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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application – Water Level Design/Essential Systems/Seismic Category 1 Structures – RAI Numbers 3.4-1 through 3.4-8, 3.6-21, 3.8-108 and 3.8-109**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

If you have any questions about the information provided here, please let me know.

Sincerely,

Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

Reference:

1. MFN 06-387, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application,* October 10, 2006

Enclosure:

1. MFN 06-454 – Response to Portion of NRC Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application – Water Level Design/Essential Systems/Seismic Category 1 Structures – RAI Numbers 3.4-1 through 3.4-8, 3.6-21, 3.8-108 and 3.8-109

cc:	AE Cubbage	USNRC (with enclosures)
	GB Stramback	GE/San Jose (with enclosures)
	eDRFs	0060-9907, 0060-8446

ENCLOSURE 1

MFN 06-454

Response to Portion of NRC Request for

Additional Information Letter No. 75

Related to ESBWR Design Certification Application

Water Level Design/Essential Systems/
Seismic Category 1 Structures

RAI Numbers 3.4-1 through 3.4-8, 3.6-21, 3.8-108 and 3.8-109

NRC RAI 3.4-1

DCD Tier 2, Revision 1, Section 3.4.1.4 states that the control building and reactor building are provided with watertight doors at the access from the electric building tunnel. DCD Tier 2, Revision 1, Figure 1.2-3 indicates that this tunnel is Seismic Category II, and therefore not necessarily constructed to withstand ground water and external flood conditions based on the description of flood protected structures described in DCD Tier 2, Revision 1, Section 3.4.

Describe the flood conditions that may develop in the below-grade Nuclear Island access tunnel during design basis external flood and groundwater conditions and how the features that protect the reactor and control buildings from flooding in the tunnel (watertight doors) conform to the guidance of Regulatory Guide 1.102, Revision 1, September 1976.

GE Response

Water stops in all construction joints and a waterproof coating are provided in the access tunnel. Additionally, the access tunnel wall thickness is designed to withstand the ground-water effects (see DCD Tier 2 Subsection 3.7.3.13).

DCD Impact

DCD Tier 2 Subsection 3.4.1.4.3 will be revised in the next update as noted in the attached markup.

NRC RAI 3.4-2

DCD Tier 2, Revision 1, Section 3.4.1.4 describes that several systems identified as non-seismic in DCD Tier 2, Revision 1, Table 3.2-1 are "seismically analyzed" or "seismically qualified." Seismic Category I systems are assumed to develop only leakage cracks rather than the larger pipe breaks to which non-seismic piping is subject for flood protection analysis.

Describe the methodology and acceptance criteria applied in the designation of non-seismic piping segments (as specified in DCD Tier 2, Revision 1, Table 3.2-1) as "seismically analyzed" or "seismically qualified" for purposes of limiting postulated breaks in moderate energy piping systems to leakage cracks for flood protection analyses.

GE Response

Moderate energy systems (mechanical modules including piping and valves) are classified as Seismic Category II when located inside Seismic Category I buildings; therefore, only leakage cracks are considered for these systems in the flooding evaluations.

As stated in DCD Tier 2 Section 3.7, 4th paragraph, "The methods of seismic analysis and design acceptance criteria for C-II SSC are the same as C-I".

When DCD Tier 2 Section 3.4 references "seismically analyzed" or "seismically qualified", the above criteria is implied.

DCD Impact

DCD Tier 2 Table 3.2-1 was revised in DCD Tier 2 Revision 2, as noted in the attached DCD Revision 2 Pages 3.2-10 and 3.2-22.

DCD Tier 2 Table 3.2-1 Pages 3.2-23 and 3.2-24 will be revised in the next update as noted in the attached markup.

NRC RAI 3.4-3

DCD Tier 2, Revision 1, Section 3.4.1.1 states that the floor drain piping system limits water accumulation in compartments with possible flooding. However, DCD Tier 2, Revision 1, Table 3.2-1 indicates that the drain piping performing this function is non-seismic.

Describe how non-seismic drain piping is verified to be adequately sized and constructed to drain water at the necessary rate to maintain water accumulation below the assumed levels following seismically induced failure of moderate-energy piping. In particular, describe how the necessary minimum flow area of the pipe is assured.

GE Response

The Equipment and Floor Drain System (EFDS) is not considered in the flooding evaluation for flooding mitigation.

DCD Impact

DCD Tier 2 Subsections 3.4.1.1 and 3.4.1.4 were revised in DCD Tier 2 Revision 2 as noted in the attached DCD Tier 2 Revision 2 pages 3.4-2 and 3.4-4.

DCD Tier 2 Table 3.2-1, page 3.2-31 will be revised in the next update as noted in the attached markup.

NRC RAI 3.4-4

DCD Tier 2, Revision 1, Section 3.4.1.1 states that the floor drain piping system limits water accumulation in compartments with possible flooding. However, the method of establishing this capability was not specified.

Explain the methodology used to determine the bounding internal flood conditions for the reactor building and control building evaluations (i.e., maximum flood rate (transient) analysis vs. maximum flood volume (static) analysis).

GE Response

The Equipment and Floor Drain System (EFDS) is not considered in the flooding evaluation for flooding mitigation. Therefore, no additional methodology other than the one described in DCD Tier 2 Section 3.4.1.4 has been used.

DCD Impact

DCD Tier 2 Subsections 3.4.1.1 and 3.4.1.4 were revised in DCD Tier 2 Revision 2 as noted in the attached DCD Tier 2 Revision 2 pages 3.4-2 and 3.4-4.

No DCD change will be made in response to this RAI.

NRC RAI 3.4-5

DCD Tier 2, Revision 1, Section 3.4.1.3 states that floors are assumed to prevent water seepage to lower levels.

Provide information regarding how this stated assumption in DCD Tier 2, Revision 1, Section 3.4.1.3 will be verified, such as through inspections of the floor penetrations.

GE Response

Structural barriers are provided to preclude floods through floor penetrations with curbs at least 200 mm (8 in) high as stated in DCD Tier 2 Subsection 3.4.1.1, 3rd paragraph. These curbs will prevent water from draining directly to the lower floor. Furthermore, stair openings limit individual room flooding. Therefore, it is not necessary to provide for special inspections to justify the assumption that floors prevent water seepage to lower levels.

DCD Impact

No DCD change will be made in response to this RAI.

NRC RAI 3.4-6

In the refueling mode of operation with the reactor vessel head de-tensioned, the isolation condenser is unavailable and DCD Tier 2, Revision 1, Section 5.4.8 describes that decay heat is removed through the reactor water cleanup system in the shutdown cooling mode of operation.

Consistent with the guidelines of Regulatory Guide 1.59, Revision 2, August 1977, with July 30, 1980 Errata correction, describe how the capability to maintain safe shutdown is assured during flooding conditions when the plant is initially in the refueling mode of operation with the reactor vessel head fully de-tensioned or removed.

GE Response

RWCU/SDC system and components are located inside the reactor building and as such are protected from external flooding.

DCD Impact

No DCD change will be made in response to this RAI.

NRC RAI 3.4-7

DCD Tier 2, Revision 1, Section 9.1.3 describes that the isolation condenser pools require makeup after 72 hours for continued decay heat removal.

Since some flooding conditions have restricted access to sites for more than 72 hours, describe how long term makeup to the isolation condenser and spent fuel pool will be provided with flood protected equipment considering that the flood may preclude access to the site for more than 72 hours.

GE Response

The Fuel and Auxiliary Pools Cooling System (FAPCS) post-accident fill-up connections and the hand-operated valves that connect to the Fire Protection System are located above ground outside of the Reactor and Fuel Buildings. The maximum flood level is below the finished ground level. Therefore, flood events cannot preclude access to these valves.

DCD Impact

DCD Tier 2 Figure 9.1-1 was revised in DCD Tier 2 Revision 2 as noted in the attached DCD Revision 2 Figure 9.1-1.

No DCD change will be made in response to this RAI.

NRC RAI 3.4-8

DCD Tier 2, Revision 1, Section 3.4 describes flood protection for certain systems and components, such as the control rod drive hydraulic control units and the Distributed Control and Information System. However, the complete scope of systems and components that must be protected from internal flooding is not identified.

Identify the systems and components that are essential for safe shutdown from each potential mode of operation for flooding events.

GE Response

Systems, structures and components are listed in DCD Tier 2 Table 3.2-1. The systems, structures, and components that are essential for safe shutdown from each potential mode of operation are classified as Seismic Category I and are safety-related.

The ESBWR design allows all water from any flooding source to flow to the building lower elevation, by means of stair towers and elevator shafts. Therefore, the flooding can only affect safety-related components located at the building's lowest elevation: the Distributed Control and Information System (DCIS) rooms in the Control Building and the Hydraulic Control Units (HCU) in the Reactor Building. In both cases, the maximum flood level is below the safety-related room's floor elevation. According to DCD Tier 2 Subsections 3.4.1.4.1 and 3.4.1.4.2, no safety-related components are located at the lowest elevations of other buildings.

DCD Impact

No DCD change will be made in response to this RAI.

NRC RAI 3.6-21

DCD Tier 2, Revision 1, Table 3.6-2 lists safety-related systems, components, and equipment for mitigation of postulated pipe failures outside containment. However, the list appears to be incomplete in that the control rod drive hydraulic system and control units were not included, yet they would likely be used to perform the reactivity control and reactor coolant inventory makeup essential functions.

To ensure the lists in DCD Tier 2, Revision 1, Tables 3.6-1 and 3.6-2 are complete, define the essential systems to achieve safe shutdown and the essential function each system is intended to perform for postulated pipe breaks inside and outside of containment, respectively.

GE Response

Table 3.6-2 will be corrected to add the Control Rod Drive System as shown in the attached markup. As in Table 3.6-1 the CRD System function in Table 3.6-2 is limited to the safety related scram/rod insertion function. The high pressure makeup function for reactor coolant inventory makeup is not listed because this is not a safety related function for the CRD System.

Additionally, Tables 3.6-1 and 3.6-2 are revised as shown in the attached markups to add the Standby Liquid Control System. The ESBWR SLCS is classified as an emergency core cooling system to provide reactor coolant inventory makeup for mitigating the consequences of a LOCA. As such, it needs to be identified in these tables.

DCD Impact

DCD Tier 2, Table 3.6-1 and Table 3.6-2 will be revised as noted in the attached markup.

NRC RAI 3.8-108

Reference is made to ASME Section XI, IWE-2410 and Table IWE-2500-1 in DCD, Tier 2, Revision 1, Section 3.8.1.7.3.4. Reference is made to ASME Section XI, IWE-2300 in DCD, Tier 2, Revision 1, Section 3.8.1.7.3.6. These appear to be editorial errors. Please replace IWE with IWL or explain why IWE is correct.

GE Response

Agreed.

DCD Impact

DCD Tier 2 Subsections 3.8.1.7.3.4 and 3.8.1.7.3.6 will be revised in the next update as noted in the attached markup.

NRC RAI 3.8-109

Special construction techniques, including modular construction, are reviewed by the staff as described in Standard Review Plan (SRP) Sections 3.8.1 thru 3.8.5, Draft Revision 2, April 1996. Revise the DCD to describe modular construction to be used in constructing the ESBWR.

GE Response

Please refer to the markup of DCD Tier 2 Subsection 3.8.4.6.5 included with the response to NRC RAI 3.8-76 transmitted under MFN 06-407.

DCD Impact

No DCD change will be made in response to this RAI.

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
C12 Control Rod Drive System (CRD)						
1. CRD primary pressure boundary	1	CV	A	B	I	
2. CRD internals	3	CV	—	B	I	
3. Hydraulic control unit	2	RB	—	B	I	(8)
4. Piping including supports – insert line	2	CV, RB	B	B	I	
5. High pressure makeup piping including supports, the check valve, and the injection valve at the connection to RWCU/SDC	2	RB	B	B	I	CRD piping classification is consistent with piping to which it connects.
6. Piping and valves with no safety-related function (pump suction, pump discharge, drive header, and other piping not part of hydraulic control unit)	N	RB	D	E	II	(7)
7. CRD water pumps	N	RB	D	E	II	
8. Fine motion drive motor	N	CV	—	E	II	
9. Electrical modules and cable with safety-related function	3	CV, RB, CB	—	B	I	
10. ATWS equipment associated with the Alternate Rod Insert (ARI) functions	N	RB	—	E	II	**Anticipated Transients Without Scram (ATWS) Equipment** — A quality assurance program that meets or exceeds the guidance of NRC Generic Letter 85-06 is applied to all nonsafety-related ATWS equipment.
C21 Leak Detection and Isolation System (LD&IS)						
1. Electrical modules (temperature sensors, pressure transmitters, etc.) and cable with safety-related function	3	CV, RB, CB	—	B	I	
2. Other electrical modules and cable with	N	CV, RB,	—	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]		Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
N61	**Main Condenser and Auxiliaries**	N	TB	—	E	NS	The main condenser is nonsafety-related, non-seismic design, but the condenser anchorage is seismically analyzed for SSE. Also see Figure 3.2-1.
N71	**Circulating Water System (CIRC)**	N	TB, OO	D	E	NS	
P	**STATION AUXILIARY SYSTEMS**						
P10	**Makeup Water System (MWS)**						
1.	Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2.	Piping and valves inside containment or inside Reactor Building	N	CV, RB	D	E	II	
3.	Other mechanical and electrical modules	N	OO, RW, RB, CB, SF	D	E	NS	
P21	**Reactor Component Cooling Water System (RCCWS)**	N	TB, RB	D	E	NS	
P22	**Turbine Component Cooling Water System (TCCWS)**	N	TB	D	E	NS	
P25	**Chilled Water System (CWS)**						
1.	Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2.	Piping and valves inside containment	N	CV	D	E	II	
3.	Other mechanical and electrical modules	N	TB, RB, CB, FB, EB, RW	D	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
P STATION AUXILIARY SYSTEMS						
P10 Makeup Water System (MWS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Piping and valves inside containment or inside Reactor Building	N	CV, RB	D	E	II	
3. Other mechanical and electrical modules	N	OO, RW, RB, CB, SF	D	E	NS	
P21 Reactor Component Cooling Water System (RCCWS)						
1. Piping and valves inside Reactor Building	N	RB	D	E	II	
2. Other mechanical and electrical modules	N	TB, RB	D	E	NS	
P22 Turbine Component Cooling Water System (TCCWS)	N	TB	D	E	NS	
P25 Chilled Water System (CWS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Piping and valves inside containment and Reactor Building	N	CV, RB	D	E	II	
3. Other mechanical and electrical modules	N	TB, RB, CB, FB, EB, RW	D	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]	Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
P30 Condensate Storage and Transfer System (CS&TS)						Mechanical modules, including piping and valves, located in Seismic Category I buildings (RB, CB, FB) are designed to Seismic Category II.
1. Mechanical modules, including piping, valves, and condensate storage tank	N	OO, RB, RW, TB	D	E	NS	
2. Electrical modules and cable	N	RB	—	E	NS	
P32 Oxygen Injection System (OIS)	N	TB	—	E	NS	
P33 Process Sampling System (PSS)	N	RB, OO, TB, RW	D	E	NS	(7)
P41 Plant Service Water System (PSWS)						
1. Mechanical and electrical modules, including piping and valves (including supports)	N	SF, OO, RB	D	E	NS	
P51 Service Air System (SAS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Other system components	N	ALL	D	E	NS	
P52 Instrument Air System (IAS)	N	ALL	D	E	NS	
P54 High Pressure Nitrogen Supply System (HPNSS)						
1. Piping and valves (including supports) forming part of the containment boundary	2	CV, RB	B	B	I	
2. Other nonsafety-related mechanical modules	N	RB	D	E	NS	

Table 3.2-1

Classification Summary

Principal Components[1]		Safety Class.[2]	Location[3]	Quality Group[4]	QA Req.[5]	Seismic Category[6]	Notes
7.	Motors for seismic category I pumps	N	OO,RB	—	E	I	Same as above.
8.	Other pumps and motors	N	OO	D	E	NS	Same as above.
9.	Electrical modules and cables for RB preaction sprinklers	N	RB	—	E	NS	Same as above.
10.	All other electrical modules and cables	N	ALL	—	E	NS	Same as above.
11.	CO_2 actuation modules	N	TB	—	E	NS	Same as above.
12.	Sprinklers	N	RB, TB, RW, SB, EB, OL	D	E	NS	Same as above.
13.	Foam, preaction or deluge	N	EB, TB, OO	—	E	NS	Same as above.
U44	**Sanitary Waste Discharge System**	N	CB, SB, EB, RB, OO	—	E	NS	
U50	**Equipment and Floor Drain System**						
1.	Piping and valves forming part of the containment boundary	2	CV, RB	B	B	I	
2.	Drain piping and valves in Seismic Category I buildings	N	RB, FB	D	E	II	
3.	Drain piping and valves including supports in other buildings	N	ALL except RB, FB	D	E	NS	
4.	Other mechanical and electrical modules	N	ALL	—	E	NS	
U65	**Other Building Structures**						
1.	Emergency Breathing Air System building	3	OO	—	B	I	
2.	All other U65 buildings	N	OO, OL	—	E	NS	

provided for the postulated flood and groundwater levels and conditions described in Section 2.4 and Table 3.4-1.

The Seismic Category I structures that house safety-related systems and equipment and that offer flood protection are described in Section 3.8. All exterior access openings are above flood level and exterior penetrations below design flood and groundwater levels are appropriately sealed.

The internal flood analysis evaluated whether a single pipe failure, a fire fighting event or other flooding source, as described in Subsection 3.4.1.4, could prevent safe reactor shutdown. In all cases system components are located above the flood level or are capable of operating flooded. Appropriate means are provided to prevent flooding compartments that house redundant system trains or divisions. Some of the mechanisms used to minimize flooding are structural barriers or compartments; curbs and elevated thresholds, at least 200 mm (8 in) high; and a leak detection system. See Subsection 3.4.1.3 for further discussion.

3.4.1.2 Flood Protection From External Sources

Safety-related systems and components are protected from exterior sources (e.g., floods, groundwater) because they are located above design flood level or because they are enclosed in groundwater protected concrete structures.

The Seismic Category I structures that may be subjected to the design basis flood are designed to withstand the flood level and groundwater level stated in Section 2.4. This is done by locating the plant grade elevation 0.3 m (1 ft.) above the flood level and by incorporating structural provisions into the plant design to protect the structures, systems and components from the postulated flood and groundwater conditions.

This approach provides:

- Wall thicknesses below flood level designed to withstand hydrostatic loads because the permanent dewatering system is non-safety related.
- Water stops provided in all expansion and construction joints below flood and groundwater levels.
- Waterproof coating of below flood and groundwater levels external surfaces.
- Water seals at pipe penetrations below flood and groundwater levels.
- Roofs designed to prevent pooling of large amounts of water in accordance with Regulatory Guide 1.102.

The flood protection measures that are described above are not only for external natural floods but also guard against flooding from on-site storage tank rupture. Such tanks are designed and constructed to minimize the risk of catastrophic failure and are located to allow drainage without damage to site facilities.

The typically relatively long time available as a flood condition develops allows ample time to take appropriate measures to assure all facility flood protection measures are in place. Because plant grade is above design flood level the Seismic Category I structures remain accessible during postulated flood events (See Table 3.4-1).

3.4.1.4 Evaluation of Internal Flooding

Leakage from pipe breaks and cracks, fire hose discharges and other flooding sources are collected by the floor drainage system, stair towers and elevator shafts and discharged to appropriate sumps. The flood level is evaluated taking into consideration the flow paths described above.

The RB and CB drain collection system and sumps are designed and separated so that drainage from a flooded compartment containing equipment for a train or division does not flow to compartments containing equipment for another system train or division. Zones that are isolated by watertight doors provide physical separation. The location of the zones prevents two redundant trains from being affected by the flooding at the same time.

The following flooding sources are considered in the analysis:

- High energy piping breaks and cracks
- Moderate energy piping, through-wall cracks
- Pump mechanical seal failures
- Storage tank ruptures
- Actuation of the FPS
- Flow from upper elevations and nearby areas

Through-wall cracks are considered in seismically supported, moderate energy piping as well as breaks and through-wall cracks in non-seismically supported moderate energy piping in the flooding analysis.

The analysis is performed based on the criteria and assumptions provided in Section 3.6 and ANS-56.11. Section 3.6 provides the criteria used to define break and crack locations and configurations for high and moderate-energy piping failures. Additional design criteria pertaining to the internal flooding analysis are provided in this section.

No breaks are assumed for piping with nominal diameters of 1 inch or less. For flooding analysis, in case of storage tank rupture, it is assumed that the entire tank inventory is drained.

Safety-Related equipment and equipment necessary for safe shutdown is located above the maximum flood height or is qualified for flood conditions. Accordingly, flooding due to moderate energy pipe failure or fire fighting or other flooding sources does not affect any safety-related equipment and the ability to safely shut down the plant.

3.4.1.4.1 Control Building

There are no tanks or high-energy piping in the CB and the more relevant moderate-energy fluid system piping, i.e. Fire Protection System (FPS) and Chilled Water System (CWS), is seismically qualified. The main source of floodwater is from the fire protection standpipe hose stations. A nominal volume of 57 m^3 (15,000 gal) is provided for the FPS considering two 7.9 l/s (125 gpm) fire hoses are in service for one (1) hour. This results in a flooding elevation in the lowest floor of the CB of 40 cm (16 in) in the corridors, stair towers and elevator rooms, assuming that the water propagates into these rooms by flowing through embedded drains and under the doors. This maximum water depth is below the DCIS room floor elevation.

access door. In addition, for further protection, the access doors to the RB and CB are watertight.

3.4.2 Analysis Procedures

In accordance with SRP 3.4.2, the following paragraphs describe the design of seismic Category I structures to withstand the effects of the external flood or highest groundwater specified for the plant. The design parameters of the flood or highest groundwater are considered in defining the input parameters for the structural design criteria appropriate to account for flood and groundwater loadings. Since the ESBWR plant is located at sites where the flood level is less than the finished ground level around the structures, the dynamic phenomena associated with such a flooding as currents, wind waves, and their hydrodynamic effects, is not considered. The bases for these parameters are discussed in Subsection 2.4.2. The procedures that are utilized to transform the static and dynamic effects of the flood and highest groundwater into effective loads applied to seismic Category I structures are discussed in this subsection.

The design of ESBWR structures complies with the relevant requirements of GDC 2 concerning natural phenomena. The envelope of site parameters used in the design of Seismic Category I structures meets the following characteristics:

(1) The flood or highest groundwater and dynamic effects, if any, used in the design are the most severe that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

(2) The flood or highest ground water level for the plant is 160 mm below the finished ground level as shown in Table 3.4-1.

(3) The flood level of the plant is 160 mm below the finished ground level and only the hydrostatic effects need to be considered. The hydrostatic head associated with the flood or with the highest groundwater level is considered as a structural load on the basemat and basement walls. Uplift or floating of the structure is considered and the total buoyancy force is based on the flood or highest groundwater head excluding wave action. However, the lateral, overturning and upward hydrostatic pressures acting on the side walls and on the foundation slab, respectively, are considered in the structural design of these elements and are based on total head.

Because the design flood elevation is below the finished ground level (Table 3.4-1), there are no dynamic forces due to flood. The lateral hydrostatic pressures on the structures due to the design flood level, as well as ground water and soil pressure, are factored into the structural design in accordance with SRP 3.4.2.

3.4.3 References

None.

Table 3.6-1

Safety-Related Systems, Components, and Equipment for Postulated Pipe Failures Inside Containment

1. Reactor Coolant Pressure Boundary (up to and including the outboard isolation valves)
2. Containment Isolation System and Containment Boundary (including liner plate)
3. Reactor Protection System (SCRAM signals)
4. Control Rod Drive System (scram/rod insertion)
5. Flow restrictors (passive)
6. Passive Containment Cooling System
7. Gravity-Driven Cooling System (including Fuel and Auxiliary Pools Cooling System interconnecting lines)
8. Isolation Condenser System
9. Standby Liquid Control System

910. The following equipment/systems or portions thereof required to assure the proper operation of those safety-related items listed in items 1 through 89.

   (a) Class 1E electrical systems

   (b) Instrumentation

   (c) Process Sampling System

Table 3.6-2

Safety-Related Systems, Components, and Equipment for Postulated Pipe Failures Outside Containment

1. Containment Isolation System and Containment Boundary (including liner plate)
2. Reactor Protection System (SCRAM signals)
3. Control Rod Drive System (scram/rod insertion)

~~3~~4. Flow restrictors

~~4~~5. Isolation Condenser System and Passive Containment Cooling System (Fuel and Auxiliary Pools Cooling System make-up lines included)

6 Standby Liquid Control System

~~5~~7 The following equipment/systems or portions thereof required to assure the proper operation of those safety-related items listed in items 1 through ~~4~~6, and GDCS function.

(a) Class 1E Power Supply Systems (DC, Uninterruptible AC)

(b) Instrumentation

(c) Process Sampling System

3.8.1.7.3.3 Preservice Examination

The preservice examinations shall be performed prior to plant startup but after the Structural Integrity Pressure Test. Visual examinations shall be performed after the application of any required protective coatings. The preservice examinations shall include those examinations listed in ASME Section XI, Table IWE-2500-1, IWL-2510 and Table IWL-2500-1.

3.8.1.7.3.4 Inservice Inspection Schedule

The inservice inspection interval for Class MC components and metallic shell and penetration liners of Class CC components and their supports shall conform to Inspection Program B as described in ASME Section XI, IWE-2412. Except where deferral is permitted by ASME Section XI, IWE-2500-1, the percentages of examinations completed within each period of the interval shall correspond to Table IWE-2412-1. The diaphragm floor and vent wall will receive a visual, VT-3, examination once during each inspection interval.

The inservice inspection of Class CC reinforced concrete shall be performed at 1, 3, and 5 years after the completion of the Structural Integrity Pressure Test and every 5 years thereafter in accordance with ASME Section XI, IWL-2410 and Table IWL-2500-1.

3.8.1.7.3.5 Pressure Tests

The pressure testing (leakage testing) of the Containment Structure shall be conducted in accordance with 10 CFR 50, Appendix J. In addition, the leakage test requirements of ASME Section XI, IWE-5000 and IWL-5000 shall apply following repair/replacement activities as defined by the ASME Code.

3.8.1.7.3.6 Qualification of Examination Personnel

Personnel performing preservice and inservice examinations of the containment system shall be qualified in accordance with the applicable requirements of the ASME Section XI. Personnel performing visual examination types VT-1 and VT-3 in accordance with 3.8.1.7.3.7 and ultrasonic examination shall be qualified in accordance with Section XI, IWA-2300. Personnel performing detailed visual examination and general visual examination of concrete shall be qualified in accordance with IWA-2300 to perform examinations as described in IWL-2300.

3.8.1.7.3.7 Visual Examination Methodology

Visual examination types VT-1 and VT-3 shall be conducted in accordance with ASME Section XI, IWA-2210. When performing examinations remotely, the requirements of Table IWA-2210-1 may be modified in order to extend maximum specified direct examination distance and decrease the minimum illumination, provided that the conditions or indications for which the examination is being conducted can be detected at the chosen distance and illumination.

3.8.1.7.3.8 Visual Examination of Surfaces

The type VT-1 examination shall be used to conduct the detailed examination required for visible containment surfaces requiring augmented examination in accordance with ASME Section XI, Table IWE-2500-1, Examination Category E-C, Item E4.11. The type VT-3 examination shall be used to conduct the general visual examinations required for wetted surfaces of submerged areas and accessible surfaces of BWR ventilation systems as required by Table IWE-2500-1,

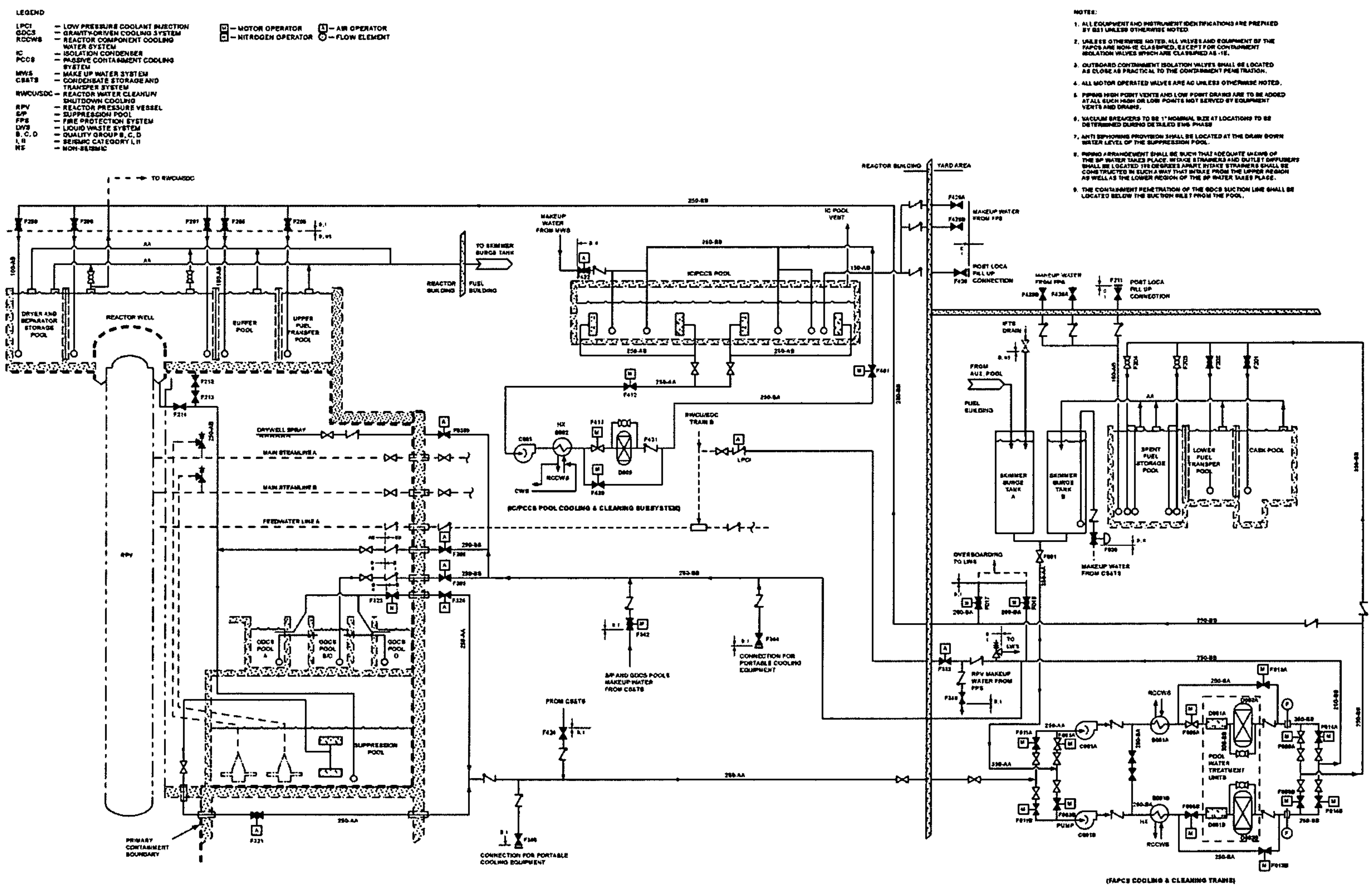

Figure 9.1-1. FAPCS Schematic Diagram