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RIVER BEND STATION PRE-SUBMITTAL MEETING

Proposed License Amendment Request

Incorporate Tornado Missile Risk Evaluator (TMRE) into the River Bend Licensing Basis

December 17, 2019

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INTRODUCTION AND AGENDA

Brian Jones - Licensing Engineer River Bend Station

Introductions

Brian Jones – RBS Licensing Engineer

Titus Folds – RBS Licensing Specialist

Rob Barrios – RBS Civil Engineering Supervisor

Andrew Toups – RBS Civil Engineer

Ray Dremel – Enercon Principal Engineer

Agenda

- Discuss the original RBS licensing basis and actions taken in response to RIS 2015-06.
- Discuss River Bend Station's overall plan to incorporate TMRE into the current RBS Licensing Basis.
- Discuss the License Amendment Request and the changes to the RBS USAR.
- Seek feedback from the NRC staff before making the submittal.

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BACKGROUND

Brian Jones - Licensing Engineer River Bend Station

Licensing Basis

RBS USAR Table 1.8-1 – Conformance to NRC Regulatory Guides

Regulatory Guide 1.76 (April 1974), "Design Basis Tornado for Nuclear Power Plants"

Regulatory Guide 1.117 Rev 1 (April 1978), "Tornado Design Classification"

RBS USAR Section 3.1.2.2 – Design Basis for Protection Against Natural Phenomena (Criterion 2)

RBS Design Conformance to GDC 2 – All safety-related structures, systems, and components are protected from or designed to withstand the effects of natural phenomena.

RBS USAR Section 3.1.2.4 – Environmental and Missile Design Bases (Criterion 4)

RBS Design Conformance to GDC 4 – All safety-related structures, systems, and equipment are protected from, or designed to withstand, the effects of any conditions associated with normal operation, maintenance, testing, and postulated accidents, including the LOCA. Missile protection is discussed in Section 3.5.

Licensing Basis

RBS USAR Table 3.5-24 Selected External Missiles

Missile[1]	Weight (lb)	Horizontal Impact Velocity (mph)
Wood plank, 4" x 12" x 12'[2]	200	288
Steel pipe, 3-in diameter, Schedule 40, 10 ft long[2]+	78	144
Steel rod, 1-in diameter x 3 ft long[2]	8	216
Steel pipe, 6-in diameter, Schedule 40, 15 ft long[2]	285	144
Steel pipe, 12-in diameter, Schedule 40, 15 ft long[2]	743	144
Utility pole, 13 1/2-in diameter, 35 ft long[3]	1490	144
Automobile, frontal area 20 sq ft[3]	4000	72

[1] All missiles are considered to be capable of striking in all directions, with vertical velocities equal to 80 percent of all the horizontal impact velocities.

[2] These missiles are to be considered at all elevations.

[3] These missiles are to be considered at elevations up to 30 ft above all grade levels within 1/2 mi of the facility structures.

Licensing Basis

RBS USAR Section 3.5.2.2 Missile Barriers

The exterior walls and roofs of the Seismic Category I structures act also as protective barriers to withstand the effects of missiles generated by natural phenomena. The thickness of these protective barriers meets or exceeds the minimum thickness requirements of NRC-SRP, NUREG-0800, Section 3.5.3, Table1, Revision 1, dated July 1981. These structures are listed in Table 3.2-1 and are shown in Fig. 1.2-2.

RBS USAR Table 3.2-1 Equipment and Structure Classification

Attachment 1 to this presentation contains the original Table 3.2-1, which contains the tornado protection designation for plant equipment. Page 19 contains the tornado protection designation for structures.

Licensing Basis

RBS USAR Table 3.5-25 Missile Barriers for Natural Phenomena and Turbine-Generated Missiles

Protected Components	Missile Barrier
RCPB and other protected equipment inside containment	Exterior shield building wall and dome, containment structure, drywell, internal structures
Main control room and protected electrical, instrumentation, control, and ventilation equipment in control building	Control building
Essential piping systems, ventilation, electrical, instrumentation, control, and other protected equipment in auxiliary building	Exterior shield building wall and dome, containment structure, auxiliary building and internal structures
Spent fuel pool	Fuel pool walls, fuel building
Emergency diesel generators	Diesel generator building

Licensing Basis

RBS USAR Table 3.5-25 Missile Barriers for Natural Phenomena and Turbine-Generated Missiles (cont.)

Protected Components	Missile Barrier
Diesel fuel oil system	Sandfill around diesel fuel oil tanks and the diesel generator building
Standby service water pumps SSW pumphouse, cooling and piping	SSW pumphouse, cooling towers, and basin
Portion of the RCPB in the auxiliary building	Auxiliary building steam tunnel
UHS cooling fans	Fan motors protected by concrete enclosures. Fans protected from horizontal and vertical missiles by 2-ft reinforced concrete cylinders and enclosure hoods. Debris protectors provided on fan outlets.

Licensing Basis

RBS SER – Section 3

Section 3.3.2, "Tornado Loadings"

Section 3.5.1.4, "Missiles Generated by Natural Phenomena"

Section 3.5.2, "Structures, Systems, and Components To Be Protected from Externally Generated Missiles"

Attachment 2 to this presentation contains a copy of the applicable RBS SER Section 3.

Licensing Basis

RBS SER Section 3.5.2 "Structures, Systems, and Components To Be Protected from Externally Generated Missiles"

Safety-related structure, systems, and components to be protected from externally generated missiles and the protection provided in the plant design is in accordance with:

- GDC 2 and 4 with respect to missile and environmental effects;
- RG 1.13, Position C.2;
- RG 1.27, Positions C.2 and C.3; and
- RG 1.117, Positions C.1 through C.3

"The applicant's list of safety-related structures, systems, and components to be protected from externally generated missiles and the provisions in the plant design providing this protection meet SRP 3.5.2 and are, therefore, acceptable."

Background - RIS 2015-06

In response to Regulatory Information Summary (RIS) 2015-06, "Tornado Missile Protection", Entergy took action to identify potential vulnerabilities in tornado missile protection at RBS.

- Plant walk downs were completed and non-conforming conditions were identified.
- The non-conforming conditions were reported to the NRC as an eight-hour notification on May 4, 2018.
- Operability determinations were completed and documented in the corrective action program using guidance in Revision 1 of Enforcement Guidance Memorandum 15-002.
- Compensatory actions were verified to be in place.

Background – Enforcement Discretion

On May 10th, 2018 RBS submitted a request to the NRC to extend enforcement discretion provided in Enforcement Guidance Memorandum 15-002 for tornado-generated missile protection non-conformances identified in response to Regulatory Issue Summary 2015-06.

On June 6th, 2018 the NRC approved RBS's request to extend enforcement discretion until June 10th 2020.

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TORNADO MISSILE RISK EVALUATOR (TMRE)

Ray Dremel – Enercon Principal Engineer

TMRE NEI 17-02 Rev 1B

The RBS TMRE model is being prepared following the guidance in NEI 17-02 Rev 1B, *Tornado Missile Risk Evaluator (TMRE) Industry Guidance Document*, September 2018.

- Hazard Frequency
- Missile Identification
- HWEL
- Vulnerability Walkdowns
- EEFP Calculations
- HRA Review
- Model Development
- Quantification

Summary of Analyses (all results still draft)

- Hazard Frequency - ~6E-5/yr F'2 to ~7E-8/yr F'6
- Missile Identification – 204,000 total
- High Wind Equipment List (HWEL)
  - Components from internal events
  - Pipe from internal flooding
  - Cables from internal fire
- Vulnerability Walkdowns
  - Identify SSCs in path
  - Determine if no line-of-site
- Exposed Equipment Failure Probability (EEFP)
  - Generally use area of opening
  - Generally group all SSCs in the area

Summary of Analyses (cont.)

- HRA Review
- Model Development
  - Fail all OSP-dependent equipment
  - Insert basic events representing SSCs evaluated in EEFP analysis
- Quantification
  - Initial results show very small increase in CDF/LERF
  - About 1E-7 CDF and <1E-8 LERF
  - Conservative estimates
    - Assume all equipment in a room fails, small hole/large room

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LICENSE AMENDMENT REQUEST

Brian Jones - Licensing Engineer River Bend Station

Current Schedule

All the engineering work associated with TMRE is currently scheduled to be complete by the end of January 2020.

License Amendment Request is currently scheduled for submittal to the NRC by the end of February 2020.

RBS will be requesting a one year review time following the NRC acceptance review.

Completion of the NRC acceptance review will satisfy meeting the deadline of 6/10/2020 for enforcement discretion.

License Amendment Precedent

The RBS License amendment will be based on the following on the following TMRE related submittals:

- Arkansas Nuclear One, Units 1 and 2 currently under NRC review (ML19119A090)
- Grand Gulf Nuclear Station, Unit 1 approved June 18, 2019 (ML19123A014)
- Shearon Harris Nuclear Power Plant, Unit 1 approved March 29, 2019 (ML18347A385)
- Vogtle Electric Generating Plant, Units 1 and 2 approved January 11, 2019 (ML18304A394)

License Amendment Overview

1.0 SUMMARY DESCRIPTION

2.0 DETAILED DESCRIPTION

- Background Information
- Current Licensing Basis
  - *General Design Criteria (GDC)*
  - *RBS Safety Evaluation Report (SER)*
  - *RBS USAR*
- Reason for the Proposed Change

3.0 TECHNICAL EVALUATION

- Tornado Missile Risk Evaluator Methodology
- Traditional Engineering Considerations

License Amendment Overview

3.0 TECHNICAL EVALUATION (continued)

- Risk Assessment
  - High Wind Equipment List
  - Vulnerable SSC Walkdowns
  - Missile Walkdowns
  - Tornado Hazard Frequency
  - Target Evaluation
  - Model Development
  - Model Quantification Results
  - Tornado Intensity Contribution
  - Sensitivities
    - *TMRE Missile Distribution Sensitivity*
    - *Compliant Case Sensitivity*
    - *Plant Grade Sensitivity*
    - *Single Event Cutset Sensitivity*
    - *HFE Sensitivity*
- Conclusions

License Amendment Overview

4.0 REGULATORY EVALUATION

- Applicable Regulatory Requirements/Criteria
- Precedent
- No Significant Hazards Consideration Analysis
- Conclusions

5.0 ENVIRONMENTAL CONSIDERATION

6.0 REFERENCES

Attachment 1 - Probabilistic Risk Assessment Technical Adequacy Documentation
Attachment 2 - RBS Updated Safety Analysis Report Page Markups
Attachment 3 - RBS Updated Safety Analysis Report Page Clean Pages

Proposed License Changes

Update USAR Table 1.8-1 Page 168 "Conformance to NRC Regulatory Guides" to include the use of the TMRE as an alternate methodology.

Table 1.8-1 currently states that RBS complies with Regulatory Guide 1.117 Rev. 1 (April 1978).

RBS proposes to add a statement allowing the use of TMRE for SSCs as an NRC accepted method and state that it can only be applied to discovered conditions where tornado missile protection was not provided, and cannot be used to avoid providing tornado missile protection in the plant modification process.

Proposed License Changes

Update USAR Section 3.5.1 to describe RBS use of TMRE for SSCs as an NRC accepted method and state that it can only be applied to discovered conditions where tornado missile protection was not provided, and cannot be used to avoid providing tornado missile protection in the plant modification process.

Add new USAR Table 3.5-29 to include a listing of Non-Conforming Safety-Related SSCs that do not require protection from tornado-generated missiles based on TMRE.

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QUESTIONS?

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CLOSING COMMENTS

Brian Jones - Licensing Engineer River Bend Station

Attachment 1

RBS USAR Table 3.2-1
Equipment and Structure Classification

TABLE 3.2-1

EQUIPMENT AND STRUCTURE CLASSIFICATION

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
I. Reactor System								
1. Reactor vessel	1	I	B	E	D	GE	CBIN	
2. Reactor vessel support skirt	1	I	B	E	D	GE	CBIN	
3. Reactor vessel appurtenances, pressure retaining portions	1	I	B	E	D	GE	CBIN	
4. CRD housing supports	2	I	B	E	D	GE	GE	
5. Reactor internal structures, engineered safety features	2	I	B	E	D	GE	GE	
6. Reactor internal structures, other	NNS	NA	S	E	D	GE	GE	(34)
7. Control rods	2	I	B	E	D	GE	GE	
8. Control rod drives	2	I	B	E	D	GE	GE	
9. Core support structure	2	I	B	E	D	GE	GE	
10. Power range detector hardware	2	I	B	E	D	GE	GE	(12)
11. Fuel assemblies	2	I	B	E	D	GE	GE	
12. Reactor vessel insulation	NNS	NA	S	E	D	P	S	
II. Nuclear Boiler System								
1. Vessels, level instrumentation condensing chambers	1	I	B	E	D	GE	GE	
2. Vessels, air accumulators	2	I	B	E	D	P	S	
3. Piping, relief valve discharge	3	I	B	E	C,D	P	S	
4. Piping, main steam within outermost isolation valve	1	I	B	E	A,C,D	GE	GE	
5. Pipe supports, main steam	1	I	B	E	D	GE	GE	
6. Pipe restraints, main steam	1	I	S	E	D	GE	GE	
7. Piping, other within outermost isolation valves	1	I	B	E	D	P	S	(12)
8. Piping, instrumentation beyond outermost isolation valves	NNS	NA	S	E	D	P	S	(12)
9. Safety/relief valves	1	I	B	E	D	GE	V	
10. Safety/relief valve position monitors	NNS	I	B	E	C,D,R	P	V	
11. Valves, main steam isolation valves	1	I	B	E	A,D	GE	V	
12. Valves, other, isolation valves and within	1	I	B	E	A,D	P	V	(12)
13. Valves, instrumentation beyond outermost isolation valves	NNS	NA	S	E	A,C	P	V	(12)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
14. Mechanical modules, instrumentation, with safety function	2	I	B	E	C	GE	GE	
15. Electrical modules with safety function	2	I	B	E	C	GE	GE	
16. Cable, with safety function	2	NA	B	E	-	P	S	
III. Recirculation System								
1. Piping	1	I	B	E	D	GE	GE	(12)
2. Pipe suspension, recirculation line	1	I	B	E	D	GE	GE	
3. Pipe restraints, recirculation line	2	I	B	E	D	GE	GE	
4. Pumps	1	I	B	E	D	GE	V	
5. Valves	1	I	B	E	D	GE	V	
6. Motor, pump	2	I	B	E	D	GE	V	
7. Electrical modules, with safety function	2	I	B	E	C	GE	GE	
8. Cable with safety function	2	NA	B	E	-	P	S	
9. LFMG set	NNS	NA	NA	N	T	GE	GE	
IV. CRD Hydraulic System								
1. Valves, scram discharge volume lines	2	I	B	E	C	GE & P	V	
	2	I	B	E	C	P	V	
2. Valves insert and withdraw lines	2	I	B	E	C	P	V	(9)
3. Valves, other	NNS	NA	S	E	C,F/A,C	P/GE	V	
4. Piping, scram discharge volume lines	2	I	B	E	C	P	S	(20)
5. Piping, insert and withdraw lines	2	I	B	E	C,D	P	S	(9)
6. Piping, other	NNS	NA	S	E	C,D,F	P	S	(12)
7. Hydraulic control unit	2	I	B	E	C	GE	GE	(17)
8. Electrical modules, with safety function	2	I	B	E	C	GE	GE	
9. Cable, with safety function	2	NA	B	E	-	P	S	
10. CRD pumps, filters, and strainers	NNS	NA	S	E	F	GE	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
V. Standby Liquid Control System								
1. Standby liquid control tank	2	I	B	E	C	GE	GE	
2. Pump	2	I	B	E	C	GE	V	
3. Pump Motor	2	I	B	E	C	GE	V	
4. Valves, explosive	1	I	B	E	C	GE	V	
5. Valves, isolation and within	1	I	B	E	C	P	V	
6. Valves, beyond isolation valves	2	I	B	E	C	P	V	
7. Piping, within isolation valves	1	I	B	E	C	P	S	(12)
8. Piping, beyond isolation valves	2	I	B	E	C	P	S	(12)
9. Electrical modules, with safety function	2	I	B	E	C	GE	GE	
10. Cable, with safety function	2	NA	B	E	C	P	S	
VI. Neutron Monitoring System								
1. Piping, TIP	NNS	NA	S	E	D	GE	GE	
2. Drive mechanism, indexing mechanism, multimax connector, purge air control unit, source range monitor (SRM), proximity switch, motor modules	NNS	NA	S	E	C	GE	GE	
3. Cable, IRM, SRM, PRMs	2	NA	B	E	-	GE	V	
VII. Reactor Protection System								
1. Electrical modules	2	I	B		C,F,T	GE	GE	
2. Cable	2	NA	B		-	P	V	
VIII. Process Radiation Monitors								(34)
1. Main steam line monitors and related electrical modules	2	I	B	E	A,C	GE	GE	
2. Main plant exhaust (gas extended range), fuel building exhaust, reactor building annulus ventilation, main control room air intakes, containment atmosphere, drywell atmosphere, RHR heat exchanger service water, containment purge isolation, and related electrical modules	2	I	B	E	A,C,F,M,R,T	P	V	(35)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
3. All other monitors (fixed and portable) and related electrical modules and cable	NNS	NA	S	E	A,W,F,T,M	P	V	
4. Cable, monitors with safety function	2	NA	B	E	-	P	S	
5. Electrical modules for process liquid, process ventilation, air ejector off gas, and standby gas treatment radiation monitoring systems	NNS	NA	S	E	A,P,T,W,F	P	S	
6. Air ejector off gas monitors and related electrical modules	NNS	NA	S	E	T	GE	GE	
7. Portable in-plant I_2 monitoring equipment	NNS	NA	S	E	-	P	V	
IX. RHR System								
1. Heat exchangers, shell side	2	I	B	E	A	GE	GE	
2. Heat exchangers, tube side	3	I	B		A	GE	GE	
3. Piping, within outermost isolation valves	1,2	I	B	E	C,D	P	S	(12,40)
4. Piping, beyond outermost isolation valves	2	I	B	E	A	P	S	(12)
5. Pumps	2	I	B	E	A	GE	V	
6. Pump motors	2	I	B	E	A	GE	V	
7. Valves, isolation, LPCI and shutdown lines	1	I	B	E	D,A	P	V	
8. Valves, isolation, other	2	I	B	E	A	P	V	(12)
9. Valves, beyond isolation valves	2	I	B	E	A	P	V	(12)
10. Electrical modules, with safety function	2	I	B	E	A	GE	GE	
11. Cable, with safety function	2	NA	B	E	-	P	S	
12. Discharge line fill pump	2	I	B	E	A	P	V	
13. Piping through tunnel, drains	NNS	NA	S	E	A,M	P	S	
14. Flush drain to radwaste	3	I	B	E	A,W	P	S	
X. Low Pressure Core Spray								
1. Piping, within outermost isolation valves	1	I	B	E	C,D	P	S	(12)
2. Piping, beyond outermost isolation valves	2	I	B	E	A	P	S	(12)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
3. Pump	2	I	B	E	A	GE	V	
4. Pump motor	2	I	B	E	A	GE	V	
5. Valves, isolation and within	1	I	B	E	C,D	P	V	(12)
6. Valves, beyond outermost isolation valves	2	I	B	E	A	P	V	(12)
7. Electrical modules with safety function	2	I	B	E	P	GE	GE	
8. Cable, with safety function	2	NA	B	E	-	P	S	
9. Water leg pump	2	I	B	E	A	P	V	
XI. High Pressure Core Spray								
1. Day supply diesel tank	3	I	B	E	S	P	S	
2. Piping, within outermost containment isolation valve	1	I	B	E	C,D	P	S	(12)
3. Piping, diesel service water	3	I	B	E	S	P	S	
4. Piping, return test line to condensate storage tank beyond second isolation valve; piping suction line from the condensate storage tank to the piping tunnel	NNS	NA	S	E	O	P	S	
5. Piping, beyond outermost containment isolation valve	2	I	B	E	A	P	S	(12)
6. Pump, HPCS	2	I	B	E	A	GE	V	
7. HPCS pump motor	2	I	B	E	A	GE	V	
8. Valves, outer isolation and within	1	I	B	E	C,D	P,GE	V	(12)
9. Valves, beyond isolation valves, motor operated	2	I	B	E	A	GE	V	(12)
10. Valves, diesel service water	3	I	B	E	O	P	V	
11. Valves, other	2	I	B	E	A	P	V	(12)
12. Electrical modules, with safety function	2	I	B	E	A	GE	GE	
13. Electrical auxiliary equipment	3	I	B	E	A	GE	GE	
14. Cable with safety function	2	NA	B	E	-	P	S	
15. Water leg pump	2	I	B	E	A	P	V	
XII. RCIC System								
1. Piping, within outermost isolation valves	1	I	B	E	C,D	P	S	(12)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
2. Piping, beyond outermost isolation valves	2	I	B	E	A,O	P	S	(12)
3. Piping, return test line to condensate storage tank beyond second isolation valve	NNS	NA	S	E	O,A	P	S	(12)
4. Pump	2	I	B	E	A	GE	V	
5. Valves, isolation and within	1	I	B	E	C	P	V	(12)
6. Valves, return test line to condensate storage beyond second isolation valve	NSS	NA	S	E	O,A	P	V	(12)
7. Valves, other	2	I	B	E	A	P	V	(12)
8. Turbine	2	I	B	E	A	GE	V	(13)
9. Electrical modules, with safety function	2	I	B	E	A	GE	GE	
10. Cable, with safety function	2	NA	B	E	-	P	S	
11. Water leg pump	2	I	B	E	A	P	V	
12. RCIC gland seal air compressor	NNS	NA	S	E	A	GE	V	
XIII. Fuel Service Equipment								
1. Fuel preparation machine	UNC	I	B	E	C,F	GE	GE	
2. General purpose grapple	UNC	I	B	E	C,F	GE	GE	
XIV. Reactor Vessel Service Equipment								
1. Steam line plugs	UNC	NA	S	E	C	GE	GE	
2. Dryer and separator sling and head strongback	2	I	B	E	C	GE	GE	
XV. In-Vessel Service Equipment								
1. Control rod grapple	3	I	B	E	C	GE	GE	
XVI. Refueling Equipment								
1. Refueling equipment platform assemblies	2	I	B	E	C,F	GE	GE	
2. Refueling bellows	NNS	NA	S	E	D	P	S	
3. Fuel transfer tube	2	I	B	E	C,F	GE	GE	
4. Isolation valves, fuel transfer tube	2	I	B	E	C,F	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
5. Penetration sleeve assembly, fuel transfer tube	2	I	B	E	C,F	P	S	
XVII. Storage Equipment								
1. Fuel building spent fuel storage racks	3	I	B	E	F	P	V	
2. Containment fuel storage racks	3	I	B	E	C	GE	GE	
3. Defective fuel storage container	3	I	B	E	F	GE	GE	
4. Fuel building new fuel storage racks	3	I	B	E	F	GE	GE	
XVIII. Radwaste System								
1. Tanks, atmospheric	NNS	NA	S	N	W	P	S	
2. Heat exchangers	NNS	NA	S	N	W	P	V	
3. Piping, other	NNS	NA	S	N	W,M	P	S	
4. Pumps	NNS	NA	S	N	W	P	V	
5. Valves, flow control and filter system	NNS	NA	S	N	W,M	P	V	(15)
6. Valves, other	NNS	NA	S	N	W	P	V	(12)
7. Mechanical modules	NNS	NA	S	N	W	P	V	(15)
XIX. Reactor Water Cleanup System								
1. Vessels: filter/demineralizer	3	NA	B	E	C	GE	GE	(25)
2. Heat exchangers	3	NA	B	E	C	GE	GE	(24,25)
3. Piping within outermost isolation valves	1	I	B	E	C,D	P	S	(12)
4. Piping, beyond outermost isolation valves	3/NNS	I/NA	B/S	E	A,C	P	S	(12,25)
5. Pumps	3	I/NA	B/S	E	A,C	GE	V	(25)
6. Valves, containment isolation valves	1	I	B	E	D,A	P	V	(12,25)
7. Valves, beyond outermost isolation valves	3/NNS	I/NA	B/S	E	C,A	P	V	(12,25)
8. Valves, containment isolation	2	I	B	E	A,C	P	V	
9. Piping, containment isolation	2	I	B	E	A,C	P	S	
10. Sample station	NNS	NA	S	E	C	GE	GE	(12)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XX. Fuel Pool Cooling and Cleanup System								
1. Demineralizer vessel	NNS	NA	S	E	F	P	V	
2. Filters	NNS	NA	S	E	F	P	V	
3. Heat exchangers	3	I	B	E	F	P	V	
4. Pumps, cooling	3	I	B	E	F	P	V	
5. Pumps, purification	NNS	NA	S	E	F	P	V	
6. Piping, containment isolation	2	I	B	E	C,F	P	S	(12)
7. Valves, containment isolation	2	I	B	E	C,F	P	V	
8. Piping, cooling subsystem	3	I	B	E	C,F	P	S	
9. Valves, cooling subsystem	3	I	B	E	C,F	P	V	
10. Piping, purification subsystem	NNS	NA	S	E	C,F	P	S	
11. Valves, purification subsystem	NNS	NA	S	E	C,F	P	V	
XXI. Main Control Room Panels								
1. Electrical modules, with	2	I	B	E	R	P	S	
safety function	2	I	B	E	R	GE	GE	
2. Cable, with safety function	2	NA	B	E	-	P	S	
	2	NA	B	E	-	GE	S	
XXII. Local Panels and Racks								
1. Electrical modules, with	2	I	B	E	A,C,F,T	P	S	
safety function	2	I	B	E	A,C,F,T	GE	GE	
2. Cable, with safety function	2	NA	B	E	-	P	S	
XXIII. Off Gas System								
1. Tanks	NNS	NA	S	E	T	GE	GE	(16)
2. Heat exchangers	NNS	NA	S	E	T	GE	GE	(16)
3. Piping	NNS	NA	S	E	T	P	S	(12,16)
4. Valves, flow control	NNS	NA	S	E	T	GE	GE	(16)
5. Valves, other	NNS	NA	S	E	T	P	V	(12,16)
6. Mechanical modules	NNS	NA	S	E	T	GE	GE	(12,16)
7. Pressure vessels	NNS	NA	S	E	T	GE	GE	(16)
8. Charcoal adsorber tanks	NNS	NA	S	E	T	GE	GE	(16,26)
XXIV. Standby Service Water System								
1. Piping	3	I	B	E	A,F,O,P,S,R	P	S	
2. Pumps	3	I	B	E	P	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
3. Pump motors	3	I	B	E	P	P	V	
4. Valves, isolation	3	I	B	E	A,F,S,R	P	V	
5. Valves, other	3	I	B	E	A,F,O,P,S,R	P	V	
6. Electrical modules, with safety function	3	I	B	E	R,P	P	S	
7. Cable, with safety function	3	NA	B	E	-	P	S	
8. Piping, containment isolation	2	I	B	E	C,A	P	S	
9. Valves, containment isolation	2	I	B	E	C,A	P	V	
XXV. Normal Service Water System								
1. Pumps	NNS	NA	S	N	O	P	V	
2. Pump Motors	NNS	NA	S	N	O	P	V	
3. Valves, isolation from standby service water	3	I	B	E	A,R,S	P	V	
4. Piping, isolation from standby service water	3	I	B	E	A,R,S	P	S	
5. Piping, other	NNS	NA	S	E,N	A,O,R,S	P	S	
6. Valves, other	NNS	NA	S	E,N	A,O,R,S	P	V	
7. Other equipment	NNS	NA	S	E,N	A,O,R,S	P	V	
XXVI. Instrument and Service Air Systems								(31)
1. Vessels, accumulators, supporting safety-related systems	3	I	B	E	A,C,D,S	P	S	(19)
2. Piping in lines between accumulators and safety-related systems	3	I	B	E	A,C,D,S	P	S	(19)
3. Valves in lines between accumulators and safety-related systems	3	I	B	E	A,C,D,S	P	V	(19)
4. Piping, containment isolation	2	I	B	E	A,C,D	P	S	
5. Valves, containment isolation	2	I	B	E	A,C,D	P	V	
6. Electrical modules with safety function	2	I	B	E	A,C,D,R	P	S	(19)
7. Cables with safety function	2	NA	B	E	-	P	S	(19)
8. Piping, other	NNS	NA	B	E,N	M	P	S	
9. Valves, other	NNS	NA	B	E,N	M	P	V	
10. Other equipment	NNS	NA	B	E,N	M	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XXVII. Diesel Generator Systems								(44)
1. Diesel-generators								
a. HPCS diesel-generator	2	I	B	E	S	GE	V	
b. Standby diesel-generator	3	I	B	E	S	P	V	
2. Electrical modules with safety functions (including the governor, voltage regulator, and exciter systems)								(34)
a. HPCS diesel-generator	2	I	B	E	R,S	GE	GE	
b. Standby diesel-generator	3	I	B	E	A,R,S	P	V	
3. Cable, with safety functions	3	NA	B	E	-	P	S	
4. Fuel Oil Storage and Transfer System								
a. Fuel oil storage tanks	3	I	B	E	S	P	S	
b. Fuel oil day tanks	3	I	B	E	S	P	S	
c. Pumps								
HPCS diesel generator	3	I	B	E	S	GE	GE	
Standby diesel generator	3	I	B	E	S	P	V	
d. Pump motors	3	I	B	E	S	P	V	
e. Piping	3	I	B	E	S	P	S	(45)
f. Valves	3	I	B	E	S	P	V	(45)
5. Cooling Water System - HPCS Diesel-Generator								(34) (8)
a. Water expansion tank	3	I	B	E	S	GE	V	
b. Heat exchanger	3	I	B	E	S	GE	V	
c. Oil cooler	3	I	B	E	S	GE	V	
d. Pumps	3	I	B	E	S	GE	V	
e. Piping and valves, integral with engine	NNS	I	S	E	S	GE	V	
f. Piping, other	3	I	B	E	S	P	S	
g. Valves, other	3	I	B	E	S	P	V	
h. Flexible connections	3	I	B	E	S	GE	V	
6. Cooling Water System - Standby Diesel-Generator								(34) (8)
a. Standpipe	3	I	B	E	S	P	V	
b. Heat exchanger	3	I	B	E	S	P	V	
c. Lube oil cooler	3	I	B	E	S	P	V	
d. Pump	3	I	B	E	S	P	V	
e. Piping and valves, integral with engine	NNS	I	S	E	S	P	V	
f. Piping, other	3	I	B	E	S	P	S	
g. Valves, other	3	I	B	E	S	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
7. Starting System - HPCS Diesel-Generator								(34) (8)
a. Air receivers	3	I	B	E	S	GE	V	
b. Air compressors	NNS	I	S	E	S	GE	V	
c. Aftercooler, air to air	NNS	I	S	E	S	GE	V	
d. Piping and valves, integral with engine	NNS	I	S	E	S	GE	V	
e. Vendor piping between engine and air receiver isolation check valves	3	I	B	E	S	GE	V	
f. Valves between engine and air receivers isolation check valves	3	I	B	E	S	GE	V	
g. Flexible connections between engine and air receivers	3	I	B	E	S	GE	V	
h. Piping and valves upstream from isolation check valves	NNS	I	S	E	S	GE	V	
i. Flexible connections upstream from isolation check valves	NNS	I	S	E	S	GE	V	
j. Air dryer, refrigerant	NNS	I	S	E	S	GE	V	
k. Piping, other	3	I	B	E	S	P	S	
l. Valves, other	3	I	B	E	S	P	V	
8. Starting System - Standby Diesel-Generator								(34) (8)
a. Air receivers	3	I	B	E	S	P	V	
b. Air compressors	NNS	NA	S	E	S	P	V	
c. Aftercoolers	NNS	NA	S	E	S	P	V	
d. Air desiccant dryers	NNS	NA	S	E	S	P	V	
e. Piping and valves, integral with engine	NNS	I	S	E	S	P	V	
f. Piping, between engine and air receivers	3	I	B	E	S	P	S	
g. Valves, between engine and air receivers	3	I	B	E	S	P	V	
h. Piping, other	NNS	NA	S	E	S	P	S	
i. Valves, other	NNS	NA	S	E	S	P	V	
j. Flexible connections	3	I	B	E	S	P	V	

TABLE 3.2-1 (Cont)

		Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
9.	Lubrication System - HPCS Diesel-Generator								(34)
	a. Pumps	3	I	B	E	S	GE	V	
	b. Lube oil cooler	3	I	B	E	S	GE	V	
	c. Sump pan	3	I	B	E	S	GE	V	
	d. Strainer	3	I	B	E	S	GE	V	
	e. Filter	3	I	B	E	S	GE	V	
	f. Piping and valves, integral with engine	NNS	I	S	E	S	GE	V	
	g. Piping, other	3	I	B	E	S	P	S	
	h. Valves, other	3	I	B	E	S	P	V	
10.	Lubrication System - Standby Diesel-Generator								(34)
	a. Lube oil pump (engine-driven)	NNS	I	S	E	S	P	V	
	b. Before and after pump	3	I	B	E	S	P	V	
	c. Lube oil cooler	3	I	B	E	S	P	V	
	d. Sump tank	NNS	I	S	E	S	P	V	
	e. Strainers	NNS	I	S	E	S	P	V	
	f. Filters	3	I	B	E	S	P	V	
	g. Piping and valves, integral with engine	NNS	I	S	E	S	P	V	
	h. Piping, other	3	I	B	E	S	P	S	
	i. Valves, other	3	I	B	E	S	P	V	
11.	Combustion Air Intake and Exhaust System - HPCS Diesel-Generator								
	a. Intake and exhaust silencers	3	I	B	E	S	GE	V	
	b. Intake air filter	3	I	B	E	S	GE	V	
	c. Expansion joints	3	I	B	E	S	GE	V	
	d. Piping	3	I	B	E	S	P	S	
12.	Combustion Air Intake and Exhaust System - Standby Diesel-Generator								
	a. Intake and exhaust silencers	NNS	I	S	E	S	P	V	
	b. Intake air filter	NNS	I	S	E	S	P	V	
	c. Expansion joints (intake)	3	I	B	E	S	P	V	
	d. Piping	3	I	B	E	S	P	S	
	e. Expansion joints (exhaust)	NNS	I	S	E	S	P	S	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XXVIII. Combustible Gas Control System								
1. Piping	2	I	B	E	C,D	P	S	
2. Valves	2	I	B	E	C,D	P	V	
3. Fans	2	I	B	E	C	P	V	
4. Hydrogen recombiners	2	I	B	E	C	P	V	
5. Electrical modules with safety functions	2	I	B	E	C,D,R	P	S	
6. Cables with safety function	2	NA	B	E	-	P	S	
XXIX. Standby Gas Treatment System								
1. Charcoal filter units	2	I	B	E	A	P	V	
2. Exhaust fans	2	I	B	E	A	P	V	
3. Ductwork	2	I	B	E	A	P	V	
4. Isolation dampers	2	I	B	E	A	P	V	
5. Electrical modules with a safety function	2	I	B	E	R,A	P	S	
6. Cable with a safety function	2	NA	B	E	-	P	S	
XXX. Containment Ventilation System								
1. Containment unit coolers/coils (1HVR*UC1A, UC1B)	2/3	I	B	E	C	P	V	(30)
2. Pressure relief dampers	2	I	B	E	C	P	V	
3. Containment unit cooler discharge backdraft dampers	2	I	B	E	C	P	V	
4. Containment unit cooler ductwork up to pressure relief damper	2	I	B	E	C	P	S	
5. Ductwork, other	NNS	NA	S	E	C	P	S	
6. Dampers, other	NNS	NA	S	E	C	P	V	
7. Dome recirculation fan	NNS	NA	S	E	C	P	V	
8. Containment unit cooler (1HVR*UC1C)	NNS	NA	S	E	C	P	V	
XXXI. Auxiliary Building Ventilation System								
1. Outside air intake ductwork from tornado damper to isolation damper	3	I	B	E	A	P	S	
2. Unit cooler ductwork	3	I	B	E	A	P	S	
3. Unit cooler dampers	3	I	B	E	A	P	V	
4. Exhaust ductwork to isolation dampers	3	I	B	E	A	P	S	

TABLE 3.2-1 (Cont)

		Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
5.	Inlet isolation dampers	3	I	B	E	A	P	V	
6.	Outlet isolation dampers	2	I	B	E	A	P	V	
7.	Air exhaust system ductwork from isolation damper to tornado dampers	2	I	B	E	A	P	S	
8.	Inlet tornado dampers	3	I	B	P	A	P	V	
9.	Outlet tornado dampers	2	I	B	P	A	P	V	
10.	Fire dampers	3	I	B	E	A	P	V	
11.	Exhaust system balancing dampers	3	I	B	E	A	P	V	
12.	Exhaust system backdraft dampers	3	I	B	E	A	P	V	
13.	Inlet and exhaust fans	NNS	NA	S	E	A	P	V	
14.	Intake and exhaust filters	NNS	NA	S	E	A	P	V	
15.	Dampers, other	NNS	NA	S	E	A	P	V	
16.	Ductwork, other	NNS	NA	S	E	A	P	S	
17.	Unit coolers/coils (1HVR*UC2 through UC11A, B)	3/3	I	B	E	A	P	V	
18.	Unit cooler 1HVR-UC14	NNS	NA	S	E	A	P	V	
XXXII.	Power Conversion System								
1.	Main steam line (MSL) from second isolation valve to and including first field weld outside the jet impingement wall and all branch lines out to and including the first valve in the branch line	1	I	B	E	A	P	S	(10)
2.	MSL from but not including the first field weld outside the jet impingement wall to and including the third isolation valve and all branch lines out to and including the first valve in the branch line	2	I	B	E	A	P	S	(10,42)
3.	Feedwater line from second isolation valve to and including outermost isolation valve	2	I	B	E	A	P	S	(10,11, 43)

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
4. Branch lines off the feedwater line between the second isolation valve and the outermost isolation valve, from the branch point at the feedwater line to and including the first valve in the branch line	2	I	B	E	A	P	S	(10)
5. MSL piping downstream of the third isolation valve to the turbine stop valves and all branch lines	NNS	NA	S	E,N	A,T	P	S	(10,21)
6. Turbine bypass piping	NNS	NA	S	N	T	P	S	(10)
7. Branch lines of the MSL between the MSL shutoff valve and the turbine main stop valve	NNS	NA	S	E,N	A,T	P	V	(10)
8. Turbine valve, turbine control valve, turbine bypass valves, and the main steam leads from the turbine control valve to the turbine casing	NNS	NA	S	N	T	P	V	(10,21 22,23)
9. Feedwater system components beyond the outermost feedwater isolation valve	NNS	NA	S	E,N	A,T	P	S	(10,43)
XXXIII. Condensate Makeup and Drawoff System								
1. Condensate storage tank	NNS	NA	S	N	O	P	V	(14)
2. Piping, containment isolation	2	I	B	E	A,C,F	P	S	
3. Valves containment isolation	2	I	B	E	A,C,F	P	V	
4. Other piping	NNS	NA	S	E	A,C,F,D, T,M,W,O	P	S	
5. Other valves and components	NNS	NA	S	E	A,C,F,D, T,M,W,O	P	V	
XXXIV. Auxiliary AC Power System (Class 1E)								
1. 4160-volt switchgear	2	I	B	E	A,F,R	P	V	
2. 480-volt load centers	2	I	B	E	A,R	P	V	
3. 480-volt motor control centers	2	I	B	E	A,F,R,M	P	V	
4. 4160/480-volt transformers	2	I	B	E	A,R,M	P	V	
5. 120-volt instrument (vital) bus	2	I	B	E	R	P	V	

TABLE 3.2-1 (Cont)

		Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
6.	Protective relays for Items 1 through 5, above	2	I	B	E	A,F,P,M	P	V	
7.	Cables (including splices) with safety function	2	NA	B	E	-	P	V	
8.	Terminal blocks	2	I	B	E	-	P	V	
9.	Conduits	NNS	NA	S	E	-	P	-	
10.	Cable trays, tray supports, and conduit supports	2	I	B	E	-	P	V,S	(33)
11.	Containment electrical penetrations and protection	2	I	B	E	C	P	V	
12.	Emergency lighting battery packs	NNS	NA	S	E,N	-	P	V	(33,34)
13.	Raceway fire stops and seals	NNS	NA	S	E,N	-	P	V	
XXXV.	125-Volt DC Power System (Class 1E)								
1.	125-volt batteries	2	I	B	E	R	P	V	
2.	Battery chargers	2	I	B	E	R	P	V	
3.	Battery racks	2	I	B	E	R	P	V	
4.	Uninterruptible power supplies (UPS)	2	I	B	E	R	P	V	
5.	125-volt switchgear	2	I	B	E	R	P	V	
6.	125-volt distribution panels	2	I	B	E	R	P	V	
7.	Protective relays	2	I	B	E	R	P	V	
8.	Cables with safety function	2	NA	B	E	-	P	V	
9.	Conduits	NNS	NA	S	E	-	-	V	
10.	Cable trays, tray supports, and conduit supports	2	I	B	E	-	P	V,S	(33)
11.	Raceway fire stops and seals	NNS	NA	S	E,N	-	P	V	
XXXVI.	Miscellaneous Components								
1.	Reactor building polar crane	3	I	B	E	C	P	V	
2.	Spent fuel cask trolley	NNS	I	B	E	F	P	V	
3.	Fuel building bridge crane	NNS	NA	S	E	F	P	V	(18)
4.	Radwaste building crane	NNS	NA	S	N	W	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XXXVII. Reactor Plant Component Cooling Water								
1. Pumps and heat exchangers	NNS	NA	S	E	A	P	V	
2. Piping, containment and drywell isolation	2	I	B	E	A,C,D	P	S	
3. Valves, containment and drywell isolation	2	I	B	E	A,C,D	P	V	
4. Piping, RHR pump and fuel pool coolers cooling water	3	I	B	E	A,F	P	S	
5. Valves, RHR Pump and fuel pool coolers cooling water	3	I	B	E	D,A,F	P	V	
6. Piping, other	NNS	NA	S	E	A,C,D,F	P	S	
7. Valves, other	NNS	NA	S	E	A,C,D,F	P	V	
XXXVIII. Equipment and Floor Drainage Systems								
1. Sumps	NNS	NA	S	E	A,C,D,F, T,W,M	P	S	
2. Pumps	NNS	NA	S	E	A,C,D,F, T,W,M	P	V	
3. Piping, containment isolation	2	I	B	E	A,C,D	P	S	
4. Valves, containment isolation	2	I	B	E	A,C,D	P	V	
5. Cable, with a safety function	2	NA	B	E	-	P	S	
6. Piping, other	NNS	NA	S	E	A,C,D,F, W,T,M	P	S	
7. Valves, other	NNS	NA	S	E	A,C,D,F, W,T,M	P	V	
XXXIX. Fuel Building Ventilation System								
1. Supply system air conditioning unit	NNS	NA	S	E	F	P	V	
2. Unit coolers	NNS	NA	S	E	F	P	V	
3. Exhaust fans	NNS	NA	S	E	F	P	V	
4. Charcoal filtration system fans	3	I	B	E	F	P	V	
5. Charcoal filtration system filters	3	I	B	E	F	P	V	
6. Charcoal filtration system ductwork	3	I	B	E	F	P	S	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
7. Charcoal filtration system balancing dampers	3	I	B	E	F	P	V	
8. Emergency air intake ductwork	3	I	B	E	F	P	S	
9. Isolation dampers and associated ductwork	3	I	B	E	F	P	V	
10. Tornado dampers	3	I	B	P	F	P	V	
11. Fire dampers	3	I	B	E	F	P	V	
12. Dampers, other	NNS	NA	S	E	F	P	V	
13. Ductwork, other	NNS	NA	S	E	F	P	S	
XL. Area Radiation Monitoring System								(34)
1. Containment post-accident area monitor and drywell post-accident area monitor	2	I	B	E	C,D	P	V	
2. Cable, monitors with safety function	NNS	NA	S	E	C	P	V	
3. All other components	NNS	NA	S	E	A,F,W,T,R	P	V	
XLI. Leak Detection System								
1. Temperature element	2	I	B	E	C,D	GE	V	
2. Temperature switch	2	I	B	E	C,D	GE	V	
3. Differential temperature switch	2	I	B	E	C,D	GE	V	
4. Differential flow switch	2	I	B	E	C,D	GE	V	
5. Pressure switch	2	I	B	E	C,D	GE	V	
6. Differential pressure switch	2	I	B	E	C,D	GE	V	
7. Differential flow summer	2	I	B	E	C,D	GE	V	
XLII. Main Steam-Positive Leakage Control System (MS-PLCS) and Penetration Valve Leakage Control System (PVLCS)								
1. Piping and valves up to first isolation valve of inboard subsystem (MS-PLCS)	1	I	B	E	C	P	S	
2. Piping and valves, other	2	I	B	E	C,A	P	S	
3.a. Electrical modules (MS-PLCS)	2	I	B	E	A	GE	GE	
b. Electrical modules (PVLCS)	2	I	B	E	A	P	S	
4. Compressor assembly (PVLCS)	2	I	B	E	A	P	V	(29)
5. Cable, with safety function	2	I	B	E	C,A	P	S	

TABLE 3.2-1 (Cont)

		Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XIIII.	Structures[32]								
1.	Primary containment	2	I	B	E		P	S	
2.	Drywell, including biological shielding	2	I	B	E		P	S	
3.	Shield building, including biological shielding	2	I	B	P		P	S	
4.	Auxiliary building, including biological shielding	2	I	B	P		P	S	
5.	Fuel building, including biological shielding	3	I	B	P		P	S	
6.	Control building, including control room, office area, and biological shielding	2	I	B	P		P	S	
7.	Diesel generator building	3	I	B	P		P	S	
8.	Standby service water cooling tower and basin	3	I	B	P		P	S	(8)
9.	Standby service water pump house	3	I	B	P		P	S	
10.	Piping and electrical tunnels housing safety-related systems	3	I	B	P		P	S	
11.	Turbine building	UNC	(26,28)	S	N		P	S	
12.	Radwaste building	UNC	(26)	S	N		P	S	(27)
13.	Auxiliary control building	UNC	NA	S	N		P	S	
14.	Services building	UNC	NA	S	N		P	S	
15.	Condensate demineralizer, regeneration, and off-gas building	UNC	(26,28)	S	N		P	S	
16.	Spent fuel pool and liner	3	I	B	E	C,F	P	S	
17.	Internal missile barriers	2	I	B	E	C	P	S	
XLIV.	Control Building Chilled Water System								
1.	Centrifugal liquid chillers	3	I	B	E	R	P	V	
2.	Condenser cooling water pumps	3	I	B	E	R	P	V	
3.	Chilled water recirculation pumps	3	I	B	E	R	P	V	
4.	Compression tanks	3	I	B	E	R	P	S	
5.	Piping	3	I	B	E	R	P	S	
6.	Valves	3	I	B	E	R	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
XIV. Control Building Ventilation System								
1. Main control room air-conditioning units and heating coils	3	I	B	E	R	P	V	
2. Standby switchgear room air-conditioning units, return air fans and battery room exhaust fans	3	I	B	E	R	P	V	
3. Chiller equipment room air-conditioning units	3	I	B	E	R	P	V	
4. Main control room charcoal filter trains	3	I	B	E	R	P	V	
5. Smoke removal fans	NNS	NA	S	E	R	P	V	
6. Chiller equipment room supply and exhaust fans	NNS	NA	S	E	R	P	V	
7. Elevator equipment room, kitchen and toilet exhaust fans	NNS	NA	S	E	R	P	V	
8. Ductwork for the smoke removal system	NNS	I	S	E	R	P	S	
9. Ductwork for a portion of the chiller equipment room ventilation supply and exhaust ductwork	NNS	I	S	E	R	P	S	
10. Dampers for the smoke removal system and for a portion of the chiller equipment room ventilation supply and exhaust ductwork	NNS	NA	S	E	R	P	V	
11. Ductwork for the control building ventilation and air-conditioning systems, including main control room and remote air intake (except pipe)	3	I	B	E	M/R	P	S	
12. Dampers for the control building ventilation and air-conditioning systems, including main control room isolation dampers and remote air intake	3	I	B	E	M/R	P	V	
13. Inlet and outlet tornado dampers	3	I	B	P	M/R	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
14. Inlet and outlet filters	NNS	NA	S	E	R	P	V	
15. Fire dampers	3	I	B	E	R	P	V	
16. Remote air intake pipe	3	I	B	E	M/R	P	S	(41)
XLVI. Drywell Ventilation System								
1. Unit coolers	NNS	NA	S	E	D	P	V	
2. Ductwork	NNS	NA	S	E	D	P	S	
3. Dampers	NNS	NA	S	E	D	P	V	
XLVII. Annulus Mixing System								
1. Fans	2	I	B	E	A	P	V	
2. Balancing dampers	2	I	B	E	A	P	V	
3. Ductwork	2	I	B	E	A	P	S	
XLVIII. Annulus Pressure Control System								
1. Ductwork from isolation damper to plant exhaust duct	2	I	B	E	A	P	S	
2. Isolation dampers	2	I	B	E	A	P	V	
3. Fans	NNS	NA	S	E	A	P	V	
4. Dampers, other	NNS	NA	S	E	A	P	V	
5. Ductwork, other	NNS	NA	S	E	A	P	S	
XLIX. Containment and Drywell Purge System								
1. Containment and drywell penetrations and isolation valves	2	I	B	E	A	P	V	
2. Fire dampers	3	I	B	E	A	P	V	
3. Filters	NNS	NA	S	E	A	P	V	
4. Fans	NNS	NA	S	E	A	P	V	
5. Ductwork	NNS	NA	S	E	A	P	V	
6. Dampers, other	NNS	NA	S	E	A	P	V	
L. Diesel Generator Building Ventilation System								
1. Exhaust fans	3	I	B	E	S	P	V	
2. Tornado dampers	3	I	B	P	S	P	V	
3. Backdraft and balancing dampers	3	I	B	E	S	P	V	
4. Ductwork	3	I	B	E	S	P	S	
5. DG control room vent fans	3	I	B	E	S	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
6. DG control room ductwork	3	I	B	E	S	P	S	
7. DG control room dampers	3	I	B	E	S	P	V	
8. Filters	NNS	NA	S	E	S	P	V	
9. Normal ventilation fans	NNS	NA	S	E	S	P	V	
10. Dampers, other	NNS	NA	S	E	S	P	V	
11. Ductwork, other	NNS	NA	S	E	S	P	S	
LI. Standby Service Water Pumphouse Ventilation System								
1. Fans	3	I	B	E	P	P	V	
2. Tornado dampers	3	I	B	P	P	P	V	
3. Ductwork	3	I	B	E	P	P	S	
LII. Turbine Building Ventilation System								
1. Fans	NNS	NA	S	N	T	P	V	
2. Filters	NNS	NA	S	N	T	P	V	
3. Unit coolers	NNS	NA	S	N	T	P	V	
4. Dampers	NNS	NA	S	N	T	P	V	
5. Ductwork	NNS	NA	S	N	T	P	S	
LIII. Radwaste Building Ventilation System								
1. Fans	NNS	NA	S	N	W	P	V	
2. Unit coolers	NNS	NA	S	N	W	P	V	
3. Dampers	NNS	NA	S	N	W	P	V	
4. Ductwork	NNS	NA	S	N	W	P	S	
5. Charcoal filter	NNS	NA	S	N	W	P	V	
6. Filters, other	NNS	NA	S	N	W	P	V	
LIV. Fire Pumphouse Heating and Ventilation System								
1. Fans	NNS	NA	S	N	P	P	V	
2. Unit heaters	NNS	NA	S	N	P	P	V	
LV. Normal Switchgear Building HVAC System								
1. Air-conditioning units	NNS	NA	S	N	M	P	V	
2. Fans	NNS	NA	S	N	M	P	V	
3. Heating coils	NNS	NA	S	N	M	P	V	
4. Dampers	NNS	NA	S	N	M	P	V	
5. Ductwork	NNS	NA	S	N	M	P	S	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
LVI. Auxiliary Boiler Building HVAC System								
1. Air-conditioning units	NNS	NA	S	N	M	P	V	
2. Fans	NNS	NA	S	N	M	P	V	
3. Dampers	NNS	NA	S	N	M	P	V	
4. Ductwork	NNS	NA	S	N	M	P	S	
LVII. Makeup Water Intake Structure and Switchgear Ventilation System								
1. Air-conditioning units	NNS	NA	S	N	M	P	V	
2. Fans	NNS	NA	S	N	M	P	V	
3. Heaters	NNS	NA	S	N	M	P	V	
4. Ductwork	NNS	NA	S	N	M	P	V	
5. Dampers	NNS	NA	S	N	M	P	S	
LVIII. Electrical and Piping Tunnel Ventilation System								
1. Fire dampers in the Category I firewall	3	I	S	N	M	P	V	
2. Fans	NNS	NA	S	N	M	P	V	
3. Dampers, other	NNS	NA	S	N	M	P	V	
4. Ductwork	NNS	NA	S	N	M	P	S	
LIX. Post-Accident Sampling System								
1. Sample tubing, piping, and valves up to and including the outermost containment isolation valve, containment atmosphere monitoring isolation valves, and drain line isolation valves	2	I	B	E	A,C	P	S	
2. Cable with safety function	2	NA	B	E	A,C	P	S	
3. Other sample tubing, piping, and valves	NNS	NA	S	E	A	P	S	
4. Sample panel wet section	NNS	NA	S	E	A,M	GE	V	(38)
5. Sample system control panel	NNS	NA	S	E	A,M	GE	V	(38)
LX. Permanent Emergency Support Facilities[34]								
1. Technical Support Center (TSC)	NNS	NA	S	N	TSC	P	V	
2. Emergency Operations Center (EOF)	NNS	NA	S	N	EOF	P	V	

TABLE 3.2-1 (Cont)

	Safety[1] Class	Seismic[2] Category	Quality[3] Assurance Category	Tornado[4] Protection Designation	Location[5]	Scope[6] of Supply	Design[7] Detail	Notes
3. Operational Support Center (OSC)	NNS	NA	S	N	BR	P	V	
LXI. Emergency Response Information System[34]								
1. Interface with Category I Systems	3	I	B	E	C	GE	V	
2. Safety Parameter Display System (SPDS)								
A. Control Room	NNS	NA	S	E	R	GE	V	
B. TSC	NNS	NA	S	N	TSC	GE	V	
C. EOF	NNS	NA	S	N	M	GE	V	
3. Electrical Modules with Display Function other than SPDS								
A. Control Room	NNS	NA	S	E	R	GE	V	
B. TSC	NNS	NA	S	N	TSC	GE	V	
C. EOF	NNS	NA	S	N	M	GE	V	
4. Radiological/Meteorological Display								
A. Control Room	NNS	NA	S	E	R	P	V	
B. TSC	NNS	NA	S	N	TSC	P	V	
C. EOF	NNS	NA	S	N	EOF	P	V	

TABLE 3.2-1 (Cont)

NOTES:

(1) Safety Classes 1, 2, 3, and NNS are defined in Section 3.2.2. The equipment is constructed in accordance with the codes listed in Table 3.2-4. (unc. = unclassified)

(2) I = The equipment is constructed in accordance with the seismic requirements for the SSE as described in Section 3.7. For civil and structural codes, see Section 3.8.

NA = The seismic requirements for the SSE are not applicable to the equipment.

(3) B = The equipment meets the quality assurance requirements of 10CFR50, Appendix B, in accordance with the quality assurance program described in Chapter 17.

S = The equipment meets the quality assurance requirements defined in the purchase specification.

(4) P = Those structures or components designed to withstand a design base tornado.

E = Those systems or components enclosed within the structure or component designed to withstand a design base tornado.

N = Those components and structures which are not designed for tornado protection.

(5) A = Auxiliary building
C = Part of, or within, containment
D = Drywell
F = Fuel building
M = Any other location
O = Outdoors onsite
P = Pump house
R = Control building
S = Diesel generator building
T = Turbine building
W = Radwaste building
TSC = Technical Support Center
EOF = Emergency Operations Facility
BR = Baton Rouge

TABLE 3.2-1 (Cont)

(6) GE = General Electric
P = Gulf States

(7) GE = General Electric - Nuclear Energy Business Group (NEBG) is responsible for details of component design.
S = Stone & Webster is responsible for details of component design.
V = Component vendor is responsible for details of component design.
CBIN = Chicago Bridge & Iron Nuclear is responsible for details of component design.

(8) Details of internal equipment design by Vendor.

(9) A portion of the CRD insert and withdraw lines from the drive flange are Safety Class 1. The remainder of the piping is Safety Class 2 up to and including the first valve on the hydraulic control unit.

(10) See Section 3.2.2.1 for explanation.

(11) In addition to a swing check valve inside the containment and a positive acting check valve outside containment, a third valve with high leaktight integrity is provided in each line outside the containment. The spring loaded piston operator of the positive acting check valve is held open by air pressure during normal operation. Fail-open solenoid valves are used to release air pressure to permit the check valve piston operator to close. The positive acting check valve and the high leaktight integrity isolation valve are remote manually operated from the main control room, using signals which indicate loss of feedwater flow.

The classification of the feedwater lines from the reactor vessel to and including the second isolation valve is Safety Class 1; from the second isolation valve to and including the outermost isolation valve is Safety Class 2; beyond the outermost isolation valve is classified NNS, but seismically supported up to and including the anchor at the turbine building/auxiliary building interface.

(12) 1. Lines equivalent to a 3/4-in or smaller liquid line which are part of the RCPB are Safety Class 2.

TABLE 3.2-1 (Cont)

2. All instrument lines which are connected to the RCPB and are utilized to actuate safety systems are Safety Class 2 from the outer isolation valve or the process shutoff valve (root valve) to the sensing instrumentation.

3. All instrument lines which are connected to the RCPB and not utilized to actuate safety systems are classified NNS from the outer isolation valve or the process shutoff valve (root valve) to the sensing instrumentation.

4. All other instrument lines:

   a. through the root valve are of the same classification as the system to which they are attached.

   b. beyond the root valve, if used to actuate a safety system, are of the same classification as the system to which they are attached.

5. All sample lines from the outer isolation valve or the process root valve through the remainder of the sampling system are classified NNS.

(13) The turbine does not fall within the applicable design codes. To assure the turbine is fabricated to the standards commensurate with their safety and performance requirements, General Electric has established specific design requirements for this component which are as follows:

1. All welding shall be qualified in accordance with Section IX, ASME Boiler and Pressure Vessel Code.

2. All pressure-containing castings and fabrications shall be hydrotested at 1.5 times design pressure.

3. All high-pressure castings shall be radiographed according to:

ASTM	E-94	
	E-142	Maximum feasible volume
	E-71, 186 or 280	Severity level 3

TABLE 3.2-1 (Cont)

4. As-cast surfaces shall be magnetic particle or liquid penetrant tested according to ASME, Section III, Paragraphs NB-2575, NC-2575, NC-2576, or NB-2576, NC-2576.

5. Wheel and shaft forgings shall be ultrasonically tested according to ASTM A-388.

6. Buff-welds shall be radiographed and magnetic particle or liquid penetrant tested according to ASME Boiler and Pressure Vessel Code. Acceptance standards shall be in accordance with ASME Boiler and Pressure Vessel Code Section III Paragraph NB-5340, NC-5340, NB-5350, and NC-5350, respectively.

7. Notification to be made on major repairs and records maintained thereof.

8. Record system and traceability according to ASME Section III, NA-4000.

9. Control and identification according to ASME Section III, NA-4000.

10. Procedures shall conform to ASME Section III, NB-5100, NC-5100.

11. Inspection personnel shall be qualified according to ASME Section III, NB-5500, NC-5500.

(14) The condensate storage tank is designed, fabricated, and tested to meet the intent of ANSI-B96.1.

(15) ASME Section VIII-1 and ANSI B31.1 apply downstream of outermost isolation valves.

(16) The gaseous radwaste system piping, pumps, and valves containing gaseous radwaste are constructed in accordance with the applicable codes of classification NNS.

(17) The hydraulic control unit (HCU) is a GE factory-assembled engineered module of valves, tubing, piping, and stored water which controls a single CRD by the application of precisely timed sequences of pressures and flows to accomplish slow insertion or withdrawal of

TABLE 3.2-1 (Cont)

the control rods for power control and rapid insertion for reactor scram.

Although the HCU, as a unit, is field installed and connected to process piping, many of its internal parts differ markedly from process piping components because of the more complex functions they must provide. Thus, although the codes and standards invoked for Safety Classes 1, 2, 3, and NNS pressure integrity quality levels clearly apply at all levels to the interfaces between the HCU and the connecting conventional piping components (e.g., pipe nipples, fittings, simple hand valves), it is considered that they do not apply to the specialty parts (e.g., solenoid valves, pneumatic components and instruments).

The design and construction specifications for the HCU do invoke such codes and standards as can be reasonably applied to individual parts in developing required quality levels, but these codes and standards are supplemented with additional requirements for these parts and for the remaining parts and details. For example, 1) all welds are LP inspected, 2) all socket welds are inspected for gap between pipe and socket bottom, 3) all welding is performed by qualified welders, and 4) all work is done in accordance with written procedures. Classification NNS is generally applicable because the codes and standards invoked by that group contain clauses which permit the use of manufacturer's standards and proven design techniques which are not explicitly defined within the codes for Safety Classes 1, 2, or 3. This is supplemented by the QC techniques previously described.

(18) This crane is not seismically designed, but is provided with earthquake restraints to prevent the trolley and bridge from coming off the rails. This crane does not carry a load over spent fuel.

(19) The safety-related systems and equipment supported by the air systems are the automatic depressurization system, the main steam isolation valves, and the air-starting system of the diesel generators.

(20) In addition to a swing check valve inside the drywell and a positive acting check valve outside the drywell, a third valve with high leaktight integrity is provided in

TABLE 3.2-1 (Cont)

each line. The spring loaded piston operator of the positive acting check valve is held open by air pressure during normal operation. Fail-open solenoid valves are used to release air pressure to permit the check valve piston operator to close. The positive acting check valve and the high leaktight integrity isolation valve are remote manually operated from the main control room, using signals which indicate loss of CRD system return line flow.

(21) All inspection records are maintained for the life of the plant. These records include data pertaining to qualification of inspection personnel, examination procedures, and examination results.

(22) All cast pressure-retaining parts of a size and configuration for which volumetric methods are effective are examined by radiographic methods by qualified personnel. Ultrasonic examination to equivalent standards is used as an alternate to radiographic methods. Examination procedures and acceptance standards are at least equivalent to those defined in Paragraph 136.4, Nonboiler External Piping, ANSI B31.1-1973.

(23) The following qualifications are met with respect to the certification requirements:

1. The manufacturer of the turbine stop valves, turbine control valves, turbine bypass valves, and main steam leads from turbine control valve to turbine casing utilizes quality control procedures equivalent to those defined in GE Publication GEZ-4982A, General Electric Large Steam Turbine Generator Quality Control Program.

2. A certification obtained from the manufacturer of these valves and steam loads demonstrates that the quality control program as defined has been accomplished.

(24) The nonregenerative heat exchanger is Safety Class 3 on the tube side and nonnuclear safety class on the shell side.

(25) The filter/demineralizer, heat exchangers, pumps, tanks, and valves supplied by GE which are Safety Class 3, are

TABLE 3.2-1 (Cont)

not required to mitigate the consequences of a LOCA, and their failure does not result in release to the environment of radioactive material which would give a single event dose greater than the annual dose from 10CFR20.105(1). Therefore, they are not Seismic Category I.

The purchaser-furnished piping and valves which are Safety Class 3 are also Seismic Category I.

(26) The design satisfies the requirements of Regulatory Guide 1.143 as described in Sections 11.2 and 11.3. The seismic design of the charcoal adsorber tanks is discussed in Section 11.3.2.2.2.1.

(27) The radwaste building is not tornado-protected above grade.

(28) The structure is designed in accordance with the seismic analysis and design approach as described in Sections 3.7.2.17A and 3.8.4.4.9, respectively.

(29) The PVLCS compressor assembly includes the compressor, filter, moisture separator, aftercooler, and accumulator. All these components are supplied as a single skid-mounted unit.

(30) The cooling coils for the containment unit coolers are Safety Class 3.

(31) Requirements for instrument and pneumatic tubing and supports classified as Safety Class 2 and 3 are shown in Table 3.2-8.

(32) The classification of a structure described herein also applies to all major structural components of that structure.

(33) Systems and components whose failure could adversely affect safety-related systems or components are analyzed to seismic Category I requirements and controlled in accordance with the pertinent requirements of the operational QA program.

(34) The pertinent provisions of the operational QA program are applied to the following items:

TABLE 3.2-1 (Cont)

a. Radioactivity sampling (air, surfaces, liquids)
b. Radioactivity contamination measurement and analysis equipment
c. Personnel monitoring equipment
d. Instrument storage, calibration, and maintenance program
e. Decontamination facilities, personnel, and equipment
f. Respiratory protection equipment (including testing)
g. Contamination control
h. Equipment and other items associated with the emergency support facilities
i. Site grading, including maintenance of the West Creek fabriform channel
j. Activities affecting reactor internal structures
k. Diesel generator auxiliaries including the lube system, jacket cooling water system, air start system, governor, voltage regulator, and excitation systems.

(35) Effluent monitors meet the environmental qualification and quality assurance requirements of Regulatory Guide 1.97, Revision 2.

(36) Valve actuators for active safety-related valves are subject to the same quality assurance requirements as the valve.

(37) The safety-related instrumentation and controls described in Sections 7.1 through 7.6 are subject to the requirements of Appendix B, Quality Assurance Program, and Class 1E requirements (TEEE 279). However, post-accident monitoring instrumentation discussed in Section 7.5 has design and qualification criteria as designated in Table 7.5-2 (e.g., Category 1, 2, 3 or Regulatory Guide 1.97).

(38) The sample panel and cooler rack are seismically supported. The instruments are not.

(39) Supports for components designated as Quality Assurance (QA) Category B are also classified as QA Category B.

TABLE 3.2-1 (Cont)

(40) The piping between RHR valves MOV F042B and MOV F027B, and between MOV F042A and MOV F027A, is safety Class 2 as shown on Fig. 5.4-12.

(41) A portion of the main control room remote air intake utilizes pipe in lieu of ductwork. Since this pipe is intended to fulfill the function of ductwork, the pipe and its supports are designed, fabricated, and installed in accordance with ASME III, Class 3 requirements with the following exceptions:

a. Visual inspection of the welds is performed.

b. ASME III Code Data Reports, N-stamping, and ANI acceptance are not required.

c. Being part of engineered safety filtration system operating at low pressure (inches W.G.), it is tested in accordance with ANSI N509 as defined in Regulatory Guide 1.52.

(42) Piping is seismically supported from the outermost isolation valve to and including the main turbine stop and control valve.

(43) Piping is seismically supported from the outermost isolation valve to and including the anchor at the turbine building/auxiliary building interface.

(44) For the standby diesel generators, 1EGS*EG1A and 1EGS*EG1B, some components supplied meet earlier editions and addenda of the ASME Section III Code than were applicable at the date the purchase orders were awarded to the subsuppliers. See Note 4 of Regulatory Guide 1.26 position in Table 1.8-1.

(45) All fuel storage and transfer system piping and valves are QA Category B, Seismic Category I, Safety Class 3 except the standby diesel generators fuel oil backpressure regulating valves 1EGF*PCV25A and B and approximately 15 inches of 1-in pipe on each side of the valves. Valves 1EGF*PCV25A and B are classified as QA Category B, Seismic Category I, Safety Class 3, non-ASME III stamped components. These valves were procured from the manufacturer recommended by the standby diesel generator supplier and have been satisfactorily used in other standby diesel generator

TABLE 3.2-1 (Cont)

applications using TDI diesels. The 15 inches of 1-in pipe on either side of the valve is classified as QA Category B, Seismic Category I, Safety Class 3, non-ASME III stamped pipe. The pipe is procured, designed, analyzed, and installed to the requirements of ASME III.

Attachment 2

RBS SER

Sections 3.3.2, 3.5.1.4, and 3.5.2

The procedures that were used to transform the wind velocity into pressure loadings on structures and the associated vertical distribution of wind pressures and gust factors are in accordance with ANSI A58.1 and American Society of Civil Engineers (ASCE) Paper 3269, as appropriate. These documents are acceptable to the staff.

The staff concludes that the plant design is acceptable and meets SRP 3.3.1 and GDC 2.

The applicant has met GDC 2 with respect to the capability of the structures to withstand design wind loading so that the design reflects

(1) appropriate consideration for the most severe wind recorded for the site with an appropriate margin

(2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenonmena

(3) the importance of the safety function to be performed

The applicant has met these requirements by using ANSI A58.1 and ASCE Paper 3269, which the staff has reviewed and found acceptable, to transform the wind velocity into an effective pressure on structures and for selecting pressure coefficients corresponding to the structures' geometry and physical configuration.

The applicant has designed the plant structures with sufficient margin to prevent structural damage during the most severe wind loadings that have been determined appropriate for the site so that the requirements of item 1 above are met. In addition, the design of seismic Category I structures, as required by item 2 above, has included, in an acceptable manner, load combinations that occur as a result of the most severe wind load and the loads resulting from normal and accident conditions.

The procedures used to determine the loadings on structures induced by the design wind specified for the plant are acceptable because these procedures have been used in the design of conventional structures and have been proven to provide a conservative basis that, together with other engineering design considerations, ensures that the structures withstand such environmental forces. The use of these procedures provides reasonable assurance that, in the event of design-basis winds, the structural integrity of the plant structures that have to be designed for the design wind will not be impaired. As a result, safety-related systems and components located within these structures are adequately protected and will perform their intended safety functions if needed, thus satisfying the requirement of item 3 above.

3.3.2 Tornado Loadings

All seismic Category I structures exposed to tornado forces and needed for the safe shutdown of the plant were designed to resist a tornado with a 290-mph tangential wind velocity of a 70-mph translational wind velocity. The simultaneous atmopsheric pressure drop was assumed to be 3 psi in 2 seconds. Tornado missiles are also considered in the design, as discussed in Section 3.5 below.

The NRC staff concludes that the plant design is acceptable and meets SRP 3.3.2 and GDC 2.

The applicant has met SRP 3.3.2 and GDC 2 with respect to the structures' capability to withstand the design tornado wind loading and tornado missiles so that their design reflects

(1) appropriate consideration for the most severe tornado recorded for the site with an appropriate margin

(2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena

(3) the importance of the safety function to be performed

The applicant has met these requirements by using ANSI A58.1 and ASCE Paper 3269, which the staff has reviewed and found acceptable, to transform the wind velocity generated by the tornado into an effective pressure on structures and for selecting pressure coefficients corresponding to the structures' geometry and physical configuration.

The applicant has designed the plant structures with sufficient margin to prevent structural damage during the most severe tornado loadings that have been determined appropriate for the site so that the requirements of item 1 above are met. In addition, the design of seismic Category I structures, as required by item 2 above, has included in an acceptable manner load combinations that occur as a result of the most severe tornado wind load and the loads resulting from normal and accident conditions.

The procedures utilized to determine the loadings on structures induced by the design-basis tornado specified for the plant are acceptable because these procedures have been used in the design of conventional structures and have been proven to provide a conservative basis that, together with other engineering design considerations, ensures that the structures will withstand such environmental forces.

The use of these procedures provides reasonable assurance that, in the event of a design-basis tornado, the structural integrity of the plant structures that have to be designed for tornadoes will not be impaired. As a result, safety-related systems and components located within these structures will be adequately protected and may be expected to perform necessary safety functions as required, thus satisfying the requirement of item 3 above.

3.4 Water Level (Flood) Design

3.4.1 Flood Protection

The water level (flood) design was reviewed in accordance with SRP 3.4.1 (NUREG-0800). Conformance with the acceptance criteria formed the basis for the NRC staff's evaluation of the water level (flood) design with respect to the applicable regulations of 10 CFR 50. To ensure conformance with the requirements of GDC 2 with respect to protection against flooding, the staff reviewed the overall plant flood protection design, including systems and components whose failure as a result of flooding could prevent safe shutdown of the plant or result in uncontrolled release of significant radioactivity.

turbine generator. The staff requires that relevant GE analyses be submitted for review and acceptance to verify the adequacy of the applicant's turbine maintenance program in terms of the probability of generating turbine missiles.

Within 3 years of startup, no cracks have been observed in a GE turbine wheel with depths greater than one-half the critical crack depth calculated for that wheel. For this reason, the staff is allowing the applicant up to 3 years from initiation of power output to propose a revised turbine maintenance program (which establishes, with NRC-approved methods, inspection and testing procedures and schedules) and obtain NRC approval of the program.

The staff requires that a license condition be imposed that requires the applicant to

(1) submit for NRC approval, within 3 years of obtaining an operating license, a turbine system maintenance program based on the manufacturer's calculations of missile generation probabilities and NRC guidelines (see Table 3.1), or volumetrically inspect all low-pressure turbine rotors at the second refueling outage and every other (alternate) refueling outage thereafter until some other maintenance program is approved by the staff

(2) conduct turbine steam valve maintenance (following initiation of power output) in accordance with NRC recommendations until a turbine system maintenance program is approved

Provided the above license condition is met, the staff concludes that the turbine-missile risk for the proposed plant design is in compliance with GDC 4 and is, therefore, acceptable.

3.5.1.4 Missiles Generated by Natural Phenomena

The FSAR regarding missiles generated by natural phenomena was reviewed in accordance with SRP 3.5.1.4. However, the SRP "Review Procedures" concerning the probability per year of damage to safety-related systems as a result of missiles were not used in this review. This review is concerned with establishing the missile spectrum, not with calculating the probability of damage.

GDC 2 requires that structures, systems, and components essential to safety be designed to withstand the effects of natural phenomena, and GDC 4 requires that these same plant features be protected against missiles. The missiles generated by natural phenomena of concern are those resulting from tornadoes. The applicant has identified a spectrum of missiles for the tornado region in which the site is located (tornado Region I), as identified in RG 1.76. The spectrum includes weight, velocity, and impact area. The missile spectrum chosen is identical to missile spectrum A of SRP 3.5.1.4. The staff has evaluated this spectrum and concludes it is representative of missiles at the site; it is, therefore, acceptable. A discussion of the protection afforded safety-related equipment from identified tornado missiles, including compliance with the guidelines of RG 1.117, is in Section 3.5.2 of this report. A discussion of the adequacy of barriers and structures designed to withstand the effects of the identified tornado missiles is in Section 3.5.3.

Based on its review of the tornado-missile spectrum, the staff concludes that the spectrum was properly selected, meets GDC 2 and 4 with repsect to protection against natural phenomena and missiles, and meets RGs 1.76, Position C.1 and C.2, and 1.117 with respect to identification of missiles generated by natural phenomena. It is, therefore, acceptable. The tornado-missile spectrum complies with SRP 3.5.1.4.

3.5.2 Structures, Systems, and Components To Be Protected from Externally Generated Missiles

Structures, systems, and components to be protected from externally generated missiles were revised according to SRP 3.5.2. GDC 2 requires that all structures, systems, and components essential to the safety of the plant be protected from the effects of natural phenomena, and GDC 4 requires that all structures, systems, and components essential to the safety of the plant be protected from the effects of externally generated missiles. As noted above, the River Bend site is in tornado Region I. (The tornado missile spectrum is discussed in Section 3.5.1.4 above.)

The applicant has identified all safety-related structures, systems, and components requiring protection from externally generated missiles. All safety-related structures are designed to withstand postulated tornado-generated missiles without damage to safety-related equipment. All safety-related systems and components and stored fuel are located within tornado-missile-protected structures or are provided with tornado-missile barriers. Buried safety-related systems such as piping and electrical circuits are adequately protected by the overlying earth. The ultimate heat sink (UHS) consists of a water storage basin and standby cooling tower. It is designed to seismic Category I and Safety Class 3 criteria and is designed to withstand the effects of natural phenomena including tornadoes and tornado missiles. (Compliance of the UHS design with Positions C.2 and C.3 of RG 1.27 is addressed in Section 9.2.5.) Thus, River Bend meets GDC 2 and 4 with respect to missile protection and RGs 1.13, Positions C.2; 1.27, Positions C.2 and C.3; and 1.117, Positions C.1, C.2, and C.3 concerning tornado-missile protection for safety-related structures, systems, and components, including stored fuel and the ultimate heat sink. Protection from low-trajectory turbine missiles, including compliance with RG 1.115, is discussed in Section 3.5.1.3 of this report.

On the basis of the above, the staff concludes that the applicant's list of safety-related structures, systems, and components to be protected from externally generated missiles and the protection provided in the plant design is in accordance with GDC 2 and 4 with respect to missile and environmental effects, and with RGs 1.13, Position C.2; 1.27, Positions C.2 and C.3; and 1.117, Positions C.1 through C.3 concerning protection of safety-related plant features, including stored fuel and the ultimate heat sink, from tornado missiles. The applicant's list of safety-related structures, systems, and components to be protected from externally generated missiles and the provisions in the plant design providing this protection meet SRP 3.5.2 and are, therefore, acceptable.