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U.S. Nuclear Regulatory Commission
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Subject: **GE-Hitachi Nuclear Energy – Changes to ESBWR Design Control Document (DCD) Tier 1 Sections**

The purpose of this letter is to identify changes to ESBWR DCD Tier 1 Sections that were submitted by letter dated September 28, 2007 (Reference 1). These changes are to address identified administrative issues that were subsequently found after the DCD Revision 4 submittal. These changes will be incorporated in the upcoming DCD Revision 5.

Enclosure 1 provides a summary of the changes to DCD Tier 1 Sections. Enclosure 2 provides the changes to the DCD Tier 1 Sections that will be incorportated in DCD Revision 5.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRR

1. Reference:

   MFN 07-514, Letter from James, C. Kinsey to U.S. Nuclear Regulatory Commission, GE-Hitachi Nuclear Energy – ESBWR Plant Design – Revision 4 to Design Control Document – Tier 1 and Tier 2

Enclosures:

1. Summary of Changes to DCD Tier 1 Sections
2. Changes to the DCD Tier 1 Sections

cc: AE Cubbage	USNRC (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
DH. Hinds,	GEH/Wilmington (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
eDRF	0000-0072-5896

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Enclosure 1

Summary of Changes to DCD Tier 1 Sections

Summary of Changes to DCD Tier 1

Item	Location	Description of Change
1.	T2.2.1-3	Add missing portion of Table 2.2.1-3.
2.	F2.2.1-1	Delete Figure 2.2.1-1. Figure is not referenced in the Design Description or the ITAAC.
3.	F2.2.3-1	Delete Figure 2.2.3-1. Figure is not referenced in the Design Description or the ITAAC.
4.	Table 2.2.5-3	Delete duplicate Table.
5.	Table 2.2.7-3	Delete word processing bracketed text.
6.	T2.2.12-2	Add missing portion of Table 2.2.12-2.
7.	S 2.2.13	Delete word processing bracketed text.
8.	S 2.2.14	Delete word processing bracketed text.
9.	T2.2.14-2	Delete the "SLC system initiation" Function.
10.	T2.4.1-3	Add missing ITAAC 25.
11.	F2.4.1-1.	Incorporate the appropriate Isolation Condenser System Schematic.
12.	T2.5.5-1	Add missing Design Commitment 6.
13.	S2.7.3	Add missing Item (3) a.
14.	S3.1	Separate Item 4 into Items 4, 5 and 6.

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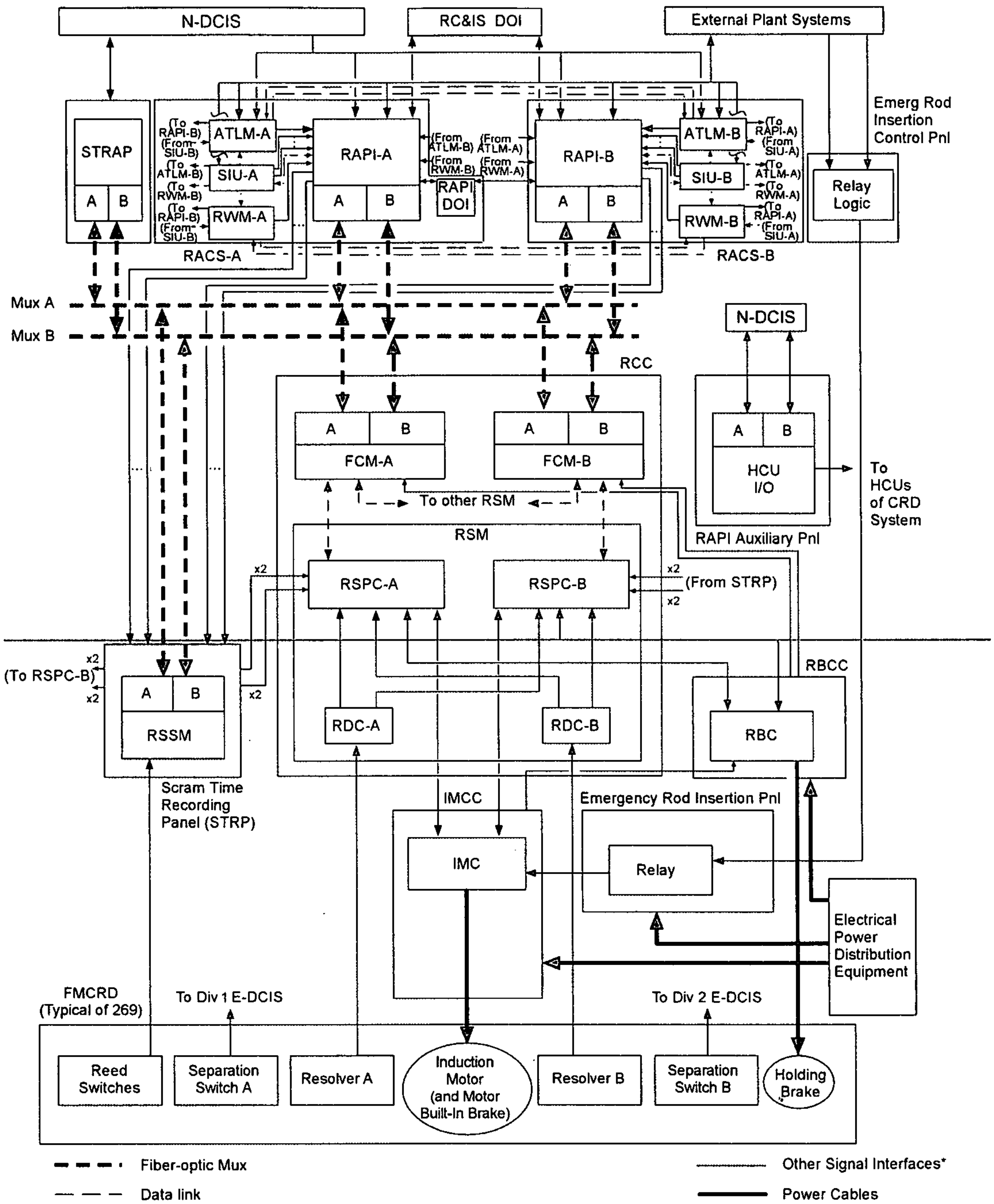
Enclosure 2

Changes to DCD Tier 1 Sections

Table 2.2.1-3 (Continued)

RC&IS Automatic Functions, Initiators, and Associated Interfacing Systems

Function	Initiator	Interfacing System
SCRRI	Generator load rejection signal.	TGCS
	FW temperature low.	FWCS
	Turbine trip signal.	TGCS
Send SCRRI signal to the DPS to initiate the Select Rod Insertion (SRI) function.	See SCRRI.	-
Rod separation detection rod block	Safety-related rod separation switches.	CRDS
Scram follow / ARI FMCRD motor run-in	See Table 2.2.7-2 for RPS scram initiating conditions and Table 2.2.14-2 for DPS scram initiating conditions.	RPS, DPS



* These signal interfaces may be hardwired connections and/or other signal communication links (as determined in the detailed design).

Figure 2.2.1-1. Rod Control and Information System Control Logic Block Diagram

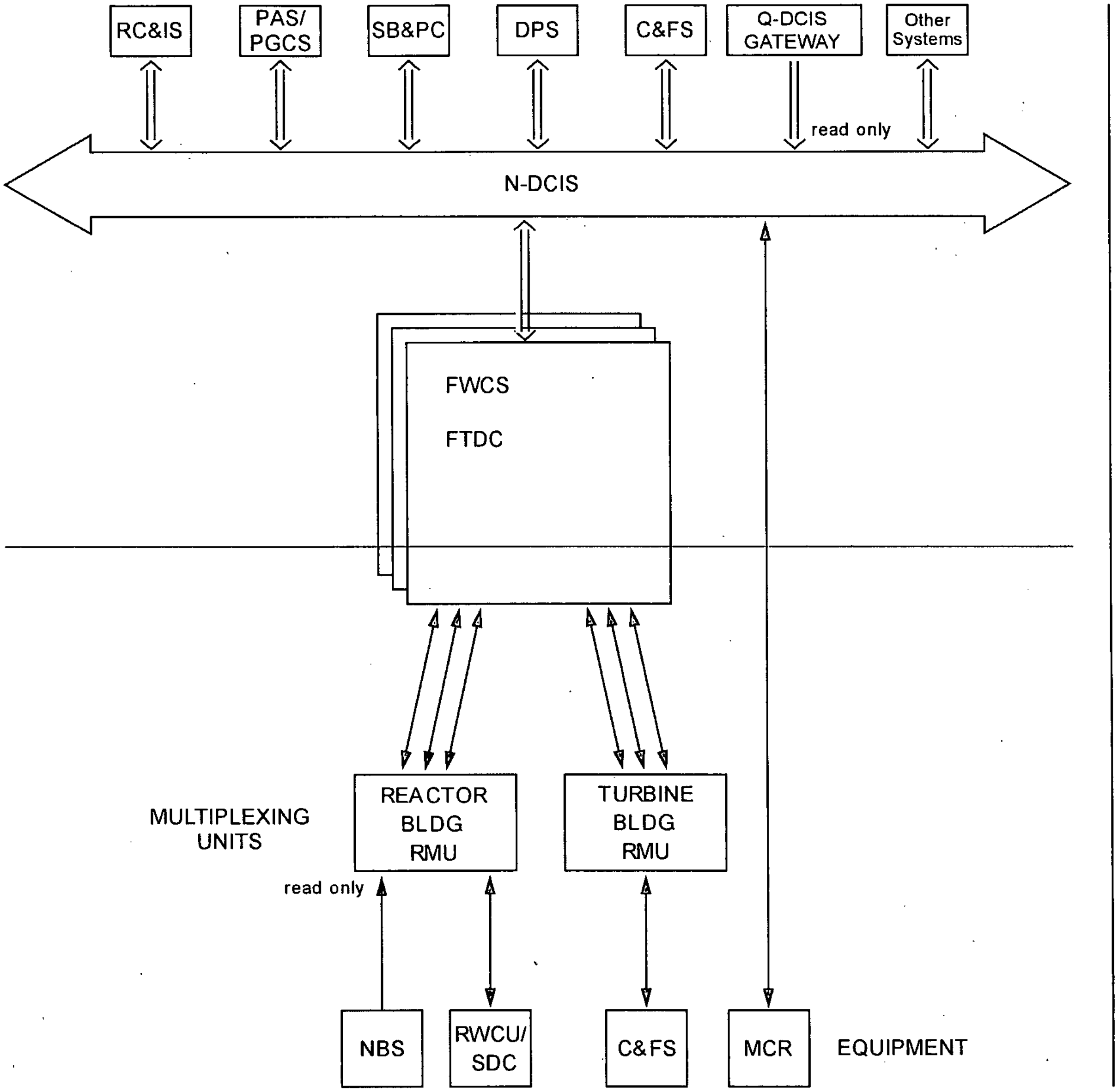


Figure 2.2.3-1. Feedwater Control System Logic Functional Diagram

~~Table 2.2.5-3~~

~~NMS Controls, Interlocks, and Bypasses~~

~~MCR Parameter~~	~~Description~~
~~Control~~	~~APRM Channel Bypass Control (one for each division) (hardware)~~
	~~SRNM Channel Bypass Controls (one for each bypass group) (hardware)~~
	~~MRBM Main Channel Bypass~~
	~~Coincident/Non-coincident switch~~
~~Interlock~~	~~APRM ATWS Permissive (for ADS inhibit)~~
	~~Reactor Mode Switch (RPS)~~
	~~SRNM ATWS Permissive (ATWS/SLC)~~
	~~APRM Signal (RC&IS)~~
	~~SRNM Control Rod Withdrawal Permissive (RC&IS)~~
	~~MRBM Rod Block~~
~~Bypass~~	~~MRBM Main Channel Bypass (one for each division)~~
	~~APRM Channel Bypass Control (one for each division)~~
	~~SRNM Channel Bypass Controls (one for each bypass group)~~

Table 2.2.7-3

RPS Controls, Interlocks (System Interfaces), and Bypasses

Parameter	Description
Control	Manual divisional trip switches
	Manual scram trip switches
	Reactor Mode Switch
	Divisional actuator trip manual switches
	RPS trip reset manual switches
	RPS scram test switch (to RC&IS)
Interlock (System Interface)	RPS full scram condition (to RC&IS, CRDS)
	Turbine bypass valves open position indication
	APRM Simulated Thermal Power (to NMS)
	Reactor Mode Switch positions: - RUN (to NMS, ICS, PAS, LD&IS) - STARTUP (to PAS, NMS) - SHUTDOWN (to CRDS) - REFUEL (to CRDS, PAS, NMS) ~~[DW381]~~
	Reactor Mode Switch in the SHUTDOWN position automatic bypass after a time delay
	Drywell pressure signal (to LD&IS)
	CRD charging header pressure signal (to RC&IS)
	Loss of Power Generation Bus (Loss of Feedwater Flow) signal (to ICS)
	MSIV closure bypass (to LD&IS)
Bypass	Special MSIV operational bypass switches
	Reactor Mode Switch in Shutdown scram manual bypass switches
	CRD HCU accumulator charging header pressure trip manual bypass switches (to RC&IS)
	MSIV closure trip signals manual bypass switches (to LD&IS)
	RPS TLU output manual divisional bypass switches
	Division of sensors channel inputs to each RPS division manual bypass switches

Table 2.2.12-2 (Continued)

LD&IS Isolation Function Monitored Variables

Monitored Variables	LD&IS Isolation Functions [(1)]									
	Main Steam & Drain Lines	RWCU/ SDC Lines	IC System Lines	Fission Products Sampling Lines	DW LCW Sump Drain Line	DW HCW Sump Drain Line	Containment Purge & Vent Valves	CWS Lines to DW Air Coolers	FAPCS Process Lines	R /B HVAC Exhaust Ducts
Main Condenser Vacuum Low	X	–	–	–	–	–	–	–	–	–
Turbine Area Ambient Temperature High	X	–	–	–	–	–	–	–	–	–
MSL Tunnel Ambient Temperature High	X	X	–	–	–	–	–	–	–	–
IC Pool Vent Radiation High	–	–	X	–	–	–	–	–	–	–
MSL Flow Rate High	X	–	–	–	–	–	–	–	–	–
Turbine Inlet Pressure Low	X	–	–	–	–	–	–	–	–	–
Reactor Water Level Low (Level 1, Level 2)	X	X	–	X	X	X	X	X	X	X

(1) "X" means isolation of Containment isolation valves or Reactor Building isolation dampers (as appropriate); "–" means Not Applicable.

2.2.13 Engineered Safety Features Safety System Logic and Control ~~[VJ458]~~

Design Description

The Safety System Logic and Control for the Engineered Safety Features systems (SSLC/ESF) addressed in this subsection performs the safety-related Emergency Core Cooling System (ECCS) control logic, the isolation logic for the control room habitability system (CRHS), and the safe shutdown function of the Isolation Condenser System (ICS).

Functional Arrangement

(1) The SSLC/ESF functional arrangement is described in Table 2.2.13-1.

Functional Requirements

(2) SSLC/ESF automatic functions, initiators, and associated interfacing systems are described in Table 2.2.13-2.

(3) SSLC/ESF controls, interlocks, and bypasses in the main control room (MCR) are described in Table 2.2.13-3.

(4) Conformance with IEEE Std. 603 requirements by the safety-related control system structures, systems, and components is addressed in Subsection 2.2.15.

(5) SSLC/ESF minimum inventory of alarms, displays, and status indications in the main control room (MCR) are addressed in Section 3.3.

(6) The equipment qualification of SSLC/ESF components described in Table 2.2.13-1 is addressed in Section 3.8.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.2.13-4 defines the inspections, tests, and/or analyses, together with associated acceptance criteria for the SSLC/ESF system.

2.2.14 Diverse Instrumentation and Controls

Design Description

The diverse instrumentation and control system (DICS) comprises the Anticipated Transients Without Scram Standby Liquid Control (ATWS/SLC) system and the diverse protection system (DPS).

Functional Arrangement

(1) DICS functional arrangement is defined in Table 2.2.14-1 and Figure 2.2.14-1.

Functional Requirements

(2) DICS automatic functions, initiators, and associated interfacing systems are defined in Table 2.2.14-2.

(3) DICS controls, interlocks and bypasses in the main control room (MCR) are defined in Table 2.2.14-3.

(4) DICS minimum inventory of alarms, displays, controls, and status indications in the main control room are addressed in Section 3.3.

(5) The equipment qualification of DICS components defined in Table 2.2.14-1 is addressed in Section 3.8.

(6) The containment isolation components that correspond to the isolation functions defined in Table 2.2.14-2 are addressed in Subsection 2.15.1. ~~{TCF510}~~

(7) Conformance with IEEE Std. 603 requirements by the safety-related control system structures, systems, and components defined in Table 2.2.14-1 is addressed in Subsection 2.2.15.

(8) Confirmatory analyses to support and validate the DPS design scope. ~~{SMK511}~~

(9) Failure Modes and Effects Analysis (FMEA) per NUREG/CR-6303 of safety-related protection system platforms (RPS and SSLC/ESF) completed to validate the DPS diverse protection function. ~~{SMK512}~~

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.2.14-4 defines the inspections, tests, and/or analyses, together with associated acceptance criteria for the DICS.

Table 2.2.14-2

DICS Functions, Initiators, and Interfacing Systems

Function	Initiator	Interfacing System
	Generator load rejection signal.	TGCS
	Loss of FW heating.	FWCS
	Turbine trip signal.	TGCS
	OPRM thermal neutron flux oscillation	NMS
	Manual SCRRI / SRI	-
Delayed FWRB (DPS)	SCRRI/SRI signal and power levels remain elevated	NMS,
DPS Scram (DPS)	RPV dome pressure high.	NBS
	RPV water level high (Level 8).	NBS
	RPV water level low (Level 3).	NBS
	Drywell pressure high.	CMS
	Suppression pool temperature high.	CMS
	MSIV closure	NBS
ADS initiation	RPV water level low (Level 1)	NBS
GDCS initiation	RPV water level low (Level 1)	NBS
ICS initiation (DPS)	RPV water level low (Level 2)	NBS
	RPV water level low (Level 1)	NBS
	MSIV closure	NBS
~~SLC system initiation~~	~~RPV water level low (Level 1)~~	~~NBS~~

Table 2.4.1-3

ITAAC For The Isolation Condenser System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
24. The Dryer/Separator Pool and Reactor Well provide sufficient makeup water volume to the IC/PCC expansion pool to support operation of the ICS and PCCS for the first 72 hours..	a) A valve-opening test will be performed using simulated low-level water signal from the IC/PCC expansion pool. b) An analysis will be performed to demonstrate the as-built Dryer/Separator Pool and Reactor Well provide sufficient makeup water volume to the IC/PCC expansion pool on a low water signal in the initial 72 hours of a LOCA.	a) Test report(s) document that the two-series, valves open on a simulated low-level water signal from the IC/PCC expansion pool. b). An analysis exists and demonstrates that the as-built Dryer/Separator Pool and Reactor Well provide sufficient makeup water volume to the IC/PCC expansion pool on a low water signal in the initial 72 hours of a LOCA.
25. The IC/PCC pools are safety-related and Seismic Category 1.	Inspections of the IC/PCC pools confirm that they are safety-related and Seismic Category I.	A design report of the IC/PCC pools confirm that they are safety-related and Seismic Category I.

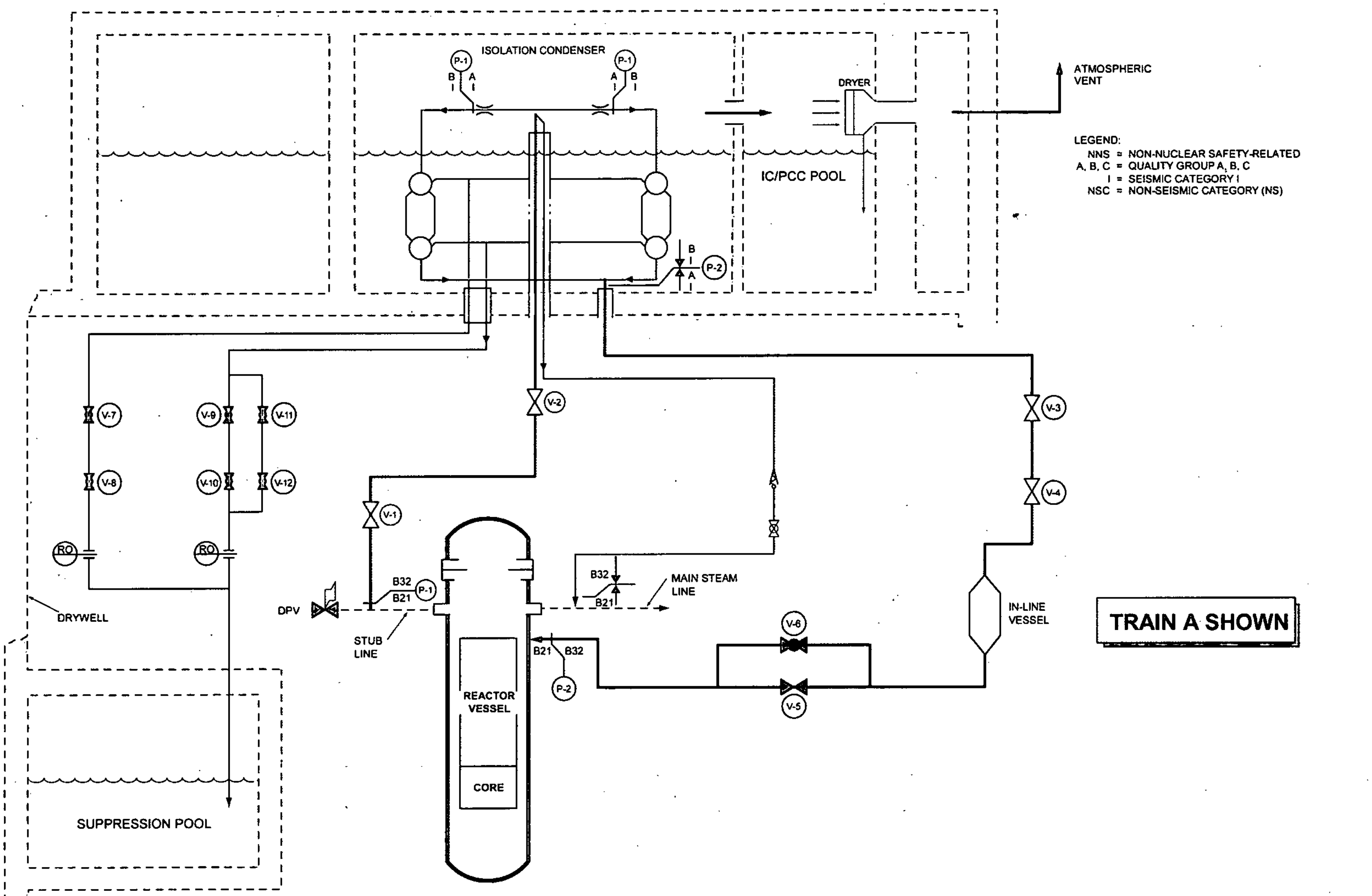


Figure 2.4.1-1 Isolation Condenser System Schematic

Table 2.5.5-1

ITAAC for Refueling Machine

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
4. The RB refueling machine is provided with controls interlocks	Test shall be performed with actual or simulated signals to demonstrate that the as-built interlocks function as required.	Report(s) document that the tests have been completed and results demonstrate that the as-built interlocks function as follows:a. Prevent hoisting a fuel assembly over the vessel with a control rod removed; b. Prevent collision with fuel pool walls or other structures; c. Limit travel of the fuel grapple; d. Interlock grapple hook engagement with hoist load and hoist up power; and e. Ensure correct sequencing of the transfer operation in the automatic or manual mode.
5. The functional arrangement of the FB fuel handling machine is as described in the Design Description of this Subsection 2.5.5.	Inspections and/or analyses of the as-built system will be performed.	Report(s) document that the as-built FB fuel handling machine conforms with the functional arrangement as described in the Design Description of the Subsection 2.5.5.
6. The FB fuel handling machine is classified as nonsafety-related, but is designed as seismic Category II.	Inspections and/or analyses of the as-built system will be performed.	Report(s) document that the as-built FB fuel handling machine can withstand seismic dynamic loads without loss of load carrying or structural integrity functions.

2.7.3 Local Control Panels And Racks

Design Description

Local Control Panels and Instrument Racks are provided as protective housings and/or support structures for electrical and electronic equipment to facilitate system operations at the local level. Because of the Reactor Protection System's fail-safe design, no potential sources of missiles or pipe breaks prevent modules from performing their safety-related reactor shutdown function.

(1) The functional arrangement of the Local Control Panels and Instrument Racks is as described in this Section 2.7.3.

(2) The safety-related Local Control Panels and Instrument Racks conform to seismic Category I requirements.

(3) a. Independence is provided between safety-related divisions.

b. Separation is provided between safety-related divisions, and between safety-related divisions and nonsafety-related equipment.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.7.3-1 provides a definition of the inspections, tests and/or analyses, together with associated acceptance criteria for the Local Control Panels and Instrument Racks.

3. NON-SYSTEM BASED MATERIAL

3.1 DESIGN OF PIPING SYSTEMS AND COMPONENTS

Design Description

Piping systems and their components are designed and constructed in accordance with their applicable design code requirements identified in the individual system design specifications. The piping systems have a design life of 60 years.

(1) Safety-related piping systems are designed to ASME Code Section III requirements.

(2) Safety-related piping systems are designed to Seismic Category I requirements.

(3) Systems, structures, and components, that are required to be functional during and following an SSE, shall be protected against or qualified to withstand the dynamic and environmental effects associated with postulated failures in Seismic Category I and nonsafety-related piping systems.

(4) ASME Code Class 1 piping systems are designed to remain within allowable stress limits and fatigue limits to prevent fatigue failure.

(5) ASME Code Class 2 and 3 piping systems are designed to remain within allowable stress limits, including those piping systems which may be subjected to thermal transients.

(6) On an individual system basis, the as-built piping shall be reconciled with the piping design requirements in Section 3.1.

Inspections, Tests, Analyses and Acceptance Criteria

Table 3.1-1 provides a definition of the inspections, test and/or analyses, together with associated acceptance criteria for the Piping Design. Similar ITAAC are included in the system-based ITAAC. As appropriate, each of the ITAAC in Section 3.1 may be closed on a system-by-system basis throughout construction, in order that systems may be placed in service.