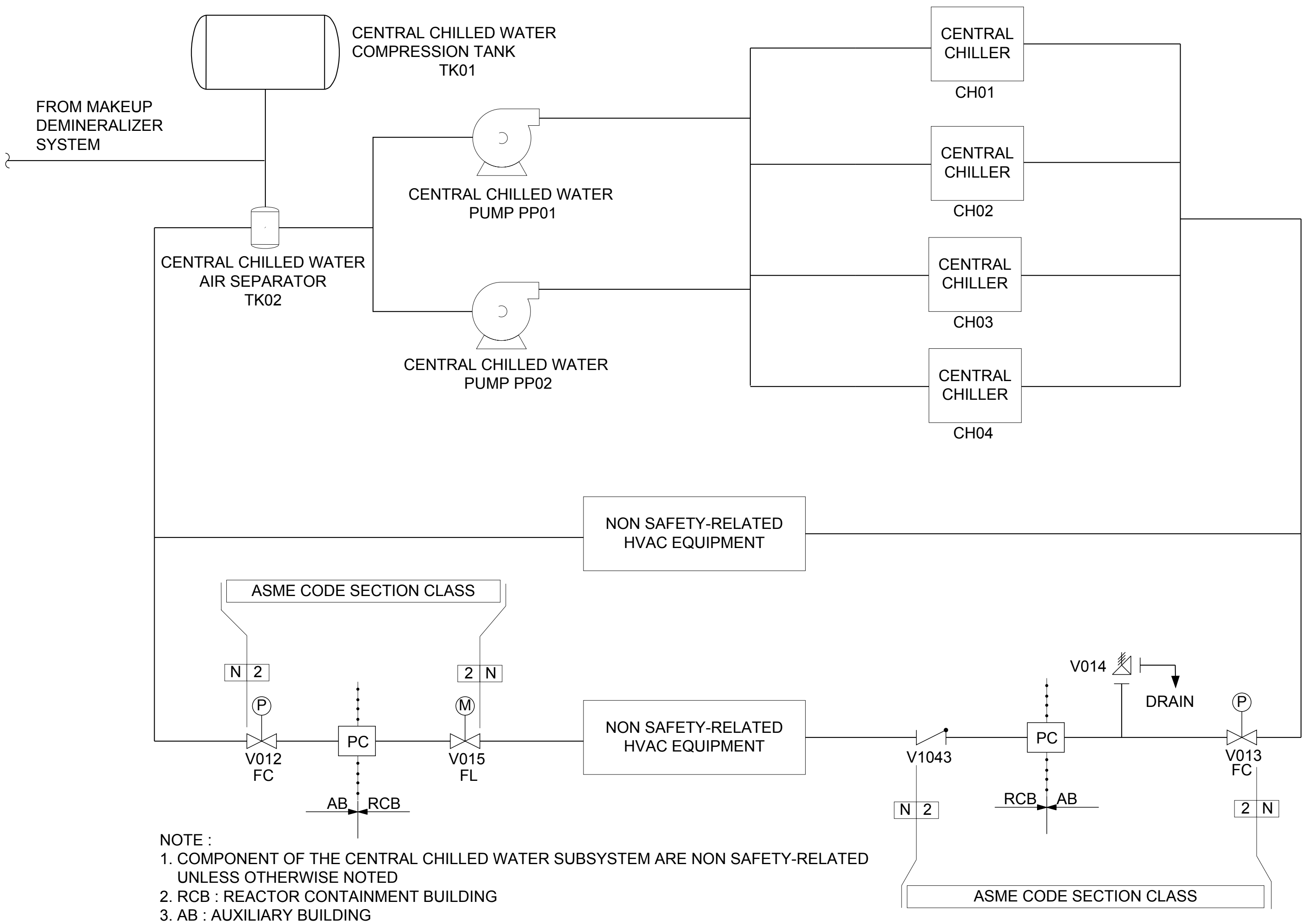
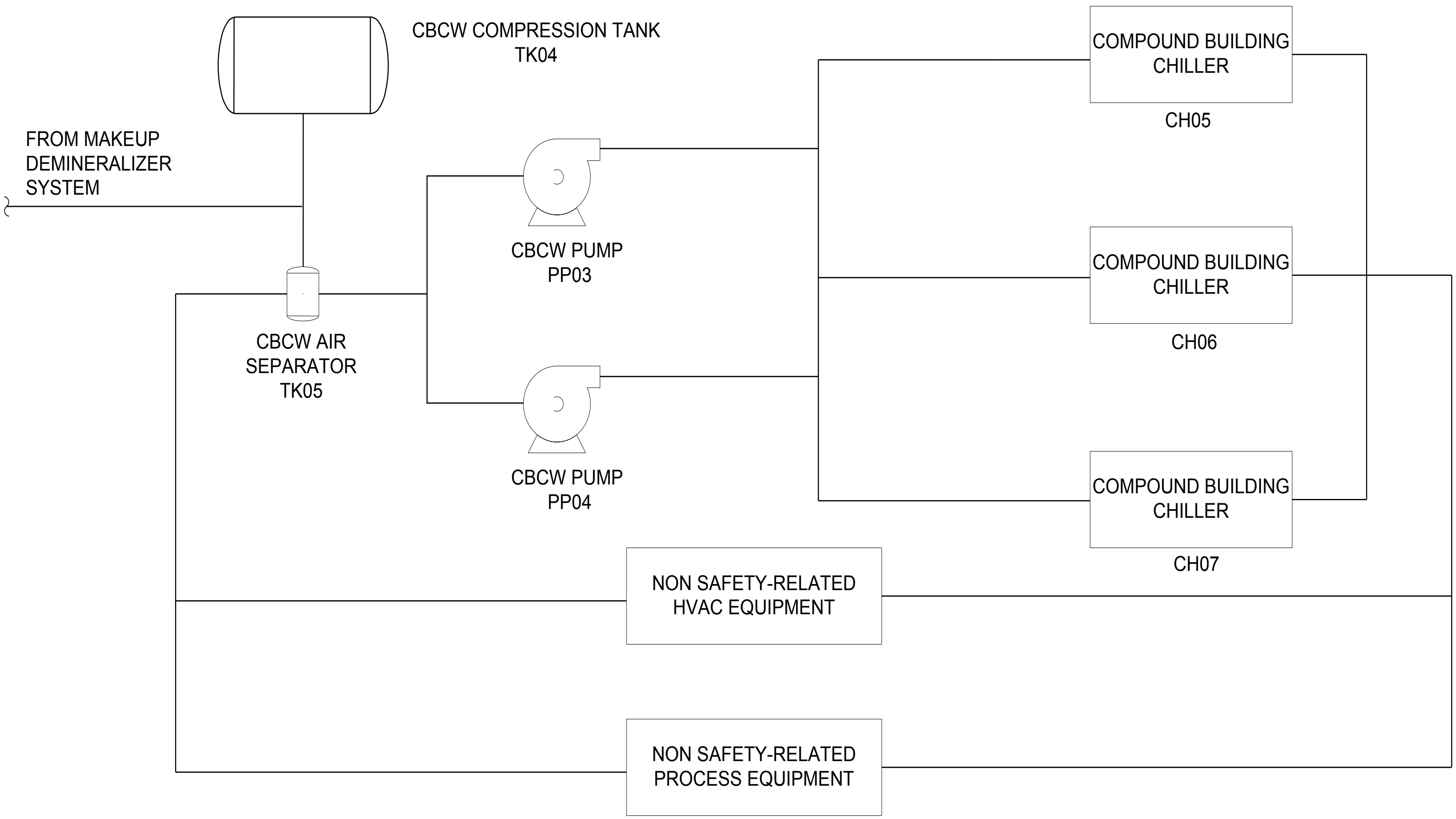


Figure 2.7.2.4-1 Plant Chilled Water System (Central Chilled Water Subsystem)



NOTE :
1. COMPONENTS OF CBCW SUBSYSTEM ARE NON SAFETY-RELATED UNLESS OTHERWISE NOTED
2. CBCW : COMPOUND BUILDING CHILLED WATER

Figure 2.7.2.4-2 Plant Chilled Water System (Compound Building Chilled Water Subsystem)

2.7.2.5 Equipment and Floor Drainage System

2.7.2.5.1 Design Description

The equipment and floor drainage system (EFDS) has no safety function except the containment isolation and flooding level detection capability. The EFDS collects radioactive and potentially radioactive liquid waste at atmospheric pressure, from equipment and floor drainage of the reactor containment building, auxiliary building, compound building, and the turbine generator building, and transports liquid waste to the liquid waste management system (LWMS). All drainages are conveyed by gravity to their respective building sumps and are then pumped to the LWMS. Radioactive contamination in turbine generator building sump is continuously monitored by a radiation monitor and alarmed in the main control room (MCR) during normal operations for radioactivity. Upon detecting any radioactivity in the discharge, the discharge is manually terminated and is routed to the floor drain tanks of LWMS.

The EFDS has the following safety-related functions:

a. Preserve containment integrity by the one fail-closed and the one fail-lock air operated containment isolation valves of the EFDS lines penetrating the containment.

b. Preserve flooding level detection capability by means of measuring flooding level in the engineering safety feature (ESF) pump rooms and the floors of Quadrants A, B, C, and D in auxiliary building.

To meet above functional requirements, the EFDS is designed as follows:

1. The functional arrangement of the EFDS is as described in the Design Description of Subsection 2.7.2.5.1 and in Table 2.7.2.5-1 and as shown in Figure 2.7.2.5-1.

2.a The ASME Code components identified in Table 2.7.2.5-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.2.5-1 is designed and constructed in accordance with ASME Section III requirements.

3.a The seismic Category I components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 can withstand seismic design basis loads without loss of safety function.

3.b The seismic Category I piping including supports identified in Table 2.7.2.5-1 can withstand seismic design basis load without loss of safety function.

4. Floor drains in the auxiliary building (AB) are physically separated into quadrants (two in each division) and there are no common floor drain lines among quadrants.

5.a The Class 1E components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

5.b Each of the Class lE components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 is powered from its respective Class lE division.

5.c Separation is provided between Class lE divisions, and between Class lE division and non-Class 1E division.

6.a MOV and AOV identified in Table 2.7.2.5-2 perform an active safety function to change position as indicated in the table.

6.b After loss of motive power, MOV and AOV identified in Table 2.7.2.5-2 assume the indicated loss of motive power position.

7.a All controls and alarms required by the design exist in the MCR to open and close MOV and AOV identified in Table 2.7.2.5-2.

7.b All controls and alarms required by the design exist in the RSR to open and close MOV and AOV identified in Table 2.7.2.5-2.

7.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.2.5-3.

7.d All displays and alarms required by the design exist in the RSR defined in Table 2.7.2.5-3.

2.7.2.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the equipment and floor drainage system specified in Table 2.7.2.5-4.

The ITAAC associated with the EFDS components and piping that comprise a portion of the containment isolation system are described in Table 2.11.3-2.

Table 2.7.2.5-1

Equipment and Floor Drainage System Equipment Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
Portion of containment penetration piping including inside containment isolation valve	Reactor Containment Building	2	I
Portion of containment penetration piping including outside containment isolation valve	Auxiliary Building	2	I

Table 2.7.2.5-2

Equipment and Floor Drainage System Components List

Component Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Containment Isolation Valve (MOV)	V-0005	Reactor Containment Building	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS/ Remote Manual	Close	As Is
Containment Isolation Valve (AOV)	V-0006	Auxiliary Building	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS/ Remote Manual	Close	Close

(1) The column "Item No." is information only (not part of certified design).

Table 2.7.2.5-3

Equipment and Floor Drainage System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Auxiliary Building Floor Drain Sump Room Flooding Level (Quadrant A,B,C & D)	LI-050A, 051B, LI-052C, 053D	Auxiliary Building	3	I	Yes/Yes	Yes/No	Yes/No
Auxiliary Building Floor Drain Sump Room Flooding Alarm (Quadrant A,B,C & D)	LAHH- 050A, 051B, 052C, 053D	Auxiliary Building	3	I	Yes/Yes	No/Yes	No/Yes
ESF Pump Room Flooding Alarm	LAHH- 079A, 080B, 085A, 086B, 091C, 092D, 097C, 098D	Auxiliary Building	3	I	Yes/Yes	No/Yes	No/Yes

(1) The column "Item No." is information only (not part of certified design).

Table 2.7.2.5-4 (1 of 4)

Equipment and Floor Drainage System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the EFDS is as described in the Design Description of Subsection 2.7.2.5.1 and in Table 2.7.2.5-1 and as shown in Figure 2.7.2.5-1.	1. Inspection of the as-built EFDS will be performed.	1. The as- built EFDS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.5.1 and as shown in Figure 2.7.2.5-1 and in Table 2.7.2.5-1.
2.a The ASME Code components identified in Table 2.7.2.5-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that as-built components identified in Table 2.7.2.5-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.2.5-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that as-built piping including supports identified in Table 2.7.2.5-1 are designed and constructed in accordance with ASME Section III requirements.
3.a The seismic Category I components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 can withstand seismic design basis loads without loss of safety function.	3.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	3.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 are located in the seismic Category I structure.
	3.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	3.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 can withstand seismic design basis loads without loss of safety function.

Table 2.7.2.5-4 (2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	3.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	3.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 including anchorage are seismically bounded by the tested or analyzed conditions.
3.b The seismic Category I piping including supports identified in Table 2.7.2.5-1 can withstand seismic design basis loads without loss of safety function.	3.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	3.b.i The as-built seismic Category I piping including supports identified in Table 2.7.2.5-1 is located in the seismic Category I structure(s).
	3.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	3.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.7.2.5-1 can withstand seismic design basis loads without loss of its safety function.
4. Floor drains in the auxiliary building (AB) are physically separated into quadrants (two in each division) and there are no common floor drain lines among quadrants.	4. Inspection of the EFDS will be performed.	4. A report exists and concludes that the floor drains in the auxiliary building (AB) are physically separated into quadrants by walls and have no common drain lines among quadrants.

Table 2.7.2.5-4 (3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.a The Class 1E components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	5.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	5.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	5.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	5.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.2.5-2 and 2.7.2.5-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
5.b Each of the Class 1E components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 is powered from its respective Class 1E division.	5.b Test will be performed by providing a test signal in only one Class 1E division at a time.	5.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.2.5-2 and 2.7.2.5-3 powered from the Class 1E division under test.
5.c Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E division.	5.c Inspection of the as-built Class 1E divisions will be performed.	5.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.

Table 2.7.2.5-4 (4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.a MOV and AOV identified in Table 2.7.2.5-2 perform an active safety function to change position as indicated in the table.	6.a.i MOV and AOV will be performed that demonstrate the capability of the valve to operate under its design conditions.	6.a.i A test report exists and concludes that each MOV or AOV changes position as indicated in Table 2.7.2.5-2 under design conditions.
	6.a.ii Test and/or analyses of the as-built MOV and AOV will be performed under pre-operational flow, differential pressure, and temperature conditions.	6.a.ii Upon receipt of the actuating signal, each MOV or AOV changes position as indicated in Table 2.7.2.5-2 under pre-operational test conditions.
6.b After loss of motive power, MOV and AOV identified in Table 2.7.2.5-2 assume the indicated loss of motive power position.	6.b Test of the as-built MOV and AOV will be performed under the conditions of loss of motive power.	6.b Upon loss of motive power, each as-built MOV or AOV identified in Table 2.7.2.5-2 assumes the indicated loss of motive power position.
7.a All controls required by the design exist in the MCR to open and close MOV and AOV identified in Table 2.7.2.5-2.	7.a Tests will be performed using the controls in the MCR.	7.a All controls in the as-built MCR open and close the MOV and AOV identified in Table 2.7.2.5-2.
7.b All controls required by the design exist in the RSR to open and close MOV and AOV identified in Table 2.7.2.5-2.	7.b Tests will be performed using the controls in the RSR.	7.b All controls in the as-built RSR open and close the MOV and AOV identified in Table 2.7.2.5-2.
7.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.2.5-3.	7.c Inspections will be performed on the displays and alarms in the MCR.	7.c All displays and alarms exist and can be retrieved in the MCR as defined in Table 2.7.2.5-3.
7.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.2.5-3.	7.d Inspections will be performed on the displays and alarms in the RSR.	7.d All displays and alarms exist and can be retrieved in the RSR as defined in Table 2.7.2.5-3.

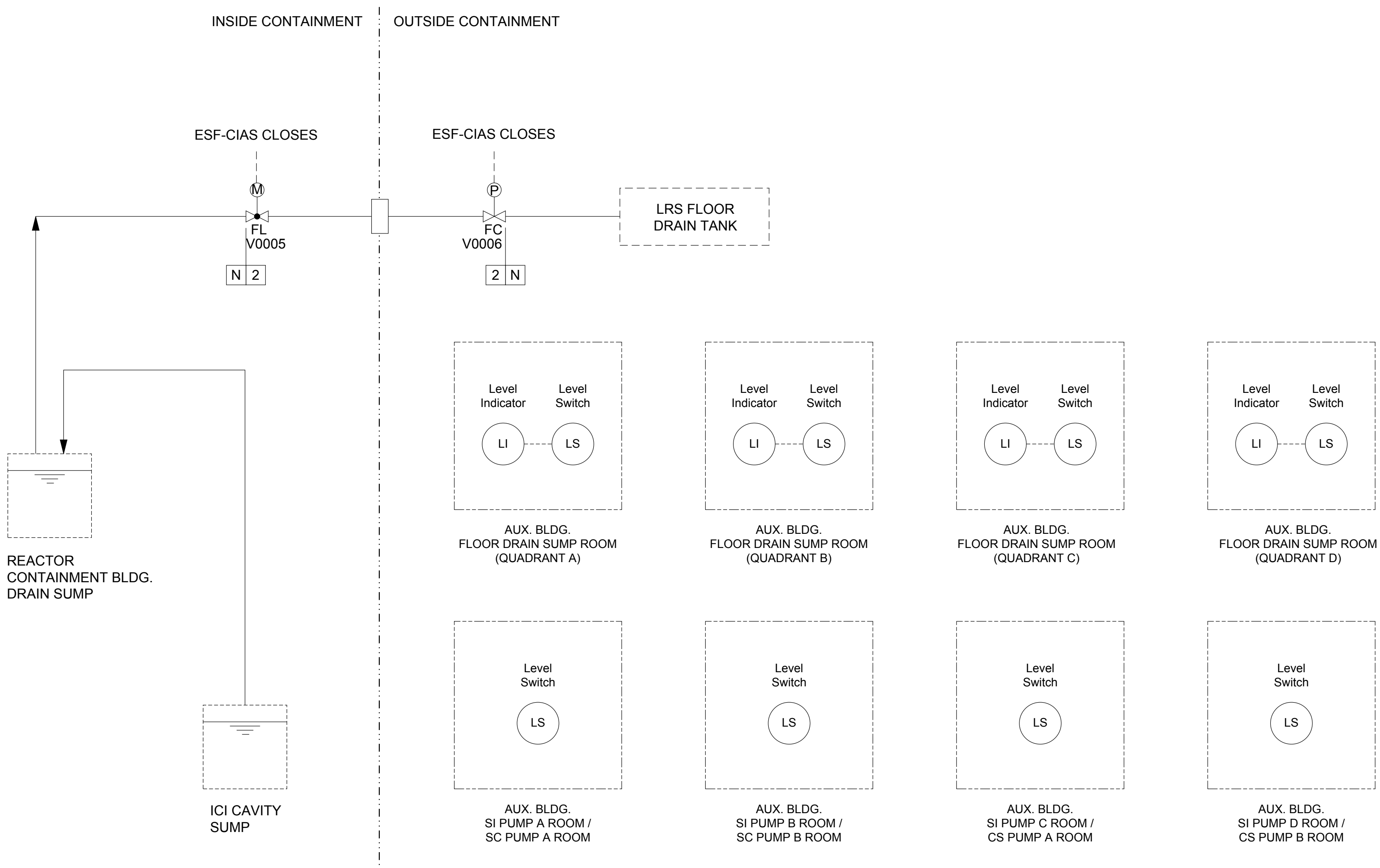


Figure 2.7.2.5-1 Equipment and Floor Drainage System

2.7.2.6 Process and Post-Accident Sampling System

2.7.2.6.1 Design Description

The process and post-accident sampling system (PPASS) is designed to collect samples of the various process fluids (liquid and gaseous) during normal and post-accident conditions and monitor various conditions using the collected and analyzed samples.

The PPASS does not have any safety function, and therefore has no safety design basis, except for providing containment isolation. The containment isolation function of PPASS is described in Subsection 2.11.3.

1. The functional arrangement of the PPASS is as described in the Design Description of Subsection 2.7.2.6.1 and in Table 2.7.2.6-1 and as shown in Figure 2.7.2.6-1.

2.a The ASME Code components identified in Table 2.7.2.6-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.7.2.6-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.6-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.6-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.2.6-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.2.6-1 retains its pressure boundary integrity at its design pressures.

5.a The seismic Category I components and instruments identified in Table 2.7.2.6-1 and Table 2.7.2.6-2 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.2.6-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs, SOVs and check valves identified in Table 2.7.2.6-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs and SOVs identified in Table 2.7.2.6-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close MOVs and SOVs identified in Table 2.7.2.6-2.

8.b All controls required by the design exist in the RSR to open and close MOVs and SOVs identified in Table 2.7.2.6-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.

2.7.2.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the PPASS are specified in Table 2.7.2.6-4.

The ITAAC related to the CIVs and the piping between the CIVs of the PPASS are described in Table 2.11.3-2.

Table 2.7.2.6-1

Process and Post-Accident Sampling System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
RCS Hot Leg Sample Line CIV inside Containment	Containment	2	I
RCS Hot Leg Sample Line CIV outside Containment	Auxiliary Building	2	I
RCS PZR Surge Sample Line CIV inside Containment	Containment	2	I
RCS PZR Surge Sample Line CIV outside Containment	Auxiliary Building	2	I
RCS PZR Steam Space Sample Line CIV inside Containment	Containment	2	I
RCS PZR Steam Space Sample Line CIV outside Containment	Auxiliary Building	2	I
SI Pumps Miniflow Sample Line Isolation Valves	Auxiliary Building	2	I
CS Pump Miniflow Sample Line Isolation Valves	Auxiliary Building	2	I
SC Pump Miniflow Sample Line Isolation Valves	Auxiliary Building	2	I
SI Tank Sample Line CIV inside Containment	Containment	2	I
SI Tank Sample Line CIV outside Containment	Auxiliary Building	2	I
SI Tank Sample Line Isolation Valves	Containment	2	I
Containment Air Sample Line CIV inside Containment	Containment	2	I
Containment Air Sample Line CIV outside Containment	Auxiliary Building	2	I
Containment Air Sample Return Line CIV outside Containment	Auxiliary Building	2	I
Containment Air Sample Return Line CIV inside Containment	Containment	2	I
PASS Sample Return Line CIV inside Containment	Containment	2	I
PASS Sample Return Line CIV outside Containment	Auxiliary Building	2	I

Table 2.7.2.6-2 (1 of 3)

Process and Post-Accident Sampling System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control / Display at MCR	Control / Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
RCS Hot Leg Sample Line CIV inside Containment (SOV)	PX-001	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
RCS Hot Leg Sample Line CIV outside Containment (SOV)	PX-002	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
RCS PZR Surge Sample Line CIV inside Containment (SOV)	PX-003	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
RCS PZR Surge Sample Line CIV outside Containment (SOV)	PX-004	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
RCS PZR Steam Space Sample Line CIV inside Containment (SOV)	PX-005	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
RCS PZR Steam Space Sample Line CIV outside Containment (SOV)	PX-006	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
SI Pumps Miniflow Sample Line Isolation Valve (SOV)	PX-008	2	I	No/No	No/No	No/No	-	-	Closed
SI Pumps Miniflow Sample Line Isolation Valve (SOV)	PX - 009	2	I	No/No	No/No	No/No	-	-	Closed

Table 2.7.2.6-2 (2 of 3)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control / Display at MCR	Control / Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
CVCS Purification Filter Inlet Sample Valves (SOV)	PX-012, 013, 014	3	I	No/No	No/No	No/No	-	-	Closed
SC Pump Miniflow Sample Line Isolation Valves (SOV)	PX-016, 017	2	I	No/No	No/No	No/No	-	-	Closed
SI Tank Sample Line CIV outside Containment (SOV)	PX-020	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
SI Tank Sample Line CIV inside Containment (SOV)	PX-021	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
SI Tank Sample Line Isolation Valves (SOV)	PX-022, 023,024, 025	2	I	No/No	No/No	No/No	-	-	Closed
CS Pump Miniflow Sample Line Isolation Valves (SOV)	PX - 026, 027	2	I	No/No	No/No	No/No	-	-	Closed
Sample Return Line Isolation Valves (SOV)	PX - 034	3	I	No/No	No/No	No/No	-	-	Closed
Containment Air Sample Line CIV inside Containment(MOV)	PX-041	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	As Is
Containment Air Sample Line CIV outside Containment (MOV)	PX-042	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	As Is
Containment Air Sample Return Line CIV outside Containment (MOV)	PX-043	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	As Is

Table 2.7.2.6-2 (3 of 3)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control / Display at MCR	Control / Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
PASS Sample Return Line CIV outside Containment (SOV)	PX-053	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Closed	Closed
VCT Gas Sample Line Isolation Valves (SOV)	PX - 063	3	I	No/No	No/No	No/No	-	-	Closed
PASS Sample Return Line CIV inside Containment	PX-1005	2	I	-/Yes	-	-	-	Closed	-/-
Containment Air Sample Return Line CIV inside Containment	PX-1020	2	I	-/Yes	-	-	-	Closed	-/-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.2.6-3

Process and Post-Accident Sampling System Instruments List

Instrument Name	Item No.[1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
RCS Hot Leg Sample Line CIVs Position	PX-V001	Containment	-	II	No/No	Yes/No	Yes/No
RCS Hot Leg Sample Line CIVs Position	PX-V002	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
RCS PZR Surge Sample Line CIVs Position	PX-V003	Containment	-	II	No/No	Yes/No	Yes/No
RCS PZR Surge Sample Line CIVs Position	PX-V004	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
RCS PZR Steam Space Sample Line CIVs Position	PX-V005	Containment	-	II	No/No	Yes/No	Yes/No
RCS PZR Steam Space Sample Line CIVs Position	PX-V006	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
SI Tank Sample Line CIVs Position	PX-V020	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
SI Tank Sample Line CIVs Position	PX-V021	Containment	-	II	No/No	Yes/No	Yes/No
Containment Air Sample Line CIVs Position	PX-V041	Containment	-	II	No/No	Yes/No	Yes/No
Containment Air Sample Line CIVs Position	PX-V042	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
Containment Air Sample Return Line CIV Position	PX-V043	Auxiliary Building	-	II	No/No	Yes/No	Yes/No
Containment Air Sample Return Line CIV Position	PX-V053	Auxiliary Building	-	II	No/No	Yes/No	Yes/No

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.2.6-4 (1 of 5)

Process and Post-Accident Sampling System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PPASS is as described in the Design Description of Subsection 2.7.2.6.1 and in Table 2.7.2.6-1 and as shown in Figure 2.7.2.6-1.	1. Inspection of the as-built system will be performed.	1. The as-built PPASS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.2.6.1 and in Table 2.7.2.6-1 and as shown in Figure 2.7.2.6-1.
2.a The ASME Code components identified in Table 2.7.2.6-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.2.6-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.2.6-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.2.6-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.2.6-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.2.6-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.2.6-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.2.6-1.

Table 2.7.2.6-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.7.2.6-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.2.6-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.2.6-1 retains its pressure boundary integrity at its design pressures.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.2.6-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in a seismic Category I structure(s).	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 is located in a seismic Category I structure(s).
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 including anchorages is seismically bounded by the tested or analyzed conditions.

Table 2.7.2.6-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.7.2.6-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping, including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping, including supports identified in Table 2.7.2.6-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.7.2.6-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspection will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.2.6-2 and 2.7.2.6-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.7.2.6-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.2.6-2 and 2.7.2.6-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspections of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, SOVs and check valves identified in Table 2.7.2.6-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs and SOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV or SOV changes position as indicated in Table 2.7.2.6-2 under design conditions.
	7.a.ii Test and/or analyses of the as-built MOVs and SOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV or SOV changes position as indicated in Table 2.7.2.6-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.7.2.6-2 under pre-perational test conditions.
7.b After loss of motive power, MOVs and SOVs identified in Table 2.7.2.6-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs and SOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV or SOV identified in Table 2.7.2.6-2 assumes the indicated loss of motive power position.

Table 2.7.2.6-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to open and close the MOVs and SOVs identified in Table 2.7.2.6-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR open and close the MOVs and SOVs identified in Table 2.7.2.6-2.
8.b All controls required by the design exist in the RSR to open and close MOVs and SOVs identified in Table 2.7.2.6-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR open and close the MOVs and SOVs identified in Table 2.7.2.6-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.2.6-2 and 2.7.2.6-3.

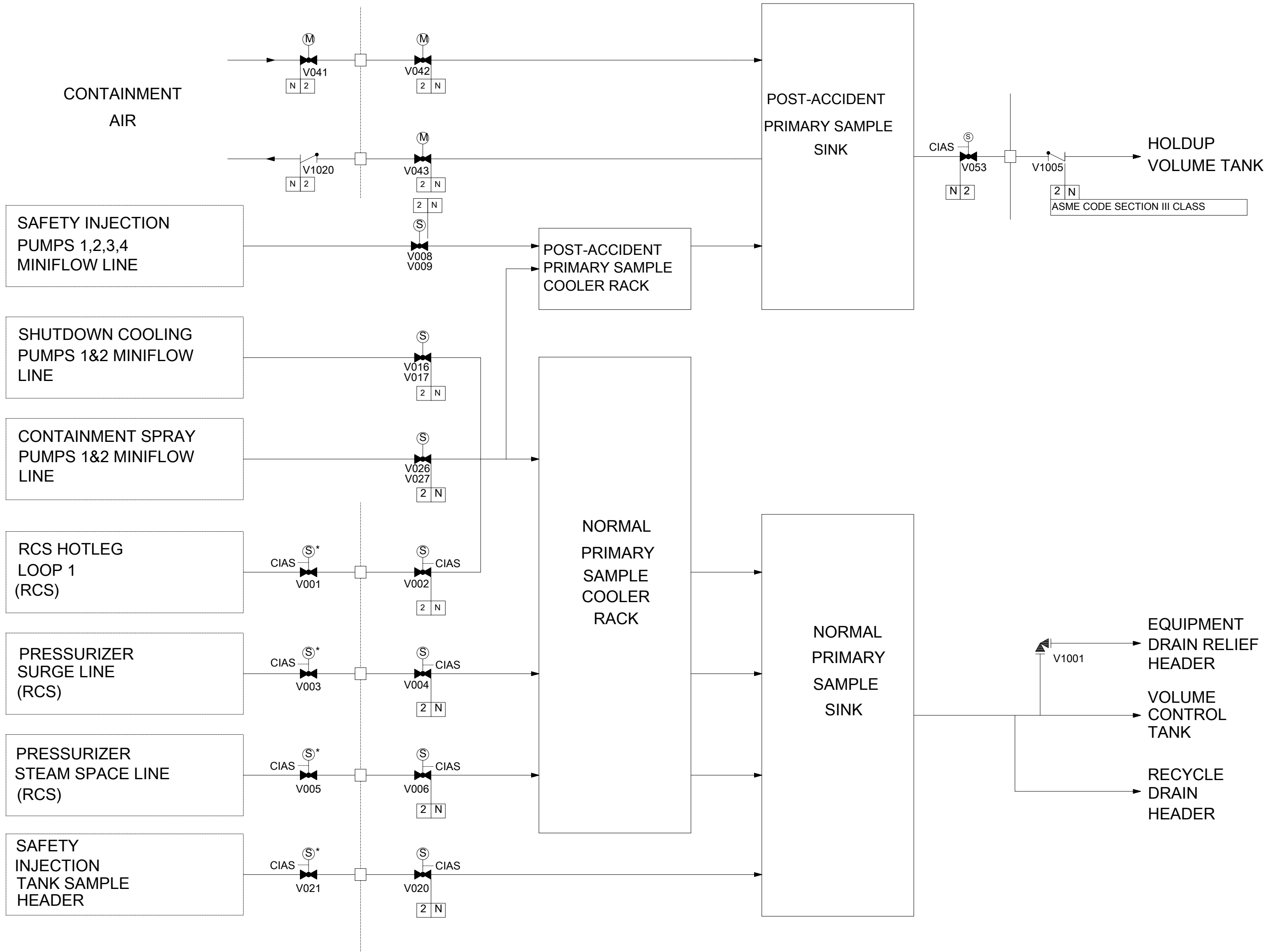


Figure 2.7.2.6-1 Process and Post-Accident Sampling System

2.7.2.7 Turbine Generator Building Closed Cooling Water System

Since the turbine generator building closed cooling water system (TGBCCW) does not perform safety functions, no ITTAC items are provided.

2.7.2.8 Turbine Generator Building Open Cooling Water System

Since the turbine generator building open cooling water system (TGBOCWS) does not perform safety functions, no ITTAC items are provided.

2.7.3 HVAC Systems

2.7.3.1 Control Room HVAC System

2.7.3.1.1 Design Description

The control room HVAC system is a safety-related, and maintains environmental conditions for personnel comfort, health, safety, and proper functions of equipment and controls within the control room envelope (CRE) during normal operations, abnormal and accident conditions of the plant. The control room HVAC system is located in auxiliary building.

The CRE is maintained at a positive pressure with respect to adjacent areas to prevent unfiltered in-leakage.

This system consists of two divisions. Each division has an outside air intake, louver, dampers, two air handling units (AHUs), an air cleaning unit (ACU), ductwork, instrumentation and controls.

Each outside air intake has a minimum of two redundant isolation dampers, a smoke detector, and two radiation detection monitors.

The control room HVAC system is designed as follows:

1. The functional arrangement of the control room HVAC system is as described in the Design Description of Subsection 2.7.3.1.1 and as shown in Figure 2.7.3.1-1.

2. The seismic Category I components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 can withstand seismic design basis loads without loss of safety function.

3.a Each of the Class 1E components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 is powered from its respective Class 1E division.

3.b Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

4.a ESR dampers, PSR dampers, check dampers and tornado dampers identified in Table 2.7.3.1-1 perform an active safety function to change position as indicated in the table.

4.b After loss of motive power, ESR dampers and PSR dampers identified in Table 2.7.3.1-1 assume the indicated loss of motive power position.

5.a All controls required by the design exist in the MCR to start and stop the ACUs and AHUs, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.1-1.

5.b All controls required by the design exist in the RSR to start and stop the ACUs and AHUs, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.1-1.

5.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.

5.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.

6. The two mechanical divisions of the control room HVAC system are physically separated.

7. The control room HVAC system provides the conditioned air that is required to maintain the room temperature within the design limits for the CRE during plant normal, abnormal and accident conditions.

8. The control room HVAC system removes particulate matter and iodine, and provides system flow as required in the safety analysis.

9. Upon detection of radiation in the outside air intakes, the air intake isolation dampers in the air intake having the higher radiation level close automatically.

10. In response to engineered safety feature actuation signal-safety injection actuation signal (ESFAS-SIAS) or engineered safety feature actuation signal-control room emergency ventilation actuation signal (ESFAS-CREVAS), the emergency makeup ACU starts and associated isolation dampers open to direct flow through the ACU.

11. The unfiltered inleakage is within the performance value limit.

12. The AHU inlet isolation dampers (PSR) listed in Table 2.7.3.1-1 close within their closure time before the airborne radioactive material passes through the isolation dampers.

13.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.

13.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.

2.7.3.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3.1-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the control room HVAC system.

Table 2.7.3.1-1 (1 of 2)

Control Room HVAC System Components List

Component Name [1]	Item No. [2]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Supply AHU	VC-HV01A, HV01B, HV01C, HV01D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
Emergency Makeup ACU	VC-AU01A, AU01B	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS or CREVAS	Start	-
Air Intake Isolation Damper (ESR)	VC-Y0011A, Y0011B, Y0012A, Y0012B	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS or CREVAS	Open	Open
AHU Inlet Isolation Damper (PSR)	VC-Y0013A, Y0013C, Y0014B, Y0014D, Y0015A, Y0015C, Y0016B, Y0016D	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS or CREVAS	Closed	Closed
AHU Discharge Check Damper	VC-Y1002A Y1002B Y1002C Y1002D	-	I	-/-	-/-	-/-	-	Open	-
ACU Inlet Isolation Damper (ESR)	VC-Y0017A, Y0017C, Y0018B, Y0018D	-	I	Yes/No	Yes/Yes	Yes/Yes	ACU fan start	Open	Closed

Table 2.7.3.1-1 (2 of 2)

Component Name (1)	Item No. (2)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Control/ Display at MCR	Control/ Display at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
ACU Return Isolation Damper (ESR)	VC-Y0019A, Y0019C, Y0020B, Y0020D	-	I	Yes/No	Yes/Yes	Yes/Yes	ACU fan start	Open	Closed
AHU Discharge Flow Control Damper (ESR)	VC-Y0021A, Y0021C, Y0022B, Y0022D	-	I	Yes/No	Yes/Yes	Yes/Yes	AHU fan start	Modulate	Closed
ACU Discharge Flow Control Damper (ESR)	VC-Y0023A, Y0023C, Y0024B, Y0024D	-	I	Yes/No	Yes/Yes	Yes/Yes	ACU fan start	Modulate	Closed
Kitchen & Toilet Exhaust Isolation Damper (PSR)	VC-Y0027, Y0028	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS or CREVAS	Closed	Closed
Smoke Removal Duct Isolation Damper (PSR)	VC-Y0029, Y0030	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS or CREVAS	Closed	Closed
Tornado Dampers	VC-Y1101A, Y1101B, Y1102, Y1103	-	I	-/No	-/-	-/-	-	Closed (Tornado Condition)	-

(1) Damper actuator types are as follows:
- ESR : Electro hydraulic spring return
- PSR : Pneumatic spring return

(2) The column "Item No." is information only (not part of certified design).

(3) Dash(-) indicates not applicable.

Table 2.7.3.1-2 (1 of 2)

Control Room HVAC System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
AHU cooling coil downstream temperature	T-3049A, 3049C, 3050B, 3050D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
ACU total differential pressure	P-3025, 3026	Aux. Bldg	-	I	-/-	Yes/Yes	Yes/Yes
AHU flow rate	F-021A, 021C, 022B, 022D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
ACU flow rate	F-053A, 053C, 054B, 054D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
ACU heater temperature	T-029A, 029C, 030B, 030D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
AHU heater downstream temperature	T-3047A, 3047C, 3048B, 3048D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
Outside air flow rate	F-051C, 052D	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes
Outside intake air radiation detection	R-071A, 072B, 073A, 074B	Aux. Bldg	-	I	Yes/No	Yes/Yes	Yes/Yes

Table 2.7.3.1-2 (2 of 2)

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Outside air intake smoke detection	X-071, 072	Aux. Bldg	-	-	-/-	No/Yes	No/Yes
Supply air duct smoke detection	X-085	Aux. Bldg	-	-	-/-	No/Yes	No/Yes
Return air duct smoke detection	X-087	Aux. Bldg	-	-	-/-	No/Yes	No/Yes

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.3.1-3 (1 of 4)

Control Room HVAC System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the control room HVAC system is as described in the Design Description of Subsection 2.7.3.1.1 and as shown in Figure 2.7.3.1-1.	1. Inspection of the as-built control room HVAC system will be conducted.	1. The as-built control room HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.1.1 and as shown in Figure 2.7.3.1-1.
2. The seismic Category I components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	2.a The as-built seismic Category I components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 are located in the seismic Category I structure.
	2.b Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	2.b A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 including anchorage are seismically bounded by the tested or analyzed conditions.
3.a Each of the Class 1E components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 is powered from its respective Class 1E division.	3.a Tests will be performed by providing a test signal in only one Class 1E division at a time.	3.a The test signal exists at the Class 1E components and instruments identified in Tables 2.7.3.1-1 and 2.7.3.1-2 powered from the Class 1E division under test.

Table 2.7.3.1-3 (2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	3.b Inspection of the as-built Class 1E divisions will be performed.	3.b Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between Class 1E divisions, and also between Class 1E division and non-Class 1E division.
4.a ESR dampers, PSR dampers, check dampers and tornado dampers identified in Table 2.7.3.1-1 perform an active safety function to change position as indicated in the table.	4.a.i Tests or type tests of ESR dampers and PSR dampers will be performed that demonstrate the capability of the damper to operate under its design conditions.	4.a.i A test report exists and concludes that each ESR damper or PSR damper changes position as indicated in Table 2.7.3.1-1 under design conditions.
	4.a.ii Test and/or analyses of the as-built ESR dampers, PSR dampers will be performed under pre-operational test conditions.	4.a.ii Upon receipt of the actuating signal, each ESR damper or PSR damper changes position as indicated in Table 2.7.3.1-1 under pre-operational test conditions.
	4.a.iii Tests of the as-built check dampers, will be performed under pre-operational test conditions.	4.a.iii Each check damper changes position as indicated in Table 2.7.3.1-1 under pre-operational test conditions.
	4.a.iv Tests of the as-built tornado dampers will be performed under pre-operational test conditions.	4.a.iv Each tornado damper changes position as indicated in Table 2.7.3.1-1 under pre-operational test conditions.
4.b After loss of motive power, ESR dampers, PSR dampers identified in Table 2.7.3.1-1 assume the indicated loss of motive power position.	4.b Tests of the as-built ESR dampers, PSR dampers will be performed under the conditions of loss of motive power.	4.b Upon loss of motive power, each as-built ESR damper, or PSR damper identified in Table 2.7.3.1-1 assumes the indicated loss of motive power position.
5.a All controls required by the design exist in the MCR to start and stop the ACUs and AHUs, and to open and close ESR dampers, PSR dampers identified in Table 2.7.3.1-1.	5.a Tests will be performed using the controls in the MCR.	5.a All controls in the as-built MCR start and stop the ACUs and AHUs, open and close ESR dampers, PSR dampers identified in Table 2.7.3.1-1.
5.b All controls required by the design exist in the RSR to start and stop the ACUs and AHUs, and to open and close ESR dampers, PSR dampers identified in Table 2.7.3.1-1.	5.b Tests will be performed using the controls in the RSR.	5.b All controls in the as-built RSR start and stop the ACUs and AHUs, and open and close ESR dampers, PSR dampers identified in Table 2.7.3.1-1.

Table 2.7.3.1-3 (3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.	5.c Inspections will be performed on the displays and alarms in the MCR.	5.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.
5.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.	5.d Inspections will be performed on the displays and alarms in the RSR.	5.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.3.1-1 and 2.7.3.1-2.
6. The two mechanical divisions of the control room HVAC system are physically separated.	6. Inspection of the as-built mechanical divisions will be performed.	6. The two mechanical divisions of the control room HVAC system are physically separated by a division wall or fire barriers.
7. The control room HVAC system provides the conditioned air that is required to maintain the room temperature within the design limits for the CRE during plant normal, abnormal and accident conditions.	7. Tests and analyses of the as-built control room HVAC system will be performed.	7. A report exists and concludes that the as-built control room HVAC system is capable of providing the conditioned air to maintain the room temperature within design limits for the CRE during plant normal, abnormal and accident conditions.
8. The control room HVAC system removes particulate matter and iodine, and provides system flow as required in the safety analysis.	8.a Testing and analysis will be performed for each ACU filter to determine filter efficiencies.	8.a A test report exists and concludes that ACU filter efficiencies are equal to or greater than 99 % for iodine, and equal to or greater than 99 % for particulate matter greater than 0.3 micron.
	8.b Test of the air flow for the as-built control room HVAC system will be performed.	8.b The as-built control room HVAC system provides filtered the outside makeup air flow of equal to or less than 6,286 cmh (3,700 cfm), filtered the return air flow of equal to or more than 7,305 cmh (4,300 cfm), and maintains positive pressure in the CRE during the emergency mode.

Table 2.7.3.1-3 (4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. Upon detection of radiation in the outside air intakes, the air intake isolation dampers in the air intake having the higher radiation level close automatically.	9. Testing will be performed on the isolation dampers using signals that simulate radiation levels in the outside air intakes.	9. A test report concludes that the air intake isolation dampers having a higher radiation level in the outside air intakes are closed upon detection of radiation, as a result of having used a signal which simulates radiation levels.
10. In response to engineered safety feature actuation signal-safety injection actuation signal (ESFAS-SIAS) or engineered safety feature actuation signal-control room emergency ventilation actuation signal (ESFAS-CREVAS), the emergency makeup ACU starts and associated isolation dampers open to direct flow through the ACU.	10. Testing will be performed on the ACU using a simulated ESFAS-SIAS or ESFAS-CREVAS.	10. A test report verifies that in response to a simulated ESFAS-SIAS or ESFAS-CREVAS, the ACU starts and ACU inlet isolation dampers and return isolation dampers open.
11. The unfilterd inleakage is within the performance value limit.	11. Tests and analyses will be performed to verify that as-built unfiltered inleakage is within limits.	11. A report exists and concludes that the as-built unfiltered inleakage is less than 510 cmh (300 cfm), as specified in the safety analysis.
12. The AHU inlet isolation dampers (PSR) listed in Table 2.7.3.1-1 close within their closure time before the airborne radioactive material passes through the isolation dampers.	12. Test of the as-built AHU inlet isolation dampers (PSR) will be performed using a simulated isolation signal.	12. The AHU inlet isolation dampers (PSR) listed in Table 2.7.3.1-1 close within the 8.2 seconds after receiving a simulated isolation signal.
13.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.	13.a Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper rating will be performed.	13.a A report exists and concludes that the fire dampers that penetrate the fire barriers have the same fire resistance rating as the barrier.
13.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.	13.b Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper closing will be performed under design air flow condition.	13.b A report exists and concludes that the fire dampers which are required to protect safety shutdown capability close under the design air flow condition.

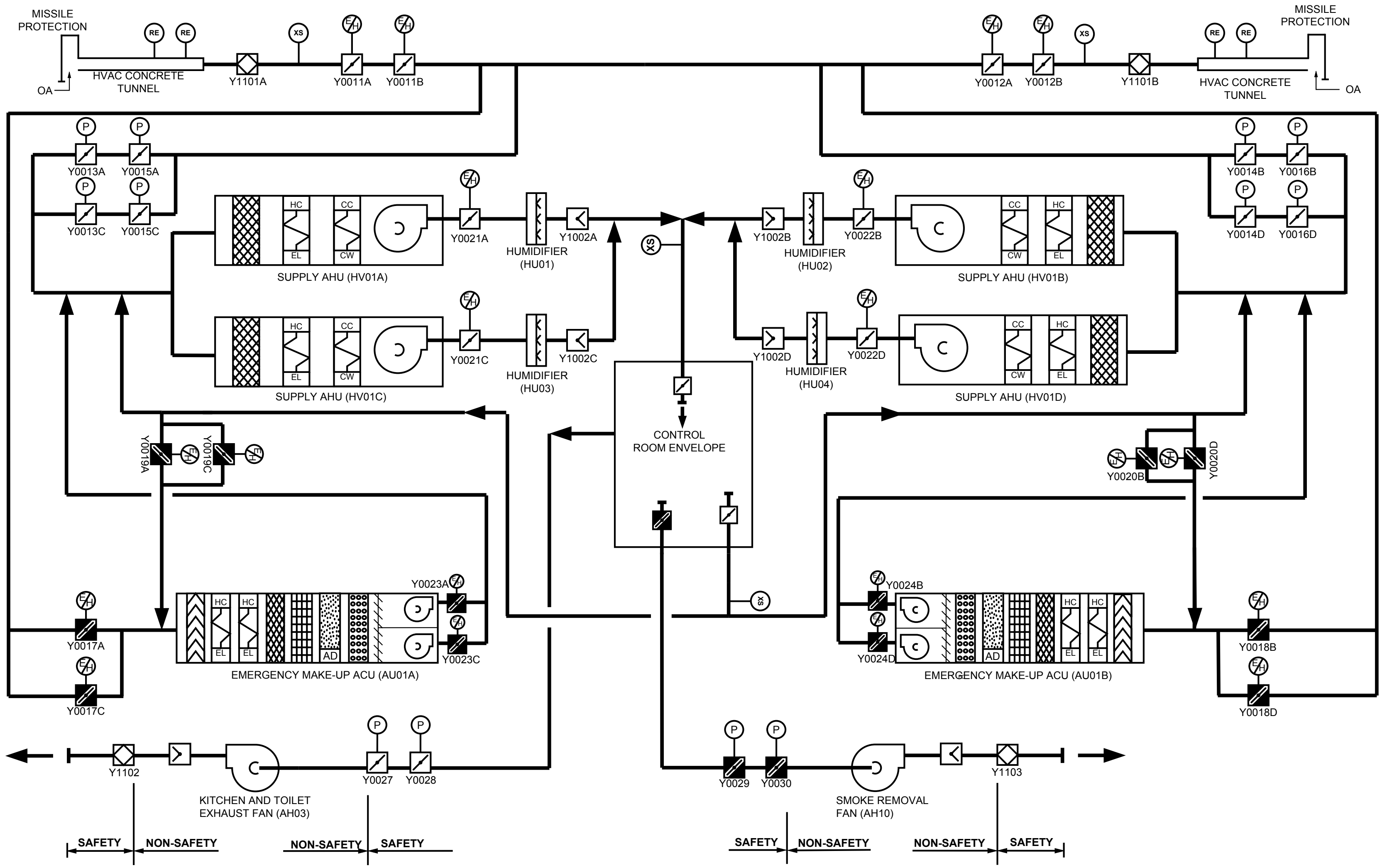


Figure 2.7.3.1-1 Control Room HVAC System

2.7.3.2 Fuel Handling Area HVAC System

2.7.3.2.1 Design Description

The fuel handling area HVAC system provides ventilation, heating, and cooling to fuel handling area located in the auxiliary building.

The fuel handling area HVAC system has safety-related function that provides suitable conditions for fuel handling area and maintains under a slightly negative pressure to the atmosphere.

The fuel handling area HVAC system has normal HVAC subsystem and emergency HVAC subsystem. The normal HVAC subsystem is non safety-related and has an AHU, a normal ACU, ductwork, instrumentation, and controls.

The emergency HVAC subsystem is safety-related and has two emergency exhaust ACUs, ductwork, instrumentation, and controls.

The fuel handling area HVAC system is designed as follows:

1. The functional arrangement of the fuel handling HVAC system is as described in the Design Description of Subsection 2.7.3.2.1 and as shown in Figure 2.7.3.2-1.

2. The seismic Category I components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 can withstand seismic design basis loads without loss of safety function.

3.a The Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

3.b Each of the Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 is powered from its respective Class 1E division.

3.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

4.a ESR dampers, PSR dampers and tornado dampers identified in Table 2.7.3.2-1 perform an active safety function to change position as identified in the table.

4.b After loss of motive power, ESR dampers and PSR dampers identified in Table 2.7.3.2-1 assume the indicated loss of motive power position.

5.a All controls required by the design exist in the MCR to start and stop the emergency ACUs and safety-related cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.2-1.

5.b All controls required by the design exist in the RSR to start and stop the emergency ACUs and safety-related cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.2-1.

5.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.2-2.

5.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.2-2.

6. The two mechanical divisions of the fuel handling area emergency HVAC subsystem (A/C & B/D) are physically separated.

7. The safety-related cubicle coolers identified in Table 2.7.3.2-1 provide conditioned air that is required to maintain the room temperature within the design limits for the spent fuel pool cooling heat exchanger rooms during plant normal, abnormal and accident conditions.

8. The fuel handling area HVAC system cubicle cooler fans identified in Table 2.7.3.2-1 operate automatically according to room temperature signal.

9. The emergency ACU in each division removes particulate matter iodine.

10. In response to engineered safety feature actuation signal-fuel area emergency ventilation actuation signal (ESFAS-FHEVAS) or high radiation signal, the normal ACU stops and isolation dampers close to divert flow through the emergency ACUs.

11.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.

11.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.

2.7.3.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3.2-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the fuel handling area HVAC.

Table 2.7.3.2-1

Fuel Handling Area HVAC System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Emergency ACUs	VF-AU02A, B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	FHEVAS	Start	-
SFP Cooling HX Room Cubicle Coolers	VF-HV02A, B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	High Temperature	Start	-
Air Intake Isolation Dampers (PSR)	VF-Y0001A, Y0002B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	FHEVAS	Closed	Closed
Normal ACU Isolation Dampers (PSR)	VF-Y0003A, Y0004B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	FHEVAS	Closed	Closed
Emergency ACU Isolation Dampers (ESR)	VF-Y0005A, Y0006B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	ACU fan start	Open	Closed
Emergency ACU Flow Control Dampers (ESR)	VF-Y0007A, Y0008B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	ACU fan start	Modulated	Closed
Tornado Dampers	VF-Y1201A, Y1202A	-	I	-/No	-/-	-/-	-	Closed (Tornado Condition)	-

(1) The column "Item No." is information only (not part of certified design).

(2) Damper actuator types are as follows:
- ESR : Electro hydraulic spring return
- PSR : Pneumatic spring return

(3) Dash(-) indicates not applicable.

Table 2.7.3.2-2

Fuel Handling Area HVAC System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Emergency ACU Total Differential Pressure	P-3053, 3054	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Emergency ACU Heater Temperature	T-3043A, 3044B	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Emergency ACU Adsorber Downstream Temperature	T-3045A, 3046B	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Emergency ACU Flowrate	F-033A, 034B	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
SFP Cooling HX Room Temperature	T-027A, 028B	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.3.2-3 (1 of 5)

Fuel Handling Area HVAC System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the fuel handling area HVAC system is as described in the Design Description of Subsection 2.7.3.2.1 and as shown in Figure 2.7.3.2-1.	1. Inspection of the as-built fuel handling area HVAC system will be performed.	1. The as-built fuel handling area HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.2.1 and as shown in Figure 2.7.3.2-1.
2. The seismic Category I components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	2.a The as-built seismic Category I components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 are located in the seismic Category I structure.
	2.b Type tests, analysis or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	2.b A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.7.3.2-3 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a The Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	3.a Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	3.a A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
3.b Each of the Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 is powered from its respective Class 1E division.	3.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	3.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.3.2-1 and 2.7.3.2-2 powered from the Class 1E division under test.
3.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	3.c Inspection of the as-built Class1E divisions will be performed.	3.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between Class 1E divisions, and also between Class 1E division and non-Class 1E division.

Table 2.7.3.2-3 (3 of 5)

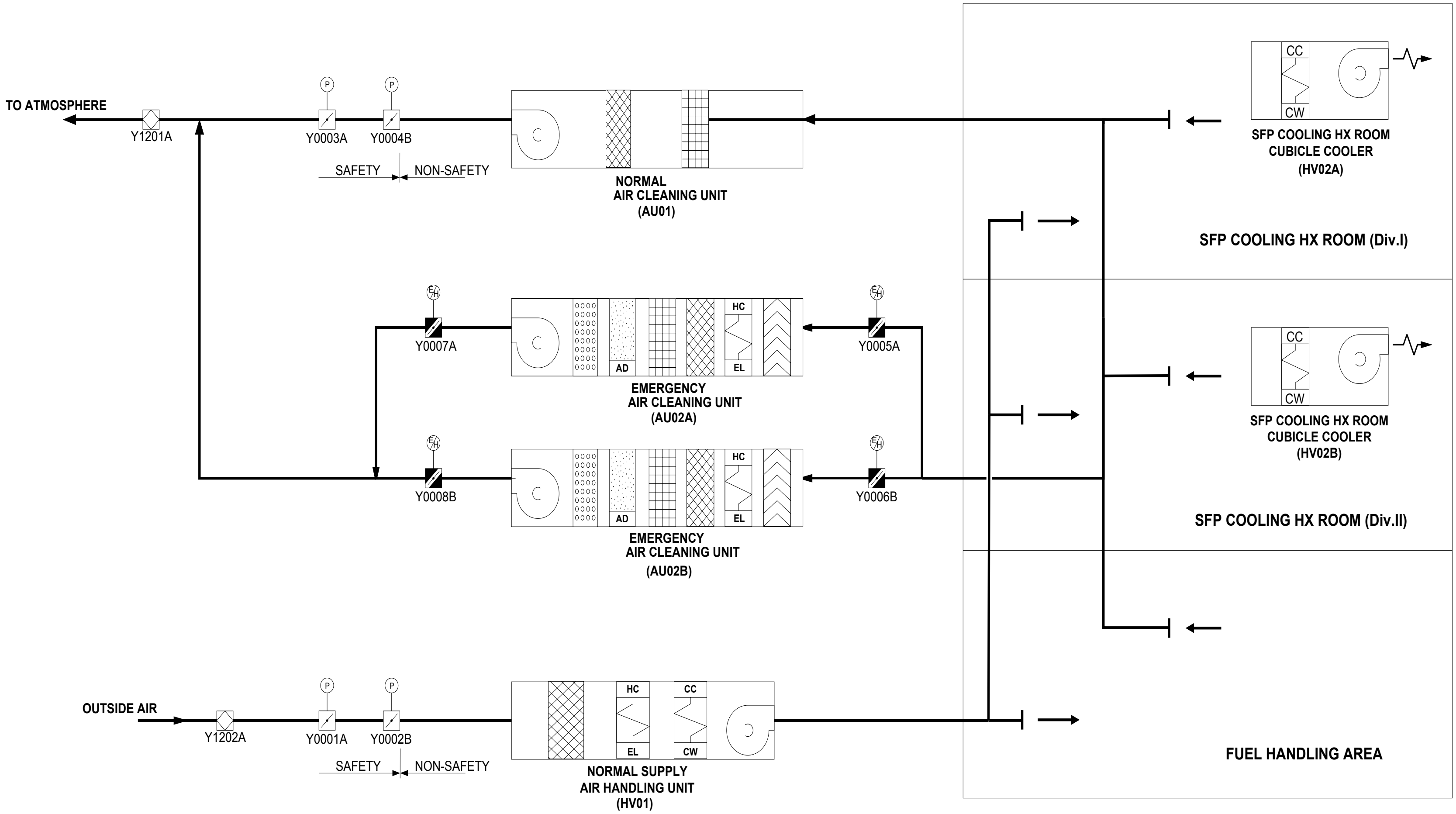
Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a ESR dampers and PSR dampers and tornado dampers identified in Table 2.7.3.2-1 perform an active safety function to change position as indicated in the table.	4.a.i Tests or type tests of ESR dampers and PSR dampers will be performed that demonstrate the capability of the damper to operate under its design conditions.	4.a.i A test report exists and concludes that each ESR damper or PSR damper changes position as indicated in Table 2.7.3.2-1 under design conditions.
	4.a.ii Test and/or analysis of the as-built ESR dampers and PSR dampers dampers will be performed under pre-operational test conditions.	4.a.ii Upon receipt of the actuating signal, each ESR damper or PSR damper changes position as indicated in Table 2.7.3.2-1 under pre-operational test conditions.
	4.a.iii Tests and/or analysis of the as-built tornado dampers will be performed under pre-operational test conditions.	4.a.iii Each tornado damper changes position as indicated in Table 2.7.3.2-1 under pre-operational test conditions.
4.b After loss of motive power, ESR dampers and PSR dampers identified in Table 2.7.3.2-1 assume the indicated loss of motive power position.	4.b Tests of the as-built ESR dampers and PSR dampers will be performed under the conditions of loss of motive power.	4.b Upon loss of motive power, each as-built ESR damper or PSR damper identified in Table 2.7.3.2-1 assumes the indicated loss of motive power position.
5.a All controls required by the design exist in the MCR to start and stop the emergency ACUs and safety-related cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.2-1.	5.a Tests will be performed using the controls in the MCR.	5.a All controls in the as-built MCR start and stop the emergency ACUs and safety-related cubicle coolers, and open and close ESR dampers and PSR dampers identified in Table 2.7.3.2-1.
5.b All controls required by the design exist in the RSR to start and stop the emergency ACUs and safety-related cubicle coolers, and to open and close the remotely operated isolation dampers identified in Table 2.7.3.2-1.	5.b Tests will be performed using the controls in the RSR.	5.b All controls in the as-built RSR start and stop the emergency ACUs and safety-related cubicle coolers, and open and close ESR dampers and PSR dampers identified in Table 2.7.3.2-1.

Table 2.7.3.2-3 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.2-2.	5.c Inspection will be performed on the displays and alarms in the MCR.	5.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Table 2.7.3.2-2.
5.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.2-2.	5.d Inspections will be performed on the displays and alarms in the RSR.	5.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Table 2.7.3.2-2.
6. The two mechanical divisions of the fuel handling area emergency HVAC subsystem are physically separated.	6. Inspection of as-built mechanical divisions will be performed.	6. The two mechanical divisions of the fuel handling area emergency HVAC subsystem are separated by a divisional wall or a fire barrier.
7. The safety-related cubicle coolers identified in Table 2.7.3.2-1 provide conditioned air that is required to maintain the room temperature within the design limits for the spent fuel pool cooling heat exchanger rooms during plant normal, abnormal and accident conditions.	7. Tests and analyses of the as-built safety-related cubicle coolers will be performed.	7. A report exists and concludes that the as-built safety-related cubicle coolers identified in Table 2.7.3.2-1 are capable of providing conditioned air to maintain the room temperature within the design limits for the spent fuel pool cooling heat exchanger rooms during plant normal, abnormal and accident conditions.
8. The fuel handling area HVAC system cubicle cooler fans identified in Table 2.7.3.2-1 operate automatically according to room temperature signal.	8. Tests of the as-built fuel handling area HVAC system cubicle cooler fans will be performed using a simulated signal.	8. The as-built fuel handling area HVAC system cubicle cooler fans identified in Table 2.7.3.2-1 operate automatically according to room temperature signal.

Table 2.7.3.2-3 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
9. The emergency ACU in each division removes particulate matter iodine.	9. Testing and analysis will be performed on each emergency ACU to determine filter efficiency.	9. A test report exists and concludes that the emergency ACU filter efficiencies are equal to or greater than 99 % for all forms of iodine, greater than or equal to 99 % for particulate matter greater than 0.3 microns.
10. In response to engineered safety feature actuation signal-fuel handling area emergency ventilation actuation signal (ESFAS-FHEVAS) or high radiation signal, the normal ACU stops and isolation dampers close to divert flow through the emergency ACUs.	10. Testing will be performed on the ACUs using a simulated ESFAS-FHEVAS or high radiation signal.	10. A test report verifies that in response to a simulated ESFAS-FHEVAS or high radiation, the isolation dampers in the air inlet and exhaust ductwork close and the emergency ACU start.
11.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.	11.a Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper rating will be performed.	11.a A report exists and concludes that the fire dampers that penetrate the fire barriers have the same fire resistance rating as the barrier.
11.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.	11.b Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper closing will be performed under design air flow condition.	11.b A report exists and concludes that the fire dampers which are required to protect safety shutdown capability close under the design air flow condition.



NOTE :

1. NORMAL AIR HANDLING UNIT AND AIR CLEANING UNIT ARE NON SAFETY-RELATED.
2. EMERGENCY AIR CLEANING UNITS AND CUBICLE COOLERS ARE SAFETY-RELATED.

Figure 2.7.3.2-1 Fuel Handling Area HVAC System

2.7.3.3 Auxiliary Building Clean Area HVAC System

2.7.3.3.1 Design Description

The auxiliary building clean area HVAC system provides ventilation, cooling and heating to the auxiliary building clean area and is located inside the auxiliary building clean area. The auxiliary building smoke removal fans are used for smoke removal.

The auxiliary building clean area HVAC system is a non safety-related system except for safety-related cubicle coolers.

The safety-related cubicle coolers for motor-driven auxiliary feedwater (AFW) pump rooms and essential chiller rooms are cooled by the essential chilled water system.

The auxiliary building clean area HVAC system is designed as follows:

1. The functional arrangement of the auxiliary building clean area HVAC system is as described in the Design Description of Subsection 2.7.3.3.1 and as shown in Figure 2.7.3.3-1.

2. The seismic Category I components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 can withstand seismic design basis loads without loss of safety function.

3.a Each of the Class 1E components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 is powered from its respective Class 1E division.

3.b Separation is provided between class 1E divisions, and between class 1E division and non-class 1E division.

4.a All controls required by the design exist in the MCR to start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.

4.b All controls required by the design exist in the RSR to start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.

4.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.3-2.

4.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.3-2.

5. The two mechanical divisions of the safety-related cubicle coolers are physically separated.

6. The auxiliary building clean area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the auxiliary building clean area during plant normal condition.

7. The safety-related cubicle coolers identified in Table 2.7.3.3-1 provide conditioned air that is required to maintain the room temperature within the design limits for the motor-driven auxiliary feedwater pump rooms and essential chiller rooms during plant normal, abnormal and accident conditions.

8. The auxiliary building clean area HVAC system cubicle cooler fans identified in Table 2.7.3.3-1 operate automatically according to room temperature signal.

9.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.

9.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.

2.7.3.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3.3-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the auxiliary building clean area HVAC.

Table 2.7.3.3-1

Auxiliary Building Clean Area HVAC System Components List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Essential Chiller Room Cubicle Coolers	VO- HV31A,31B HV32A,32B	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-
Motor-Driven AFW Pump Room Cubicle Coolers	VO- HV33A, 33B	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.3.3-2

Auxiliary Building Clean Area HVAC System Instruments List

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Essential Chiller Room Temperature	T-081A, 082B, 083C, 084D	Auxiliary Building	-	I	Yes/No	Yes/Yes	Yes/Yes
Motor-Driven AFW Pump Room Temperature	T-085A, 086B	Auxiliary Building	-	I	Yes/ No	Yes/Yes	Yes/Yes

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.3.3-3 (1 of 3)

Auxiliary Building Clean Area HVAC System ITAAC

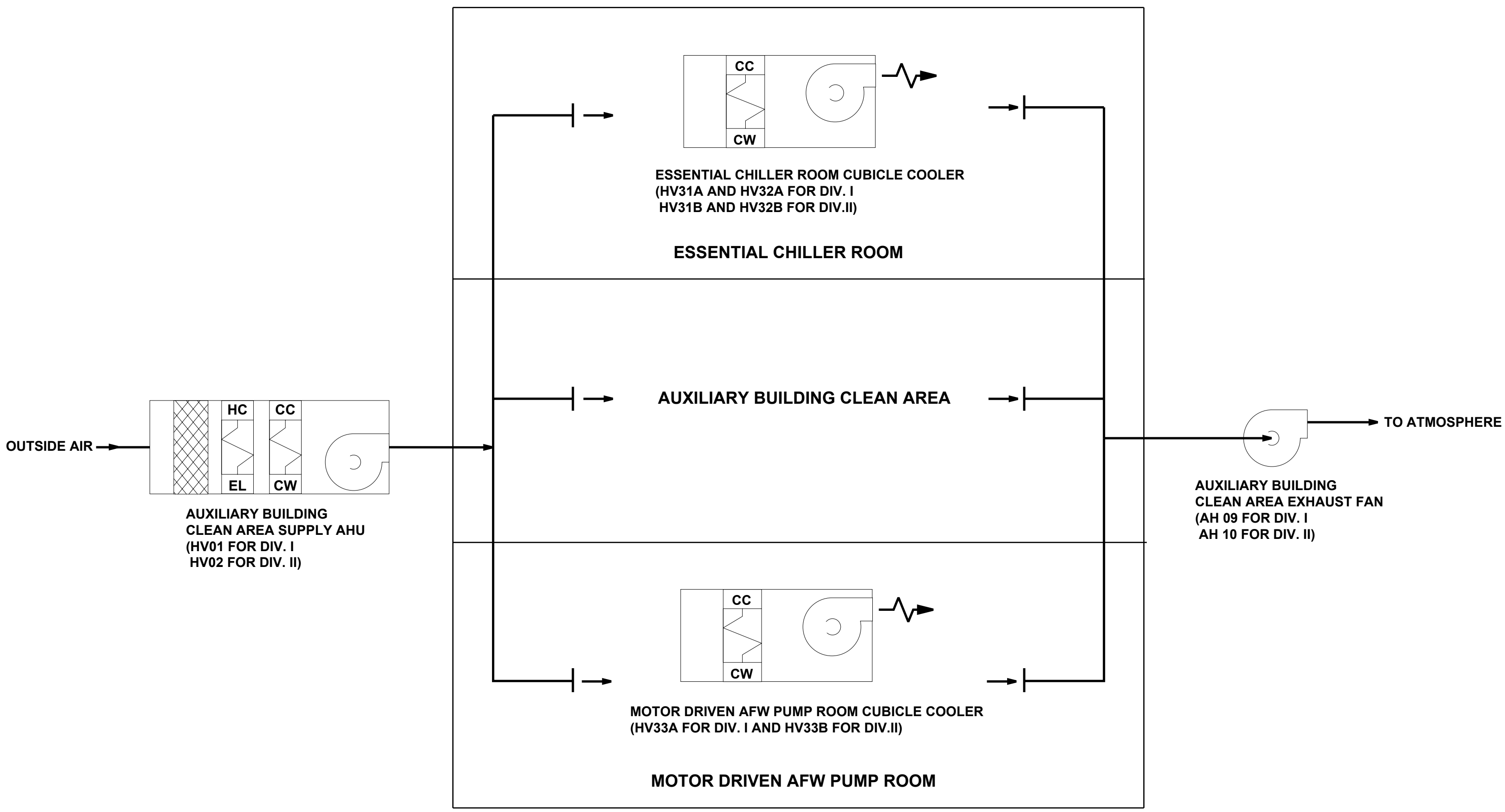
Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the auxiliary building clean area HVAC system is as described in the Design Description of Subsection 2.7.3.3.1 and as shown in Figure 2.7.3.3-1.	1. Inspection of the as-built the auxiliary building clean area HVAC system will be performed.	1. The as- built auxiliary building clean area HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.3.1 and as shown in Figure 2.7.3.3-1.
2. The seismic Category I components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	2.a The as-built seismic Category I components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 are located in the seismic Category I structure.
	2.b Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	2.b A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 including anchorage are seismically bounded by the tested or analyzed conditions.
3.a Each of the Class 1E components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 is powered from its respective Class 1E division.	3.a Tests will be performed by providing a test signal in only one Class 1E division at a time.	3.a The test signal exists at the Class 1E components and instruments identified in Tables 2.7.3.3-1 and 2.7.3.3-2 powered from its respective Class 1E division under test.

Table 2.7.3.3-3 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	3.b Inspection of the as-built Class1E divisions will be performed.	3.b Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between Class 1E divisions, and also between Class 1E division and non-Class 1E division.
4.a All controls required by the design exist in the MCR to start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.	4.a Tests will be performed using the controls in the MCR.	4.a All controls in the as-built MCR start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.
4.b All controls required by the design exist in the RSR to start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.	4.b Tests will be performed using the controls in the RSR.	4.b All controls in the as-built RSR start and stop the safety-related cubicle coolers identified in Table 2.7.3.3-1.
4.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.3-2.	4.c Inspection will be performed on the displays and alarms in the MCR.	4.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Table 2.7.3.3-2.
4.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.3-2.	4.d Inspection will be performed on the displays and alarms in the RSR.	4.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Table 2.7.3.3-2.
5. The two mechanical divisions of the safety-related cubicle coolers are physically separated.	5. Inspection of the as-built mechanical divisions will be performed.	5. The two mechanical divisions of the safety-related cubicle coolers are separated by a divisional wall or a fire barrier.
6. The auxiliary building clean area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the auxiliary building clean area during plant normal condition.	6. Tests and analyses of the as-built auxiliary building clean area HVAC system will be performed.	6. A report exists and concludes that the as-built auxiliary building clean area HVAC system is capable of providing conditioned air to maintain the room temperature within the design limits for the auxiliary building clean area during plant normal condition.

Table 2.7.3.3-3 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7. The safety-related cubicle coolers identified in Table 2.7.3.3-1 provide conditioned air that is required to maintain the room temperature within the design limits for the motor-driven auxiliary feedwater pump rooms and essential chiller rooms during plant normal, abnormal and accident conditions.	7. Tests and analyses of the as-built safety-related cubicle coolers will be performed.	7. A report exists and concludes that the as-built safety-related cubicle coolers identified in Table 2.7.3.3-1 are capable of providing conditioned air to maintain the room temperature within the design limits for motor-driven auxiliary feedwater pump rooms and essential chiller rooms during plant normal, abnormal and accident conditions.
8. The auxiliary building clean area HVAC system cubicle cooler fans identified in Table 2.7.3.3-1 operate automatically according to room temperature signal.	8. Tests of the as-built auxiliary building clean area HVAC system cubicle cooler fans will be performed using a simulated signal.	8. The as-built auxiliary building clean area HVAC system cubicle cooler fans identified in Table 2.7.3.3-1 operate automatically according to room temperature signal.
9.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.	9.a Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper rating will be performed.	9.a A report exists and concludes that the fire dampers that penetrate the fire barriers have the same fire resistance rating as the barrier.
9.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.	9.b Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper closing will be performed under design air flow condition.	9.b A report exists and concludes that the fire dampers which are required to protect safety shutdown capability close under the design air flow condition.



NOTE : THIS SYSTEM IS NON SAFETY-RELATED EXCEPT FOR ESSENTIAL CHILLER ROOM AND MOTTOR DRIVEN AFW PUMP ROOM CUBICLE COOLERS.
ESSENTIAL CHILLER ROOM AND MOTTOR DRIVEN AFW PUMP ROOM CUBICLE COOLERS ARE SAFETY-RELATED.

Figure 2.7.3.3-1 Auxiliary Building Clean Area HVAC System

2.7.3.4 Turbine Generator Building HVAC System

Since the turbine generator building HVAC system does not perform safety functions, no ITAAC items are provided.

2.7.3.5 Engineered Safety Feature Ventilation System

The engineered safety feature (ESF) ventilation system includes:

- Emergency diesel generator area HVAC system
- Electrical and I&C equipment areas HVAC system
- Auxiliary building controlled area HVAC system

2.7.3.5.1 Design Description

2.7.3.5.1.1 Emergency Diesel Generator Area HVAC System

The emergency diesel generator area HVAC system is a safety-related system that provides ventilation, cooling and heating to four emergency diesel generator areas. The emergency diesel generator area HVAC system is located inside the auxiliary building and emergency diesel generator building.

The emergency diesel generator area HVAC system consists of four divisions. Each division of the emergency diesel generator area HVAC system has an air handling unit (AHU), fans, cubicle coolers, dampers, ductwork, instrumentation and controls.

2.7.3.5.1.2 Electrical and I&C Equipment Areas HVAC System

The electrical and I&C equipment areas HVAC system is a safety-related system that provides ventilation, cooling and heating to the electrical equipment rooms and I&C equipment rooms. The electrical and I&C equipment areas HVAC system is located in the auxiliary building.

The electrical and I&C equipment areas HVAC system consists of two divisions. Each division of the electrical and I&C equipment areas HVAC system has battery room exhaust fans, RSR supply and exhaust fan, cubicle coolers, ductwork, instrumentation and controls.

The safety-related electrical rooms and I&C equipment rooms are cooled by the safety-related cubicle coolers.

2.7.3.5.1.3 Auxiliary Building Controlled Area HVAC System

The auxiliary building controlled area HVAC system is a safety-related system that provides ventilation, cooling and heating to the auxiliary building controlled area. The auxiliary building controlled area HVAC system is located in the auxiliary building controlled area.

The auxiliary building controlled area HVAC system consists of two divisions. Each division of the auxiliary building controlled area HVAC system has air handling units, air cleaning units, cubicle coolers, dampers, ductwork, instrumentation and controls.

Each division of auxiliary building controlled area HVAC system maintains its division of the auxiliary building controlled area under a slightly negative pressure relative to the atmosphere.

The ESF ventilation system is designed as follows:

1.a The functional arrangement of the emergency diesel generator area HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.1 and as shown in Figure 2.7.3.5-1.

1.b The functional arrangement of the electrical and I&C equipment areas HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.2 and as shown in Figure 2.7.3.5-2.

1.c The functional arrangement of the auxiliary building controlled area HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.3 and as shown in Figure 2.7.3.5-3.

2. The seismic Category I components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 can withstand seismic design basis loads without loss of safety function.

3.a The Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

3.b Each of the Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 is powered from its respective Class 1E division.

3.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

4.a ESR dampers, PSR dampers and tornado dampers identified in Table 2.7.3.5-1 perform an active safety function to change position as indicated in the table.

4.b After loss of motive power, ESR dampers and PSR dampers identified in Table 2.7.3.5-1 assume the indicated loss of motive power position.

5.a All controls required by the design exist in the MCR to start and stop the ACUs, AHUs and cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.

5.b All controls required by the design exist in the RSR to start and stop the ACUs, AHUs and cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.

5.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.5-2.

5.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.5-2.

6.a Each mechanical division of the emergency diesel generator area HVAC system (A, B, C & D) is physically separated from the other divisions.

6.b The two mechanical divisions of the electrical and I&C equipment areas HVAC system (A/C & B/D) are physically separated.

6.c The two mechanical divisions of the auxiliary building controlled area HVAC system (A/C & B/D) are physically separated.

7.a The emergency diesel generator area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the emergency diesel generator area during plant normal, abnormal and accident conditions.

7.b The electrical and I&C equipment areas HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the electrical and I&C equipment areas except non safety-related equipment rooms during plant normal, abnormal and accident conditions.

7.c The auxiliary building controlled area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the auxiliary building controlled area during plant normal, abnormal and accident conditions.

8. The emergency diesel generator area HVAC system, the electrical and I&C equipment areas HVAC system and the auxiliary building controlled area HVAC system cubicle cooler fans identified in Table 2.7.3.5-1 operate automatically according to room temperature signal.

9. The auxiliary building controlled area emergency exhaust ACU removes particulate matter and iodine.

10. Upon receipt of a safety injection actuation signal (SIAS), the auxiliary building controlled area emergency exhaust ACU starts and isolation dampers on the auxiliary building controlled area supply AHU outlet and normal exhaust ACU inlet are closed automatically.

11. The electrical and I&C equipment areas HVAC system provides battery room ventilation that is required to maintain hydrogen concentration within the design limit during plant normal, abnormal and accident conditions.

12.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.

12.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.

2.7.3.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3.5-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the engineered safety feature ventilation system.

Table 2.7.3.5-1 (1 of 4)

Engineered Safety Feature Ventilation System Components List

Component Name	Item No. (1)(2)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Emergency Diesel Generator Area HVAC System									
EDG Room Normal Supply AHU	VD–HV11A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
EDG Room Emergency Cubicle Cooler	VD–HV12A/B/C/D, HV13A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-
EDG Control Room Cubicle Cooler	VD–HV10A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-
Room Fan	VD–AH02A/B/C/D AH05A/B/C/D AH06A/B/C/D AH07A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
Tornado Dampers	VD-Y1201A/B/C/D 1202A/B/C/D 1203A/B/C/D 1204A/B/C/D 1205A/B/C/D	-	I	-/No	-/-	-/-	-	Closed (Tornado Condition)	-

Table 2.7.3.5-1 (2 of 4)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Electrical and I&C Equipment Areas HVAC System									
Safety- Related Cubicle Cooler	VE-HV01A~04A, HV06A,07A, HV09A~18A, HV01B~04B, HV06B~18B	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-
Class 1E Battery Room Supply Fan	VE-AH20A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
Class 1E Battery Room Exhaust Fan	VE-AH21A/B/C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
RSR Supply Fan	VE-AH22C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
RSR Exhaust Fan	VE-AH23C/D	-	I	Yes/No	Yes/Yes	Yes/Yes	-	Start	-
Tornado Dampers	VE-Y1451A/B/C/D 1452A/B/C/D 1453C/1454C	-	I	-/No	-/-	-/-	-	Closed (Tornado Condition)	-

Table 2.7.3.5-1 (3 of 4)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Auxiliary Building Controlled Area HVAC System									
Auxiliary building controlled area emergency exhaust ACU	VK-AU01A/01B/ 01C/01D	-	I	Yes/Yes	Yes/Yes	Yes/Yes	SIAS	Start	-
Safety-related cubicle cooler	VK-HV13A/13B/ 14A/14B	-	I	Yes/No	Yes/Yes	Yes/Yes	High Temperature	Start	-
Safety-related cubicle cooler	VK-HV10A/10B/ 11A/11B/ 12A/12B/ 15A/15B/ 16A/16B/ 17A/17B/ 18A/18B/ 19A/19B/ 20A/20B/ 21B/ 22A/22B/ 23A/23B	-	I	Yes/Yes	Yes/Yes	Yes/Yes	High Temperature	Start	-
Auxiliary building controlled area supply AHU outlet isolation damper (PSR)	VK-Y0017A/18A/ 19B/20B	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS	Closed	Closed
Auxiliary building controlled area normal exhaust ACU inlet isolation damper (PSR)	VK-Y0021A/22A/ 23B/24B	-	I	Yes/No	Yes/Yes	Yes/Yes	SIAS	Closed	Closed

Table 2.7.3.5-1 (4 of 4)

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Auxiliary Building Controlled Area HVAC System									
Auxiliary building controlled area emergency exhaust ACU isolation damper (ESR)	VK-Y0002A/ 0002B/ 0002C/ 0002D	-	I	Yes/Yes	Yes/Yes	Yes/Yes	ACU fan start	Closed	Closed
Auxiliary building controlled area emergency exhaust ACU flow control damper (ESR)	VK-Y0001A/ 0001B/ 0001C/ 0001D	-	I	Yes/Yes	Yes/Yes	Yes/Yes	ACU fan start	Modulate	Closed
Tornado Dampers	VK-Y1401A/ 1402B	-	I	-/No	-/-	-/-	-	Closed (Tornado Condition)	-

(1) The column "Item No." is information only (not part of certified design).

(2) The component that the item no. ends with A or B is located in the EDG building and the component that the item no. ends with C or D is located in the auxiliary building.

(3) Damper actuator types are as follows:
- ESR : Electro hydraulic spring return
- PSR : Pneumatic spring return

(4) Dash(-) indicates not applicable.

Table 2.7.3.5-2 (1 of 3)

Engineered Safety Feature Ventilation System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Emergency Diesel Generator Area HVAC System							
EDG Room Normal Supply AHU flow rate	F-11A, 12B	EDG Building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Normal Supply AHU heating coil downstream temperature	T-3005A, 3006B	EDG Building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Normal Supply AHU cooling coil downstream temperature	T-3009A, 3010B	EDG Building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Temperature	T-13A, 14B, 17A, 18B	EDG Building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Control Room Temperature	T-21A, 22B	EDG Building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Normal Supply AHU flow rate	F-13C, 14D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Normal Supply AHU heating coil downstream temperature	T-3007C, 3008D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Normal Supply AHU cooling coil downstream temperature	T-3011C, 3012D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Room Temperature	T-15C, 16D, 19C, 20D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
EDG Control Room Temperature	T-23C, 24D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes

Table 2.7.3.5-2 (2 of 3)

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Electrical and I&C Equipment Areas HVAC System							
RSR Supply Fan flow rate	F-138C, 139D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
RSR Exhaust Fan flow rate	F-140C, 141D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
RSR Cubicle Cooler Fan Return flow rate	F-142C, 143D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes
Safety-Related Electrical and I&C Room Temperature	T-101C, 102D, 103C, 104D, 105A, 106B, 107C, 108D, 111A, 112B, 113A, 114B, 116B, 117C, 118D, 119C, 120D, 121C, 122D, 123A, 124B, 125A, 126B, 127A, 128B, 129A, 130B, 131A, 132B, 133C, 134D, 135C, 136D	Auxiliary building	-	I	Yes/No	Yes/Yes	Yes/Yes

Table 2.7.3.5-2 (3 of 3)

Instrument Name	Item No. (1)	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Auxiliary Building Controlled Area HVAC System							
Auxiliary building controlled area emergency exhaust ACU Fan Flow Rate	F-45A, 46B, 49C, 50D	Auxiliary building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Auxiliary building controlled area emergency exhaust ACU Heating Coil Downstream Temperature	T-3023A, 3024B, 3053C, 3054D	Auxiliary building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Auxiliary building controlled area emergency exhaust ACU Carbon Adsorber Downstream Temperature	T-3033A, 3034B, 3063C, 3064D	Auxiliary building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Safety-Related Mechanical Equipment Room Temperature	T-207C, 208D, 209C, 210D, 211A, 212B, 213A, 214B, 215C, 216D, 217C, 218D, 219A, 220B, 221A, 222B, 201A, 202B, 223A, 228B, 205A, 204B, 224B, 233A, 234B, 235A, 236B	Auxiliary building	-	I	Yes/Yes	Yes/Yes	Yes/Yes

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.3.5-3 (1 of 7)

Engineered Safety Feature Ventilation System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a The functional arrangement of the emergency diesel generator area HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.1 and as shown in Figure 2.7.3.5-1.	1.a Inspection of the as-built emergency diesel generator area HVAC system will be performed.	1.a The as-built emergency diesel generator area HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.5.1.1 and as shown in Figure 2.7.3.5-1.
1.b The functional arrangement of the electrical and I&C equipment areas HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.2 and as shown in Figure 2.7.3.5-2.	1.b Inspection of the as-built electrical and I&C equipment areas HVAC system will be performed.	1.b The as-built electrical and I&C equipment areas HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.5.1.2 and as shown in Figure 2.7.3.5-2.
1.c The functional arrangement of the auxiliary building controlled area HVAC system is as described in the Design Description of Subsection 2.7.3.5.1.3 and as shown in Figure 2.7.3.5-3.	1.c Inspection of the as-built auxiliary building controlled area HVAC system will be performed.	1.c The as-built auxiliary building controlled area HVAC system conforms with the functional arrangement as described in the Design Description of Subsection 2.7.3.5.1.3 and as shown in Figure 2.7.3.5-3.

Table 2.7.3.5-3 (2 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
2. The seismic Category I components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 can withstand seismic design basis loads without loss of safety function.	2.a Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	2.a The as-built seismic Category I components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 are located in the seismic Category I structure.
	2.b Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	2.b A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 can withstand seismic design basis loads without loss of safety function.
	2.c Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	2.c A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.7.3.5-3 (3 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.a The Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	3.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	3.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	3.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	3.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.3.5-1 and 2.7.3.5-2 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
3.b Each of the Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 is powered from its respective Class 1E division.	3.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	3.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.3.5-1 and 2.7.3.5-2 powered from the Class 1E division under test.
3.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	3.c Inspection of the as-built Class 1E divisions will be performed.	3.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.

Table 2.7.3.5-3 (4 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a ESR dampers, PSR dampers and tornado dampers identified in Table 2.7.3.5-1 perform an active safety function to change position as indicated in the table.	4.a.i Tests or type tests of ESR dampers and PSR dampers will be performed that demonstrate the capability of the damper to operate under its design conditions.	4.a.i A test report exists and concludes that each ESR damper or PSR damper changes position as indicated in Table 2.7.3.5-1 under design conditions.
	4.a.ii Test and/or analyses of the as-built ESR dampers and PSR dampers will be performed under pre-operational test conditions.	4.a.ii Upon receipt of the actuating signal, each ESR damper or PSR damper changes positions as indicated in Table 2.7.3.5-1 under pre-operation test conditions.
	4.a.iii Tests of the as-built tornado dampers will be performed under pre-operational test conditions.	4.a.iii Each tornado damper changes position as indicated in Table 2.7.3.5-1 under pre-operational test conditions.
4.b After loss of motive power, ESR dampers and PSR dampers identified in Table 2.7.3.5-1 assume the indicated loss of motive power position.	4.b Tests of the as-built ESR dampers and PSR dampers identified will be performed under the conditions of loss of motive power.	4.b Upon loss of motive power, each as-built ESR damper or PSR damper identified identified in Table 2.7.3.5-1 assumes the indicated loss of motive power position.
5.a All controls required by the design exist in the MCR to start and stop the ACUs, AHUs and cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.	5.a Tests will be performed using the controls in the MCR.	5.a All controls in the as-built MCR start and stop the ACUs, AHUs and cubicle coolers, and open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.
5.b All controls required by the design exist in the RSR to start and stop the ACUs, AHUs and cubicle coolers, and to open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.	5.b Tests will be performed using the controls in the RSR.	5.b All controls in the as-built RSR start and stop the ACUs, AHUs and cubicle coolers, and open and close ESR dampers and PSR dampers identified in Table 2.7.3.5-1.
5.c All displays and alarms required by the design exist in the MCR as defined in Table 2.7.3.5-2.	5.c Inspections will be performed on the displays and alarms in the MCR.	5.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Table 2.7.3.5-2.
5.d All displays and alarms required by the design exist in the RSR as defined in Table 2.7.3.5-2.	5.d Inspections will be performed on the displays and alarms in the RSR.	5.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Table 2.7.3.5-2.

Table 2.7.3.5-3 (5 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.a Each mechanical division of the emergency diesel generator area HVAC system (A, B, C & D) is physically separated from the other divisions.	6.a Inspection of the as-built mechanical divisions will be performed.	6.a Each mechanical divisions of the emergency diesel generator area HVAC system is physically separated by a divisional wall or a fire barrier.
6.b The two mechanical divisions of the electrical and I&C equipment areas HVAC system (A/C & B/D) are physically separated.	6.b Inspection of the as-built mechanical divisions will be performed.	6.b The two mechanical divisions of the electrical and I&C equipment areas HVAC system are physically separated by a divisional wall or a fire barrier.
6.c The two mechanical divisions of the auxiliary building controlled area HVAC system (A/C & B/D) are physically separated.	6.c Inspection of the as-built mechanical divisions will be performed.	6.c The two mechanical divisions of the auxiliary building controlled areas HVAC system are physically separated by a divisional wall or a fire barrier.
7.a The emergency diesel generator area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the emergency diesel generator area during plant normal, abnormal and accident conditions.	7.a Tests and analyses of the as-built emergency diesel generator area HVAC system will be performed.	7.a A report exists and concludes that the as-built emergency diesel generator area HVAC system is capable of providing conditioned air to maintain the room temperature within the design limits for the emergency diesel generator area during plant normal, abnormal and accident conditions.
7.b The electrical and I&C equipment areas HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the electrical and I&C equipment areas except non safety-related equipment rooms during plant normal, abnormal and accident conditions.	7.b Tests and analyses of the as-built electrical and I&C equipment areas HVAC system will be performed.	7.b A report exists and concludes that the as-built electrical and I&C equipment areas HVAC system is capable of providing conditioned air to maintain the room temperature within the design limits for the electrical and I&C equipment areas except non safety-related equipment rooms during plant normal, abnormal and accident conditions.

Table 2.7.3.5-3 (6 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
7.c The auxiliary building controlled area HVAC system provides conditioned air that is required to maintain the room temperature within the design limits for the auxiliary building controlled area during plant normal, abnormal and accident conditions.	7.c Tests and analyses of the as-built auxiliary building controlled area HVAC system will be performed.	7.c A report exists and concludes that the as-built auxiliary building controlled area HVAC system is capable of providing conditioned air to maintain the room temperature within the design limits for the auxiliary building controlled area during plant normal, abnormal and accident conditions.
8. The emergency diesel generator area HVAC system, the electrical and I&C equipment areas HVAC system and the auxiliary building controlled area HVAC system cubicle cooler fans identified in Table 2.7.3.5-1 operate automatically according to room temperature signal.	8. Tests of the as-built emergency diesel generator area HVAC system, electrical and I&C equipment areas HVAC system and auxiliary building controlled area HVAC system cubicle cooler fans will be performed using a simulated signal.	8. The as-built emergency diesel generator area HVAC system, electrical and I&C equipment areas HVAC system and auxiliary building controlled area HVAC system cubicle cooler fans identified in Table 2.7.3.5-1 operate automatically according to room temperature signal.
9. The auxiliary building controlled area emergency exhaust ACU removes particulate matter and iodine.	9. Testing and analysis will be performed for each ACU filter to determine filter efficiencies.	9. A test report exists and concludes that ACU filter efficiencies are equal to or greater than 99 % for all forms of iodine, and greater than or equal to 99 % for particulate matter greater than 0.3 micron.
10. Upon receipt of a safety injection actuation signal (SIAS), the auxiliary building controlled area emergency exhaust ACU starts and isolation dampers on the auxiliary building controlled area supply AHU outlet and normal exhaust ACU inlet are closed automatically.	10. Testing will be performed on the ACUs and the isolation damper using a simulated SIAS.	10. The ACU starts and the isolation dampers are closed upon receipt of a simulated SIAS.

Table 2.7.3.5-3 (7 of 7)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The electrical and I&C equipment areas HVAC system provides battery room ventilation that is required to maintain hydrogen concentration within the design limit during plant normal, abnormal and accident conditions.	11. Tests and analyses of the as-built electrical and I&C equipment areas HVAC system will be performed.	11. A report exists and concludes that the as-built electrical and I&C equipment areas HVAC system is capable of providing battery room ventilation in order to maintain hydrogen concentration below 1 % by battery room volume during plant normal operations, abnormal and accident conditions.
12.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier.	12.a Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper rating will be performed.	12.a A report exists and concludes that the fire dampers that penetrate the fire barriers have the same fire resistance rating as the barrier.
12.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition.	12.b Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper closing will be performed under design air flow condition.	12.b A report exists and concludes that the fire dampers which are required to protect safety shutdown capability close under the design air flow condition.

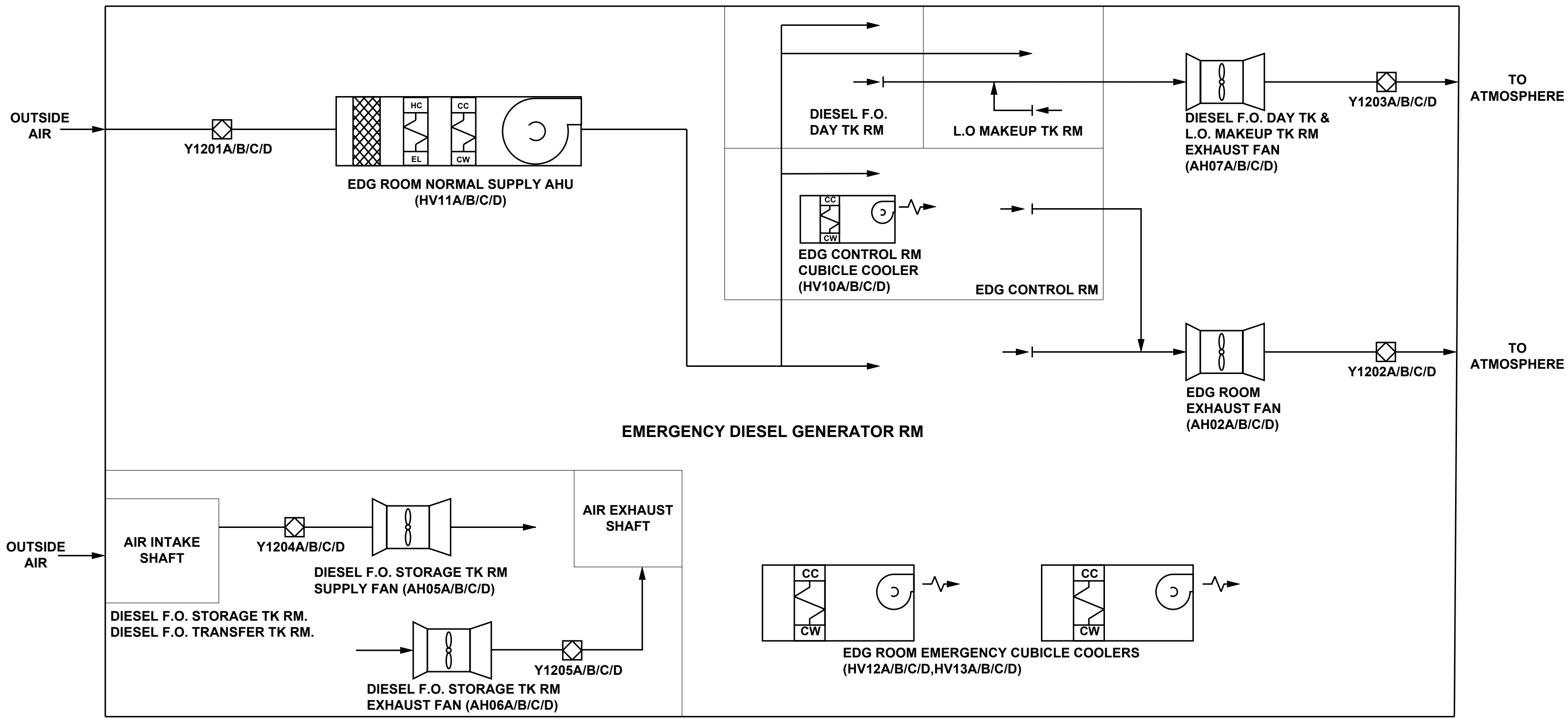


Figure 2.7.3.5-1 Emergency Diesel Generator Area HVAC System

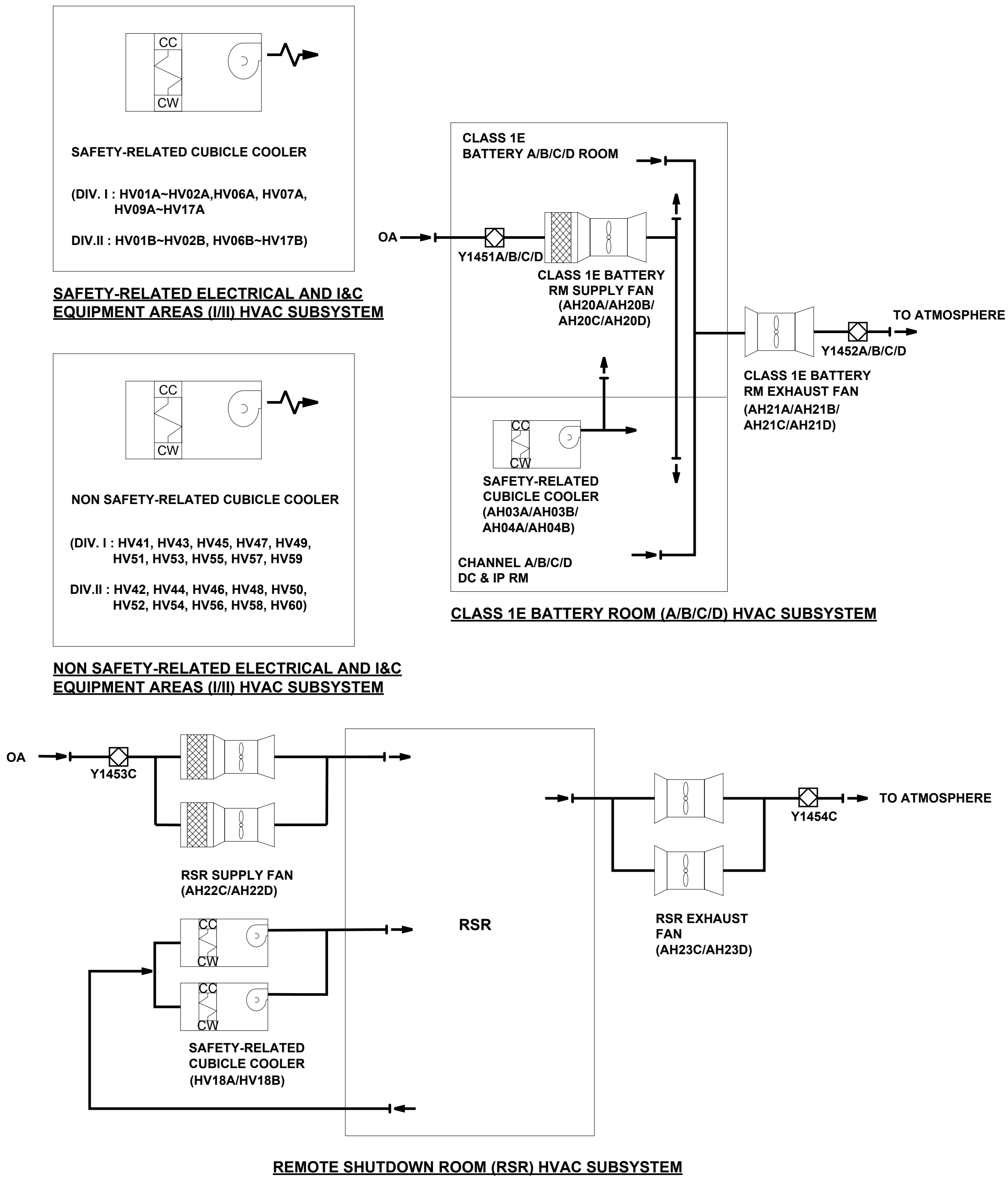


Figure 2.7.3.5-2 Electrical and I&C Equipment Area HVAC System

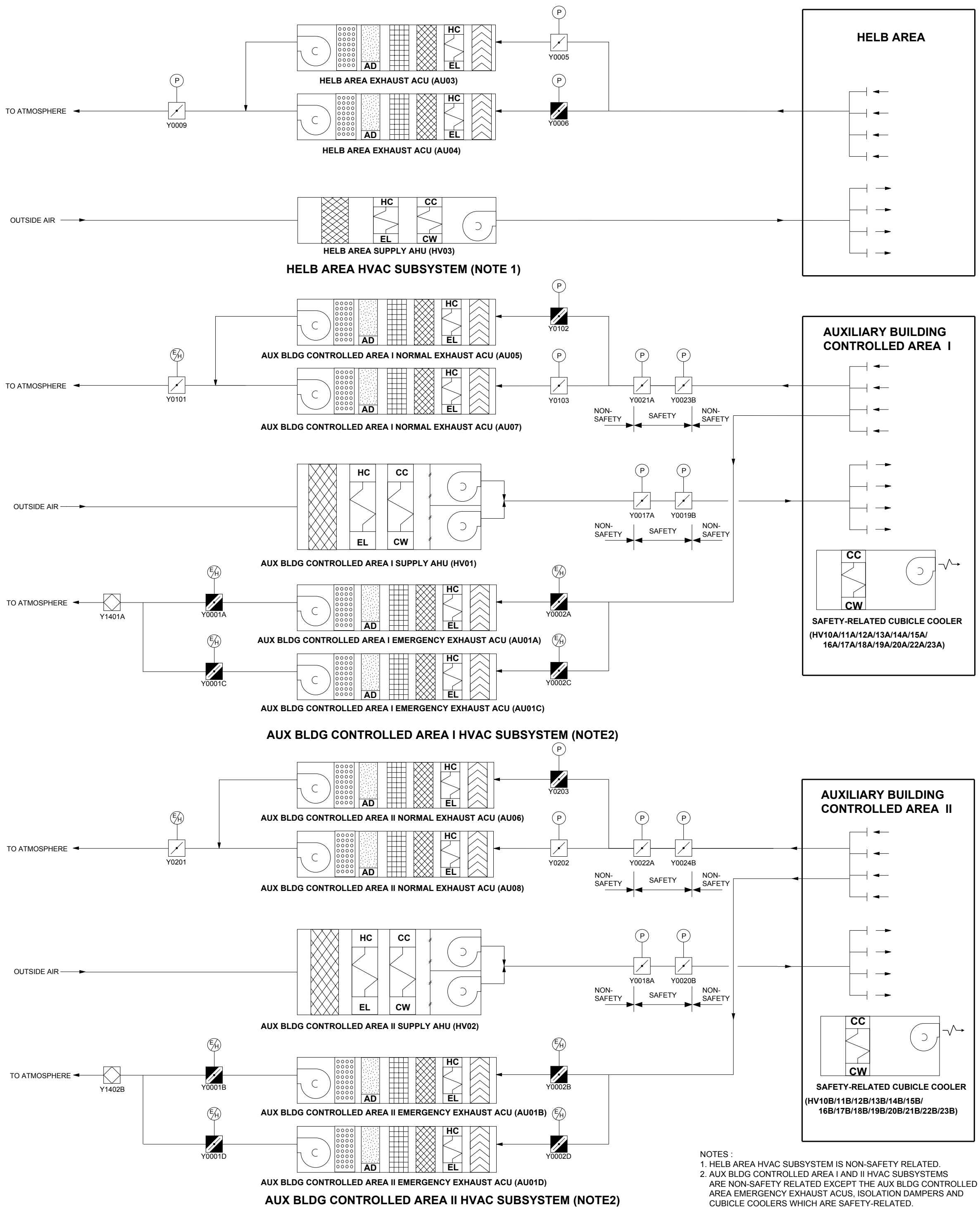


Figure 2.7.3.5-3 Auxiliary Building Controlled Area HVAC System

2.7.3.6 Reactor Containment Building HVAC System and Reactor Containment Building Purge System

2.7.3.6.1 Design Description

The reactor containment building HVAC system and reactor containment building purge system is includes:

- Reactor containment building HVAC system
- Reactor containment building purge system

2.7.3.6.1.1 Reactor Containment Building HVAC System

The reactor containment building HVAC system is a non safety-related system that provides cooling and air recirculation in the containment.

The reactor containment building HVAC system consists of reactor containment building cooling subsystem, reactor cavity cooling subsystem, and CEDM cooling subsystem.

The reactor containment building cooling subsystem cools and recirculates air inside the containment.

The reactor cavity cooling subsystem provides cooled air to the concrete surrounding the reactor.

The CEDM cooling subsystem maintains the temperature of the CEDM coils.

2.7.3.6.1.2 Reactor Containment Building Purge System

The reactor containment building purge system provides containment pressure relief, reduces air borne radioactivity, and maintains environmental condition within the containment. The reactor containment building purge system is located in the auxiliary building and the containment building.

The reactor containment building purge system has safety-related function that isolates containment isolation valves (CIVs) and piping. The reactor containment building purge system is a non safety-related system, with the exception of CIVs and piping penetrating the containment which are covered in Subsection 2.11.3.

The reactor containment building purge system is divided into low volume purge subsystem, and high volume purge subsystem.

The high volume purge subsystem consists of one 100 percent capacity supply AHU and two 50 percent capacity exhaust ACUs, CIVs, ductwork, instrumentation and controls. The high volume purge subsystem reduces airborne radioactivity and maintains environmental conditions within the containment to entry for maintenance or inspections during cold shutdown and refueling conditions.

The low volume purge subsystem consists of two 100 percent capacity supply fans and two 100 percent capacity exhaust ACUs, CIVs, ductwork, instrumentation and controls. The low volume purge subsystem controls the containment atmosphere pressure and removes gaseous and particulate contamination from the containment atmosphere during normal operation, when required.

The reactor containment building HVAC system and reactor containment building purge system are designed as follows:

1. The functional arrangement of the reactor containment building HVAC system and reactor containment building purge system are as described in the Design Description of Subsections 2.7.3.6.1.1 and 2.7.3.6.1.2 and as shown in Figures 2.7.3.6-1 and 2.7.3.6-2.

2.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier except for the reactor containment building HVAC system.

2.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition except for the reactor containment building HVAC system.

3. The non safety-related reactor containment building HVAC system equipment and ductwork including support, which are classified as seismic Category II, are designed to withstand the seismic event without any gross structural failure that could damage the nearby safety-related equipment.

2.7.3.6.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.3.6-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the reactor containment building HVAC system and reactor containment building purge system.

The ITAAC related to CIVs and piping penetrating the containment of the reactor containment building purge system are described in Table 2.11.3-2.

Table 2.7.3.6-1 (1 of 2)

Reactor Containment Building HVAC System and
Reactor Containment Building Purge System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the reactor containment building HVAC system and reactor containment building purge system are as described in the Design Description of Subsections 2.7.3.6.1.1 and 2.7.3.6.1.2 and as shown in Figures 2.7.3.6-1 and 2.7.3.6-2.	1. Inspection of the as-built system will be conducted.	1. The as-built reactor containment building HVAC system and reactor containment building purge system conforms with the functional arrangement as described in the Design Description of Subsections 2.7.3.6.1.1 and 2.7.3.6.1.2 and as shown in Figures 2.7.3.6-1 and 2.7.3.6-2.
2.a The fire dampers are installed in the fire rated barriers and have the same fire resistance rating as the barrier except for the reactor containment building HVAC system.	2.a Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper rating will be performed.	2.a A report exists and concludes that the fire dampers that penetrate the fire barriers have the same fire resistance rating as the barrier.
2.b The fire dampers which are required to protect safety shutdown capability close under design air flow condition except for the reactor containment building HVAC system.	2.b Type tests, tests, a combination of type tests and analyses, or a combination of tests and analyses of fire damper closing will be performed under design air flow condition.	2.b A report exists and concludes that the fire dampers which are required to protect safety shutdown capability close under the design air flow condition.

Table 2.7.3.6-1 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The non safety-related reactor containment building HVAC system equipment and ductwork including support, which are classified as seismic Category II are designed to withstand the seismic event without any gross structural failure that could damage the nearby safety-related equipment.	3.a Analysis will be performed to demonstrate that as-built non safety-related equipment and ductwork, including supports, do not adversely interact with safety-related SSCs during and after an SSE.	3.a Reports exist and conclude that the as-built non safety-related equipment and ductwork, including supports, whose failure could adversely impact safety-related SSCs do not adversely interact with safety-related systems during and after an SSE.
	3.b Inspection will be performed to verify that the as-built non safety-related equipment and ductwork, including supports, are installed in accordance with the configurations specified by the analyses.	3.b The as-built non safety-related equipment and ductwork, including supports whose failure could adversely interact with safety-related SSCs are installed in accordance with the configurations specified by the analyses.

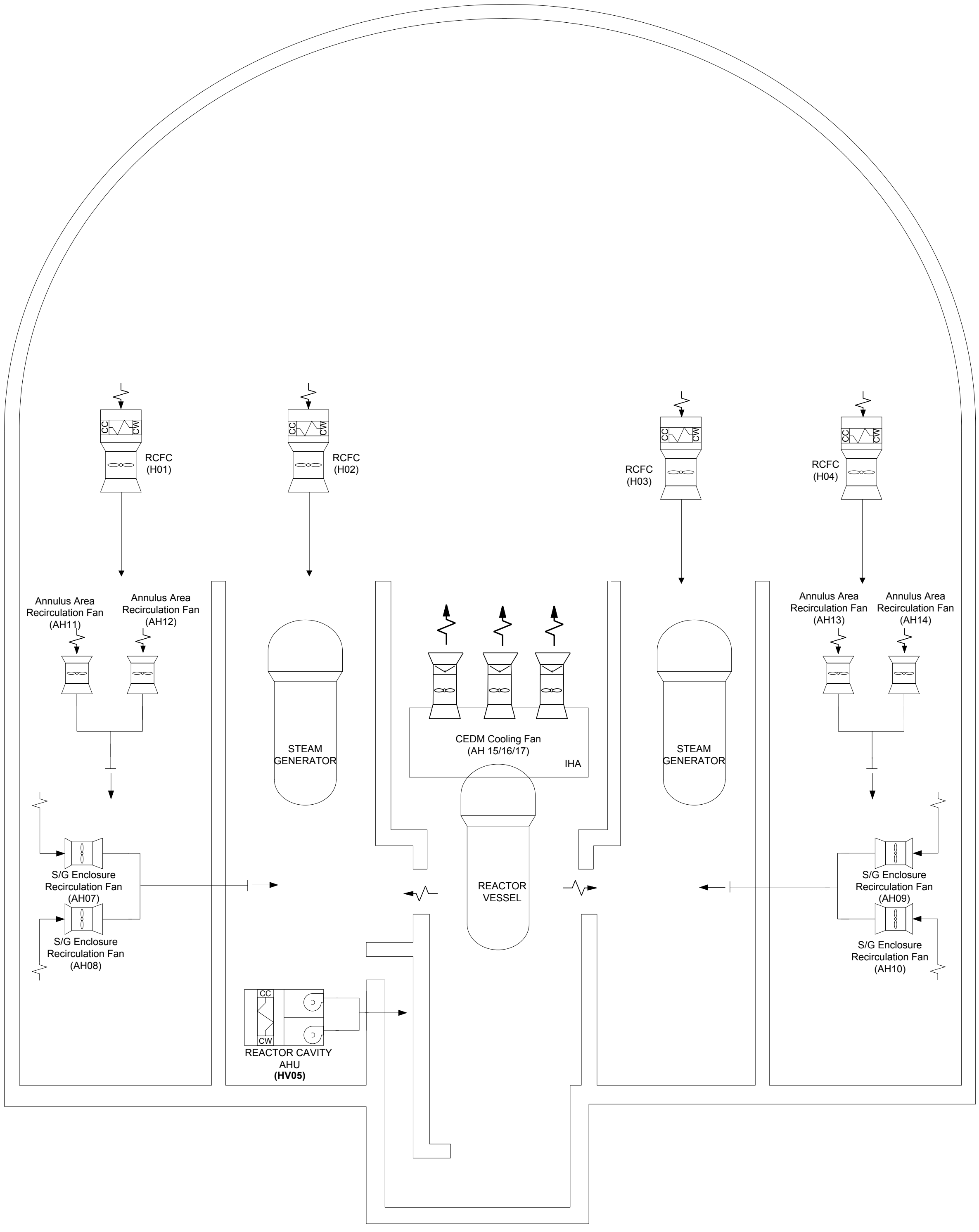


Figure 2.7.3.6-1 Reactor Containment Building HVAC System

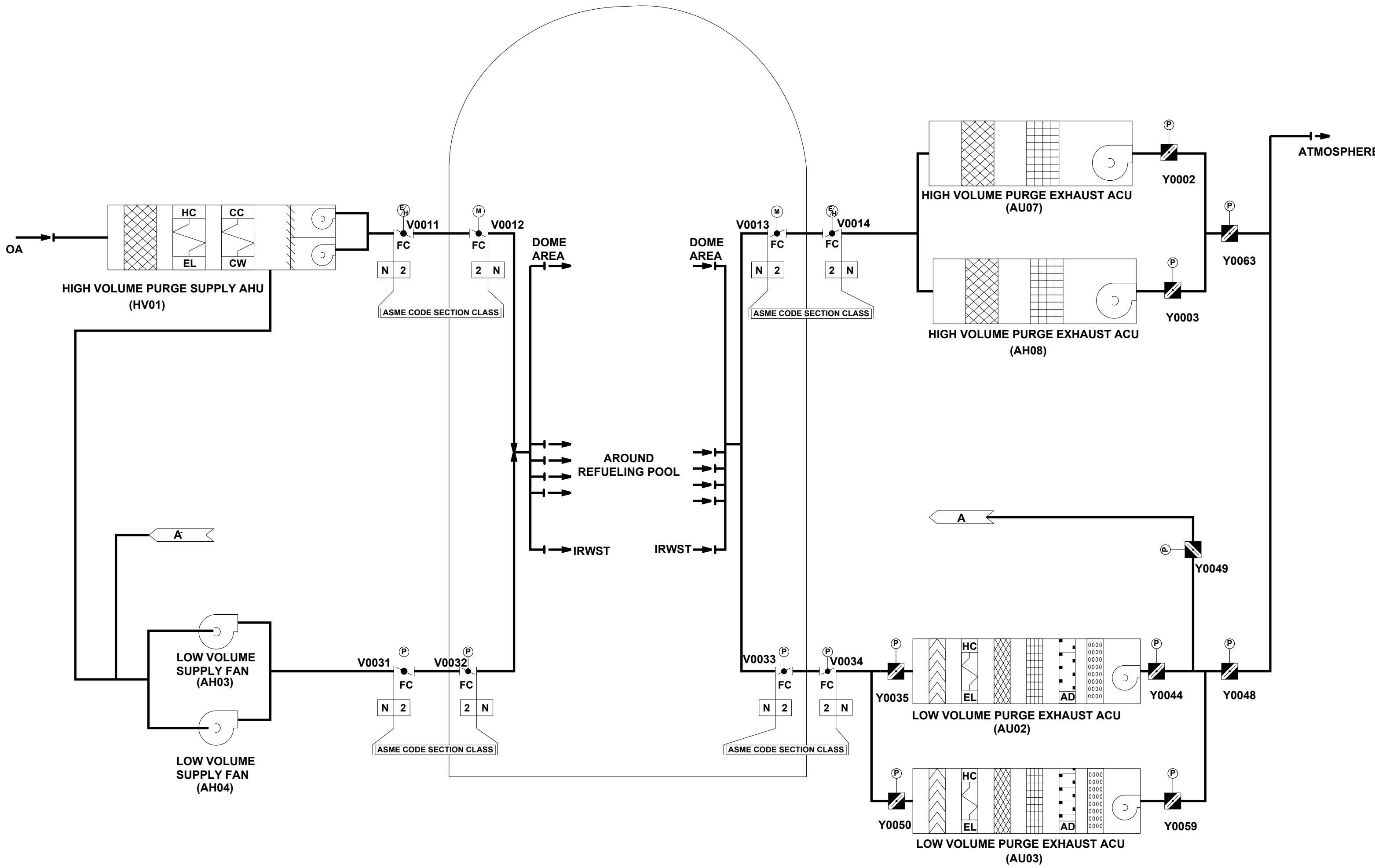


Figure 2.7.3.6-2 Reactor Containment Building Purge System

2.7.3.7 Compound Building HVAC System

Since the compound building HVAC system does not perform safety functions, no ITAAC items are provided.

2.7.4 New and Spent Fuel Handling System

2.7.4.1 New Fuel Storage

2.7.4.1.1 Design Description

The new fuel storage racks are non safety-related, but seismic Category I for integrity of the new fuel assemblies. The new fuel storage racks provide on-site dry storage for nuclear fuel assemblies. The new fuel storage racks are located in the new fuel storage pit in the fuel handling area of the auxiliary building.

The new fuel storage racks are designed and constructed to accommodate design basis load and load combinations including impact due to postulated fuel handling accidents in a sub-critical configuration.

1. The functional arrangement of the new fuel storage racks is as described in the Design Description of Subsection 2.7.4.1.1.

2. The new fuel storage racks maintain the effective multiplication factor, K_{eff}, less than or equal to criticality limits during normal operation and the postulated accident conditions.

2.7.4.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.4.1-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the new fuel storage racks.

Table 2.7.4.1-1

New Fuel Storage ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the new fuel storage racks is as described in the Design Description of Subsection 2.7.4.1.1.	1. Inspection of the as-built new fuel storage racks will be performed.	1. The as-built new fuel storage racks conform with the functional arrangement as described in the Design Description of Subsection 2.7.4.1.1.
2. The new fuel storage racks maintain the effective multiplication factor, K_{eff}, less than or equal to criticality limits during normal operation and the postulated accident conditions.	2.a Inspection and analysis of the as-built new fuel storage racks will be performed.	2.a The calculated effective multiplication factor, K_{eff}, for the new fuel storage racks is less than or equal to 0.95 during normal operation and postulated accident conditions. In case of immersion in a foam or mist of the optimum moderation density, effective multiplication factor, K_{eff}, is less than or equal to 0.98.
	2.b Inspections will be performed to verify that the materials of the as-built new fuel storage racks conform with the criticality analysis of the new fuel storage racks.	2.b The materials of the as-built new fuel storage racks conform with the criticality analysis of the new fuel storage racks.

2.7.4.2 Spent Fuel Storage

2.7.4.2.1 Design Description

The spent fuel storage racks are non safety-related, but seismic Category I for integrity of the spent fuel assemblies. The spent fuel storage racks provide on-site storage capability for a core offload during the design life. The spent fuel storage racks are located in the spent fuel pool in the fuel handling area of the auxiliary building.

The spent fuel storage racks are designed and constructed to accommodate design basis load and load combinations including impact due to postulated fuel handling accidents in a subcritical configuration.

1. The functional arrangement of the spent fuel storage racks is as described in the Design Description of Subsection 2.7.4.2.1.

2. The spent fuel storage racks maintain the effective multiplication factor, K_{eff}, less than or equal to criticality limits during normal operation and the postulated accident conditions.

2.7.4.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.4.2-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the spent fuel storage racks.

Table 2.7.4.2-1

Spent Fuel Storage ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the spent fuel storage racks is as described in the Design Description of Subsection 2.7.4.2.1.	1. Inspection of the as-built spent fuel storage racks will be performed.	1. The as-built spent fuel storage racks conform with the functional arrangement as described in the Design Description of Subsection 2.7.4.2.1.
2. The spent fuel storage racks maintain the effective multiplication factor, K_{eff}, less than or equal to criticality limits during normal operation and the postulated accident conditions.	2.a Inspection and analysis of the as-built spent fuel storage racks will be performed.	2.a The calculated effective multiplication factor, K_{eff}, for the spent fuel storage racks is less than or equal to 0.95 during normal operation and postulated accident conditions.
	2.b Inspections will be performed to verify that the materials of the as-built spent fuel storage racks conform with the criticality analysis of the spent fuel storage racks.	2.b The materials of the as built spent fuel storage racks conform with the criticality analysis of the spent fuel storage racks.

2.7.4.3 Spent Fuel Pool Cooling and Cleanup System

2.7.4.3.1 Design Description

The spent fuel pool (SFP) cooling system removes heat generated by the stored spent fuel assemblies in the spent fuel pool water. The SFP cleanup system purifies spent fuel pool water, refueling pool water, IRWST water, and fuel transfer canal water through filters and ion exchangers. The spent fuel pool cooling and cleanup system (SFPCCS) performs safety-related functions to maintain the SFP water temperature within limits and preserve containment integrity by isolation of the SFPCCSs lines penetrating the containment. The SFP cooling system (SFPCS) is safety-related and the SFP cleanup system is non safety-related. The SFPCCS consists of a SFP cooling system and cleanup system. The SFPCCS is located in the auxiliary building.

To meet above functional requirements, the SFPCCS is designed as follows:

1. The functional arrangement of the SFPCCS is as described in the Design Description of Subsection 2.7.4.3.1 and in Table 2.7.4.3-1 and as shown in Figure 2.7.4.3-1.

2.a The ASME Code components identified in Table 2.7.4.3-2 are designed and constructed in accordance with ASME Section III requirements.

2.b. The ASME Code piping including supports identified in Table 2.7.4.3-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.7.4.3-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.4.3-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.7.4.3-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.7.4.3-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.7.4.3-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7. Check valves identified in Table 2.7.4.3-2 perform an active safety function to change position as indicated in the table.

8.a All controls required by the design exist in the MCR to start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.

8.b All controls required by the design exist in the RSR to start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.

9. The two mechanical divisions of the SFPCS are physically separated except for the cross-connect line between SFP cooling pump suction, discharge lines.

10. The SFPCCS provides heat removal capacity to remove the decay heat generated by spent fuel assemblies.

11. The SFP cooling pumps have sufficient net positive suction head (NPSH).

2.7.4.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the SFPCCS are specified in Table 2.7.4.3-4.

The ITAAC related to the CIVs and the piping between CIVs of the SFPCCS are described in Table 2.11.3-2.

Table 2.7.4.3-1

Spent Fuel Pool Cooling and Cleanup System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
SFP cooling piping from SFP cooling suction to discharge and including the following equipment and valves : FC-PP01A/B, FC-HE02A/B and FC-1005,1006	Auxiliary Building	3	I
SFPCCSs piping penetrating the reactor containment up to isolation valves and including the following valves : FC-1142, 1145 and FC-1143, 1144	Reactor Containment Building/ Auxiliary Building	2	I
SFP cleanup piping from each cleanup suction to discharge excluding piping of containment isolation	Reactor Containment Building/ Auxiliary Building	-	II
SFP external makeup and spray piping including the following valves : FC-2601, 2605, 2611, 2615	Auxiliary Building	-	I

(1) Dash(-) indicates not applicable.

Table 2.7.4.3-2

Spent Fuel Pool Cooling and Cleanup System Components List

Component Name	Item No. (1)	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
SFP Cooling Pump A, B	FC-PP01A, PP01B	3	I	Yes/No	Yes/Yes	Yes/Yes	Pump Stop : SFP Level Lo-Lo	Start	-
SFP Cooling Heat Exchanger	FC-HE02A, HE02B	3	I	-	-	-	-	-	-
SFP Cooling Pump Discharge Line Check Valve	FC-1005, 1006	3	I	-	-	-	-	Transfer Open/ Transfer Close	-
Containment Isolation Valve	FC-1142, 1143, 1144 (Manual), 1145 (Check V/V)	2	I	-	-	-	-	Close	-
SFP External Makeup and Spray Line Check Valve	FC-2601, 2605, 2611, 2615	-	I	-	-	-	-	-	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.4.3-3

Spent Fuel Pool Cooling and Cleanup System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
SFP Cooling Pump Discharge Flow	F-005, 006	Auxiliary Building	-	I	No/No	No/Yes	No/Yes
SFP Cooling Heat Exchanger Discharge Temperature	T-007A, 008B	Auxiliary Building	-	I	Yes/No	Yes/Yes	Yes/Yes
SFP Water Level	L-001A, 002B	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
SFP Temperature	T-003B, 004A	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.4.3-4 (1 of 5)

Spent Fuel Pool Cooling and Cleanup System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SFPCCS is as described in the Design Description of Subsection 2.7.4.3.1 and in Table 2.7.4.3-1 and as shown in Figure 2.7.4.3-1.	1. Inspection of the as-built SFPCCS will be performed.	1. The as-built SFPCCS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.4.3.1 and in Table 2.7.4.3-1 and as shown in Figure 2.7.4.3-1.
2.a The ASME Code components identified in Table 2.7.4.3-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.7.4.3-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.7.4.3-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design report(s) or data report(s). [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.7.4.3-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.7.4.3-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A reports exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.7.4.3-2.

Table 2.7.4.3-4 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3.b Pressure boundary welds in ASME Code piping identified in Table 2.7.4.3-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A reports exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.7.4.3-1.
4.a The ASME Code components identified in Table 2.7.4.3-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.7.4.3-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.7.4.3-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.7.4.3-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 are located in the seismic Category I structure.
	5.a.ii Type tests, analyses or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 can withstand seismic design basis loads without loss of safety function.

Table 2.7.4.3-4 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorage are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 including anchorage are seismically bounded by the tested or analyzed conditions.
5.b The seismic Category I piping including supports identified in Table 2.7.4.3-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure(s).	5.b.i The as-built seismic Category I piping including supports identified in Table 2.7.4.3-1 is located in the seismic Category I structure(s).
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.7.4.3-1 can withstand seismic design basis loads without loss of its safety function.
6.a The Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses, or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

Table 2.7.4.3-4 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Tables 2.7.4.3-2 and 2.7.4.3-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.
6.b Each of the Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Tables 2.7.4.3-2 and 2.7.4.3-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7. Check valves identified in Table 2.7.4.3-2 perform an active safety function to change position as indicated in the table.	7. Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7. Each check valve changes position as indicated in Table 2.7.4.3-2 under pre-operational test conditions.
8.a All controls required by the design exist in the MCR to start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.
8.b All controls required by the design exist in the RSR to start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the SFP cooling pumps identified in Table 2.7.4.3-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.

Table 2.7.4.3-4 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.7.4.3-2 and 2.7.4.3-3.
9. The two mechanical divisions of the SFPCS are physically separated except for the cross-connect line between SFP cooling pump suction, discharge lines.	9. Inspections of the as-built mechanical divisions will be performed.	9. The two mechanical divisions of the SFPCS are physically separated by a divisional wall, or a fire barrier, or by spatial separation in the spent fuel pool, except or the cross-connect line between SFP cooling pump suction, discharge lines.
10. The SFPCCS provides heat removal capacity to remove the decay heat generated by spent fuel assemblies.	10.a An analysis will be performed to verify that the heat removal capacity of the SFP cooling heat exchangers.	10.a A report exists and concludes that the product of the overall heat transfer coefficient (U) and the effective heat transfer area (A) of each SFP cooling heat exchanger is greater than or equal to 4.7×10^6 Btu/hr-°F.
	10.b Test will be performed on the as-built SFP cooling pumps to confirm that the SFP cooling pumps can provide flow rate.	10.b Each as-built SFP cooling pump delivers a flow rate at least 4,000 gpm to each as-built SFP cooling heat exchanger.
11. The SFP cooling pumps have sufficient net positive suction head (NPSH).	11. Test to measure the as-built SFP cooling pump suction pressure will be performed. Inspection and analysis to determine NPSH available to each pump will be performed based on test data and as-built data.	11. A report exists and concludes that the as-built calculated NPSH available exceeds each SFP cooling pump’s required NPSH.

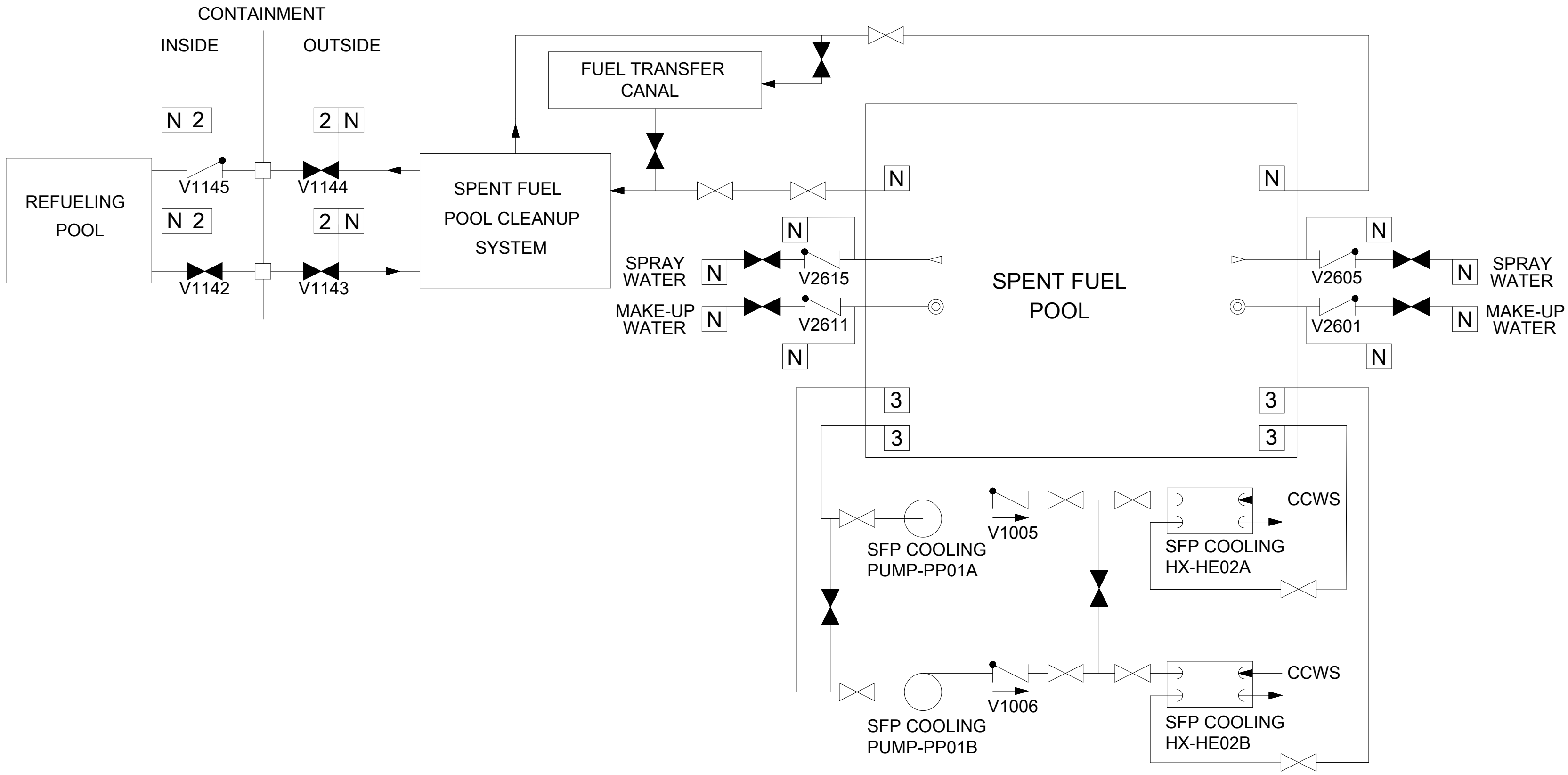


Figure 2.7.4.3-1 Spent Fuel Pool Cooling and Cleanup System

2.7.4.4 Light Load Handling System

2.7.4.4.1 Design Description

The light load handling system (LLHS) handles, moves and stores fuel assemblies and control element assemblies (CEAs) during fuel transfer operation. The LLHS load measuring devices are designed to reduce the potential for damage to a fuel assembly. All of the LLHS equipment are classified as non-nuclear safety with the single exception of the double blind flange assembly for transfer tube penetration sleeve. The LLHS has indicator lights on the control console to verify visually the operation status for the operator. Additionally, movement of the refueling machine (RM) and the spent fuel handling machine (SFHM) bridge is audibly signaled.

The RM, CEA change platform (CEACP) and CEA elevator (CEAE) are located in the reactor containment building. The SFHM, new fuel elevator (NFE) and fuel handling hoist of overhead crane are located in the fuel handling area of the auxiliary building. The fuel transfer system (FTS) is located in both the reactor containment building and the auxiliary building.

1. The functional arrangement of the LLHS is as described in the Design Description of Subsection 2.7.4.4.1 and in Table 2.7.4.4-1.

2. The ASME Code equipment identified in Table 2.7.4.4-1 is designed and constructed in accordance with ASME Section III requirements.

3. The ASME Code equipment identified in Table 2.7.4.4-1 retains its pressure boundary integrity at its design pressure.

4. The seismic Category I equipment identified in Table 2.7.4.4-1 can withstand seismic design basis loads without loss of safety function.

5. The seismic Category II equipment identified in Table 2.7.4.4-1 retains structural integrity and will not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following a safe shutdown earthquake (SSE).

6. The RM, SFHM and CEACP hoists are provided with load measuring devices and are interlocked to interrupt hoisting and lowering if load limits are reached.

7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.

8. The RM, SFHM and CEACP hoists are provided with mechanical stops to limit upward hoist travel.

9. Even during a loss of electrical power to the RM or SFHM, the RM or SFHM will not drop the fuel assembly held by its hoist.

10. The new fuel elevator is interlocked to prevent from raising of the elevator with a fuel assembly in the elevator cavity.

2.7.4.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.4.4-2 specifies the inspections, tests, analyses, and associated acceptance criteria for the LLHS.

Table 2.7.4.4-1

Light Load Handling System Equipment Location/Characteristics

Equipment Name	Location	ASME Section III Class	Seismic Category
Refueling Machine	Reactor Containment Building	NNS	II
CEA Change platform	Reactor Containment Building	NNS	II
CEA Elevator	Reactor Containment Building	NNS	II
Spent Fuel Handling Machine	Auxiliary Building	NNS	II
New Fuel Elevator	Auxiliary Building	NNS	II
Fuel Handling hoist of overhead crane	Auxiliary Building	NNS	II
Double blind flange assembly	Reactor Containment Building	2	I

Table 2.7.4.4-2 (1 of 2)

Light Load Handling System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the LLHS is as described in the Design Description of Subsection 2.7.4.4.1 and in Table 2.7.4.4-1.	1. Inspection of the as-built system will be conducted.	1. The as-built LLHS conforms with the functional arrangement as described in Design Description of Subsection 2.7.4.4.1 and in Table 2.7.4.4-1.
2. The ASME Code equipment identified in Table 2.7.4.4-1 is designed and constructed in accordance with ASME Section III requirements.	2. Inspection of the as-built equipment will be performed as documented in the ASME design reports.	2. A report exists and concludes that the as-built equipment identified in Table 2.7.4.4-1 is designed and constructed in accordance with ASME Section III requirements.
3. The ASME Code equipment identified in Table 2.7.4.4-1 retains its pressure boundary integrity at its design pressure.	3. A hydrostatic test will be conducted on the as-built equipment required to be hydrostatically tested by the ASME Section III.	3. A report exists and concludes that the results of the hydrostatic test of the as-built equipment identified in Table 2.7.4.4-1 conform with ASME Section III requirements.
4. The seismic Category I equipment identified in Table 2.7.4.4-1 can withstand seismic design basis loads without loss of safety function.	4.a Inspections will be performed to verify that the as-built seismic Category I equipment is located in the seismic Category I structure.	4.a The as-built seismic Category I equipment identified in Table 2.7.4.4-1 is located in the seismic Category I structure.
	4.b Type tests, analyses or a combination of type tests and analyses of seismic Category I equipment will be performed.	4.b A report exists and concludes that the seismic Category I equipment identified in Table 2.7.4.4-1 can withstand seismic design basis loads without loss of safety function.
	4.c Inspections will be performed to verify that the as-built seismic Category I equipment including anchorage is seismically bounded by the tested or analyzed conditions	4.c A report exists and concludes that the as-built seismic Category I equipment identified in Tables 2.7.4.4-1 including anchorage is seismically bounded by the tested or analyzed conditions.

Table 2.7.4.4-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The seismic Category II equipment identified in Table 2.7.4.4-1 retains structural integrity and will not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following a safe shutdown earthquake (SSE).	5. Inspections and analyses of the as-built seismic Category II equipment will be performed.	5. A report exists and concludes that the as-built seismic Category II equipment identified Table 2.7.4.4-1 does not impair the ability of a seismic Category Ⅰ equipment to perform its design basis safety function during or following an SSE.
6. The RM, SFHM and CEACP hoists are provided with load measuring devices and are interlocked to interrupt hoisting and lowering if load limits are reached.	6. Testing of the RM, SFHM and CEACP hoists will be performed to evaluate equipment response to simulated loads.	6. Load measuring devices and interlocks of the RM, SFHM and CEACP hoists interrupt hoisting and lowering when simulated load limits are reached.
7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.	7. Testing of the RM, SFHM and CEACP hoists will be performed to confirm that the interlock function works to limit upward hoist travel.	7. The RM, SFHM and CEACP hoists are interlocked to limit upward hoist travel.
8 The RM, SFHM and CEACP hoists are provided with mechanical stops to limit upward hoist travel.	8. Testing of the RM, SFHM and CEACP hoists will be performed to confirm that the mechanical stops function works to limit upward hoist travel.	8. The RM, SFHM and CEACP hoists are limited for upward hoist travel at the mechanical stops.
9. Even during a loss of electrical power to the RM or SFHM, the RM or SFHM will not drop the fuel assembly held by its hoist.	9. Testing of the RM and SFHM will be performed by removing electrical power from the loaded equipment.	9. The grapple does not open upon the loss of electrical power.
10. The new fuel elevator is interlocked to prevent from raising of the elevator with a fuel assembly in the elevator cavity.	10. Testing of the new fuel elevator will be performed to confirm that the interlock function works to limit travel.	10. The lift of new fuel elevator is limited with a fuel assembly in the elevator cavity.

2.7.4.5 Overhead Heavy Load Handling System

2.7.4.5.1 Design Description

The overhead heavy load handling system (OHLHS) is a non safety-related system that handles and moves any loads greater than a fuel assembly load. OHLHS consists of one fuel handling area overhead crane, one containment polar crane, and other cranes and hoists that handle heavy loads which may damage safe shutdown equipment in the event of accidental drop.

The containment polar crane is used to handle the reactor vessel head in the area of the reactor vessel and the fuel handling area overhead crane is used to handle new fuel containers and spent fuel casks in the fuel handling area.

The containment polar crane is designed as a single-failure-proof crane so that any single failure will not result in losing the crane's capability to perform its own functions. The containment polar crane is also designed as seismic Category II and therefore, the dynamic effects arising from seismic events are restricted by the seismic restraints which prevent the bridge or trolley from leaving the rails during and after a safe shutdown earthquake (SSE).

The fuel handling area overhead crane, equipped with a cask handling hoist and a fuel handling hoist, is mounted on the rail that extends the entire length of the fuel handling area. During construction, the overhead crane travels the entire rail without any provisions for restriction; however, once fuel assemblies are received onsite, provisions are installed permanently to restrict movement of the crane over the spent fuel pool (SFP) area for safe heavy-load handling.

The fuel handling area overhead crane is designed as seismic Category II. During an SSE, the fuel handling area overhead crane and all its components retain structural integrity, and the bridge and trolley remain in place on their respective runways with their wheels prevented from leaving the tracks.

1. The functional arrangement of the OHLHS is as described in the Design Description of Subsection 2.7.4.5.1.

2. The OHLHS retains structural integrity and will not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following an SSE.

3. The containment polar crane has seismic restraints that prevent derailment of either the hoist trolley or the main bridge box girders during and after an SSE.

4. The containment polar crane meet requirements for single-failure-proof cranes.

5. The OHLHS's hoists are provided with load-measuring devices and are interlocked to interrupt hoisting if load limits are reached.

6. The OHLHS's hoists are provided with mechanical stops to limit upward movement of the hoists.

7. The fuel handling hoist of fuel handling area overhead crane is interlocked to prevent moving new fuel over the spent fuel storage racks.

8. The cask handling hoist of fuel handling area overhead crane is interlocked and equipped with mechanical stops to prevent moving a cask over the spent fuel storage racks and the new fuel storage racks.

9. The OHLHS has a control system to return to or maintain a secure holding position of critical loads in the event of a system fault.

2.7.4.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for the OHLHS is described in Table 2.7.4.5-1.

Table 2.7.4.5-1 (1 of 3)

Overhead Heavy Load Handling System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the OHLHS is as described in the Design Description of Subsection 2.7.4.5.1.	1. Inspection of the as-built system will be conducted.	1. The as-built OHLHS conforms with the functional arrangement as described in the Design Description of subsection 2.7.4.5.1.
2. The OHLHS retains structural integrity and will not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following an SSE.	2. Inspection and analyses will be performed for the as-built seismic Category II OHLHS.	2. A report exists and concludes that the as-built OHLHS retains structural integrity and does not impair the ability of a seismic Category I equipment to perform its design basis safety function during or following an SSE.
3. The containment polar crane has seismic restraints that prevent derailment of either the hoist trolley or the main bridge box girders during and after an SSE.	3. A combination of inspections, test and analyses will be performed for the as-built polar crane seismic restraint system.	3. A report exists and concludes that the as-built polar crane seismic restraint system prevents derailment of either the hoist trolley or the main bridge box girders during and after an SSE.

Table 2.7.4.5-1 (2 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The containment polar crane meet requirements for single-failure-proof cranes.	4. A combination of inspection, tests and analyses will be performed on the as-built polar crane main and auxiliary hoists to verify a single-failure-proof. The containment polar crane: • reeving system design precludes a load drop in the event of a single rope failure. • is equipped with at least two holding brakes. • will be tested at a minimum of 100 % of rated load in accordance with ASME NOG-1 full-load test. • will be tested at a minimum of 125 % of rated load in accordance with ASME NOG-1 rated load Test. • will be no-load tested to verify limit switch, interlock and stop settings. • critical welds will be subject to non-destructive examination (NDE) in accordance with ASME NOG-1.	4. A report exists and concludes that the as-built containment polar crane main and auxiliary hoists are a single-failure-proof. The containment polar crane: • can tolerate a single reeving system rope failure without a load drop. • is equipped with two holding brakes, each of which is set and rated at a minimum torque of 125 % of rated hoisting torque at the point of brake application. • can hold and operate with a load of at least 100 % of rated load. • can lift, transport, lower, stop and hold a test load of at least 125 % of rated load. Each polar crane hoist holding brake is capable of stopping and holding a minimum of 125 % rated load. • limit switches, interlocks and stops are set in accordance with design requirements. • critical welds meet ASME NOG-1 criteria for NDE.

Table 2.7.4.5-1 (3 of 3)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. OHLHS's hoists are provided with load-measuring devices and are interlocked to interrupt hoisting if load limits are reached.	5. Tests of the OHLHS's hoists will be performed to evaluate their responses to simulated loads.	5. The OHLHS's hoist load measuring devices and interlocks interrupt hoisting and lowering when simulated load limits are reached.
6. OHLHS's hoists are provided with mechanical stops to limit upward movement of the hoists.	6. Tests of the fuel handling area overhead crane and containment polar crane hoists will be performed to confirm the functioning of mechanical stops to limit upward hoist travel.	6. The fuel handling area overhead crane and containment building polar crane hoists are limited to travel upward at the mechanical stops.
7. The fuel handling hoist of fuel handling area overhead crane is interlocked to prevent moving new fuel over the spent fuel storage racks.	7. Tests of fuel handling hoist of fuel handling area overhead crane will be performed to confirm the interlock function to limit travel.	7. The fuel handling hoist of fuel handling area overhead crane is limited by the interlock to travel over the spent fuel storage racks.
8. The cask handling hoist of fuel handling area overhead crane is interlocked and equipped with mechanical stops to prevent moving a cask over the spent fuel storage racks and the new fuel storage racks.	8. Tests of cask handling hoist of fuel handling area overhead crane will be performed to confirm the interlock function and mechanical stop to limit travel.	8. The cask handling hoist travel of fuel handling area overhead crane is limited by the interlock and the mechanical stops.
9. OHLHS has a control system to return to or maintain a secure holding position of critical loads in the event of a system fault.	9. Tests of the as-built OHLHS control system will be performed to assure that the as-built OHLHS returns to or maintains a secure holding position of critical loads in the event of a system.	9. The as-built control system includes safety devices which assure that the as-built OHLHS returns to and/or maintains a secure holding position of critical loads in the event of a system fault.

2.7.5 Auxiliary System

2.7.5.1 Compressed Air and Gas Systems

Since the compressed air and gas systems do not perform safety functions, no ITAAC items are provided.

2.7.5.2 Fire Protection System

2.7.5.2.1 Design Description

The fire protection system (FPS) is classified as a non safety-related system with the exception of the containment isolation function. The FPS provides fire detection and suppression capabilities and mitigates fire propagation.

The FPS consists of a water distribution system, automatic and manual suppression systems, a fire detection and alarm system, and portable fire extinguishers. Main components of the FPS are located in yard and auxiliary building. The FPS provides fire protection for containment building, auxiliary building, turbine building, and compound building. The FPS has a safety-related containment isolation function as described in Subsection 2.11.3.

Seismic Category I design is applied to the FPS located in the auxiliary building, emergency diesel generator building, and containment building containing safe shutdown equipment following a safe shutdown earthquake (SSE).

To meet functional requirements, the FPS is designed as follows:

1. The functional arrangement of the FPS is as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figure 2.7.5.2-1.

2.a The main fire water storage tank has minimum volume for design flow rate for fire fighting during 2 hours.

2.b The seismic Category I fire water storage tank has minimum volume for 2 hose station during 2 hours.

3.a There are three 50 percent capacity fire pumps: one pump is motor driven and two pumps are diesel driven.

3.b There are two 100 percent capacity seismic Category I motor driven fire pumps.

4. The FPS fire water supply is available as emergency containment spray backup source for severe accident mitigation.

5. During and after safe-shutdown earthquake loading, the stand pipe system remains functional in areas containing equipment required for safe shutdown.

6. The fuel tank for the diesel-driven fire pump is capable of holding at least equal to 5.07 L per kW(1 gal per hp) plus 10 percent volume.

7. Manual pull stations or individual fire detectors provide fire detection capability and can be used to initiate fire alarms.

8.a All displays and alarms required by the design exist in the MCR as defined in Table 2.7.5.2-2.

8.b All displays and alarms required by the design exist in the RSR as defined in Table 2.7.5.2-2.

2.7.5.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses and associated acceptance criteria for the fire protection system are described in Table 2.7.5.2-3.

The ITAAC associated with the FPS equipment, components and piping that comprise a portion of the CIS are described in Table 2.11.3-2.

Table 2.7.5.2-1

Fire Protection System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Electrical Class 1E/Harsh Environ. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Normal Fire Pump	FP-PP01~03	-[2]	III	No/No	No/Yes	No/Yes	-	Start/Stop	-
Jockey Pump	FP-PP04	-	III	No/No	No/Yes	No/Yes	-	Start/Stop	-
Seismic Category I Fire Pump	FP-PP05/PP06	-	I	Yes/No	No/Yes	No/Yes	-	Start/Stop	Stop
Seismic Category I Valves	FP-V030 (AOV) V-1440 (CHK)	2	I	Yes/Yes	No/Yes No/No	No/Yes No/No	CIAS	Open/Close	Close
Seismic Category I Tank	TK-03, TK-04	-	I	No/No	Yes/No	Yes/No	-	No	-

(1) The column "Item No." is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.7.5.2-2

Fire Protection Systems Instruments List

Channel Name	Item No.[1]	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Alarm at MCR	Display/ Alarm at RSR
Fresh Water Storage Tank Level	L-003/004	III	No/No	Yes/Yes	Yes/Yes
Seismic Category I Storage Tank Level	L-045/046	I	No/No	Yes/Yes	Yes/Yes
Fresh Water Storage Tank Temp	T-001/002	III	No/No	Yes/Yes	Yes/Yes
Fire Pump Discharge piping Pressure	P-004	III	No/No	Yes/Yes	Yes/Yes
Diesel Fuel Tank Level	L-072	III	No/No	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

Table 2.7.5.2-3 (1 of 2)

Fire Protection System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the FPS is as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figure 2.7.5.2-1.	1. Inspection of the as-built FPS will be performed.	1. The as-built FPS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.5.2.1 and as shown in Figure 2.7.5.2-1.
2.a The main fire water storage tank has minimum volume for design flow rate for fire fighting during 2 hours.	2.a Inspection of the as-built main fire water storage tank will be performed.	2.a The as-built main fire water storage tank has at least 1.136×10^6 L (300,000 gal).
2.b The seismic Category I fire water storage tank has minimum volume for 2 hose station during 2 hours.	2.b Inspection of the as-built Seismic Category I fire water storage tank will be performed.	2.b The as-built seismic Category I fire water storage tank has at least 6.813×10^4 L (18,000 gal).
3.a There are three 50 percent capacity fire pumps: one pump is motor driven and two pumps are diesel driven.	3.a Test and analysis will be performed to determine design flow rate for the as-built each pump.	3.a A report exists and concludes that each fire pump can provide the design flow rate to satisfy the demand of any automatic sprinkler system plus 1,900 lpm (500 gpm) for fire hoses.
3.b There are two 100 percent capacity seismic Category I motor driven fire pumps.	3.b Test and analysis will be performed to determine design flow rate for the as-built each pump.	3.b A report exists and concludes that each seismic Category I fire pump can provide the design flow rate to satisfy the demand of two fire hoses 284 lpm/each (75 gpm/each) in area containing safe shutdown components.
4. The FPS fire water supply is available as emergency containment spray backup source for severe accident mitigation.	4. Inspection of the as-built FPS fire water supply system will be performed.	4. The as-built FPS fire water supply system has the provision to connect to the containment spray system for severe accident mitigation.

Table 2.7.5.2-3 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. During and after safe shutdown earthquake loading, the stand pipe system remains functional in areas containing equipment required for safe shut down.	5. An inspection will be performed of the as-built stand pipe system as documented in a seismic design report.	5. The seismic design report exists and concludes that the as-built stand pipe system remains functional in areas containing equipment required for safe shutdown during and after safe shutdown earthquake loading.
6. The fuel tank for the diesel-driven fire pump is capable of holding at least equal to 5.07 L per kW (1 gal per hp) plus 10 % volume.	6. Inspection of the diesel-driven fire tank will be performed	6. The volume of the as-built diesel fire pump fuel tank is at least equal to 5.07 L per kW (1 gal per hp) plus 10 % volume.
7. Manual pull stations or individual fire detectors provide fire detection capability and can be used to initiate fire alarms.	7. Inspection and testing of the as-built manual pull stations and individual fire detectors will be performed using simulated fire conditions.	7. The as-built manual pull stations and individual fire detector can be used to initiate fire alarms, and individual fire detectors respond to simulated fire conditions.
8.a All displays and alarms required by the design exist in the MCR as defined in Table 2.7.5.2-2.	8.a Inspections will be performed on the displays and alarms in the MCR.	8.a All displays and alarms exist and can be retrieved in the as-built MCR as defined in Table 2.7.5.2-2.
8.b All displays and alarms required by the design exist in the RSR as defined in Table 2.7.5.2-2.	8.b Inspections will be performed on the displays and alarms in the RSR.	8.b All displays and alarms exist and can be retrieved in the as-built RSR as defined in Table 2.7.5.2-2.

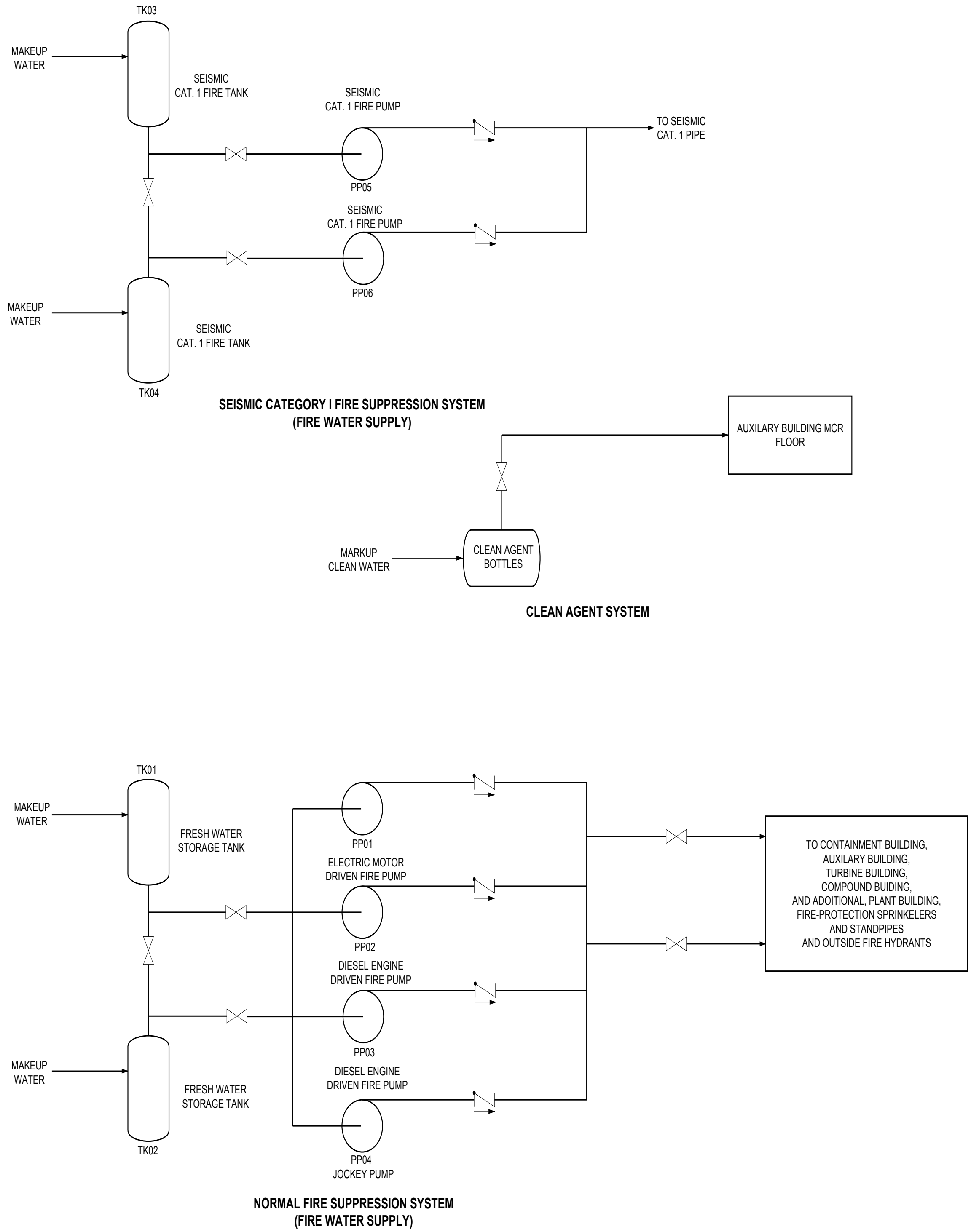


Figure 2.7.5.2-1 Fire Protection System

2.7.5.3 Domestic Water and Sanitary Systems

Since the domestic water and sanitary system does not perform safety functions, no ITAAC items are provided.

2.7.6 Radioactive Waste Management

2.7.6.1 Liquid Waste Management System

2.7.6.1.1 Design Description

The liquid waste management system (LWMS) is a non safety-related system. The LWMS is designed to handle, process, store, and release the liquid radioactive waste generated during normal operation including anticipated operational occurrences (AOOs). The LWMS treats liquid radioactive waste using reverse osmosis (R/O) package system. The processed liquid radioactive waste is sampled prior to release from monitor tanks. The LWMS provides means to monitor radioactivity levels in the processed liquid waste prior to release. The LWMS provides sufficient capacity, redundancy, and flexibility to treat the liquid radioactive waste in a manner to reduce the radionuclide concentrations to meet the effluent concentration limits in 10 CFR 20, Appendix B, and 10 CFR 50, Appendix I dose objectives for liquid effluents.

The LWMS is located in the compound building. The LWMS consists of equipment waste subsystem, floor drain subsystem, chemical waste subsystem and detergent waste subsystem.

1. The functional arrangement of the LWMS is as described in the Design Description of Subsection 2.7.6.1.1 and in Table 2.7.6.1-1 and as shown in Figure 2.7.6.1-1.

2. The LWMS discharge valves are automatically closed upon detection of high radioactivity level in the liquid effluent.

3. R/O package system has the capacity to maintain radioactivity releases within regulatory limits.

4. An alarm from the radiation monitor at the liquid waste discharge line is provided in the MCR.

2.7.6.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for the LWMS is described in Table 2.7.6.1-2.

Table 2.7.6.1-1

Liquid Waste Management System Component List

Component Name	Item No. (1)	Quantity	Location
Floor drain tanks	WV-TK01/02	2	Compound Building
Equipment waste tanks	WV-TK03/04	2	Compound Building
Chemical waste tanks	WV-TK05/06	2	Compound Building
Monitor tanks	WV-TK07/08	2	Compound Building
Detergent waste tanks	WY-TK01/02	2	Compound Building
Floor drain pumps	WV-PP01/02	2	Compound Building
Equipment waste pumps	WV-PP03/04	2	Compound Building
Chemical waste tank pumps	WV-PP05/06	2	Compound Building
Monitor tank pumps	WV-PP07/08	2	Compound Building
Detergent waste tank pumps	WY-PP01/02	2	Compound Building
Detergent waste filter	WY-FT01	1	Compound Building
R/O package systems	WV-ZR01/02	2	Compound Building

(1) The column “Item No.” is information only (not part of certified design).

Table 2.7.6.1-2

Liquid Waste Management System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the LWMS is as described in the Design Description of Subsection 2.7.6.1.1 and in Table 2.7.6.1-1 and as shown in Figure 2.7.6.1-1.	1. Inspection of the as-built LWMS will be performed.	1. The as-built LWMS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.6.1.1 and in Table 2.7.6.1-1 and as shown in Figure 2.7.6.1-1.
2. The LWMS discharge valves are automatically closed upon detection of high radioactivity level in the liquid effluent.	2. Tests of the as-built LWMS discharge valves will be performed using a simulated test signal.	2. The as-built LWMS discharge valves are automatically closed upon detection of a simulated high radiation test signal.
3. R/O package system has the capacity to maintain radioactivity releases within regulatory limits.	3. Inspections will be performed to verify that the filter media and ion exchanger resins are loaded in R/O package system.	3. The filter media and ion exchanger resins specified by vendor for LWMS R/O package system are loaded in R/O package system.
4. An alarm from the radiation monitor at the liquid waste discharge line is provided in the MCR.	4. Inspection will be performed for retrievability of the alarm from the radiation monitor at the liquid waste discharge line in the as-built MCR.	4. An alarm from the radiation monitor at the liquid waste discharge line can be retrieved in the as-built MCR.

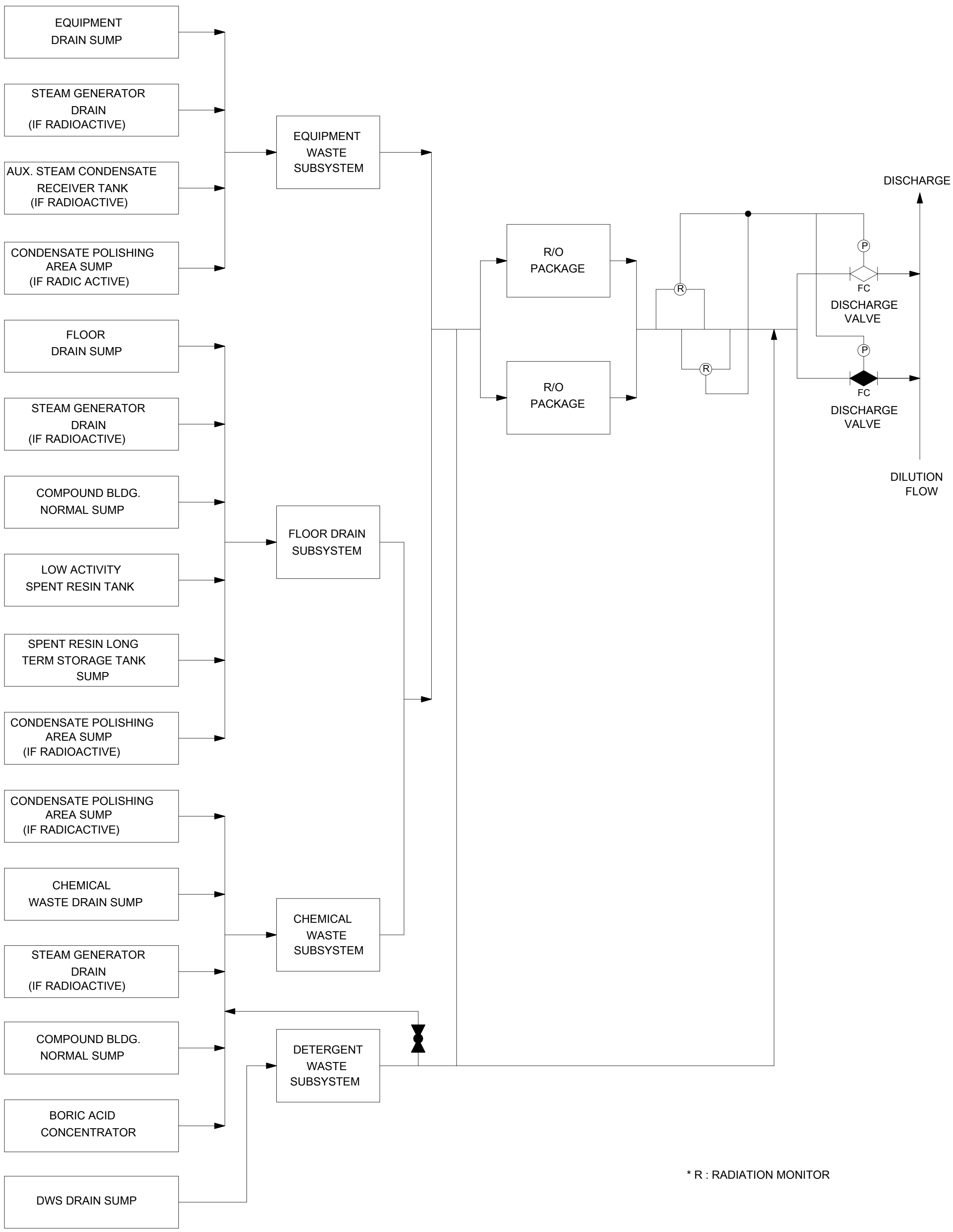


Figure 2.7.6.1-1 Liquid Waste Management System

2.7.6.2 Gaseous Waste Management System

2.7.6.2.1 Design Description

The gaseous waste management system (GWMS) is non safety-related with the exception of containment penetration isolation valves and the piping. The GWMS is designed to collect, store, process, sample and monitor gaseous radioactive waste generated as a result of normal operation, including anticipated operational occurrences (AOOs). The GWMS ensures that gaseous waste releases comply with effluent concentration limit in 10 CFR 20, Appendix B, and 10 CFR 50, Appendix I dose objectives for gaseous effluents.

The GWMS is located in the compound building. The GWMS processes gaseous radioactive waste with charcoal delay bed.

The GWMS is designed as follows:

1. The functional arrangement of the GWMS is as described in the Design Description of Subsection 2.7.6.2.1 and in Table 2.7.6.2-1 and as shown in Figure 2.7.6.2-1.

2. The GWMS discharge valve is closed automatically upon detection of a high radiation signal from the radiation monitor at gaseous waste discharge.

3. An alarm from the gaseous waste discharge radiation monitor is provided in the MCR and the radwaste control room.

4. The nitrogen injection valve is opened automatically upon receipt of a high oxygen concentration signal above the pre-determined setpoint.

5. The GWMS charcoal beds contain the mass needed to allow decay of radionuclides to keep releases within regulatory limits.

2.7.6.2.2 Inspections, Tests, Analysis, and Acceptance Criteria

The inspections, tests, and analyses, and associated acceptance criteria for the gaseous waste management system is specified in Table 2.7.6.2-3 except for containment penetration isolation valves and piping.

The inspection, tests, analyses, and associated acceptance criteria for the containment penetration isolation valves and piping of GWMS are specified in Table 2.11.3-2.

Table 2.7.6.2-1

Gaseous Waste Management System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
The portion of containment penetration piping including inside isolation valve	Reactor Containment Building	2	I
The portion of containment penetration piping including outside isolation valve	Auxiliary Building	2	I

Table 2.7.6.2-2

Gaseous Waste Management System Components List

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Containment Isolation Valve(MOV)	V-0001	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As Is
Containment Isolation Valve(SOV)	V-0002	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close

(1) The column "Item No." is information only (not part of certified design).

Table 2.7.6.2-3

<u>Gaseous Waste Management System ITAAC</u>

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the GWMS is as described in Design Description of Subsection 2.7.6.2.1 and in Table 2.7.6.2-1 and as shown in Figure 2.7.6.2-1.	1. Inspection of the as-built GWMS will be performed.	1. The as-built GWMS conforms with the functional arrangement as described in Design Description of Subsection 2.7.6.2.1 and in Table 2.7.6.2-1 and as shown in Figure 2.7.6.2-1.
2. The GWMS discharge valve is closed automatically upon detection of a high radiation signal from the radiation monitor at gaseous waste discharge.	2. Tests will be conducted for the GWMS discharge valve using simulated test signal.	2. Upon receipt of a simulated GWMS high radiation test signal, the as-built GWMS discharge valve is closed automatically.
3. An alarm from the gaseous waste discharge radiation monitor is provided in the MCR and the radwaste control room.	3. Inspection will be performed for the retrievability of the alarm from the gaseous waste discharge monitor in the as-built MCR.	3. An alarm from gaseous waste discharge radiation monitor can be retrieved in the as-built MCR and the radwaste control room.
4. The nitrogen injection valve is opened automatically upon receipt of a high oxygen concentration signal above the pre-determined setpoint.	4. Tests will be conducted for the GWMS nitrogen injection valve using simulated test signal.	4. Upon receipt of a simulated high oxygen concentration test signal, the as-built nitrogen injection valve is opened automatically.
5. The GWMS charcoal delay beds contain the mass needed to allow decay of radionuclides to keep releases within regulatory limits.	5. Inspections will be performed to verify the contained mass of the charcoal beds.	5. The GWMS charcoal delay beds contain the mass to allow delaying 3.5 days for krypton and 45 days for xenon.

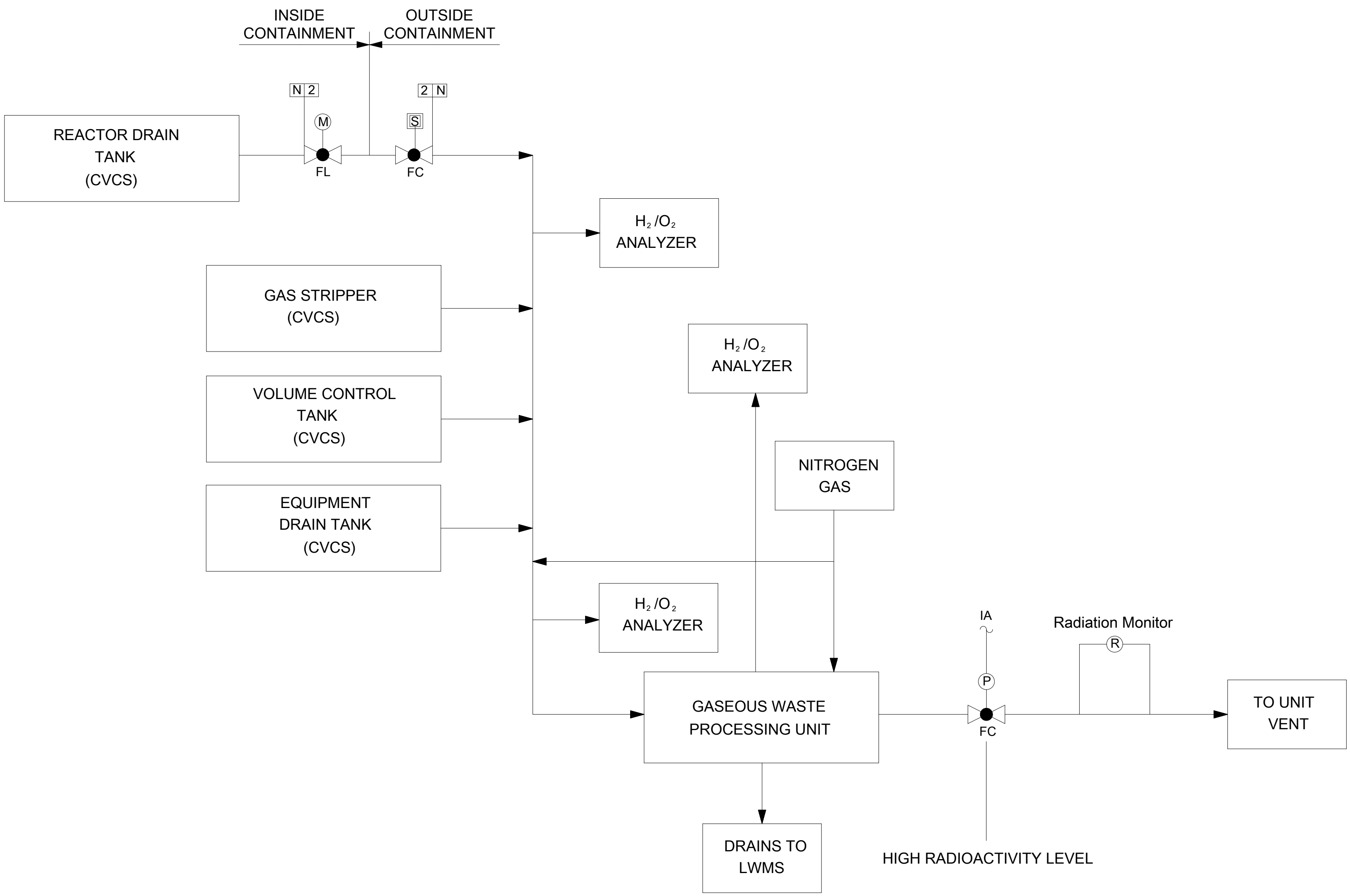


Figure 2.7.6.2-1 Gaseous Waste Management System

2.7.6.3 Solid Waste Management System

2.7.6.3.1 Design Description

The solid waste management system (SWMS) is designed as a non safety-related system. The SWMS collects, packages, and temporarily stores the solid radioactive wastes prior to processing or shipment.

The SWMS is located in the compound building. The SWMS consists of subsystems to manage various types of solid radioactive waste products, including spent resin, spent filter elements, reverse osmosis (R/O) concentrates, dry active waste (DAW).

1. The functional arrangement of the SWMS is as described in the Design Description of Subsection 2.7.6.3.1 and in Table 2.7.6.3-1.

2. The SWMS spent resin storage tanks listed in Table 2.7.6.3-1 have the capacity for radioactive spent resin storage.

2.7.6.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the SWMS are listed in Table 2.7.6.3-2.

Table 2.7.6.3-1

Solid Waste Management System Component List

Component Name	Item No. (1)	Quantity	Location
Low Activity Spent Resin Tank	WX-TK01	1	Compound Building
Spent Resin Long Term Storage Tank	WX-TK02	1	Compound Building

(1) The column “Item No.” is information only (not part of certified design).

Table 2.7.6.3-2

Solid Waste Management System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the SWMS is as described in the Design Description of Subsection 2.7.6.3.1 and in Table 2.7.6.3-1.	1. Inspection of the as-built SWMS will be performed.	1. The as-built SWMS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.6.3.1 and in Table 2.7.6.3-1.
2. The SWMS spent resin storage tanks listed in Table 2.7.6.3-1 have the capacity for radioactive spent resin storage.	2. Inspection and analysis of the as-built spent resin storage capability will be performed.	2. A report exists and concludes that the spent resin storage tanks have storage capacity to store waste volume expected during normal operation including anticipated operation occurrences.

2.7.6.4 Process and Effluent Radiation Monitoring and Sampling System

2.7.6.4.1 Design Description

The process and effluent radiation monitoring and sampling system (PERMSS) provide components to monitor liquid and gaseous effluents prior to release to unrestricted areas, and to monitor in-plant radioactivity.

The PERMSS is non safety-related with the exception of the following, each of which is safety-related and Class 1E:

- Main control room (MCR) air intake radiation monitors
- Containment building operating area and upper operating area radiation monitors
- Fuel handling area monitors
- Containment air radiation monitors

Components of the PERMSS are located in the containment building, the auxiliary building, the compound building, and the turbine building.

1. The functional arrangement of the PERMSS is as described in the Design Description of Subsection 2.7.6.4.1 and in Table 2.7.6.4-1.
2. The PERMSS has components that provide radiation monitoring of gaseous and liquid processing systems.
3. All displays and alarms required by the design exist in the MCR and RSR as defined in Table 2.7.6.4-1.
4. Each safety-related radiation monitor channel monitors the radiation level in its assigned area, and indicates its respective MCR alarm and local audible and visual alarm when the radiation level reaches a preset level.
5. The safety-related divisional cabinet (SRDC) of the PERMSS provides an automatic ESF initiation signals, as shown on Table 2.7.6.4-2.
6. The seismic category I monitors identified in Table 2.7.6.4-1 can withstand seismic design basis loads without loss of safety function.

7. Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

2.7.6.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.6.4-3 specifies the inspections, tests, analyses, and associated acceptance criteria for the process and effluent radiation monitoring and sampling system.

Table 2.7.6.4-1 (1 of 3)

Process and Effluent Radiation Monitoring and Sampling System Components List

Description	Tag No [(1)]	Monitor Type	Location	Seismic Category	Electric classification	Display/ Alarm at MCR/RSR
High Energy Line Break Area Exhaust ACU Effluent	PR-RE-006	Sampler (P,I)	Auxiliary Building	III	Non-Class 1E	Yes/Yes/Yes
High Energy Line Break Area Exhaust ACU Inlet	PR-RE-007	P, I, G	Auxiliary Building	III	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area I Exhaust ACU Inlet	PR-RE-013	P, I, G	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area II Exhaust ACU Inlet	PR-RE-014	P, I, G	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area I Normal Exhaust ACU Effluent	PR-RE-015	Sampler (P,I)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area II Normal Exhaust ACU Effluent	PR-RE-016	Sampler (P,I)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area I Emergency Exhaust ACU Inlet	PR-RE-017	P, I, G	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area II Emergency Exhaust ACU Effluent	PR-RE-018	Sampler (P,I)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes

Table 2.7.6.4-1 (2 of 3)

Description	Tag No (1)	Monitor Type	Location	Seismic Category	Electric classification	Display/ Alarm at MCR/RSR
Aux BLDG Controlled Area I Emergency Exhaust ACU Effluent	PR-RE-019	Sampler (P,I)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Aux BLDG Controlled Area II Emergency Exhaust ACU Effluent	PR-RE-020	Sampler (P,I)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Containment Purge Effluent	PR-RE-037	P, I, G	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Containment Air	PR-RE-039A	P, I, G	Auxiliary Building	I	Class 1E	Yes/Yes/Yes
Containment Air	PR-RE-040B	P, I, G	Auxiliary Building	I	Class 1E	Yes/Yes/Yes
Fuel Handling Area HVAC Effluent	PR-RE-043	P, I, G	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Condenser Vacuum Vent Effluent	PR-RE-063	Gas & Sampler (P, I)	Turbine Building	III	Non-Class 1E	Yes/Yes/Yes
Main Control Room Air Intake	PR-RE-071A	Gas	Auxiliary Building	I	Class-1E	Yes/Yes/Yes
	PR-RE-072B	Gas	Auxiliary Building	I	Class-1E	Yes/Yes/Yes
	PR-RE-073A	Gas	Auxiliary Building	I	Class-1E	Yes/Yes/Yes
	PR-RE-074B	Gas	Auxiliary Building	I	Class-1E	Yes/Yes/Yes
Gaseous Radwaste System Exhaust	PR-RE-080	Gas	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
Comp. BLDG HVAC Effluent	PR-RE-082	Sampler (P,I)	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
Comp. BLDG Exhaust ACU Inlet	PR-RE-083	P, I, G	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
Condensate Receiver Tank	PR-RE-103	Liquid	Auxiliary Building	III	Non-Class 1E	Yes/Yes/Yes
CCW Supply Header (TRN A)	PR-RE-111	Liquid	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
CCW Supply Header (TRN B)	PR-RE-112	Liquid	Auxiliary Building	III	Non-Class 1E	Yes/Yes/Yes

Table 2.7.6.4-1 (3 of 3)

Description	Tag No (1)	Monitor Type	Location	Seismic Category	Electric classification	Display/ Alarm at MCR/RSR
ESW PUMP Discharge Header (TRN A)	PR-RE-113	Liquid	CCW HX Building	II	Non-Class 1E	Yes/Yes/Yes
ESW PUMP Discharge Header (TRN B)	PR-RE-114	Liquid	CCW HX Building	II	Non-Class 1E	Yes/Yes/Yes
Condensate Polishing Area Sump Water	PR-RE-164	Liquid	Turbine Building	III	Non-Class 1E	Yes/Yes/Yes
Liquid Radwaste System Effluent	PR-RE-183	Liquid	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
	PR-RE-184	Liquid	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
Steam Generator Blowdown Line	PR-RE-104	Liquid	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
CVCS Letdown Line	CV-RE-036	Liquid	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes
Process Sample Panel	PR-RE-185	Liquid	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
	PR-RE-186	Liquid	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
Comp. BLDG Hot Machine Shop ACU outlet	PR-RE-084	P, I, G	Compound Building	III	Non-Class 1E	Yes/Yes/Yes
[FP & Water/Waster Water Treatment BLDG]	PR-RE-190	Liquid	Waste Water Treatment Building	III	Non-Class 1E	Yes/Yes/Yes
Main Steam Line	PR-RE-217 PR-RE-218 PR-RE-219 PR-RE-220	Gas (2)	Auxiliary Building	II	Non-Class 1E	Yes/Yes/Yes

(1) The column "Tag No." is information only (not part of certified design).

(2) N-16 monitoring function is embedded in the Main Steam Line Area Radiation Monitor.

(3) Monitor Type

P: Particulate, I : Iodine, G: Noble gas, Liquid

Table 2.7.6.4-2

Engineered Safety Features Actuation System Initiation Conditions

Control Room Emergency Ventilation Actuation Signal • High Radiation of MCR Intake Air

Table 2.7.6.4-3 (1 of 2)

Process and Effluent Radiation Monitoring and Sampling System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the PERMSS is as described in the Design Description of Subsection 2.7.6.4.1 and in Table 2.7.6.4-1.	1. Inspection of the as-built PERMSS will be conducted.	1. The as-built PERMSS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.6.4.1 and in Table 2.7.6.4-1.
2. The PERMSS has components that provide radiation monitoring of gaseous and liquid processing systems.	2. Inspections will be performed to verify that the as-built gaseous and liquid processing systems are provided with radiation monitoring.	2. The components of radiation monitoring exist in gaseous and liquid processing systems of the as-built PERMSS.
3. All displays and alarms required by the design exist in the MCR and RSR as defined in Table 2.7.6.4-1.	3. Tests will be performed on the displays and alarms in the MCR and RSR.	3. All displays and alarms exist and can be retrieved in the as-built MCR and RSR as defined in Table 2.7.6.4-1.
4. Each safety-related radiation monitor channel monitors the radiation level in its assigned area, and indicates its respective MCR alarm and local audible and visual alarm when the radiation level reaches a preset level.	4. Testing of each channel of the safety-related radiation monitors will be conducted using simulated input signals.	4. MCR and local alarms are initiated when the simulated radiation level reaches a preset limit.
5. The safety-related divisional cabinet (SRDC) of the PERMSS provides an automatic ESF initiation signals, as shown on Table 2.7.6.4-2.	5. A testing of the as-built SRDC will be performed using simulated test signals.	5. Each as-built ESF initiation signals are sent to ESF-CCS group control cabinet upon detection of high radiation of the MCR intake defined in Table 2.7.6.4-2, if plant's radiation monitors exceed predetermined setpoints for control room emergency ventilation actuation signal (CREVAS).

Table 2.7.6.4-3 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. The seismic Category I monitors identified in Table 2.7.6.4-1 can withstand seismic design basis loads without loss of safety function.	6.a. Inspections will be performed to verify that the as-built seismic Category I monitor identified in Table 2.7.6.4-1 is located in seismic Category I structure	6.a. The as-built seismic Category I monitor identified in Table 2.7.6.4-1 is located in a seismic Category I structure.
	6.b. Type test, analyses, or a combination of type tests and analyses of seismic Category I monitor identified in Table 2.7.6.4-1 will be performed.	6.b. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.4-1 withstands seismic design basis loads without loss of safety function.
	6.c. Inspections and analyses will be performed to verify the as-built seismic Category I monitors identified in Table 2.7.6.4-1 including anchorages and is seismically bounded by the tested or analyzed conditions.	6.c. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.4-1 including anchorages is seismically bounded by the tested or analyzed conditions.
7. Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	7. Inspection of the as-built Class 1E divisions will be performed.	7. Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between class 1E division and non-class 1E division.

2.7.6.5 Area Radiation Monitoring System

2.7.6.5.1 Design Description

The area radiation monitoring system (ARMS) monitors the radiation levels in selected areas through the plant. The area monitors warn operators and station personnel of the visible and audible alarm when unusual radiological events occur.

Components of the ARMS are located in the containment building, the auxiliary building, and the compound building.

1. The functional arrangement of the ARMS is described in the Design Description of Subsection 2.7.6.5.1 and in Table 2.7.6.5-1.

2. The ARMS provides operating personnel with an indication and record of radiation levels in the MCR.

3. The monitors provide local readout and alarm units at the detector locations.

4. Separation is provided between Class 1E channels, and between Class 1E division and non-Class 1E division.

5. The seismic Category I monitors of the ARMS identified in Table 2.7.6.5-1 can withstand seismic design basis loads without loss of safety function.

6. The safety-related divisional cabinet (SRDC) of the ARMS provides an automatic ESF initiation signals, as shown in Table 2.7.6.5-2.

2.7.6.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for the area radiation monitoring system is described on Table 2.7.6.5-3.

Table 2.7.6.5-1

Area Radiation Monitoring System Components List

Description	Tag No [1]	Class [2]			Range	Display/ Alarm at MCR/RSR
		S	SE	E		
Post Accident Primary Sample Room	RE-205	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Normal Primary Sample Room	RE-285	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Main Steam & FW Containment Piping Penetration Area	RE-237 RE-238	N	II	N	10^{0}~10^{5}	Yes/Yes/Yes
Fuel Handling ACC & POST-ACC High Range Monitor In Containment	RE-231A RE-232B	3	I	A B A B	10^{-3}~10^{2}	Yes/Yes/Yes
	RE-233A RE-234B				10^{1}~10^{8}	Yes/Yes/Yes
Incore Instrument	RE-235	N	II	N	10^{-3}~10^{2}	Yes/Yes/Yes
Containment Personnel Access Hatch Area	RE-236	3	I	A B	10^{-3}~10^{2}	Yes/Yes/Yes
Spent Fuel Pool Area	RE-241A RE-242B	N	II	N	10^{-3}~10^{2}	Yes/Yes/Yes
New Fuel Storage Area	RE-245	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Hot Machine Shop	RE-293	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Low Level Lab	RE-257	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Instrument Calibration Facility	RE-286	N	II	N	10^{-3}~10^{2}	Yes/Yes/Yes
Main Control Room Area	RE-275	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
TSC Area	RE-279	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Truck Bay	RE-289	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Waste Drum Storage Area	RE-292	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes
Compound Building Dry Active Waste Storage Area	RE-284	N	III	N	10^{-3}~10^{2}	Yes/Yes/Yes

(1) The column "Tag No." is information only (not part of certified design).

(2) S : Safety Class per ANSI/ANS-51.1; 1=SC-1, 2=SC-2, 3=SC-3, N=NNS
SE : Seismic Category; I, II, III
E : Electrical Class ; A, B, C, D=Class 1E Separation Division, N=Non-Class 1E

Table 2.7.6.5-2

Engineered Safety Features Actuation System Initiation Conditions

Containment Purge Isolation Actuation Signal • High Radiation of the Containment Operation Area Fuel Handling area Emergency Ventilation Actuation Signal • High Radiation of Spent Fuel Pool Area

Table 2.7.6.5-3 (1 of 2)

Area Radiation Monitoring System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the ARMS is as described in the Design Description of Subsection 2.7.6.5.1 and in Table 2.7.6.5-1.	1. Inspection of the as-built ARMS will be conducted.	1. The as-built ARMS conforms with the functional arrangement as described in the Design Description of Subsection 2.7.6.5.1 and in Table 2.7.6.5-1.
2. The ARMS provides operating personnel with an indication and record of radiation levels in the MCR.	2. Inspection of the ARMS components will be performed.	2. It provides operating personnel with an indication and record of radiation levels at selected locations within the various plant buildings to warn of excessive gamma radiation levels in areas where nuclear fuel is stored or handled.
3. The monitors provide local readout and alarm units at the detector locations.	3. Testing of local readout and alarm units at the detectors will be conducted.	3. Local alarms are initiated when the simulated radiation level reaches a preset limit. Both audible and visual alarms are included for each local readout/alarm unit.
4. Separation is provided between Class 1E division, and between Class 1E division and non-Class 1E division.	4. Inspection of the as-built Class 1E divisions will be performed.	4. Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.

Table 2.7.6.5-3 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. The seismic Category I monitors of the ARMS identified in Table 2.7.6.5-1 can withstand seismic design basis loads without loss of safety function.	5.a. Inspections will be performed to verify that the as-built seismic Category I monitor identified in Table 2.7.6.5-1 is located in a seismic Category I structure(s).	5.a. The as-built seismic Category I monitor identified in Table 2.7.6.5-1 is located in a seismic Category I structure(s).
	5.b. Type test, analyses, or a combination of type tests and analyses of seismic Category I monitor identified in Table 2.7.6.5-1 will be performed.	5.b. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.5-1 withstands seismic design basis loads without loss of safety function.
	5.c. Inspections and analyses will be performed to verify the as-built seismic Category I monitor identified in Table 2.7.6.5-1 including anchorages and is seismically bounded by the tested or analyzed conditions.	5.c. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.5-1 including anchorages is seismically bounded by the tested or analyzed conditions.
6. The safety-related divisional cabinet (SRDC) of the ARMS provides an automatic ESF initiation signals, as shown in Table 2.7.6.5-2.	6. A Testing of the as-built SRDC will be performed using simulated test signals.	6. Each as-built ESF initiation signals are sent to ESF-CCS group control cabinet upon detection of high radiation of containment operating area and fuel handling area defined in Table 2.7.6.5-2, if plant's radiation monitors exceed predetermined setpoints for containment purge isolation actuation signal (CPIAS) and fuel handling area emergency ventilation actuation signal (FHEVAS).

2.8 Radiation Protection

2.8.1 Design Description

Radiation protection design features in the APR1400 provide the limitation of radiation exposures to plant personnel and to the public complying with the NRC RG and as low as reasonably achievable (ALARA) principles.

The design commitments for radiation protection are as follows:

1. Shielding design of rooms, corridors, cubicles, labyrinth access, and operating areas commensurate with their access requirement and radiation levels for walls surrounding very high radiation areas and significantly high radiation areas.

2. Ventilation systems for the radiological controlled areas are designed to keep the radiation exposure below the limits specified in 10 CFR 20, Appendix B.

3. Area and airborne radioactivity monitoring systems are located in the plant areas where personnel access can be restricted by the airborne contamination.

4. Radiation shielding design is provided to protect the operators so that they could take actions to mitigate or recover from the design basis accidents.

2.8.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.8-2 provides the inspections, tests, analyses and associated acceptance criteria, which will be undertaken for radiation protection.

Table 2.8-1

Radiation Zone Designations during Normal Operating Conditions Access Acceptance Criteria

Zone Designation	Design Dose Rate (mSv/hr)	Zone Description
1	DR ≤ 0.001	Uncontrolled, Unlimited access
2	0.001 < DR ≤ 0.025	Controlled, Limited access, 40 hr/wk
3	0.025 < DR ≤ 0.05	Controlled, Limited access, 8 to 40 hr/wk
4	0.05 < DR ≤ 0.2	Controlled, Limited access, 2 to 8 hr/wk
5	0.2 < DR ≤ 1	Controlled, Limited access, 20 min/wk to 2 hr/wk
6	1 < DR ≤ 10	Controlled, access only permitted by radiation protection personnel
7	10 < DR ≤ 5,000	Controlled, access only permitted by radiation protection personnel
8	DR > 5,000	Controlled, access only permitted by radiation protection personnel

Table 2.8-2

Radiation Protection ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Shielding design of rooms, corridors, cubicles, labyrinth access, and operating areas commensurate with their access requirement and radiation levels for walls surrounding very high radiation areas and significantly high radiation areas.	1. Inspections and analysis based upon the as-built shielding structure will be conducted to verify the adequacy of the shielding design in plant area.	1. A report exists and concludes that maximum radiation levels are less than or equal to the radiation levels in the radiation zones specified in Table 2.8-1.
2. Ventilation systems for the radiological controlled areas are designed to keep the radioactivity concentration below the limits specified in 10 CFR 20, Appendix B.	2. Analysis will be performed to predict the airborne radioactivity concentrations and to confirm the ventilation design adequacy by considering ventilation flow rates and equipment leakages in the plant areas during normal operations.	2. Analysis exists and concludes that ventilation airflows are from the lower potential airborne contamination area to the higher. The concentrations of airborne radionuclides are in the limit specified in 10 CFR 20, Appendix B.
3. Area and airborne radioactivity monitoring systems are located in the plant areas where personnel access can be restricted by the airborne contamination.	3. Refer to Table 2.7.6.4-3 ITAAC # 1 and Table 2.7.6.5-3 ITAAC # 1.	3. Refer to Table 2.7.6.4-3 ITAAC # 1 and Table 2.7.6.5-3 ITAAC # 1.
4. Radiation shielding design is provided to protect the operators so that they could take actions to mitigate or recover from the design basis accidents.	4. Analysis will be performed to predict maximum radiation exposure to the operators during the design basis accidents.	4. A report exists and concludes that maximum radiation exposure dose to operators is less than the limits specified in GDC 19.

2.9 Human Factors Engineering

2.9.1 Design Description

Human factors engineering (HFE) program ensures that human-system interfaces (HSIs) of the control room (i.e., main control room (MCR), remote shutdown room (RSR), technical support center (TSC), emergency operations facility (EOF), and local control stations (LCSs) associated important human actions [HAs]) reflects state-of-the-art HFE principles and satisfies all specific regulatory requirements. The HFE program includes following activities.

An Implementation Plan is developed for conducting an HFE program element described in HFE Program Plan. After completion of conducting by the individual Implementation Plan, the results are summarized in a Results Summary Report. The HFE program elements for ITAAC are as follows:

1. Task analysis identifies the task requirements for accomplishing the functions allocated to plant personnel.

2. A staffing and qualifications identifies requirements for the number of personnel and their qualifications related with task requirements and regulatory requirements.

3. Treatment of important HAs identifies HAs most important to safety for a particular plant design.

4. HSI design translates functional and task requirement to HSI design requirements and the detailed design of HSI inventories.

5. Human factors verification and validation (HF V&V) determines that the final HFE design conforms to accepted design principles, and enables personnel to successfully and safely perform their task to achieve operational goals.

6. Design implementation verifies that the as-built design conforms to the verified and validated design resulting from the HFE design process.

7. Human performance monitoring develops a human performance monitoring strategy.

2.9.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for HFE program elements are described in the Table 2.9-1.

Table 2.9-1 (1 of 2)

Human Factors Engineering ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. Task analysis identifies the task requirements for accomplishing the functions allocated to plant personnel.	1. An inspection verifies the task analysis is conducted in accordance with the Task Analysis Implementation Plan.	1. A report exists and concludes that task analysis was conducted in accordance with the Task Analysis Implementation Plan.
2. A staffing and qualifications identifies requirements for the number of personnel and their qualifications related with task requirements and regulatory requirements.	2. An inspection verifies the staffing and qualifications are conducted in accordance with the Staffing and Qualifications Implementation Plan.	2. A report exists and concludes that staffing and qualifications were conducted in accordance with the Staffing and Qualifications Implementation Plan.
3. Treatment of important HAs identifies HAs most important to safety for a particular plant design	3. An inspection verifies the analysis of important HAs is conducted in accordance with the Treatment of Important Human Actions Implementation Plan.	3. A report exists and concludes that treatment of important HAs was conducted in accordance with the Treatment of Important Human Actions Implementation Plan.
4. HSI design translates functional and task requirement to HSI design requirements and the detailed design of HSI inventories.	4. An inspection verifies the HSI design is conducted in accordance with the requirements of the HSI Design Implementation Plan.	4. A report exists and concludes that HSI design was conducted in accordance with the HIS Design Implementation Plan.
5. Human factors verification and validation (HF V&V) determines that the final HFE design conforms to accepted design principles, and enables personnel to successfully and safely perform their task to achieve operational goals.	5. An inspection verifies the HF V&V is conducted in accordance with the Human Factors Verification and Validation Implementation Plan.	5. A report exists and concludes that HF V&V was conducted in accordance with the HF V&V Implementation Plan.

Table 2.9-1 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6. Design implementation verifies that the as-built design conforms to the verified and validated design resulting from the HFE design process.	6. An inspection verifies the design implementation is conducted in accordance with the Design Implementation Plan.	6. A report exists and concludes that design implementation was conducted in accordance with the Design Implementation Plan.
7. Human performance monitoring develops a human performance monitoring strategy.	7. An inspection verifies the human performance monitoring is conducted in accordance with the Human Performance Monitoring Implementation Plan.	7. A report exists and concludes that human performance monitoring was developed in conformance with the Human Performance Monitoring Implementation Plan.

2.10 Emergency Planning

2.10.1 Design Description

The technical support center (TSC) provides facilities for management and technical support to plant operations during emergency conditions. The operations support center (OSC) provides an assembly area where operations support personnel can assemble in an emergency. Subsections 2.7.3.1 describe a habitability of the TSC (TSC is included in control room envelope).

1. The TSC has at least 200 m^2 of floor space.

2. The TSC is located adjacent to the MCR in the auxiliary building.

3. The means exists for communications among the MCR, the TSC, the EOF, principal state and local emergency operations centers (EOCs), and radiological field assessment teams.

4. The means exists for communications from the MCR, the TSC, and the EOF to the NRC headquarters and regional office EOCs (including establishment of the emergency response data system (ERDS) between the onsite computer system and the NRC operations center).

5. The OSC is located in compound building, separate from the MCR and the TSC.

6. The OSC has equipment for voice communication with the MCR and the TSC.

2.10.2 Inspection, Test, Analyses, and Acceptance Criteria

Table 2.10-1 specifies the inspections, tests, analyses, and associated acceptance criteria for emergency planning.

Table 2.10-1

Emergency Planning ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The TSC has at least at least 200m^2 of floor space.	1. Inspection and analysis of the TSC will be performed.	1. A report exists and concludes that TSC has at least 200m^2 of floor space.
2. The TSC is located adjacent to the MCR in the auxiliary building.	2. Inspection and analysis of the TSC will be performed.	2. The TSC is close to the MCR, and the walking distance from the TSC to the MCR does not exceed two minutes.
3. The means exists for communications among the MCR, the TSC, the EOF, principal state and local emergency operations centers (EOCs), and radiological field assessment teams.	3. A test of the communication systems will be performed.	3. Communications are established among the MCR, the TSC, the EOF, principal State and local EOCs, and radiological field assessment teams.
4. The means exists for communications from the MCR, the TSC, and the EOF to the NRC headquarters and regional office EOCs (including establishment of the Emergency Response Data System (ERDS between the onsite computer system and the NRC Operations Center.)	4. A test of the communication systems will be performed.	4. Communications are established from the MCR, the TSC and the EOF to the NRC headquarters and regional office EOCs, and an access port for ERDS is provided.
5. The OSC is located in compound building, separate from the MCR and the TSC.	5. Inspection of the location of the OSC will be performed.	5. The OSC is located in compound building, separate from the MCR and the TSC.
6. The OSC has equipment for voice communication with the MCR and the TSC.	6. An inspection of the OSC will be performed, including a test of the equipment for voice communication.	6. The OSC communications equipment is installed, and voice transmission and reception are accomplished.

2.11 Containment System

2.11.1 Containment Structure

2.11.1.1 Design Description

The geometric shape of the prestressed concrete containment structure is a vertically oriented cylinder topped by a hemispherical dome with no ring girder at the dome/cylinder interface.

The containment consists of a prestressed concrete shell containing unbonded tendons and reinforcement steel. Prestressing is obtained through post-tensioning – a method of prestressing in which tendons are tensioned after concrete has hardened. Reinforcing steel is provided overall in the cylinder and dome. Additional reinforcement is provided at discontinuities, such as the cylinder-basemat interface, around penetrations and openings, at buttresses, and at other areas.

The concrete shell inner surface is lined with a minimum 1/4-in. carbon steel plate that is anchored to the concrete shell and dome to provide the required pressure boundary leak tightness. The liner plate system is not designed or considered as a structural member in providing for the overall containment load resistance. The liner plate system is attached to the containment shell with an anchorage system.

The containment is designed to accommodate conditions during and following postulated accidents.

1. The reactor cavity floor area allows for the spreading of core debris, enhancing its coolability.

2. The reactor cavity has the core debris chamber to retain core debris.

3. Fill concrete slab of reactor cavity floor concrete is provided to protect against challenge to containment liner plate melt through.

4. The containment retains structural integrity at the design pressures of 4.22 kg/cm^2G (60 psig).

2.11.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the containment structure are specified in Table 2.11.1-2.

Table 2.11.1-1

Containment Design and Parameters Performance Characteristics

Design Parameter	Design value
Internal design pressure, kg/cm^2G (psig)	4.22 (60)
Containment design temperature, °C (°F)	143.3 (290.0)
Containment minimum design pressure containment maximum external design pressure, kg/cm^2G (psig)	-0.28 (-4.0)
Containment Net free volume, m^3 (ft^3)	8.8576×10^4 (3.128×10^6)
Design leak rate, First 24 hours (% free volume/day)	0.1
Design leak rate, After 1 day (% free volume/day)	0.05

Table 2.11.1-2

Containment Structure ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The reactor cavity floor area allows for spreading of core debris, enhancing its coolability.	1. Inspections of the as-built the reactor cavity will be performed.	1. A report exists and concludes that the large reactor cavity area exists in the as-built reactor cavity.
2. The reactor cavity has the core debris chamber to retain core debris.	2. Inspections of the as-built reactor cavity will be performed.	2. A report exists and concludes that the core reactor cavity includes a core debris trap.
3. Fill concrete slab of reactor cavity floor concrete is provided to protect against challenge to containment liner plate melt through.	3. Inspections of the as-built reactor cavity will be performed.	3. A report exists and concludes that the core debris chamber exists in the as-built reactor cavity.
4. The containment retains structural integrity at the design pressures of 4.22 kg/cm^2G (60 psig).	4. Containment pressure and temperature response analyses to LOCA and MSLB accidents are performed to ensure the containment integrity.	4. The peak calculated containment pressure following all of the LOCAs and secondary system piping ruptures should be less that the containment design pressure.

2.11.2 Containment Spray System

2.11.2.1 Design Description

The containment spray system (CSS) is a safety-related system. It removes heat and reduces the concentration of radionuclides released from the containment atmosphere and transfers the heat to the component cooling water system following events which increase containment temperature and pressure. The CSS can also remove heat from the in-containment refueling water storage tank (IRWST).

The CSS is located in the auxiliary building and the containment.

1. The functional arrangement of the CSS is as described in the Design Description of Subsection 2.11.2.1 and in Table 2.11.2-1 and as shown in Figure 2.11.2-1.

2.a The ASME Code components identified in Table 2.11.2-2 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.11.2-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.11.2-2 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.11.2-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.11.2-2 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.11.2-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports identified in Table 2.11.2-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7.a MOVs and check valves identified in Table 2.11.2-2 perform an active safety function to change position as indicated in the table.

7.b After loss of motive power, MOVs identified in Table 2.11.2-2 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to start and stop the CSS pumps, and to open and close MOVs identified in Table 2.11.2-2.

8.b All controls required by the design exist in the RSR to start and stop the CSS pumps, and to open and close MOVs identified in Table 2.11.2-2.

8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.11.2-2 and 2.11.2-3.

8.d All displays and alarms required by the design exist in the RSR as defined in Tables 2.11.2-2 and 2.11.2-3.

9. Two mechanical divisions of the CSS (A & B) are physically separated.

10. The CSS pumps have sufficient net positive suction head (NPSH).

11. The CSS pumps are tested at full flow during power operation.

12. CS system provides containment spray flow to the containment during post-LOCA operation.

13. CS heat exchanger provides cooling capacity of the post-LOCA fluid for a minimum of 30 days.

2.11.2.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the CSS are specified in Table 2.11.2-4.

The ITAAC related to the CIVs and the piping between the CIVs of the CSS are described in Table 2.11.3-2.

Table 2.11.2-1

Containment Spray System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
All CS pumps, CS heat exchangers, CS pump miniflow heat exchangers, CSS piping and valves including the valves interfacing with a lower classification piping outside containment	Auxiliary Building	2	I
Containment Spray Nozzles	Containment	2	I

Table 2.11.2-2 (1 of 2)

Containment Spray System Components List

Component Name	Item No. [(1)]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Containment Spray Pump 1, 2	CS - PP01A, PP01B	2	I	Yes/Yes	Yes/Yes	Yes/Yes	SIAS/ CSAS	Running	-
Containment Spray Heat Exchanger	CS - HE01A, HE01B	2	I	-	-	-	-	-	-
Containment Spray Miniflow Heat Exchanger	CS - HE02A, HE02B	2	I	-	-/-	-/-	-	-	-
Containment Spray Nozzles	-	2	I	-	-/-	-/-	-	-	-
Containment Spray Header Block Valve (MOV)	CS -V001, V002	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Transfer Closed/ Transfer Open	As-Is
Containment Spray Header Isolation Valve (MOV)	CS -V003, V004	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Transfer Open/ Transfer Closed	As-Is
Containment Spray Header Check Valve	CS -V1007, V1008	2	I	-	-/-	-/-	-	Transfer Open/ Transfer Closed	-
CSP Discharge Check Valve	CS - V1001, V1002	2	I	-	-/-	-/-	-	Transfer Open	-

Table 2.11.2-2 (2 of 2)

Component Name	Item No. [1]	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
CS IRWST Return Line Flow Control Valve (MOV)	CS - V005, V006	2	I	Yes/Yes	Yes/Yes	Yes/Yes	No	Transfer Open/ Transfer Closed	As-Is
CS IRWST Return Line Isolation Valve (MOV)	CS - V007, V008	2	I	Yes/Yes	Yes/Yes	Yes Yes	-	Transfer Open/ Transfer Closed	As-Is
ECSBS Spray Header Isolation Valve (Manual)	CS - V1013	2	I	-/-	-/-	-/-	-	-	-
ECSBS Spray Header Check Valve	CS -V1014	2	I	-/Yes	-/-	-/-	-	Transfer Closed	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.11.2-3

Containment Spray System Instruments List

Instrument Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Pump Flow	F-338,348	Auxiliary Building	-	I	Yes/Yes	Yes/No	Yes/No
CS Heat Exchanger Outlet Temperature	T-071, 072	Auxiliary Building	-	I	Yes/Yes	Yes/No	Yes/No
IRWST Return Line Flow Control Valve Position	CS-V005,006	Auxiliary Building	-	I	Yes/Yes	Yes/No	Yes/No
CS Pump Suction Pressure	P-051, 061	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
CS Pump Discharge Pressure	P-071, 081	Auxiliary Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
Containment Pressure	P-352A, 352B 352C, 352D	Containment Building	-	I	Yes/Yes	Yes/Yes	Yes/No

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.11.2-4 (1 of 6)

Containment Spray System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CSS is as described in the Design Description of Subsection 2.11.2.1 and in Table 2.11.2-1 and as shown in Figure 2.11.2-1.	1. Inspection of the as-built CSS system will be conducted.	1. The as-built CSS conforms with the functional arrangement as described in the Design Description of Subsection 2.11.2.1 and in Table 2.11.2-1 and as shown in Figure 2.11.2-1.
2.a The ASME Code components identified in Table 2.11.2-2 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design report(s) or data report(s).	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.11.2-2 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.11.2-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping including supports identified in Table 2.11.2-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.11.2-2 meet ASME Section III requirements.	3.a Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in components identified in Table 2.11.2-2.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.11.2-1 meet ASME Section III requirements.	3.b Inspections of the as-built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping identified in Table 2.11.2-1.

Table 2.11.2-4 (2 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.11.2-2 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.11.2-2 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.11.2-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the results of the hydrostatic test of the as-built piping identified in Table 2.11.2-1 conform with ASME Section III requirements.
5.a The seismic Category I components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components and instruments are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 are located in a seismic Category I structure.
	5.a.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components and instruments will be performed.	5.a.ii A report exists and concludes that the seismic Category I components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 can withstand seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components and instruments including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 including anchorages are seismically bounded by the tested or analyzed conditions.

Table 2.11.2-4 (3 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports identified in Table 2.11.2-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic category I structure.	5.b.i The as-built seismic Category I piping including supports identified in Table 2.11.2-1 is located in the seismic Category I structure.
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping including supports identified in Table 2.11.2-1 can withstand seismic design basis loads without loss of safety function.
6.a The Class 1E components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.	6.a.i A report exists and concludes that the Class 1E components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Table 2.11.2-2 and 2.11.2-3 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.

Table 2.11.2-4 (4 of 6)

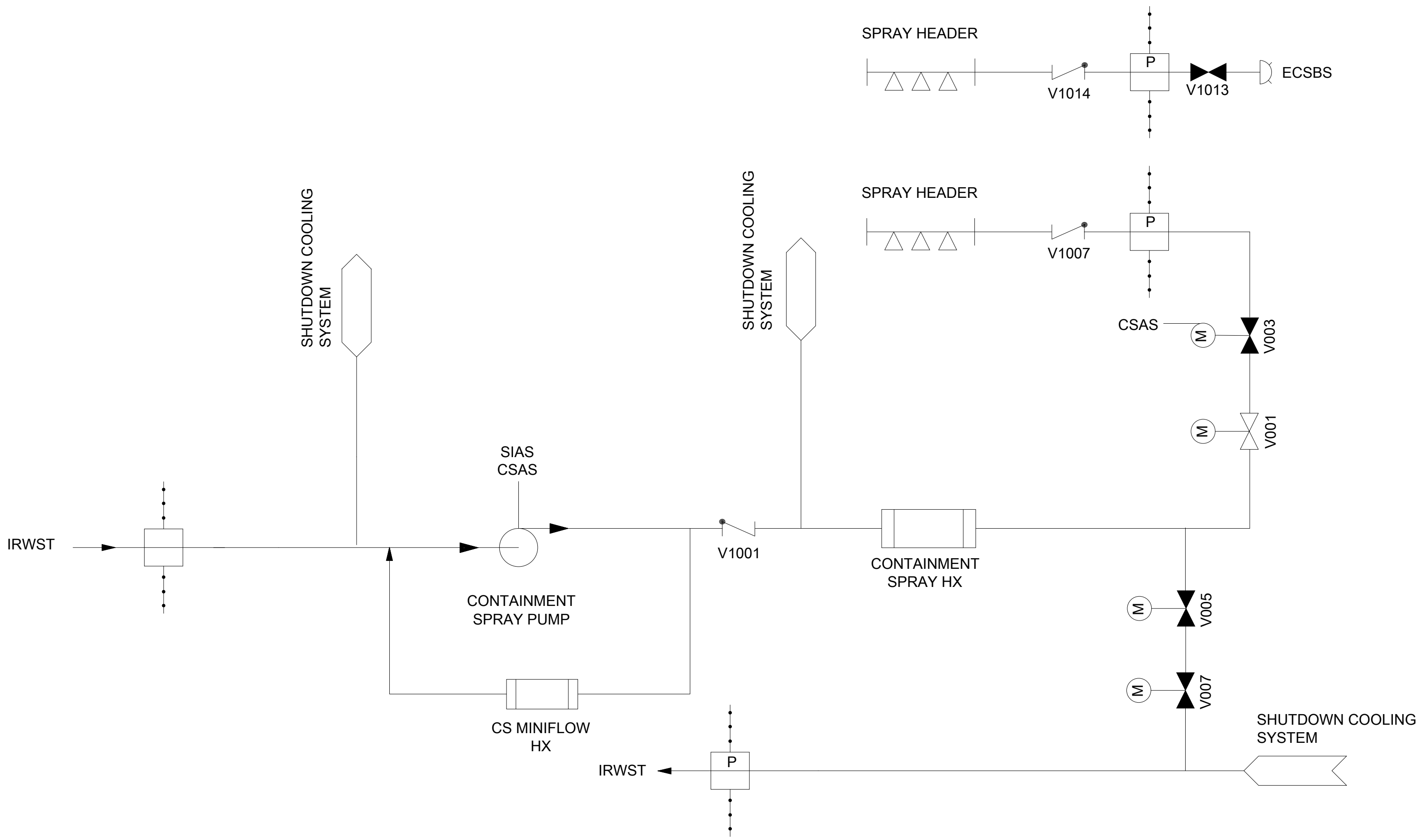
Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components and instruments identified in Tables 2.11.2-2 and 2.11.2-3 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal in only one Class 1E division at a time.	6.b The test signal exists at the Class 1E components and instruments identified in Table 2.11.2-2and 2.11.2-3 powered from the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs and check valves identified in Table 2.11.2-2 perform an active safety function to change position as indicated in the table.	7.a.i Tests or type tests of MOVs will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV changes position as indicated in Table 2.11.2-2 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV changes position as indicated in Table 2.11.2-2 under pre-operational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.11.2-2 under pre-operational test conditions.
7.b After loss of motive power, MOVs identified in Table 2.11.2-2 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV operated valve identified in Table 2.11.2-2 assumes the indicated loss of motive power position.

Table 2.11.2-4 (5 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a All controls required by the design exist in the MCR to start and stop the CSS pumps, and to open and close MOVs identified in Table 2.11.2-2.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR start and stop the CSS pumps, and open and close MOVs identified in Table 2.11.2-2.
8.b All controls required by the design exist in the RSR to start and stop the CSS pumps, and to open and close MOVs identified listed in Table 2.11.2-2.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR start and stop the CSS pumps, open and close MOVs identified in Table 2.11.2-2.
8.c All displays and alarms required by the design exist in the MCR as defined in Tables 2.11.2-2 and 2.11.2-3.	8.c Inspections will be performed on the displays and alarms in the MCR.	8.c All displays and alarms exist and can be retrieved in the as-built MCR as defined in Tables 2.11.2-2 and 2.11.2-3.
8.d Displays and alarms required by the design exist in the RSR as defined in Tables 2.11.2-2 and 2.11.2-3.	8.d Inspections will be performed on the displays and alarms in the RSR.	8.d All displays and alarms exist and can be retrieved in the as-built RSR as defined in Tables 2.11.2-2 and 2.11.2-3.
9. Two mechanical divisions of the CSS (A & B) are physically separated.	9. Inspection of the as-built mechanical divisions will be performed.	9. Two mechanical divisions of the CSS are physically separated by a divisional wall or a fire barriers.
10. The CSS pumps have sufficient net positive suction head (NPSH).	10. Test to measure the as-built CSS pump suction pressure will be performed. Inspection and analyses to determine NPSH available to each pump will be performed based on test data and as-built data.	10. A report exists and concludes that the as-built calculated NPSH available exceeds each CSS pump's NPSH required.

Table 2.11.2-4 (6 of 6)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
11. The CSS pumps are tested at full flow during power operation.	11. The as-built CS pump full flow tests will be performed. Analysis will be performed to convert the test results from the test conditions to the design basis condition.	11. A report exists and concludes that the CSS pump has a flow capacity of minimum 5,000 gpm each through the test loop.
12. CS system provides containment spray flow to the containment during post-LOCA operation.	12. An analysis of plugging and wear of valves and orifices will be performed.	12. A report concludes that pressure drop/overall system resistance across CS system is consistent with safety analysis results for 30 days of post-LOCA operation. A report concludes that wear rates are acceptable for 30 days of post-LOCA operation based on provided equipment specification. A report concludes that post-LOCA debris will not clog the CS system instrument lines.
13. CS heat exchangers provide cooling capacity of the post-LOCA fluid for a minimum of 30 days.	13. Type tests, analyses, or a combination of type tests and analyses for heat exchanger performance will be performed to demonstrate that the CS heat exchangers provide cooling capacity of the post-LOCA fluid for a minimum of 30 days.	13. A report concludes that debris plugging and settlement in the CS heat exchanger tubes will not occur, and/or affect the performance of the CS heat exchangers for the 30-day mission time. A report concludes that failure due to abrasive wear will not degrade the performance of the CS heat exchangers below the 30-day acceptance criteria.



Note : Division I is shown for the representative configuration.

Figure 2.11.2-1 Containment Spray System

2.11.3 Containment Isolation System

2.11.3.1 Design Description

The containment isolation system (CIS) provides a safety-related means to close valves in fluid system piping that passes through containment penetrations. The CIS provides a pressure barrier at each of these containment penetrations.

The CIS has the following safety-related functions:

- Provide automatic and leak-tight closure of those valves required to close for containment integrity following a design basis event to minimize release of any radioactive material.
- Provide a double barrier at the containment penetration in those fluid systems that are not required to function following a design basis event.

To meet above functional requirements, the CIS is designed as follows:

1. The functional arrangement of the CIS is as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1 and as shown in Figure 2.11.3-1.

2.a The ASME Code components identified in Table 2.11.3-1 are designed and constructed in accordance with ASME Section III requirements.

2.b The ASME Code piping including supports identified in Table 2.11.3-1 is designed and constructed in accordance with ASME Section III requirements.

3.a Pressure boundary welds in ASME Code components identified in Table 2.11.3-1 meet ASME Section III requirements.

3.b Pressure boundary welds in ASME Code piping identified in Table 2.11.3-1 meet ASME Section III requirements.

4.a The ASME Code components identified in Table 2.11.3-1 retain their pressure boundary integrity at their design pressure.

4.b The ASME Code piping identified in Table 2.11.3-1 retains its pressure boundary integrity at its design pressure.

5.a The seismic Category I components identified in Table 2.11.3-1 can withstand seismic design basis loads without loss of safety function.

5.b The seismic Category I piping including supports in Table 2.11.3-1 can withstand seismic design basis loads without loss of safety function.

6.a The Class 1E components identified in Table 2.11.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

6.b Each of the Class 1E components identified in Table 2.11.3-1 is powered from its respective Class 1E division.

6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.

7. MOVs, AOVs, SOVs, E/H Valves, and check valves identified in Table 2.11.3-1 perform an active safety function to change assume position as indicated in the table.

7.b After loss of motive power, MOVs, AOVs, SOVs, and E/H Valves identified in Table 2.11.3-1 assume the indicated loss of motive power position.

8.a All controls required by the design exist in the MCR to open and close MOVs, AOVs, SOVs, and E/H Valves identified in Table 2.11.3-1.

8.b All controls required by the design exist in the RSR to open and close MOVs, AOVs, SOVs, and E/H Valves identified in Table 2.11.3-1.

8.c All displays required by the design exist in the MCR as defined in Table 2.11.3-1.

8.d All displays required by the design exist in the RSR as defined in Table 2.11.3-1.

9. CIV closure times are selected to limit potential releases of radioactivity as low as reasonably achievable.

10. The CIS provides a safety-related function of containment isolation to prevent or limit the release of fission products to the environment.

2.11.3.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspection, tests, analyses, and associated acceptance criteria for the CIAS are specified in Table 2.11.3-2.

Table 2.11.3-1 (1 of 23)

Containment Isolation System Components List

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
Auxiliary Feedwater System												
AFW-V0043	MOV	4	14	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	DPS-AFAS1 DMA-AFAS1 ESF-AFAS1	Close	As-is
AFW-V0044	MOV	4	14	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	DPS-AFAS2 DMA-AFAS2 ESF-AFAS2	Close	As-is
AFW-V0045	MOV	4	14	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	DPS-AFAS1 DMA-AFAS1 ESF-AFAS1	Close	As-is
AFW-V0046	MOV	4	14	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	DPS-AFAS2 DMA-AFAS2 ESF-AFAS2	Close	As-is

Table 2.11.3-1 (2 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
AFW-V1007A	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
AFW-V1007B	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
AFW-V1008A	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
AFW-V1008B	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
Auxiliary Steam System												
AS-V1016	Manual	21	-	Outside	2	I	No/No	No/No	No/No	-	Close	-
AS-V1017	Manual	21	-	Inside	2	I	No/No	No/No	No/No	-	Close	-
Condenser Vacuum System												
CA-V0013	MOV	4	30	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CA-V1023	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
Component Cooling Water System												
CC-V231	MOV	5	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CCWSTLLAS	Normal Open/Close	As-is
CC-V1099	Check	5	-	Inside	2	I	-/Yes	No/No	No/No	-	Normal Open/Close	-
CC-V0249	MOV	16	50	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CCWSTLLAS	Normal Open/Close	As-is

Table 2.11.3-1 (3 of 23)

Item No.(1)	Valve Type	Arrangement No.(3)	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal (4)	Active Safety Function	Loss of Motive Power Position
CC-V0250	MOV	16	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CCWSTLLAS	Normal Open/Close	As-is
CC-V1100	Check	16	-	Inside	2	I	-/ Yes	No/No	No/No	-	Close	-
CC-V0296	MOV	19	40	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CC-V297	MOV	19	40	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CC-V1685	Check	19	-	Inside	2	I	-/ Yes	No/No	No/No	-	Close	-
CC-V301	MOV	16	40	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CC-V302	MOV	16	40	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CC-V1686	Check	16	-	Inside	2	I	-/ Yes	No/No	No/No	-	Close	-
Containment Monitoring System												
CM-V001	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V002	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V003	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V004	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close

Table 2.11.3-1 (4 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
CM-V009	SOV	25	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V010	SOV	25	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V011	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V012	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V013	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V014	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V023	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V024	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CM-V1013	Check	25	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CM-V1014	Check	25	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CM-V17	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
CM-V18	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
CM-V19	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open

Table 2.11.3-1 (5 of 23)

Item No.(1)	Valve Type	Arrangement No.(3)	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal (4)	Active Safety Function	Loss of Motive Power Position
CM-V20	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
CM-V21	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
CM-V22	SOV	13	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Open
Containment Spray System												
CS-V003	MOV	4	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Normal Open/Close	As-is
CS-V004	MOV	4	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Normal Open/Close	As-is
CS-V1007	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Normal Open/Close	-
CS-V1008	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Normal Open/Close	-
CS-V1013	Manual	9	-	Outside	2	I	-/-	No/No	No/No	-	Normal Open/Close	-
CS-V1014	Check	9	-	Inside	2	I	-/-	No/No	No/No	-	Normal Open/Close	-

Table 2.11.3-1 (6 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
Chemical and Volume Control System												
CV-V189	Check	4	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CV-V255	MOV	5	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	As-is
CV-V362	Manual	9	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
CV-V363	Check	9	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CV-V494	Check	6	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CV-V505	AOV	14	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Close	Close
CV-V506	AOV	14	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CSAS	Close	Close
CV-V509	MOV	4	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
CV-V522	AOV	14	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CV-V523	AOV	14	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CV-V524	MOV	5	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	As-is

Table 2.11.3-1 (7 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
CV-V560	AOV	17	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CV-V561	AOV	17	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CV-V580	AOV	6	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
CV-V747	Check	5	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
CV-V835	Check	5	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
Radioactive Drain System												
DE-V0005	MOV	27	20	Inside	2	I	Yes/ Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
DE-V0006	AOV	27	20	Outside	2	I	Yes/ Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
Spent Fuel Pool Cooling and Cleanup System												
FC-V1142	Manual	21	-	Inside	2	I	-/-	No/No	No/No	-	Close	-
FC-V1143	Manual	21	-	Outside	2	I	-/-	No/No	No/No	-	Close	-
FC-V1144	Manual	9	-	Outside	2	I	-/-	No/No	No/No	-	Close	-
FC-V1145	Check	9	-	Inside	2	I	-/-	No/No	No/No	-	Close	-

Table 2.11.3-1 (8 of 23)

Item No.[1]	Valve Type	Arrange ment No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
Fire Protection System												
FP-V0030	AOV	6	30	Outside	2	I	Yes/ Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
FP-V1440	Check	6	-	Inside	2	I	No/ Yes	No/No	No/No	-	Close	-
Feedwater System												
FW-V121	E/H	34	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V122	E/H	34	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V123	E/H	34	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V124	E/H	34	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V131	E/H	10	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V132	E/H	10	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V133	E/H	10	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V134	E/H	10	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V138	SOV	10	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V139	SOV	10	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close

Table 2.11.3-1 (9 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
Gaseous Radwaste System												
GW-V0001	MOV	30	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
GW-V0002	SOV	30	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
Instrument Air System												
IA-V020	AOV	28	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
IA-V1601	Check	28	-	Inside	2	I	No/Yes	No/No	No/No	-	Close	-
In-Containment Water Storage System												
IW-V005	MOV	31	20	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
IW-V006	MOV	31	20	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
IW-V010	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V011	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V012	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V013	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V014	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open

Table 2.11.3-1 (10 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
IW-V015	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V016	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V017	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V018	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V019	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V020	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V021	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open/Close	Open
IW-V022	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V023	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V024	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V025	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V026	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V027	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open

Table 2.11.3-1 (11 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
IW-V028	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V029	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V030	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V031	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V032	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V033	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V034	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
IW-V035	SOV	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Open	Open
Main Steam System												
MS-V0109	AOV	1	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	ESF-AFAS-2 DPS-AFAS-2	Normal Close / Open	Open
MS-V0110	AOV	1	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	ESF-AFAS-1 DPS-AFAS-1	Normal Close / Open	Open
MS-V0111	AOV	1	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open	Open

Table 2.11.3-1 (12 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
MS-V0112	AOV	1	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Open	Open
MS-V1030	Manual	3	-	Outside	2	I	Yes/Yes	No/No	No/No	-	-	-
MS-V1257	Manual	1	-	Outside	2	I	Yes/Yes	No/No	No/No	-	-	-
MS-V1073	Manual	1	-	Outside	2	I	Yes/Yes	No/No	No/No	-	-	-
MS-V1051	Manual	3	-	Outside	2	I	Yes/Yes	No/No	No/No	-	-	-
MS-V011	E/H	1	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS DMA-MSIS	Close	Close
MS-V012	E/H	3	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS DMA-MSIS	Close	Close
MS-V013	E/H	3	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS DMA-MSIS	Close	Close
MS-V014	E/H	1	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS DMA-MSIS	Close	Close
MS-V015	E/H	1	10	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V016	E/H	3	10	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V017	E/H	3	10	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V018	E/H	1	10	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close

Table 2.11.3-1 (13 of 23)

Item No.[1]	Valve Type	Arrange ment No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
MS-V090	AOV	1	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V091	AOV	3	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V092	AOV	3	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V093	AOV	1	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
MS-V101	E/H	3	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Close
MS-V102	E/H	1	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Close
MS-V103	E/H	1	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Close
MS-V104	E/H	3	-	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Close	Close
MS-V1301	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1302	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1303	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1304	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1305	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-

Table 2.11.3-1 (14 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
MS-V1306	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1307	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1308	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	Close
MS-V1309	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	Close
MS-V1310	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1311	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1312	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1313	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1314	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1315	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1316	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1317	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1318	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-

Table 2.11.3-1 (15 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
MS-V1319	Safety V/V	3	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
MS-V1320	Safety V/V	1	-	Outside	2	I	-/Yes	No/No	No/No	-	Close	-
Nitrogen System												
NT-V0004	SOV	28	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
NT-V1016	Check	28	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
Process Sampling System												
PR-V1433	Check	5	-	Inside	2	I	-/Yes	No/No	No/No	-	-	-
PR-V431	MOV	24	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
PR-V432	MOV	24	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
PR-V434	MOV	5	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
Radiation Monitoring System												
PS-V0031	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0032	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0033	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close

Table 2.11.3-1 (16 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
PS-V0034	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0035	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0036	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0257	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0258	SOV	26	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
Primary Sampling System												
PX-V0001	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0002	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0003	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0004	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0005	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0006	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0020	SOV	20	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close

Table 2.11.3-1 (17 of 23)

Item No.(1)	Valve Type	Arrangement No.(3)	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal (4)	Active Safety Function	Loss of Motive Power Position
PX-V0021	SOV	20	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V0041	SOV	22	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
PX-V0042	MOV	22	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
PX-V0043	MOV	4	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
PX-V1020	Check	4	-	Inside	2	I	Yes/Yes	No/No	No/No	-	Close	-
PX-V0053	SOV	25	15	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS	Close	Close
PX-V1005	Check	25	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-
Service Air System												
SA-V001	AOV	6	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
SA-V1401	Check	6	-	Inside	2	I	No/Yes	No/No	No/No	-	Close	Close
Steam Generator Blowdown System												
SD-V0005	AOV	29	40	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	MSIS/CIAS/ DPS-AFAS /AFAS	Close	Close
SD-V0006	AOV	29	40	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	MSIS/CIAS/ DPS-AFAS /AFAS	Close	Close

Table 2.11.3-1 (18 of 23)

Item No.[(1)]	Valve Type	Arrangement No.[(3)]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [(4)]	Active Safety Function	Loss of Motive Power Position
SD-V0007	MOV	29	40	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	MSIS/CIAS/ DPS-AFAS /AFAS	Close	Close
SD-V0008	MOV	29	40	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	MSIS/CIAS/ DPS-AFAS /AFAS	Close	Close
SD-V1113	Manual	9	-	Outside	2	I	No/No	No/No	No/No	-	Close	-
SD-V1114	Manual	9	-	Inside	2	I	No/No	No/No	No/No	-	Close	-
SD-V1115	Check	9	-	Outside	2	I	No/Yes	No/No	No/No	-	Close	-
SD-V1116	Check	9	-	Inside	2	I	No/Yes	No/No	No/No		Close	-
Safety Injection System/Shutdown Cooling System												
SI-V100	Check	10	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V101	Check	10	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V113	Check	4	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V123	Check	12	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V133	Check	4	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-

Table 2.11.3-1 (19 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
SI-V143	Check	12	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V179	Relief	7	-	Inside	2	I	No/Yes	No/No	No/No	RV Setpoint	Close	-
SI-V189	Relief	7	-	Inside	2	I	No/Yes	No/No	No/No	RV Setpoint	Close	-
SI-V293	Manual	2	-	Outside	2	I	No/No	No/No	No/No	-	Close	-
SI-V300	MOV	12	50	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Close	As-is
SI-V301	MOV	12	50	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Close	As-is
SI-V302	MOV	12	20	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/ Close	As-is
SI-V303	MOV	12	20	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/ Close	As-is
SI-V304	MOV	15	60	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/Close	As-is
SI-V305	MOV	15	60	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/Close	As-is
SI-V308	MOV	15	60	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/Close	As-is
SI-V309	MOV	15	60	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Open/Close	As-is

Table 2.11.3-1 (20 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
SI-V321	MOV	18	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/Open	As-is
SI-V331	MOV	18	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/Open	As-is
SI-V474	Relief	11	-	Inside	2	I	No/Yes	No/No	No/No	RV Setpoint	Close	-
SI-V523	Check	18	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V533	Check	18	-	Inside	2	I	No/Yes	No/No	No/No	-	Normal Close/Open	-
SI-V600	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/ Open	As-is
SI-V601	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/ Open	As-is
SI-V602	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/Open	As-is
SI-V603	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/Open	As-is
SI-V616	MOV	18	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, DPS-SIAS	Normal Close/Open	As-is
SI-V626	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, DPS-SIAS	Normal Close/Open	As-is
SI-V636	MOV	18	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, DPS-SIAS	Normal Close/Open	As-is

Table 2.11.3-1 (21 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
SI-V646	MOV	8	10	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	SIAS, DPS-SIAS	Normal Close/Open	As-is
SI-V653	MOV	7	160	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Close/ Open e	As-is
SI-V654	MOV	7	160	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	-	Normal Close/ Open	As-is
SI-V655	MOV	7	80	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/ Open	As-is
SI-V656	MOV	7	80	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	-	Normal Close/ Open	As-is
SI-V682	AOV	11	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	SIAS, DPS-SIAS	Close	Close
Reactor Containment Building Purge System												
VQ-V0011	E/H	23	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0012	MOV	23	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	As-is
VQ-V0013	MOV	23	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	As-is
VQ-V0014	E/H	23	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close

Table 2.11.3-1 (22 of 23)

Item No.[1]	Valve Type	Arrangement No.[3]	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal [4]	Active Safety Function	Loss of Motive Power Position
VQ-V0031	AOV	2	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0032	AOV	2	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0033	AOV	17	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0034	AOV	17	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
Plant Chilled Water System												
WI-V0012	AOV	33	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
WI-V0013	AOV	28	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
WI-V0014	Relief	33	-	Inside	2	I	-/Yes	No/No	No/No	-	-	-
WI-V0015	MOV	33	50	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
WI-V1043	Check	28	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-

Table 2.11.3-1 (23 of 23)

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

(3) Valve arrangements are shown in Figure 2.11.3-1.

(4) Definition of actuation signals.

AFAS - Auxiliary Feedwater Actuation Signal

CIAS - Containment Isolation Actuation Signal

CPIAS - Containment Purge Isolation Actuation Signal

CSAS - Containment Spray Actuation Signal

SIAS - Safety Injection Actuation Signal

MSIS - Main Steam Isolation Signal

All above signals are engineered safety feature (ESF) signal and classified as ESF valves.

Table 2.11.3-2 (1 of 5)

Containment Isolation System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CIS is as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1 and as shown in Figure 2.11.3-1.	1. Inspection of the as-built system will be conducted.	1. The as-built CIS conforms with the functional arrangement as described in the Design Description of Subsection 2.11.3.1 and in Table 2.11.3-1 and as shown in Figure 2.11.3-1.
2.a The ASME Code components identified in Table 2.11.3-1 are designed and constructed in accordance with ASME Section III requirements.	2.a Inspection of the as-built components will be performed as documented in the ASME design reports.	2.a The ASME Section III design report(s) or data report(s) exist and conclude that the as-built components identified in Table 2.11.3-1 are designed and constructed in accordance with ASME Section III requirements.
2.b The ASME Code piping including supports identified in Table 2.11.3-1 is designed and constructed in accordance with ASME Section III requirements.	2.b Inspection of the as-built piping including supports will be performed as documented in the ASME design reports. [DAC]	2.b The ASME Section III design report(s) or data report(s) exist and conclude that the as-built piping, including supports identified in Table 2.11.3-1 is designed and constructed in accordance with ASME Section III requirements.
3.a Pressure boundary welds in ASME Code components identified in Table 2.11.3-1 meet ASME Section III requirements.	3.a Inspections of the as- built pressure boundary welds will be performed in accordance with the ASME Section III.	3.a A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds components in Table 2.11.3-1.
3.b Pressure boundary welds in ASME Code piping identified in Table 2.11.3-1 meet ASME Section III requirements.	3.b Inspections of the as- built pressure boundary welds will be performed in accordance with the ASME Section III.	3.b A report exists and concludes that the ASME Section III requirements are met for non-destructive examination of the as-built pressure boundary welds in piping in Table 2.11.3-1.

Table 2.11.3-2 (2 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4.a The ASME Code components identified in Table 2.11.3-1 retain their pressure boundary integrity at their design pressure.	4.a A hydrostatic test will be conducted on the as-built components required to be hydrostatically tested by the ASME Section III.	4.a A report exists and concludes that the results of the hydrostatic test of the as-built components identified in Table 2.11.3-1 conform with ASME Section III requirements.
4.b The ASME Code piping identified in Table 2.11.3-1 retains its pressure boundary integrity at its design pressure.	4.b A hydrostatic test will be conducted on the as-built piping required to be hydrostatically tested by the ASME Section III.	4.b A report exists and concludes that the he results of the hydrostatic test of the as- built piping identified in Table 2.11.3-1 conform with ASME Section III requirements.
5.a The seismic Category I components identified in Table 2.11.3-1 can withstand seismic design basis loads without loss of safety function.	5.a.i Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	5.a.i The as-built seismic Category I components identified in Table 2.11.3-1 are located in a seismic Category I structure.
	5.a.ii Type tests, analyses, or a combination of type tests and analyses of seismic Category I components will be performed.	5.a.ii A report exists and concludes that the seismic Category I components identified in Table 2.11.3-1 can withstand Seismic design basis loads without loss of safety function.
	5.a.iii Inspections will be performed to verify that the as-built seismic Category I components including anchorages are seismically bounded by the tested or analyzed conditions.	5.a.iii A report exists and concludes that the as-built seismic Category I components identified in Table 2.11.3-1 including anchorage are seismically bounded by the tested or analyzed conditions.

Table 2.11.3-2 (3 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5.b The seismic Category I piping including supports in Table 2.11.3-1 can withstand seismic design basis loads without loss of safety function.	5.b.i Inspections will be performed to verify that the as-built seismic Category I piping including supports is located in the seismic Category I structure.	5.b.i The as-built seismic Category I piping, including supports, identified in Table 2.11.3-1, is located in the seismic Category I structure.
	5.b.ii Inspections and analyses of the as-built seismic Category I piping including supports will be performed.	5.b.ii A report exists and concludes that the as-built seismic Category I piping, including supports identified in Table 2.11.3-1 can withstand seismic design basis loads without a loss of safety function.
6.a The Class 1E components identified in Table 2.11.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during and following a design basis accident without loss of safety function for the time required to perform the safety function.	6.a.i Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components located in a harsh environment.	6.a.i The report exists and concludes that the Class 1E components identified in Table 2.11.3-1 as being qualified for a harsh environment can withstand the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.
	6.a.ii Inspections will be performed on the as-built Class 1E components and the associated wiring, cables, and terminations located in a harsh environment.	6.a.ii A report exists and concludes that the as-built Class 1E components and the associated wiring, cables, and terminations identified in Table 2.11.3-1 as being qualified for a harsh environment are bounded by type tests ,analyses, or a combination of type tests and analyses.

Table 2.11.3-2 (4 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
6.b Each of the Class 1E components identified in Table 2.11.3-1 is powered from its respective Class 1E division.	6.b Tests will be performed by providing a test signal only one Class 1E division at a time.	6.b The test signal exists at the at the Class 1E components identified in Table 2.11.3-1 powered form the Class 1E division under test.
6.c Separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division.	6.c Inspection of the as-built Class 1E divisions will be performed.	6.c Physical separation or electrical isolation exists in accordance with NRC RG 1.75 between these Class 1E divisions, and also between Class 1E division and non-Class 1E division.
7.a MOVs, AOVs, SOVs, E/H valves, and check valves identified in Table 2.11.3-1 perform an active safety function to change assume position as indicated in the table.	7.a.i Tests or type tests of MOVs, AOVs, SOVs, and E/H valves will be performed that demonstrate the capability of the valve to operate under its design conditions.	7.a.i A test report exists and concludes that each MOV, AOV, SOV, or E/H valve changes position as indicated in Table 2.11.3-1 under design conditions.
	7.a.ii Tests and/or analyses of the as-built MOVs, AOVs, SOVs, and E/H valves will be performed under pre-operational flow, differential pressure, and temperature conditions.	7.a.ii Upon receipt of the actuating signal, each MOV, AOV, SOV, or E/H valve changes position as indicated in Table 2.11.3-1 under preoperational test conditions.
	7.a.iii Tests of the as-built check valves will be performed under pre-operational test pressure, temperature, and fluid flow conditions.	7.a.iii Each check valve changes position as indicated in Table 2.11.3-1 under pre-operational test conditions.
7.b After loss of motive power, MOVs, AOVs, SOVs, and E/H valves identified in Table 2.11.3-1 assume the indicated loss of motive power position.	7.b Tests of the as-built MOVs, AOVs, SOVs, and E/H valves will be performed under the conditions of loss of motive power.	7.b Upon loss of motive power, each as-built MOV, AOV, SOV, or E/H valve identified in Table 2.11.3-1 assumes the indicated loss of motive power position.
8.a All controls required by the design exist in the MCR to open and close MOVs, AOVs, SOVs, and E/H valves identified in Table 2.11.3-1.	8.a Tests will be performed using the controls in the MCR.	8.a All controls in the as-built MCR open and close MOVs, AOVs, SOVs, and E/H valves identified in Table 2.11.3-1.

Table 2.11.3-2 (5 of 5)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.b All controls required by the design exist in the RSR to open and close MOVs, AOVs, SOVs and E/H valves identified in Table 2.11.3-1.	8.b Tests will be performed using the controls in the RSR.	8.b All controls in the as-built RSR open and close MOVs, AOVs, SOVs and E/H valves identified in Table 2.11.3-1.
8.c All displays required by the design exist in the MCR as defined in Table 2.11.3-1.	8.c Inspections will be performed on the display in the MCR.	8.c All displays exist and can be retrieved in the as-built MCR as defined in Table 2.11.3-1.
8.d All displays required by the design exist in the RSR as defined in Table 2.11.3-1.	8.d Inspections will be performed on the displays in the RSR.	8.d All displays exist and can be retrieved in the as-built RSR as defined in Table 2.11.3-1.
9. CIV closure times are selected to limit potential releases of radioactivity as low as reasonably achievable.	9. Tests will be performed to verify as-built CIVs close within the isolation response times.	9. The as-built CIVs identified in Table 2.11.3-1 close within the required times.
10. The CIS provides a safety-related function of containment isolation to prevent or limit the release of fission products to the environment.	10. Tests will be performed to verify the as-built containment isolation valve leakage rates in accordance with 10 CFR 50, Appendix J, Type C tests.	10. The as-built containment isolation valve leak rates are less than the allowable leakage rate specified in 10 CFR 50, Appendix J.

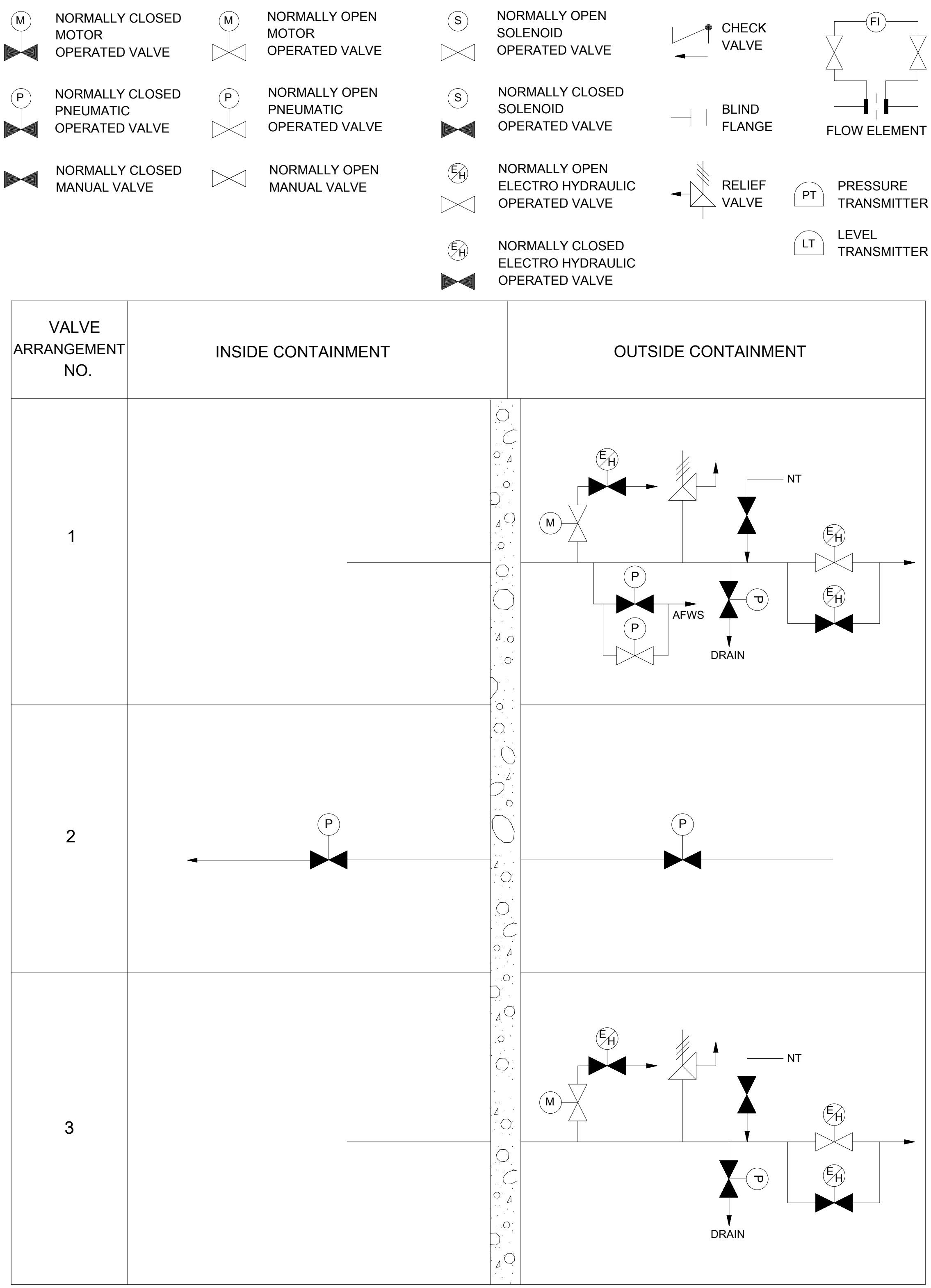


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (1 of 9)

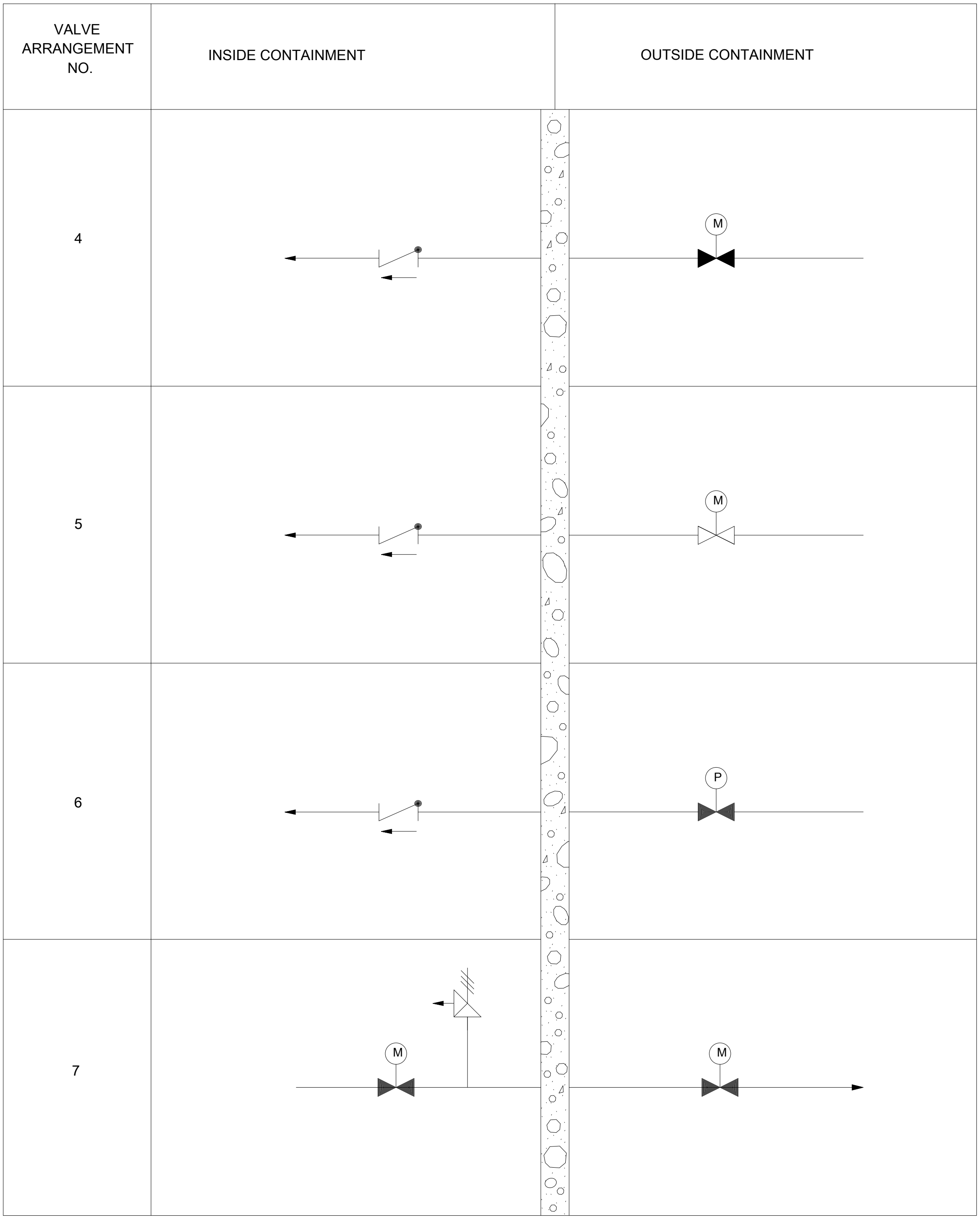


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (2 of 9)

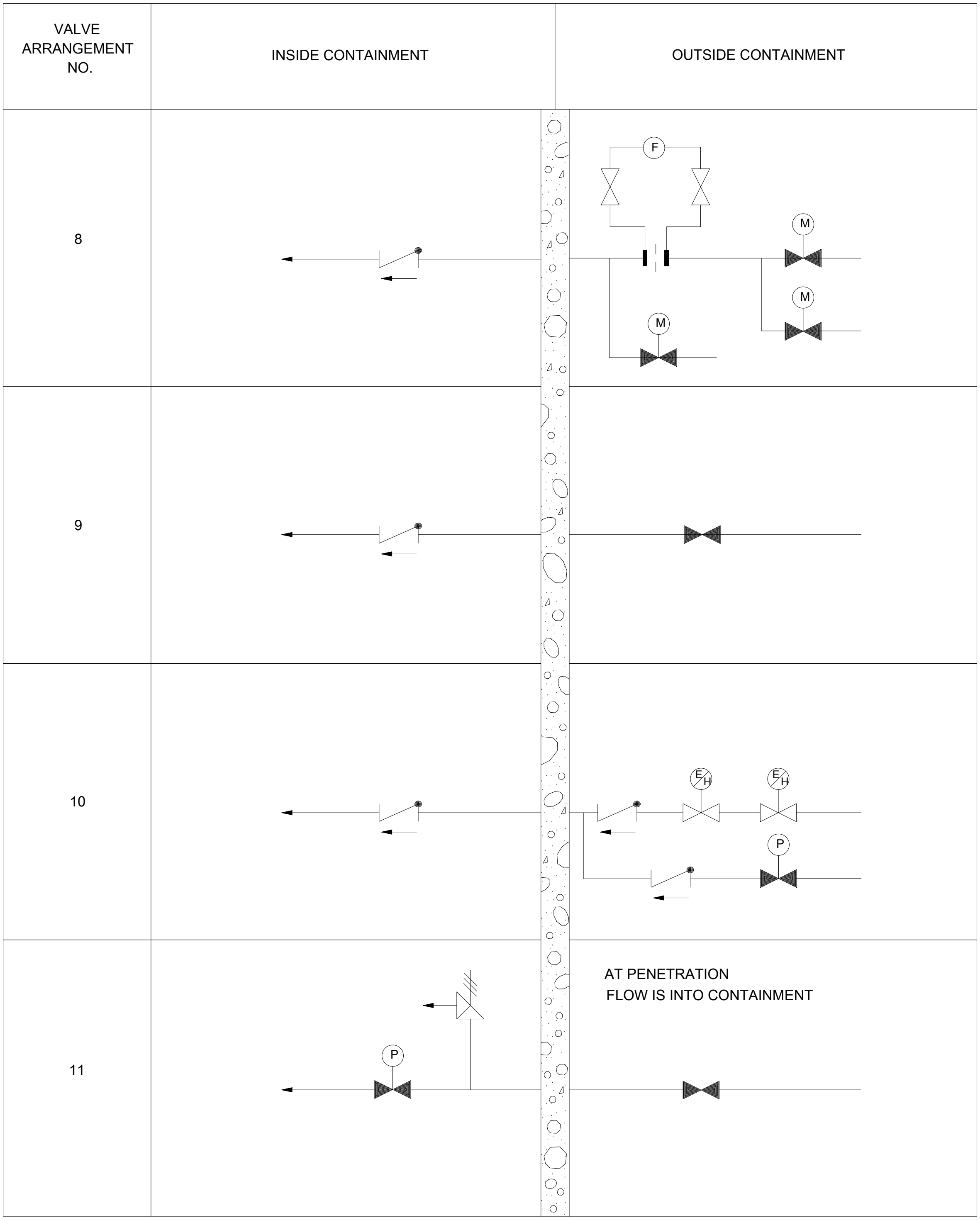


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (3 of 9)

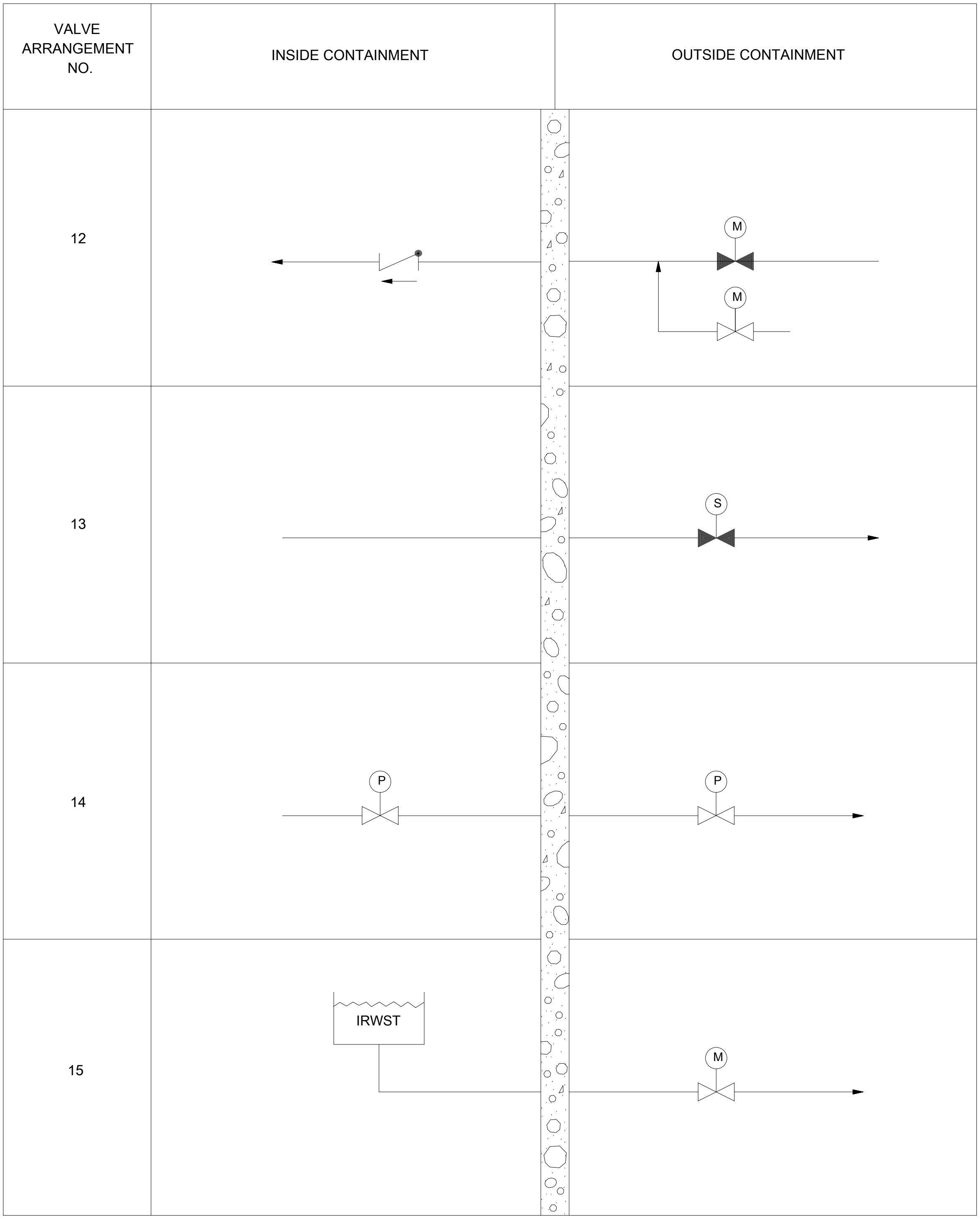


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (4 of 9)

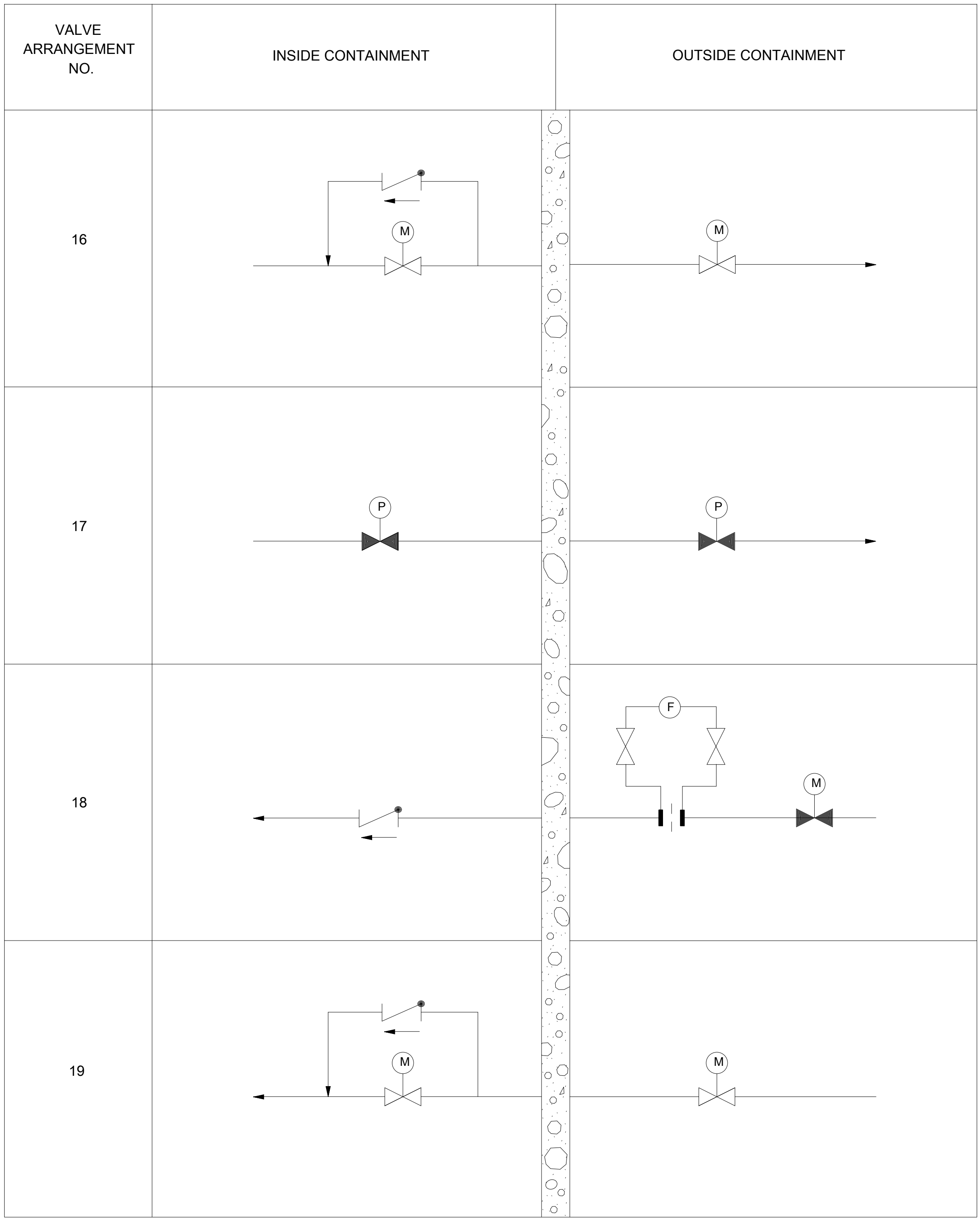


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (5 of 9)

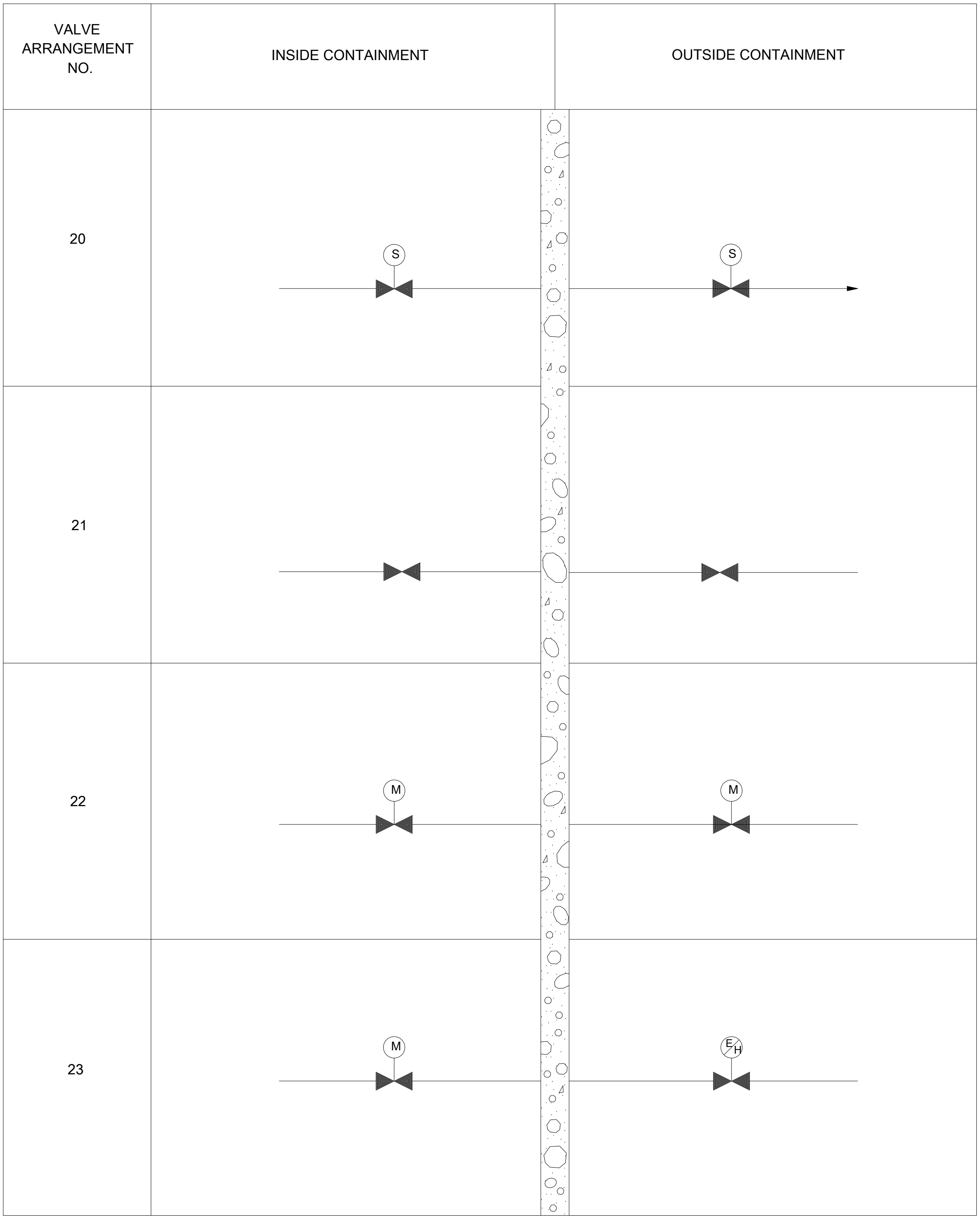


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (6 of 9)

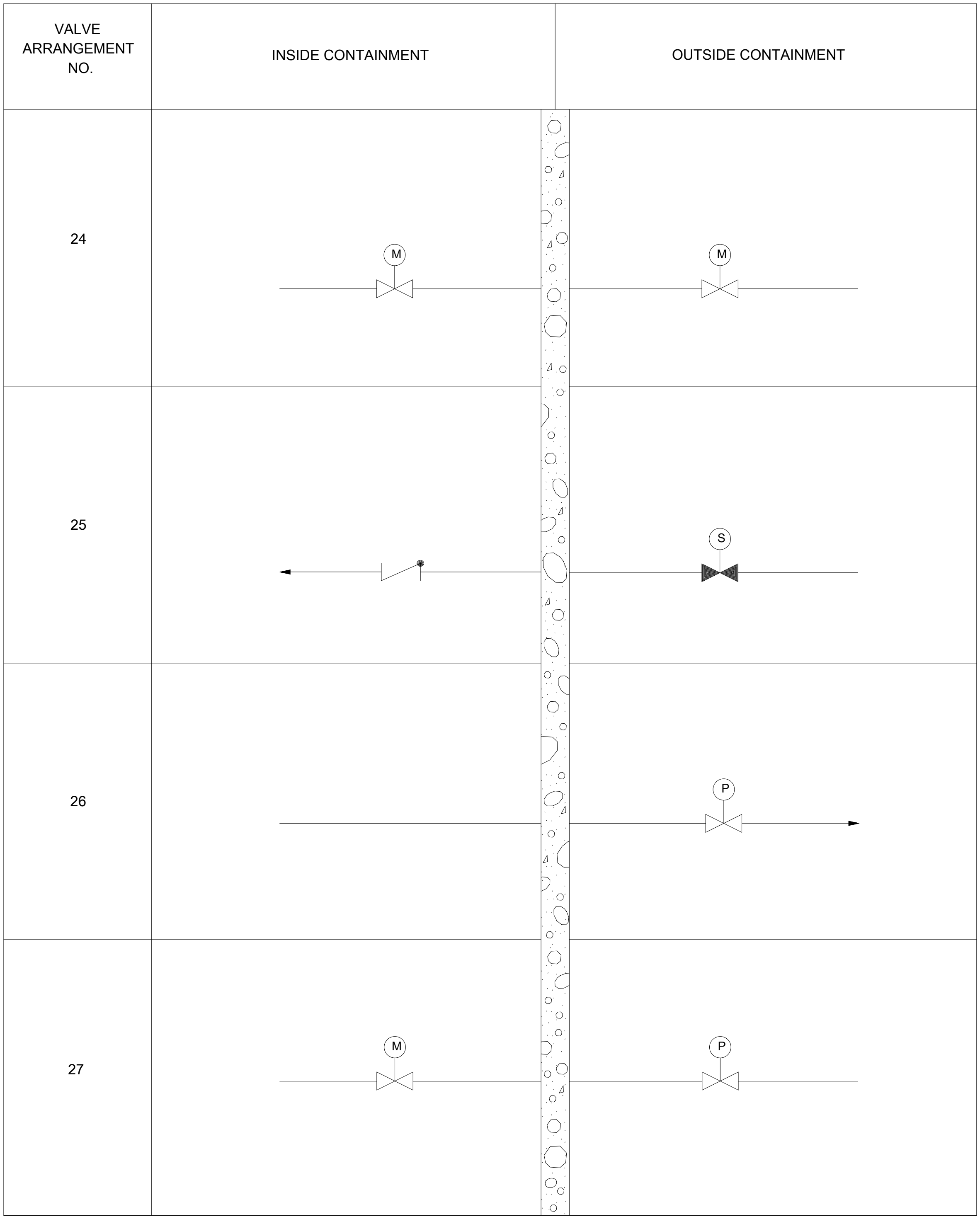


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (7 of 9)

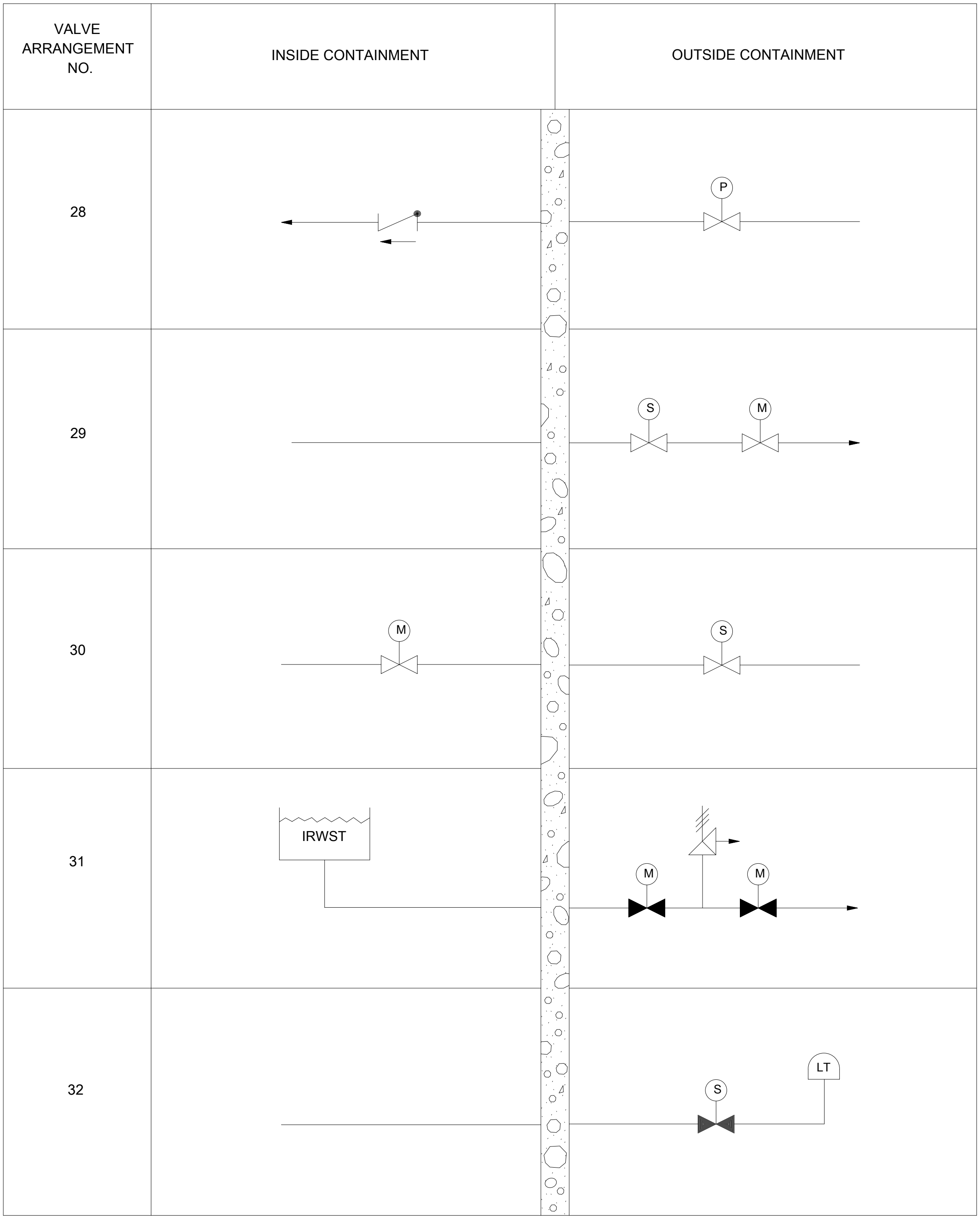


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (8 of 9)

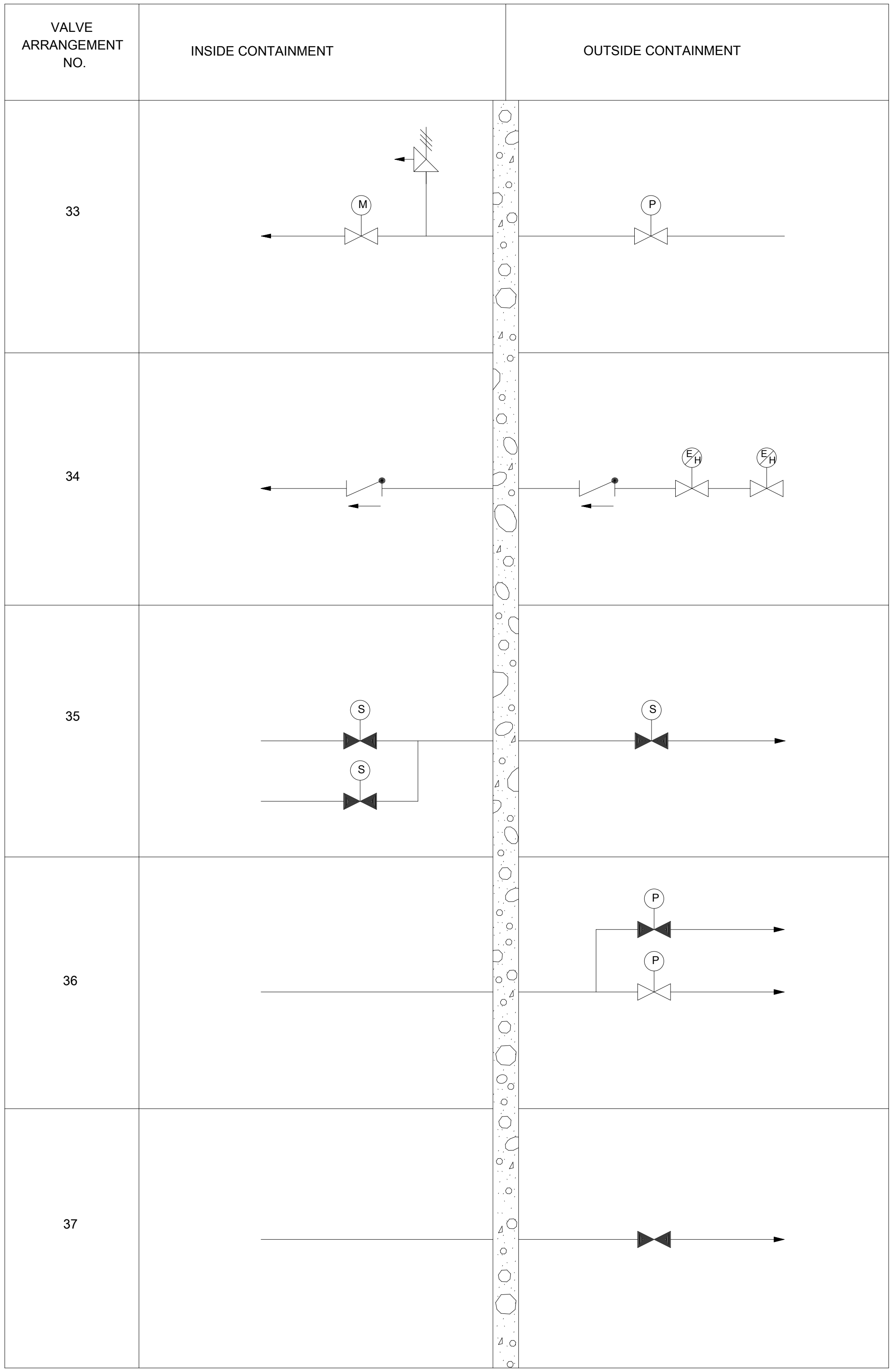


Figure 2.11.3-1 Containment Isolation Valves Functional Arrangement (9 of 9)

2.11.4 Containment Hydrogen Control System

2.11.4.1 Design Description

The containment hydrogen control system (CHCS) is a non safety-related system. The CHCS is used to maintain hydrogen gas concentration in containment at a level which precludes an uncontrolled hydrogen and oxygen recombination within containment following beyond design basis accidents.

The CHCS consists of the passive autocatalytic recombiners (PARs) and hydrogen igniters (HIs). The PARs and HIs are designed to control and allow adiabatic controlled burning of hydrogen at fairly low concentration in containment and in-containment refueling water storage tank (IRWST) from exceeding 10 volume percent during a degraded core accident with 100 percent fuel clad metal-water reaction.

To meet above functional requirements, the CHCS is designed as follows:

1. The functional arrangement of the CHCS is as described in the Design Description of Subsection 2.11.4.1 and in Table 2.11.4-1 and as shown in Figure 2.11.4-1.

2. The seismic Category I components identified in Table 2.11.4-1 can withstand seismic design basis loads without loss of safety function.

3. The CHCS provides PARs complemented by HIs to control the containment hydrogen concentration for beyond design basis accidents.

4. Although the HIs shown in Figure 2.11.4-1 are classified as non-Class 1E, the electrical power for HIs is supplied from the Class 1E division with the electrical isolation device in order to enhance the reliability of HIs. On loss of offsite power and failure of the emergency generator to start or run, the HIs have the alternate power supply from the alternate alternating current (AAC) generator. Also, HIs are powered by battery back-up.

5.a Controls exist in the MCR to start and stop the HIs identified in Table 2.11.4-1.

5.b Controls exist in the RSR to start and stop the HIs identified in Table 2.11.4-1.

5.c Displays and alarms in the MCR exist as defined in Table 2.11.4-1.

5.d Displays and alarms in the RSR exist as defined in Table 2.11.4-1.

2.11.4.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the containment hydrogen control system are specified in Table 2.11.4-3.

Table 2.11.4-1

Containment Hydrogen Control System Components List

Component Name	Item No. [1]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/ Control at MCR	Display/ Control at RSR	Control Signal	Active Safety Function	Loss of Motive Power Position
Passive Autocatalytic Recombiner	HR01A/01B ~ HR15A/15B	Containment	-	I	-/-	-/-	-/-	-	No	-
Hydrogen Igniter	HI01 ~ HI08	Containment	-	I	No/-	Yes/Yes	Yes/Yes	-	No	-

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable.

Table 2.11.4-2

Containment Hydrogen Control System

Instrument Name	Item No. [(1)]	Location	ASME Section III Class	Seismic Category	Class 1E/Harsh Envir. Qual.	Display/Alarm at MCR	Display/Alarm at RSR
Containment Hydrogen Concentration	A-005,007	Containment Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes
IRWST Hydrogen Concentration	A-006,008	Containment Building	-	I	Yes/Yes	Yes/Yes	Yes/Yes

(1) The column “Item No.” is information only (not part of certified design).

(2) Dash(-) indicates not applicable

.

Table 2.11.4-3 (1 of 2)

Containment Hydrogen Control System ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the CHCS is as described in the Design Description of Subsection 2.11.4.1 and in Table 2.11.4-1 and as shown in Figure 2.11.4-1.	1. Inspection of the as-built CHCS will be conducted.	1. The as-built CHCS conforms with the functional arrangement as described in the Design Description of Subsection 2.11.4.1 and in Table 2.11.4-1 and as shown in Figure 2.11.4-1.
2. The seismic Category I components identified in Table 2.11.4-1 can withstand seismic design basis loads without loss of safety function.	2. Inspections will be performed to verify that the as-built seismic Category I components are located in the seismic Category I structure.	2. The as-built seismic Category I components identified in Table 2.11.4-1 are located in a seismic Category I structure.
3. The CHCS provides PARs complemented by HIs to control the containment hydrogen concentration for beyond design basis accidents.	3.a Inspection for the number of PARs and hydrogen igniters will be performed.	3.a At least thirty PARs and eight hydrogen igniters are provided inside containment.
	3.b Operability testing will be performed on the PARs and hydrogen igniters.	3.b A report exists and concludes that the PAR depletion rate for each installed PAR is equal to or greater than that of predetermined PAR hydrogen depletion capacity. For hydrogen igniters, the surface temperature exceeds 1,700 °F

Table 2.11.4-3 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. Although the HIs shown in Figure 2.11.4-1 are classified as non-Class 1E, the electrical power for HIs shall be supplied from the Class 1E division with the electrical isolation device in order to enhance the reliability of HIs. On loss of offsite power and failure of the emergency diesel generator to start or run, the HIs have the alternate power supply from the alternate alternating current (AAC) generator. Also, HIs are powered by battery back-up.	4. Tests will be performed on the as-built HIs.	4. Although the HIs shown in Figure 2.11.4-1 are classified as non-Class 1E, the electrical power for HIs shall be supplied from the Class 1E division with the electrical isolation device in order to enhance the reliability of HIs. On loss of offsite power and failure of the emergency generator to start or run, the HIs have the alternate power supply from the alternate alternating current (AAC) generator. Also, HIs are powered by battery back-up.
5.a Controls exist in the MCR to start and stop the HIs identified in Table 2.11.4-1.	5.a Tests will be performed using the controls in the MCR.	5.a Controls in the as-built MCR start and stop the hydrogen igniters listed in Table 2.11.4-1.
5.b Controls exist in the RSR to start and stop the HIs identified in Table 2.11.4-1.	5.b Tests will be performed using the controls in the RSR.	5.b Controls in the as-built RSR start and stop the hydrogen igniters listed in Table 2.11.4-1.
5.c Displays and alarms in the MCR exist as defined in Table 2.11.4-2.	5.c Inspections will be performed on the displays and alarms in the MCR.	5.c Displays and alarms exist and can be retrieved in the MCR as defined in Tables 2.11.4-2.
5.d Displays and alarms in the RSR exist as defined in Tables 2.11.4-2.	5.d Inspections will be performed on the displays and alarms in the RSR.	5.d Displays and alarms exist and can be retrieved in the RSR as defined in Table 2.11.4-2.

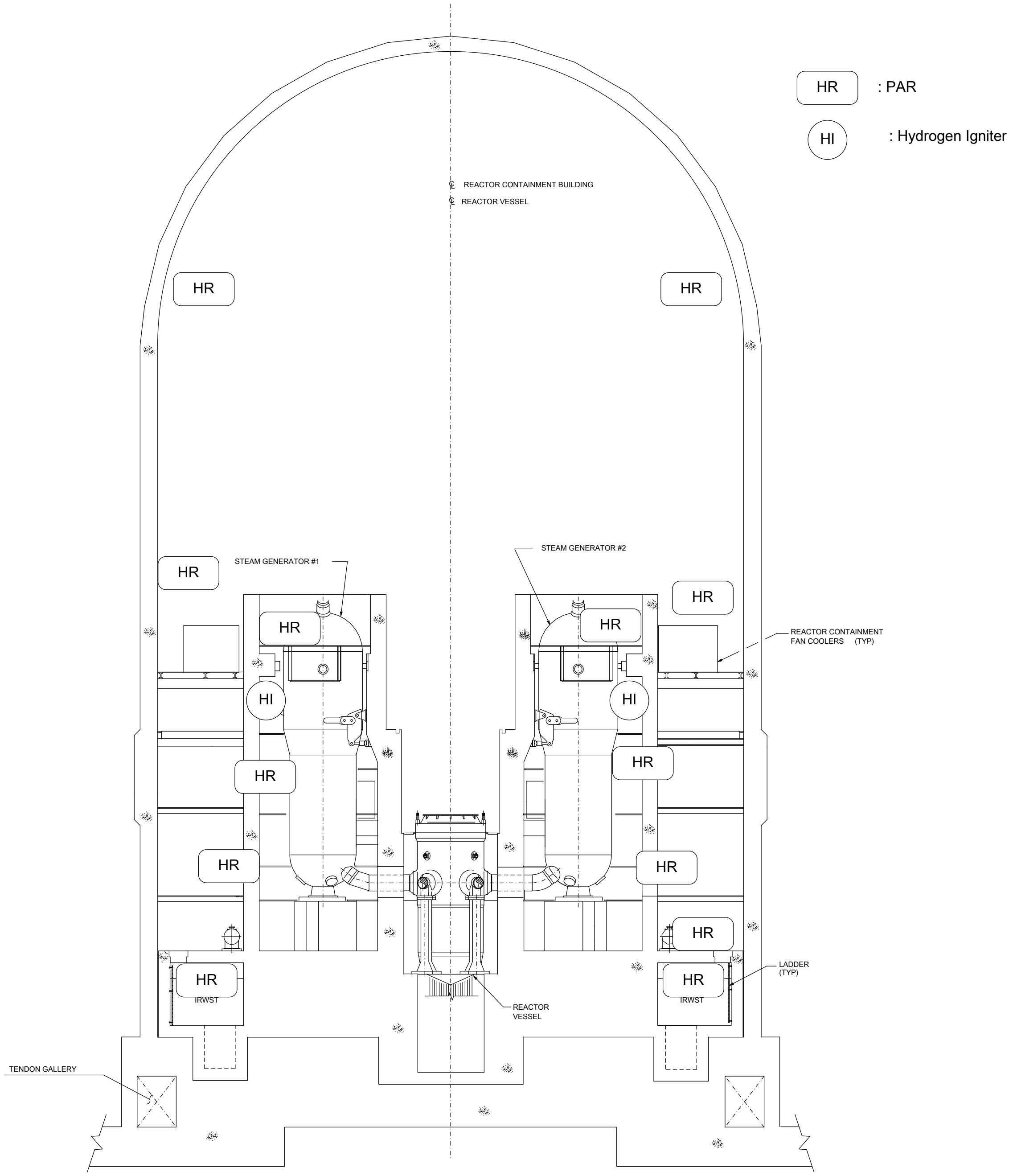


Figure 2.11.4-1 Containment Hydrogen Control System Functional Arrangement

2.12 Physical Security Hardware

2.12.1 Design Description

The physical security system provides physical features to detect, delay, assist response to, and defend against the design basis threat (DBT) for radiological sabotage. The physical security system consists of physical barriers, intrusion detection, surveillance, communications, alarm stations, and power supplies. The details of the design of physical security system are categorized as sensitive security information.

1.a Vital equipment is located only within a vital area.

1.b Access to vital equipment requires passage through the vital area barrier.

2.a COL information

2.b COL information

2.c COL information

3.a COL information

3.b COL information

3.c COL information

4.a COL information

4.b Included in 11.a below.

4.c COL information

5. Isolation zones and exterior areas within the protected area are provided with illumination to permit observation of abnormal presence or activity of persons or vehicles.

6. The external walls, doors, ceilings, and floors in the main control room, the central alarm station and the secondary alarm station are bullet-resistant to at least Underwrites Laboratory Ballistic Standard 752, level 4.

7. The vehicle barrier system is installed and located at the necessary standoff distance to protect against the design basis threat (DBT) vehicle bombs.

8.a COL information

8.b COL information

9. COL information

10. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area.

11.a Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability can provide assessment of activities before and after each alarm annunciation within the perimeter barrier.

11.b The central and secondary alarm stations are located inside the protected area and the interior of each alarm station is not visible from the perimeter of the protected area.

11.c The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, the design enables the survivability of equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel.

12. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within a vital area.

13.a Security alarm devices including transmission lines to annunciators are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power). Alarm annunciation shall indicate the type of alarm (e.g., intrusion alarms and emergency exit alarm) and location.

13.b Intrusion detection and assessment systems concurrently provide visual displays and audible annunciation of alarms in the central and secondary alarm stations.

14. Equipment exists to record onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time.

15. Emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress.

16.a The central and secondary alarm stations have conventional (landline) telephone service with the main control room and local law enforcement authorities.

16.b The central and secondary alarm stations are capable of continuous communications with security personnel.

16.c Non-portable communication equipment in the central and secondary alarm stations remains operable from an independent power source in the event of loss of normal power.

2.12.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.12-1 provides the ITAAC for the physical security hardware.

Table 2.12-1 (1 of 4)

Physical Security Hardware ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1.a Vital equipment is located only within a vital area.	1.a Inspection will be performed to confirm that vital equipment is located within a vital area.	1.a All vital equipment is located only within a vital area.
1.b Access to vital equipment requires passage through the vital area barrier.	1.b Inspection will be performed to confirm that access to vital equipment requires passage through the vital area barrier.	1.b Vital equipment is located within a protected area such that access to vital equipment requires passage through the vital area barrier.
2.a COL information		
2.b COL information		
2.c COL information		
3.a COL information		
3.b COL information		
3.c COL information		
4.a COL information		
4.b Included in 11.a below		
4.c COL information		
5. Isolation zones and exterior areas within the protected area are provided with illumination to permit observation of abnormal presence or activity of persons or vehicles.	5. Inspection of the illumination in the isolation zones and external areas of the protected area will be performed.	5. The illumination in isolation zones and exterior areas within the protected area is 0.2 foot candles measured horizontally at ground level or, alternatively, sufficient to permit observation.
6. The external walls, doors, ceilings, and floors in the main control room, the central alarm station and the secondary alarm station are bullet-resistant to at least Underwrites Laboratory Ballistic Standard 752, level 4.	6. Inspections and/or analysis of the central and secondary alarm station will be performed.	6. The external walls, doors, ceilings, and floors in the main control room, the central alarm station and the secondary alarm station are bullet-resistant to at least Underwrites Laboratory Ballistic Standard 752, level 4.
7. The vehicle barrier system is installed and located at the necessary stand-off distance to protect against the design basis threat (DBT) vehicle bombs.	7. Inspections and analysis will be performed for the vehicle barrier system.	7. The vehicle barrier system will protect against the DBT vehicle bombs based upon the stand-off distance of the system.

Table 2.12-1 (2 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
8.a COL information		
8.b COL information		
9. COL information		
10. Vital areas are locked and alarmed with active intrusion detection systems that annunciate in the central and secondary alarm stations upon intrusion into a vital area.	10. An inspection of the as-built vital areas and central and secondary alarm stations are performed.	10. Vital areas are locked and alarmed with active intrusion detection systems and intrusion is detected and annunciated in both the central and secondary alarm stations.
11.a Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability can provide assessment of activities before and after each alarm annunciation within the perimeter barrier.	11.a Test, inspection, or a combination of test and inspections of the installed systems will be performed	11.a Security alarm annunciation and video assessment information is displayed concurrently in the central alarm station and the secondary alarm station, and the video image recording with real time playback capability provides assessment of activities before and after alarm annunciation within the perimeter barrier.
11.b The central and secondary alarm stations are located inside the protected area and the interior of each alarm station is not visible from the perimeter of the protected area.	11.b Inspections of the central and secondary alarm stations will be performed.	11.b The central and secondary alarm stations are located inside the protected area and the interior of each alarm station is not visible from the perimeter of the protected area.
11.c The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, the design enables the survivability of equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel.	11.c Inspections and/or analysis of the central and secondary alarm station will be performed.	11.c The central and secondary alarm stations are designed and equipped such that, in the event of a single act, in accordance with the design basis threat of radiological sabotage, equipment needed to maintain the functional capability of either alarm station to detect and assess alarms and communicate with onsite and offsite response personnel exists.

Table 2.12-1 (3 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
12. Secondary security power supply system for alarm annunciator equipment and non-portable communications equipment is located within the vital area.	12. An inspection will be performed to ensure that the location of the secondary security power supply equipment for alarm annunciator equipment and non-portable communications equipment is within a vital area.	12. Secondary security power supply equipment for alarm annunciator equipment and non-portable communication equipment is located within a vital area.
13.a Security alarm devices, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power). Alarm annunciation shall indicate the type of alarm (e.g., intrusion alarms and emergency exit alarm) and location.	13.a A test will be performed to verify that security alarms, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when on standby power) and that alarm annunciation indicates the type of alarm (e.g., intrusion alarms and emergency exit alarms) and location.	13.a A report exists and concludes that security alarm devices, including transmission lines to annunciators, are tamper indicating and self-checking (e.g., an automatic indication is provided when failure of the alarm system or a component occurs, or when the system is on standby power) and that alarm annunciation indicates the type of alarm (e.g., intrusion alarms and emergency exit alarms) and location.
13.b Intrusion detection and assessment systems concurrently provide visual displays and audible annunciation of alarms in the central and secondary alarm stations.	13.b Tests will be performed on intrusion detection and assessment equipment.	13.b The intrusion detection system concurrently provides visual displays and audible annunciations of alarms in both the central and secondary alarm stations.
14. Equipment exists to record onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time.	14. Test, analysis, or a combination of test and analysis will be performed to ensure that equipment is capable of recording each onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time.	14. A report exists and concludes that equipment is capable of recording each onsite security alarm annunciation, including the location of the alarm, false alarm, alarm check, and tamper indication; and the type of alarm, location, alarm circuit, date, and time.

Table 2.12-1 (4 of 4)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
15. Emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress.	15. Test, inspection, or a combination of tests and inspections of the emergency exits through the vital area boundaries will be performed.	15. The emergency exits through the vital area boundaries are locked, alarmed, and equipped with a crash bar to allow for emergency egress.
16.a The central and secondary alarm stations have conventional (landline) telephone service with the main control room and local law enforcement authorities.	16.a Tests, inspections, or a combination of tests and inspections of the central and secondary alarm stations' conventional telephone services will be performed.	16.a The central and secondary alarm stations are equipped with conventional (landline) telephone service with the main control room and local law enforcement authorities.
16.b The central and secondary alarm stations are capable of continuous communication with security personnel.	16.b Tests, inspections, or a combination of tests and inspections of the central and secondary alarm stations' continuous communication capabilities will be performed.	16.b The central and secondary alarm stations are equipped with the capability to continuously communicate with security officers, watchmen, armed response individuals, or any security personnel that have responsibilities during a contingency event.
16.c Non-portable communication equipment in the central and secondary alarm stations remains operable from an independent power source in the event of loss of normal power.	16.c Tests, inspections, or a combination of tests and inspections of non-portable communication equipment will be performed.	16.c Non-portable communication devices (including conventional telephones systems) in the central and secondary alarm stations are wired to an independent power supply that enables the system to remain operable in the event of loss of normal power.

2.13 Design Reliability Assurance Program

2.13.1 Design Description

The purpose of the APR1400 design reliability assurance program (RAP) is to provide reasonable assurance that:

a. A plant is designed, constructed, and operated in a manner that is consistent with the risk insights and key assumptions (e.g., SSC design, reliability, and availability) from the probabilistic, deterministic, and other methods of analysis.

b. The RAP SSCs do not degrade to an unacceptable level of reliability, availability, or condition during plant operations.

c. The frequency of transients that challenge these SSCs is minimized.

d. These SSCs will function reliably when challenged.

The risk-significant SSCs including both safety-related and non safety-related SSCs are identified for inclusion in the RAP through the expert panel.

1. For structures, systems, and components within the scope of the reliability assurance program (RAP SSCs), the design is consistent with risk insights and key assumptions.

2.13.2 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.13-1 describes the ITAAC for the design RAP.

Table 2.13-1

Design Reliability Assurance Program ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. For structures, systems, and components within the scope of the reliability assurance program (RAP SSCs), the design is consistent with risk insights and key assumptions.	1. An analysis will demonstrate that the initial design of all RAP SSCs (for procurement and installation) is completed in accordance with the design RAP.	1. The initial design of all RAP SSCs identified at the time of the COL issuance has been subject to the applicable reliability assurance activities of the design RAP.

3.0 Interface Requirement

3.1 Electrical System

The offsite power system is site-specific. The offsite power system has interfaces with the onsite power system as follows:

a. The offsite power system is provided with a minimum of two independent offsite circuits from the transmission network to the onsite electrical distribution system.

b. The offsite transmission lines are designed to have the capacity and capability to power the required loads during steady state, transient, accident condition, and postulated events.

c. Independence is established between the onsite and offsite power systems physically and electrically.

d. The main transformer and the standby auxiliary transformers are connected to the switchyard.

e. The switchyard and its circuit breakers are sized to supply their load requirements and rated to interrupt fault currents.

f. Voltage variations of the transmission network do not cause voltage variations of more than acceptable tolerance of the normal voltage ratings of the loads.

g. The normal steady-state frequency of the offsite system is within acceptable tolerance of 60 Hz during recoverable periods of the offsite system instability.

h. The protocols are provided for the plant to remain cognizant of grid vulnerabilities.

i. Grounding and lightning protection systems are provided for the switchyard.

j. Alarms and displays are provided in order to monitor the switchyard.

3.2 Ultimate Heat Sink

The ultimate heat sink (UHS) is a safety-related and site-specific. The COL applicant is to provide the UHS design information based on the specific site characteristics including meteorological conditions. The COL applicant is to verify the following interface requirements:

a. The UHS provides the capability to reject the heat under normal and accident conditions (safe shutdown or post accident) assuming a single active failure concurrent with a loss of offsite power.

b. The UHS provides cooling capacity for at least 30 days without makeup water under worst case meteorological conditions in accordance with NRC RG 1.27.

c. The UHS provides the maximum supply temperature of 33.2 °C (91.8 °F) to the essential service water system.

d. The UHS design provides isolation between the UHS and the non safety-related system.

e. The UHS provides the means to ensure the adequate NPSH of the ESW pumps under all operation modes if applicable to the site-specific design.

f. The UHS provides the means to prevent long-term fouling and mitigate short-term clogging anticipated at the site that may degrade system performance.

g. The UHS is designed to prevent water hammer if applicable to the site-specific design.

h. The UHS is designed to consider the evaluation of maximum evaporation and other losses if applicable to the site-specific design.

i. The UHS provides the detailed design and location of the UHS makeup pump (including flow capacity, total dynamic head (TDH), available NPSH) if applicable to the site-specific design.

j. The components and piping including supports of the UHS are fabricated, installed and inspected in accordance with ASME Section III requirements if applicable to the site-specific design.

k. Pressure boundary welds in ASME Code components and piping of UHS meet ASME Section III requirements if applicable to the site-specific design.

l. The ASME Code components and piping of UHS maintain their pressure boundary integrity as its design pressure if applicable to the site-specific design.

m. The Seismic Category I structure, components, piping including supports, and instruments of the UHS can withstand seismic design basis loads without loss of safety function if applicable to the site-specific design.

n. The Class 1E components and instruments can withstand the harsh environmental conditions during design basis accident without loss of safety function if applicable to the site-specific design.

o. Each of Class 1E components and instruments is powered from its respective Class 1E division, and separation is provided between Class 1E divisions, and between Class 1E division and non-Class 1E division if applicable to the site-specific design.

p. Alarms and indications for the UHS water temperature and level are provided in the MCR and RSR.

q. Controls required for the safety-related functions of the UHS are provided in the MCR and RSR if applicable to the site-specific design.

3.3 Essential Service Water System

Some of the Essential Service Water System (ESWS) are site-specific. The COL applicant is to provide the ESWS design information based on the specific site characteristics. The COL applicant is to verify the following interface requirements:

a. The ESWS piping outside the component cooling water heat exchanger building connected to the ultimate heat sink is designed and constructed in accordance with ASME Section III requirements.

b. The ESWS piping is designed and constructed to prevent the void formation in the pipe and minimize the water hammer.