Equipment Qualification Program

Revision 4

Non-Proprietary

July 2018

REVISION HISTORY

Revision	Date	Page	Description
0	November 2014	All	First Issue
1	February 2017	Pages v, 10, 11, 12, 13, 17, 29	Reference EQPR (environmental qualification parameters report) is deleted because the environmental parameters information is added in this report. (RAI 176-8089 Q3.11-9)
		Pages 5, 24	Typing errors are corrected (102Gy to 100Gy) in response to RAI 176-8089 Q3.11-9.
		Pages 10, 11, 13, 22, 23	Added figures are adopted as references.
		Page 30	Section 5.6 is revised in response to RAI 115-8066 Q3.11-3, 3.11-5, 3.11-6.
		-	Previous Table 2 is deleted in response to RAI 179-8089 Q3.11-9
		Table 2	- Table 3 becomes Table 2 due to deletion of Table 2. -- Added information regarding Room No, Required Operational Time, Designation and Classification in response to RAI 176-8089 Q3.11-9.
		Table 3	-Table 4 becomes Table 3 due to deletion of Table 2. -Gamma, Beta, Neutron doses are specified in response to RAI 176-8089, Q3.11-9
		Pages 94, 95, 97, 98, 100, 101, 102, 104	- Pressure values are updated according to DIT-N-0007-01-001
		Figure 2~9	Figure 2~9 is added in response to RAI 176-8089 Q3.11-9
		Pages iv, 138,139,141,143,145,146,149,153,156,	Revision for scope change(Safety-Related Equipment→Seismic Category I Equipment) of Seimsic Qualification
		Pages 138,156,159	Revison for addendum and change of reference
		Pages 146,153	Delete description of using experience data in accordance with R.G 1.100
		Pages 162~163	Revision for change and addendum of reference of anchoring component
		Appendix A	Added in response to RAI 8089, Q3.11-9
		Appendix B	Added in response to RAI 8089, Q3.11-9
2	February 2018	Pages 9, 10	Added in response to RAI 8686, Q3.11-18
		Pages 34	Added in response to RAI 8686, Q3.11-22
		Pages 40	Revised in accordance with EOC(CR-18-E-001)
		Table 2	Added in response to RAI 8089, Q3.11-9_Rev. 4
		Table 3	Added in response to RAI 8089, Q3.11-9_Rev. 4
3	May 2018	Table 2	Reflected for RAI RAI 8089, Q3.11-9,NRC Feedback
		Page A-3, A-4	Reflected for RAI RAI 8089, Q3.11-9,NRC Feedback
		Page A-5	Reflected for RAI RAI 8089, Q3.11-9,NRC Feedback
		Page B-5	Reflected for RAI RAI 8089, Q3.11-11,NRC Feedback
4	July 2018	Table 2 Pages 44,45 and 51	Reflected in accordance with EOC (CR-17-IC-164, No.40)

ABSTRACT

The APR1400 Equipment Qualification Program consists of two parts which are classified into Environmental Qualification Program and Seismic Qualification Program respectively. These are discussed in separate parts.

Part 1

This report describes the program used to meet the requirements of 10 CFR 50.49, NRC RG 1.89, NUREG-0588 Category I, IEEE Std. 323, and NUREG-0800 (SRP 3.11). The program described herein applies to Class 1E electrical equipment and safety-related active mechanical equipment important to safety for nuclear power plants committed to the above requirements. Description of the elements of the environmental qualification program, methodology, and technical bases are presented. Type test, analysis, and other methods of qualification compliant with NUREG-0588 are discussed. It is expected that this report may be referenced by license applicants for the scope and methods to be employed for qualification of Class 1E electrical equipment and safety-related active mechanical equipment.

Part 2

This program is to establish the seismic and dynamic qualification procedure and criteria for Seismic Category I mechanical equipment, controls and instrumentation and Class 1E electrical equipment in APR1400. This program is a part of the overall APR1400 Equipment Qualification Program, hereinafter referred to as EQP. This program provides the seismic and dynamic qualification requirements and general procedures to qualify safety-related equipment in accordance with IEEE Std. 344 and NRC RG 1.100. It is expected that this report may be referenced by license applicants for the scope and methods.

ACRONYMS AND ABBREVIATIONS

AB	auxiliary building
ACI	American Concrete Institute
ACU	air cleaning unit
A/E	architect/engineer
AFW	auxiliary feedwater
AFWP	auxiliary feedwater pump
AFWST	auxiliary feedwater storage tank
AHU	air handling unit
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
APC	auxiliary process cabinet
ASME	American Society of Mechanical Engineers
BAMP	boric acid makeup pump
BAST	boric acid storage tank
BOP	balance of plant
CCS	component control system
CCW	component cooling water
CCWPH	component cooling water pump house
CEA	control element assembly
CEDM	control element drive mechanism
CFR	code of federal regulations
CG	center of gravity
CIV	containment isolation valve
CPCS	core protection calculator system
CS	containment spray
DBA	design basis accident
DRCS	digital rod control system
EDG	emergency diesel generator
EDGB	emergency diesel generator building
ENFMS	ex-core neutron flux monitoring system
EQP	equipment qualification program
ESF-CCS	engineered safety features - component control system
ESR	electro-hydraulic actuated spring return
ESW	essential service water

ESWB	essential service water building
FMEA	failure modes and effects analysis
GDC	general design criteria
HELB	high-energy line break
HJTC	heated junction thermocouple
HT	high temperature
HX	heat exchanger
ICI	in-core instrumentation
IE	inspection and enforcement
IEEE	institute of electrical and electronics engineers
IRWST	in-containment refueling water storage tank
ITP	interface and test processor
LOCA	loss-of-coolant accident
LT	low temperature
MCC	motor control center
MCR	main control room
MFLB	main feedwater line break
MI	mineral insulated
MMIS	man machine interface
MSADV	main steam atmospheric dump valve
MSLB	main steam line break
MTP	maintenance and test panel
NR	narrow range
NRC	U.S. Nuclear Regulatory Commission
OBE	operating basis earthquake
OL	operating license
POSRV	pilot operated safety relief valve
PPS	plant protection system
PRM	process radiation monitor
PSR	pneumatically actuated spring return
PZR	pressurizer
QA	quality assurance
RCB	reactor containment building
RCP	reactor coolant pump
RDT	reactor drain tank
RG	regulatory guide

RH	relative humidity
RRS	required response spectra
RSPT	reed switch position transmitter
RSSH	resin sluice supply header
RTSG	reactor trip switchgear
RTSS	reactor trip switchgear system
SC	shutdown cooling
SCS	shutdown cooling system
SDCHX	shutdown cooling heat exchanger
SG	steam generator
SI	safety injection
SIP	safety injection pump
SIS	safety injection system
SIT	safety injection tank, structural integrity test
S/PM	surveillance/preventive maintenance
SRP	standard review plan
SRSS	square root of the sum of the squares
SRV	safety relief valve
SSC	structure, system, or component
SSE	safe shutdown earthquake
SWGR	switchgear
TGB	turbine generator building
TID	total integrated dose
TS	trade secret
VCT	volume control tank
WR	wide range
ZPA	zero-period acceleration

Part 1

Environmental Qualification Program

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Objectives 1

1.2 Background 1

1.3 Criteria and Standards 2

1.4 Summary 2

2 DEFINITIONS 3

2.1 Abnormal Condition 3

2.2 Accident Condition 3

2.3 Active Components 3

2.4 A/E 3

2.5 Aging 3

2.6 Analysis 3

2.7 Auditable Data 3

2.8 Class 1E 3

2.9 Common-Mode Failure 3

2.10 Components 4

2.11 Condition Monitoring 4

2.12 Containment 4

2.13 Demonstration 4

2.14 Design Basis Accident (DBA) 4

2.15 Design Life 4

2.16 Design Qualification 4

2.17 Engineered Safety Features 4

2.18 Equipment 4

2.19 Equipment Qualification 5

2.20 Failure 5

2.21 Harsh Environment 5
2.22 Harsh Zone 5
2.23 Installed Life 5
2.24 Interface 5
2.25 Margin 5
2.26 Mild Environment 5
2.27 Mild Zone 5
2.28 Nuclear Generating Station 6
2.29 Normal Conditions 6
2.30 Operating Experience 6
2.31 Performance Requirements 6
2.32 Qualified Life 6
2.33 Sample Equipment 6
2.34 Service Conditions 6
2.35 Synergistic Effects 6
2.36 Type Tests 6
3 DESCRIPTION OF ENVIRONMENTAL QUALIFICATION PROGRAM 7
3.1 Scope of Supply 7
3.2 Qualification Program 8
3.2.1 Aging 9
3.2.2 Seismic 10
3.2.3 Environmental 11
3.3 Environmental Conditions and Effects 11
3.3.1 Temperature 11
3.3.2 Radiation 12
3.3.3 Vibration 13
3.3.4 Pressure 13

3.3.5 Humidity 14
3.3.6 Chemical Spray 14
3.3.7 Dust 14
3.3.8 Submergence 14
3.3.9 Power Supply Voltage and Frequency Variations 15
3.3.10 Other Environmental Effects 15
4 EQUIPMENT QUALIFICATION REQUIREMENTS 16
4.1 Location 16
4.2 Environment 16
4.3 Design Basis Accidents 16
4.4 Operating Requirements 16
5 METHODS OF QUALIFICATION 17
5.1 Type Testing 17
5.1.1 Equipment Procurement Specification 17
5.1.2 Type Test Methods 17
5.1.3 Margin 18
5.1.4 Test Sequence 21
5.1.5 Type Test Report 23
5.1.6 Environmental Test Profiles 23
5.1.7 Acceptance Criteria 23
5.1.8 Test Anomalies 24
5.2 Analysis 25
5.2.1 Analyses Based on Partial Type Test Data and Equipment-Specific Qualification Requirements 25
5.2.2 Failure Modes and Effects Analysis 26
5.3 Operating Experience 26
5.4 Aging 26
5.4.1 Aging Analysis and Conditioning 27

5.4.2 Periodic Replacement 29
5.4.3 Surveillance/Preventative Maintenance 30
5.5 Conservatism of Qualification Parameters 30
5.6 Qualification of Safety-Related Active Mechanical Equipment 31
6 DOCUMENTATION 32
6.1 Equipment-Specific Qualification Documentation 32
6.1.1 Aging Analysis Report 32
6.1.2 Qualification Plan 32
6.1.3 Age Conditioning Report 33
6.1.4 Qualification Test Procedure 33
6.1.5 Qualification Test Report 34
6.1.6 Operating Experience Data 34
6.1.7 Equipment for Mild Environment 35
6.2 Equipment Categorization 35
6.3 Qualification Data Summary and Evaluation 35
6.4 Supporting Documentation 36
7 QUALITY ASSURANCE 37
8 ADMINISTRATIVE PROCEDURES 38
8.1 Equipment Specification 38
8.2 Supplier Design and Qualification Program 38
8.3 Qualification Task 38
8.4 Qualification Documentation and Submittals 38
9 REFERENCES 39

LIST OF TABLES

Table 1 Ventilation Areas 42
Table 2 Equipment Qualification Equipment List 43
Table 3 Environmental Parameters Data 94
Table 4 Containment Spray Conditions 122

LIST OF FIGURES

Figure 1 Design Basis Containment Atmosphere Temperature and Pressure EQ Profile for Accident 123
Figure 2 Main Steam Valve Room MSLB Temperature Profile 124
Figure 3 Auxiliary Building HELB Temperature Profile 125
Figure 4 Turbine Driven AF Pump Room Temperature Profile 126
Figure 5 Turbine Driven AF Pump Room Vent & Main Steam Enclosures 127
Figure 6 HELB HVAC Duct Tray Pipe Way Temperature Profile 128
Figure 7 SG Blowdown Flash Tank Room Temperature Profile 129
Figure 8 Equipment Qualification Working Process 130
Figure 9 Equipment Qualification Flow Diagram By Type of Safety-Related Equipment 131

APPENDICES

APPENDIX A CALCULATUION METHOD OF DETERMINING OF NORMAL CONDITION TIDs FOR ENVIRONMENTAL QUALIFICATION A-1

APPENDIX B CALCULATION METHOD OF DETERMINING POST-ACCIDENT CONDITION TIDs FOR ENVIRONMENT QUALIFICATION B-1

Page intentionally blank

1 INTRODUCTION

1.1 Objectives

The intent of equipment environmental qualification is to demonstrate that equipment will perform the necessary safety-related functions during normal and accident conditions.

This program includes the methods used to meet the requirements of the "Category I" requirements of NUREG-0588 (Reference 9.1), the requirements of the Standard Review Plan, NUREG-0800 (SRP 3.11) (Reference 9.2), 10 CFR 50.49 (Reference 9.3), and Institute of Electrical and Electronics Engineers (IEEE) Std 323 (Reference 9.8). The methods described herein apply to Class 1E electrical equipment and safety-related active mechanical equipment important to safety for use in nuclear power plants committed to the above requirements. It is expected that this report may be referenced by license applicants for the scope and methods employed herein.

Qualification documentation will be supplied by Supplier and is described in detail in Section 6.

1.2 Background

The environmental requirements to be considered in the design of safety-related equipment are embodied in 10 CFR, Appendix A to Part 50, General Design Criteria 1, 2, 4, 23, and 50. The environmental design of the safety-related equipment is verified, documented, and controlled as required by Sections III, XI, and XVII of 10 CFR 50 Appendix B.

NUREG-0588 was issued in December 1979 to promote a more orderly and systematic implementation of equipment qualification programs by the industry and to provide guidance to the U.S. Nuclear Regulatory Commission (NRC) staff for its use in ongoing licensing reviews. The positions contained in the report provide guidance on (1) how to establish environmental service conditions, (2) how to select methods that are considered appropriate for qualifying equipment in different areas of the plant, and (3) other issues such as margin, aging, and qualification documentation.

In February 1980, the NRC requested certain near-term Operating License (OL) applicants to review and evaluate the environmental qualification documentation for each item of safety-related electrical equipment and to identify the degree to which their qualification programs comply with the staff positions described in NUREG-0588. Inspection and Enforcement (IE) Bulletin 79-01B (Reference 9.28), "Environmental Qualification of Class 1E Equipment," was issued on January 14, 1980 and its supplements dated February 29, September 30, and October 24, 1980 established environmental qualification requirements for Class 1E electrical equipment in operating reactors.

A final rule on environmental qualification of electric equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, Section 50.49 of 10 CFR Part 50, specifies the requirements to be met for demonstrating the environmental qualification of electric equipment important to safety located in a harsh environment.

The qualification requirements for safety-related active mechanical equipment are principally contained in Appendices A and B of 10 CFR 50. The qualification methods defined in NUREG-0800 (SRP 3.11) can also be applied to mechanical equipment. Environmental qualification of safety-related active mechanical equipment is described in detail in Section 5.6.

1.3 Criteria and Standards

The qualification program is designed to meet the requirements of the "Category I" requirements of NUREG-0588, IEEE Std. 323, and IEEE Std. 627 (Reference 9.18). IEEE Std. 323 was issued to provide guidance for demonstrating the qualifications of Class 1E equipment for nuclear generating stations. The individual supporting standards that the architect engineer (A/E) will employ, either in whole or in part, are listed in Section 9.

1.4 Summary

A summary of the various sections of this program is given below:

Description of Environmental Qualification Program (Section 3)

The general scope of supply and the various qualification program activities are described. This program will cover safety-related electrical and active mechanical equipment including sensors, electrical penetration assemblies, cables, hydrogen and radiation monitoring systems, panels, motor control centers (MCCs), switchgear (SWGR), miscellaneous instrumentation, nuclear service valves and auxiliary equipment, and pump motors located in harsh and mild environments.

Equipment Qualification Requirements (Section 4)

Information will be included on the location of equipment, qualification environment, and operating requirements.

Methods of Qualification (Section 5)

Type tests, analysis and other methods of qualification compliant with 10 CFR 50.49, NUREG-0800 (SRP 3.11), and the “Category I” requirement of NUREG-0588, NRC Regulatory Guide (RG) 1.89 (Reference 9.22), and IEEE Std. 323 are presented. The demonstration of conservatism of the qualification parameters is described.

Documentation (Section 6)

This section describes the documentation required for qualification. The qualification reports and their generation are described. Documentation necessary to support the review on a particular applicant's docket will be available for audit.

Quality Assurance (Section 7)

The A/E's quality assurance (QA) practices and documentation requirements associated with equipment qualification activities are described.

Administrative Procedures (Section 8)

Supplier’s participation and responsibility coupled with qualification program technical definition, management, and control are described.

2 DEFINITIONS

2.1 Abnormal Condition

The limiting environmental condition expected following an accident or transient that is not a normal operating condition but is not considered an accident

2.2 Accident Condition

The environmental conditions expected as a direct result of an accident that requires activation of emergency safeguard systems to protect the plant combined with a single active failure

2.3 Active Components

Any component characterized by a change in state, or by mechanical motion, to perform an automatic safety function such as safe shutdown of the reactor, or mitigation of the consequences of a postulated pipe break in the reactor coolant pressure boundary

2.4 A/E

Architect/engineer

2.5 Aging

The effects of operational, environmental, and system conditions on equipment during a period of time up to, but not including, a design basis accident or the process of simulating such an accident

2.6 Analysis

A process of mathematical or other logical reasoning that leads from stated premises to a conclusion concerning specific capabilities of equipment and its adequacy for a particular application

2.7 Auditable Data

Technical information that is documented and organized in a readily understandable and traceable manner and that permits independent auditing of the inferences or conclusions based on the information provided.

2.8 Class 1E

The safety classification of electrical equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or are otherwise essential in preventing significant release of radioactive material to the environment.

2.9 Common-Mode Failure

Multiple failures attributable to a common cause

2.10 Components

Individual items that are the integral parts of equipment and cannot be individually operability tested (e.g., seals, gaskets, resistors)

2.11 Condition Monitoring

Activities by which equipment condition is monitored to provide reasonable assurance that it will not degrade or age beyond the state to which it is no longer operable

2.12 Containment

That portion of the engineered safety features (ESF) designed to act as the principal barrier, beyond the reactor system pressure boundary, to prevent the release, even under conditions of a reactor accident, of unacceptable quantities of radioactive material beyond a controlled zone

2.13 Demonstration

A course of reasoning showing that a certain result is a consequence of assumed premises; an explanation or illustration, as in teaching by use of examples

2.14 Design Basis Accident (DBA)

Postulated abnormal accidents used in the design to establish the performance requirements of the safety-related structures, systems, and components. These events include abnormal operating occurrences and design basis accidents.

2.15 Design Life

The time during which satisfactory performance can be expected for a specific set of service conditions

2.16 Design Qualification

The generation and maintenance of evidence to demonstrate that equipment can perform within its specification requirements

2.17 Engineered Safety Features

Features of a unit other than reactor trip or those used only for normal operation, that are provided to prevent, limit, or mitigate the release of radioactive material

2.18 Equipment

An assembly of components designed and manufactured to perform specific functions

2.19 Equipment Qualification

The generation and maintenance of auditable evidence to ensure that the equipment will operate on demand to meet the performance requirements under applicable service conditions

2.20 Failure

The loss of ability to perform a required service function by a component, equipment, or system

2.21 Harsh Environment

Any area that has a significant increase in environmental parameters (pressure, temperature, relative humidity, or chemical) due to a postulated DBA, or any area with a total integrated dose (TID) greater than 100 Gy (greater than 10 Gy for electronic components such as semiconductors or electronic components containing organic material)

2.22 Harsh Zone

An area of the plant that is predicted to have the conditions of a harsh environment

2.23 Installed Life

The interval from installation to removal, during which the equipment or component may be subject to design service conditions and system demands (Note: Equipment may have an installed life of the designated life of the plant with certain components changed periodically; thus, the installed life of the components would be less than designated life of the plant)

2.24 Interface

A junction or junctions between Class 1E equipment and another piece of equipment or device (for example, connection boxes, splices, terminal boards, electrical connections, grommets, gaskets, cables, conduits, enclosures)

2.25 Margin

The difference between the most severe specified service conditions and the conditions used during equipment qualification type testing

2.26 Mild Environment

An environment expected as a result of normal service conditions and extremes (abnormal) in service conditions where seismic is the only DBA of consequence

2.27 Mild Zone

An area of the plant that is predicted to have conditions of a mild environment

2.28 Nuclear Generating Station

A plant wherein electrical energy is produced from nuclear energy by means of suitable apparatus. The station may consist of one or more units that may or may not share some common auxiliaries.

2.29 Normal Conditions

The environmental conditions expected during normal plant operation with equipment performing its function, as required, on a continuous steady-state basis

2.30 Operating Experience

Accumulation of verifiable service data for conditions equivalent to those for which particular equipment is to be qualified

2.31 Performance Requirements

Specified range of parameters within which equipment must operate under normal and accident conditions (e.g., power, actuation time, and accuracy).

2.32 Qualified Life

The period of time for which satisfactory performance can be demonstrated for a specific set of service conditions. The qualified life of a particular equipment item may be changed during its installed life where justified.

2.33 Sample Equipment

Production equipment tested to obtain data that are valid over a range of ratings and for specific services

2.34 Service Conditions

Environmental, power, and signal conditions expected as a result of normal operating requirements, expected extremes (abnormal) in operating requirements, and postulated conditions appropriate for the DBAs of the stations.

2.35 Synergistic Effects

The effects that result from two or more stresses acting together, as distinguished from the effects of the stresses applied separately

2.36 Type Tests

Tests made on one or more equipment samples to verify the adequacy of the design and manufacturing processes

3 DESCRIPTION OF ENVIRONMENTAL QUALIFICATION PROGRAM

3.1 Scope of Supply

This report addresses electrical and active mechanical equipment important to safety for nuclear power plants. This equipment is classified in four categories by 10 CFR 50.49 (b) and NUREG-0800 (SRP 3.11) as (1) safety-related electric equipment which is required to function under the postulated accident conditions, (2) non-safety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions by safety-related equipment, (3) accident monitoring equipment, and (4) safety-related active mechanical equipment. Category (1) includes Class 1E electrical equipment, Category (2) equipment shall be selected for environmental qualification by the respective responsible system engineers based on their evaluation of the equipment's failure under postulated environmental conditions as being detrimental to satisfactory accomplishment of equipment safety functions. The Category (3) group comprises NRC RG 1.97 (Reference 9.23) accident monitoring instrumentation equipment. Category (4) is the safety-related active mechanical equipment that contains non-metallic parts/components such as seals, gaskets, and lubricants. The environmental qualification program described in this document is based on engineering principles that provide reasonable assurance these components will function properly in their environments, when required during normal operation and during and after DBAs.

For the APR1400, the scope of supply for safety-related electrical and active mechanical equipment includes the following:

a. Load center and switchgear

b. Motor control center

c. DC motor control center

d. Battery, charger, and inverter

e. Electrical penetration assemblies

f. Electrical cables

g. Monitoring system and associated panels

h. Process sensor and instrumentation

i. Power-operated valve assemblies

j. Check valves

k. Safety relief valves

l. Pumps and drives of various types

m. Air handling unit (AHU) and cubicle coolers

n. Air cleaning unit (ACU), fan, and duct heaters

o. Emergency diesel generators (EDGs)

p. Dampers

q. Chillers

3.2 Qualification Program

Applicants for operating licenses are required to demonstrate that electrical and active mechanical equipment important to safety will perform its required Class 1E functions throughout their design life under the expected normal and postulated accident conditions. Qualification programs must consider the effects of normal and accident environments, inservice and seismic vibration, radiation, temperature, pressure, chemical spray, humidity, submergence, synergistic effects, dust, as well as the natural aging process for the individual equipment.

The goal of the qualification program is to provide reasonable assurance that the specified equipment will operate within defined limits when exposed to the conditions associated with its required service environments. In order to meet this goal, the qualification program will address the following areas, as required.

a. Performance or operating requirements for Class 1E electrical and safety-related active mechanical equipment to demonstrate qualification

b. The environmental conditions and exposure times for which the equipment must be qualified

c. Simulation of environments or effects to determine qualification of individual components

d. Effects on these components of long- or short-term exposure to simulated environments

e. Methods of observing or detecting these effects (anomalies)

f. The methods for establishing a qualified life

g. The required levels of documentation and quality assurance

The integration of these areas is accomplished through a series of activities that include the following:

a. Generation of an aging analysis plan and report that define age-susceptible components of the equipment (This program also includes detailed procedures for age conditioning and defines periodic replacement intervals as required.)

b. Generation of a qualification plan that incorporates the results of the aging analysis in defining the qualification methods and documentation activities of the qualification program

c. Performance of the age conditioning sub-program and preparation of an age conditioning report, if required

d. Preparation of detailed qualification test plans and procedures

e. Performance of the qualification testing

f. Preparation of the final qualification test report and qualification data summary form

g. Development of the requirements for maintenance and surveillance activities

This report will address each one of the above areas as it applies to safety-related electrical and active mechanical equipment.

The qualification program is established to meet the requirements of 10 CFR 50.49, and the “Category I” requirements of NUREG-0588, NUREG-0800, NRC RG 1.89, and IEEE Std. 323. The qualification program has two approaches that are based on the equipment's location. Equipment located in a harsh environment is not treated in the same fashion as equipment located in a mild environment. Regardless of equipment location, qualification will be demonstrated based on either type testing, accelerated age conditioning, periodic replacement, surveillance/preventive maintenance (S/PM), and/or any combination thereof. The qualification methods associated with both approaches are as follows:

a. Harsh Environments

Safety-related equipment located in a harsh environment, such as in containment and in some auxiliary building areas, required to be functional during and after the DBAs will undergo an aging analysis and an accelerated aging program. Subsequent to age conditioning, the equipment will undergo type testing for the accident environment as specified in Sections 2.0, 3.0, and 4.0 of NUREG-0588 and Section 6.0 of IEEE Std. 323. Equipment subjected to a postulated harsh environment includes Class 1E transmitters, cables and connectors, some process instrumentation, electrical penetration assemblies, cubicle coolers, ACU, nuclear service valves and auxiliary equipment, radiation and hydrogen monitoring equipment, pump motors and damper.

b. Mild Environments

Safety-related equipment located in a mild environment, such as control areas and some areas in the plant, will be qualified for the normal local environment and a seismic event. An aging analysis will be performed prior to qualification type testing to determine whether or not known significant aging mechanisms exist for that equipment. The aging analysis will focus on the identification of known aging mechanisms that significantly increase the equipment susceptibility to its DBA (seismic only for mild environments). Pending the results of the aging analysis, the equipment will either require an accelerated age conditioning program, periodic part replacement program, surveillance/preventive maintenance program, or any combination thereof to demonstrate and maintain qualification status. Equipment subjected to a mild environment includes Class 1E local control panels, some process instrumentation (indicators, converters, and recorders), load center, SWGR, DC control center, MCC, battery, charger and inverter, AHU, fan and duct heaters, EDG, and miscellaneous electronic modules.

3.2.1 Aging

The assessment of equipment aging effects is required to determine if significant aging mechanism does exist regardless of equipment location. Thermal, radiation, humidity, cyclic operation, electromechanical, and synergistic effects will be addressed as appropriate.Where significant aging mechanisms are identified, equipment shall be preconditioned by natural or accelerated aging.

3.2.1.1 Accelerated age conditioning

The accelerated age conditioning program will be conducted in accordance with Section 4.0 of NUREG-0588 and Section 6.0 of IEEE Std. 323.

The methodology used in the determination and evaluation of the equipment age-related failure modes and mechanisms will include, as appropriate, the following types of information:

a. Arrhenius and/or activation energy data

b. Aging acceleration rate data

c. Failure modes and effects analysis (FMEA) data

d. Thermal stress data

e. Electrical stress data

f. Electromechanical and operational cycling data

g. Normal operating vibration data

h. Radiation component susceptibility data

i. Major industry known synergistic data

3.2.1.2 Natural Aging

The natural aging will be conducted in accordance with 10CFR 50.49 and Section 6.3.1.8.1 of IEEE Std. 323-2003. If naturally preconditioning the equipment to end-of-life condition is not practicable, shorter life can be designated. In this case, the equipment shall be replaced at a speicified interval. Anaysis is performed to verify that natural aging conditions are at least as severe as the intended service condition. In the end, qualified life is determined based on the designated life when analysis and DBA testing are successfully completed.

Natural aging can be used for type testing provided that

a. Operating data of the equipment is available

b. Operating and maintenance/replacement records are available

c. Operating conditions are at least as severe as intended service condition

3.2.2 Seismic

The seismic qualification program for Class 1E equipment will be in accordance with IEEE Std. 344 (Reference 9.10).

Seismic qualification of pump motors, and nuclear service valves and auxiliary equipment, is per IEEE Std. 344.

This report does not describe seismic testing, methods, or results, other than to reference IEEE Std. 344.

The detailed seismic qualification is described in Part 2, Seismic Qualification Program.

3.2.3 Environmental

Equipment will be environmentally qualified to levels at least as severe as the conditions specified in Table 3 of this report for normal and accident conditions. Environmental parameters and qualification profiles for DBAs (LOCA, MSLB, HELB) are provided in Table 3, 4 and Figure 1 to Figure 7 of this report.

3.3 Environmental Conditions and Effects

The postulated environmental conditions to which safety-related equipment are exposed generally include long time periods at either moderate or low levels of temperature, pressure, humidity, and radiation, followed by, for equipment located in the containment, exposure to high levels of these same parameters for relatively short periods of time. Equipment operation under these high stress levels may be required in order to mitigate or monitor the postulated accident conditions. The level of exposure may also be affected by the location of the particular equipment.

For example, a component located in the reactor containment building may be exposed to moderate temperature, pressure, humidity, and radiation for long periods of time and then would be required to function for safety purposes under possible conditions of high temperature, pressure, humidity, radiation and chemical spray resulting from a LOCA or MSLB /MFLB.

The purpose of the qualification program is to demonstrate that equipment will perform its Class 1E function.

3.3.1 Temperature

3.3.1.1 Harsh Environment

The preferred method of establishing an environmental profile for DBA testing of safety-related equipment located in harsh environmental zone is to adhere to Category I guidelines in Sections 1.1 and 1.2 of NUREG-0588, Rev. 1 for developing a test profile that will envelop all temperature and pressure gradients for DBAs in a superheated steam/air environment. See the APR1400 containment DBA temperature and pressure profiles provided in Figure 1 to 7 of this report.

A second method of establishing a test profile is based on a thermal equivalence analysis. This method of establishing a profile will be used in lieu of the preferred method whenever the preferred method represents severe overtesting of a particular component.

3.3.1.2 Thermal Equivalence Requirements

In an accident scenario for which it is necessary to use thermal equivalence techniques, the following requirements must be met:

a. Application of the thermal equivalence approach shall be justified for each piece of equipment, including any judgments regarding the survivability limits of the equipment.

b. The specific heat transfer modeling of the equipment shall be described and the selection of the critical surface or surfaces shall be justified as limiting with respect to both time and location. The test results will be used to demonstrate the conservatism of the heat transfer modeling.

c. Multiple temperature measurements of the critical surface(s) from testing shall envelop the calculated surface temperature transient(s), including the initial ramp. "Soaking" will not be permitted.

d. A margin of at least +8 ℃ (+15 °F) shall be applied between the measured surface temperature and the calculated surface temperature. This margin accounts for the uncertainties associated with design, production tolerances, testing techniques, and the number of units tested. This temperature margin of +8 ℃ (+15 °F) is in accordance with the guideline of IEEE Std. 323.

e. Application of the thermal equivalence approach shall be restricted to the limiting superheated steam harsh environment, based on a spectrum of break sizes.

3.3.1.3 Mild Environment

Equipment located in general plant areas outside containment that is not subjected to a DBA environment will be qualified to the normal and abnormal range of environmental conditions postulated to occur at the equipment location. Equipment that is served by safety-related support systems will be qualified per defined environmental interface requirements, to the limiting environmental conditions that are postulated for that location.

Specific environmental conditions, as described in Table 3 of this report, will be used as appropriate for environmental qualification of the equipment in mild environments.

3.3.2 Radiation

3.3.2.1 Harsh and Mild Environments

Equipment will be qualified for the types and levels of radiation associated with normal operation plus the radiation associated with the most severe DBA. These levels are defined in Table 3 of this report. If more than one type of radiation is significant, each type may be applied separately.

Equipment that is exposed to radiation greater than 10^2 Gy (greater than 10 Gy for electronic components such as semiconductors or electronic components containing organic material) will be irradiated to its anticipated total integrated dose (TID) prior to type testing unless it is determined by analysis supported by partial type test data, that radiation does not negatively impact the equipment's ability to perform its required function. Where analysis supported by partial type test data cannot demonstrate proper operation at the required radiation levels, type testing will be performed

Where the application of the accident dose is planned during DBA testing, it need not be included during the aging process.

Equipment will be qualified to the specific radiation environments defined in Table 3 of this report, as required.

3.3.2.2 Gamma

Cobalt-60 is considered an acceptable gamma radiation source. Other sources may be found acceptable, and will be justified. Equipment will be tested to specific gamma radiation levels of the reactor containment building defined in Table 3 of this report.

3.3.2.3 Beta

Equipment exposed to beta radiation will be identified and an analysis will be performed to determine if the operability of the equipment is affected by beta radiation ionization and heating effects. Qualification will be performed by test unless analysis demonstrates that the safety function will not be degraded by beta exposure. Equipment will be tested and/or analyzed to the beta radiation levels of the reactor containment building defined in Table 3 of this report. Where testing is recommended, a gamma equivalent radiation source will be used.

3.3.2.4 Paints/Radiation Effects

An analysis will be performed addressing paint exposure to beta and gamma radiation, if required. Qualification of painted equipment will be performed by test, if analysis indicates that the safety function of the equipment could be impaired by paint failure due to radiation.

3.3.3 Vibration

Vibration may be externally or self-induced. Safety-related piping systems (including components) are designed and observed under startup or initial service conditions to ensure that external or self-induced vibration of piping systems is in accordance with The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III. Vibration effects of components (e.g., Class 1E pump motors) are addressed by periodic measurement of vibration during inservice inspection tests of pumps in accordance with ASME Code, Section XI. For pump motors, acceptance vibration levels defined in the Hydraulic Institute Standards provide the maximum vibration levels acceptable to ensure continued qualified motor performance.

Where significant levels of continuous vibration are expected to exist during service, the effects of such vibration, either externally or self-induced, will be evaluated via surveillance, preventive maintenance, analysis, partial type testing, or any combination of the above.

3.3.4 Pressure

Safety-related equipment in the APR1400 is not normally exposed to high-pressure environments. However, after/during a postulated accident, such as the LOCA or MSLB, components located in the reactor containment building may be exposed to significant external pressure from a combined steam-air mixture. Equipment will be environmentally tested to these conditions and its performance will be demonstrated during and after the test.

Refer to the containment DBA pressure profile, provided in Figure 1 of this report.

3.3.5 Humidity

Safety-related equipment in APR1400 is not normally exposed to 100 percent relative humidity (RH). However, during and after a postulated accident, such as a LOCA or MSLB, components located in the reactor containment building may be exposed to 100 percent RH resulting from condensing steam. This equipment will be environmentally tested to short-term high humidity levels and its performance will be demonstrated during and after the test.

3.3.6 Chemical Spray

Safety-related equipment in the APR1400 is not normally exposed to chemical spray environments. However, during and after a postulated accident, such as a LOCA or MSLB, components located in the reactor containment building may be exposed to a chemical spray by actuation of the containment spray system. Equipment will be environmentally tested to conditions at least as severe as these conditions and its performance will be demonstrated during and after the test. A single failure analysis of the spray system will be performed, as described in Subsection 5.2.2, to determine the most severe spray composition. Corrosion effects due to long-term exposure will be addressed, as appropriate.

Where qualification for chemical spray environment is required, the simulated spray will be initiated at the rate and duration shown in containment spray conditions table of this report. Typical values of chemical spray composition, concentration, and pH are defined in containment spray condition table of this report.

3.3.7 Dust

Dust requirements will not be applied to indoor equipment, because indoor conditions are prevented by normal dust control in the plant ventilation systems.

Outdoor dust environments will be considered when establishing service conditions and qualification requirements. The potential effects of dust exposure will be evaluated relative to effects upon equipment safety function performance. Where dust could have a degrading effect on equipment safety function performance, it will be addressed in the qualification program through the upgrading of equipment interface requirements. The following factors will be considered as appropriate when evaluating the effects of outdoor dust.

a. Interface requirements and limits for the environmental control systems

b. Equipment filtering capabilities

c. Dust density, composition, and accumulation rate

d. Equipment using high voltages or performing electromechanical functions

3.3.8 Submergence

Equipment locations and operability requirements will be reviewed to establish whether or not specific equipment could be subject to submergence during its required operating time. Flood levels both inside and outside containment will be reviewed and potential impacts on equipment qualification appropriately addressed. Where operability during submergence is required, qualification will be demonstrated by type test and/or analysis supported by partial type test data. See Subsection 5.2.1 for additional discussion.

If simulation of hydrostatic pressure is required for submergence testing, it will include the maximum vapor pressure in that environment plus margin and the pressure due to its level of submergence. The duration of the test will be as specified in equipment-specific qualification test procedures.

3.3.9 Power Supply Voltage and Frequency Variations

Power supply voltage and frequency variations are addressed in several areas throughout the equipment design and verification process. During the design process, interface requirements dictate the acceptable range of power supply variation. Equipment specifications incorporate these interface requirements into the design to ensure acceptable operation within the defined ranges of power supply voltage and frequency variations. Upon equipment fabrication and completion, design verification tests are performed to demonstrate design adequacy. Class 1E pump motors are designed and qualified to operate successfully under normal operating condition at rated load with a variation in the voltage or frequency up to the following typical values:

a. ±10 percent of rated voltage with rated frequency

b. ±5 percent of rated frequency with rated voltage

c. A combined variation in voltage and frequency of ±10 percent of the rated values, provided the frequency variation does not exceed ±5 percent of rated frequency

3.3.10 Other Environmental Effects

a. Heat rise due to I^2R

b. Heat rise produced by conduction

c. Contact of component with process fluids

4 EQUIPMENT QUALIFICATION REQUIREMENTS

Qualification requirements for safety-related equipment in the scope of supply are contained in the APR1400 procurement specifications. These requirements include equipment-specific DBAs, location, normal and accident environments, and operating times required under accident environments.

4.1 Location

Location determines the harsh or mild environment for the equipment. Equipment located in the containment building may be exposed to a normal, moderate-temperature, and moderate-radiation environment as well as a high-temperature, high-pressure, high-radiation, high-humidity, and chemical spray accident environment, including a possible seismic event. Most equipment located outside containment would only be subjected to a possible seismic event or a limited-temperature/humidity excursion.

If it is determined that a particular piece of equipment is located in an area that exposes it to a defined environmental condition (e.g., high-energy line break [HELB], flooding, or radiation due to recirculation fluids), then these conditions will be incorporated into the qualification program.

4.2 Environment

The environment to which equipment is exposed is contingent on its location as described above, as well as on the type of accident. For example, a LOCA would expose equipment to a different accident environment in the containment building than an MSLB or a seismic event. The qualification requirements will impose the worst-case environment for each component, as applicable.

4.3 Design Basis Accidents

DBAs are established for each piece of equipment based on the requirements of the safety analysis. To demonstrate that the equipment is qualified to function during and/or after a DBA, it will be qualified to a simulated test environment that exceeds, with appropriate margin, the defined environmental condition associated with that accident.

4.4 Operating Requirements

Operating requirements for specific equipment are established by the safety analysis of each accident. Some equipment may be required to function during and after the accident and other equipment may only be required to maintain structural integrity to avoid affecting the operation of safety equipment.

5 METHODS OF QUALIFICATION

This section describes type tests, analysis, and other methods of qualification consistent with the requirements of NUREG-0588. The analysis used to establish the environmental conditions for DBAs are described. The methodology used to perform an aging analysis is also described.

The qualification methods defined in IEEE Std. 323 are used, as follows:

a. Type testing

b. Operating experience

c. Analysis

d. Combined methods

(Any combination of type testing, operating experience, and analysis)

5.1 Type Testing

The goal of type testing is to demonstrate that the equipment performance meets or exceeds the requirements of equipment performance specifications under the normal, abnormal, and accident conditions specified in the APR1400 equipment procurement specifications.

Type testing is the preferred method and will be employed to the maximum extent practical. Where operating experience or analysis is used, partial type testing will be used to support assumptions made and conclusions reached.

5.1.1 Equipment Procurement Specification

Safety-related equipment specifications include a description of the equipment, the safety-related performance characteristics, design environmental conditions and, where appropriate, the effect of changes in environmental conditions upon safety-related performance characteristics. Safety-related performance characteristics will be specified with nominal, maximum, and minimum values, where applicable. Design environmental conditions are specified with normal, DBA, and post-DBA ranges or conditions, where applicable. Miscellaneous data, such as significant sequences, rate of change, and combinations of environmental conditions; operating, energy and environmental cycles; qualified life; and unusual environmental conditions are specified as required.

The environmental qualification checklists that are completed for each piece of equipment undergoing qualification will address the safety-related equipment qualification and environmental parameters. The specific equipment documentation provides the customer-specific installation requirements and the manner and frequency of maintenance requirements to maintain qualification.

5.1.2 Type Test Methods

The type test demonstrates that the equipment performance characteristics meet or exceed its specified safety-related performance requirements. The type test will consist of a planned sequence of test conditions that meet or exceed the expected or specified service conditions, including margin, per IEEE Std. 323, and will take into account both normal and accident service conditions.

Prior to performing the type test, a written qualification test plan, aging analysis report, age conditioning report, and qualification test procedures are prepared in accordance with IEEE Std. 323 and NUREG-0588.

The safety-related equipment is mounted in a manner and position that simulate its in-plant installation.

The safety-related performance characteristics of the equipment are determined at the nominal controlled environmental and energy supply operating conditions. Equipment is operated at rated load conditions over the range of its input and output parameters or other safety functions.

The safety-related performance characteristics of the equipment are determined for the significant portions of the design range of each of the significant environmental parameters or each significant combination thereof.

The test is monitored using equipment that provides sufficient resolution for detecting meaningful changes in the measured variables. The test equipment is calibrated against auditable calibration standards and will have documentation to support such calibration. The monitoring of performance characteristics and environmental parameters is of sufficient frequency to provide an assured basis for evaluation of the safety-related performance characteristics of the equipment.

Performance characteristics will be monitored and recorded (as appropriate) before, during, and after type testing.

Operability status of the equipment will be monitored and recorded (as appropriate) continuously during testing. For long-term testing (longer than 1 day), monitoring at discrete intervals is performed with justification provided.

5.1.3 Margin

The purpose of margin in qualification testing is to account for reasonable uncertainties while demonstrating satisfactory performance.

The qualification type testing includes provisions to verify that margin exists. In defining the type test, increasing levels of testing, number of test cycles, or test duration are considered as methods of providing reasonable assurance that adequate margin exists.

Margins provided in Section 6.3.1.6 of IEEE Std. 323 will be used as a guide. These margins will be applied in addition to any conservatism applied during derivation of local environmental conditions unless the conservatism can be quantified and shown to contain appropriate margins.

Equipment-specific qualification test procedures will define all margins and will utilize the environmental parameters of Table 3 and profiles of Figure 1 to Figure 7 of this report as service conditions.

Typical margins that are applied, as appropriate, to service conditions for type testing are as follows:

a. Peak temperature: +8 for ℃, +15 for ℉ (Notes 2, 3 and 4)

b. Peak pressure: +10 percent of gauge pressure but not more than 10 psi (Notes 2 and 3)

c. Radiation: +10 percent of accident dose (Note 5)

d. Voltage: ±10 percent of rated value unless otherwise specified (Note 7)

e. Frequency: ±5 percent of rated value unless otherwise specified (Note 7)

f. Time: +10 percent of the period of time the equipment is required to be operational following the DBA (Note 6)

g. Vibration: +10 percent added to the acceleration of the response spectrum at the mounting point of the equipment

h. Normal Service Condition (Note 1)

Notes

1) To be applied to equipment located in general plant areas outside containment where it is not subjected to a DBA.

2) To be applied only to DBA and for a minimum of 4 days following the DBA.

3) Margin need not be applied if double peak is used.

4) Under saturated steam conditions, margin on temperature shall be such that test pressure will not exceed the saturated steam pressure corresponding to peak temperature by more than 10 psi.

5) Additional 10 percent margin is not required if the radiation calculations are done per methods outlined in NUREG-0588, Rev. 1 or if calculated values are quantifiable margins.

6) See Subsections 5.1.3.1 and 5.1.3.2 of this report for detailed information.

7) Negative factors shall be applied if, by lowering the value of the service conditions, the severity of the test is increased.

8) If margins are not adequate, the report may be acceptable if justification can be made.

9) Other margins for unique items must be applied as called for in the applicable IEEE Standard.

5.1.3.1 Time Margin

1-hour test margin is normally included in the minimum test time requirement for the following two cases:

a. Where equipment needs to be operational to perform its safety function for a period of time less than 1 hour (i.e., within seconds or minutes), and, once its function is complete, subsequent failures are shown not to be detrimental to plant safety.

b. Where equipment is not required to function during a DBA but must not fail within a short period of time into the accident, and subsequent failures are also shown not to be detrimental to plant safety.

Time margins of less than 1 hour are typically included in the minimum required test time for equipment whose operability time is seconds or minutes and when severe overtesting may result by applying the 1-hour time margin.

The minimum required test time is the sum of the maximum operability time and the time margin. The maximum operability time comprises the time that the specific trip function is required for the full spectrum

of break sizes that establish the particular trip function needed and includes an additional quantity of time that accounts for calculational uncertainties. The maximum operability time is determined as follows.

Maximum operability times are obtained as a function of break area by evaluating each of the DBAs (e.g., steam line break and feedwater line break) for a full spectrum of break area. To provide reasonable assurance that these times are bounding, the initial conditions and trip setpoints that are used in these evaluations are chosen to maximize the time the equipment would be needed. For example, minimum initial containment pressure is coupled with the upper limit on the high containment pressure trip setpoint and maximum initial steam generator pressure is coupled with the lower limit on the low steam generator pressure trip setpoint. Protection system trips whose setpoints might not be reached for certain plant operating conditions will not be credited with limiting the bounding time to trip. Thus, for each DBA, this process yields a bounding time to trip as a function of break area for use in the qualification of protection system trips.

Margins are incorporated by adding a percentage increment to the bounding time to trip versus break area using the method identified in Section 6.3.1.6 of IEEE Std. 323.

5.1.3.2 Unusual Time Margin

In an accident for which it is necessary to use time margin evaluation techniques, the following requirements shall be met.

a. Application of time margins less than 1 hour will be justified for each piece of equipment, including any judgments regarding the survivability limits of the equipment.

b. The maximum operability time will be justified with consideration for a spectrum of breaks and the potential need for the equipment later in an accident or during recovery operations.

c. Demonstration that failure of the equipment after performance of its safety function will neither mislead the operator to take an improper action nor be detrimental to plant safety.

d. The margin applied to the minimum operability time, when combined with the other test margins, will account for the uncertainties associated with the equipment design, production tolerances, and test equipment inaccuracies.

The minimum time margin is determined by multiplying the maximum operability time by a time margin factor. This factor is determined by considering the margins applied to all other test parameters, along with equipment manufacturing tolerances and test sample variations. The magnitude of the factor is modified by the amount of detailed empirical information available associated with manufacturing tolerances, test sample variation, and excess margin available from other parameters.

A quantitative test profile margin comparison may demonstrate equipment qualification by addressing an excessive margin requirement (e.g., temperature or pressure) as compared to an inadequate time margin requirement.

5.1.4 Test Sequence

Type tests are performed on the equipment in a specified sequence that shall be justified as the most severe for the equipment being tested. The same test samples will be exposed to the full testing sequence. For most equipment and applications, the following constitutes the most severe sequence:

a. Inspection is performed to provide reasonable assurance that a test item has not been damaged due to handling since manufacture and to determine basic dimensions.

b. The equipment is then operated under normal conditions to provide a functional database for comparison with performance under more highly stressed conditions. Certain measurements such as rate of change with time of a parameter may be made at this time.

c. The equipment is operated at the extremes of performance characteristics given the equipment specifications excluding DBA and post-DBA conditions unless these data are available from other tests on identical or essentially similar equipment.

d. Accelerated age conditioning is performed next (if required). Key measurements are made following the aging process and compared with the database of information gathered prior to aging. This comparison is performed to determine if the equipment is performing satisfactorily prior to subsequent testing and to verify the existence of potential age-related failure mechanisms. Section 5.4 provides additional discussion regarding the methods and procedures used in an accelerated age conditioning program.

e. Normal and abnormal environmental tests such as radiation exposure, thermal aging, electromechanical cycling, and vibration aging are performed next.

f. The equipment is subjected to simulated seismic vibration. Where it is determined that significant levels of external or internally induced vibration exist, qualification will be demonstrated based upon the methodology presented in Subsection 3.3.3.

g. The equipment is next operated while exposed to the simulated DBA test (radiation may be excluded if incorporated during the normal aging test above). Those safety functions that must be performed during the simulated DBA are continuously monitored.

h. The equipment is then operated while exposed to the simulated post-accident conditions (following exposure to accident conditions). Those safety functions that must be performed during this simulation are monitored. Submergence testing, if required, will be performed following DBA testing per the methodology of Subsection 3.3.8.

The temperature to which equipment is qualified when exposed to the simulated accident environment will be monitored and verified by thermocouple readings located as close as practical to the surface of the components being qualified.

Caustic spray will be incorporated during the simulated accident testing at the maximum pressure and the limiting temperature condition that would occur when the onsite spray systems actuate.

Equipment is inspected or disassembled to the extent necessary for the determination of the status and condition of the equipment, and the findings recorded.

Depending on equipment categorization (see Section 6.2) one of the following type test sequences will be used.

Equipment in category A and B:

a. Pre-test inspection

b. Performance testing (baseline testing)

c. Accelerated aging (thermal, operational cycles, radiation, vibration)

d. Performance testing

e. Seismic testing

f. Performance testing

g. DBA testing

h. Performance testing

i. Post-test inspection

Notes

1) Radiation aging is to precede thermal aging if synergistic effects are not identified.

2) Radiation aging need not be done if it is shown that the required radiation level would not affect the equipment safety-related function.

3) Vibration aging may be included as part of seismic testing.

The following tests and monitoring are performed, as applicable, in addition to the sequence specified above.

1) Performance testing and/or monitoring of operability status during (e) and (g), to the extent practical

2) Submergence test following (g), if required

Equipment in category C and D:

a. Pre-test inspection

b. Performance testing (baseline testing)

c. Aging

d. Performance testing

e. Normal and abnormal environmental testing

f. Performance testing

g. Seismic testing

h. Performance testing

i. Post-test inspection

Notes:

The following tests and monitoring are performed, as applicable, in addition to the sequence specified above.

1) Performance testing and/or monitoring of operability status during (e) and (g), to the extent practicable

The test sequence for Class 1E pump motors will utilize a similar test sequence as outlined above. The aging analysis and accelerated age conditioning procedures will use the guidelines of IEEE Std. 334 (Reference 9.9) as appropriate. All thermal and radiation age conditioning will be performed on motorettes or formettes made of the same insulating material as the actual full-scale motor that is being qualified.

5.1.5 Type Test Report

Type test data used to verify the qualification of the equipment will be organized in an auditable form. The type test report will be consistent with the requirements of IEEE Std. 323 and NUREG-0588.

Data for safety-related equipment will be compiled in reports prepared at the completion of the qualification program, and will be available for audit as described in Section 6.

5.1.6 Environmental Test Profiles

The containment DBA environmental test profile for equipment that is required to perform a safety-related function during or after a DBA is shown in Figure 1 of this report. For environmental qualification test purposes, margin including additional peak transients, as required by Section 6.3.1.2 and 6.3.1.6 of IEEE Std. 323, shall be applied to the DBA temperature and pressure profiles. Equipment will be exercised or monitored for its safety function.

5.1.7 Acceptance Criteria

Testing, or testing and analysis, will demonstrate that the equipment is qualified to perform its required safety function for all required service conditions with margin at the end of its qualified life.

Acceptance criteria are established prior to the start of type testing and included as part of the qualification test procedure document. The following is a list of typical acceptance criteria:

a. Test environments are at least as severe as, and representative of, the required environmental profile.

b. Operation of the equipment under normal environmental conditions to the extremes of performance and electrical characteristics is within the limits of accuracy required in the equipment specifications.

c. Equipment has been aged, as appropriate, and has been exposed to the expected end-of-life radiation dose if applicable prior to DBA testing.

d. Equipment has been subjected to seismic DBA testing.

e. Operation of the equipment in its safety-related functions, while exposed to the DBA environment, is within the limits of accuracy required in the equipment specifications.

f. Operation of the equipment in its safety-related functions, while exposed to the post-DBA environment, if applicable, is within the limits of accuracy required in the equipment specifications.

g. Post-test examination of the equipment reveals no conditions that might have interfered with the ability of the equipment to perform its safety-related functions.

h. Instrument accuracy requirements are established from the assumptions used in the particular safety analysis for which the equipment performs its safety function. These requirements are reflected in the equipment specifications, and where applicable, in the safety system setpoints. The most conservative limits on time and accuracy requirements would be used for qualification. However, it may be necessary to qualify several instruments to various levels based on the particular applications.

Equipment that is required to function for post-accident monitoring would be tested to the profile shown in Figure 1 of this report, since long-term cooling extends for at least the time period of the profile.

Documentation that the acceptance criteria were properly defined and successfully met will be recorded in the equipment-specific qualification documentation package and highlighted in the qualification data summary form.

5.1.8 Test Anomalies

In the event that anomalies are observed during qualification testing that violate defined acceptance criteria, the following actions will be taken, as appropriate, prior to further qualification testing to provide reasonable assurance of complete and satisfactory resolution:

a. Verify operability status of monitoring and data acquisition equipment involved

b. Re-evaluate acceptance criteria requirements, if appropriate

c. Establish the type of failure (random or common mode)

d. Formal notification submittal to A/E describing and evaluating the failure

e. A/E's review and approval of recommended corrective action for continuing qualification

5.1.8.1 Random Failures

If it is determined that the failure was random, appropriate corrective action will be taken to eliminate the problem.

Replacement parts may be used to replace those that have failed. All replacement parts used will have undergone the same accelerated age conditioning and qualification testing as did the original failed part prior to continuation of the qualification program. All corrective actions taken will be documented and fully justified.

5.1.8.2 Common-Mode Failures

If it is determined that the failure was common mode, appropriate corrective action will be taken to eliminate the problem. Possible corrective action may include equipment/component redesign, part replacement, equipment relocation, additional analysis, or any combination thereof. Part replacement or redesign will be in accordance with the pre-conditioning requirements of random failures. Upon discovery of such a failure, the A/E will be notified prior to taking corrective action. All corrective actions taken will be documented and fully justified.

5.2 Analysis

As stated in Section 5.1, type testing is the preferred method of qualification and will be employed to the extent practical. If analysis is chosen as the primary method for qualification, partial type test data will be provided to support the analytical assumptions and conclusions reached.

The analytical methods used for calculating and establishing pressure and temperature envelopes and radiation levels to which equipment is to be qualified will be compliant with the methods defined in NUREG-0588.

5.2.1 Analyses Based on Partial Type Test Data and Equipment-Specific Qualification Requirements

If analysis is chosen as the primary method for qualification, partial type test data will be provided to adequately demonstrate functional operability. An example demonstrating this approach is as follows:

If analysis is being used to demonstrate submergence capabilities for a particular piece of equipment, type test data on a similar unit may be employed as evidence used to demonstrate qualification for the equipment in question. A structural and functional similarity evaluation between the equipment being qualified and the similar unit will be performed to adequately demonstrate the applicability of the partial type test data.

Equipment-specific analyses may be used to justify elimination of submergence qualification if it can be shown that:

a. The equipment safety function is completed prior to submergence.

b. Adequate operability time margin is incorporated.

c. Subsequent failure will not degrade other equipment.

Where type testing is the preferred method of qualification, analysis may be used to support and justify the qualification test sequence and/or test makeup. An example demonstrating this approach is as follows:

Low-level radiation qualification testing (to levels below 100 Gy or to level below 10 Gy for electronic components such as semiconductors or electronic components containing organic material) may be

deleted from the qualification type test sequence if it can be demonstrated via a radiation susceptibility analysis that low-level radiation does not impact the equipment's ability to perform its required safety function.

5.2.2 Failure Modes and Effects Analysis

A single failure analysis on the containment spray system per Section 1.3 of NUREG-0588 will be performed to determine the resulting most severe chemical composition of the caustic spray. The results of this analysis will be incorporated into the qualification program. Where qualification has been completed using chemical spray composition parameters less severe than as those required by NUREG-0588, an analysis may be performed, in lieu of retesting, to demonstrate that the new, more severe chemical composition has no adverse impact on the equipment's ability to perform its safety function. Justification for analysis in lieu of retesting will be provided.

Some components of safety-related equipment do not perform a safety-related function but, due to a particular hardware configuration, must be classified as safety related.

For this type of component, an FMEA will be performed that demonstrates by analysis that failure of that component, for a defined set of worst-case failure modes, does not have a degrading impact on other interfacing safety-related components.

An evaluation will also be performed defining whether or not test circuitry should be classified as safety-related components. Test circuitry will be classified as safety-related if it could fail in a manner that results in perturbations exceeding defined acceptance criteria.

5.3 Operating Experience

Performance data from equipment of similar design that has successfully operated under known service conditions may be used in qualifying other equipment to equal or less severe conditions. Applicability of these data depends on the adequacy of documentation establishing past service conditions, equipment performance, and similarity to the equipment to be qualified and upon which operating experience exists. A demonstration of required operability during applicable DBA(s) shall be included in equipment qualification programs based on operating experience, when DBA qualification is required.

5.4 Aging

As stated in Subsection 3.2.1, the aging portion of the qualification program is defined based upon whether or not equipment is located in a harsh or a mild environment. Equipment located in a harsh environment will undergo an aging analysis and an accelerated age conditioning program. Equipment located in a mild environment will undergo an aging analysis that focuses on the identification of known aging mechanisms that significantly increase the equipment susceptibility to its DBA (seismic only for mild environments). If no known significant aging mechanisms are found, a surveillance/preventive maintenance (S/PM) program will be developed to monitor for degradation trends that suggest increasing seismic susceptibility. If an aging mechanism is found that is known to significantly increase the equipment's seismic susceptibility with time, then that mechanism will be analyzed to determine whether an accelerated aging program or a periodic part replacement program is appropriate.

The following subsections describe in detail the methods and documentation requirements associated with the development of an aging analysis and the resulting age conditioning program, periodic replacement program and/or the S/PM, as appropriate, to demonstrate qualification of the respective equipment or component.

5.4.1 Aging Analysis and Conditioning

For equipment located in a harsh environment, the following discussion defines the methodology for the development of an aging analysis and an accelerated age conditioning program.

This section may also be applicable for equipment and/or components located in mild environments where it has been determined that known significant aging mechanisms exist and where accelerated age conditioning is appropriate.

The following is a listing of the major efforts that are required in the performance of an aging analysis:

a. Preparation of a complete bill of material consisting of all components, subassemblies, or assemblies (as required) of the equipment

b. Identification of those components performing a safety-related function

c. Analysis of those components identified in item b above for age-related failure modes and mechanisms

d. Development of an accelerated age conditioning procedure that, when implemented, will result in the equipment being aged to a projected end-of-life condition

Thermal, radiation, low-level vibration, cyclic operation, electromechanical, and synergistic aging effects will be considered.

Component/Failure Matrix

For each component identified as performing a safety-related function, corresponding information, as identified in Subsection 3.2.1, will be defined in an aging analysis.

An evaluation of this information will be performed to define dominant age-related failure modes and mechanisms. An accelerated age conditioning procedure or a periodic part replacement program will be prepared based on this evaluation.

Qualified Life Estimation

A goal of the qualification program is to demonstrate that the equipment has a designated qualified life. If a designated qualified life is not obtainable due to material or schedule constraints, then the age analysis will establish various age conditioning procedures that define the efforts and parameters necessary to age the equipment. The selection of the lesser qualified lifetimes is partially a function of the analysis and the physical properties of the equipment. A review will next be made to select one procedure to be implemented.

If qualification is to be based on periodic replacement of a life-limiting component(s), that component(s) will specifically be identified and a periodic replacement program defined as part of the aging analysis, and included in the appropriate interface criteria.

Thermal Aging

Arrhenius methodology will be used to address accelerated thermal aging, where appropriate; however, if other methods are used, justification will be provided.

Electromechanical Cyclic Aging

Electromechanical cyclic aging will be applied prior to qualification testing for the expected number of cycles plus margin under rated load.

The "cycle" and number of cycles plus margin will be defined and justified.

The cycle rate will be defined and will not result in excessive component heating beyond the manufacturer's suggested limits.

Cycling will be performed while under electrical load if so required by the aging analysis. Both current and voltage loading parameters will be specified.

The method for cycling components (e.g., electrical or mechanical actuation) will be defined.

An explicit definition of the term "cycle," as related to electromechanical cyclic operation, will be provided.

Components undergoing cycling will be mounted in a manner that simulates or is conservative with respect to actual inservice mounting.

Electromechanical components being tested will not be cleaned, calibrated, or adjusted during or after the cycling unless this action is part of the component's normal maintenance procedure and schedule. Normal maintenance procedures and schedules will be identified and included as part of the aging analysis and included in the respective interface criteria.

Acceptance criteria will be defined to establish the bases for acceptable operation for the specified number of cycles and loading.

Test measurement procedures will be defined. Test measurements will be taken and documented before, during, and after cyclic aging.

Power On and Off Cycling

The number of power on and off cycles anticipated to occur plus margin will be defined and applied, where significant. Power on and off cycling will be considered significant when the number of cycles is large or where there are significant stresses associated with power on and off cycling. The number of power on and off cycles to be used during age conditioning will be justified.

Radiation Aging

Radiation information and profiles used as input data to the radiation aging analysis will be in accordance with the typical radiation types, levels, and rates and in accordance with equipment-specific requirements.

All component radiation susceptibility analyses will be supported by test data.

Electrical Energization

The effects of electrical energization during the accelerated age conditioning process will be addressed as part of the aging analysis. Electrical energization will only be applied if this analysis indicates that inclusion of this effect, during the accelerated aging process, will have a significant effect on material degradation.

Synergistic Effects

Major industry-recognized age-related synergistic effects will be addressed in the aging analysis.

Aging Sequence

The determination and justification of the accelerated age conditioning sequence will be defined in the aging analysis.

Aging Rate

The basis for all thermal, radiation, electromechanical, and operational accelerated aging rates will be defined and justified in the aging analysis.

Equipment Storage Requirements

Equipment qualification-related storage requirements will be identified within the qualification documentation. These requirements will be based on known significant storage-related aging mechanisms.

Documentation

The results of the aging analysis will be documented and summarized in an aging analysis report. This report will contain all appropriate information used as listed in Section 6.

Accelerated Age Conditioning

The results of the accelerated age conditioning will be presented in an age conditioning report. The accelerated age conditioning report will identify and analyze all equipment failures occurring during the accelerated age conditioning process to determine whether the failure was random or common mode.

5.4.2 Periodic Replacement

As described in Section 5.4, equipment located in mild environments will either undergo an accelerated age conditioning program, periodic part replacement program, surveillance/preventive maintenance program, or any combination thereof. For such equipment, the conclusions of the aging analysis will state the recommended approach.

The aging analysis associated with mild environments will be based on the same type of input data and methodology used for harsh environment equipment. It is the correlation of these data with known significant aging mechanisms and with in-plant equipment accessibility that may result in recommendations stressing periodic part replacement. Where periodic replacement is recommended for specific components, these components will be clearly identified in the age analysis and a replacement program defined and justified.

5.4.3 Surveillance/Preventative Maintenance

For mild environment equipment, if it is determined that no known aging mechanisms exist that significantly increase the equipment's susceptibility to its DBA (seismic only for mild equipment), then an S/PM program will be developed.

The purpose of the S/PM program, which includes scheduled periodic surveillance testing under normal service conditions, is to monitor for degradation trends that suggest increasing susceptibility to a possible common-mode failure due to a seismic event. The basis for the S/PM program is that for equipment located in environments that are unchanged during DBAs, having adequate capability for periodic testing and maintenance, and where no known significant age-related failure mechanisms exist, then advanced age conditioning prior to qualification type testing may not be required if justified. For equipment located in harsh environments, an S/PM program may be established, as appropriate, to provide actual inservice trending data to support the qualified life established during qualification type testing.

This program will include guidelines and schedules for calibration and preventative maintenance. The requirements for the calibration and preventative maintenance will be based upon the plant's normal inservice inspection tests and maintenance program.

The preventative maintenance will include, as appropriate:

a. Visual inspection

b. Mechanical inspection

c. Electrical testing

d. Periodic tests

e. Failure trending

f. Incipient failure detection

It is anticipated that most of these tests are already included in Technical Specifications requirements.

Data maintenance and storage in a central file, and evaluation activities such as the S/PM program, are the responsibility of the utility.

Because of its location, access to equipment in the containment building may be limited for surveillance/ preventive maintenance or periodic calibration.

5.5 Conservatism of Qualification Parameters

The levels of environmental qualification required are specified in Table 3 of this report. Accident conditions of these requirements are established based on the methods recommended by NRC RG 1.89 and NUREG-0588. Margins utilized per Section 6.3.1.6 of IEEE Std 323, Section 3 of NUREG-0588, and as described in Subsection 5.1.3 will be documented in the appropriate qualification document. Comparison of the qualification requirements to the environmental test parameters will demonstrate conservatism of the parameters. Margin identification and verification will be performed.

5.6 Qualification of Safety-Related Active Mechanical Equipment

Environmental qualification of mechanical equipment conforms with GDCs 1and 4, and 10 CFR Part 50, Appendix B, Criteria III and XVII which requires:

a) Components shall be designed to be compatible with the postulated environmental conditions including those associated with LOCAs.

b) Qualification records shall be maintained and shall include the results of tests and material analyses.

c) Design control measures shall be established for verifying the adequacy of design.

Mechanical equipment is principally divided into active and non-active (passive) mechanical equipment.

Environmental qualification of mechanical equipment is focused on the materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, and diaphramgms) and is limited to active mechanical equipment located in harsh environment which has mechanical moving parts to perform its safety-related function. The qualification effort requires the evaluation of all safety-related nonmetallic parts against the applicable environmental conditions.

Non-active mechanical equipment(passive mechanical equipment), whose safety function is structural integrity is designed and qualified for the appropriate temperature and pressure environment in accordance with the applicable code to which it is constructed such as ASME and Pressure Vessel Codes.

The followings shall be confirmed in implementing the environmental qualification of active mechanical equipment:

a) To identify safety-related mechanical equipment located in harsh environment areas, including its required operating time.

b) To identify nonmetallic subcomponents of such equipment.

c) To identify the environmental conditions and process parameters for which this equipment must be qualifited.

d) To identify nonmetallic material capabilities.

e) To evaluate environmental effects.

For this equipment, the service requirements and the environmental requirements are defined in the APR1400 design specification for this equipment.

The safety-related active mechanical equipment that contains non-metallic parts is also environmentally qualified in accordance with ASME Standard QME-1-2007 “Qualification of Active Mechanical Equipment.” QR-B, “Guide for Qualification of Nom-Metallic Parts.”(Reference 9.31), as endorsed by RG 1.100, Revision 3, and is listed in Table 2 as specified by RG 1.206, Section C.I.3.11.6.

6 DOCUMENTATION

This section describes qualification documentation. Qualification documentation will verify that the equipment is qualified for its application and meets its specified performance requirements. Equipment-specific documentation is described below.

6.1 Equipment-Specific Qualification Documentation

In order to demonstrate that the equipment qualification program has adequately addressed all pertinent qualification requirements, the following equipment-specific qualification reports will be developed, as appropriate. The documentation will be organized in an auditable form and in accordance with the guidelines set forth in Sections 6.0 and 7.0 of IEEE Std. 323, and in Section 5.0 and Appendix E of NUREG-0588.

6.1.1 Aging Analysis Report

The aging analysis report, as described in Section 5.4, will contain the following types of information:

a. Identification of the equipment qualified

b. Equipment specification

c. Qualification program

d. Identification of any scheduled surveillance/maintenance, periodic testing, and any parts replacement required to maintain qualification

e. The specific safety function(s), postulated failure mode, or the failure effects to be demonstrated by analysis

f. Description of analytical methods, computer program or mathematical model used, and the method of verification

g. Assumptions and empirically derived values used, with appropriate justification

h. Summary of analytically established performance characteristics and their acceptability

i. Conclusions, including limitations or qualified life or periodic surveillance/maintenance interval determination

j. Approval signature and date

6.1.2 Qualification Plan

The qualification plan outlines the necessary testing and documentation activities required to demonstrate qualification. The qualification plan will incorporate the results obtained in the aging analysis and any previous qualification testing into the overall qualification plan. The following information will be included in the plan:

a. Scope of responsibility

b. Overview and objective

c. Equipment description

d. Test sequence and makeup (overview)

e. Seismic and environmental test parameters

f. Acceptance criteria (overview)

g. Documentation submittal requirements

h. Approval signature and date

6.1.3 Age Conditioning Report

The results of the accelerated age conditioning process will be presented in an age conditioning report either as a separate document or as part of the final qualification test report. The purpose of this report is to identify and analyze all equipment failures occurring during the accelerated age conditioning process to determine whether the failure(s) were random or common mode. Approval signature and date will be obtained.

6.1.4 Qualification Test Procedure

Detailed qualification test procedures and associated acceptance criteria will be defined prior to actual qualification testing. The following types of procedural information will be addressed, as appropriate:

a. Overview and objective

b. Equipment description

c. Detailed test sequence

d. Monitoring and operability check procedures

e. Baseline performance test procedures

f. Environmental and seismic test profile definition and procedures

g. Margin verification

h. Detailed test setup schematics and/or description

i. Required test instrumentation and equipment

j. Detailed acceptance criteria

k. Equipment mounting and cable connection schematics and/or description

l. Approval signature and date

6.1.5 Qualification Test Report

Upon completion of qualification testing, an equipment-specific test report will be prepared summarizing the test results, conclusions, and recommendations. The following types of information will be addressed and included, as appropriate:

a. Identification of the equipment qualified

b. Equipment specification

c. Qualification program

d. Identification of any scheduled surveillance/maintenance, periodic testing, and any parts replacement required to maintain qualification

e. Identification of safety function(s) to be demonstrated by test data

f. Test plan

g. The report of test results shall include:

   1) Test objective

   2) Detailed description of test sample

   3) Description of test setup, instrumentation and calibration data

   4) Test procedure

   5) Summary of test data, accuracy, and anomalies

   6) The result of a qualification program to demonstrate that the equipment remains functional during and following a DBE as applicable.

h. Summary and conclusions, including limitations and qualified life or periodic surveillance/ maintenance interval determination

i. Approval signature and date

6.1.6 Operating Experience Data

a. Identification of equipment qualified

b. Equipment specification

c. Qualification program

d. Identification of any scheduled surveillance/maintenance, periodic testing, and any parts replacement required to maintain qualification

e. Identification of the safety function(s) to be demonstrated by operating experience

f. Specification of the equipment for which operating experience is available

g. Comparison of specifications and functions of equipment with operating experience and new equipment to be qualified

h. Summary of operating experience data, including service conditions, maintenance records, and operating history.

i. Conclusions, including limitations and qualified life or periodic surveillance/maintenance interval determination

j. Approval signature and date

6.1.7 Equipment for Mild Environment

a. Identification of the equipment qualified

b. Equipment specification

c. Identification of any scheduled surveillance/maintenance, periodic testing, and any parts replacement required to maintain qualification

d. Identification of the equipment's safety function(s)

e. Certificate of compliance that the equipment supplied meets the requirements of the equipment specification with approval signature and date

6.2 Equipment Categorization

Per the requirements of Appendix E of NUREG-0588, the equipment is grouped into one of the following categories based on its functional requirements and location:

Category	Definition

a. Equipment exposed to the harsh environments of DBAs that must function to mitigate or monitor those accidents

b. Equipment exposed to the harsh environments of DBAs that need not function for mitigation of said accidents but must not fail in a manner detrimental to plant safety during those accidents

c. Equipment exposed to the harsh environments of DBAs that need not function during those accidents and whose failure (in any mode) is deemed not detrimental to plant safety

d. Equipment not exposed to the harsh environments of DBAs

6.3 Qualification Data Summary and Evaluation

In addition to the information identified in Appendix E of NUREG-0588, the following information will be provided, as required:

a. Discussion of how equipment qualification review was performed including consideration of quality assurance

b. How the accident environmental profiles were developed

c. How safety-related equipment required for accident mitigation and safe shutdown of the plant was identified

6.4 Supporting Documentation

All supporting raw test data and analyses generated during equipment qualification for the appropriate equipment-specific qualification document will be attached or the location provided.

All other publications (e.g., reports, books, and standards) used to support the qualification program will be appropriately referenced to allow data traceability.

7 QUALITY ASSURANCE

Equipment qualification per this report will be in accordance with the following:

a. All Supplier and/or test labs directly used by A/E and/or KHNP for performing safety-related qualification services will be formally reviewed for their quality assurance practices. Results of this review will be maintained.

b. For qualification tests, A/E and/or KHNP quality control surveillance practices will be applied.

c. A/E standard hardware procurement practices will be applied when procuring test samples.

d. Test procedures and analyses will be prepared to ensure repeatability of the qualification test program.

e. Qualification documentation will be reviewed in accordance with standard A/E review practices and quality assurance requirements.

8 ADMINISTRATIVE PROCEDURES

8.1 Equipment Specification

Performance requirements are set forth in equipment specifications that are generally prepared by the A/E. The requirements include nominal maximum and minimum values of performance parameters, and environmental conditions for normal and DBA operation. The applicable standards for qualification are referenced by the specification. The specification is included in the engineering package that is sent to prospective Suppliers for bidding.

8.2 Supplier Design and Qualification Program

After the contract has been awarded, the Supplier submits his design and qualification program to the A/E for approval. The design is reviewed to ensure the equipment is capable of meeting performance and environmental requirements. The qualification program is reviewed for compliance with the requirements of the equipment specification and the referenced standards. In most cases, the qualification program is written by the qualification facility that has been retained by the Supplier.

8.3 Qualification Task

Although the task of qualification is normally performed by the Supplier, the A/E follows the progress of the qualification effort and, in conjunction with the Supplier, interfaces with the qualification facility to provide reasonable assurance that the equipment will be subjected to the proper qualification environment. The Supplier is responsible for ensuring that the electrical and operational performance of the equipment meets the acceptance criteria. For the more complex tests, the A/E and KHNP may have witnesses present during testing.

8.4 Qualification Documentation and Submittals

Throughout the qualification program, various defined documentation products (see Section 6) are generated. The A/E will review and approve all documentation products to provide reasonable assurance of proper program definition and control.

The aging analysis report is prepared first, defining all age conditioning results and procedures and part replacement recommendations, as appropriate. Next, the qualification plan is submitted, outlining the overall program and informing the Supplier and test lab of services to be prepared, if required. In parallel with age conditioning, detailed qualification test procedures and acceptance criteria are developed. After completion of age conditioning and test procedure development, actual qualification testing is performed.

Upon completion of qualification testing, a test report will be prepared and submitted to the A/E for approval. When the report is approved, it is maintained by the A/E as a qualification report that contains sufficient information to allow QA traceability and repeatability. Qualification documentation will be available for audit.

9 REFERENCES

All codes and standards shall be the edition in effect as of December 31, 2010 unless identified otherwise.

1 NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," Rev. 1, U.S Nuclear Regulatory Commission, November 1980.

2 NUREG-0800, Standard Review Plan, Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment." Rev. 3, U.S Nuclear Regulatory Commission, March 2007.

3 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants" U.S Nuclear Regulatory Commission.

4 IEEE Std 98-2002, "IEEE Standard for the Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials," Institute of Electrical and Electronics Engineers, 2002.

5 IEEE Std 99-2007, "IEEE Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electric Equipment," Institute of Electrical and Electronics Engineers, 2007.

6 IEEE Std 101-1987, "IEEE Guide for the Statistical Analysis of Thermal Life Test Data," Institute of Electrical and Electronics Engineers, 1987.

7 IEEE Std 317-1983(R2003), "IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers,1983.

8 IEEE Std 323-2003, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2003.

9 IEEE Std 334-2006, "IEEE Standard for Qualifying Continuous Duty Class 1E Motors for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 1983.

10 IEEE Std 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2004.

11 IEEE Std 382-2006, "IEEE Standard Qualification of Actuators for Power-Operated Valve Assemblies with Safety-Related Functions for Nuclear Power Plants," Institute of Electrical and Electronics Engineers, 2006.

12 IEEE Std 383-2003, "IEEE Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2003.

13 IEEE Std 420-2001, "IEEE Standard for Design and Qualification of Class 1E Control Boards, Panels, and Racks Used in Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2001.

14 IEEE Std 535-1986 (R1994), "IEEE Standard for Qualification of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 1986.

15 IEEE Std 572-2006, "IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2006.

16 IEEE Std 603-2009, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2009.

17 IEEE Std 649-2006, "IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2006.

18 IEEE Std 627-2010, "IEEE Standard for Qualification of Equipment used in Nuclear Facilities," Institute of Electrical and Electronics Engineers, 2010.

19 IEEE Std 650-2006, "IEEE Standard for Qualification of Class 1E Static Battery Chargers and Inverters for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2006.

20 Regulatory Guide 1.63, "Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, February 1987.

21 Regulatory Guide 1.73, "Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants," Rev.1, U.S. Nuclear Regulatory Commission, October 2013.

22 Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," Rev. 1, U.S. Nuclear Regulatory Commission, June 1984

23 Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Rev. 4, U.S. Nuclear Regulatory Commission, June 2006.

24 Regulatory Guide 1.100, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," Rev. 3, U.S. Nuclear Regulatory Commission, September 2009.

25 Regulatory Guide 1.156, "Qualification of Connection Assemblies for Nuclear Power Plants," Rev. 1, U.S. Nuclear Regulatory Commission, July 2011.

26 Regulatory Guide 1.158, "Qualification of Safety-Related Lead Storage Batteries for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, February 1989.

27 Regulatory Guide 1.211, “Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants,” U.S. Nuclear Regulatory Commission, April 2009.

28 Bulletin 79-01B "Environmental Qualification of Class1E Equipment,” U.S. Nuclear Regulatory Commission, January 1980.

29 EPRI NP-1588, "Research Project 890-1, Final Report, "A Review of Equipment Aging Theory and Technology," Electric Power Research Institute, September 1980.

30 ASME Boiler and Pressure Vessel Code, The American Society of Mechanical Engineers.

31 ASME QME-1-2007 “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants,” The American Society of Mechanical Engineers, 2007.

Table 1

Ventilation Area

Area	Safety-Related	Area Temperature Alarm in Control Room
Control Room Area		
1. Control Room and Adjacent Offices	Yes	Yes
2. Computer Room	No	Yes
Auxiliary Building Clean Area		
1. Turbine-Driven AFWP Room	No	Yes
2. Motor-Driven AFWP Room	Yes	Yes
3. Essential Chiller and Pump	Yes	Yes
Auxiliary Building Controlled Area		
1. SC Heat Exchanger Room	Yes	Yes
2. SI Pump Room	Yes	Yes
3. CS Pump Room	Yes	Yes
4. CS Heat Exchanger Room	Yes	Yes
5. Penetration Room	Yes	Yes
6. CCW Pump Room	Yes	Yes
Electrical Equipment Room		
1. Vital Instrument & Equipment	Yes	Yes
2. Class 1E Switchgear Room	Yes	Yes
3. Class 1E Battery Room	Yes	Yes
4. Remote Shutdown Console Room	Yes	Yes
Fuel Handling Area		
1. Spent Fuel Pool Heat Exchanger Room and Pump Room	Yes	Yes
2. Emergency ACU Room	Yes	Yes
Emergency Diesel Generator Area	Yes	Yes
Containment Building	No	Yes

Table 2 (1 of 51)

Equipment Qualification Equipment List

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
Auxiliary Feedwater System													
AFW-PP01A	Turbine Driven Aux. Feedwater Pumps	ESF	AB	078-A15C	Continuous	Harsh	Mild	Mechanical EQ	No	I	(3)	SR	
AFW-PP01B	Turbine Driven Aux. Feedwater Pumps	ESF	AB	078-A15D	Continuous	Harsh	Mild	Mechanical EQ	No	I	(3)	SR	
AFW-PP02A	Motor Driven Aux. Feedwater Pumps	ESF	AB	078-A20A	Continuous	Harsh	Mild	Mechanical EQ	No	I	(3)	SR	
AFW-PP02B	Motor Driven Aux. Feedwater Pumps	ESF	AB	078-A20B	Continuous	Harsh	Mild	Mechanical EQ	No	I	(3)	SR	
AFW-V0035	Globe Valve and Actuator, AFW Modulating	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0036	Globe Valve and Actuator, AFW Modulating	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0037	Globe Valve and Actuator, AFW Modulating	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0038	Globe Valve and Actuator, AFW Modulating	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0043	Gate Valve and Actuator, AFW Isolation, CIV	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0044	Gate Valve and Actuator, AFW Isolation, CIV	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0045	Gate Valve and Actuator, AFW Isolation, CIV	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AFW-V0046	Gate Valve and Actuator, AFW Isolation, CIV	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Auxiliary Feedwater Pump Turbine System													
AT-V0007	Globe Valve and Actuator, AFW Pump Turbine Steam Line Drain	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AT-V0008	Globe Valve and Actuator, AFW Pump Turbine Steam Line Drain	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AT-V0009	Globe Valve and Actuator, AFW Pump Turbine Steam Line Isolation	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AT-V0010	Globe Valve and Actuator, AFW Pump Turbine Steam Line Isolation	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
AT-LP01C	AF Pump Turbine Control Panel (12)	ESF	AB	078-A15C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AT-LP01D	AF Pump Turbine Control Panel (12)	ESF	AB	078-A15D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
Auxiliary Feedwater Storage and Transfer													
AX-LI003A	Field Indicator Device, AFWST 1 (12)	ESF	AB	100-A07C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI004B	Field Indicator Device, AFWST 2 (12)	ESF	AB	100-A07D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI005A	Field Indicator Device, AFWST 2 (12)	ESF	AB	100-A07D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI005C	Field Indicator Device, AFWST 2 (12)	ESF	AB	100-A07D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI005D	Field Indicator Device, AFWST 2 (12)	ESF	AB	100-A07D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O

Table 2 (2 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
AX-LI006B	Field Indicator Device, AFWST 1 (12)	ESF	AB	100-A07C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI006C	Field Indicator Device, AFWST 1 (12)	ESF	AB	100-A07C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
AX-LI006D	Field Indicator Device, AFWST 1 (12)	ESF	AB	100-A07C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
Component Cooling Water System													
CC-PP03A	Component Cooling Water Make-up Pumps	ESF	AB	078-A29C	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-PP03B	Component Cooling Water Make-up Pumps	ESF	AB	078-A29D	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-PP01A	Component Cooling Water Pumps	ESF	AB	055-A02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-PP01B	Component Cooling Water Pumps	ESF	AB	055-A02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-PP02A	Component Cooling Water Pumps	ESF	AB	055-A02C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-PP02B	Component Cooling Water Pumps	ESF	AB	055-A02D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0011	CCW Surge Tank01A Makeup Isolation	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0012	CCW Surge Tank01B Makeup Isolation	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0021	CCW Heat Exchanger HE01A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0022	CCW Heat Exchanger HE01B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0023	CCW Heat Exchanger HE02A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0024	CCW Heat Exchanger HE02B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0025	CCW Heat Exchanger HE03A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0026	CCW Heat Exchanger HE03B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0027	CCW Heat Exchanger Bypass Isolation	ESF	CCWHXB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0028	CCW Heat Exchanger Bypass Isolation	ESF	CCWHXB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0031	CCW Heat Exchanger HE01A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0032	CCW Heat Exchanger HE01B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0033	CCW Heat Exchanger HE02A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0034	CCW Heat Exchanger HE02B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0035	CCW Heat Exchanger HE03A Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0036	CCW Heat Exchanger HE03B Outlet	ESF	CCWHXB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0037	CCW Heat Exchanger Bypass Isolation	ESF	CCWHXB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0038	CCW Heat Exchanger Bypass Isolation	ESF	CCWHXB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0097	Containment Spray Heat Exchanger 01A Inlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0098	Containment Spray Heat Exchanger 01B Inlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O

Table 2 (3 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
CC-V0131	Essential Chiller Condenser 2B Outlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0132	Essential Chiller Condenser 2A Outlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0143	Train A Non-Safety Load Supply Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0144	Train B Non-Safety Load Supply Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0145	Train A Non-Safety Load Supply Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0146	Train B Non-Safety Load Supply Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0147	Train A Non-Safety Load Return Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0148	Train B Non-Safety Load Return Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0149	Train A Non-Safety Load Return Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0150	Train B Non-Safety Load Return Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0181	DG C Heat Exchanger Inlet Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0182	DG D Heat Exchanger Inlet Isolation	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0191	DG A Heat Exchanger Inlet Isolation	ESF	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0192	DG B Heat Exchanger Inlet Isolation	ESF	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0231	RCP Cooler Supply Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0249	RCP Cooler Return Containment Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0250	RCP Cooler Return Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0296	Letdown Heat Exchanger Supply Containment Isolation	ESF	AB	COL 3.11(7)	Short-Term (40sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0297	Letdown Heat Exchanger Supply Containment Isolation	ESF	RCB	COL 3.11(7)	Short-Term (40sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0301	Letdown Heat Exchanger Return Containment Isolation	ESF	RCB	COL 3.11(7)	Short-Term (40sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0302	Letdown Heat Exchanger Return Containment Isolation	ESF	AB	COL 3.11(7)	Short-Term (40sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0351	SC Heat Exchanger 01A Inlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0352	SC Heat Exchanger 01B Inlet Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0383	Essential Chiller Condenser 1A Outlet Isolation	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0384	Essential Chiller Condenser 1B Outlet Isolation	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0389	SFP Clooing Heat Exchanger 02A Inlet Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0390	SFP Clooing Heat Exchanger 02B Inlet Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CC-V0901	Essential Chiller Condenser 1A Outlet Control	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O

Table 2 (4 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
CC-V0902	Essential Chiller Condenser 1B Outlet Control	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0905	Essential Chiller Condenser 2A Outlet Control	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0906	Essential Chiller Condenser 2B Outlet Control	ESF	AB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0937	Cross Tie Supply Header Isolation	ESF	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0938	Cross Tie Supply Header Isolation	ESF	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0939	Cross Tie Return Header Isolation	ESF	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V0940	Cross Tie Return Header Isolation	ESF	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
CC-V1001	CCW Pump01A Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1002	CCW Pump01B Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1003	CCW Pump02A Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1004	CCW Pump02B Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1099	CCW Quadrant A to RCP Common Line Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CC-V1100	RCP Return Pressure Release Line Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CC-V1107	CCW Surge Tank Tank01A Vacuum Relief	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
CC-V1108	CCW Surge Tank Tank01B Vacuum Relief	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
CC-V1109	N2 Supply to CCW Surge Tank01A Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1110	N2 Supply to CCW Surge Tank01B Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1111	CCW Surge Tank Tank01A Pressure Relief	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
CC-V1112	CCW Surge Tank Tank01B Pressure Relief	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
CC-V1131	CCW Pump Pump01A Recirculation Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1132	CCW Pump Pump01B Recirculation Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1133	CCW Pump Pump02A Recirculation Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1134	CCW Pump Pump02B Recirculation Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1303	CCW Makeup Pump03A Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1304	CCW Makeup Pump03B Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1309	CCW Makeup Pump03A Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1310	CCW Makeup Pump03B Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1317	Demi Water Makeup to Surge Tank01A Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1318	Demi Water Makeup to Surge Tank01B Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1319	Demi Water Makeup to Surge Tank01A Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	

Table 2 (5 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
CC-V1320	Demi Water Makeup to Surge Tank01B Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1325	CCW Makeup Pump03A Recirculation Line Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1326	CCW Makeup Pump03B Recirculation Line Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
CC-V1685	L/D Heat Exchanger Inlet Isolation 297 Bypass Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CC-V1686	L/D Heat Exchanger Outlet Line Pressure Release Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
Condenser Vacuum System													
CA-CA013	Gate Valve and Actuator, CA Isolation, CIV	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
Containment Spray System													
CS-PP01A	Containment Spray Pump & Motor	ESF	AB	050-A01C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-PP01B	Containment Spray Pump & Motor	ESF	AB	050-A01D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0001	Containment Spray Header Block	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0002	Containment Spray Header Block	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0003	Containment Spray Header Isolation	ESF	AB	COL 3.11(7)	Short-Term (60sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0004	Containment Spray Header Isolation	ESF	AB	COL 3.11(7)	Short-Term (60sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0005	CS Heat Exchanger to IRWST Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0006	CS Heat Exchanger to IRWST Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0007	CS Heat Exchanger to IRWST Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V0008	CS Heat Exchanger to IRWST Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
CS-V1001	CS Pump Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CS-V1002	CS Pump Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CS-V1005	CS Heat Exchanger Heat Exchanger01A Thermal Relief To EDT	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
CS-V1006	CS Heat Exchanger Heat Exchanger01B Thermal Relief To EDT	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
CS-V1007	Containment Isolation Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CS-V1008	Containment Isolation Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
CS-V1014	ECSBS Spary Header Check	BDBA	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
Chemical and Volume Control System													
CV-0505	Globe Valve and Actuator, RCP Controlled Bleedoff, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O

Table 2 (6 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
CV-0506	Globe Valve and Actuator, RCP Controlled Bleedoff, CIV	CIV	RCB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0509	Gate Valve and Actuator, IRWST Makeup Line, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0515	Globe Valve and Actuator, Letdown Isolation	To isolate RCS	RCB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0516	Globe Valve and Actuator, Letdown Isolation	To isolate RCS	RCB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0522	Globe Valve and Actuator, Letdown Containment Isolation, CIV	CIV	RCB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0523	Globe Valve and Actuator, Letdown Containment Isolation, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0524	Globe Valve and Actuator, Charging Containment Isolation, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0255	Globe Valve and Actuator, Seal Injection Containment Isolation, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0560	Globe Valve and Actuator, RDT Effluent Containment Isolation, CIV	CIV	RCB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0561	Globe Valve and Actuator, RDT Effluent Containment Isolation, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0580	Gate Valve and Actuator, RSSH to RDH Isolation, CIV	CIV	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0576	Globe Valve and Actuator, Charging Flow Restricting	To Restrict charging flow	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
CV-0577	Globe Valve and Actuator, Charging Flow Restricting	To Restrict charging flow	AB	COL 3.11(7)	CONT	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
Emergency Diesel Generator System													
DG-DG01A	Class 1E Diesel Generator including Engine	EDG	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
DG-DG01B	Class 1E Diesel Generator including Engine	EDG	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
DG-DG01C	Class 1E Diesel Generator including Engine	EDG	AB	100-A03C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
DG-DG01D	Class 1E Diesel Generator including Engine	EDG	AB	100-A03D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
DG-DP01A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP02A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP03A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP04A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O

Table 2 (7 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-DP05A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP06A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP07A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP08A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP09A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP10A	Control Panels & Cubicles (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP01B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP02B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP03B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP04B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP05B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP06B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP07B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP08B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP09B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP10B	Control Panels & Cubicles (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP01C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP02C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP03C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP04C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP05C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O

Table 2 (8 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-DP06C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP07C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP08C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP09C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP10C	Control Panels & Cubicles (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP01D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP02D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP03D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP04D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP05D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP06D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP07D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP08D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP09D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
DG-DP10D	Control Panels & Cubicles (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP01A	Control Panel (12)	EDG	EDGB	100-H01A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP02A	Engine Panel (12)	EDG	EDGB	100-H02A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP01B	Control Panel (12)	EDG	EDGB	100-H01B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP02B	Engine Panel (12)	EDG	EDGB	100-H02B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP01C	Control Panel (12)	EDG	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP02C	Engine Panel (12)	EDG	AB	100-A03C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O

Table 2 (9 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
LP01D	Control Panel (12)	EDG	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
LP02D	Engine Panel (12)	EDG	AB	100-A03D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(3)	SR	O
Emergency Diesel Engine Cooling Water System													
DG-V4217A	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4217B	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4217C	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4217D	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4250A	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4250B	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4250C	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4250D	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4230A	Preheating HT Water Pump Inlet Isolation Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4230B	Preheating HT Water Pump Inlet Isolation Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4230C	Preheating HT Water Pump Inlet Isolation Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4230D	Preheating HT Water Pump Inlet Isolation Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4231A	HT Water Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4231B	HT Water Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4231C	HT Water Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4231D	HT Water Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
Emergency Diesel Engine Starting Air System													
DG-V4022A	Starting Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4022B	Starting Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4022C	Starting Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4022D	Starting Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4030A	Starting Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4030B	Starting Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4030C	Starting Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4030D	Starting Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4308A	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4308B	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (10 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-V4308C	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4308D	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4309A	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4309B	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4309C	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4309D	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4312A	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4312B	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4312C	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4312D	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4043A	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4043B	Starting Air Common Header Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4043C	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4043D	Starting Air Common Header Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4039A	Starting Air Outlet Regulating Globe Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4039B	Starting Air Outlet Regulating Globe Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4039C	Starting Air Outlet Regulating Globe Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4039D	Starting Air Outlet Regulating Globe Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4040A	Starting Air Outlet Regulating Globe Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4040B	Starting Air Outlet Regulating Globe Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4040C	Starting Air Outlet Regulating Globe Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4040D	Starting Air Outlet Regulating Globe Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5023A	Starting Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5023B	Starting Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5023C	Starting Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5023D	Starting Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5031A	Starting Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (11 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-V5031B	Starting Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5031C	Starting Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V5031D	Starting Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4041A	Over Speed Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4041B	Over Speed Air Receiver Relief Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4041C	Over Speed Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4041D	Over Speed Air Receiver Relief Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4316A	Over Speed Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4316B	Over Speed Air Receiver Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4316C	Over Speed Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4316D	Over Speed Air Receiver Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
Emergency Diesel Engine Lube Oil System													
DG-V4114A	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4114B	3-Way Thermostatic Control Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4114C	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4114D	3-Way Thermostatic Control Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4111A	Lube Oil/Preheating Water Heat Exchanger Outlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4111B	Lube Oil/Preheating Water Heat Exchanger Outlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4111C	Lube Oil/Preheating Water Heat Exchanger Outlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4111D	Lube Oil/Preheating Water Heat Exchanger Outlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4059A	Lube Oil Regulating Gate Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4059B	Lube Oil Regulating Gate Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4059C	Lube Oil Regulating Gate Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4059D	Lube Oil Regulating Gate Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4140A	Lube Oil Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4140B	Lube Oil Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (12 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-V4140C	Lube Oil Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4140D	Lube Oil Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4232A	Prelube Oil Pump Inlet Isolation Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4232B	Prelube Oil Pump Inlet Isolation Valve	EDG	EDGB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4232C	Prelube Oil Pump Inlet Isolation Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4232D	Prelube Oil Pump Inlet Isolation Valve	EDG	AB	COL 3.11(7)	Short-Term	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4109A	Prelube Oil Engine Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4109B	Prelube Oil Engine Inlet Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4109C	Prelube Oil Engine Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DG-V4109D	Prelube Oil Engine Inlet Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
Emergency Diesel Engine Fuel Oil System													
DO-PP01A	Emergency Diesel Fuel Oil Transfer Pumps	EDG	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP01B	Emergency Diesel Fuel Oil Transfer Pumps	EDG	EDGB	063-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP01C	Emergency Diesel Fuel Oil Transfer Pumps	EDG	AB	065-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP01D	Emergency Diesel Fuel Oil Transfer Pumps	EDG	AB	065-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP02A	Emergency Diesel Fuel Oil Transfer Pumps	EDG	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP02B	Emergency Diesel Fuel Oil Transfer Pumps	EDG	EDGB	063-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP02C	Emergency Diesel Fuel Oil Transfer Pumps	EDG	AB	065-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-PP02D	Emergency Diesel Fuel Oil Transfer Pumps	EDG	AB	065-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1005A	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1005B	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1005C	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1005D	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1006A	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1006B	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1006C	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1006D	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1007A	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1007B	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1007C	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
DO-V1007D	Diesel Fuel Transfer Pump Discharge Check Valve	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (13 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
Spent Fuel Pool Cooling System													
FC-PP01A	Spent Fuel Pool Cooling Pump	ESF	AB	100-A24A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
FC-PP01B	Spent Fuel Pool Cooling Pump	ESF	AB	100-A32B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
FC-V1005	SFP Cooling Pump01A Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
FC-V1006	SFP Cooling Pump01B Discharge Check	ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
FC-V1145	SFP Cleanup Demineralizer Outlet Header Penetration Check	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
Main Feedwater System													
FW-V0121	Economizer Main Feedwater Isolation Valve	ESF	AB	137-A31C	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0122	Economizer Main Feedwater Isolation Valve	ESF	AB	137-A31C	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0123	Economizer Main Feedwater Isolation Valve	ESF	AB	137-A31D	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0124	Economizer Main Feedwater Isolation Valve	ESF	AB	137-A31D	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0131	Downcomer Main Feedwater Isolation Valves	ESF	AB	137-A31C	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0132	Downcomer Main Feedwater Isolation Valves	ESF	AB	137-A31C	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0133	Downcomer Main Feedwater Isolation Valves	ESF	AB	137-A31D	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0134	Downcomer Main Feedwater Isolation Valves	ESF	AB	137-A31D	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0138	Feedwater Chemical Injection Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
FW-V0139	Feedwater Chemical Injection Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
Instrument Air System													
IA-V0020	Cylinder Valve and Actuator, CIV	ESF	AB	COL 3.11(7)	Short-Term(5 Min)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
In-Containment Water Storage System													
IW-V0001	Reactor Cavity Flooding Isolation	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0002	Reactor Cavity Flooding Isolation	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0003	Reactor Cavity Flooding Isolation	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0004	Reactor Cavity Flooding Isolation	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0005	BAMP Suction Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0006	BAMP Suction Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0010	IRWST Level Transmitter (LT-392D) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0011	IRWST Level Transmitter (LT-392D) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0012	HVT Wide Range Level Transmitter (LT-396D) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0013	HVT Wide Range Level Transmitter (LT-396D) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O

Table 2 (14 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
IW-V0014	HVT Wide Range Level Transmitter (LT-397C) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0015	HVT Wide Range Level Transmitter (LT-397C) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0016	HVT Narrow Range Level Transmitter (LT-403A) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0017	HVT Narrow Range Level Transmitter (LT-403A) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0018	Reactor Cavity Transmitter (LT-397A) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0019	Reactor Cavity Transmitter (LT-397A) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0020	Reactor Cavity Transmitter (LT-398B) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0021	Reactor Cavity Transmitter (LT-398B) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0022	IRWST Level Transmitter (LT-393C) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0023	IRWST Level Transmitter (LT-393C) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0024	IRWST Level Transmitter (LT-391A) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0025	IRWST Level Transmitter (LT-391A) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0026	IRWST Level Transmitter (LT-390B) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0027	IRWST Level Transmitter (LT-390B) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0028	HVT Wide Range Level Transmitter (LT-394B) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0029	HVT Wide Range Level Transmitter (LT-394B) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0030	HVT Wide Range Level Transmitter (LT-395A) Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0031	HVT Wide Range Level Transmitter (LT-395A) Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0032	Reactor Cavity (LT-399C) Transmitter Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0033	Reactor Cavity (LT-399C) Transmitter Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0034	Reactor Cavity (LT-400D) Transmitter Upper Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V0035	Reactor Cavity (LT-400D) Transmitter Lower Tap Isolation	ESF	AB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
IW-V1003	BAMP Suction Line Pressure (Thermal) Relief	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Main Steam System													
MS-V0011	Main Steam Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0012	Main Steam Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0013	Main Steam Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0014	Main Steam Isolation Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0015	Main Steam Isolation Bypass Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O

Table 2 (15 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
MS-V0016	Main Steam Isolation Bypass Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0017	Main Steam Isolation Bypass Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0018	Main Steam Isolation Bypass Valve	ESF	AB	COL 3.11(7)	Short-Term(5 sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0090	Main Steam Drip Leg Isolation Valve	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
MS-V0091	Main Steam Drip Leg Isolation Valve	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
MS-V0092	Main Steam Drip Leg Isolation Valve	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
MS-V0093	Main Steam Drip Leg Isolation Valve	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
MS-V0101	MSADV and Actuator	Dump	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0102	MSADV and Actuator	Dump	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0103	MSADV and Actuator	Dump	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0104	MSADV and Actuator	Dump	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0105	MSADV Isolation Valve and Actuator	Isolation	AB	COL 3.11(7)	Varies	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0106	MSADV Isolation Valve and Actuator	Isolation	AB	COL 3.11(7)	Varies	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0107	MSADV Isolation Valve and Actuator	Isolation	AB	COL 3.11(7)	Varies	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V0108	MSADV Isolation Valve and Actuator	Isolation	AB	COL 3.11(7)	Varies	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
MS-V1301	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1302	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1303	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1304	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1305	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1306	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1307	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1308	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1309	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1310	Main Steam Safety Valve	Safety Valve	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1311	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1312	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1313	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1314	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1315	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1316	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	

Table 2 (16 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
MS-V1317	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1318	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1319	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
MS-V1320	Main Steam Safety Valve	Safety Valve	AB	137-A31D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Compressed Gas System													
NT-V0004	Nitrogen Supply to SITs and RDT CIV, Globe Valve and Actuator	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
Radiation Monitoring System													
PR-RE/RT-039A	Containment Air Monitor (12)	Leak Detection	AB	100-A22A	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-040B	Containment Air Monitor (12)	Leak Detection	AB	100-A22A	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-071A	Control Room Air Intake Monitor (12)	ESF	AB	174-A05C	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-072B	Control Room Air Intake Monitor (12)	ESF	AB	174-A05C	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-073A	Control Room Air Intake Monitor (12)	ESF	AB	174-A05D	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-074B	Control Room Air Intake Monitor (12)	ESF	AB	174-A05D	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-231A	Containment Operating Area Monitor (12)	ESF, Accident Monitoring	RCB	156-C01	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-232B	Containment Operating Area Monitor (12)	ESF, Accident Monitoring	RCB	156-C01	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-233A	Containment Upper Operating Area Monitor (12)	ESF, Accident Monitoring	RCB	156-C01	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-234B	Containment Upper Operating Area Monitor (12)	ESF, Accident Monitoring	RCB	156-C01	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-241	Spent Fuel Pool Area Monitor (12)	ESF, Accident Monitoring	AB	156-A08B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PR-RE/RT-242	Spent Fuel Pool Area Monitor (12)	ESF, Accident Monitoring	AB	156-A08B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
Process Sampling System													
PS-V0031	Steam Generator 1 Sample Line from Blowdown Hot Leg CIV, Gate Valve and Actuator (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(3)	SR	O
PS-V0032	Steam Generator 2 Sample Line from Blowdown Hot Leg CIV, Gate Valve and Actuator (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(3)	SR	O
PS-V0033	Steam Generator 1 Sample Line from Downcomer CIV, Gate Valve and Actuator (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(3)	SR	O
PS-V0034	Steam Generator 2 Sample Line from Downcomer CIV, Gate Valve and Actuator(12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(3)	SR	O

Table 2 (17 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PS-V0035	Steam Generator 1 Sample Line from Blowdown Cold Leg CIV, Gate Valve and Actuator	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
PS-V0036	Steam Generator 2 Sample Line from Blowdown Cold Leg CIV, Gate Valve and Actuator	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
PS-V0257	Steam Generator 1 Primary Sample and Cooler Rack ISO Valve, Gate Valve and Actuator	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
PS-V0258	Steam Generator 2 Primary Sample and Cooler Rack ISO Valve, Gate Valve and Actuator	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
Primary Sampling System													
PX-V0001	RCS Hotleg Loop1 Sample CIV	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0002	RCS Hotleg Loop1 SAMPLE CIV	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0003	PZR Surge Line Sample CIV	ESF	RCB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0004	PZR Surge Line Sample CIV	ESF	AB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0005	PZR Steam Space Sample CIV	ESF	RCB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0006	PZR Steam Space Sample CIV	ESF	AB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0020	SI Tanks Sample CIV	ESF	AB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0021	SI Tanks Sample CIV	ESF	RCB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0041	Containment Air Sample Line CIV	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0042	Containment Air Sample Line CIV	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0043	Containment Air Sample Line CIV	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V0053	Sample Return To HVT	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
PX-V1005	PASS Sample Return Line Check CIV	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I		SR	O
PX-V1020	Containment Air Sample Return Line Check CIV	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I		SR	O
Reactor Coolant System													
RC-V0200	Pilot Operated Safety Relief Valve (POSRV)	Overpressure Protection	RCB	136-C02	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)		O
RC-V0201	Pilot Operated Safety Relief Valve (POSRV)	Overpressure Protection	RCB	136-C02	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)		O
RC-V0202	Pilot Operated Safety Relief Valve (POSRV)	Overpressure Protection	RCB	136-C02	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)		O
RC-V0203	Pilot Operated Safety Relief Valve (POSRV)	Overpressure Protection	RCB	136-C02	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)		O

Table 2 (18 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
RC-LP01A	POSRV Master Control Cabinet (2),(12)	POSRV Signal Interface	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
RC-LP01B	POSRV Master Control Cabinet (2),(12)	POSRV Signal Interface	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
RC-LP01C	POSRV Master Control Cabinet (2),(12)	POSRV Signal Interface	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
RC-LP01D	POSRV Master Control Cabinet (2),(12)	POSRV Signal Interface	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
Various	Hydraulic Snubbers for Surge Line	RCPB	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Various	Steam Generator Supports including Snubbers	RCPB	RCB	100-C02A 100-C02B	short-term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Various	Reactor Coolant Pump Supports including Snubbers	RCPB	RCB	100-C02A 100-C02B	short-term	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
Reactor Gas Vent System													
RG-V0410	PZR Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0411	PZR Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0412	PZR Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0413	PZR Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0414	RX Vessel Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0415	RX Vessel Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0416	RX Vessel Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0417	RX Vessel Gas Vent	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0419	Gas Vent To IRWST	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V0420	Gas Vent To IRWST	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
RG-V1421	RCGVS Vacuum Relief	ESF	RCB	COL 3.11(7)	Varies	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
Service Air System													
SA-V0001	Cylinder Valve and Actuator, CIV	ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Mechanical EQ	No	I			O
S/G Blowdown System													
SD-V0005	S/G-1 Blowdown Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
SD-V0006	S/G-2 Blowdown Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
SD-V0007	S/G-1 Blowdown Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SD-V0008	S/G-2 Blowdown Containment Isolation	ESF	AB	COL 3.11(7)	Intermittent	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SD-V1115	Wet Lay Up Recir Pump A Discharge Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	

Table 2 (19 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SD-V1116	Wet Lay Up Recir Pump B Discharge Check	ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Mechanical EQ	No	I		SR	
Safety Injection System													
SI-PP02A	Safety Injection Pumps motors	ESF	AB	050-A03A	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	
SI-PP02B	Safety Injection Pumps motors	ESF	AB	050-A03B	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	
SI-PP02C	Safety Injection Pumps motors	ESF	AB	050-A02C	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	
SI-PP02D	Safety Injection Pumps motors	ESF	AB	050-A02D	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	
SI-V0300	Globe Valveand Actuator, IRWST Return Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0301	Gate Valve and Actuator, IRWST Return Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0302	Globe Valve and Actuator, SI Combined Miniflow Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0303	Globe Valve and Actuator, SI Combined Miniflow Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0304	Gate Valve, IRWST Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0305	Gate Valve, IRWST Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0308	Gate Valve, IRWST Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0309	Gate Valve, IRWST Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0321	Globe Valve and Actuator, SI Hot Leg Inject. Line Isol.	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0322	Globe Valve and Actuator, Hot Leg Check Valve Leakage Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0331	Globe Valve and Actuator, SI Hot Leg Injection Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0332	Globe Valve and Actuator, Hot Leg Check Valve Leakage Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0602	Globe Valve and Actuator, SI Low Flow Control Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0603	Globe Valve and Actuator, SI Low Flow Control Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O

Table 2 (20 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-V0604	Gate Valve and Actuator, SI Hot Leg Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0609	Gate Valve and Actuator, SI Hot Leg Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0605	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0606	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0607	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0608	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0611	Globe Valve and Actuator, SIT Fill & Drain Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0621	Globe Valve and Actuator, SIT Fill & Drain Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0631	Globe Valve and Actuator, SIT Fill & Drain Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0641	Globe Valve and Actuator, SIT Fill & Drain Isolation	ESF	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0613	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0623	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0633	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0643	Globe Valve and Actuator, SIT Atmospheric Vent Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0614	Gate Valve, SIT Discharge Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O

Table 2 (21 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-V0624	Gate Valve, SIT Discharge Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0634	Gate Valve, SIT Discharge Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0644	Gate Valve, SIT Discharge Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0616	Globe Valve and Actuator, SI Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0626	Globe Valve and Actuator, SI Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0636	Globe Valve and Actuator, SI Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0646	Globe Valve and Actuator, SI Line Isolation Valves	ESF	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0618	Globe Valve and Actuator, Check Valve Leakoff Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0628	Globe Valve and Actuator, Check Valve Leakoff Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0638	Globe Valve and Actuator, Check Valve Leakoff Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0648	Globe Valve and Actuator, Check Valve Leakoff Isolation Valves	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0682	Globe Valve and Actuator, SIT Fill Line Isolation	ESF	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
Shutdown Cooling System													
SI-PP01A	Shutdown Cooling Pump and Motor	RT	AB	050-A04A	Continuous	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	
SI-PP01B	Shutdown Cooling Pump and Motor	RT	AB	050-A04B	Continuous	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	

Table 2 (22 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-V0310	Globe Valve and Actuator, SDCHX Outlet Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0311	Globe Valve and Actuator, SDCHX Outlet Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0312	Globe Valve and Actuator, SDCHX Bypass Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0313	Globe Valve and Actuator, SDCHX Bypass Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0314	Globe Valve and Actuator, SCS Test Return Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0315	Globe Valve and Actuator, SCS Test Return Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0340	Gate Valve and Actuator, SCS/CSS Pump Suction Cross Connect Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0341	Gate Valve and Actuator, SCS/CSS Pump Discharge Cross Connect Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0342	Gate Valve and Actuator, SCS/CSS Pump Suction Cross Connect Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0343	Gate Valve and Actuator, SCS/CSS Pump Discharge Cross Connect Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0344	Gate Valve and Actuator, SCP Suction Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0346	Gate Valve and Actuator, SCP Suction Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0347	Gate Valve and Actuator, CSP Suction Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0348	CSP Suction Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0391	Gate Valve and Actuator, Reactor Cavity Isolation Valves	RT	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0393	Gate Valve and Actuator, Reactor Cavity Isolation Valves	RT	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0395	Gate Valve and Actuator, Reactor Cavity Isolation Valves	RT	RCB	COL 3.11(7)	short-term	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0600	Globe Valve and Actuator, SCS Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O

Table 2 (23 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-V0601	Globe Valve and Actuator, SCS Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0651	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	RCB	100-C02A	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0652	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0653	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	RCB	100-C01	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0654	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	RCB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0655	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0656	Gate Valve and Actuator, SCS Suction Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0688	Gate Valve and Actuator, SCS Test Return Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0693	Gate Valve and Actuator, SCS Test Return Line Isolation Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0690	Globe Valve and Actuator, SCS Warmup Line Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
SI-V0691	Globe Valve and Actuator, SCS Warmup Line Flow Control Valves	RT	AB	COL 3.11(7)	Intermittent	Harsh	Harsh	Mechanical EQ, Electrical EQ	No	I	(3)	SR	O
Essential Service Water System													
SX-PP01A	Essential Service Water Pump	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-PP01B	Essential Service Water Pump	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-PP02A	Essential Service Water Pump	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-PP02B	Essential Service Water Pump	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-V0045	ESW Pump 01A Discharge	ESF	ESWPB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-V0046	ESW Pump 01B Discharge	ESF	ESWPB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-V0047	ESW Pump 02A Discharge	ESF	ESWPB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-V0048	ESW Pump 02B Discharge	ESF	ESWPB	COL 3.11(7)	Varies	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
SX-V1001	ESW Pump 01A Discharge Check	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
SX-V1002	ESW Pump 01B Discharge Check	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	

Table 2 (24 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SX-V1003	ESW Pump 02A Discharge Check	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
SX-V1004	ESW Pump 02B Discharge Check	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
SX-V1051	CCW Heat Exchanger Outlet Common Header Vacuum Relief	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
SX-V1052	CCW Heat Exchanger Outlet Common Header Vacuum Relief	ESF	ESWPB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
Equipment and Floor Drainage System													
DE-V0005	Containment Drain Sump Pump Discharge Line, CIV	ESF	RCB	COL 3.11(7)	Short-Term (20sec)	Harsh	Harsh	Mechnical EQ	No	I	(3)	SR	O
DE-V0006	Containment Drain Sump Pump Discharge Line, CIV	ESF	AB	COL 3.11(7)	Short-Term (20sec)	Harsh	Harsh	Mechnical EQ	No	I	(3)	SR	O
Gaseous Radwaste System													
GW-V0001	Reactor Drain Tank Gas Space to GWMS CIV	ESF	RCB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechnical EQ	No	I	(3)	SR	O
GW-V0002	Reactor Drain Tank Gas Space to GWMS CIV	ESF	AB	COL 3.11(7)	Short-Term (15sec)	Harsh	Harsh	Mechnical EQ	No	I	(3)	SR	O
Control Room Area HVAC System													
VC-HV01A	Supply AHU	Cooling	AB	174-A24C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-HV01B	Supply AHU	Cooling	AB	174-A24D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-HV01C	Supply AHU	Cooling	AB	174-A23C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VC-HV01D	Supply AHU	Cooling	AB	174-A23D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VC-AU01A	Emergency Makeup ACU	ESF	AB	174-A24C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-AU01B	Emergency Makeup ACU	ESF	AB	174-A24D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0011A	Air Intake Isolation Damper (ESR)	ESF	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0011B	Air Intake Isolation Damper (ESR)	ESF	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0012A	Air Intake Isolation Damper (ESR)	ESF	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0012B	Air Intake Isolation Damper (ESR)	ESF	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0013A	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24C	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0013C	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24C	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0014B	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24D	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0014D	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24D	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0015A	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24C	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0015C	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24C	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0016B	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24D	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0016D	AHU Inlet Isolation Damper (PSR)	ESF	AB	174-A24D	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0017A	ACU Inlet Isolation Damper (ESR)	Open	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O

Table 2 (25 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VC-Y0017C	ACU Inlet Isolation Damper (ESR)	Open	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0018B	ACU Inlet Isolation Damper (ESR)	Open	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0018D	ACU Inlet Isolation Damper (ESR)	Open	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0019A	ACU Return Isolation Damper (ESR)	Open	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0019C	ACU Return Isolation Damper (ESR)	Open	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0020B	ACU Return Isolation Damper (ESR)	Open	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0020D	ACU Return Isolation Damper (ESR)	Open	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0021A	AHU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0021C	AHU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A23C	Continuous	Mild	Mild	Electrical EQ	No	I	(3)	SR	O
VC-Y0022B	AHU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0022D	AHU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A23D	Continuous	Mild	Mild	Electrical EQ	No	I	(3)	SR	O
VC-Y0023A	ACU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0023C	ACU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24C	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0024B	ACU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0024D	ACU Discharge Flow Control Damper (ESR)	Modulation	AB	174-A24D	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VC-Y0027	Kitchen & Toilet Isolation Damper (PSR)	ESF	AB	157-A02C	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VC-Y0028	Kitchen & Toilet Isolation Damper (PSR)	ESF	AB	195-A09C	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VC-Y0029	Smoke Removal Duct Isolation Damper (PSR)	ESF	AB	174-A24D	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VC-Y0030	Smoke Removal Duct Isolation Damper (PSR)	ESF	AB	174-A03D	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
Emergency Diesel Generator Area HVAC System													
VD-HV10A	EDG Control Room Cubicle Cooler	Cooling	EDGB	100-H01A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV10B	EDG Control Room Cubicle Cooler	Cooling	EDGB	100-H01B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV10C	EDG Control Room Cubicle Cooler	Cooling	AB	100-A02C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV10D	EDG Control Room Cubicle Cooler	Cooling	AB	100-A02D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV11A	EDG Room Normal Supply AHU	Cooling	EDGB	135-H03A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VD-HV11B	EDG Room Normal Supply AHU	Cooling	EDGB	135-H03B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VD-HV11C	EDG Room Normal Supply AHU	Cooling	AB	174-A14C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VD-HV11D	EDG Room Normal Supply AHU	Cooling	AB	174-A14D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VD-HV12A	EDG Room Emergency Cubicle Cooler	Cooling	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV13A	EDG Room Emergency Cubicle Cooler	Cooling	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (26 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VD-HV12B	EDG Room Emergency Cubicle Cooler	Cooling	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV13B	EDG Room Emergency Cubicle Cooler	Cooling	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV12C	EDG Room Emergency Cubicle Cooler	Cooling	AB	100-A03C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV13C	EDG Room Emergency Cubicle Cooler	Cooling	AB	100-A03C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV12D	EDG Room Emergency Cubicle Cooler	Cooling	AB	100-A03D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HV13D	EDG Room Emergency Cubicle Cooler	Cooling	AB	100-A03D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH02A	EDG Room Exhaust Fan	Ventilation	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH02B	EDG Room Exhaust Fan	Ventilation	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH02C	EDG Room Exhaust Fan	Ventilation	AB	174-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH02D	EDG Room Exhaust Fan	Ventilation	AB	174-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH05A	Diesel Fuel Oil Storage Tank Room Supply Fan	Ventilation	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH05B	Diesel Fuel Oil Storage Tank Room Supply Fan	Ventilation	EDGB	063-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH05C	Diesel Fuel Oil Storage Tank Room Supply Fan	Ventilation	AB	065-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH05D	Diesel Fuel Oil Storage Tank Room Supply Fan	Ventilation	AB	065-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH06A	Diesel Fuel Oil Storage Tank Room Exhaust Fan	Ventilation	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH06B	Diesel Fuel Oil Storage Tank Room Exhaust Fan	Ventilation	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH06C	Diesel Fuel Oil Storage Tank Room Exhaust Fan	Ventilation	AB	065-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH06D	Diesel Fuel Oil Storage Tank Room Exhaust Fan	Ventilation	AB	065-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH07A	Diesel Fuel Oil Day Tank & L.O. Makeup Tank Room Exhaust Fan	Ventilation	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH07B	Diesel Fuel Oil Day Tank & L.O. Makeup Tank Room Exhaust Fan	Ventilation	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH07C	Diesel Fuel Oil Day Tank & L.O. Makeup Tank Room Exhaust Fan	Ventilation	AB	120-A04C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-AH07D	Diesel Fuel Oil Day Tank & L.O. Makeup Tank Room Exhaust Fan	Ventilation	AB	120-A04D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VD-HC01A	EDG Room Electric Duct Heater	Heating	EDGB	100-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VD-HC01B	EDG Room Electric Duct Heater	Heating	EDGB	100-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VD-HC02A	Diesel Fuel Oil Storage Tank Room Electric Duct Heater	Heating	EDGB	063-H02A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VD-HC02B	Diesel Fuel Oil Storage Tank Room Electric Duct Heater	Heating	EDGB	063-H02B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VD-HC02C	Diesel Fuel Oil Storage Tank Room Electric Duct Heater	Heating	AB	065-A01C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VD-HC02D	Diesel Fuel Oil Storage Tank Room Electric Duct Heater	Heating	AB	065-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O

Table 2 (27 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
Electrical and I&C Equipment Areas HVAC System													
VE-HV01A	Class 1E Switchgear 01C Room Cubicle Cooler	Cooling	AB	078-A02C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV01B	Class 1E Switchgear 01D Room Cubicle Cooler	Cooling	AB	078-A02D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV02A	Class 1E Load Center 01C Room Cubicle Cooler	Cooling	AB	078-A03C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV02B	Class 1E Load Center 01D Room Cubicle Cooler	Cooling	AB	078-A03D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV03A	Train - A DC&IP Equip. Room Cubicle Cooler	Cooling	AB	078-A56A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV03B	Train - B DC&IP Equip. Room Cubicle Cooler	Cooling	AB	078-A56B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV04A	Train - C DC&IP Equip. Room Cubicle Cooler	Cooling	AB	078-A05C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV04B	Train - D DC&IP Equip. Room Cubicle Cooler	Cooling	AB	078-A05D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV06A	480V Class 1E MCC 01A Room Cubicle Cooler	Cooling	AB	100-A12A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV06B	480V Class 1E MCC 01B Room Cubicle Cooler	Cooling	AB	100-A12B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV07A	Class 1E Switchgear 01A Room Cubicle Cooler	Cooling	AB	078-A25A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV07B	Class 1E Switchgear 01B Room Cubicle Cooler	Cooling	AB	078-A25B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV08B	Swing Load Center Room Cubicle Cooler	Cooling	AB	078-A58B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV09A	Electrical Penetration Room C Cubicle Cooler	Cooling	AB	120-A09C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV09B	Electrical Penetration Room D Cubicle Cooler	Cooling	AB	120-A09D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV10A	480V Class 1E MCC 03C Room Cubicle Cooler	Cooling	AB	137-A10C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV10B	480V Class 1E MCC 03D Room Cubicle Cooler	Cooling	AB	137-A10D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV11A	Electrical Penetration Room Cubicle Cooler	Cooling	AB	137-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV11B	Electrical Penetration Room Cubicle Cooler	Cooling	AB	137-A11D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV12A	Penetration. Mux Room A Cubicle Cooler	Cooling	AB	137-A17A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV12B	Penetration Mux Room B Cubicle Cooler	Cooling	AB	137-A17B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV13A	Electrical Penetration Room Cubicle Cooler	Cooling	AB	137-A18A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV13B	Electrical Penetration Room Cubicle Cooler	Cooling	AB	137-A18B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV14A	480V Class 1E MCC 03A Room Cubicle Cooler	Cooling	AB	137-A23A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV14B	480V Class 1E MCC 03B Room Cubicle Cooler	Cooling	AB	120-A15B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV15A	480V Class 1E MCC 04A Room Cubicle Cooler	Cooling	AB	137-A15A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV15B	480V Class 1E MCC 04B Room Cubicle Cooler	Cooling	AB	137-A15B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV16A	I&C Equipment Room Cubicle Cooler	Cooling	AB	157-A25C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV16B	I&C Equipment Room Cubicle Cooler	Cooling	AB	157-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV17A	I&C Equipment Room Cubicle Cooler	Cooling	AB	157-A19C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (28 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VE-HV17B	I&C Equipment Room Cubicle Cooler	Cooling	AB	157-19D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV18A	Remote Shutdown Room Cubicle Cooler	Cooling	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HV18B	Remote Shutdown Room Cubicle Cooler	Cooling	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH20A	Train - A Battery Room Supply Fan	Ventilation	AB	100-A11A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH20B	Train - B Battery Room Supply Fan	Ventilation	AB	100-A11B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH20C	Train - C Battery Room Supply Fan	Ventilation	AB	078-A06C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH20D	Train - D Battery Room Supply Fan	Ventilation	AB	078-A06D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH21A	Train - A Battery Room Exhaust Fan	Ventilation	AB	078-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH21B	Train - B Battery Room Exhaust Fan	Ventilation	AB	100-A11B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH21C	Train - C Battery Room Exhaust Fan	Ventilation	AB	078-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH21D	Train - D Battery Room Exhaust Fan	Ventilation	AB	078-A11D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH22A	Remote Shutdown Room Supply Fan	Ventilation	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH22B	Remote Shutdown Room Supply Fan	Ventilation	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH23A	Remote Shutdown Room Exhaust Fan	Ventilation	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-AH23B	Remote Shutdown Room Exhaust Fan	Ventilation	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VE-HC01A	Train - A Battery Room Electrical Duct Heater	Heating	AB	100-A11A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC01B	Train - B Battery Room Electrical Duct Heater	Heating	AB	100-A11B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC01C	Train - C Battery Room Electrical Duct Heater	Heating	AB	078-A06C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC01D	Train - D Battery Room Electrical Duct Heater	Heating	AB	078-A07D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC02A	Class 1E Switchgear 01A Room Electrical Duct Heater	Heating	AB	078-A25A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC02B	Class 1E Switchgear 01B Room Electrical Duct Heater	Heating	AB	078-A25B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC03A	Remote Shutdown Room Electrical Duct Heater	Heating	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC03B	Remote Shutdown Room Electrical Duct Heater	Heating	AB	137-A43D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC04A	I&C Equipment Room Electrical Duct Heater	Heating	AB	157-A25C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC04B	I&C Equipment Room Electrical Duct Heater	Heating	AB	157-A01D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC05C	I&C Equipment Room Electrical Duct Heater	Heating	AB	157-A19C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC05D	I&C Equipment Room Electrical Duct Heater	Heating	AB	157-A19D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC06A	Elect Penetration A Room Electrical Duct Heater	Heating	AB	137-A18A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC06B	Elect Penetration B Room Electrical Duct Heater	Heating	AB	137-A18B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC07A	480V Class 1E MCC 03A Room Elec. Duct Heater	Heating	AB	137-A23A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC07B	480V Class 1E MCC 03B Room Elec. Duct Heater	Heating	AB	120-A15B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O

Table 2 (29 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VE-HC08A	480V Class 1E 04A MCC 04A Room Elec. Duct Heater	Heating	AB	137-A15A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC09A	Penetration Mux A Room Electrical Duct Heater	Heating	AB	137-A17A	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC09B	Penetration Mux B Room Electrical Duct Heater	Heating	AB	137-A17B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
VE-HC10B	Swing Load Center Room Electrical Duct Heater	Heating	AB	078-A58B	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	O
Fuel Handling Area HVAC System													
VF-AU02A	Emergency Exhaust ACU	ESF	FHA	120-A24A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VF-AU02B	Emergency Exhaust ACU	ESF	FHA	120-A25A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VF-HV02A	SFP HX Room Cubicle Cooler	Cooling	FHA	100-A24A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VF-HV02B	SFP HX Room Cubicle Cooler	Cooling	FHA	100-A32B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VF-Y0001A	Air Intake Isolation Damper (PSR)	ESF	FHA	100-A36B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VF-Y0002B	Air Intake Isolation Damper (PSR)	ESF	FHA	100-A36B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VF-Y0003A	Normal Exhaust ACU Isolation Damper (PSR)	ESF	FHA	100-A38A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VF-Y0004B	Normal Exhaust ACU Isolation Damper (PSR)	ESF	FHA	100-A38A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VF-Y0005A	Emergency Exhaust ACU Isolation Damper (ESR)	Open	FHA	137-A25A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VF-Y0006B	Emergency Exhaust ACU Isolation Damper (ESR)	Open	FHA	120-A24A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VF-Y0007A	Emergency Exhaust Flow Control Damper (ESR)	Modulation	FHA	137-A25A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VF-Y0008B	Emergency Exhaust Flow Control Damper (ESR)	Modulation	FHA	120-A24A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
Auxiliary Building Controlled Area HVAC System													
VK-AU01A	Aux. Bldg Controlled Area I Emergency Exhaust ACU	ESF	AB	120-A21A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-AU01C	Aux. Bldg Controlled Area I Emergency Exhaust ACU	ESF	AB	120-A32A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-AU01B	Aux. Bldg Controlled Area II Emergency Exhaust ACU	ESF	AB	120-A29B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-AU01D	Aux. Bldg Controlled Area II Emergency Exhaust ACU	ESF	AB	120-A30B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-HV10A	CS Pump & Miniflow Heat Exchanger Room Cubicle Cooler	Cooling	AB	050-A01C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV10B	CS Pump & Miniflow Heat Exchanger Room Cubicle Cooler	Cooling	AB	050-A01D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV11A	SI Pump Room Cubicle Cooler	Cooling	AB	050-A02C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV11B	SI Pump Room Cubicle Cooler	Cooling	AB	050-A02D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV12A	SI Pump Room Cubicle Cooler	Cooling	AB	050-A03A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV12B	SI Pump Room Cubicle Cooler	Cooling	AB	050-A03B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV13A	CCW Pump Room Cubicle Cooler	Cooling	AB	055-A02A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VK-HV13B	CCW Pump Room Cubicle Cooler	Cooling	AB	055-A02B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (30 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VK-HV14A	CCW Pump Room Cubicle Cooler	Cooling	AB	055-A02C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VK-HV14B	CCW Pump Room Cubicle Cooler	Cooling	AB	055-A02D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VK-HV15A	CS Heat Exchanger Room Cubicle Cooler	Cooling	AB	055-A01C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV15B	CS Heat Exchanger Room Cubicle Cooler	Cooling	AB	055-A01D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV16A	SC Pump & Miniflow Heat Exchanger Room Cubicle Cooler	Cooling	AB	050-A04A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV16B	SC Pump & Miniflow Heat Exchanger Room Cubicle Cooler	Cooling	AB	050-A04B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV17A	SC Heat Exchanger Room Cubicle Cooler	Cooling	AB	055-A30A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV17B	SC Heat Exchanger Room Cubicle Cooler	Cooling	AB	055-A30B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV18A	Charging Pump Room Cubicle Cooler	Cooling	AB	055-A42A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV18B	Charging Pump Room Cubicle Cooler	Cooling	AB	055-A55B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV19A	Mechanical Penetration Room Cubicle Cooler	Cooling	AB	100-A13A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV19B	Mechanical Penetration Room Cubicle Cooler	Cooling	AB	100-A13B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV20A	Mechanical Penetration Room Cubicle Cooler	Cooling	AB	120-A16A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV20B	Mechanical Penetration Room Cubicle Cooler	Cooling	AB	120-A16B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV21B	Aux. Charging Pump Room Cubicle Cooler	Cooling	AB	055-A54B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV22A	Aux. Bldg Controlled Area Emergency Exhaust ACU Room Cubicle Cooler	Cooling	AB	120-A21A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV22B	Aux. Bldg Controlled Area Emergency Exhaust ACU Room Cubicle Cooler	Cooling	AB	120-A29B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV23A	Aux. Bldg Controlled Area Emergency Exhaust ACU Room Cubicle Cooler	Cooling	AB	120-A32A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-HV23B	Aux. Bldg Controlled Area Emergency Exhaust ACU Room Cubicle Cooler	Cooling	AB	120-A30B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
VK-Y0001A	Aux. Bldg Controlled Area Emergency Exhaust ACU Flow Control Damper (ESR)	Modulation	AB	120-A21A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	
VK-Y0001B	Aux. Bldg Controlled Area Emergency Exhaust ACU Flow Control Damper (ESR)	Modulation	AB	120-A29B	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0001C	Aux. Bldg Controlled Area Emergency Exhaust ACU Flow Control Damper (ESR)	Modulation	AB	120-A32A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0001D	Aux. Bldg Controlled Area Emergency Exhaust ACU Flow Control Damper (ESR)	Modulation	AB	120-A30B	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0002A	Aux. Bldg Controlled Area Emergency Exhaust ACU Isolation Damper (ESR)	Open	AB	120-A32A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0002B	Aux. Bldg Controlled Area Emergency Exhaust ACU Isolation Damper (ESR)	Open	AB	120-A29B	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O

Table 2 (31 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VK-Y0002C	Aux. Bldg Controlled Area Emergency Exhaust ACU Isolation Damper (ESR)	Open	AB	120-A21A	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0002D	Aux. Bldg Controlled Area Emergency Exhaust ACU Isolation Damper (ESR)	Open	AB	120-A30B	Continuous	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VK-Y0017A	Aux. Bldg Controlled Area Supply AHU Outlet Isolation Damper (PSR)	ESF	AB	100-A20A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0018A	Aux. Bldg Controlled Area Supply AHU Outlet Isolation Damper (PSR)	ESF	AB	137-A29B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0019B	Aux. Bldg Controlled Area Supply AHU Outlet Isolation Damper (PSR)	ESF	AB	100-A20A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0020B	Aux. Bldg Controlled Area Supply AHU Outlet Isolation Damper (PSR)	ESF	AB	137-A29B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0021A	Aux. Bldg Controlled Area Normal Exhaust ACU Inlet Isolation Damper (PSR)	ESF	AB	156-A14A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0022A	Aux. Bldg Controlled Area Normal Exhaust ACU Inlet Isolation Damper (PSR)	ESF	AB	195-A08B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0023B	Aux. Bldg Controlled Area Normal Exhaust ACU Inlet Isolation Damper (PSR)	ESF	AB	156-A14A	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0024B	Aux. Bldg Controlled Area Normal Exhaust ACU Inlet Isolation Damper (PSR)	ESF	AB	COL 3.11(7)	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VK-Y0050A	Post Accident Sample Room Isolation Damper (PSR)	Open	AB	055-A22A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-Y0050B	Post Accident Sample Room Isolation Damper (PSR)	Open	AB	055-A22B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-Y0050C	Post Accident Sample Room Isolation Damper (PSR)	Open	AB	055-A22A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VK-Y0050D	Post Accident Sample Room Isolation Damper (PSR)	Open	AB	055-A22B	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
Auxiliary Building Clean Area HVAC System													
VO-HV31A	Essential Chiller Room Cubicle Cooler	Cooling	AB	078-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VO-HV31B	Essential Chiller Room Cubicle Cooler	Cooling	AB	078-A12D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VO-HV32A	Essential Chiller Room Cubicle Cooler	Cooling	AB	078-A12C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VO-HV32B	Essential Chiller Room Cubicle Cooler	Cooling	AB	078-A11D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VO-HV33A	Motor- Driven AFW Pump Room Cubicle Cooler	Cooling	AB	078-A20A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
VO-HV33B	Motor- Driven AFW Pump Room Cubicle Cooler	Cooling	AB	078-A20B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
Reactor Containment Purge System													
VQ-V0012	High Volume Containment Purge System Supply CIV, Butterfly Valve and Actuator	ESF	RCB	156-C01	Short-Term (5sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
VQ-V0011	High Volume Containment Purge System Supply CIV, Butterfly Valve and Actuator	ESF	AB	174-A16B	Short-Term (5sec)	Mild	Mild	Electrical EQ	No	I	(3)	SR	O
VQ-V0013	High Volume Containment Purge System Exhaust CIV, Butterfly Valve Actuator	ESF	RCB	156-C01	Short-Term (5sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O

Table 2 (32 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
VQ-V0014	High Volume Containment Purge System Exhaust CIV, Butterfly Valve Actuator	ESF	AB	174-A16B	Short-Term (5sec)	Mild	Mild	Electrical EQ	No	I	(3)	SR	O
VQ-V0031	Low Volume Containment Purge System Supply CIV, Butterfly Valve and Actuator	ESF	AB	174-A16B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
VQ-V0032	Low Volume Containment Purge System Supply CIV, Butterfly Valve and Actuator	ESF	RCB	156-C01	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VQ-V0033	Low Volume Cont. Purge System Exhaust CIV, Butterfly Valve and Actuator	ESF	RCB	156-C01	Short-Term (5sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
VQ-V0034	Low Volume Cont. Purge System Exhaust CIV, Butterfly Valve and Actuator	ESF	AB	174-A16B	Short-Term (5sec)	Mild	Mild	Mechanical EQ	No	I	(3)	SR	O
Hydrogen Monitoring System													
Various	Hydrogen Analyzers	ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I			
Plant Chilled Water System													
WI-V013	PCW Supply to Containment Ventilation Units CIV, Gate Valve and Actuator	ESF	AB	100-A16C	Short-Term (60sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
WI-V014	PCW Supply to Containment Ventilation Units CIV, Check Valve	Relief	RCB	114-C01A	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
WI-V015	PCW Return from Containment Ventilation Units CIV, Gate Valve and Actuator	ESF	RCB	114-C01A	Short-Term (60sec)	Harsh	Harsh	Electrical EQ	No	I	(3)	SR	O
WI-V012	PCW Return from Containment Ventilation Units CIV, Gate Valve and Actuator	ESF	AB	100-A16C	Short-Term (60sec)	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	O
Essential Chilled Water System													
WO-CH01A	Essential Chiller	Cooling	AB	078-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
WO-CH01B	Essential Chiller	Cooling	AB	078-A11D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
WO-CH02A	Essential Chiller	Cooling	AB	078-A12C	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
WO-CH02B	Essential Chiller	Cooling	AB	078-A12D	Continuous	Mild	Mild	Mechanical EQ	No	I		SR	
WO-PP01A	Essential Chilled Water Pump	Cooling	AB	078-A11C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-PP01B	Essential Chilled Water Pump	Cooling	AB	078-A11D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-PP02A	Essential Chilled Water Pump	Cooling	AB	078-A12C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-PP02B	Essential Chilled Water Pump	Cooling	AB	078-A12D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-PP03A	Essential Chilled Water Make-up Pump	Cooling	AB	120-A10C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-PP03B	Essential Chilled Water Make-up Pump	Cooling	AB	120-A10D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V1001A	ECW Compression Tank Relief valve	Relief	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V1001B	ECW Compression Tank Relief valve	Relief	AB	COL 3.11(7)	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	

Table 2 (33 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
WO-V0906A	Control Room Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A24C	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
WO-V0906B	Control Room Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A24D	Continuous	Harsh	Harsh	Mechanical EQ	No	I	(3)	SR	
WO-V0906C	Control Room Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A23C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V0906D	Control Room Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A23D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V0917A	EDG Room Normal Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A14C	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V0917B	EDG Room Normal Supply AHU Chilled Water 3-Way Valve	Cooling	AB	174-A14D	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V0918A	EDG Room Normal Supply AHU Chilled Water 3-Way Valve	Cooling	AB	135-H03A	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-V0918B	EDG Room Normal Supply AHU Chilled Water 3-Way Valve	Cooling	AB	135-H03B	Continuous	Mild	Mild	Mechanical EQ	No	I	(3)	SR	
WO-LP01A	Essential Chilled Water System Control Panel (12)	Control	AB	078-A11C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
WO-LP01B	Essential Chilled Water System Control Panel (12)	Control	AB	078-A11D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
WO-LP01C	Essential Chilled Water System Control Panel (12)	Control	AB	078-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
WO-LP01D	Essential Chilled Water System Control Panel (12)	Control	AB	078-A12D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
WO-LI003C	Field Indicator Device (12)	Cooling	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
WO-LI003D	Field Indicator Device (12)	Cooling	AB	174-A06D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
Electric System													
PF-SW01A	4.16kV Metal Clad Switchgear	Power Supply (PS)	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PF-SW01B	4.16kV Metal Clad Switchgear	Power Supply (PS)	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PF-SW01C	4.16kV Metal Clad Switchgear	Power Supply (PS)	AB	078-A02C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PF-SW01D	4.16kV Metal Clad Switchgear	Power Supply (PS)	AB	078-A02D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PG-LC01A	480V Load Center	Power Supply (PS)	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PG-LC01B	480V Load Center	Power Supply (PS)	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PG -LC01C	480V Load Center	Power Supply (PS)	AB	078-A03C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PG -LC01D	480V Load Center	Power Supply (PS)	AB	078-A03D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PG -LC02	480V Load Center	Power Supply (PS)	AB	078-A58B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH-MC01A	480V Motor Control Center	Power Supply (PS)	AB	100-A12A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (34 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PH -MC02A	480V Motor Control Center	Power Supply (PS)	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC03A	480V Motor Control Center	Power Supply (PS)	AB	137-A23A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC04A	480V Motor Control Center	Power Supply (PS)	AB	137-A15A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC05A	480V Motor Control Center	Power Supply (PS)	AB	100-H01A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC01B	480V Motor Control Center	Power Supply (PS)	AB	100-A12B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC02B	480V Motor Control Center	Power Supply (PS)	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC03B	480V Motor Control Center	Power Supply (PS)	AB	120-A15B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC04B	480V Motor Control Center	Power Supply (PS)	AB	137-A15B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC05B	480V Motor Control Center	Power Supply (PS)	AB	100-H01B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC01C	480V Motor Control Center	Power Supply (PS)	AB	078-A03C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC02C	480V Motor Control Center	Power Supply (PS)	AB	078-A03C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC03C	480V Motor Control Center	Power Supply (PS)	AB	137-A10C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC04C	480V Motor Control Center	Power Supply (PS)	AB	100-A02C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC01D	480V Motor Control Center	Power Supply (PS)	AB	078-A03D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC02D	480V Motor Control Center	Power Supply (PS)	AB	078-A03D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC03D	480V Motor Control Center	Power Supply (PS)	AB	137-A10D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
PH -MC04D	480V Motor Control Center	Power Supply (PS)	AB	100-A02D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ01A	Local Starter	Power Supply (PS)	AB	137A18A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ01B	Local Starter	Power Supply (PS)	AB	137A18B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ01C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ01D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ02A	Local Starter	Power Supply (PS)	AB	137A18A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ02B	Local Starter	Power Supply (PS)	AB	137A18B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ02C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ02D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ03C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
RC-SQ03D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
SI-SQ01C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (35 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-SQ01D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
SI-SQ02C	Local Starter	Power Supply (PS)	AB	100A22A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
SI-SQ02D	Local Starter	Power Supply (PS)	AB	120A15B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-SQ01C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-SQ01D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-SQ02C	Local Starter	Power Supply (PS)	AB	120A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-SQ02D	Local Starter	Power Supply (PS)	AB	120A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
CV-SQ01B	Local Starter	Power Supply (PS)	AB	137A18B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
VK-SQ01	Local Starter	Power Supply (PS)	AB	055A50B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
Various	Local Control Station	Power Supply (PS)	AB	Various	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BT01A	125Vdc Battery with Rack	Power Supply (PS)	AB	100-A11A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BT01B	125Vdc Battery with Rack	Power Supply (PS)	AB	100-A11B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BT01C	125Vdc Battery with Rack	Power Supply (PS)	AB	078-A07C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BT01D	125Vdc Battery with Rack	Power Supply (PS)	AB	078-A07D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC01A	480Vac/125Vdc Battery Charger	Power Supply (PS)	AB	078-A56A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC01B	480Vac/125Vdc Battery Charger	Power Supply (PS)	AB	078-A56B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC01C	480Vac/125Vdc Battery Charger	Power Supply (PS)	AB	078-A05C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC01D	480Vac/125Vdc Battery Charger	Power Supply (PS)	AB	078-A05D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC02A	480Vac/125Vdc Standby Battery Charger	Power Supply (PS)	AB	078-A56A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC02B	480Vac/125Vdc Standby Battery Charger	Power Supply (PS)	AB	078-A56B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC02C	480Vac/125Vdc Standby Battery Charger	Power Supply (PS)	AB	078-A05C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-BC02D	480Vac/125Vdc Standby Battery Charger	Power Supply (PS)	AB	078-A05D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-MC01A	125Vdc Control Center	Power Supply (PS)	AB	078-A56A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-MC01B	125Vdc Control Center	Power Supply (PS)	AB	078-A56B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-MC01C	125Vdc Control Center	Power Supply (PS)	AB	078-A05C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DC-MC01D	125Vdc Control Center	Power Supply (PS)	AB	078-A05D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-TR01A	480Vac/120Vac Regulating Transformer	Power Supply (PS)	AB	078-A56A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-TR01B	480Vac/120Vac Regulating Transformer	Power Supply (PS)	AB	078-A56B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-TR01C	480Vac/120Vac Regulating Transformer	Power Supply (PS)	AB	078-A05C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-TR01D	480Vac/120Vac Regulating Transformer	Power Supply (PS)	AB	078-A05D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-IN01A	125Vdc/120Vac Inverter	Power Supply (PS)	AB	078-A56A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (36 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
IP-IN01B	125Vdc/120Vac Inverter	Power Supply (PS)	AB	078-A56B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-IN01C	125Vdc/120Vac Inverter	Power Supply (PS)	AB	078-A05C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IP-IN01D	125Vdc/120Vac Inverter	Power Supply (PS)	AB	078-A05D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
SI-SQ02C	125Vdc Local Starter	Power Supply (PS)	AB	100-A22A	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
SI-SQ02D	125Vdc Local Starter	Power Supply (PS)	AB	120-A15B	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
AF-SQ01C	125Vdc Local Starter	Power Supply (PS)	AB	120-A09C	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
AF-SQ01D	125Vdc Local Starter	Power Supply (PS)	AB	120-A09D	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
Various	Electrical Penetration Assemblies - Medium Voltage Power	Power Supply (PS)	RCB	136-C01A,B	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
Various	Electrical Penetration Assemblies - Low Voltage Power & Control	Power Supply (PS)	RCB	136-C01A,B 114-C01A,B	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
Various	Electrical Penetration Assemblies – Low Voltage Instrumentation	Power Supply (PS)	RCB	136-C01A,B 114-C01A,B	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
Various	Electrical Conductor Sealing Assemblies	Power Supply (PS)	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	5kV Power Cables	Power Supply (PS)	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	600V Power Cables	Power Supply (PS)	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	600V Control Cables	Various	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	600V Instrumentation Cables	Various	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	Thermocouple Extension Cables	Various	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	Coaxial Cables	Various	Various	Various	Continuous	Mild/Harsh	Mild/Harsh	Electrical EQ	No	I		SR	
N/A(10)	RSPT Type I & II Cable Assemblies	RT	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	ICI Cable Assemblies	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	HJTC Cable Assemblies	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	RSPT Type I, II Cable	RT	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	Reed Switch Position Transmitter	RT	RCB	Various	Continuous	Mild	Mild	Electrical EQ	No	I		SR	
N/A(10)	HJTC MI Cables & Connectors	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	HJTC Probe	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	ICI MI Cable & Connectors	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
N/A(10)	ICI Assembly	PAM	RCB	Various	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	
Instrumentation and Control System													
AFW-FT-0047A	AFW Flow Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-FT-0048B	AFW Flow Transmitter, Channel B (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O

Table 2 (37 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
AFW-FT-0049C	AFW Flow Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-FT-0050D	AFW Flow Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-TE-0053A	AFW Line Back Leakage Temp. Element, Ch. A	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
AFW-TE-0054B	AFW Line Back Leakage Temp. Element, Ch. B	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
AFW-TE-0053C	AFW Line Back Leakage Temp. Element, Ch. C	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
AFW-TE-0054D	AFW Line Back Leakage Temp. Element, Ch. D	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
AFW-PT-0005A	AFW Pump Suction Pressure Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0006B	AFW Pump Suction Pressure Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0007C	AFW Pump Suction Pressure Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0008D	AFW Pump Suction Pressure Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0023A	AFW Pump Discharge Pressure Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0024B	AFW Pump Discharge Pressure Transmitter, Channel B (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0025C	AFW Pump Discharge Pressure Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-PT-0026D	AFW Pump Discharge Pressure Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-Z-0035A	AFW Flow Modulating Valve Position Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-Z-0036B	AFW Flow Modulating Valve Position Transmitter, Channel B (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-Z-0037C	AFW Flow Modulating Valve Position Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AFW-Z-0038D	AFW Flow Modulating Valve Position Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-LT-0003C	AFW Turbine Steam Drip Leg Level Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-LT-0004D	AFW Turbine Steam Drip Leg Level, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-PT-0013C	AFW Turbine Inlet Steam Pressure Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-PT-0014D	AFW Turbine Inlet Steam Pressure Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-S'(3)035C	AFW Pump Turbine Speed Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AT-S'(3)036D	AFW Pump Turbine Speed Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0003A	AFWST 1 Level Transmitter Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0004B	AFWST 2 Level Transmitter, Channel B (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O

Table 2 (38 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
AX-LT-0005A	AFWST 2 Level Transmitter, Channel A (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0005C	AFWST 2 Level Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0005D	AFWST 2 Level Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0006B	AFWST 1 Level Transmitter Channel B (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0006C	AFWST 1 Level Transmitter, Channel C (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
AX-LT-0006D	AFWST 1 Level Transmitter, Channel D (12)	Aux. Feedwater	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)Q	No	I		SR	O
CC-FT-0071A	CCW Flow Transmitter, Channel A (12)	Component Cooling WTR.	CCWPH	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CC-FT-0071B	CCW Flow Transmitter, Channel B (12)	Component Cooling WTR.	CCWPH	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CC-TE-069A	CCW Temperature Element, Channel A	Component Cooling WTR.	CCWPH	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
CC-TE-070B	CCW Temperature Element, Channel B	Component Cooling WTR.	CCWPH	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
CE-SW-01A	RTSS Cabinet (2), Channel A (12)	RT	AB	137-A36C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CE-SW-01B	RTSS Cabinet (2), Channel B (12)	RT	AB	137-A38C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CE-SW-01C	RTSS Cabinet (2), Channel C (12)	RT	AB	137-A35C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CE-SW-01D	RTSS Cabinet (2), Channel D (12)	RT	AB	137-A37C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CM-LP01A	Containment Hydrogen Analyzer Cabinet (2) (12)	Containment Hydrogen Concentration Monitoring	AB	120-A20A	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
CM-LP01B	Containment Hydrogen Analyzer Cabinet (2) (12)	Containment Hydrogen Concentration Monitoring	AB	120-A36B	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
CM-LP02A	Containment Hydrogen Analyzer Cabinet (2) (12)	Containment Hydrogen Concentration Monitoring	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CM-LP02B	Containment Hydrogen Analyzer Cabinet (2) (12)	Containment Hydrogen Concentration Monitoring	AB	137-A17B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
CM-PT-351A	Containment Pressure Protective (NR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-351B	Containment Pressure Protective (NR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-351C	Containment Pressure Protective (NR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O

Table 2 (39 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
CM-PT-351D	Containment Pressure Protective (NR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-352A	Cont. Pressure Protective (WR) Transmitter (12)	RT/ESF/ PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-352B	Cont. Pressure Protective (WR) Transmitter (12)	RT/ESF/ PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-352C	Cont. Pressure Protective (WR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-PT-352D	Cont. Pressure Protective (WR) Transmitter (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-TE-031A	Containment Temperature Element (12)	Accident Monitoring	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CM-LT-027A	CONTAINMENT WATER LEVEL (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
CM-LT-028B	CONTAINMENT WATER LEVEL (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
CS-FT-338C	Containment Spray Pump Flow Transmitter (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
CS-FT-348D	Containment Spray Pump Flow Transmitter (12)	Accident Monitoring	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMCQ	No	I		SR	O
CS-TE-071C	Containment Spray Temperature Element, HX	Containment Spray	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
CS-TE-072D	Containment Spray Temperature Element, HX	Containment Spray	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
DG-LI'(3)001A	HT Water Expansion Tank Level Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)001B	HT Water Expansion Tank Level Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)001C	HT Water Expansion Tank Level Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)001D	HT Water Expansion Tank Level Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)010A	LT Water Expansion Tank Level Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)010B	LT Water Expansion Tank Level Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)010C	LT Water Expansion Tank Level Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LI'(3)010D	LT Water Expansion Tank Level Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001A01	HT Water Expansion Tank Level Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001B01	HT Water Expansion Tank Level Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001C01	HT Water Expansion Tank Level Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001D01	HT Water Expansion Tank Level Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (40 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-LS'(3)001A02	HT Water Expansion Tank Level Switch High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001B02	HT Water Expansion Tank Level Switch High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001C02	HT Water Expansion Tank Level Switch High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)001D02	HT Water Expansion Tank Level Switch High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010A01	LT Water Expansion Tank Level Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010B01	LT Water Expansion Tank Level Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010C01	LT Water Expansion Tank Level Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010D01	LT Water Expansion Tank Level Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010A02	LT Water Expansion Tank Level Switch High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010B02	LT Water Expansion Tank Level Switch High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010C02	LT Water Expansion Tank Level Switch High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-LS'(3)010D02	LT Water Expansion Tank Level Switch High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)086A	Over Speed Air Receiver Pressure Indicator Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)086B	Over Speed Air Receiver Pressure Indicator Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)086C	Over Speed Air Receiver Pressure Indicator Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)086D	Over Speed Air Receiver Pressure Indicator Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)142A	Lube Oil/Preheating Water Heat Exchanger Inlet Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)142B	Lube Oil/Preheating Water Heat Exchanger Inlet Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)142C	Lube Oil/Preheating Water Heat Exchanger Inlet Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)142D	Lube Oil/Preheating Water Heat Exchanger Inlet Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)176A	Starting Air Receiver Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)176B	Starting Air Receiver Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)176C	Starting Air Receiver Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)176D	Starting Air Receiver Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)177A	Starting Air Receiver Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (41 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-PI'(3)177B	Starting Air Receiver Pressure Indicator	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)177C	Starting Air Receiver Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PI'(3)177D	Starting Air Receiver Pressure Indicator	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)041A	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)041B	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)041C	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)041D	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)042A	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)042B	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)042C	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)042D	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)046A	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)046B	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)046C	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)046D	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)047A	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)047B	Engine Inlet Lube Oil Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)047C	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)047D	Engine Inlet Lube Oil Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)060A	Crankcase Gas Pressure Measurement Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)060B	Crankcase Gas Pressure Measurement Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)060C	Crankcase Gas Pressure Measurement Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)060D	Crankcase Gas Pressure Measurement Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)182A	Starting Air Receiver Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)182B	Starting Air Receiver Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)182C	Starting Air Receiver Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (42 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-PS'(3)182D	Starting Air Receiver Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)183A	Starting Air Receiver Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)183B	Starting Air Receiver Pressure Switch Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)183C	Starting Air Receiver Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PS'(3)183D	Starting Air Receiver Pressure Switch Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PT'(3)110A	LT Water Pump Discharge Pressure Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PT'(3)110B	LT Water Pump Discharge Pressure Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PT'(3)110C	LT Water Pump Discharge Pressure Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-PT'(3)110D	LT Water Pump Discharge Pressure Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)004A	HT Water Pump Suction Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)004B	HT Water Pump Suction Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)004C	HT Water Pump Suction Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)004D	HT Water Pump Suction Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)007A	HT Water Outlet Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)007B	HT Water Outlet Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)007C	HT Water Outlet Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)007D	HT Water Outlet Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)008A	HT Water Outlet Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)008B	HT Water Outlet Temperature Transmitter	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)008C	HT Water Outlet Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)008D	HT Water Outlet Temperature Transmitter	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)044A	Lube Oil Engine Inlet Temperature Transmitter Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)044B	Lube Oil Engine Inlet Temperature Transmitter Low	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O

Table 2 (43 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
DG-TT'(3)044C	Lube Oil Engine Inlet Temperature Transmitter Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)044D	Lube Oil Engine Inlet Temperature Transmitter Low	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)045A	Lube Oil Engine Inlet Temperature Transmitter High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)045B	Lube Oil Engine Inlet Temperature Transmitter High	EDG	EDGB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)045C	Lube Oil Engine Inlet Temperature Transmitter High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
DG-TT'(3)045D	Lube Oil Engine Inlet Temperature Transmitter High	EDG	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-TE-350	IRWST Temperature Element	Accident Monitoring	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
IW-TE- 351	IRWST Temperature Element	Accident Monitoring	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ	No	I		SR	O
IW-LT-390B	IRWST LEVEL	Accident Monitoring	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
IW-LT-391A	IRWST LEVEL	Accident Monitoring	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ	No	I		SR	O
MS-PT-1013A	SG 1 Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1013B	SG 1 Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1013C	SG 1 Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1013D	SG 1 Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1023A	SG 2 Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1023B	SG 2 Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1023C	SG 2 Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
MS-PT-1023D	SG 2 Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
NR-RW-001A	ENFMS Safety Channel Detector, Channel A (12)	RT/PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I	—	SR	
NR-RW-001B	ENFMS Safety Channel Detector, Channel B (12)	RT/PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I	—	SR	
NR-RW-001C	ENFMS Safety Channel Detector, Channel C (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I	—	SR	
NR-RW-001D	ENFMS Safety Channel Detector, Channel D (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I	—	SR	

Table 2 (44 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PA-PA03A	ESF-CCS GC Cabinet (2) (12)	ESF	AB	157-A25C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PA-PA03B	ESF-CCS GC Cabinet (2) (12)	ESF	AB	157-A01D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PA-PA03C	ESF-CCS GC Cabinet (2) (12)	ESF	AB	157-A19C	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PA-PA03D	ESF-CCS GC Cabinet (2) (12)	ESF	AB	157-A19D	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PA-PA04A	MTP/ITP Cabinet (2), Channel A (12)	RT/ESF Test and Maintenance	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA04B	MTP/ITP Cabinet (2), Channel B (12)	RT/ESF Test and Maintenance	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA04C	MTP/ITP Cabinet (2), Channel C (12)	RT/ESF Test and Maintenance	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA04D	MTP/ITP Cabinet (2), Channel D (12)	RT/ESF Test and Maintenance	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA06C	ESF-CCS LC Cabinet (2) (12)	ESF	AB	157-A19C	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PA-PA06D	ESF-CCS LC Cabinet (2) (12)	ESF	AB	157-A19D	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PA-PA14A	PPS Cabinet (2), Channel A (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA14B	PPS Cabinet (2), Channel B (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA14C	PPS Cabinet (2), Channel C (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA14D	PPS Cabinet (2), Channel D (12)	RT/ESF	AB	COL 3.11(7)	Continuous	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA15A	CPCS Cabinet (2), Channel A (12)	RT	AB	COL 3.11(7)	Short-term	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA15B	CPCS Cabinet (2), Channel B (12)	RT	AB	COL 3.11(7)	Short-term	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA15C	CPCS Cabinet (2), Channel C (12)	RT	AB	COL 3.11(7)	Short-term	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA15D	CPCS Cabinet (2), Channel D (12)	RT	AB	COL 3.11(7)	Short-term	Mild	Mild	Electriclal EQ/EMC	No	I		SR	O
PA-PA16A	QIAS-P Cabinet (2) , Channel A (12)	PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA16B	QIAS-P Cabinet (2) , Channel B (12)	PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA18A	APC Cabinet (2), Channel A (12)	SIGNAL SPLITING	CR	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA18B	APC Cabinet (2), Channel B (12)	SIGNAL SPLITING	CR	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA18C	APC Cabinet (2), Channel C (12)	SIGNAL SPLITING	CR	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA18D	APC Cabinet (2), Channel D (12)	SIGNAL SPLITING	CR	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
PA-PA29C	DRCS Remote I/O Cabinet (2) (Associated Circuit) (12)	Isolating non-safety I&C equipment from safety I&C equipment.	AB	157A19C	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(8)	NSR	O

Table 2 (45 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PA-PA29D	DRCS Remote I/O Cabinet (2) (Associated Circuit) (12)	Isolating non-safety I&C equipment from safety I&C equipment.	AB	157A19D	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I	(8)	NSR	O
PA-PA47A	BOP Radiation Monitoring Cabinet (2) (12)	ESF, AMI	AB	157-A01D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PA-PA47B	BOP Radiation Monitoring Cabinet (2) (12)	ESF, AMI	AB	157-A25C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PA-PA48A	ENFMS Cabinet (2), Channel A (12)	RT/PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA48B	ENFMS Cabinet (2), Channel B (12)	RT/PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA48C	ENFMS Cabinet (2), Channel C (12)	PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PA-PA48D	ENFMS Cabinet (2), Channel D (12)	PAM	AB	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PE-LX01A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX01B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX01C	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A03C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX01D	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A03D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX02A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX02B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX02C	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A03C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX02D	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A03D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX03A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX03B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX03C	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A02C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX03D	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A02D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE-LX04A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX04B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX04C	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A10C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX04D	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A10D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX05A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O

Table 2 (46 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PE -LX05B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX05C	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A10C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX05D	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A10D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX06B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	078-A25B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX07A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX07B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	120-A15B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX08A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A15A	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PE -LX08B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	120-A15B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX09A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A15A	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
PE -LX09B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A15B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX10A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX10B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A15B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX11A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX11B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX12A	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17A	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX12B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PE -LX13B	ESF-CCS LC Cabinet (2), (12)	ESF	AB	137-A17B	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I		SR	O
PM-PM01	MCR RO Console , (12)	Plant Status Monitoring and Control	AB	157-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O
PM -PM02	MCR TO/EO Console , (12)	Plant Status Monitoring and Control	AB	157-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O
PM -PM03	MCR SS Console, (12)	Plant Status Monitoring and Control	AB	157-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O
PM -PM04	MCR STA Console, (12)	Plant Status Monitoring and Control	AB	157-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O

Table 2 (47 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
PM -PM05	MCR Safety Console (12)	Plant Status Monitoring and Control	AB	157-A12C	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O
PM-UC-19	PPS/CPCS/ESF-CCS Operator Module, Channel A (12)	PPS Monitoring	AB	157-A12C	Continuous	Mild	Mild	Electricla EQ, EMC	No	I		SR	O
PM-UC-20	PPS/CPCS/ESF-CCS Operator Module, Channel B (12)	PPS Monitoring	AB	157-A12C	Continuous	Mild	Mild	Electricla EQ, EMC	No	I		SR	O
PM-UC-21	PPS/CPCS/ESF-CCS Operator Module, Channel C (12)	PPS Monitoring	AB	157-A12C	Continuous	Mild	Mild	Electricla EQ, EMC	No	I		SR	O
PM-UC-22	PPS/CPCS/ESF-CCS Operator Module, Channel D (12)	PPS Monitoring	AB	157-A12C	Continuous	Mild	Mild	Electricla EQ, EMC	No	I		SR	O
PM-UC'(3)9	QIAS-P Display, Channel A (12)	PAM	CR	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
PM-UC-40	QIAS-P Display, Channel B (12)	PAM	CR	COL 3.11(7)	Continuous	Mild	Mild	Electrical EQ/EMC	No	I		SR	O
RC-PDT-115A	SG 1 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-115B	SG 1 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-115C	SG 1 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-115D	SG 1 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-125A	SG 2 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-125B	SG 2 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-125C	SG 2 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PDT-125D	SG 2 Differential Pressure Differential Transmitter (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-102A	Pressurizer Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-102B	Pressurizer Pressure Transmitter (12)	RT/ESF/ PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-102C	Pressurizer Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-102D	Pressurizer Pressure Transmitter (12)	RT/ESF	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-103A	Pressurizer Pressure Transmitter (12)	SI/SCS Valve Control	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-104B	Pressurizer Pressure Transmitter (12)	SI/SCS Valve Control	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-105C	Pressurizer Pressure Transmitter (12)	SI/SCS Valve Control	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-106D	Pressurizer Pressure Transmitter (12)	SI/SCS Valve Control	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-190A	RCS Pressure (Cold Leg-Pump Discharge)Transmitter 12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-PT-190B	RCS Pressure (Cold Leg-Pump Discharge)Transmitter (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	

Table 2 (48 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
RC-SE-113A	RCP 1A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-113B	RCP 1A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-113C	RCP 1A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-113D	RCP 1A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123A	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123B	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123C	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123D	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133A	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133B	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133C	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133D	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123A	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123B	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123C	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-123D	RCP 1B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133A	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133B	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133C	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-133D	RCP 2A Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-143A	RCP 2B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-143B	RCP 2B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-143C	RCP 2B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-SE-143D	RCP 2B Speed Sensor and Cable	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-113A	RCP 1A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-113B	RCP 1A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-113C	RCP 1A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-113D	RCP 1A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-123A	RCP 1B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-123B	RCP 1B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	

Table 2 (49 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
RC-ST-123C	RCP 1B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-123D	RCP 1B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-133A	RCP 2A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-133B	RCP 2A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-133C	RCP 2A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-133D	RCP 2A Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-143A	RCP 2B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-143B	RCP 2B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-143C	RCP 2B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-ST-143D	RCP 2B Speed Transmitter	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ	No	I		SR	
RC-TE-112A	RCS, Hot Leg Temperature (NR) Element (5), (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-112B	RCS, Hot Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-112C	RCS, Hot Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-112D	RCS, Hot Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-113A	RCS, Hot Leg Temperature (NR) Element (5),(12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-113B	RCS, Hot Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-113C	RCS, Hot Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-113D	RCS, Hot Leg Temperature (NR) Element 12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-122A	RCS, Cold Leg Temperature (NR) Element (5), (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-122B	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-122C	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-122D	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-123A	RCS, Cold Leg Temperature (NR) Element (5), (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-123B	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-123C	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O

Table 2 (50 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
RC-TE-123D	RCS, Cold Leg Temperature (NR) Element (12)	RT	RCB	COL 3.11(7)	Short-Term	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-132A	RCS, Hot Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-132B	RCS, Hot Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-133A	RCS, Hot Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-133B	RCS, Hot Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-142A	RCS, Cold Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-142B	RCS, Cold Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-143A	RCS, Cold Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
RC-TE-143B	RCS, Cold Leg Temperature Element (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ (EMC)	No	I		SR	O
RS-RU01	Remote Shutdown Console (12)	Plant Status Monitoring and Control	AB	137-A06D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(7)	SR	O
SI-FT-302A	SCS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT-305B	SCS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT-311D	SIS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT'(3)1B	SIS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT- 321B	SIS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT-341A	SIS Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT-390D	Hot Leg Injection Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-FT-391C	Hot Leg Injection Flow Transmitter (12)	PAM	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-PT-311D	SI Tank Pressure Transmitter (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-PT- 321B	SI Tank Pressure Transmitter (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-PT-331C	SI Tank Pressure Transmitter (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-PT-341A	SI Tank Pressure Transmitter (12)	PAM	RCB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-TE-300A	SDCHX 1 Inlet and Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-TE-301A	SDCHX 1 Inlet and Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-TE-302A	SDCHX Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O

Table 2 (51 of 51)

Tag No.	Equipment Identification	Equipment Function	Building	Room No.	Required Operational Time	Environmental Condition(1)	Radiation Condition (4),(6)	Designation	Influence of Immersion(11)	Seismic Cat.	Remarks	Classification	HF Sensitive
SI-TE-303B	SDCHX 2 Inlet and Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-TE-304B	SDCHX 2 Inlet and Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
SI-TE-305B	SDCHX Outlet Temperature Element (12)	SDC	AB	COL 3.11(7)	Continuous	Harsh	Harsh	Electrical EQ/EMC	No	I		SR	O
QN-PA17N	QIAS-N Cabinet (2), (12)	Plant Status Monitoring	AB	137-A10D	Continuous	Mild	Mild	Electrical EQ (EMC)	No	I	(8)	NSR	O

(1) See Table 3 for definition of environmental categories.

(2) Equipment located within a cabinet (2) is qualified allowing for temperature increase inside cabinet (2).

(3) Non-metallic consumable parts (as O-Ring, Packing and Gasket) are contained.

(4) Radiation environmental qualification requirements for individual components are developed as discussed in Subsection 3.11.5.

(5) Only Channels A and B are qualified for accident environment.

(6) Table 3 provides the worst case upper bound radiation environment in the region where the component is located.

(7) RO, and TO/EO consoles include ESF-CCS soft control modules (ESCMs) which are Class 1E devices. SS and STA consoles include ESCMs which are Class 1E devices and QIAS-N FPDs which are Non-Class 1E devices.
Safety Console includes Class 1E and Non-Class 1E devices. Class 1E devices are QIAS-P FPD, operator modules, Class 1E switches, ESCM. Non-Class 1E devices are QIAS-N FPDs.
Remote shutdown console includes ESCMs which are Class 1E devices and QIAS-N FPDs which are Non-Class 1E devices.

(8) QIAS-N Cabinet (2) and DRCS Remote I/O cabinets are designed by the associated circuit in accordnace with the IEEE Std.384, since it performs a non-safety function, but the hardware is qualified.

(9) Piping design determines room number that valves or other equipment will be installed in and is applied to graded approach.
Therefore, room number specified in the "E" column will be defined after piping design is completed. COL applicant will provide information on the room numbers.

(10) For cables or cable assemblies which do not have tag number due to being supplied as bulk, “N/A” will be specified in the Column labeled “Tag No”

(11) Influence of Immersion means susceptible to flooding

(12) Equipment contains electronic components such as semi-conductors or organic materials. It will be designated as H(Harsh) in the Designation if it is located in a Room with TID greater than 10 Gy.

Table 3 (1 of 28)

Environmental Parameters Data

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	049-A01C	ELEVATOR HOISTWAY	M														
AB	049-A01D	ELEVATOR HOISTWAY	M														
AB	049-A02A	ELEVATOR HOISTWAY	H														
AB	049-A02B	ELEVATOR HOISTWAY	H														
AB	050-A01C	CS PUMP & MINIFLOW HX RM	H														
AB	050-A01D	CS PUMP & MINIFLOW HX RM	H														
AB	050-A02C	SI PUMP RM	H														
AB	050-A02D	SI PUMP RM	H														
AB	050-A03A	SI PUMP RM	H														
AB	050-A03B	SI PUMP RM	H														
AB	050-A04A	SC PUMP & MINIFLOW HX RM	H														
AB	050-A04B	SC PUMP & MINIFLOW HX RM	H														
AB	055-A01C	CS HX RM	H														
AB	055-A01D	CS HX RM	H														
AB	055-A02A	CCW PUMP RM	M														
AB	055-A02B	CCW PUMP RM	M														
AB	055-A02C	CCW PUMP RM	M														
AB	055-A02D	CCW PUMP RM	M														
AB	055-A03C	CENTRAL WATER CHILLER RM	M														
AB	055-A03D	CENTRAL WATER CHILLER RM	M														
AB	055-A04C	SEISMIC CAT. I FIRE WATER TANK RM	M														
AB	055-A04D	SEISMIC CAT. I FIRE WATER TANK RM	M														
AB	055-A05C	STAIR	M														
AB	055-A05D	STAIR	M														
AB	055-A07C	GENERAL ACCESS AREA	H														
AB	055-A07D	GENERAL ACCESS AREA	H														
AB	055-A08C	FLOOR DRAIN SUMP PUMP RM	H														
AB	055-A08D	FLOOR DRAIN SUMP PUMP RM	H														

Table 3 (2 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	055-A10C	TENDON GALLERY ENTRANCE AREA	M													
AB	055-A11D	STORAGE	M													
AB	055-A14C	PIPE CHASE & VALVE RM	H													
AB	055-A14D	PIPE CHASE & VALVE RM	H													
AB	055-A18A	PIPE CHASE & VALVE RM	H													
AB	055-A18B	PIPE CHASE & VALVE RM	H													
AB	055-A19A	GENERAL ACCESS AREA	H													
AB	055-A19B	GENERAL ACCESS AREA	H													
AB	055-A20A	STAIR	H													
AB	055-A20B	STAIR	H													
AB	055-A21A	PIPE CHASE & VALVE RM	H													
AB	055-A21B	PIPE CHASE & VALVE RM	H													
AB	055-A22A	PIPE CHASE	H													
AB	055-A22B	PIPE CHASE	H													
AB	055-A30A	SC HX RM	H													
AB	055-A30B	SC HX RM	H													
AB	055-A31B	CHEMICAL DRAIN SUMP PUMP RM	H													
AB	055-A33A	EQUIP. DRAIN SUMP PUMP RM	H													
AB	055-A33B	EQUIP. DRAIN SUMP PUMP RM	H													
AB	055-A34A	FLOOR DRAIN SUMP PUMP RM	H													
AB	055-A34B	FLOOR DRAIN SUMP PUMP RM	H													
AB	055-A35A	GENERAL ACCESS AREA	H													
AB	055-A36A	CVCS CHEMICAL ADD PACKAGE RM	M													
AB	055-A38A	BORONOMETER RM	H													
AB	055-A39A	PROCESS RAD MONITOR RM	H													
AB	055-A42A	CHARGING PUMP RM	H													
AB	055-A43A	CHARGING PUMP MINIFLOW HX RM	H													
AB	055-A44A	SECONDARY SAMPLE PUMP RM	M													
AB	055-A45A	PIPE CHASE	H													
AB	055-A46B	CONDENSATE RETURN UNIT RM	H													

TS

Table 3 (3 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	055-A47B	PRI. OFF-GAS SAMPLE PUMP RM	H													
AB	055-A48B	POST ACCIDENT SAMPLE RM	H													
AB	055-A49B	POST ACCIDENT SAMPLE CONTROL PANEL RM	M													
AB	055-A50B	GENERAL ACCESS AREA	H													
AB	055-A51B	EQUIP. DRAIN TANK RM	H													
AB	055-A52B	RD PUMP RM	H													
AB	055-A53B	RD PUMP RM	H													
AB	055-A54B	AUX. CHARGING PUMP RM	H													
AB	055-A55B	CHARGING PUMP RM	H													
AB	055-A56A	VALVE RM	H													
AB	055-A56B	VALVE RM	H													
AB	055-A57C	PIPING & CABLE AREA	H													
AB	055-A57D	PIPING & CABLE AREA	H													
AB	055-A58A	PIPE CHASE	H													
AB	055-A59A	VALVE RM	M													
AB	055-A60A	ELEV. HALL	M													
AB	055-A60B	ELEV. HALL	M													
AB	055-A61C	ELEV. HALL	M													
AB	055-A61D	ELEV. HALL	M													
AB	055-A62A	CHASE	H													
AB	055-A62B	CHASE	H													
AB	065-A01C	DIESEL FUEL OIL STORAGE TANK RM	M													
AB	065-A01D	DIESEL FUEL OIL STORAGE TANK RM	M													
AB	068-A01A	VALVE HANDLING AREA	H													
AB	068-A05A	HVAC CHASE	M													
AB	068-A06A	GAS STRIPPER RM	H													
AB	068-A07A	HOT PIPE WAY	H													
AB	068-A08B	HOT PIPE WAY	H													
AB	068-A09B	VALVE RM	H													

TS

Table 3 (4 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						Total
										Normal			Accident			
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	068-A10A	FILTER & DEMIN. VALVE AREA	H													
AB	068-A11A	FILTER & DEMIN. VALVE AREA	H													
AB	068-A12A	FILTER & DEMIN. VALVE AREA	H													
AB	068-A13A	ELEV. HALL	M													
AB	077-A01A	REACTOR DRAIN FILTER PIT	H													
AB	077-A02A	SFP CLEAN-UP FILTER PIT	H													
AB	077-A03A	SFP DEMIN FILTER PIT	H													
AB	077-A04A	SFP CLEAN-UP FILTER PIT	H													
AB	077-A05A	SFP DEMIN FILTER PIT	H													
AB	077-A06A	PURIFICATION FILTER PIT	H													
AB	077-A07A	REACTOR MAKE-UP WATER FILTER PIT	H													
AB	077-A08A	PURIFICATION FILTER PIT	H													
AB	077-A09A	SGBD FILTER PIT	H													
AB	077-A10A	SEAL INJECTION FILTER PIT	H													
AB	077-A11A	SGBD FILTER PIT	H													
AB	077-A12A	SEAL INJECTION FILTER PIT	H													
AB	077-A13A	SGBD FILTER PIT	H													
AB	077-A14A	BORIC ACID FILTER PIT	H													
AB	077-A15A	FILTER CARTRIDGE STORAGE	H													
AB	078-A01C	PNS SWGR RM	M													
AB	078-A01D	PNS SWGR RM	M													
AB	078-A02C	CLASS 1E SWGR O1C RM	M													
AB	078-A02D	CLASS 1E SWGR O1D RM	M													
AB	078-A03C	CLASS 1E LOAD CENTER O1C RM	M													
AB	078-A03D	CLASS 1E LOAD CENTER O1D RM	M													
AB	078-A04C	MISC. ELECTRICAL EQUIP. RM	M													
AB	078-A04D	MISC. ELECTRICAL EQUIP. RM	M													
AB	078-A05C	TRAIN-C DC & IP EQUIP. RM	M													
AB	078-A05D	TRAIN-D DC & IP EQUIP. RM	M													
AB	078-A06C	N1E BATTERY RM	M													

TS

Table 3 (5 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	078-A06D	N1E BATTERY RM	M														
AB	078-A07C	TRAIN-C BATTERY RM	M														
AB	078-A07D	TRAIN-D BATTERY RM	M														
AB	078-A09C	HVAC CHASE	M														
AB	078-A09D	HVAC CHASE	M														
AB	078-A10C	GENERAL ACCESS AREA	M														
AB	078-A10D	GENERAL ACCESS AREA	M														
AB	078-A11C	ESSENTIAL CHILLER RM	M														
AB	078-A11D	ESSENTIAL CHILLER RM	M														
AB	078-A12C	ESSENTIAL WATER CHILLER RM	M														
AB	078-A12D	ESSENTIAL WATER CHILLER RM	M														
AB	078-A13D	DUCT RM	M														
AB	078-A14C	BUTTRESS OPNG	M														
AB	078-A15C	TURBINE DRIVEN AUX. FEEDWATER (AFW) PUMP RM	H														
AB	078-A15D	TURBINE DRIVEN AUX. FEEDWATER (AFW) PUMP RM	H														
AB	078-A16C	HVAC CHASE	M														
AB	078-A16D	HVAC CHASE	M														
AB	078-A17C	TURBINE DRIVEN AUX. FEEDWATER (AFW) PUMP VENT.	H														
AB	078-A17D	TURBINE DRIVEN AUX. FEEDWATER (AFW) PUMP VENT.	H														
AB	078-A19A	CORRIDOR	M														
AB	078-A19B	CORRIDOR	M														
AB	078-A20A	MOTOR DRIVEN AUX. FEEDWATER PUMP RM	M														
AB	078-A20B	MOTOR DRIVEN AUX. FEEDWATER PUMP RM	M														
AB	078-A21A	PIPE CHASE	M														
AB	078-A21B	PIPE CHASE	M														
AB	078-A23A	BUTTRESS OPNG	M														
AB	078-A23B	BUTTRESS OPNG	M														
AB	078-A25A	CLASS 1E SWITCHGEAR 01A RM	M														
AB	078-A25B	CLASS 1E SWITCHGEAR 01B RM	M														
AB	078-A29C	CCW MAKEUP PUMP RM	M														

Table 3 (6 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	078-A31A	GENERAL ACCESS AREA	M														
AB	078-A32A	SPENT FUEL POOL CLEAN-UP DEMIN. RM	H														
AB	078-A33A	SG BLOWDOWN DEMIN. RM	H														
AB	078-A34A	PRE-HOLDUP ION EXCH. RM	H														
AB	078-A35A	PURIFIC. ION EXCH. RM	H														
AB	078-A36A	BORIC ACID ION EXCH. RM	H														
AB	078-A37A	DEBORATING ION EXCH. RM	H														
AB	078-A38A	SFP CLEAN-UP PUMP RM	M														
AB	078-A39A	GAS STRIPPER EFFLUENT RAD MONITOR RM	H														
AB	078-A40B	BORIC ACID CONC. RM	H														
AB	078-A41B	SG WET LAYUP RECIRC. PUMP RM	M														
AB	078-A42B	HELB AREA AHU RM	H														
AB	078-A43B	HELB AREA ACU RM	H														
AB	078-A44B	GENERAL ACCESS AREA	M														
AB	078-A47B	ELECTRICAL EQUIPMENT RM	M														
AB	078-A49B	RMW PUMP RM	M														
AB	078-A50B	HOLDUP PUMP RM	M														
AB	078-A51B	BORIC ACID MAKEUP PUMP RM	M														
AB	078-A52C	480V N1E MCC RM	M														
AB	078-A52D	480V N1E MCC RM	M														
AB	078-A53C	480V N1E LOAD CENTER RM	M														
AB	078-A53D	480V N1E LOAD CENTER RM	M														
AB	078-A54A	ELEV. HALL	M														
AB	078-A54B	ELEV. HALL	M														
AB	078-A55C	ELEV. HALL	M														
AB	078-A55D	ELEV. HALL	M														
AB	078-A56A	TRAIN-A DC & IP EQUIP. RM	M														
AB	078-A56B	TRAIN-B DC & IP EQUIP. RM	M														
AB	078-A57C	PIPING & CABLE AREA	M														
AB	078-A57D	PIPING & CABLE AREA	M														

Table 3 (7 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	078-A58B	SWING LOAD CENTER RM	M													
AB	078-A59D	CCW MAKE UP PUMP RM	M													
AB	086-A01A	FILTER AREA	M													
AB	100-A01C	EXHAUST SILENCER RM	M													
AB	100-A01D	EXHAUST SILENCER RM	M													
AB	100-A02C	DG CONTROL PANEL RM	M													
AB	100-A02D	DG CONTROL PANEL RM	M													
AB	100-A03C	DIESEL GENERATOR RM	M													
AB	100-A03D	DIESEL GENERATOR RM	M													
AB	100-A04C	CABLE ACCESS AREA	M													
AB	100-A04D	CABLE ACCESS AREA	M													
AB	100-A05C	ELECTRICAL EQUIPMENT RM	M													
AB	100-A05D	ELECTRICAL EQUIPMENT RM	M													
AB	100-A06C	GENERAL ACCESS AREA	M													
AB	100-A06D	GENERAL ACCESS AREA	M													
AB	100-A07C	AUX. FEEDWATER(AFW) TANK	M													
AB	100-A07D	AUX. FEEDWATER(AFW) TANK	M													
AB	100-A08C	NON-1E DC & IP EQUIP. RM	M													
AB	100-A08D	NON-1E DC & IP EQUIP. RM	M													
AB	100-A09C	TENDON ACCESS RM	M													
AB	100-A10A	GENERAL ACCESS AREA	M													
AB	100-A10B	GENERAL ACCESS AREA	M													
AB	100-A11A	TRAIN-A BATTERY RM	M													
AB	100-A11B	TRAIN-B BATTERY RM	M													
AB	100-A12A	480V CLASS 1E MCC 01A RM	M													
AB	100-A12B	480V CLASS 1E MCC 01B RM	M													
AB	100-A13A	MECHANICAL PENETRATION RM	H													
AB	100-A13B	MECHANICAL PENETRATION RM	H													
AB	100-A14A	PERSONNEL AIR LOCK ENTRANCE	M													
AB	100-A15C	PIPE CHASE	M													

TS

Table 3 (8 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	100-A15D	PIPE CHASE	M														
AB	100-A16C	PIPE CHASE	H														
AB	100-A16D	PIPE CHASE	H														
AB	100-A17A	CHASE	M														
AB	100-A17B	CHASE	M														
AB	100-A18A	MUX N1 RM	M														
AB	100-A18B	MUX N2 RM	M														
AB	100-A19C	VESTIBULE	M														
AB	100-A19D	VESTIBULE	M														
AB	100-A20A	GENERAL ACCESS AREA	M														
AB	100-A21A	NEW RESIN STORAGE RM	M														
AB	100-A22A	GENERAL ACCESS AREA	M														
AB	100-A23A	AUX BLDG. CONTROLLED AREA (I) SUPPLY AHU RM	M														
AB	100-A24A	SFP COOLING HX RM	H														
AB	100-A25A	VOLUME CONTROL TANK RM	H														
AB	100-A26A	VALVE RM	H														
AB	100-A27B	STORAGE	M														
AB	100-A28B	HELB PIPE & HVAC CHASE	H														
AB	100-A29B	PIPE & HVAC CHASE	H														
AB	100-A30B	STORAGE	M														
AB	100-A31B	POOL LEAK DETECTION AREA	M														
AB	100-A32B	SFP COOLING HX RM	H														
AB	100-A33B	HELB HVAC VENT CHASE	M														
AB	100-A35B	LOADING & UNLOADING AREA	M														
AB	100-A36B	FUEL HANDLING AREA SUPPLY AHU RM	M														
AB	100-A37B	GENERAL ACCESS AREA	M														
AB	100-A38A	FUEL HANDLING AREA NORMAL EXHAUST ACU RM	M														
AB	100-A39A	HVAC VENT CHASE	M														

Table 3 (9 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	100-A39B	HVAC VENT CHASE	M													
AB	100-A42C	D/G OIL STORAGE ACCESS	M													
AB	100-A42D	D/G OIL STORAGE ACCESS	M													
AB	100-A43C	D/G OIL STORAGE ENTRANCE	M													
AB	100-A43D	D/G OIL STORAGE ENTRANCE	M													
AB	100-A44D	VESTIBULE	M													
AB	100-A45A	ELEV. HALL	M													
AB	100-A45B	ELEV. HALL	M													
AB	100-A46C	ELEV. HALL	M													
AB	100-A46D	ELEV. HALL	M													
AB	109-A01C	AIR INTAKE RM	M													
AB	109-A01D	AIR INTAKE RM	M													
AB	111-A01B	CASK LOADING PIT	H													
AB	114-A01B	SPENT FUEL POOL	H													
AB	117-A01A	BORIC ACID BATCH TANK ROOM	M													
AB	117-A02A	HELB HVAC DUCT TRAY PIPE WAY	H													
AB	119-A01B	REFUELING CANAL	H													
AB	119-A02B	CASK DECON. PIT	H													
AB	120-A01C	PIPING CABLE AREA	M													
AB	120-A01D	PIPING CABLE AREA	M													
AB	120-A02C	LUBE OIL MAKE-UP TANK RM	M													
AB	120-A02D	LUBE OIL MAKE-UP TANK RM	M													
AB	120-A03C	DIESEL FUEL OIL DAY TANK RM	M													
AB	120-A03D	DIESEL FUEL OIL DAY TANK RM	M													
AB	120-A04C	LT & HT WATER EXPANSION TANK RM	M													
AB	120-A04D	LT & HT WATER EXPANSION TANK RM	M													
AB	120-A05C	ELECTRICAL EQUIP. RM	M													
AB	120-A05D	ELECTRICAL EQUIP. RM	M													
AB	120-A07C	GENERAL ACCESS AREA	M													
AB	120-A07D	GENERAL ACCESS AREA	M													

TS

Table 3 (10 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	120-A08C	480V N1E MCC RM	M													
AB	120-A08D	480V N1E MCC RM	M													
AB	120-A09C	ELECTRICAL PENETRATION RM(C)	M													
AB	120-A09D	ELECTRICAL PENETRATION RM(D)	M													
AB	120-A10C	ECW MAKE-UP PUMP RM	M													
AB	120-A10D	ECW MAKE-UP PUMP RM	M													
AB	120-A11A	GENERAL ACCESS AREA	M													
AB	120-A11B	GENERAL ACCESS AREA	M													
AB	120-A13B	STAIR	M													
AB	120-A14A	SG BLOWDOWN REGEN HX RM	H													
AB	120-A15B	480V CLASS 1E MCC 03B RM	M													
AB	120-A16A	MECHANICAL PENETRATION RM	H													
AB	120-A16B	MECHANICAL PENETRATION RM	H													
AB	120-A17A	STAIR	M													
AB	120-A18A	LX PANEL RM														
AB	120-A18C	LX PANEL RM	M													
AB	120-A18D	LX PANEL RM	M													
AB	120-A20A	GENERAL ACCESS AREA	M													
AB	120-A21A	AUX. BLDG. CONTROLLED AREA(I) EMER. EXHAUST ACU RM-1	H													
AB	120-A22C	VESTIBULE	M													
AB	120-A22D	VESTIBULE	M													
AB	120-A23A	VALVE RM	H													
AB	120-A24A	FUEL HANDLING AREA EMER. EXHAUST ACU RM	H													
AB	120-A25A	HVAC CHASE	H													
AB	120-A29B	AUX. BLDG. CONTROLLED AREA(II) EMER. EXHAUST ACU RM	H													
AB	120-A30B	AUX. BLDG. CONTROLLED AREA(II) EMER. EXHAUST ACU RM-2	H													
AB	120-A31B	GENERAL ACCESS AREA	M													

TS

Table 3 (11 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						
										Normal			Accident			Total
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	120-A32A	AUX. BLDG. CONTROLLED AREA(I) EMER. EXHAUST ACU RM	M													
AB	120-A33A	ELEV. HALL	M													
AB	120-A33B	ELEV. HALL	M													
AB	120-A34C	ELEV. HALL	M													
AB	120-A34D	ELEV. HALL	M													
AB	120-A35B	BATTERY RM	M													
AB	120-A36B	HYDROGEN ANALYZER RM	M													
AB	120-A37B	ACCESS AREA	M													
AB	123-A01C	D/G RM NORMAL SUPPLY RM	M													
AB	123-A01D	D/G RM NORMAL SUPPLY RM	M													
AB	127-A01C	DIESEL VENT STACK	M													
AB	127-A01D	DIESEL VENT STACK	M													
AB	137-A01C	CABLE SPREADING AREA	M													
AB	137-A01D	CABLE SPREADING AREA	M													
AB	137-A02C	ELECTRICAL EQUIP. RM	M													
AB	137-A02D	ELECTRICAL EQUIP. RM	M													
AB	137-A03C	CEDM M/G SET RM	M													
AB	137-A04C	CEDM POWER CONT. CABINET RM	M													
AB	137-A05D	PCS RM	M													
AB	137-A06D	REMOTE SHUT DOWN RM	M													
AB	137-A07D	VESTIBULE	M													
AB	137-A08D	STAIR	M													
AB	137-A09C	GENERAL ACCESS AREA	M													
AB	137-A09D	GENERAL ACCESS AREA	M													
AB	137-A10C	480V CLASS 1E MCC 03C RM	M													
AB	137-A10D	480V CLASS 1E MCC 03D RM	M													
AB	137-A11C	ELECTRICAL PENETRATION RM(C)	M													
AB	137-A11D	ELECTRICAL PENETRATION RM(D)	M													
AB	137-A12D	MUX N2 RM	M													
AB	137-A13B	GENERAL ACCESS AREA	M													

TS

Table 3 (12 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	137-A14B	480V N1E MCC 18N RM	M														
AB	137-A15A	480V CLASS 1E MCC 04A RM	M														
AB	137-A15B	480V CLASS 1E MCC 04B RM	M														
AB	137-A16A	ELEV. HALL	M														
AB	137-A16B	ELEV. HALL	M														
AB	137-A17A	PENETRATION MUX A RM	M														
AB	137-A17B	PENETRATION MUX B RM	M														
AB	137-A18A	ELECTRICAL PENETRATION RM(A)	M														
AB	137-A18B	ELECTRICAL PENETRATION RM(B)	M														
AB	137-A19A	SG BLOWDOWN FLASH TANK RM	H														
AB	137-A20A	GENERAL ACCESS AREA	M														
AB	137-A21A	ELECTRICAL EQUIP. RM	M														
AB	137-A22A	ELECTRICAL EQUIP. RM	M														
AB	137-A23A	480V CLASS 1E MCC 03A RM	M														
AB	137-A24B	480V N1E MCC 17N RM	M														
AB	137-A25A	FUEL HANDLING AREA EMER. EXHAUST ACU RM	H														
AB	137-A27B	STORAGE RM	M														
AB	137-A28B	AUX BLDG. CONTROLLED AREA(II) SUPPLY AHU RM	M														
AB	137-A29B	GENERAL ACCESS AREA	M														
AB	137-A30C	MAIN STEAM ENCLOSURE	H														
AB	137-A30D	MAIN STEAM ENCLOSURE	H														
AB	137-A31C	MAIN STEAM VALVE ROOM	H														
AB	137-A31D	MAIN STEAM VALVE ROOM	H														
AB	137-A32B	PIPE CHASE	M														
AB	137-A35C	REACTOR TRIP SWGR RM	M														
AB	137-A36C	REACTOR TRIP SWGR RM	M														
AB	137-A37C	REACTOR TRIP SWGR RM	M														
AB	137-A38C	REACTOR TRIP SWGR RM	M														

Table 3 (13 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	137-A39A	GENERAL ACCESS AREA	M														
AB	137-A40B	TRANSFER TUBE INSPECTION AREA	H														
AB	137-A41A	REMOTE CONTROL CONSOLE RM	M														
AB	137-A42A	VESTIBULE	M														
AB	137-A43D	HVAC RM	M														
AB	137-44C	ELEV. HALL	M														
AB	137-44D	ELEV. HALL	M														
AB	139-A01B	NEW FUEL STORAGE AREA	M														
AB	156-A01B	SST RM	M														
AB	156-A02B	HOT TOOL CRIB	H														
AB	156-A04B	CONTAINMENT ENTRANCE AREA	H														
AB	156-A05B	GENERAL ACCESS AREA	M														
AB	156-A08B	NEW FUEL CONTAINER LAYDOWN & INSPECTION AREA	M														
AB	156-A10A	EQUIPMENT HATCH ACCESS RM	H														
AB	156-A13A	ELEV. HALL	M														
AB	156-A13B	ELEV. HALL	M														
AB	156-A14A	AUX BLDG. CONTROLLED AREA(I) NORMAL EXHAUST ACU RM	H														
AB	156-A15B	PIPE CHASE	H														
AB	156-A16A	SIS FILLING TANK RM	M														
AB	156-A17A	CHASE	M														
AB	156-A17B	CHASE	M														
AB	157-A01D	I & C EQUIPMENT RM	M														
AB	157-A02C	TSC OFFICE	M														
AB	157-A03C	MEN'S TOILET	M														
AB	157-A04C	LOCKER RM	M														
AB	157-A05C	WOMEN'S TOILET	M														
AB	157-A06D	VESTIBULE	M														
AB	157-A07C	STORAGE	M														
AB	157-A08D	COMPUTER RM PACU RM	M														

Table 3 (14 of 28)

Bldg.	Room No.	Identification	H/M (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)						Total
										Normal			Accident			
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron	
AB	157-A09C	MEETING RM	M													
AB	157-A10C	KITCHEN & DINING RM	M													
AB	157-A12C	MAIN CONTROL RM	M													
AB	157-A13C	VESTIBULE	M													
AB	157-A13D	VESTIBULE	M													
AB	157-A14D	COMPUTER RM	M													
AB	157-A15D	COMPUTER RM OFFICE	M													
AB	157-A16C	CORRIDOR	M													
AB	157-A16D	CORRIDOR	M													
AB	157-A17C	CORRIDOR	M													
AB	157-A18C	CLEAN AGENT RM	M													
AB	157-A19C	I & C EQUIP. RM	M													
AB	157-A19D	I & C EQUIP. RM	M													
AB	157-A20C	I & C EQUIP. RM	M													
AB	157-A20D	I & C EQUIP. RM	M													
AB	157-A21D	INSTRUMENT MAINTENANCE SHOP	M													
AB	157-A22D	GUEST RM	M													
AB	157-A23D	AEB RM	M													
AB	157-A24C	SHOWER RM	M													
AB	157-A25C	I & C EQUIP. RM	M													
AB	157-A26C	SERVICE RM	M													
AB	157-A27C	GENERAL ACCESS AREA	M													
AB	157-A27D	GENERAL ACCESS AREA	M													
AB	157-A28D	BREATHING AIR RACK	M													
AB	157-A29C	TSC EQUIP. REPAIR & MAINT RM	M													
AB	157-A30C	TSC RECORD STORAGE RM	M													
AB	170-A01A	ELEV. MACHINE RM	M													
AB	174-A01C	EDG RM NORMAL EXHAUST FAN RM	M													
AB	174-A01D	EDG RM NORMAL EXHAUST FAN RM	M													
AB	174-A02C	ESSENTIAL CHILLED WATER COMPRESSION TANK RM	M													
AB	174-A03C	CCW SURGE TANK RM	M													
AB	174-A03D	CCW SURGE TANK RM	M													
AB	174-A05C	480V N1E MCC RM	M													
AB	174-A05D	ELECTRICAL EQUIP. RM	M													
AB	174-A06D	ESSENTIAL/CENTRAL CHILLED WATER COMPRESSION TANK RM	M													

TS

Table 3 (15 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	174-A12C	GENERAL ACCESS AREA															
AB	174-A12D	GENERAL ACCESS AREA															
AB	174-A13C	480V N1E MCC RM															
AB	174-A13D	480V N1E MCC RM															
AB	174-A14C	EDG RM NORMAL SUPPLY AHU RM															
AB	174-A14D	EDG RM NORMAL SUPPLY AHU RM															
AB	174-A15B	CONTAINMENT HIGH/LOW VOLUME PURGE ACU RM															
AB	174-A16B	CONTAINMENT HIGH VOLUME PURGE AHU RM															
AB	174-A17B	ELEV. HALL															
AB	174-A18C	ELEV. HALL															
AB	174-A18D	ELEV. HALL															
AB	174-A19C	ACCESS RM															
AB	174-A19D	ACCESS RM															
AB	174-A22B	HVAC CHASE															
AB	174-A23C	CONTROL RM AREA SUPPLY AHUS RM															
AB	174-A23D	CONTROL RM AREA SUPPLY AHUS RM															
AB	174-A24C	CONTROL RM AREA SUPPLY AHU/ACU RM															
AB	174-A24D	CONTROL RM AREA SUPPLY AHU/ACU RM															
AB	174-A25B	HVAC AREA															
AB	174-A25C	HVAC AREA															
AB	174-A26C	VESTIBULE															
AB	174-A26D	VESTIBULE															
AB	175-A01C	MSIV RM SUPPLY AHU RM															
AB	175-A01D	MSIV RM SUPPLY AHU RM															
AB	195-A01C	ELEV. HALL															
AB	195-A01D	ELEV. HALL															
AB	195-A02C	AUX. BLDG. CLEAN AREA SUPPLY AHUS RM															
AB	195-A02D	AUX. BLDG. CLEAN AREA SUPPLY AHUS RM															

Table 3 (16 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
AB	195-A04C	DIESEL VENT STACK	M														
AB	195-A04D	DIESEL VENT STACK	M														
AB	195-A05C	480V N1E LOADCENTER RM	M														
AB	195-A05D	480V N1E LOADCENTER RM	M														
AB	195-A06C	HVAC VENT RM	M														
AB	195-A06D	HVAC VENT RM	M														
AB	195-A07B	ELEV. HALL	M														
AB	195-A08B	AUX. BLDG. CONTROLLED AREA (II) NORMAL EXHAUST ACU RM	H														
AB	195-A09C	HVAC EXHAUST PENT HOUSE	M														
AB	195-A10D	SMOKE FAN RM	M														
AB	215-A02B	ELEVATOR MACHINE RM	M														
AB	216-A01C	ELEVATOR MACHINE RM	M														
AB	216-A01D	ELEVATOR MACHINE RM	M														
RCB	055-C01	TENDON GALLERY	M														
RCB	069-C01	ICI CAVITY	H														
RCB	078-C01	REACTOR CAVITY	H														
RCB	080-C01	HOLD-UP VOLUME TANK	H														
RCB	081-C01	IRWST	H														
RCB	089-C01	CORE DEBRIS CHAMBER	H														
RCB	089-C02	REACTOR CAVITY ACCESS AREA	H														
RCB	100-C01	CONTAINMENT ANNULUS AREA	H														
RCB	100-C02A	STEAM GENERATOR CAVITY	H														
RCB	100-C02B	STEAM GENERATOR CAVITY	H														
RCB	100-C03	REACTOR DRAIN TANK RM	H														
RCB	100-C04	LETDOWN HX RM	H														
RCB	100-C05	ELEV. HOISTWAY	H														
RCB	106-C01	UGS LAYDOWN AREA	H														
RCB	114-C01A	CONTAINMENT ANNULUS AREA	H														
RCB	114-C01B	CONTAINMENT ANNULUS AREA	H														
RCB	114-C02	CSB LAYDOWN AREA	H														

Table 3 (17 of 28)

Table 3 (17 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
RCB	115-C01	VALVE RM	H														
RCB	115-C02	VALVE RM	H														
RCB	115-C03	VALVE RM	H														
RCB	128-C01	REGENERATIVE HX RM	H														
RCB	130-C01	REFUELING POOL AREA	H														
RCB	136-C01A	CONTAINMENT ANNULUS AREA	H														
RCB	136-C01B	CONTAINMENT ANNULUS AREA	H														
RCB	136-C02	PRESSURIZER CAVITY	H														
RCB	156-C01	OPERATING AREA	H														
RCB	173-C01	ELEV. MACHINE RM	H														
EDGB	063-H01	STAIR	M														
EDGB	063-H02A	DIESEL FUEL OIL TRANSFER PUMP RM	M														
EDGB	063-H02B	DIESEL FUEL OIL TRANSFER PUMP RM	M														
EDGB	063-H03A	DIESEL FUEL OIL STORAGE TANK RM	M														
EDGB	063-H03B	DIESEL FUEL OIL STORAGE TANK RM	M														
EDGB	100-H01A	D/G CONTROL RM	M														
EDGB	100-H01B	D/G CONTROL RM	M														
EDGB	100-H02A	EMER. D/G RM	M														
EDGB	100-H02B	EMER. D/G RM	M														
EDGB	100-H03	ELECTRICAL EQUIP. RM	M														
EDGB	100-H04A	AIR INTAKE SHAFT	M														
EDGB	100-H04B	AIR INTAKE SHAFT	M														
EDGB	100-H05A	AIR EXHAUST SHAFT	M														
EDGB	100-H05B	AIR EXHAUST SHAFT	M														
EDGB	100-H06A	VALVE ROOM	M														
EDGB	100-H06B	VALVE ROOM	M														
EDGB	100-H07A	STAIR	M														
EDGB	100-H07B	STAIR	M														
EDGB	121-H01A	LUBE OIL MAKEUP TANK RM	M														

Table 3 (18 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
EDGB	121-H01B	LUBE OIL MAKEUP TANK RM	M														
EDGB	121-H02A	DIESEL FUEL OIL DAY TANK RM	M														
EDGB	121-H02B	DIESEL FUEL OIL DAY TANK RM	M														
EDGB	135-H01A	D/G EXHAUST SILENCER RM	M														
EDGB	135-H01B	D/G EXHAUST SILENCER RM	M														
EDGB	135-H02A	AIR INTAKE FILTER RM	M														
EDGB	135-H02B	AIR INTAKE FILTER RM	M														
EDGB	135-H03A	EDG RM NOR. SUPPLY AHU RM	M														
EDGB	135-H03B	EDG RM NOR. SUPPLY AHU RM	M														
CPB	057-P01	ELEV. HOISTWAY	M														
CPB	062-P01	CONTAMINATED CLOTHING STORAGE	M														
CPB	062-P02	MASK DECONTAMINATION RM	M														
CPB	063-P01	HOT PIPE CHASE	H														
CPB	063-P02	GRS HEADER DRAIN TANK RM	H														
CPB	063-P03	VALVE RM	H														
CPB	063-P04	GRS INLET SKID RM	H														
CPB	063-P05	S.R.L.T STORAGE TANK RM	H														
CPB	063-P06	FUTURE USE AREA	M														
CPB	063-P07	VALVE RM	H														
CPB	063-P08	LOW ACTIVITY SPENT RESIN TANK RM	H														
CPB	063-P10	HOT TOOL RM	M														
CPB	063-P12	LRS SEAL WATER RECYCLE EQUIPMENT RM	M														
CPB	063-P13	HOT PIPE CHASE	H														
CPB	063-P14	HOT TOOL RM	M														
CPB	063-P16	CORRIDOR	M														
CPB	063-P17	HVAC CHASE	M														
CPB	063-P18	STAIR	M														
CPB	063-P19	ELECT. RISER	M														
CPB	063-P20	HVAC CHASE	M														

Table 3 (19 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	063-P21	EQUIP. WASTE PUMP RM	H														
CPB	063-P22	EQUIP. WASTE PUMP RM	H														
CPB	063-P23	EQUIP. WASTE TANK RM	H														
CPB	063-P24	EQUIP. WASTE TANK RM	H														
CPB	063-P25	FLOOR DRAIN PUMP RM	H														
CPB	063-P26	NORMAL SUMP PUMP RM	M														
CPB	063-P27	CHEMICAL WASTE PUMP RM	M														
CPB	063-P28	FLOOR DRAIN TANK RM	H														
CPB	063-P29	FLOOR DRAIN TANK RM	H														
CPB	063-P30	CHEMICAL WASTE TANK RM	H														
CPB	063-P31	CHEMICAL WASTE TANK RM	H														
CPB	063-P32	DETERGENT WASTE TANK & PUMP RM	M														
CPB	063-P33	SAMPLING RM	M														
CPB	063-P34	L.R.S. CONTROL PANEL RM	M														
CPB	063-P36	DWS DRAIN SUMP PUMP RM	M														
CPB	063-P37	MONITOR TANK RM	M														
CPB	063-P38	PSS-SOLIDIFICATION & DRUM CONVEYOR RM	H														
CPB	063-P39	SPENT RESIN LONG TERM STORAGE TANK SUMP PUMP RM	H														
CPB	063-P40	CONCENTRATE PUMP RM	H														
CPB	063-P41	CONCENTRATE HOLDING TANK RM	H														
CPB	063-P42	RO FEED PUMP RM	H														
CPB	063-P43	IX FEED PUMP RM	M														
CPB	063-P44	IX FEED TANK RM	H														
CPB	063-P45	HOT TOOL RM	M														
CPB	063-P46	CORRIDOR	M														
CPB	063-P47	CTS-HEPA VACUUM SKID RM	H														
CPB	063-P48	CTS-DRYER SKID RM	H														
CPB	063-P49	CTS-VACUUM SKID RM	H														

Table 3 (20 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	063-P50	HVAC CHASE	M														
CPB	063-P51	STAIR	M														
CPB	063-P52	CHEMICAL DRAIN SUMP PUMP RM	M														
CPB	063-P53	CORRIDOR	M														
CPB	063-P54	MONITOR TANK PUMP RM	M														
CPB	063-P55	CABLE TRAY & PIPE CHASE	M														
CPB	063-P56	DROP AREA	M														
CPB	063-P57	SORTING RM	M														
CPB	063-P59	NON-CONTAMINATED CLOTHING STORAGE	M														
CPB	063-P60	LAUNDRY OFFICE	M														
CPB	063-P61	LAUNDRY STORAGE	M														
CPB	063-P62	STORAGE	M														
CPB	063-P63	TELECOM CLOSET	M														
CPB	063-P64	CORRIDOR	M														
CPB	063-P65	ELECT. RISER	M														
CPB	063-P66	STAIR	M														
CPB	063-P67	ISOTOPIC STORAGE	M														
CPB	063-P68	TLD & FILM STORAGE	M														
CPB	063-P69	FOREMEN'S OFFICE	M														
CPB	063-P70	CONTAMINATED ELECTRIC EQUIP. RM	M														
CPB	063-P71	CONTAMINATED INSTRUMENT REPAIR RM	M														
CPB	063-P72	CALIB. OFFICE	M														
CPB	063-P73	INSTRUMENT CALIB. FACILITY	M														
CPB	063-P74	COUNTING RM	M														
CPB	063-P75	COUNTING OFFICE	M														
CPB	063-P76	STAIR	M														
CPB	063-P77	HVAC CHASE	M														
CPB	063-P78	PIPE CHASE	H														
CPB	063-P79	PIPE CHASE	H														
CPB	063-P80	PIPE CHASE	H														

Table 3 (21 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	077-P01	HOT PIPE WAY	H														
CPB	079-P01	ELEV. HOISTWAY	M														
CPB	079-P02	ELEV. HOISTWAY	M														
CPB	085-P01	WASTE GAS DRYER SKID RM	H														
CPB	085-P02	WASTE GAS DRYER SKID RM	H														
CPB	085-P03	VALVE RM	H														
CPB	085-P04	CHARCOAL GUARD BED RM	H														
CPB	085-P05	ELECT. RISER	M														
CPB	085-P06	VALVE RM	H														
CPB	085-P07	VALVE RM	H														
CPB	085-P08	VALVE RM	H														
CPB	085-P09	WASTE SHREDDER RM	H														
CPB	085-P11	SORTING RM	H														
CPB	085-P12	DROP AREA (CLEAN)	M														
CPB	085-P13	CLEAN WASTE STORAGE	M														
CPB	085-P14	CORRIDOR	M														
CPB	085-P15	VALVE RM	H														
CPB	085-P16	VALVE RM	H														
CPB	085-P17	VALVE RM	H														
CPB	085-P18	DROP AREA(POTENTIAL)	M														
CPB	085-P19	POTENTIAL CLEAN WASTE STORAGE	H														
CPB	085-P20	VALVE RM	H														
CPB	085-P21	CHARCOAL GUARD BED RM	H														
CPB	085-P24	DAW DRYER & DEWATERING EQUIP.RM	H														
CPB	085-P26	DROP AREA(HOT)	M														
CPB	085-P30	HOT TOOL RM	M														
CPB	085-P31	PRIMARY SAMPLING RM	M														
CPB	085-P32	PRIMARY SAMPLING SINK RM	H														
CPB	085-P33	HOT TOOL RM	M														
CPB	085-P35	STORAGE	M														

Table 3 (22 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	085-P36	SAMPLE COUNTING RM	M														
CPB	085-P37	RADIOCHEMISTRY LAB	M														
CPB	085-P38	BALANCE RM	M														
CPB	085-P39	LAB SERVICE VALVE STATION	M														
CPB	085-P40	LAB OPERATOR'S OFFICE	M														
CPB	085-P41	COMPOUND BLDG. SUMP PUMP RM	M														
CPB	085-P42	IX MODULE RM	H														
CPB	085-P43	IX MODULE RM	H														
CPB	085-P44	RO FEED TANK RM	H														
CPB	085-P45	DRUM REMOVAL CHASE	H														
CPB	085-P46	MF MEMBRANE MODULE RM	H														
CPB	085-P47	MF MEMBRANE MODULE RM	H														
CPB	085-P48	RO MEMBRANE MODULE & VALVE SKID RM	H														
CPB	085-P50	SAMPLE CHILLER RM	M														
CPB	085-P51	SECONDARY SAMPLING RM	M														
CPB	085-P52	BALANCE RM	M														
CPB	085-P53	LAB STORAGE	M														
CPB	085-P54	TURBINE GENERATOR BLDG. LAB	M														
CPB	085-P55	LAB OFFICE	M														
CPB	085-P57	LUBE OIL LAB	M														
CPB	085-P58	CORRIDOR	M														
CPB	085-P59	TELECOM CLOSET	M														
CPB	085-P61	ELECT. RISER	M														
CPB	096-P01	CHARCOAL DELAY BED RM	H														
CPB	096-P02	CHARCOAL DELAY BED RM	H														
CPB	100-P01	CHEMICAL STORAGE AREA	M														
CPB	100-P02	GRS EQUIP. REMOVAL AREA	H														
CPB	100-P03	HOT TOOL RM	M														
CPB	100-P04	WELDING RM	M														
CPB	100-P05	HOT INSTRUMENT RM	M														

Table 3 (23 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	100-P06	HOT MACHINE SHOP	M														
CPB	100-P07	FUTURE EXTENSION AREA	M														
CPB	100-P08	TRUCK BAY	M														
CPB	100-P09	WASTE DRUM STORAGE AREA	H														
CPB	100-P10	SPENT FILTER DRUM STORAGE AREA	H														
CPB	100-P12	PIPING OPEN'G AREA	M														
CPB	100-P13	PIPING OPEN'G AREA	M														
CPB	100-P14	CORRIDOR	M														
CPB	100-P15	HOT TOOL RM	M														
CPB	100-P17	FLAMMABLE GAS STORAGE	M														
CPB	100-P18	NONFLAMMABLE GAS STORAGE	M														
CPB	100-P19	VESTIBULE	M														
CPB	100-P20	CONFERENCE RM	M														
CPB	100-P21	MEN'S LOCKER RM	M														
CPB	100-P06	HOT MACHINE SHOP	M														
CPB	100-P07	FUTURE EXTENSION AREA	M														
CPB	100-P08	TRUCK BAY	M														
CPB	100-P09	WASTE DRUM STORAGE AREA	H														
CPB	100-P10	SPENT FILTER DRUM STORAGE AREA	H														
CPB	100-P12	PIPING OPEN'G AREA	M														
CPB	100-P13	PIPING OPEN'G AREA	M														
CPB	100-P14	CORRIDOR	M														
CPB	100-P15	HOT TOOL RM	M														
CPB	100-P17	FLAMMABLE GAS STORAGE	M														
CPB	100-P18	NONFLAMMABLE GAS STORAGE	M														
CPB	100-P19	VESTIBULE	M														
CPB	100-P20	CONFERENCE RM	M														
CPB	100-P21	MEN'S LOCKER RM	M														
CPB	100-P38	MEN'S TOILET	M														
CPB	100-P39	WOMEN'S TOILET	M														

Table 3 (24 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	100-P40	VESTIBULE	M														
CPB	100-P41	LOBBY	M														
CPB	100-P42	O.S.C. AREA	M														
CPB	100-P43	HEALTH PHYSICS STORAGE	M														
CPB	100-P44	WATER HEATER TANK RM	M														
CPB	100-P45	MEN'S TOILET	M														
CPB	100-P46	MEN'S SHOWER RM	M														
CPB	100-P47	DRYING AREA	M														
CPB	100-P48	CORRIDOR	M														
CPB	100-P49	TELECOM CLOSET	M														
CPB	100-P50	VESTIBULE	M														
CPB	100-P51	WOMEN'S SHOWER RM	M														
CPB	100-P52	DRYING AREA	M														
CPB	100-P53	WOMEN'S TOILET	M														
CPB	100-P54	CORRIDOR	M														
CPB	100-P55	CORRIDOR	M														
CPB	100-P56	LAUNDRY AREA	M														
CPB	100-P57	ELECT. RISER	M														
CPB	100-P58	ELECT. RISER	M														
CPB	100-P59	DAW STORAGE RM	M														
CPB	100-P60	WASTE DRUM TRANSF. RM	M														
CPB	100-P61	VIP LOCKER RM	M														
CPB	100-P62	TOILET	M														
CPB	100-P63	SHOWER RM	M														
CPB	120-P01	GASEOUS RADWASTE SAMPLE CONTROL PANEL RM	M														
CPB	120-P02	GASEOUS RADWASTE SAMPLE VALVE RACK RM	M														
CPB	120-P03	GRS EXHAUST RAD MONITOR RM	M														
CPB	120-P04	CHARCOAL DELAY BED REMOVAL AREA	M														
CPB	120-P05	HOT TOOL RM	M														

Table 3 (25 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	120-P06	HOT TOOL RM	M														
CPB	120-P07	CORRIDOR	M														
CPB	120-P08	GASEOUS RADWASTE ACCESS AREA	M														
CPB	120-P09	ELECTRICAL EQUIPMENT RM	M														
CPB	120-P10	BATTERY RM	M														
CPB	120-P11	COMPOUND BLDG. WATER CHILLER RM	M														
CPB	120-P12	COMPOUND BLDG. WATER CHILLER RM	M														
CPB	120-P13	STORAGE	M														
CPB	120-P15	STORAGE	M														
CPB	120-P16	CONTROLLED AREA SUPPLY AHU RM	M														
CPB	120-P20	ELECTRICAL EQUIP. RM	M														
CPB	120-P21	CCS CABINET RM	M														
CPB	120-P22	STORAGE	M														
CPB	120-P23	CONTROL RM	M														
CPB	120-P24	STORAGE	M														
CPB	120-P25	ELECTRICAL EQUIP. RM	M														
CPB	120-P27	CORRIDOR	M														
CPB	120-P28	TELECOM CLOSET	M														
CPB	120-P29	ELECT. RISER	M														
CPB	120-P30	ELEC. REPAIR OFFICE	M														
CPB	120-P31	ELEC. EQUIPMENT REPAIR RM	M														
CPB	120-P32	SERVICE & STORAGE AREA	M														
CPB	120-P33	HVAC CHASE	M														
CPB	139-P01	ELEV. MACHINE RM	M														
CPB	139-P02	EMERGENCY EXHAUST ACU RM	M														
CPB	139-P03	CORRIDOR	M														
CPB	139-P04	TELE-COMMUNICATION EQUIP. RM	M														
CPB	139-P06	NORMAL EXHAUST ACU RM	M														
CPB	139-P07	INSTRUMENT REPAIR OFFICE	M														
CPB	139-P08	COMMUNICATION MAINTENANCE RM	M														

Table 3 (26 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
CPB	139-P09	MEN'S TOILET	M														
CPB	139-P10	WOMEN'S TOILET	M														
CPB	139-P11	TELECOM CLOSET	M														
CPB	139-P12	ELECT. RISER	M														
CPB	139-P13	CORRIDOR	M														
CPB	139-P14	HVAC CHASE	M														
CPB	139-P15	INSTRUMENT REPAIR RM	M														
CPB	139-P16	CLEAN AREA SUPPLY AHU RM	M														
CPB	139-P17	COMMUNICATION POWER SUPPLY RM	M														
CPB	139-P18	AIR INTAKE PENTHOUSE	M														
CPB	139-P19	SRS CTS CHILLER SKID RM	M														
CPB	157-P01	CORRIDOR	M														
CPB	157-P02	WOMEN'S TOILET	M														
CPB	157-P03	MEN'S TOILET	M														
CPB	157-P04	LOBBY	M														
CPB	157-P05	HVAC EQUIP. RM	M														
CPB	157-P08	STORAGE	M														
CPB	157-P09	OPERATOR WAITING RM	M														
CPB	157-P10	REST AREA	M														
CPB	163-P01	AIR EXHAUST PENTHOUSE	M														
CPB	174-P01	ELEV. MACHINE RM	M														
CPB	174-P02	CHILLED WATER COMPRESSION TANK RM	M														
TGB	050-T01	CONDENSATE PUMP PIT AREA	M														
TGB	055-T01	CONDENSER PIT AREA	M														
TGB	060-T01	CONDENSATE OVERFLOW STORAGE SUMP PIT AREA	M														
TGB	067-T01	ELEV. HOISTWAY	M														
TGB	067-T02	UNDERGROUND COMMON TUNNEL	M														
TGB	072-T01	CHEMICAL HANDLING RM	M														
TGB	072-T02	LUBE OIL STORAGE	M														

Table 3 (27 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
TGB	072-T03	MAIN TURBINE LUBE OIL CONDITIONER RM	M														
TGB	073-T01	STAIR	M														
TGB	073-T02	TURBINE GEN. BLDG. BASEMENT FL	M														
TGB	073-T03	CONDENSATE POLISHING AREA	M														
TGB	073-T05	CONDENSATE POLISHING CONTROL RM	M														
TGB	073-T06	CAUSTIC/ACID DAY TANK & PUMP RM	M														
TGB	073-T07	STAIR	M														
TGB	073-T08	STAIR	M														
TGB	073-T10	STAIR	M														
TGB	073-T11	SWITCHGEAR AREA	M														
TGB	100-T01	TURBINE GEN. BLDG. GROUND FL	M														
TGB	100-T02	MUX CABINET RM	M														
TGB	100-T03	MECHANICAL REPAIR RM	M														
TGB	100-T04	TOILET	M														
TGB	100-T05	OPERATORS WAITING RM	M														
TGB	100-T11	TURBINE LUBE OIL RESERVOIR RM	M														
TGB	100-T12	MUX CABINET RM	M														
TGB	100-T15	SWITCHGEAR RM	M														
TGB	100-T17	BATTERY RM	M														
TGB	100-T20	TOILET	M														
TGB	100-T21	INSTRUMENT REPAIR OFFICE	M														
TGB	100-T22	INSTRUMENT REPAIR SHOP	M														
TGB	112-T01	EXCITATION CONTROL CUBICLE RM	M														
TGB	122-T01	SWITCHGEAR RM	M														
TGB	122-T02	AHU RM	M														
TGB	122-T03	GENERAL TOOL RM & WAREHOUSE	M														
TGB	122-T04	ELECTRICAL REPAIR OFFICE	M														
TGB	122-T05	ELECTRICAL REPAIR SHOP	M														
TGB	122-T07	ACCESS AISLE	M														

Table 3 (28 of 28)

Bldg.	Room No.	Identification	H/M. (4)	Pressure (psig)		Temperature (°F)		Relative Humidity (%)		Radiation TID (Gy)							TS
										Normal			Accident			Total	
				Normal	Accident	Normal	Accident	Normal	Accident	Gamma	Beta	Neutron	Gamma	Beta	Neutron		
TGB	122-T08	MAIN STEAM PIPING AREA	M														
TGB	136-T01	TURBINE GEN. BLDG. OPERATING FL	M														
TGB	136-T02	CLEAN WORKING RM	M														
TGB	136-T03	REPAIR TOOL RM	M														
TGB	136-T04	SPECIAL TOOL RM	M														
TGB	136-T05	OPERATOR'S OFFICE	M														
TGB	136-T06	SHOWER RM	M														
TGB	136-T07	JANITOR RM	M														
TGB	136-T08	WOMEN'S TOILET	M														
TGB	136-T09	MEN'S TOILET	M														
TGB	136-T10	ELECTRIC WATER HEATER RM	M														
TGB	136-T11	CONTROL PANEL RM	M														
TGB	136-T12	PIPE CHASE	M														
TGB	136-T13	LOCKER RM	M														
TGB	136-T14	CORRIDOR	M														
TGB	170-T01	TBN. GEN. BLDG. DEAERATOR FL	M														
TGB	187-T01	ELEV. MACHINE RM	M														

1) Beta or gamma dose is negligible when compared to total doses, or there is no source term in this area.
2) Neutrons are not present except for the areas nearby reactor vessel during normal operations.
3) There occurs no neutron during accident operations.
4) Harsh and Mild designation varies depending on the type of equipment to be located in Room No.
Any area with total integrated dose (TID) greater than 10 Gy for electronic components such as semi-conductors or electronic components containing organic material will be designated as H (Harsh).

Table 4

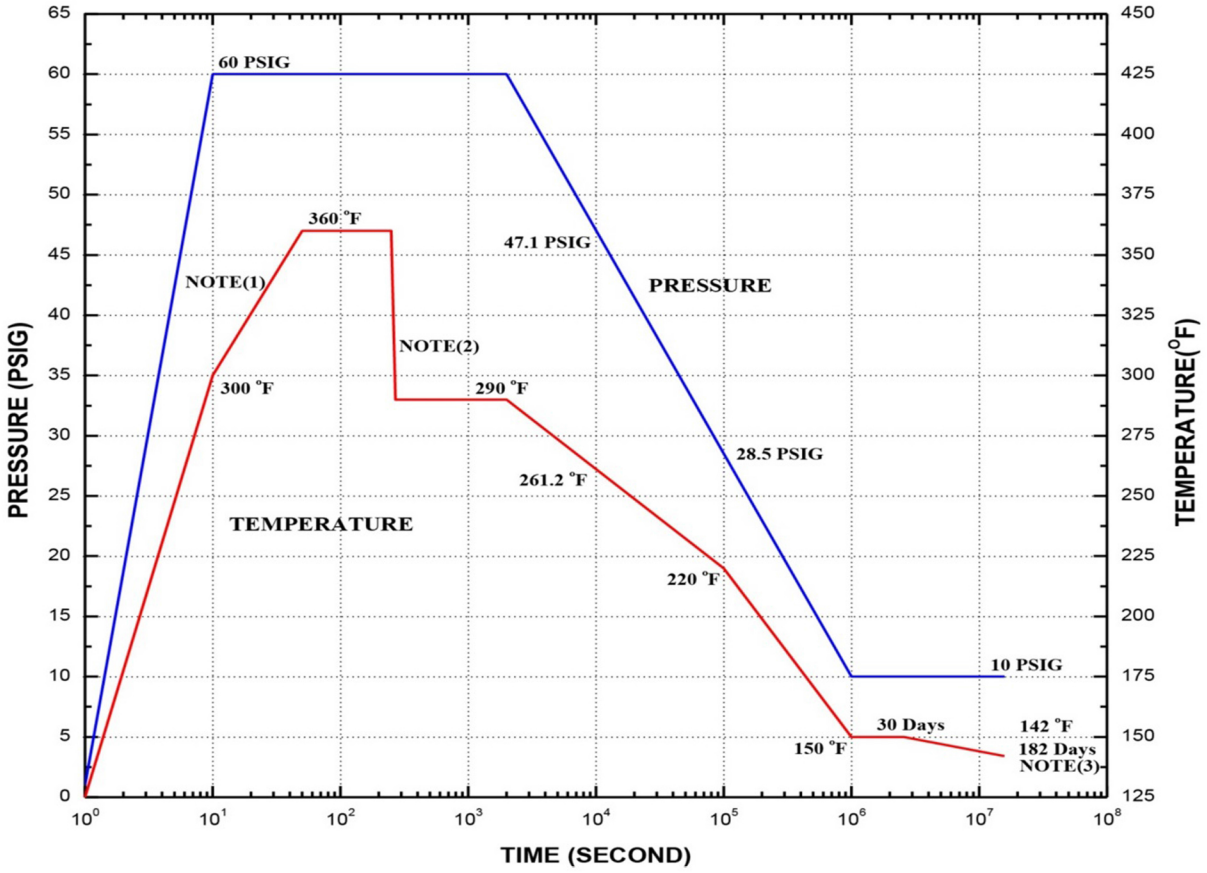
Containment Spray Conditions

Parameter \ Phase	Short Term (Accident Initiation-up to 4 hours)	Long Term (4 hours-up to 30 days)
Chemistry	4,400 ppm Boron as H_3BO_3 0-50 ppm Hydrazine as N_2H_4 4 ≤ pH ≤ 10	4,400 ppm Boron as H_3BO_3 0-50 ppm Hydrazine as N_2H_4 7.0 ≤ pH ≤ 8.5 Using Tri-sodium Phosphate as the Buffering Agent
Spray Density (Note 1)	≥ 0.57 gpm/ft^2	≥ 0.57 gpm/ft^2
Spray Temp. (Note 2)	Variable	

Notes:

1. Spray density is based on 5,000 (gpm/train) over 150 (ft) diameter containment. The pressure and temperature profiles are controlled by continuous operation of spray system up to 30 days.

2. The minimum spray droplet temperature is greater than 50 °F, and the maximum spray temperature can be veried depending on the temperature of IRWST water that supplies to spray nozzle.

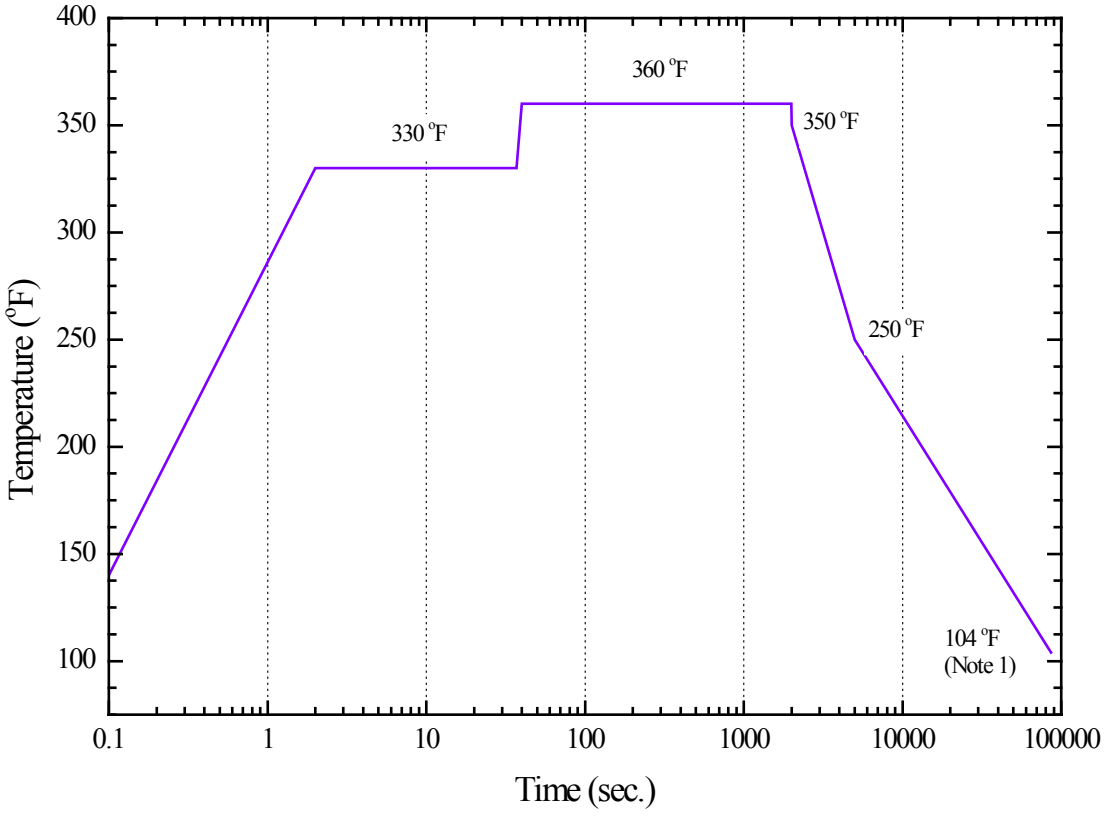


(1) Pressure and temperature are increasing within 10 seconds from 0 psig and 49 °C (120 °F), respectively.

(2) Rapid drop within 20 seconds at 250 seconds

(3) After 182 days, pressure and temperature can be extended up to 1 year with the same values.

Figure 1 Design Basis Containment Atmosphere Temperature and Pressure EQ Profile for Accident

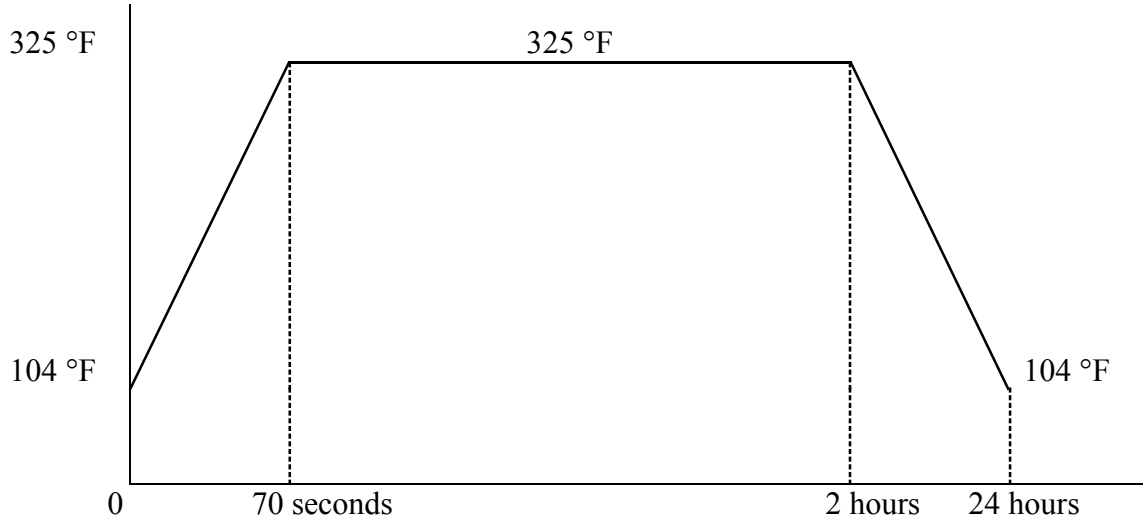


Time (sec.)	0	0.1	2.0	37	40	1,990	2,000	5,000	86,400
Temp. (°F)	104	140	330	330	360	360	350	250	104

Note:

1. Temperature is decreasing up to 104°F at 86,400 seconds. (24 hours)

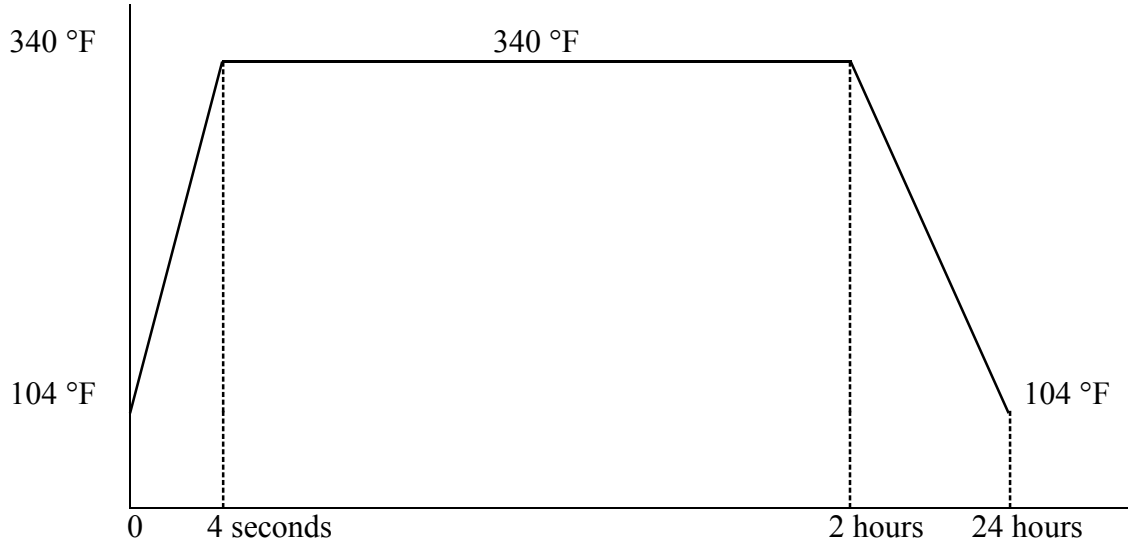
Figure 2 Main Steam Valve Room MSLB Temperature Profile



Note:

1. Temperature profile above applies to the following zones: 055-A46B, 068-A06A, 078-A40B, 078-A42B, and 078-A43B

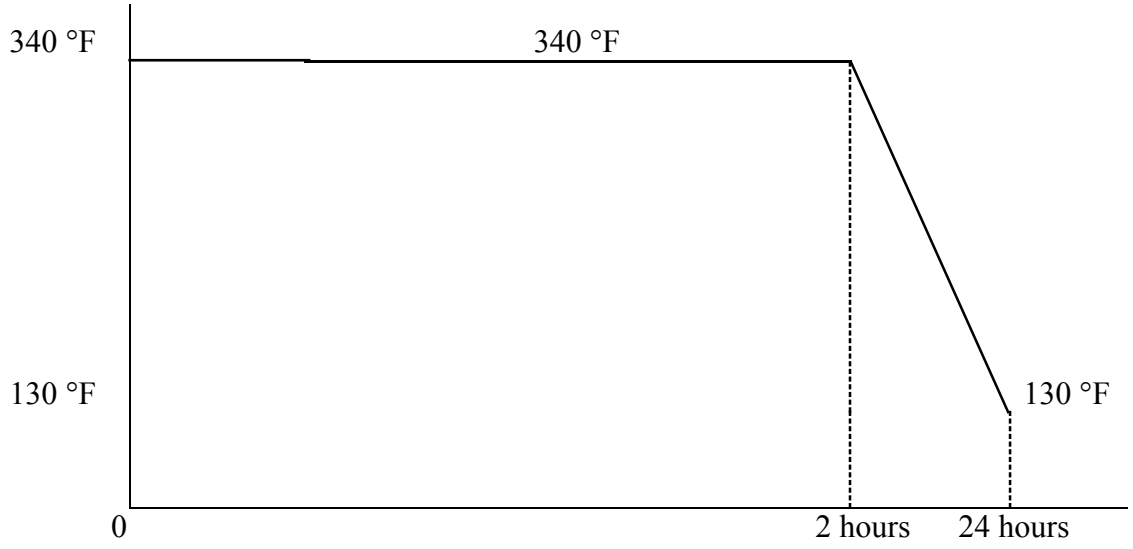
Figure 3 Auxiliary Building HELB Temperature Profile



Note:

1. Temperature profile above applies to the following zones: 078-A15C/D

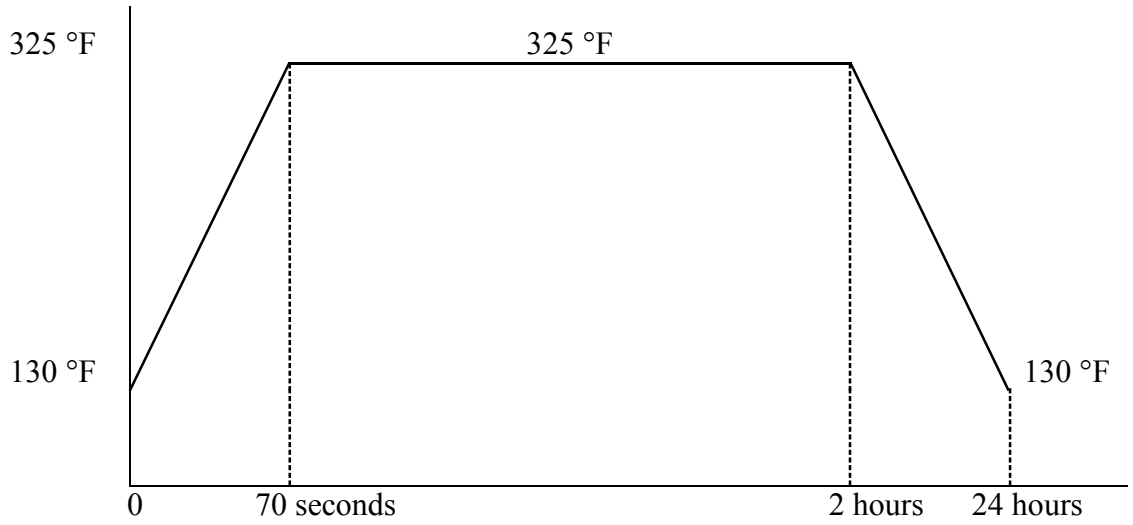
Figure 4 Turbine Driven AF Pump Room Temperature Profile



Note:

1. Temperature profile above applies to the following zones: 078-A17C/D, and 137-A30C/D

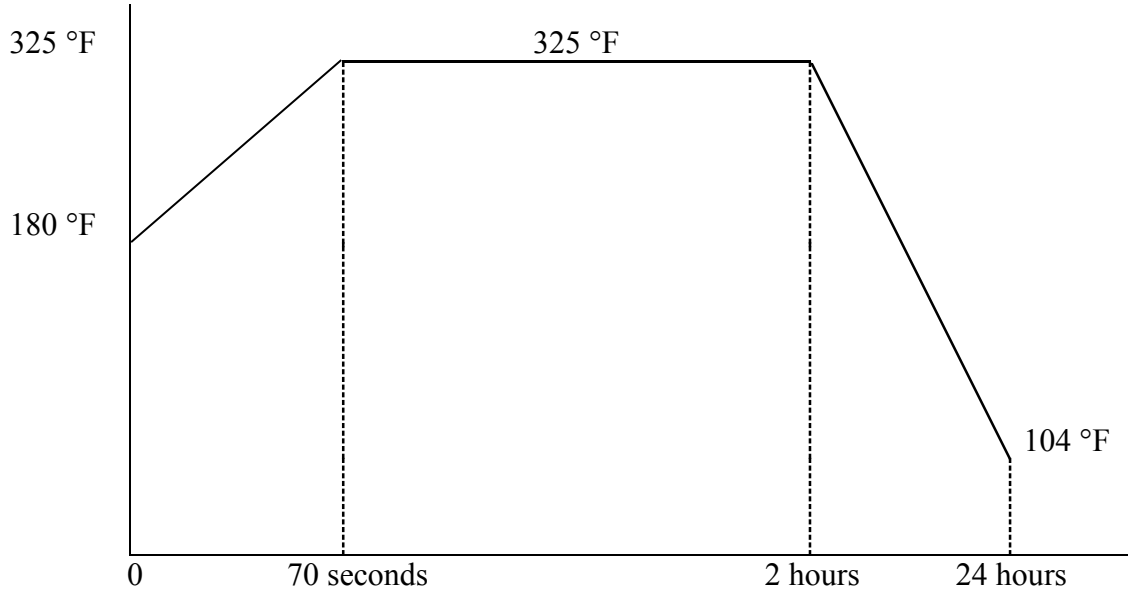
Figure 5 Turbine Driven AF Pump Room Vent & Main Steam Enclosures Temperature Profile



Note:

1. Temperature profile above applies to the following zones: 100-A28B, and 117-A02A

Figure 6 HELB HVAC Duct Tray Pipe Way Temperature Profile



Note:

1. Temperature profile above applies to the following zones: 120-A14A and 137-A19A

Figure 7 SG Blowdown Flash Tank Room Temperature Profile

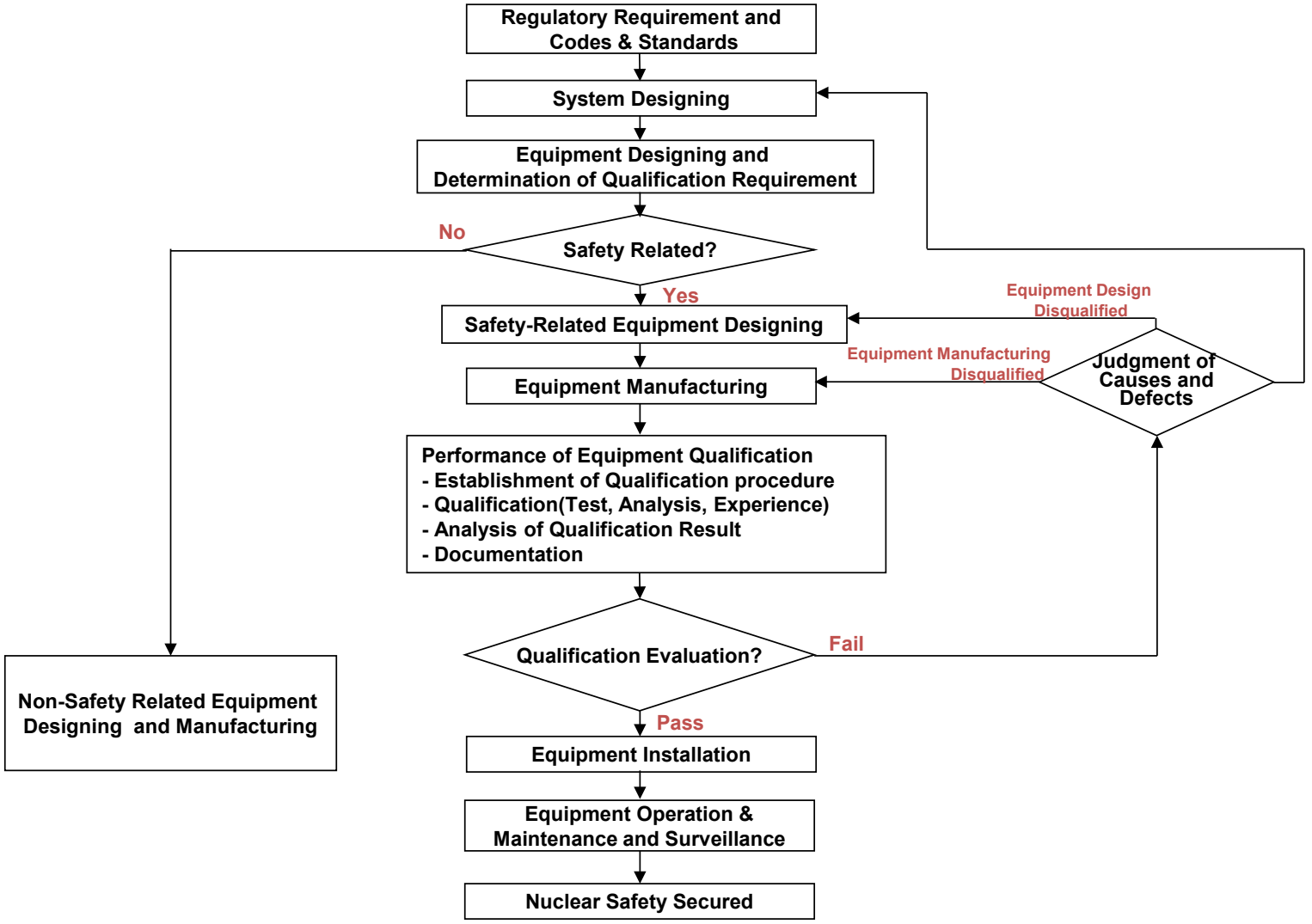


Figure 8 Equipment Qualification Working Process

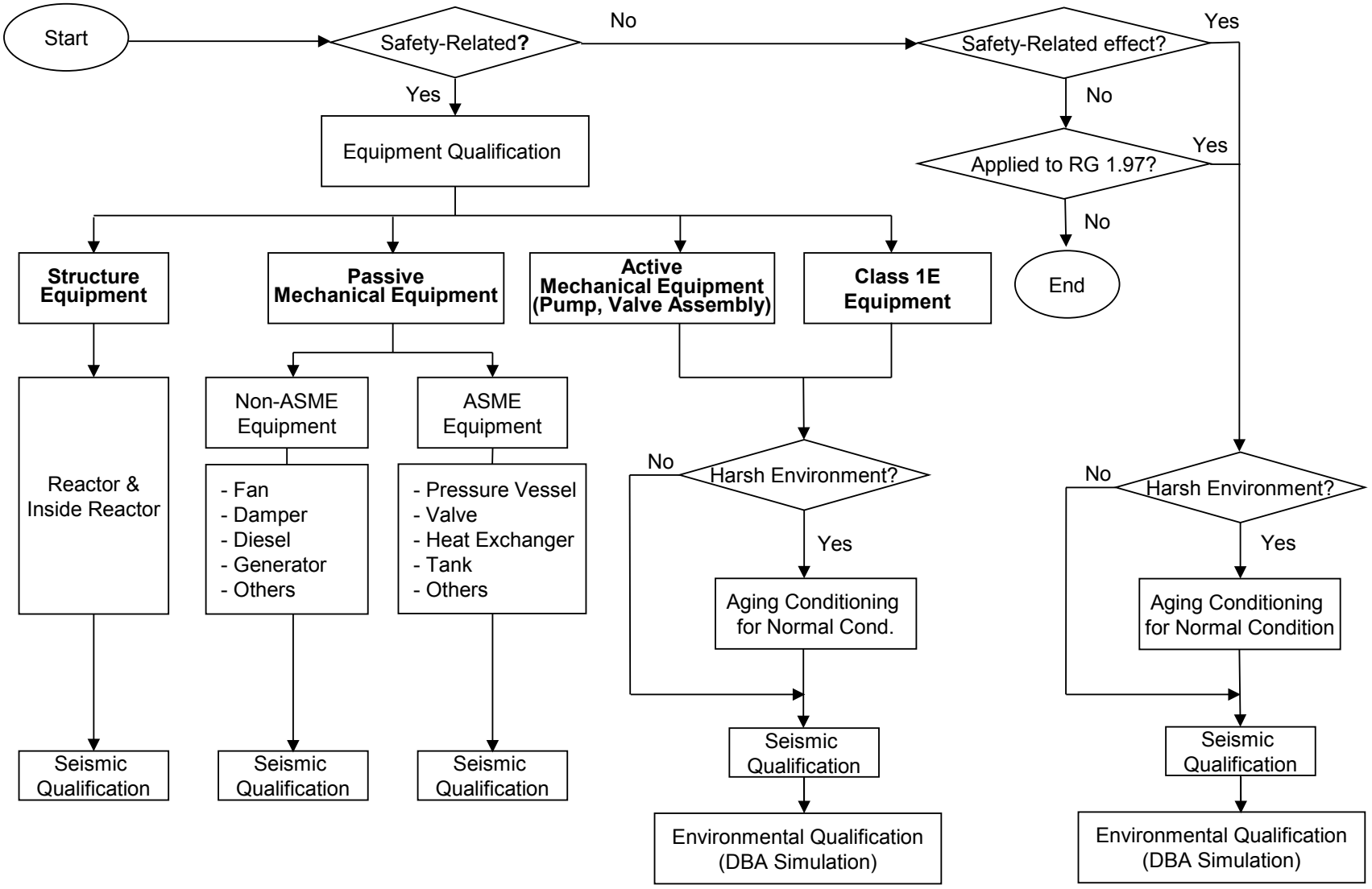


Figure 9 Equipment Qualification Flow Diagram By Type of Safety-Related Equipment

Part 2

Seismic Qualification Program

TABLE OF CONTENTS

1 OBJECTIVES 139

1.1 CRITERIA AND STANDARDS 139

1.2 SUMMARY 139

2 DEFINITIONS 140

2.1 Safe Shutdown Earthquake (SSE) 140

2.2 Operating Basis Earthquake (OBE) 140

2.3 Safety-Related Equipment 140

2.3.1 Active Equipment 140

2.3.2 Passive Equipment 140

2.4 Seismic Loads 141

2.5 Floor Acceleration 141

2.6 Response Spectrum 141

2.6.1 Floor Response Spectrum 141

2.6.2 Test Response Spectrum 141

2.7 Dynamic Characteristics 141

2.7.1 Natural Frequencies 141

2.7.2 Mode Shapes 141

2.7.3 Damping 142

2.8 Resonance 142

2.9 Mathematical Model 142

2.10 Dynamic Analysis 142

2.11 Static (Coefficient) Analysis 142

2.12 Supporting Tests 142

2.13 Qualification Tests 142

2.14 Device 142

2.15 Assembly 142

2.16 Failure 143

2.17 Malfunction 143

3 SCOPE OF EQUIPMENT SEISMIC AND DYNAMIC QUALIFICATION 144

3.1 SEISMIC CATEGORY I EQUIPMENT 144

3.2 SEISMIC CATEGORY II EQUIPMENT 144

4 SEISMIC QUALIFICATION REQUIREMENTS 146

5 QUALIFICATION PROGRAMS 147

5.1 QUALIFICATION BY TESTING ONLY 147

5.2 QUALIFICATION BY THE USE OF EXPERIENCE DATA 147

5.3 QUALIFICATION BY SUPPORTING TESTS AND ANALYTICAL CALCULATIONS (COMBINATION) 147

5.4 SUPPORTING TESTS SUPPLEMENTED WITH QUALIFICATION TESTS 148

5.5 SUPPORTING ANALYSIS AND QUALIFICATION TESTS 148

5.6 SUPPORTING TESTS 148

5.6.1 Dynamic Supporting Tests 148

5.6.2 Static Supporting Tests 149

5.7 QUALIFICATION TESTS 149

5.7.1 Dynamic Input 149

5.7.2 Mounting 150

5.7.3 Nozzle Loads 150

5.7.4 Other Loads 150

5.7.5 Basis of Acceptability 150

5.8 ANALYTICAL TECHNIQUES 150

5.9 SUPPORTING CALCULATIONS FOR QUALIFICATION TESTS 150

5.10 ANALYTICAL QUALIFICATION 150

5.10.1 Rigid Equipment and Rigid Supports 151

5.10.2 Rigid Equipment and Flexible Support 151
5.10.3 Flexible Equipment 151
5.10.4 Equipment Supplied with Attached Piping 152
5.10.5 Equipment Supported by Different Buildings or Different Elevations within the Same Building 152
5.11 COMBINATIONS OF PLANT CONDITIONS, SERVICE LEVELS, AND LOADINGS 152
5.11.1 Service/Design Limits 152
5.11.2 Dynamic Loads 153
5.11.3 Nozzle Loads 153
5.11.4 Operating Loads 153
5.11.5 Methods of Analysis 153
5.11.5.2 Dynamic Analysis 153
5.11.6 Basis of Acceptability 154
5.12 EXPERIENCE DATA 154
5.13 OPERABILITY OF ACTIVE EQUIPMENT 154
5.13.1 Electrical and Instrumentation 154
5.13.2 Mechanical Equipment 155
5.13.3 Mechanical Drive Turbines 156
5.13.4 Fans 156
5.13.5 Diesel Engine 156
5.14 BUILDING STRUCTURE LOADS 156
6 DOCUMENTATION 157
6.1 FORMAT OF THE DYNAMIC QUALIFICATION REPORTS 157
7 REFERENCES 160

LIST OF TABLES

Table 1 Stress Limits for Equipment and Supports 161
Table 2 Stress Limits for Bolting to Steel Building Structure 162
Table 3 Strength Limits for Anchoring to Building Structure 163

LIST OF FIGURES

Figure 1 Typical Examples of Equipment Attachments to Building Structure..... 165

Page intentionally blank

1 OBJECTIVES

Seismic qualification is a means to verify the electrical and active mechanical equipment can meet its performance requirements during and following one safe shutdown earthquake (SSE) preceded by a number of operating basis earthquakes (OBEs). This program establishes the seismic and dynamic qualification procedures and criteria for Seismic Category I equipment in APR1400. This program is part of the overall APR1400 Equipment Qualification Program (EQP). This program provides the seismic and dynamic qualification requirements and general procedures to qualify electircal and mechanical equipment in accordance with NRC RG 1.100 (References 7.1 and 7.5) and IEEE Std 344. It is expected that this report may be referenced by license applicants for the scope and methods employed herein.

1.1 CRITERIA AND STANDARDS

The seismic requirements to be considered in the design of all the Seismic Category I equipment are embodied in Title 10 Code of Federal Regulations (10 CFR), Appendix A to Part 50, General Design Criterion 3.

The qualification program is designed to meet the requirements of SRP 3.10 (Reference 7.3), NRC RG 1.100, IEEE Std 344, and IEEE Std 627. IEEE Std 344 was issued to provide guidance for demonstrating the seismic qualifications of Class 1E equipment for nuclear generating stations. The individual supporting standards that the A/E will employ, either in whole or in part, are listed in Section 7.

1.2 SUMMARY

A summary of the various sections of this program is given below:

Scope of Equipment Seismic and Dynamic Qualification (Section 3)

The general scope of supply and the various qualification program activities are described. This program will cover Seismic Category I equipment in harsh and mild environments.

Seismic Qualification Requirements (Section 4)

The methods required in performing seismic qualification are presented.

Qualification Programs (Section 5)

Information is provided for the detailed seismic qualification methods to be employed in compliance with NRC RG 1.100, IEEE Std 344, and ASME QME-1 (Reference 7.6) requirements. Demonstration of the conservatism of the qualification parameters is described.

Documentation (Section 6)

This section describes the documentation required for qualification. The qualification reports and their generation are described. Documentation necessary to support the review of a particular applicant's docket will be available for audit.

2 DEFINITIONS

2.1 Safe Shutdown Earthquake (SSE)

An earthquake that is based upon an evaluation of the maximum earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake that produces the maximum vibratory ground motion for which certain structures, systems, and components are designed to remain functional.

2.2 Operating Basis Earthquake (OBE)

An earthquake that could reasonably be expected to occur at the plant site during the operating life of the plant considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake that produces the vibratory ground motion for which those features of the nuclear power plant necessary for continued operation without undue risk to the health and safety of the public, are designed to remain functional.

2.3 Safety-Related Equipment

Safety-related equipment is the equipment necessary to provide reasonable assurance of:

a. The integrity of the reactor coolant pressure boundary,

b. The capability to shut down the reactor and maintain it in a safe shutdown condition, or

c. The capability to prevent or mitigate the consequences of accidents that could result in potential off-site exposures in excess of the limits stated in 10 CFR 100.

Electrical equipment falling in this category is called Class 1E equipment.

All safety-related equipment shall be either active or passive.

2.3.1 Active Equipment

Equipment containing moving parts, which in order to accomplish its function, must undergo mechanical movement of those parts, or must prevent a movement of those parts to ensure that the equipment will remain in its last position.

2.3.2 Passive Equipment

Equipment that must maintain its pressure boundary and/or structural integrity, but not necessarily perform mechanical motion or have certain deflection limits, during the course of accomplishing a system safety function.

Any equipment that is not designated as safety-related but could degrade the integrity of a safety-related component shall be treated the same as passive equipment.

2.4 Seismic Loads

The additional loads that may be imposed on the equipment due to the occurrence of an earthquake.

2.5 Floor Acceleration

The maximum acceleration of a particular building floor (or equipment mounting) resulting from a given dynamic excitation applied to the building. The maximum floor acceleration can be obtained from the floor response spectrum as the acceleration at high frequencies (the flat portion of the response spectrum curve) and sometimes referred to as the zero-period acceleration (ZPA).

2.6 Response Spectrum

A plot of maximum responses of a family of idealized single-degree-of-freedom linear-elastic oscillators subjected to transient vibratory base input motion. Each damping value produces a different response spectrum.

2.6.1 Floor Response Spectrum

The response spectrum for which the transient base excitation is the floor motion rather than the ground motion. The response spectra at the elevations where the equipment will be located are included with the purchase specification and are called required response spectra (RRS).

2.6.2 Test Response Spectrum

The response spectrum resulting from the actual motion of the shake table for specified damping values. They may be derived by analytical techniques or by using spectrum analysis equipment (i.e., real-time analyzer).

2.7 Dynamic Characteristics

The characteristics that are needed to determine the dynamic behavior of the equipment due to any forcing function. These characteristics are as follows.

2.7.1 Natural Frequencies

Free vibration frequencies of the system.

2.7.2 Mode Shapes

The vibrational shape of the system when vibrating at one of its natural frequencies. Each natural frequency has a different mode shape.

2.7.3 Damping

An energy dissipation mechanism that reduces the amplification and broadens the vibratory response in the region of resonance. Damping is usually expressed as a percentage of critical damping. Critical damping is defined as the least amount of viscous damping that causes a single-degree-of-freedom system to return to its original position without oscillation after initial disturbance.

2.8 Resonance

The condition that exists when the equipment has the same predominant period as does the applied forcing function.

2.9 Mathematical Model

The idealization of a component, structure, or piece of equipment as an assemblage of linear systems suitable for detailed dynamic analyses.

2.10 Dynamic Analysis

An analysis procedure for multi-degree-of-freedom systems in which the responses are obtained for each normal mode and then combined to predict the true response and the associated stress and deflection due to any forcing function.

2.11 Static (Coefficient) Analysis

An analysis that evaluates the stresses and deflections due to equivalent steady state forces acting through the center of gravity of the equipment. These forces shall be chosen conservatively such that it results in stresses and deflections higher than those predicted by dynamic analyses.

2.12 Supporting Tests

Tests that are conducted to determine the properties and characteristics of the equipment and to provide data needed for the analysis or qualification tests. These tests are either dynamic or static.

2.13 Qualification Tests

Tests that are conducted to prove that the equipment shall perform its safety function or design-intended function when subjected to the loading combinations associated with different postulated plant conditions.

2.14 Device

An item of electric equipment that is used in connection with, or as an auxiliary to, other pieces of equipment.

2.15 Assembly

Two or more devices (or elements) sharing a common mounting or supporting structure.

2.16 Failure

The condition in which a piece of equipment can no longer perform its intended safety function.

2.17 Malfunction

Improper performance of mechanical or electrical equipment.

3 SCOPE OF EQUIPMENT SEISMIC AND DYNAMIC QUALIFICATION

3.1 SEISMIC CATEGORY I EQUIPMENT

Seismic Category I equipment is required to be seismically and dynamically qualified by demonstrating that its structural integrity and safety function during and after a postulated earthquake in conjunction with the full range of applicable normal and accident loads and conditions.

Seismic Category I equipment requiring qualification in accordance with the APR1400 EQP is described as follows:

a. Equipment associated with systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment reactor heat removal

b. Equipment and systems used to power, control, or monitor other structures, systems, and components (SSCs) important to safety

c. Equipment essential to preventing significant release of radioactive material to the environment

d. Instrumentation (including accident and post-accident monitoring) needed to assess plant and environmental conditions during and after an accident, as described in NRC RG 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants”

The equipment seismic qualification program criteria define specific technical requirements for seismic and dynamic qualification of seismic category I, safety-related mechanical equipment (excluding piping), and seismic category I (Class 1E) electrical and instrumentation equipment, including associated supports and mountings. The program includes qualification of category I tanks and reservoirs for hydrodynamic seismic loads, where applicable. All such equipment that is required to perform functionally or maintain its structural integrity, as described above, is subject to rigorous seismic/dynamic qualification.

Some non-safety-related equipment are identified to meet seismic Category I requirements in Table 3 of Part 1 of this report. These equipment shall be capable of providing their intended function and maintaining structural integrity in accordance with specific design requirement.It should be noted that detailed criteria for functionality testing and inspection of mechanical and electrical equipment (e.g., performance tests, hydrostatic tests, and leakage tests) are not within the scope of the equipment seismic qualification program.

3.2 SEISMIC CATEGORY II EQUIPMENT

The equipment seismic qualification program criteria also define technical requirements for seismic and dynamic qualification of equipment important to safety whose failure could prevent satisfactory accomplishment of one or more of the safety-related functions.

This includes seismic Category II equipment, defined as that equipment which performs non-safety-related functions, and whose continued function is not required, but whose structural or functional failure or interaction could degrade the function or integrity of a seismic Category I SSC to an unacceptable level, or could result in incapacitating injury to occupants of the control room.

Therefore, seismic Category II equipment can be seismically qualified by demonstrating that it retains its position sufficiently in an SSE that it will not cause unacceptable structural interaction with or failure of

seismic Category I SSCs. For fluid systems, this requires an appropriate level of pressure boundary integrity to prevent seismically induced flooding that may cause adverse effects on safety-related SSCs.

In cases where it is not possible or practical to isolate the seismic Category I equipment, non-seismic equipment that is adjacent to seismic Category I equipment is classified as seismic Category II and analyzed and supported so that an SSE accident does not cause an unacceptable interaction with the seismic Category I equipment.

4 SEISMIC QUALIFICATION REQUIREMENTS

The dynamic qualification of Seismic Category I equipment is achieved by providing reasonable assurance of its structural integrity and verifying the operability of active equipment when subjected to equivalent conditions that would be present during the postulated plant conditions. The following qualification programs are required:

a. Qualification by tests only

b. Qualification by analytical methods only

c. Qualification by the use of experience data (An experience-based qualification is not used for any equipment until it is endorsed by NRC R.G.1.100)

d. Qualification by any combination of supporting tests, supporting calculations, qualification tests, analytical calculations and experience.

Regardless of the equipment qualification programs chosen, the conditions and requirements for those portions of the program are stated in the following sections and shall be met.

5 QUALIFICATION PROGRAMS

Many factors control the design of a qualification program. If qualification is to be achieved by analysis only, all assumptions used in the analysis shall be given and justified. If testing alone is used for qualification, all applicable loads shall be simulated during the test unless it can be shown that the simultaneous application of certain loads is not necessary for providing reasonable assurance of the equipment's safety function or design-intended function.

5.1 QUALIFICATION BY TESTING ONLY

Qualification by testing only is recommended when the following conditions are fulfilled:

a. The test machine is capable of producing the required motion in accordance with the conditions stated in Section 5.7 of this program.

b. The applicable loads are of a simple nature or it is possible to simulate them.

c. The test table allows the simulation of actual mounting.

d. It is possible to monitor the functional capability of active equipment during the test.

e. The structural configuration of the equipment is extremely complex and beyond the capability of mathematical modeling techniques.

f. The response of the equipment is expected to be extremely nonlinear.

g. Qualification by analytical methods only. Analytical calculations only may be used as a qualification method in the following cases:

    1) When maintaining the structural integrity is an assurance for the safety function or design-intended function

    2) When the equipment is structurally simple

    3) When the response of the equipment is linear or is a simple nonlinear behavior

    4) When the effects of attached components and the superposition of load conditions are too complex for testing

5.2 QUALIFICATION BY THE USE OF EXPERIENCE DATA

An experience-based qualification is not used for any equipement until it is endorsed by NRC R.G.1.100.

5.3 QUALIFICATION BY SUPPORTING TESTS AND ANALYTICAL CALCULATIONS (COMBINATION)

Supporting tests may be used to determine:

a. Deflection limits within which operability is maintained

b. Dynamic parameters needed for constructing or verifying mathematical models

c. Damping values

d. Assumptions to be used in the analysis

e. The amount of nonlinearity involved

Supporting tests may be static or dynamic. The dynamic test may be conducted using shake tables or single-point exciters.

After collecting the required information from supporting tests, analytical techniques may be used to show that the structural integrity and/or operability of equipment is maintained without undertaking a complete test program. It must be noted that without performing some supporting tests, analytical calculations alone provide weak evidence for assuring operability.

5.4 SUPPORTING TESTS SUPPLEMENTED WITH QUALIFICATION TESTS

Supporting tests for these programs may be used to obtain the following types of information:

a. Natural frequencies

b. Amount of cross-coupling

c. Significance of simultaneous application of all applicable loads and possibility of decoupling them without affecting the reliability of the equipment

Such supporting tests may simplify the qualification tests as they may permit justification for single-axis excitation, the use of a less complex waveform to simulate the forcing function, and a reduced number of loading conditions.

5.5 SUPPORTING ANALYSIS AND QUALIFICATION TESTS

This approach may be used for qualification of complex and simple assemblies such as control boards, switchgear assemblies, vertical pumps and motors, and diesel-generator units. An analysis approach may be used to determine the overall equipment integrity and response at the subassembly or component locations and the subassemblies may be tested to the response levels that are predicted analytically.

5.6 SUPPORTING TESTS

Supporting tests may be either dynamic or static in nature.

5.6.1 Dynamic Supporting Tests

In dynamic supporting tests, the equipment may be excited by using a shake table, or single-point exciters applied at a sufficient number of points to simulate the forcing function. The excitations shall be of sufficient strength to excite all significant modes of the equipment. Typical data obtained from such tests are:

a. Dynamic characteristics of the equipment (e.g., natural frequencies, mode shapes, and damping factors)

b. Cross-coupling effects (i.e., the response in any direction due to the excitation in any other direction in situations where installing accelerometers in some locations is impractical, cross-coupling may be estimated based on the response of the available accelerometer locations.)

c. The significance of the response of the equipment to vibratory motion to determine the necessity of combining equipment nozzle loads with other dynamic loads

5.6.2 Static Supporting Tests

Static supporting tests are conducted by applying static forces on the equipment. Typical data obtained from these tests are:

a. Static deflections and flexibility parameters that are needed for constructing a mathematical model

b. Distortion in the equipment casing due to nozzle loads, and the deformation limits within which the equipment would maintain its functionality

5.7 QUALIFICATION TESTS

Active equipment shall be tested under operating conditions in accordance with the requirements of NRC RG 1.100 and IEEE Std. 344. Equivalent operating loads shall be simulated to act on passive equipment, but the equipment itself need not be under an operating condition. The following requirements are conditions for a proper qualification test and shall be fulfilled:

5.7.1 Dynamic Input

The input for dynamic testing shall be determined from the floor motion and shall be modified, as necessary, by the test procedure and setup. The input for dynamic testing shall include non-seismic vibratory loads as well as seismic loads.

When single-axis excitation is used, cross-coupling shall be considered as follows:

a. When performing the supporting tests, the extent of the response in any other direction shall be determined. To explain, let rij be the ratio of the response in the j direction to the excitation in the i direction, and determine rxy, rxz, ryx, ryz, rzx, and rzy. Where x, y, z are the three principal directions of the equipment or any other set of orthogonal axes that may produce a higher response.

b. The dynamic coefficients to be used in qualification tests shall be based on the values obtained from the design response spectrum increased by the cross-coupling factors, rij, obtained from the supporting tests or estimated by other acceptable means.

5.7.2 Mounting

The equipment shall be mounted to simulate the recommended service mounting. If this cannot be done, the effect of the actual supporting structure shall be considered in determining the input motion.

5.7.3 Nozzle Loads

The expected (or calculated) piping reaction loads on the equipment shall be used in the qualification.

5.7.4 Other Loads

Any other loads that may act on the equipment (mechanical, electrical, or instrument) during the postulated dynamic event shall be simulated during the test, unless the supporting tests (or calculations) show that they are insignificant.

5.7.5 Basis of Acceptability

Inspection shall be made by the test conductor to provide reasonable assurance that no structural damage has occurred. For active equipment, sufficient monitoring devices shall be used to evaluate the performance of the tested equipment during the test. The equipment shall demonstrate its ability to perform its intended function when subjected to all applicable loads. A test report, which includes all test data, results and conclusions, shall be submitted to the combined license applicant for review. A suggested format for the test report is presented in Section 6. It is recommended that the Supplier follow the outline of Section 6 for documenting the dynamic testing. This will facilitate the review of the material in the report and support its completeness.

5.8 ANALYTICAL TECHNIQUES

Analytical calculations may be used for one of three purposes:

a. To develop supporting data for performing qualification tests

b. To qualify the equipment using the data obtained from supporting tests

c. To qualify the equipment without tests

5.9 SUPPORTING CALCULATIONS FOR QUALIFICATION TESTS

Calculations may be used to evaluate the effect of the floor motion on the base of the equipment. This would be in such cases as a device installed in a panel or cabinet, equipment mounted on a complex structure, a valve mounted on a piping system. Calculations may also be used to justify reducing the requirements for qualification testing.

5.10 ANALYTICAL QUALIFICATION

The methods to be used for qualification, by calculations only or by calculations based on supporting test results, are stated in this section. These methods will depend on the type of equipment and supporting

structure. The following defines some of the possible cases and associated analytical methods that may be used in each case.

5.10.1 Rigid Equipment and Rigid Supports

a. The equipment, as well as its supports, can be considered rigid if it can be shown that its fundamental natural frequency does not fall in the frequency range below the high-frequency asymptote (ZPA) of the RRS.

b. For rigid equipment supported by a rigid structure (including any in-place supporting steel provided by the combined license applicant), the equipment motion shall be the same as the floor motion without amplification. The horizontal and vertical dynamic accelerations shall be taken as the ZPA from the floor response spectrum for the elevation at which the equipment is located, as provided by the combined license applicant.

c. The acceleration values obtained shall be used to perform a static analysis as described in Subsection 5.11.5 of this report.

5.10.2 Rigid Equipment and Flexible Support

a. In cases where the equipment itself is a rigid body but its supporting system is flexible (including any in-place steel or concrete provided by the combined license applicant, the overall system may be idealized as a single-degree-of-freedom system consisting of an equivalent mass and spring system.

b. In cases where the equipment and support systems' natural frequency falls in the frequency range below the high-frequency asymptote (ZPA), the system shall be remodeled using a multi-degree-of-freedom idealization. A dynamic analysis shall be performed using an appropriate damping factor. If the natural frequency is greater than or equal to the ZPA, a static analysis shall be performed using the acceleration value corresponding to the ZPA of the RRS. A conservative static analysis may use the peak acceleration from the RRS.

c. The selection of damping values to be used with the response spectrum curves in determining the acceleration is a significant factor. Unless any specific value is given for analysis, damping factors of 2 percent for Upset/Service Level B and 3 percent for Emergency/Faulted/Service Levels C and D shall be accepted. Higher damping values may be accepted only if they can be justified.

5.10.3 Flexible Equipment

a. In cases where the equipment cannot be considered as a rigid body and where the equipment cannot be modeled as a single-degree-of-freedom system, it shall be modeled as a multi-degree-of-freedom system.

b. A dynamic analysis shall be performed and the natural frequencies, mode shapes, and modal participation factors for each mode shall be computed.

c. Finally, by combining all the significant modes, the resultant stresses and deflections shall be determined using a detailed (modal) dynamic analysis method.

5.10.4 Equipment Supplied with Attached Piping

a. For equipment supplied with attached piping, due to construction requirements, the Supplier shall perform an analysis for the attached piping as well as the equipment.

b. The analysis shall satisfy the piping design criteria specified in each procurement specification.

c. The procedure for analysis shall be determined according to the situation. If the equipment is attached to the floor, then the equipment shall be analyzed first to determine the input to the piping. However, if the equipment is attached to the piping only (pipe-mounted), the piping analysis shall yield the loads to be used in the analysis of the equipment.

5.10.5 Equipment Supported by Different Buildings or Different Elevations within the Same Building

a. This is usually the case for piping; heating, ventilation, and air conditioning (HVAC) ducts; and cable trays.

b. Stresses resulting from relative displacements at various support locations for systems identified above shall be superimposed on the stresses produced in the system due to inertia effects.

c. Additional restraints, supports, or other means shall be employed to limit or reduce the high response loads.

5.11 COMBINATIONS OF PLANT CONDITIONS, SERVICE LEVELS, AND LOADINGS

The loading combinations are defined in accordance with different real and postulated plant conditions and equipment service levels for ASME Boiler and Pressure Vessel Code, Section III components. These plant conditions and equipment service levels shall be classified as stated in the ASME Section III, Division 1. The same concept of plant conditions and equipment service levels shall be applied on all mechanical and electrical equipment, as well as controls and instrumentation. However, if the stresses and deflections of the more severe loading condition or service level meet the design limits of the less severe loading condition or service level, it may not be required to check the additional loading conditions and service levels. The loading combinations for the same plant condition / service level shall depend on whether the equipment is a pressure-retaining (fluid system component) or a non-pressure-retaining (non-fluid system) component. In addition, the design stress limits shall depend on whether the equipment is classified as active or passive.

5.11.1 Service/Design Limits

Unless otherwise stated in procurement specification, there shall be no deflection limits required for passive equipment. However, for active equipment, the deflection limits shall be those maximum deflections that would not impair the operability of the equipment. These limits shall be determined from supporting tests. Engineering judgment shall only be accepted in simple and clear cases. The stress limits for ASME III and non-ASME equipment and supports are summarized in Table 1.

5.11.2 Dynamic Loads

The dynamic loads shall be obtained, in the horizontal and vertical directions, from the corresponding response spectra provided by the combined license applicant for the two postulated accidents, upset and emergency conditions. The horizontal dynamic loads shall be applied in the two horizontal principal directions simultaneously along with the vertical dynamic loads.

5.11.3 Nozzle Loads

The procurement specification will specify the nozzle loads that shall be used in the qualification.

5.11.4 Operating Loads

Operating loads include all loads resulting from the operation of the equipment, such as torque due to rotating parts and vibratory loads due to eccentricities.

5.11.5 Methods of Analysis

Acceptable analytical procedures for the various conditions are described in the following subsections.

5.11.5.1 Static (Coefficient) Analysis

If it can be shown that the equipment and its support are rigid, a static analysis may be performed to determine the stresses and deflections due to dynamic loads. In this case, the dynamic forces shall be determined by multiplying the mass of the subassembly or parts of the equipment by the maximum floor dynamic acceleration at the base of the equipment (ZPA from the response spectra). If the fundamental natural frequency is not known, a static analysis using 1.5 times the maximum peak of the applicable floor response spectra is acceptable. These forces shall be applied through the center of gravity of the subassembly or the part of the equipment. The stresses resulting from each force (in each of the three directions) shall be combined by taking the square root of the sum of the squares (SRSS) to yield the dynamic stresses. The dynamic deflections (deflections due to dynamic loads) shall be calculated in the same manner. These dynamic stresses and deflections shall be added to all stresses and deflections resulting from all applicable loads to obtain the final resultant stresses and deflections, which shall be compared with the design limits stated in Subsection 5.11. Furthermore, deflections are verified to provide reasonable assurance of operability.

5.11.5.2 Dynamic Analysis

When acceptable justification for static (coefficient) analysis cannot be provided, a dynamic analysis shall be required, and unless a conservative factor is used to account for the participation of higher modes, a detailed dynamic analysis shall be performed. A mathematical model may be constructed to represent the dynamic behavior of the equipment. The model can be analyzed using the response spectrum modal analysis or time-history (modal or step-by-step) analysis. The maximum inertia forces at each mass point, from each mode, shall be applied at that point to calculate the modal stresses and modal deflections. The various modal contributions shall be combined by taking the SRSS of the individual modal stresses or deflections. Closely spaced modes shall be combined by using an approach from NRC RG 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis" (Reference 7.2). The stresses and deflections resulting from each of the three directions shall be combined by taking the

SRSS to obtain the dynamic stresses and deflections. These dynamic stresses and deflections shall be added to all stresses and deflections resulting from all applicable loads and then compared with the design limits stated in Subsection 5.11.

5.11.6 Basis of Acceptability

The resultant stresses and deflections due to all loads included in the loading combinations stated in the procurement specification shall be within the design limits stated also in the procurement specification. Any deviation from these criteria shall be justified and the calculations shall show that the structural integrity of equipment, as well as the operability of active equipment, is maintained when subjected to the specified loading combinations. The Supplier shall submit to the combined license applicant a report that includes the data, calculations, results, and conclusions of the analysis. A suggested form for the report is presented in Section 5.14.

5.12 EXPERIENCE DATA

An experience-based qualification is not used for any equipement until it is endorsed by NRC R.G.1.100.

Similarity

Qualification by the use of experience data shall be based on the concept of dynamic similarity for excitation, physical system, dynamic response, and operability as follows:

a. Similarity of excitation exists, such as spectral characteristics, duration, directions of excitation axes, and location of measurement, for the motions relative to the equipment mounting.

b. Similarity of the equipment configuration shall be established.

c. A physical system dynamic response can be described through the same quantities as those applied to excitation or through a physical system description.

The experience data shall provide documented evidence to support the demonstration of proper operability.

5.13 OPERABILITY OF ACTIVE EQUIPMENT

The methods and guidance in ASME QME-1 including Appendix QRA, with exceptions provided in NRC RG 1.100, are used for seismic qualification of active mechanical equipment. The seismic and dynamic testing portion of the qualification program is performed in a sequence consistent with the requirements of Section 6 of IEEE Std. 323-2003 (Reference 7.4).

The operability of all active equipment before, during, and after (if required) DBAs, including seismic, shall be proven by test and/or analysis, and the test or analysis report shall be provided as part of the dynamic qualification report.

5.13.1 Electrical and Instrumentation

The qualification test methods described in Section 5.7 of this program to prove the operability of active electrical and instrumentation equipment shall be employed.

5.13.2 Mechanical Equipment

For mechanical equipment, the operability by analysis and/or tests shall be proven as follows:

a. Pumps

A static deflection analysis and/or test for the shaft and rotor (if applicable) should be performed under design basis loading, including the maximum allowable nozzle loads specified in the procurement specification. The deflection shall be less than the allowable/recommended deflection by the Supplier.

b. Valves

The operability requirements stated in Reference 7.6 shall be followed by the Supplier and are considered part of this report.

c. Acceptable Methods to Prove Valve Operability

The following are the acceptable methods that can be applied by the Supplier to demonstrate valve operability:

1) Manual Valves

Active manual valves are those that should be opened, or closed, after DBA. In this case, Supplier shall prove by analysis and/or test that the valve moving parts (e.g., stem, disc) are not permanently damaged due to DBA along with the maximum operating and nozzle loads.

2) Check Valves

The integrity of the valve and its parts, including disc, disc support, hinge, hinge-pin, hinge-arm, and seat shall be proven by test and/or analysis. The valve has to undergo in-shop hydrostatic tests. Impact loading may or may not be of concern, depending on the design and flow condition of the check valve. Supplier should demonstrate that the impact of valve's disc does not damage its seat or other parts of the valve.

The valve's operability verification document should address by test and/or analysis all possible worst loading conditions on the valve during and after seismic events, including any applicable impact loading.

3) Other Active Valves

All other active valves (except manual and check valves) should be subjected to the following tests and/or analyses to demonstrate operability:

Backseat and main seat leakage, and disc hydrostatic tests that verify the functionality of the valve within the specified time limits, when subjected to the design differential pressure and design basis loads. Three full-stroke operations, as a minimum, are required.

Test and/or analysis should be performed for static equivalent seismic loads applied at the center of gravity (CG) of the valve's extended structure.

5.13.3 Mechanical Drive Turbines

The operability of the mechanical drive turbine should focus primarily on the operability of auxiliary active components (valves, pumps, instruments) associated with or mounted on the turbine. The operability should be performed by analysis and/or test.

5.13.4 Fans

The operability of fans by performing an analysis and/or test to determine the shaft and bearing deflections when the fan is subjected to the external design basis loads shall be demonstrated. The clearance between the shaft and bearing as a result of these loads shall be smaller than the recommended clearance.

5.13.5 Diesel Engine

For the operability of the diesel engine and its auxiliary active components (valves, pumps, instruments), the methods described in NRC RG 1.9 (Reference 7.9) and IEEE Std 387 (Reference 7.8) shall be applied.

5.14 BUILDING STRUCTURE LOADS

Regardless of the qualification method(s) used, all the loads transmitted to the building structure shall be provided. The following loads shall be included in the calculations and the results for each shall be given separately:

a. Dead load

b. Operating loads

c. Nozzle loads (if applicable)

d. Pressure and thermal loads (if applicable)

e. Additional loads due to dynamic excitations (if applicable)

f. Any other loads that may be transmitted to the foundation during the dynamic event

The detailed load and stress calculation of mounting connection shall be included in the building structure load summary.

When the purchase specification requires the Supplier to design the mounting connection to the building structure, calculations may be included in the building structure load summary. If these calculations are provided as a separate document, they shall be referenced in the building structure load summary. Tables 2 and 3 indicate load combinations and stress limits and strength limits for the design of bolted and anchor bolted connections to the building structure.

6 DOCUMENTATION

The dynamic qualification documentation shall include all the information stated in Section 6.1 in an auditable form.

6.1 FORMAT OF THE DYNAMIC QUALIFICATION REPORTS

The dynamic qualification reports shall include both information suggested below and in IEEE 344 Section 11.3., and should present a clear, logical explanation of how the data have been used to achieve qualification.

Title Page

The following information should be shown on the title page:

a. Buyer

b. Supplier and Equipment Name

c. Specification Number

d. Revision Number

e. Date

f. Equipment Tag No.

I – General

This section shall include a description of the equipment, its function(s), and the qualification program used to verify the safety function(s) or design-intended function(s). In addition, the following information shall be provided:

a. Project and the Buyer Names

b. Specification and Purchase Order Numbers

c. Equipment Name and Number

d. Organization(s) performing qualification program

e. Similarity analysis showing the similarity between the equipment being qualified and the equipment purchased from Supplier.

II – Data and Assumptions

a. Testing Section

The following data shall be included:

1) Type of testing machine

2) Loads considered and attempts made to idealize them during the test

3) Methods used to simulate the supporting structure

4) Position and orientation of setting equipment

5) Steps taken to monitor the function of equipment during the test and tentative accelerometer locations (photographs are recommended)

6) Means of generating test response spectra (if applicable)

7) Calibration dates and results for all instruments used in the dynamic test

8) Approved test plan

b. Analytical Section

The following data shall be presented:

1) Loads considered

2) Damping values used in the analysis

3) Codes and standards used as bases for the analysis

4) Assumptions made for idealizing boundary conditions, converting the load criteria to actual loads used for calculations, and converting the design criteria to actual stress, deformation, and stability limits.

5) A list of the computer programs used in the analysis and the documentation, which establish the validity of any computer program used, if not available in the public domain.

6) Input and output data of the computer program to verify the loading criteria and analysis result.

III – Qualification Procedure

a. Testing Section: State type of test, waveform, frequency range, acceleration levels, axes of excitation, phase between inputs, equipment mounting details during testing, and any other data to completely describe the input motion and show how it is applied.

b. Analytical Section: State the method used in the analysis, analytical equations, and their derivation from basic principles. The calculations should be mentioned, if any.

IV – Results

a. Testing Section: This section shall include the measurements obtained from the test and their interpretations. Findings and observations from monitoring the function of the equipment and/or

inspection shall be presented. The generated test response spectra curves superimposed on the required response spectra curve shall be shown in this section, when applicable. All results should be presented in either numerical or graphical form.

b. Analytical Section: Show actual design calculations and sketches for the mathematical models, including numbering used for the node points and numbers. If possible, show loads, resultant forces, moments, stresses, and deformation on the mathematical model of the equipment.

c. For Active Equipment: Demonstrate the method used and results of equipment operability during and/or after DBAs, as required in the procurement specification.

V – Conclusions

Give a brief summary of the results obtained from the qualification program. A concise statement of the conclusion reached, which should satisfy the qualification requirements, shall be stated in this section.

VI – Drawings

Submit design drawings of the equipment and its supports. All necessary dimensions shall be shown on these drawings.

7 REFERENCES

All codes and standards shall be the edition in effect as of December 31, 2010 unless identified otherwise.

1 Regulatory Guide 1.100, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," Rev. 3, U.S. Nuclear Regulatory Commission, September 2009

2 Regulatory Guide 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis," Rev. 2, U.S. Nuclear Regulatory Commission, July 2006

3 NUREG-0800, Standard Review Plan, Section 3.10, "Seismic and Synamic Qualification of Mechanical and Electrical Equipment." Rev. 3, U.S Nuclear Regulatory Commission, March 2007

4 IEEE Std. 323-2003, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2003

5 IEEE Std. 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 2004

6 ASME QME-1-2007 "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," The American Society of Mechanical Engineers, 2007

7 Generic Letter 89-10, "Safety-Related MOV Testing and Surveillance," U.S. Nuclear Regulatory Commission, June 28, 1989

8 IEEE Std. 387-1995, "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Suppliers for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, 1995

9 Regulatory Guide 1.9, "Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants," Rev. 4, U.S. Nuclear Regulatory Commission, June 2007

10 ACI 349-01, "Code Requirements for Nuclear Safety-Related Concrete Structures (ACI 349-01) and Commentary," American Concrete Institute, February 2001

11 ANSI/AISC N690 – 1994 including Supplement 2(2004), "Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities," American National Standard Institute / American Institute of Steel Construction, 1994 & 2004

12 Regulatory Guide 1.199, "Anchoring Components and Structural Supports in Concrete", U.S. Nuclear Regulatory Commission, November 2003

Table 1 Stress Limits for Equipment and Supports (Excluding Items Associated with Building Structure – See Figure 1)

Plant Operating Condition	Loading Combination	Stress Limits for ASME Section III Equipment and Supports (Use Appropriate Class and Subsections)		Stress Limits for Non-ASME Section III Equipment and Supports[4)]
		Active Equipment	Passive Equipment	
Normal	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)]	Service Limit A	Service Limit A	AISC N690-94 Section Q1.5
Upset	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)] + Upset Condition Dynamic Loads[2)]	Service Limit B[6)]	Service Limit B	* AISC N690-94 Section Q1.5
Emergency and Faulted	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)] + Emergency / Faulted Condition Dynamic Loads[3)]	Service Limit B[6)]	Service Limit C and D, respectively	* AISC N690-94 Section Q1.5 multiplied by 1.6 but not to exceed 0.95Fy for tension; and multiplied by1.4 but not to exceed 0.95 Fy/$\sqrt{3}$ for shear

* For active components, shaft (rotor) deflection analysis shall be performed for verifying operability.

Table 2 Stress Limits for Bolting to Steel Building Structure[7)]
(Independent of Equipment Classfication)

Plant Operating Condition	Loading Combination	Stress Limits
Normal	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)]	AISC N690-94 Section Q1.5/Q1.6/ Q1.16/Q1.23
Upset	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)] + Upset Condition Dynamic Loads[2)]	AISC N690-94 Section Q1.5/Q1.6/ Q1.16/Q1.23
Emergency and Faulted	Dead Loads + Pressure Loads + Thermal Expansion Loads + Equip. Operation Loads[1)] + Emergency / Faulted Condition Dynamic Loads[3)]	AISC N690-94 Section Q1.5/Q1.6/ Q1.16/Q1.23 multiplied by 1.6 and 1.4 for tension and shear stress limits respectively

Table 3 Strength Limits for Anchoring to Building Structure[7] (1 of 2)
(Independent of Equipment Classification)

Table Plant Operating Condition	Loading Combination	Strength Limits per ACI 349-01 Appendix B[8] (Reference 7.10 and 7.12)
Normal	(0.9) Dead Loads[5] + (1.7) Pressure Loads + (1.3) Thermal Expansion Loads + (1.4) Equip. Operation Loads[1]	Tensile Strength $\phi_n N_s = \phi_n A_{se} f_{ut} \geq N_u$ where, f_{ut} shall not be taken greater than $1.9 f_y$ or 125,000 psi. Shear Strength $\phi_s V_s = \phi_s (0.6) A_{se} f_{ut} \geq V_u$ where, f_{ut} shall not be taken greater than $1.9 f_y$ or 125,000 psi. Tension / Shear Interaction $\frac{N_u}{\phi_n \cdot N_s} + \frac{V_u}{\phi_s \cdot V_s} \leq 1.2$ where, $\phi_n = 0.80$, $\phi_s = 0.75$ Note) The tensile & shear stress area for anchor shall be taken as $A_{se} = 0.7854[D - \frac{0.9743}{n}]^2$ where, D: Major thread diameter *n:* Number of threads per inch Minimum center-to-center spacing For untorqued anchors: $4d_o$ For torqued anchors: $6d_o$ Maximum anchor diameter Anchor diameter(d_o) ≤ 2 in where, d_o: Outside diameter of anchor If the concrete strength of the equipment foundation, as designed by A/E, does not meet the anchor bolt ductile failure requirements of ACI 349-01, Appendix B, Vendor shall modify anchor bolt details including bolt diameter, number of bolts, bolt material, and bolt arrangement as recommended by A/E. See ACI 349-01, Appendix B for explanation of nomenclature shown in this table.
Upset	(0.9) Dead Loads[5] + (1.7) Pressure Loads + (1.3) Thermal Expansion Loads + (1.4) Equip. Operation Loads[1] + (1.7) Upset Condition Dynamic Loads[2]	

Table 3 (2 of 2)

Plant Operating Condition	Loading Combination	Strength Limits per ACI 349-01 Appendix B[8)]
Emergency and Faulted	(0.9) Dead Loads + (1.0) Pressure Loads + (1.0) Thermal Expansion Loads + (1.0) Equip. Operation Loads[1)] + (1.0) Emergency / faulted Condition Dynamic Loads[3)]	

Notes:

1) Equipment operating loads are those loads associated with the operation of the equipment being qualified. Equipment operating loads include but are not limited to:

   a) Piping nozzle reactions
   b) Motor startup and running torque
   c) Valve seating torque and/or thrust
   d) Thrust load on fans and pumps

2) Upset condition dynamic loads include the postulated dynamic loads as identified in the purchase specification.

3) Faulted condition dynamic loads include the safe shutdown earthquake plus other postulated dynamic loads as identified in the purchase specification.

4) Weld allowable stresses shall be per AISC N690-94 Q1.5.3 for Normal and Upset Load Cases. For Emergency and Faulted Load Cases, the allowable stresses per AISC N690-94, Table Q1.5.3 may be increased by 1.6 but shall not exceed 0.95 Fy for tension and by 1.4 but shall not exceed 0.95 Fy/$\sqrt{3}$ for shear.

5) When calculating the overturning moments induced from eccentricity between weight center and anchor group center, the load factor of dead load shall be 1.4 instead of 0.9.

   When calculating the horizontal forces and overturning moments induced from seismic condition, the load factor of dead load shall be 1.4 instead of 0.9.

6) For active components, shaft (rotor) deflection analysis shall be performed for verifying operability.

7) Building structure; refer to A/E-designed components (see Figure 1).

8) Strength limits follow the conditions set forth in Regulatory Guide 1.199.

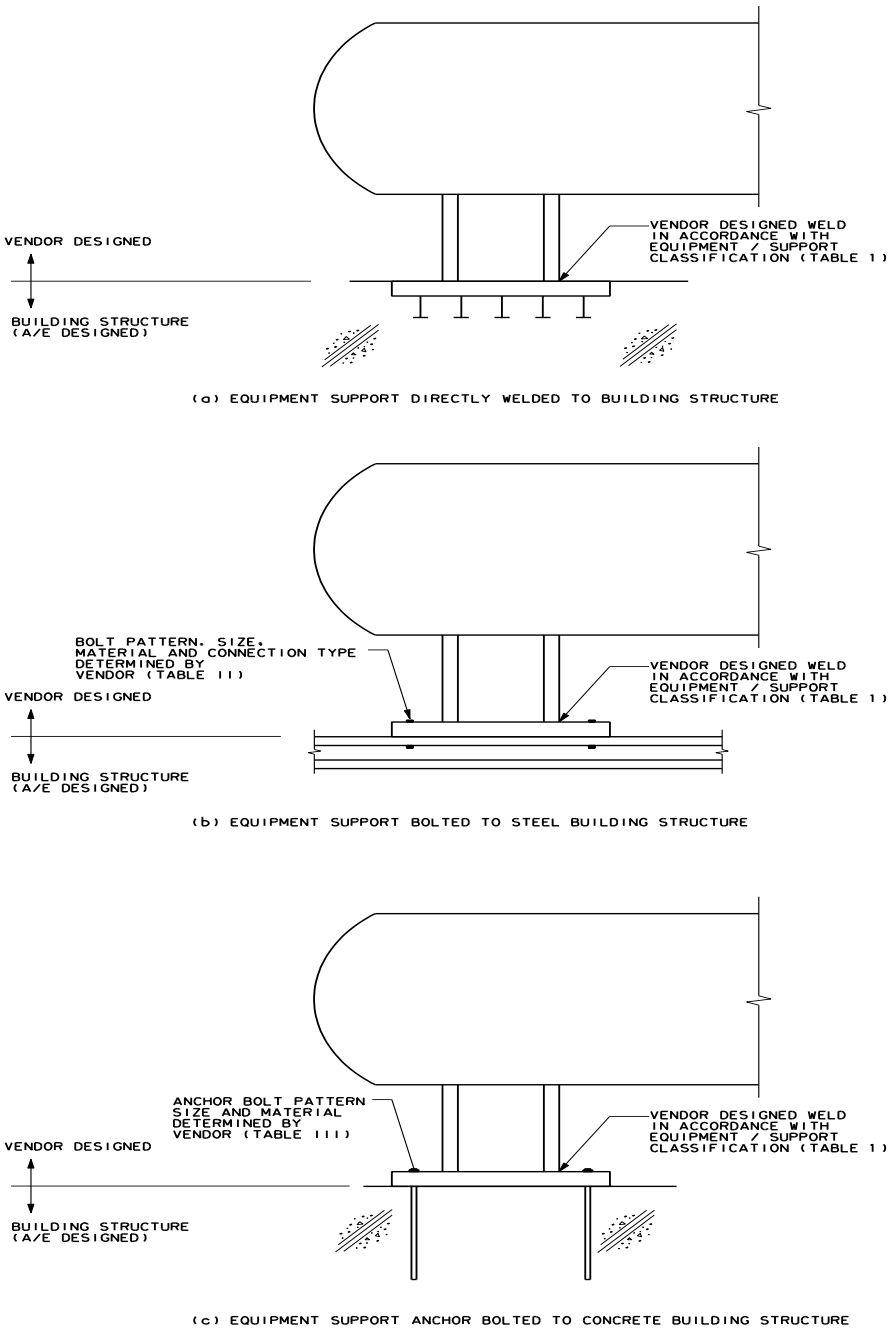


Figure 10Typical Examples of Equipment Attachments to Building Structure

APPENDIX A CALCULATUION METHOD OF DETERMINING OF NORMAL CONDITION TIDs FOR ENVIRONMENTAL QUALIFICATION

The total integrated dose (TID) used for environmental qualification is determined by summing the cumulative doses received during normal operation for 60 years and the 1 year post-accident doses. This appendix illustrates the methods to determine the normal operation TID values over the installed life of the components/equipment. The methods to calculate the post-accident TID are presented in Appendix B.

A simplified flow chart for calculating the normal TID values is presented in Figure A-1. As shown in Figure A-1, the following three dose contributing factors are considered for the determination of the normal TIDs:

a. Direct doses from target radiation source inside the room,

b. Indirect doses from surrounding radioactive equipment rooms, and

c. Doses from airborne radioactivity (also identified as submersion radiation) from equipment leakage in the target source room.

A.1. Input Parameters and Assumptions

The major input parameters and assumptions used for the normal TID calculations are as follows:

a. 'Direct Dose' is defined as doses directly received from radioactive sources in the target areas and 'Indirect Dose' as doses received from radioactive sources located in surrounding areas which are separated by shielding structures from the target source equipment.

b. The dose rates during normal operation are determined based on 1% fuel defect as specified in RG 1.89, Appendix D.

c. For fuel transfer tube and cask loading pit, the TID values are calculated based on the refueling duration of 40 months which is calculated assuming one month of refueling period per fuel cycle of 18 months for 60 years, since the source terms in those areas are present only during the refueling period.

d. A capacity factor of 1.0 is conservatively applied for all equipment.

e. Dose rates are calculated at 1-foot away from equipment surface for direct dose calculations, and at 1-inch away from the inside of the shield wall for indirect dose calculations.

f. A 20% margin is added to the direct doses to consider dose contributions from the surrounding areas. If the 20% margin is not bounding the all dose contributions from the adjacent sources, the actual dose rates from the adjacent sources are added to the direct doses.

g. Doses from gammas are only considered except for the reactor areas based on the followings:

    1) Neutrons are not present except for the areas nearby reactor vessel during normal operations.

2) Beta rays are negligible, since they have the relatively very short range shielded by external structure cable insulation/jacketing.

h. Airborne activity is calculated using the following parameters:

1) Leakage rates from valves and flanges associated with the components in each cubicle, assuming simultaneous leakages from all valves and flanges;

2) Fraction of the leakage that becomes airborne (Partition Factor);

3) Room volumes for the corresponding components;

4) HVAC exhaust air flow rate

I. Any reduction effect including radioactive decay is not considered for entire lifetime of 60 years

j. In accordance with RG 1.89, an additional margin of 10% is added to the normal TID for consideration of the uncertainty of the test.

A.2. Calculation Methods

The TID from direct doses are calculated using Microshield computer codes. The methods to calculate the dose rates are same as those used to determine the radiation zones and the required minimum shield thicknesses provided in Section 12.3 except that the source terms used in this equipment qualification assume 1% fuel defect.

Contributions of the indirect doses from the adjacent areas are typically bounded by a margin of 20% of the direct doses. For the cases where the direct dose contributions are greater than 20%, the actually calculated doses are added to the direct doses to estimate the total doses.

The following equation is used to calculate the TID for the cases where the indirect dose contributions are bounded by 20% of the direct doses.

$$TID_{DI} = 5.26\text{E}+05 \times D_{equip} \times 1.2, \quad \text{(Eq. 1a)}$$

where, TID_{DI} = Total integrate dose from direct and indirect radiation [Gy]

$5.26\text{E}05$ = Total time exposed to normal operation (= 60 years) [hr]

D_{equip} = Direct dose rate at 1 foot away from the equpment surface $[\text{Gy} \cdot hr^{-1}]$

When the dose contributions from adjacent sources exceed the 20% of the direct doses, the actual indirect doses are added to the direct doses as follows:

$$TID_{DI} = 5.26\text{E}+05 \times \left(D_{equip} + \sum_{i} D_{sur,i} \right), \quad \text{(Eq. 1b)}$$

where, $D_{sur,i}$ = Indirect dose rate at 1 inch away from shield wall against room I $[\text{Gy} \cdot hr^{-1}]$

Submersion doses from the airborne radioactivity due to leakage are calculated using the following equation stipulated in RG 1.183, C. Regulatory Position, Section 2.8:

$$\mathrm{TID}_{Sub} = \mathrm{GF} \cdot \sum_i \mathrm{C}_{A,i} \cdot DCF_{ext,i} \quad \text{(Eq. 2)}$$

where, TID_{sub} = Total integrated dose from Submersion [Gy]

V = Volume of the room [m^3]

$C_{A,i}$ = Time-integrated airborne activity of isotope I [$(\mathrm{Bq} \cdot \mathrm{sec}) \cdot m^{-3}$]

$DCF_{ext,i}$ = Semi-infinite external effective dose conversion factor for isotope i [$\mathrm{Sv} \cdot m^3 (\mathrm{Bq} \cdot \mathrm{sec})^{-1}$]

GF = Geometry correction factor, ($= 8.525\mathrm{E}\text{-}04 \cdot \mathrm{V}^{0.338}$)

To calculate the equilibrium airborne radioactivity concentration in the Equation 3 above, the following equation is used as given in the DCD Section 12.2.2:

$$\mathrm{C_A} = \frac{\mathrm{C} \cdot \mathrm{L} \cdot \mathrm{P}}{7.48\ (\lambda \cdot \mathrm{V} + \mathrm{F})}, \quad \text{(Eq. 3)}$$

where, C_A = the airborne concentration in component room [$\mathrm{Bq} \cdot cm^{-3}$]

C = Fluid concentration in equipment/components [$\mathrm{Bq} \cdot cm^{-3}$]

L = Leak rate from postulated leakages from valves and flanges associated with the component, [gpm]

P = Fraction of the leaked activity that becomes airborne (Partition Factor)

λ = Decay constant [min^{-1}]

V = Volume of the enclosed room [ft^3]

F = HVAC Air exhaust flow rate [cfm]

7.48 = Conversion Constant (7.48 gal/ft^3)

The TID values are then calculated considering the additional 10% margin as follows:

$$\mathrm{TID} = (TID_{DI} + TID_{Sub}) \times 1.1 \quad \text{(Eq. 4).}$$

On the other hand, the TID values for the rooms (or areas) without radiation sources in the radiologically controlled area (i.e., general access area, rooms such as storage area and hot tool area) are calculated as following:

$$\mathrm{TID} = 5.26\mathrm{E} + 05 \times D_{upper,i} \times 1.1 \times 1.2 \quad \text{(Eq. 5).}$$

where, TID = Total integrate dose [Gy]

5.26E05 = Total time exposed to normal operation (= 60 years) [hr]

$D_{upper,i}$ = Upper dose rate in radiation zone i [$\mathrm{Gy} \cdot hr^{-1}$]

1.1 = 10% margin for uncertainty

1.2 = Additional 20% margin

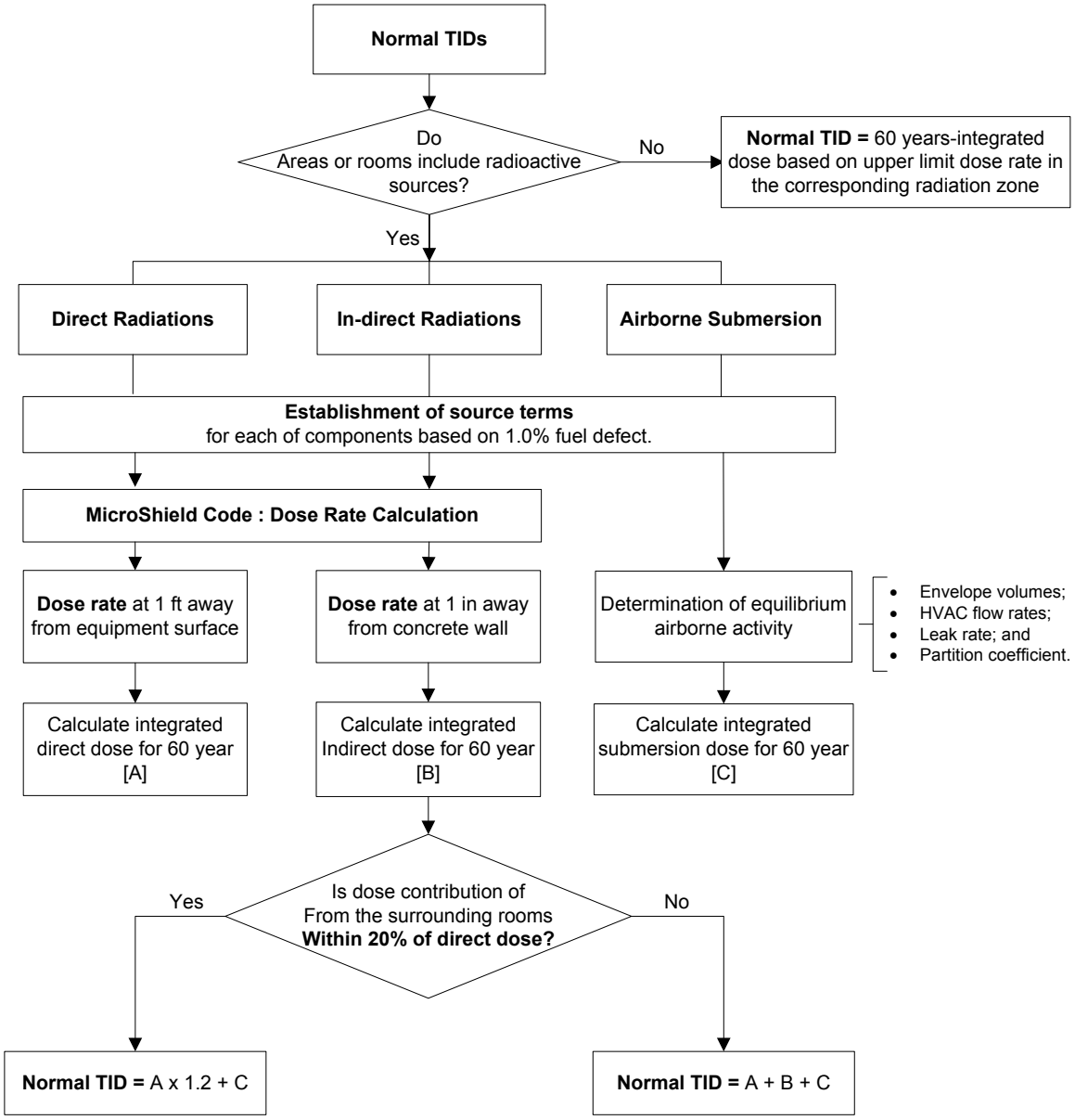


Figure A-1 A Simplified Flowchart for Calculating the Normal TIDs for Equipment Qualification

APPENDIX B CALCULATION METHOD OF DETERMINING POST-ACCIDENT CONDITION TIDs FOR ENVIRONMENT QUALIFICATION

The appendix illustrates the methods, calculation models, inputs and assumptions for the determination of accident TIDs. A simplified flow chart for calculating the general TID for systems and components inside and outside the containment is presented in Figure B-1.

In general the method, including the structure of the computer model, for calculating the TIDs is based on the RUNT-G and ISOSHLD computer codes, which determines the post-DBA radioactive source terms and the corresponding accident TID values. The ISOSHLD computer code is incorporated into the RUNT-G code to run as one computer program. The integrated RUNT-G and ISOSHLD computer model is used for the determination of TIDs for systems that re-circulate containment sump water outside the containment, AB controlled area emergency exhaust air cleaning units (ABCAEEACUs) and emergency control room ventilation system filter media, and for the inclusion of the airborne activity associated with leakage from recirculation systems and containment leakage following a LOCA.

B.1. TIDs inside containment

B.1.1. Input parameters and assumption

TIDs for environmental qualification of mechanical and electrical components important to safety under the post-accident radiological environment inside the containment, which include the CS/SC, SI systems, accident radiation monitors, etc., are calculated for one (1) year following a LOCA event. The input parameters, assumptions, and evaluation model for running the RUNT-G code are described below.

a. Released Source Term: The source terms of two release phases (gap and early in-vessel release) as described in RG 1.183 are considered as the effective source terms for post-accident equipment qualification analysis. The core inventory release fractions for each radionuclide group at the gap release and early in-vessel release phases for the LOCA are listed in DCD Table 15.6.5-13. Iodines in the forms of elemental, particulate and organic iodine in the containment atmosphere are assumed to be 4.85%, 95%, and 0.15%, respectively. With the exception of elemental and organic iodine and noble gases, the fission products are assumed to be in particulate form as specified in RG 1.183, Appendix A, Section 2. The maximum core inventory of the APR1400 is shown in Table 15A-1. The source term activities for gap release and early in-vessel release are separately calculated for all radionuclide groups.

b. Containment Data (extracted from DCD):

   1) Free volume= 3.128×10^6 ft^3

   2) Internal radius = 75 ft

   3) Effective height = $3.128 \times 10^6 / (\pi \times 752) = 177.0$ ft

   4) Sprayed region = 2.346×10^6 ft^3 assuming 75% of containment free volume

c. Surface Area: Total surface area available to be deposited on the walls of containment is assumed to be the same as that inside containment (700,963 ft^2). Of this area, the surface area of containment wall and operating floor is 9.05×10^4 ft^2.

d. Containment Leakage: No leakage from the reactor containment building to the environment is assumed in order to maximize the TIDs inside containment.

e. Containment Spray: According to RG 1.183 guidance, the airborne radioactivity in the containment may be removed by natural deposition and the containment spray system. Their removal rates are a function of time after accident, which is described in Subsection 15.6.5.5.1.1.

f. IRWST Volume: The minimum volume of water sources in containment is 8.6×10^4 ft^3 (2.44×10^9 cm^3).

g. IRWST Source term: The initial source term in the IRWST except for noble gases consists of 40% of halogens in the core inventory, 30% of alkali metal, and fractions of other fission products which are addressed in detail in Table 15.6.5-13.

h. Radioactive Decay: The effect of radioactive decay during holdup in the containment is included.

B.1.2. Calculation Method and Model

The radioactive nuclides released from the core escape from the reactor coolant pressure boundary (RCPB) into the containment during a LOCA, are dispersed throughout the containment. This analysis consists of two steps; the first is to determine the activity distribution as a function of time, and the second is to determine the dose contribution from each source to each dose point.

As illustrated in Figure B-3, the activity distribution, or the locations inside containment at which the dose rate is calculated are as follows:

a. Center of Containment Atmosphere (X1)

b. Containment Wall Surface (X2)

c. Bottom of Containment (Radioactivity in sump water contributes to the exposure rate at the location in containment air space through the concrete shield) (X3)

d. Center of Containment IRWST Sump (X4)

And the radioactive source terms that contribute to radiation exposure at any location are as follows:

a. Airborne Fission Products in Containment Atmosphere

b. Deposited Fission Products on Containment Wall

c. Fission Products in IRWST Sump Water

Airborne nuclides in containment are readily absorbed by the spray droplets and thereby removed from the containment atmosphere. The aerosol removal by containment spray, natural deposition, and radioactive decay are considered. The dose rate in containment due to radioactive airborne is calculated by the RUNT-G code. As described above, the following three (3) processes would affect the airborne activity:

a. Radioactive decay and sub-sequent daughter products are calculated in the RUNT-G model;

b. Removal by the containment spray system; and

c. Plate-out on walls and other surface inside containment by natural deposition.

Depending on the above locations, X1, X2, X3, and X4, the resultant TIDs assigned to specific components or equipment are determined for the bounding analysis as follows:

a. Components located below elevation 100' = TIDs at X4 location,

b. Components located above elevation 100' = Maximum gamma TID + Maximum beta TID at any location.

As shown in Figure B-2 below, the RUNT-G model is developed to simulate the removal of the radioactivity in the containment atmosphere, in the IRWST sump, and on containment walls after the LOCA event.

TIDs for the concentrations of radionuclides at different locations inside containment are determined using the ISOSHLD computer code, which is incorporated in RUNT-G. As illustrated in Figure 3, the containment and the IRWST are modeled as a right cylinder with a free volume of 3.128×10^6 ft^3 (8.86×10^{10} cm^3) with an inner radius of 75 ft, and a right cylinder with a volume of 8.61×10^4 ft^3 (2.44×10^9 cm^3) and effective height of cylinder of 4.87 ft, respectively. The radioactive materials released in the containment and IRWST sump are assumed to be uniformly distributed throughout the containment atmosphere and the IRWST sump.

Radioactive source terms on the containment wall surface are calculated using the removal rate by natural deposition. The removal by natural deposition consists of gravity settling, thermophoresis, diffusiophoresis, and turbulent diffusion, of which the most dominant process is the removal by gravity settling. The radionuclides deposited on the containment wall and operating floor area are assumed to contribute to the dose at the center of containment. For calculating the dose rate at the center of containment (i.e., dose point of X1), the plate-out of concrete walls is modeled as a point source with a total activity equal to the total activity plate-out on the walls. For the dose rate on the concrete wall, the dose contribution of the plate-out radionuclides is determined by modeling the source as a large disk with a radius of 2.70×10^3 cm. The dose point is set 1.0 cm away from the wall to avoid the singularity at X = 0.

Table 1 indicates the main input parameters of the ISOSHLD code.

B.2. TIDs in ESF system areas in auxiliary building (outside the containment)

There are two systems, the safety injection system (SIS)/shutdown cooling system (SCS), and the containment spray system (CSS) that re-circulate containment sump water outside of containment during a design basis accident. The analysis of accident TIDs for these systems is discussed below, including the input parameters, assumptions, methods, and models.

The SIS/SCS and the CSS are part of the ESF systems used for mitigation of a LOCA. TIDs for the cubicles containing the ESF components/equipment and from the rooms adjacent to the components are calculated based on the post-LOCA environment. The input parameters, the assumptions, and the evaluation model for running the RUNT-G code are described below.

B.2.1. Input parameters and Assumptions

a. Source Term: Source terms for the systems that re-circulate containment sump water outside the containment are based on the source terms that are used for equipment qualification inside containment. Please refer to item B.1.1 above.

b. Radioactive decay and subsequent daughters: The effect of radioactive decay with subsequent daughter products during holdup in the containment is included for a duration of 1 year.

c. Containment Leakage: The containment leak rate is the design-basis leak rate specified in the Technical Specifications. For the first 24 hours following a LOCA, the leak rate is assumed to be 0.1 vol.%/day of containment volume and the leak rate is assumed to be 0.05 vol.%/day thereafter.

d. Containment Spray: According to RG 1.183 guidance, the airborne radioactivity in the containment is removed by natural deposition and the containment spray system. Their removal rates are a function of time after accident, which is described in DCD Subsection 15.6.5.5.1.1.

e. Atmospheric Dispersion ($\boldsymbol{\chi/Q}$): The relative concentration of the plume is given by the following equation (Ref.1):

$$\chi/\mathrm{Q} = (\mathrm{U} \cdot \mathrm{C} \cdot \mathrm{A})^{-1} \qquad \text{(Eq.1)}$$

Where, U = Wind speed (1 m/sec)

C = Building wake factor (= 0.5)

A = Cross section area of containment

f. ABCAEES Envelope Areas: Following the LOCA, the engineered safety feature actuation signal (ESFAS) actuates the auxiliary building controlled area emergency exhaust system (ABCAEES) .The radioactive source leaked from ESF system (i.e., SI/CS systems) recirculation loop flashes to SI/CS component rooms. The source terms in the ESF systems areas are released to the environment through the ABCAEES, which ventilates the auxiliary building controlled areas I and II including the SC/CS heat exchanger room, component cooling water (CCW) pump room, SI pump room, SC/CS pump and mini-flow heat exchanger room, mechanical penetration room, charging pump room, and auxiliary charging pump room. The other areas outside the ABCAEES are not considered in this analysis. All components in those areas such as valves in the post-accident sampling system, which are non-safety related, are infrequently operated and have a relatively small leakage.

For simplification of the RUNT-G model, the auxiliary building controlled areas I and II are assumed to be one area having a volume of 4.97×10^5 ft^3 (1.40×10^{10} cm^3), which consists of 2.50×10^5 ft^3 (7.08×10^{10} cm^3) and 2.47×10^5 ft^3 (6.99×10^9 cm^3) for auxiliary building controlled areas I and II, respectively. For conservative TIDs calculation of the HVAC system components, these areas are assumed to be ventilated by one of the two air cleanup units (ACUs) in each HVAC line of the ABCAEES. The flow rates through such ACUs are summed to be 6,000 cfm (1.02×10^4 m^3/hr).

The filter efficiency of the ABCAEES for all species of radioactive nuclides except for noble gases is assumed to be 100% according to the guidance of RG1.89, Appendix I.

g. IRWST Source term: The initial source term in the IRWST consists of 40% of halogens in the core inventory, 30% of alkali metal, and small fractions of other fission products.

h. ESF Components Leakage: For the equipment qualification, the maximum anticipated leakage rate through all ESF system components containing the IRWST water source term (i.e., SI/SC/CS components) is calculated to be 0.285 ft^3/hr (8.07 $\times$ 10^3 cm^3/hr), based on the leakage rates from each valve and pump in the SI/SC/CS systems and the number of the corresponding components (i.e., valves, and pumps) that are conservatively determined:

1) Maximum anticipated leakage rate

- 4 cm^3 per cm-hour for all valves including check valves
- 50 cm^3 per hour for centrifugal pumps (mechanical seal) excepting SI pumps
- 1,000 cm^3 per hour for SI or CS pumps

2) Number of components

- 251 for valves (= 211 for SI system + 40 for CS system)
- 3 for pumps (= 2 for SI system + 1 for CS system)

In accordance with this RG 1.183 guidance, the ESF leakage of 0.285 ft^3/hr is doubled to the modeled value of 0.57 ft^3/hr (1.61 $\times$ 10^3 cm^3/hr). It should be noted that the design basis ESF leakage allowed for the radiological consequence analysis in DCD Chapter 15 is 0.668 ft/hr (1.89 x 10^3 cm^3/hr) which is doubled to 1.34 ft^3/hr (3.78 x 10^3 cm^3/hr) per RG 1.183.

i. Partition Coefficient: When a portion of radionuclides in the leakage from SI/SC/CS equipment becomes airborne in the auxiliary building and subsequently enters into the ABCAEES, the assumed partition coefficient for each isotope group is as follows (based on the RG 1.183 guidance):

1) Noble gas: 1.0

2) Halogen: 0.1

3) Others nuclides: 0.01 (assumed in order to be conservative)

j. IRWST Volume: The minimum volume of water sources in containment is 8.6 $\times$ 10^4 ft^3 (2.44 $\times$ 10^9 cm^3).

k. Concrete Structure and Geometry:

1) The inside radius of the containment building is 75 ft (2.29 $\times$ 10^3 cm).

2) The containment wall is surrounded with ¼ in (6.35 $\times$ 10^{-1} cm) steel liner and 4.5 ft (1.37 $\times$ 10^2 cm) concrete.

3) The containment free volume is assumed to be 3.13 $\times$ 10^6 ft^3 (8.86 $\times 10^{10}$ cm^3).

4) All structures and equipment inside containment are ignored as shielding materials.

5) The containment steel liner is modeled as iron with a density of 7.86 g/cm^3.

6) The density of the concrete wall is 2.242 g/cm^3.

7) For the direct dose calculation from airborne radioactivity in containment, the containment is modeled as a right cylinder which has the same internal radius and volume as the assumed free volume as illustrated in Figure B-3.

l. SI/SC/CS Piping geometry: All the actual pipe sizes in each cubicle containing the SI/SC/CS components where schedule 40S steel pipe is assumed are taken into account.

B.2.2. Calculation Method and Model

The integrated RUNT-G and ISOSHLD computer model is used to determine the individual doses that contribute to the overall TIDs.

B.2.2.1 Airbone Activity inside the Auxiliary Building and Filter Loading Dose due to Containment Leakage

As shown in Figure B-4 below, the RUNT-G model is developed to simulate the time-dependent leakage from containment, the dispersion in the atmosphere, and the intake to the auxiliary building.

This model is subdivided into three types as gaseous (includes noble gas & organic halogen), elemental and particulate halogen. For the first 24 hrs following a LOCA, the leak rate is assumed to be 0.1 %/day of containment volume and the leak rate is assumed to be 0.05 %/day thereafter (i.e., paths of L_{23} and L_{34}). After the onset of the LOCA event, the wash-out phenomena by containment spray and natural deposition are taken into consideration as the leakage from BARRIER 1 to the sump (i.e., path of L_{28}). These phenomena are only applicable to non-noble gases. The atmospheric dispersion and determination of the intake activity of the ABCAEES are calculated by using the fraction factor on FILTER 1, which is equal to the multiplication product (1.90×10^{-3}) of (χ/Q (relative concentration of the plume, 6.725×10^{-4} sec/m^3) × W (ABCAEES intake flow rate, 1.02×10^4 m^3/hr) and a conversion factor of 1 hour to 3600 seconds). The leak rate from containment is multiplied by the fraction factor to produce radioactivity taken into the auxiliary building via the ABCAEES. Therefore, BARRIER 2 means airborne radioactivity inside the auxiliary building. The release rate to the atmosphere through the auxiliary building (i.e., paths of L_{45} and L_{55}) depends on the cubicle volume and HVAC flow rate.

TIDs for airborne activity in the auxiliary building (i.e., BARRIER 2) and the filter loading of ABCAEES (i.e., FILTER 2) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. Tables B-2 and B-3 indicate the main input parameters of the ISOSHLD code, and the ISOSHLD models are shown in Figures B-5 and B-6.

B.2.2.2 Airborne Activity and Filter Loading Dose due to SI/SC/CS Leakage

As shown in Figure B-7, the RUNT-G model is developed to simulate the time-dependent leakage from SI/SC/CS equipment, which are located at elevation 55'-0" in the auxiliary building, and the atmospheric dispersion to the environment through the auxiliary building cubicles.

It is assumed that all the ESF leakages of 0.57 ft^3/hr (1.61 $\times$ 10^4 cm^3/hr) are retained on the floor of the corresponding compartments in the auxiliary building (i.e. BARRIER 1), and some of the iodines are flashed and become airborne in the auxiliary building. Then, the airborne iodine radioactivity in cubicles of the auxiliary building is released to the environment via the ABCAEES filter (i.e., paths of L_{23} and L_{38}). The release rate to the environment through the auxiliary building depends on cubicle volume and HVAC flow rate.

TIDs for airborne activity in the auxiliary building (i.e., BARRIER 1) and the filter loading of ABCAEES (i.e., FILTER 1) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. The main input parameters of the ISOSHLD code and ISOSHLD model are the same as those in Tables B-2 and B-3, and in Figures B-5 and B-6, respectively.

B.2.2.3 Post-LOCA Direct Dose from the Airborne Source in Containment

As shown in Figure B-8, the RUNT-G model is developed to calculate the time-dependent activity in the containment, which is divided into three types as gaseous (includes noble gas & organic halogen), elemental and particulate halogen.

After the onset of the LOCA event, leakage from the core to the atmosphere of the containment is modeled as the leakage from the SOURCE to BARRIER 1 (i.e., path L_{12}). The wash-out phenomena by containment spray and natural deposition are described as the leakage from BARRIER 1 to the sump (i.e., path L_{24}), which are only applicable to non-noble gases.

TIDs from airborne activity in containment (i.e., BARRIER 1) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. Table B-4 indicates the main input parameters of the ISOSHLD code, and the ISOSHLD model is shown in Figure B-9.

B.2.2.4 Post-LOCA Direct Dose from SI/SC/CS Piping

As shown in Figure B-10, the RUNT-G model is developed to calculate the time-dependent IRWST source activity in containment. The radioactivity concentration in the IRWST water after the initiation of the LOCA event is used as the source term in SI/SC/CS circulating water.

TIDs from direct radiation in the IRWST source term (i.e., BARRIER 1) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. Table B-5 indicates the main input parameters of the ISOSHLD code, and the ISOSHLD model is the same as that in Figure B-9.

B.2.2.5 Post-LOCA Direct Dose from SI/SC/CS Components

TIDs for SI/SC/CS equipment are calculated using the result of the TID calculation for the SI/SC/CS pipes.

For pumps which have the same diameter as the pipe, the TIDs for the pumps are expected to be lower than the TIDs for pipes having the same diameter because of the shield effect by the enclosing steel casing. Therefore, TIDs for the SI/SC/CS piping during the LOCA condition can be conservatively used for pumps in the SI/SC/CS systems. The heat exchangers can be also modeled with a single pipe with an effective diameter which is derived from the equation 2a or 2b below. For the tube region, where the heat exchanger tubes and shell are located, the shielding effect of internal steel and cooling water in the shell side are not taken into account. For the plenum region, where the tube side inlet and outlet are located, the same wall thickness and diameter with the tube region are applied; i.e., the wall thickness and volume are decreased. The impact of decreased radioactivity due to the decreased volume in that region is negligible since the relative impact of the decreased wall thickness is larger due to the simplification. Therefore, TIDs for pipes having the same diameter with the effective diameter of the heat exchanger can

be expected to yield conservative TID values. The effective diameter of the heat exchanger can be calculated as follows:

$$D = (2N)^{1/2} \times d \quad \text{for U-tube Type Heat Exchanger} \quad \text{(Eq.2a)}$$

$$D = (N)^{1/2} \times d \quad \text{for one-through Type Heat Exchanger} \quad \text{(Eq.2b)}$$

Where, N = Number of tubes in heat exchanger

d = Diameter of tube

D= Effective diameter of heat exchanger

B.3. TIDs in fuel handling area in auxiliary building (outside the containment)

TIDs for components in the fuel handling area are calculated based on the post-FHA (fuel handling accident) environment. The input parameters, assumptions, and evaluation model for running the RUNT-G code are described below.

B.3.1. Input Parameters and Assumptions

a. Source Term: For the purpose of conducting a conservative analysis that bounds most cases, all of the fuel rods in a fuel assembly are assumed to be damaged and all the gap activity in the damaged rods is assumed to be instantaneously released into the spent fuel pool, where total gap activities are 10% of Kr-85, 8% of I-131, 5% of other iodines and noble gases, and 12% of alkali metals in fuel rods. The retention of noble gases in the pool is negligible and the iodine above the pool consists of 57% of elemental iodine and 43% of organic iodine, considering the overall effective decontamination factor of 200 for iodine. The source term for the FHA event is described in detail in DCD Subsection 15.7.4.2 and Table 15.7.4-1.

b. Fuel Handling Area: After the fuel handling accident, airborne radioactive materials in the fuel handling area are vented to the environment via fuel handling area ACUs over a two hour time period. This HVAC system emergency exhaust flow rate is 5,000 cfm/ACU. The total free volume covered by this HVAC system is 8.77×10^5 ft^3. The removal efficiency of the carbon absorbers and HEPA filter is assumed to be 100%.

c. HEPA filter and Charcoal Densities: The HEPA filter media and charcoal densities are both assumed to be 0.48 g/cm^3 for conservatism.

d. Radioactive decay and subsequent daughters: The effect of radioactive decay with subsequent daughter products during holdup in the containment is included for a duration of 1 year.

B.3.2. Calculation Method and Model

As shown in Figure B-11, the RUNT-G model is developed to simulate time dependent activity in the fuel handling area after the onset of the FHA event.

Leakage from the fuel assembly to the atmosphere of the fuel handling area is modeled as the leakage from the SOURCE to BARRIER 1 (i.e. path of L_{12}). Airborne activity in the fuel handling area is released to the environment through the fuel handling area emergency HVAC system (i.e., paths of L_{23} and L_{38}). The release rate to the environment through the fuel handling area depends on cubicle volume and HVAC

flow rate. The reduction of the amount of radioactivity by deposition and/or plate-out on structure surfaces is not considered for the reason of conservatism.

TIDs for airborne activity in the fuel handling area (i.e., BARRIER 1) and the filter loading of the fuel handling area emergency HVAC system (i.e., FILTER 1) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. The main input parameters of the ISOSHLD code for airborne activity in the fuel handling area is given in Table B-6, and the other main parameters and ISOSHLD model are the same as those in Table B-3, and Figures B-5 and B-6, respectively, presented above.

B.4. TIDs in the main steam valve house inside the auxiliary building (outside the containment)

TIDs for components in the main steam valve house (MSVH) are calculated based on the post-MSLB (main steam line break) environment. The input parameters, assumptions, and evaluation model for running the RUNT-G code are described below.

B.4.1. Input Parameters and Assumptions

a. Source Term: Per RG 1.183, Appendix E, Section 2, for the main steam line break accident, the release from the breached fuel is based on the estimate of the number of fuel rods assumed to have experienced Departure from Nucleate Boiling (DNB) and the assumption that 5% of the core inventory of the noble gases and iodines is in the fuel gap, except for Kr-85 at 10% and I-131 at 8%.

b. The expected number of fuel rods in DNB is assumed to be 1% of the core where the failed fuel is modeled with a radial peaking factor of 1.8. There is no fuel melt expected during the MSLB. To determine the activity in the steam generator resulting from primary-to-secondary leakage, a primary coolant of 2.744×10^5 kg and primary to secondary (P-T-S) leakage of 0.6 gpm are used. The initial secondary coolant source term is assumed to be at the Technical Specification limit of 3.7×10^3 Bq/g (0.1μCi/g) Dose Equivalent (DE) I-131 and is given in DCD Table 15A-9. The source term for the MSLB event is described in detail as specified in DCD Subsection 15.1.5.3.3 and Table 15.1.5-12.

c. Main Steam Valve House: The volume of each MSVH (i.e., room number of 137-A31C/D) is 123,955 ft^3.

d. Radioactive decay and subsequent daughters: The effect of radioactive decay with subsequent daughter products during holdup in the containment is included for a duration of 1 year.

B.4.2. Calculation Method and Model

As shown in Figure B-12, the RUNT-G model is developed to simulate the time-dependent activity in the MSVH.

After the onset of the MSLB event, the radioactivity leaked from the broken steam piping to the MSVH, which includes secondary coolant and RCS coolant activities, is modeled as the leakage from the SOURCE to BARRIER 1 (i.e., path of L_{12}). The reduction of the amount of radioactivity by deposition and/or plate-out on the steam piping or structure surfaces is not considered.

TIDs from airborne activity in the MSVH (i.e., BARRIER 1) are determined by using the ISOSHLD code which is incorporated in the RUNT-G computer code. Table B-7 indicates the main input parameters of the ISOSHLD code, and the ISOSHLD model is the same as that shown in Figure B-5.

B.5. Summary of Accident TID Calculation

In accordance with the requirements in RG 1.89, the TIDs are adjusted by another 10% EQ safety margin for uncertainty.

B.6. References

USAEC, "Meteorology and Atomic Energy", 1968.

Table B-1 (1 of 3)

Main ISOSHLD Input Parameters for Airborne Activity in Containment

Geometry		ISOSHLD Parameter	Values
1) TID from Airborne Activity in Containment			
Source Dimension	Shape	IGEOM	Cylindrical Source (Immersion Dose Model)
	Height[1)]	SLTH	5.40×10^{3} cm
	Radius	T(1)	2.29×10^{3} cm
	Volume[2)]	N/A	4.81×10^{9} cm^{3}
Source Characteristic	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^{3}
Dose Point X1	X	X (=SLTH/2)	2.70×10^{3} cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm
Dose Point X2	X	N/A	2.70×10^{3} cm
	Y	DELR	2.70×10^{3} cm
	Z	N/A	0.0 cm
Dose Point X3	X	X (=SLTH/2)	0.0 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm

Table B-1 (2 of 3)
Main ISOSHLD Input Parameters for Airborne Activity in Containment

Geometry		ISOSHLD Parameter	Values
2) TID from Radioactivity in IRWST Sump: Above IRWST Sump			
Source Dimension	Shape	IGEOM	Cylindrical Source & Slab Shield on Cylinder End
	Height[1)]	T(1)	1.49×10^2 cm
	Radius	SLTH	2.29×10^3 cm
	Volume[2)]	N/A	2.44×10^9 cm^3
Source Characteristic	Material	N/A	Water
	Density	N/A	1.0 g/cm^3
Air in Containment	Thickness	T(2)	1.37×10^2 cm
	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Dose Point X1 & X2[1)]	X	X (=T(1)+T(2))	2.85×10^3 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm
Dose Point X3	X	X (=T(1)+2.54cm))	1.51×10^2 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm
3) TID from Radioactivity in IRWST Sump: Within IRWST Sump			
Source Dimension	Shape	IGEOM	Cylindrical Source (Immersion Dose Model)
	Height[1)]	SLTH	1.49×10^2 cm
	Radius	T(1)	2.29×10^3 cm
	Volume[2)]	N/A	4.81×10^9 cm^3
Source Characteristic	Material	N/A	Water
	Density	N/A	1.00 g/cm^3
Dose Point X4	X	X (=SLTH/2)	74.3 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm

Table B-1 (3 of 3)

Main ISOSHLD Input Parameters for Airborne Activity in Containment

Geometry		ISOSHLD Parameter	Values
4) TID by Plate-out Radioactivity on Containment Wall: Center of Containment			
Source Dimension	Shape	IGEOM	Point Source
	Radius	T(1)	2.29×10^{3} cm
Source Characteristic	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Dose Point X1 & X3[2)]	X	X (=T(1))	2.29×10^{3} cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm
5) TID by Plate-out Radioactivity on Containment Wall: Wall of Containment			
Source Dimension	Shape	IGEOM	Disk Source
	Thickness	T(1)	0.0 cm
	Radius	SLTH	2.70×10^{3} cm
Source Characteristic	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Dose Point X2[3)]	X	X	1.00 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm

1) The dose rate at containment wall surface is assumed to be the same as that at center of containment atmosphere (i.e., dose point of X1) from the source in IRWST sump water for conservatism. Therefore, every parameter has the same value with the input parameter for dose point X1.

2) The dose rate at bottom of containment is assumed to be the same as that at center of containment atmosphere (i.e., dose point of X1) from the source deposited on the surface is used as. Therefore, every parameter has the same value with the input parameter for dose point X1

3) The dose point is set 1 cm away from the wall to avoid the singularity at X = 0.

Table B-2

Main ISOSHLD Input Parameters for Airborne Activity in Auxiliary Building

Geometry		ISOSHLD Parameter	Values
Source Dimension	Shape	IGEOM	Cylindrical Source (Immersion Dose Model)
	Height[1)]	SLTH	6.10×10^2 cm
	Radius	T(1)	1.58×10^3cm
	Volume[2)]	N/A	4.81×10^9 cm^3
Source Characteristic	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Dose Point	X	X (=SLTH/2)	3.05×10^2 cm
	Y	N/A	0.0 cm
	Z	N/A	0.0 cm

1) Height of rooms in auxiliary building is assumed to be 610cm (=20ft)

2) Volume of rooms or cubicles, which contains components/equipment in the ESF systems, ranges from 2.21×10^8 cm^3 ($=7.82 \times 10^3$ ft^3) to 9.15×10^8 cm^3 ($=3.23 \times 10^4$ ft^3), but it is conservatively assumed to be 4.81×10^9 cm^3 ($= 1.70 \times 10^5$ ft^3) as a bounding volume, thus leading to maximization of the potentially expected TIDs for the corresponding components/equipment.

Table B-3

Main ISOSHLD Input Parameters for ABCAEES Filter

Geometry		ISOSHLD Parameter	Values
Source Dimension	Shape	IGEOM	Rectangular Source
	Width (X)	T(1)	6.10×10^{1} cm
	Length (Y)	Y	6.10×10^{1} cm
	Height (Z)	SLTH	6.10×10^{1} cm
	Volume	N/A	2.27×10^{5} cm^3
Source Characteristic	Material[1)]	N/A	Carbon
	Density	N/A	4.80×10^{-1} g/cm^3
Dose Point[1)]	X	X (=T(1) + T(2))	3.30×10^{1} cm
	Y	YP	3.05×10^{1} cm
	Z	SP	3.05×10^{1} cm

1) Be assumed to be 2.54cm away from HVAC ACU source term

Table B-4

Main ISOSHLD Input Parameters for Direct Dose from Containment

Geometry		ISOSHLD Parameter	Values
Source Dimension	Shape	IGEOM	Cylindrical Source & Cylindrical Shield
	Height[1)]	SLTH	5.40×10^3 cm
	Radius	T(1)	2.29×10^3 cm
	Volume	N/A	8.86×10^{10} cm^3
Source Characteristic	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Containment Concrete Shield Wall[2)]	Thickness	T(2)	1.37×10^2 cm
	Material	N/A	Concrete
	Density	N/A	2.242 g/cm^3
Dose Point	X	X	2.42×10^3 cm
	Y	Y (=SLTH/2)	2.70×10^3 cm
	Z	N/A	0.0 cm

1) Calculated based on the containment plane area of 1.64×10^7cm^2 ($=1.77 \times 10^4$ft^2)

2) The shielding effect of the 137cm (=4.5ft) containment cylindrical concrete wall is only considered. The additional shielding effect due to structures in the auxiliary building is not considered for conservatism.

Table B-5

Main ISOSHLD Input Parameters for Direct Dose from SI/SC/CS Piping

Geometry		ISOSHLD Parameter	Values
Source Dimension	Shape	IGEOM	Cylindrical Source & Cylindrical Shield
	Height[1)]	SLTH	6.10×10^{2} cm
	Radius	T(1)	1.90×10^{1} cm
	Volume	N/A	6.95×10^{5} cm^3
Source Characteristic	Material	N/A	Water
	Density	N/A	1.00 g/cm^3
Pipe Wall[2)]	Radius	T(2)	1.27 cm
	Material	N/A	Steel
	Density	N/A	7.86 g/cm^3
Air	Radius	T(3)	3.05×10^{1} cm
	Material	N/A	Air
	Density	N/A	1.29×10^{-3} g/cm^3
Concrete Shield Wall	Radius	T(4)	Wall Thickness (T) of Adjacent Room
	Material	N/A	Concrete
	Density	N/A	2.242 g/cm^3
Dose Point	X	X	$5.08E\times 10^{1}$ cm w/o concrete wall [3)] $(5.33 \times 10^{1} + T)$ cm w/ concrete wall
	Y	Y (=SLTH/2)	3.05×10^{2} cm
	Z	N/A	0.0 cm

1) Piping length is assumed to be 20ft.

2) Only shielding effect of the pipe wall of 1.27cm is considered for conservatism

3) Assumed to be 1ft away from the SI/SC/CS piping

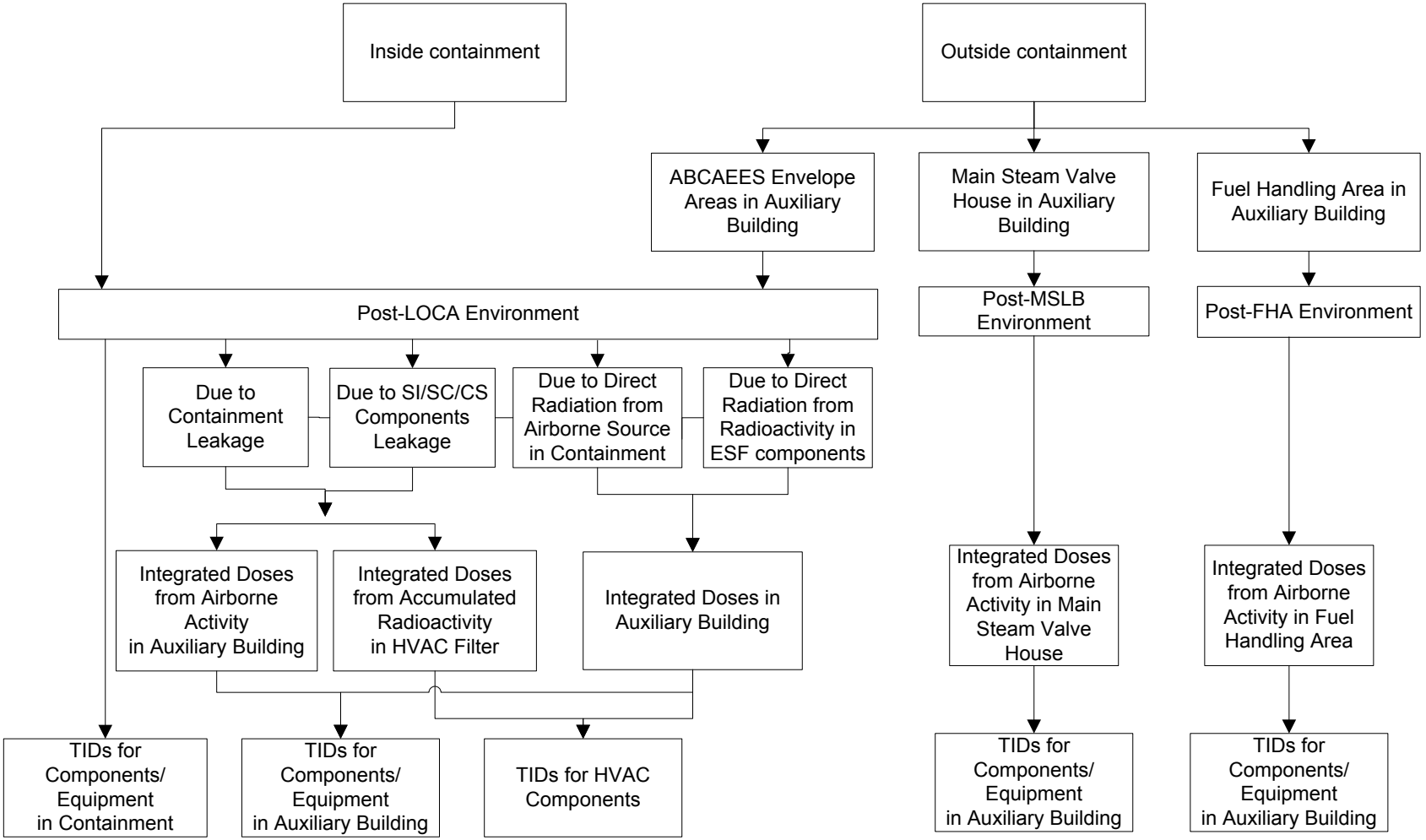


Figure B-1 A Simplified Flowchart for Determination of Accident TIDs

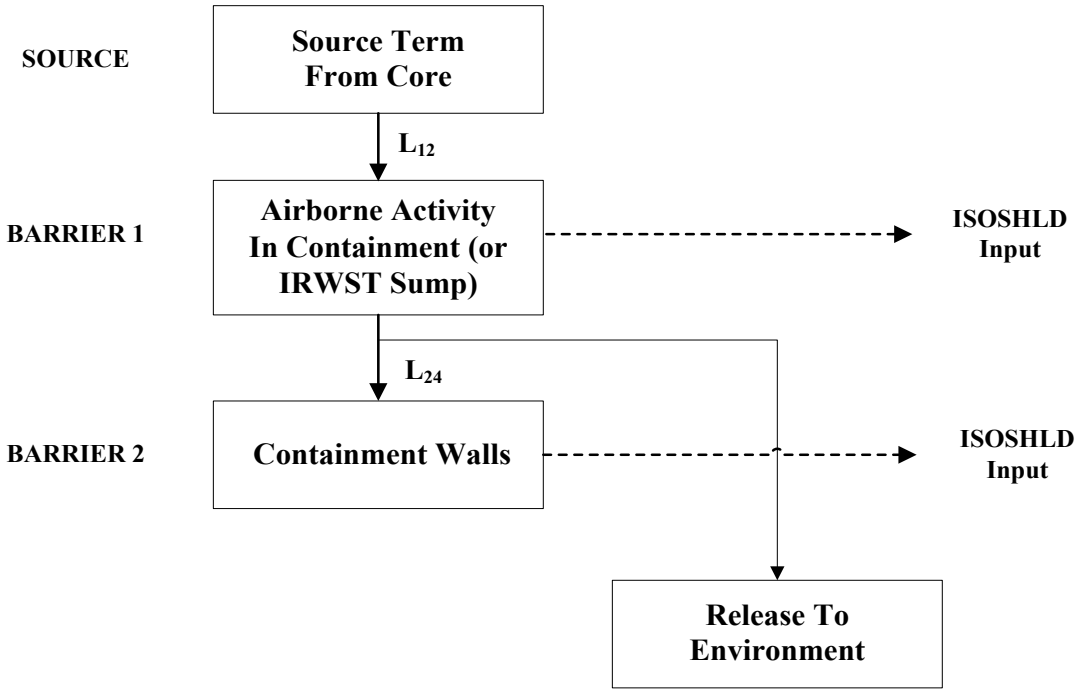


Figure B-2 RUNT-G Model to Calculate radioactivity in containment, IRWST sump, and walls

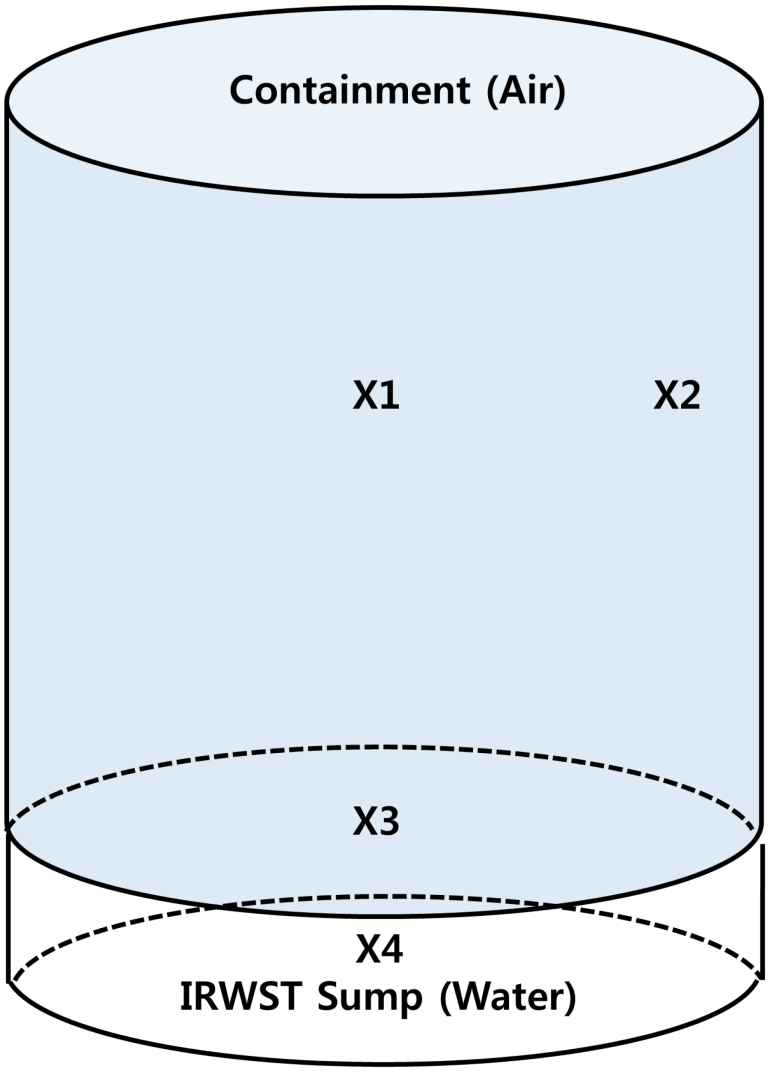


Figure B-3 ISOSHLD Model for Dose Evaluation Inside Containment

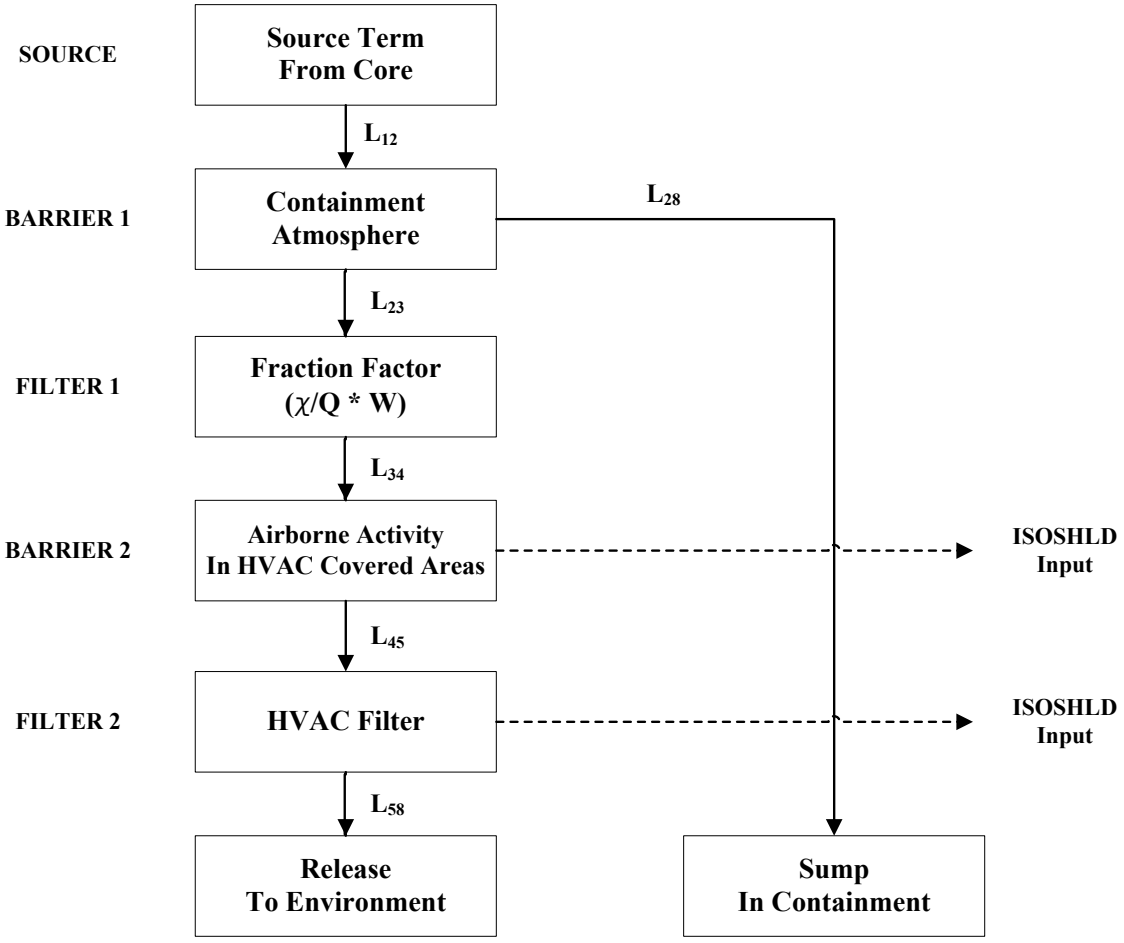


Figure B-4 RUNT-G Model for Containment Leakage

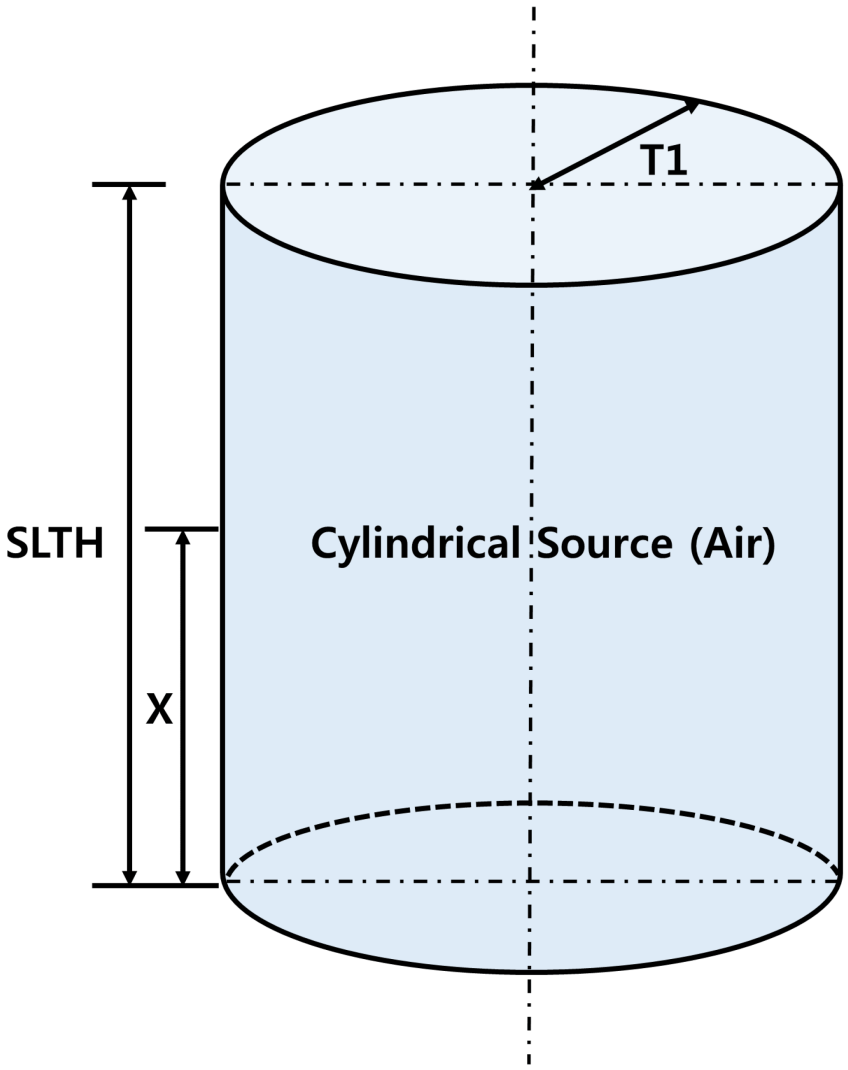


Figure B-5 ISOSHLD Model for Immersion Dose Evaluation

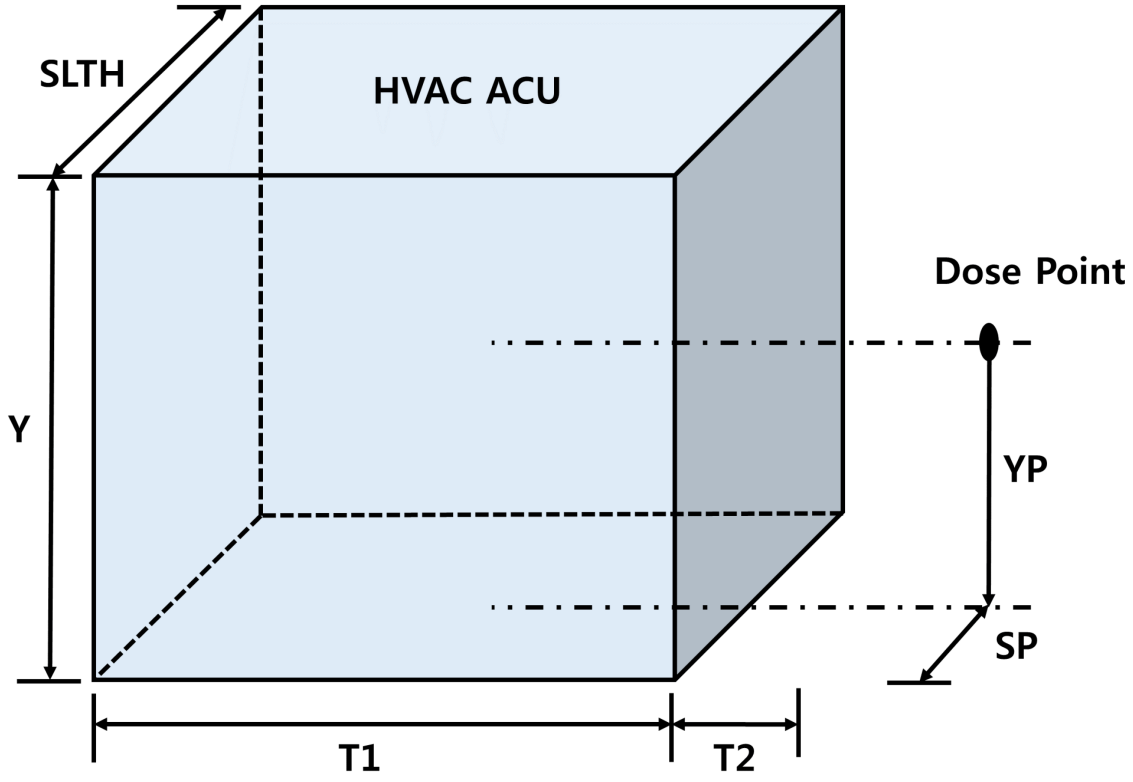


Figure B-6 ISOSHLD Model for ABCAEES Filter

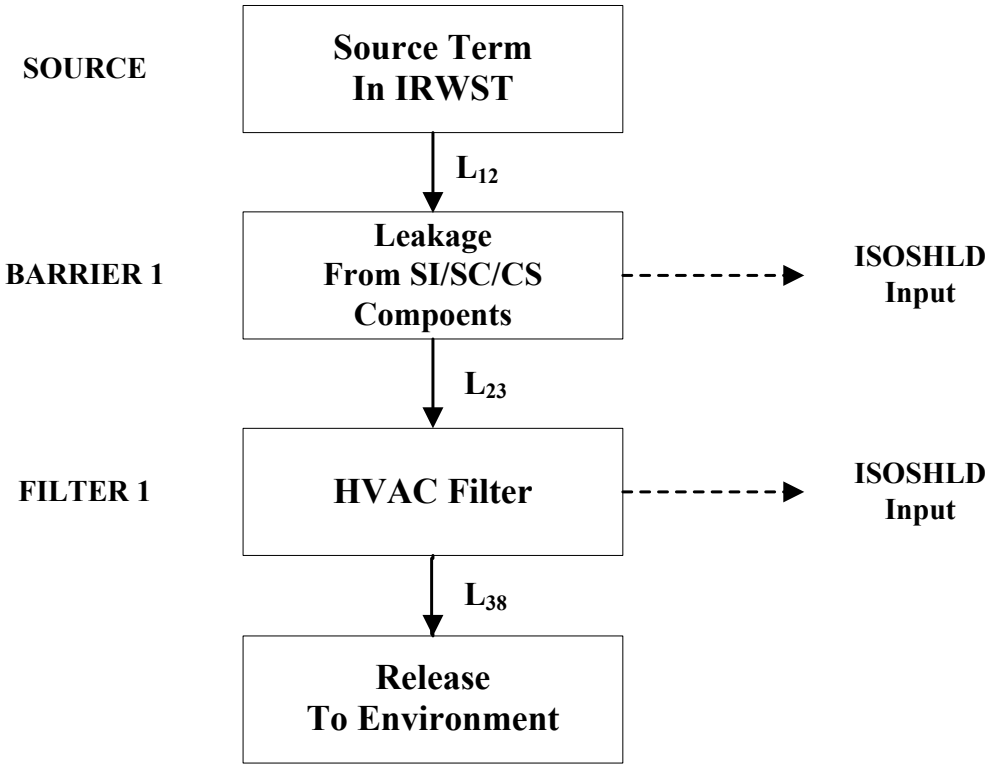


Figure B-7 RUNT-G Model for SI/SC/CS Components Leakage

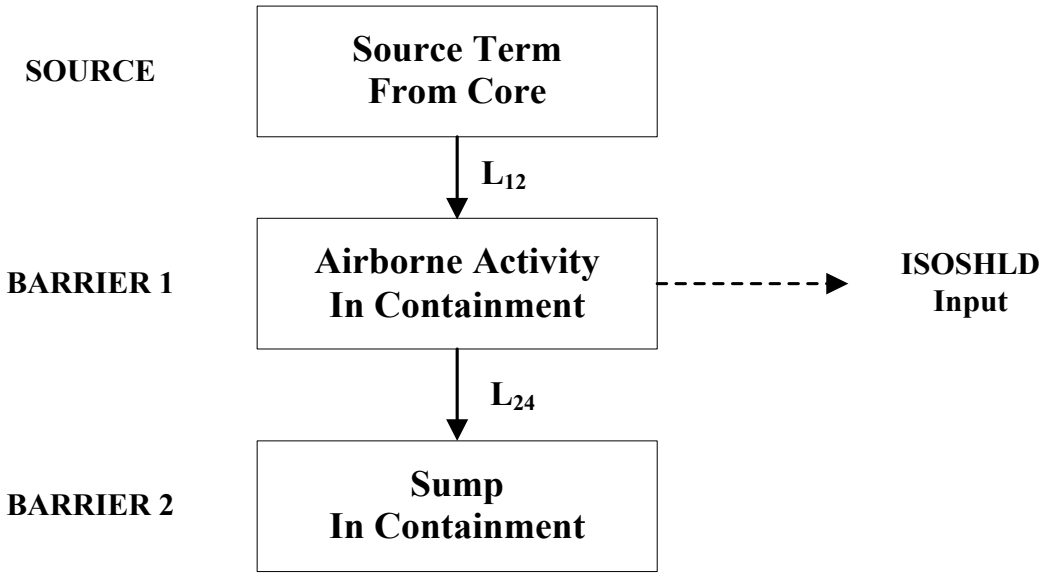


Figure B-8 RUNT-G Model for Direct Shine from Containment

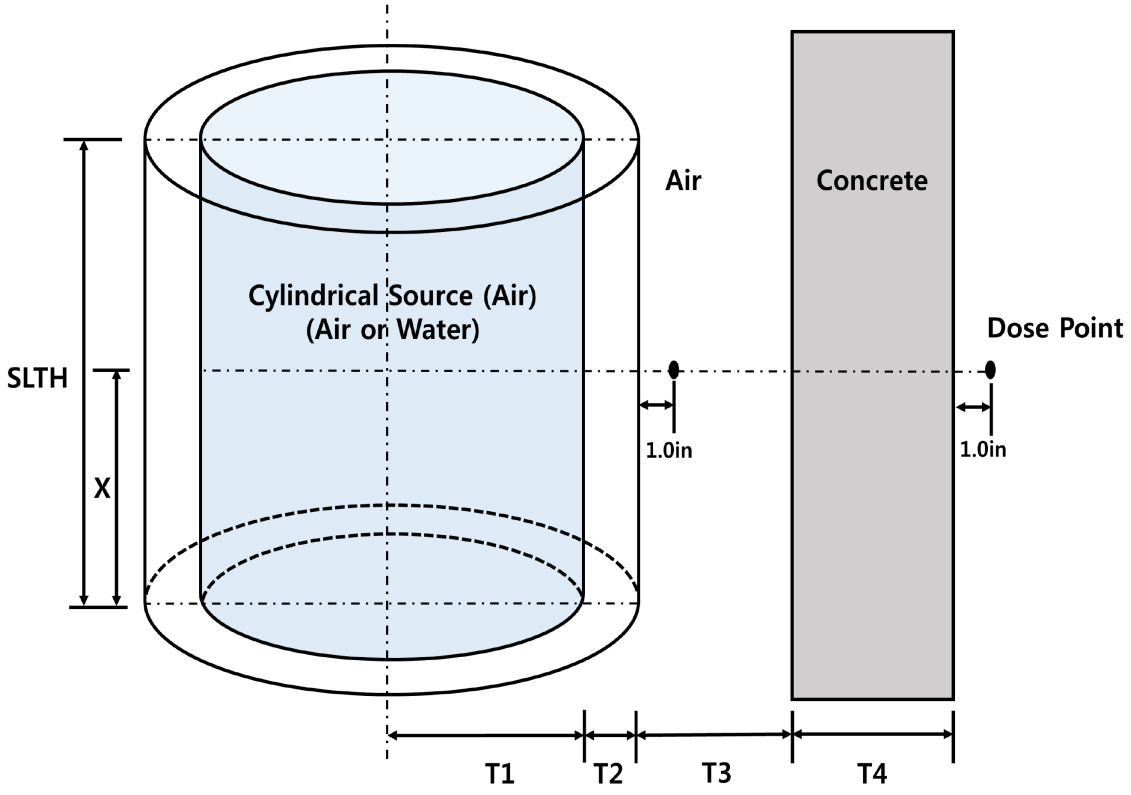


Figure B-9 ISOSHLD Model for Direct Shine from Containment or SI/SC/CS Piping

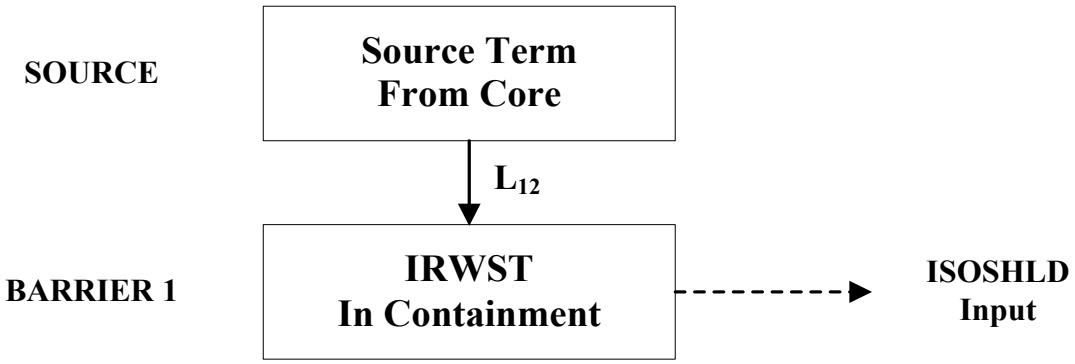


Figure B-10 RUNT-G Model for Direct Shine from ESF Components

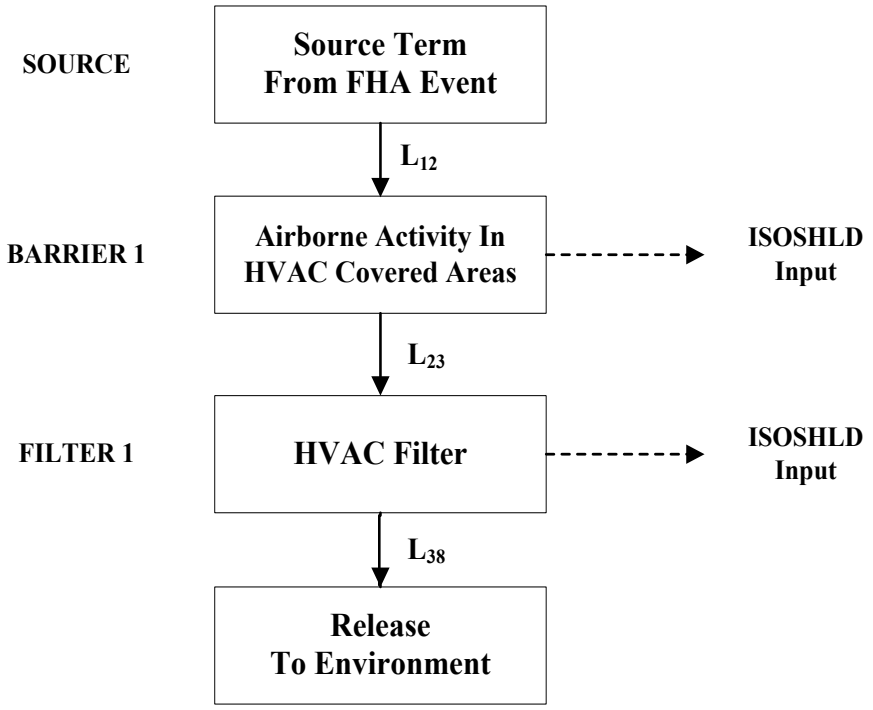


Figure B-11 RUNT-G Model for Fuel Assembly Leakage

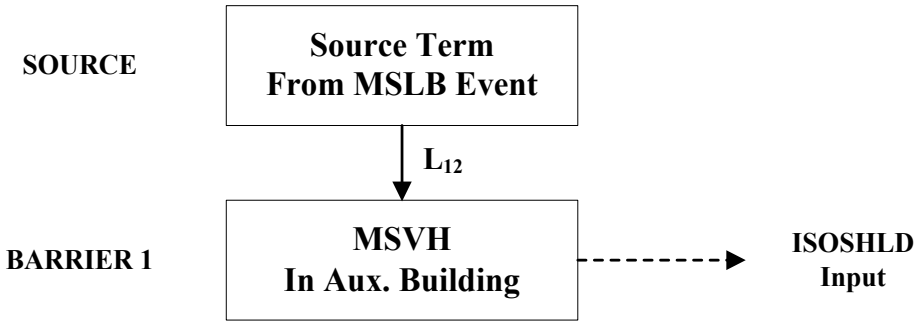


Figure B-12 RUNT-G Model for Radioactivity Release from MSLB Event