

17.4 Reliability Assurance Program

The reliability assurance program (RAP) applies to the systems, structures, and components (SSC) that are identified as risk-significant (or significant contributors to plant safety) as determined by using probabilistic, deterministic, and other methods of analysis, including information obtained from sources such as the plant-specific and site-specific probabilistic risk analysis (PRA), industry operating experience, relevant component failure databases and expert panels. Implementing the RAP will enhance safety by focusing on design resources for risk-significant SSC and on maintaining the reliability of such SSC during the design and operation stages of the plant.

17.4.1 Reliability Assurance Program Scope, Stages, and Goals

The purpose of the RAP for the U.S. EPR is to provide reasonable assurance of the following considerations:

- The plant is designed, constructed and operated consistent with assumptions and risk insights for risk-significant SSC.
- Risk-significant SSC are selected and maintained so that they do not degrade to an unacceptable level during the life of the plant.
- The frequency of challenges (transients) to risk-significant SSC is minimized.
- These SSC will function reliably when challenged.

The RAP is implemented as an integral part of the design process and is implemented during the detailed design phase so that the important U.S. EPR reliability assumptions of the PRA are considered throughout the course of plant life.

The RAP is implemented in two stages. The first stage applies to reliability assurance activities that occur before the initial fuel load. The objective of the RAP during the first stage is to provide reasonable assurance that the reactor design meets the preceding considerations in the areas of design, procurement, fabrication, construction, and preoperational testing activities and programs. The assumed reliability of SSC in the design stage will be realistic and achievable.

The second stage of the RAP applies to reliability assurance activities for an operating plant. During the second stage of the RAP, the goal is to verify that the reliability of the SSC within the scope of the RAP is maintained during plant operation. The activities for the second stage will be integrated into relevant existing programs, such as maintenance rule, surveillance testing, inservice inspection, inservice testing, and quality assurance (QA). Individual component reliability may change throughout the course of plant life because of a number of factors, including aging and changes in suppliers and technology. Plant programs will provide reasonable assurance that the reliability of SSC will remain acceptable.

17.4.2 Reliability Assurance Program Implementation

The RAP for the design stage is implemented in several phases. The first phase is the design certification phase, which defines the overall structure of the RAP, including guidance for procedures and other activities which will be implemented in future phases. A design-specific PRA model is used to develop a list of SSC and insights. The risk-significant SSC are identified in this phase for inclusion in the program using the probabilistic, deterministic, or other methods previously indicated.

The second phase is the site-specific phase, which introduces the plant site-specific design information to the RAP process. A COL applicant that references the U.S. EPR design certification will identify the site-specific SSC within the scope of the RAP. Also in this phase, the RAP is modified or appended based on consideration specific to the site.

Risk-significant SSC are subject to the appropriate quality requirements through the implementation of the RAP. Safety-related SSC that are also determined to be risk-significant in the RAP have a full 10 CFR 50 Appendix B quality assurance program applied along with the applicable GDC.

For non-safety-related SSC that have been determined to be “risk-significant” under the RAP in Section 17.4, the U.S. EPR design applies additional quality assurance measures and design requirements consistent with the guidance in SRP 17.5, Part V, “Non-Safety Related SSC Quality Controls.” These additional quality assurance measures are described in the approved topical report ANP-10266A, Revision 1, “AREVA NP Inc. Quality Assurance Plan (QAP) for Design Certification of the U.S. EPR Topical Report,” Addendum A, and are applied to all risk-significant SSC during the design certification phase.

All risk-significant SSC will be included in the scope of the COL applicant’s Maintenance Rule program in accordance with 10 CFR 50.65(b) in the high safety significance category. This is done so that the risk-significant SSC are subject to performance monitoring criteria which are established consistent with the reliability and availability assumptions used in the PRA.

Tier 1 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) provide confirmation that as the SSC design progresses, the procurement and construction information for risk-significant SSC is consistent with the RAP related key assumptions and insights. This confirmation occurs by verifying that appropriate quality requirements are specified in the documents approved for the procurement and construction of risk-significant SSC.

Beyond the writing of design specifications, consistency with RAP related key assumptions and insights during the construction and initial testing phases are verified by confirming that the systems are as built in accordance with the system level ITAAC

identified in Tier 1 Chapter 2. Related to the RAP SSC, at a plant level, safety-significant features based on PRA insights and severe accident analyses are identified in Table 14.3-6, which are verified by corresponding system related ITAAC.

Also in this phase, the RAP is modified or appended based on consideration of conditions specific to the site.

17.4.2.1 Design Consideration

The RAP is established to provide sufficient documentation during the design and operation of the U.S. EPR. As part of the design process, SSC are evaluated to determine their dominant failure modes and the associated effects. Most components have an industry operating history available that defines the significant failure modes and their likely causes.

Strategies for failure prevention or mitigation are developed through the identification and prioritization of the various possible failure modes for each component. This information is provided as input for the operational program phase.

During the design phase, appropriate design reviews and reliability assessments evaluate the reliability of risk-significant SSC that are identified by the PRA and other sources. As part of the design reliability process, design engineers provide quality and reliability to the development of the SSC while verifying that the PRA properly models the basis for the design of SSC. PRA model development during the design phase mostly relies on generic information, bounding assumptions, or design requirements as a basis for model development. An assessment of the model can be performed when changes occur during the plant design phase, as well as during normal plant operations. The assessment considers reliability concepts, such as human reliability, redundancy, diversity, and external events to improve the system design. A further evaluation of design options is pursued if the results of the assessment reveal that the proposed design change could conflict with the results and insights derived from the PRA, or could cause significant unavailability of a safety function.

The design changes that affect the PRA model are reviewed and appropriate revisions are prepared in accordance with the PRA update process.

17.4.2.2 SSC Identification and Prioritization

The first task of the RAP is to identify the risk-significant SSC that are to be included in the scope of the program. A table that includes a list of design-specific SSC is included in the RAP. This preliminary list is prepared and controlled under the RAP program. This list is updated when the plant-specific PRA is developed. The selection of risk-significant SSC uses a combination of probabilistic and deterministic insights such as PRA analytical results, industry experience, regulations, expert panel process, and engineering judgment to identify and prioritize the SSC.

The Level 1 and Level 2 PRA provides an evaluation of the accident sequences from initiating events and failures of safety functions that lead to core damage. The analysis of external events considers events caused externally to systems associated with power or plant shutdown operations. These events include internal fire, high winds, internal flooding, and seismic margins.

Risk-significant SSC can be judged by using the PRA Level 1 and Level 2 model based on the risk achievement worth (RAW), common cause failure (CCF) RAW, or Fussell-Vesely (FV) of the respective SSC. Components with an RAW value of two or greater, a CCF RAW value of 20 or greater, or FV of 0.005 or greater can be considered risk-significant. The RAW of a component is the factor by which the plant core damage frequency increases if the component reliability is assigned the value of 1.0 (assumed guaranteed to fail). The CCF RAW of a common cause group is the factor by which the plant core damage frequency increases if the common cause group probability of failure is set to 1 (common cause failure is assumed to occur). FV is a measure of the component's contribution to the overall core damage frequency.

Section 19.1.7.4 describes the use of the PRA and risk importance measures as input to determining the RAP list. The results tables within U.S. EPR FSAR Chapter 19 provide lists of risk-significant SSC. Table 17.4-1 and Table 17.4-2 provide a compiled summary of the PRA input to the RAP program along with an indication of the following applicable PRA based rationale for selection:

- FV Importance to at-power CDF (FV - PWR CDF).
- RAW Importance to at-power CDF (RAW- PWR CDF).
- CCF RAW Importance to at-power CDF (CCF RAW- PWR CDF).
- FV Importance to at-power LRF (FV - PWR LRF).
- RAW Importance to at-power LRF (RAW - PWR LRF).
- CCF RAW Importance to at-power LRF (CCF RAW - PWR LRF).
- FV Importance to low-power and shutdown CDF (FV - SD CDF).
- RAW Importance to low-power and shutdown CDF (RAW - SD CDF).
- CCF RAW importance to low-power and shutdown CDF (CCF RAW - SD CDF).
- FV importance to low-power and shutdown LRF (FV - SD LRF).
- RAW importance to low-power and shutdown LRF (RAW - SD LRF).
- CCF RAW importance to low-power and shutdown (LRF CCF RAW - SD LRF).

17.4.2.3 Expert Panel

An expert panel is established to assess the qualitative and quantitative inputs related to risk-significant SSC. A preliminary list of risk-significant SSC is developed using a combination of probabilistic and deterministic insights. This includes information obtained from sources, such as design-specific PRA, nuclear plant operating experience, relevant component failure databases.

The expert panel will use their expertise and PRA insights to develop the list of the risk-significant SSC. The panel members will use input from the specific risk importance calculational methods (i.e., FV and RAW) to determine risk-significant SSC. Each calculational method will identify a different set of SSC based on differing concepts of importance. Each method is useful for providing insights into the selection of risk-significant SSC. The expert panel may use all of these methods in the decision making process.

The use of an expert panel compensates for the limitations of the PRA model, such as model assumptions, treatment for support systems, level of definition of cut sets, cut sets truncation, shadowing effect of very large (high frequency) cutsets, and inclusion of repair or restoration of failed equipment and limitations in the meanings of the importance measures in the Nuclear Energy Institute Guideline NUMARC 93-01 (Reference 1).

The expert panel consists of individuals who possess extensive knowledge in the areas of PRA, risk and reliability, plant operation, system engineering and maintenance. A process is developed for the selection and the qualification of the members.

Meetings are held on an as-needed basis to discuss the final selection of the risk-significant SSC that are to be included in the RAP. Industry-wide information sources and engineering judgment will be used to consider the addition of SSC to the RAP.

In addition to the quantitative factor from the PRA, the expert panel qualitatively evaluated systems and structures within the design certification scope based on deterministic criteria including but not limited to:

- A contribution to the initiators.
- An implicit contribution to the CDF.
- An implicit contribution to the LRF.
- A contribution to seismic margin analysis, performance history/operating experience of the component.
- Technical Specifications considerations for the component.

- Detection of component failures.
- The effect of component failure on the other systems.

As a result of the expert panel review, a list of non-site-specific systems and structures within the RAP scope, and an indication of whether they are PRA based input versus added by the expert panel, is provided in Table 17.4-3.

17.4.3 **Organization, Design Control, Procedures and Instructions, Corrective Actions, and Audit Plans**

AREVA NP is an integrated design and engineering organization that is responsible for formulating and implementing Phase 1 of the RAP.

The AREVA NP RAP implementation plan includes RAP scope, objectives, design consideration, the identification and prioritization of SSC, RAP organization, and expert panel. This RAP implementation plan is described in the following paragraphs.

The AREVA NP engineering organization is responsible for the safety analyses, risk and reliability analyses, and the PRA necessary to support the development of the RAP. PRA and design engineering personnel report to the manager of nuclear island engineering. Therefore, risk and reliability personnel are directly involved with the design organization and are responsible for keeping the design staff cognizant of the risk-significant items of the RAP, program needs, and project status. Risk and reliability personnel participate in the design change control process to incorporate RAP-related inputs into the design process. Additionally, a cognizant representative of risk and reliability is present at design reviews to identify interfaces between the performance of risk-significant SSC and the reliability assumptions in the PRA. Meetings between risk and reliability personnel and the designer are held to manage interface issues.

AREVA NP engineering design procedural controls are applied to the RAP. Specific procedures provide guidance for the design control process, control of design changes, and storage and retrieval controls.

The design control procedure defines the process for performing, documenting, and verifying design activities. This includes the development or modification of system designs, evaluations, analyses, calculations and design document preparation (e.g., specifications, drawings, reports).

The procedure for design change control defines the process for evaluating design changes in engineering controlled documents so that the total effect is considered before a change is approved, and the affected documents are identified and changed accordingly. The procedure identifies the information and organizations responsible

for these interfaces, including PRA review. If a proposed change could affect the safety, availability, or capacity factor of the U.S. EPR, system reliability is analyzed.

There are several AREVA NP corporate quality assurance and design control procedures which provide guidance for the development of a high-quality process for the reliability assurance program and for maintaining the appropriate documentation of it. The documentation development and maintenance procedure establishes the requirements and responsibilities for the preparation, approval, and issue of documents controlled by the engineering design organizations. The QA records procedure provides requirements for QA record retention. The self-assessment, corrective action, and audit procedures specify the responsibilities associated with respective audits of the engineering organization. This self-assessment is also used to promptly identify, document, and determine corrective actions for conditions that are adverse to quality.

The above AREVA NP corporate processes provide configuration control of the list of SSC within the scope of RAP thereby demonstrating that the U.S. EPR reliability assurance implementation program will maintain the scope of RAP SSC throughout the design process.

17.4.4 Reliability Assurance Program Information Needed in a COL Application

A COL applicant that references the U.S. EPR design certification will provide the information requested in Regulatory Guide 1.206, Section C.I.17.4.4.

17.4.5 References

1. NUMARC 93-01, Nuclear Utilities Management and Resources Council, "Industry Guideline for Monitoring Effectiveness of Maintenance at Nuclear Power Plants," April 1996.

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA10AA004	Discharge from CCW HTX 10 Check Valve	CL		X			X							
CCWS	30KAA10AA006	Discharge to Common Header 1 Hydraulic Valve	CL		X			X							
CCWS	30KAA10AA010	Return from Common Header 1 Hydraulic Valve	CL		X			X							
CCWS	30KAA10AA112	Heat Exchanger Bypass MOV	OP		X			X							
CCWS	30KAA10AC001	HTX 10	EL		X			X							
CCWS	30KAA10AP001	Motor Driven Pump	EL	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
CCWS	30KAA10BB001	Surge Tank	EL		X			X							
CCWS	30KAA12AA005	Train 1 to LHSI HTX 10 Cooling MOV	FO	X	X	X	X	X	X						
CCWS	30KAA12AA011	Train 1 from LHSI HTX 10 Cooling Manual Valve	MEC1		X										
CCWS	30KAA12AA012	Train 1 from LHSI HTX 10 Discharge Check Valve	FO		X	X									

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA20AA004	Discharge from CCW HTX 20 Check Valve	FO					X				X			
CCWS	30KAA20AA005	Discharge from CCW HTX 20 Manual Valve	MEC1		X			X							
CCWS	30KAA20AA007	Pump 20 Cooling Manual Valve	MEC1		X			X							
CCWS	30KAA20AA008	Pump 20 Cooling Manual Valve	MEC1		X			X							
CCWS	30KAA20AA011	Pump 20 Suction from CCST Manual Valve	MEC1		X			X							
CCWS	30KAA20AA015	Pump 20 Suction Manual Valve	MEC1		X			X							
CCWS	30KAA20AA018	Pump 20 Discharge Manual Valve	MEC1		X			X							
CCWS	30KAA20AA112	Train 2 Heat Exchanger Bypass MOV	OP								X				
CCWS	30KAA20AA140	Pump 20 Cooling Manual Valve	MEC1		X			X							
CCWS	30KAA20AC001	Train 2 HTX 20	EL								X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA20AP001	Train 2 Motor Driven Pump	FS	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
CCWS	30KAA20BB001	Train 2 Surge Tank	EL								X				
CCWS	30KAA22AA005	Train 2 to LHSI HTX 20 Cooling MOV	FO	X	X	X	X	X	X						
CCWS	30KAA22AA007	LHSI Pump 20 Cooling Manual Valve	MEC1		X										
CCWS	30KAA22AA010	LHSI Pump 20 Cooling Manual Valve	MEC1		X										
CCWS	30KAA22AA011	Train 2 from LHSI HTX 20 Cooling Manual Valve	MEC1		X										
CCWS	30KAA22AA012	Train 2 Discharge of LHSI HTX Check Valve	FO			X									
CCWS	30KAA22AA013	Train 2 LHSI Pump Seal Cooler MOV	FO	X	X		X	X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA22AA101	Common Header 1 QKA20 Chiller Return 3-Way MOV	CF										X	X	
CCWS	30KAA22AA116	LHSI Pump 20 Motor Cooling Manual Valve	MEC1		X										
CCWS	30KAA22AA127	LHSI Pump 20 Sealing Fluid Cooling Manual Valve	MEC1		X										
CCWS	30KAA30AA004	Train 3 Discharge from CCW HTX 30 Check Valve	FO		X			X			X				
CCWS	30KAA30AA005	Discharge from CCW HTX 30 Manual Valve	MEC1		X			X							
CCWS	30KAA30AA006	Train 3 Discharge to Common Header 2 Hydraulic Valve	FO					X							
CCWS	30KAA30AA007	Pump 30 Cooling Manual Valve	MEC1		X			X							
CCWS	30KAA30AA008	Pump 30 Cooling Manual Valve	MEC1		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA30AA010	Train 3 Return from Common Header 2 Hydraulic Valve	FO					X							
CCWS	30KAA30AA011	Pump 30 Suction from CCST Manual Valve	MEC1		X			X							
CCWS	30KAA30AA015	Pump 30 Suction Manual Valve	MEC1		X			X							
CCWS	30KAA30AA018	Pump 30 Discharge Manual Valve	MEC1		X			X							
CCWS	30KAA30AA112	Train 3 Heat Exchanger Bypass MOV	OP					X			X				
CCWS	30KAA30AA140	Pump 30 Cooling Manual Valve	MEC1		X			X							
CCWS	30KAA30AC001	Train 3 HTX 30	EL					X			X				
CCWS	30KAA30AP001	Train 3 Motor Driven Pump	FS	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
CCWS	30KAA30BB001	Train 3 Surge Tank	EL					X			X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA32AA005	Train 3 to LHSI HTX 30 Cooling MOV	FO	X		X				X					
CCWS	30KAA32AA012	Train 3 from LHSI Cooling Check Valve	FO			X									
CCWS	30KAA32AA013	Train 3 LHSI Pump Seal Cooler MOV	FO	X											
CCWS	30KAA32AA101	Common Header 2 QKA30 Chiller Return 3-Way MOV	CF		X		X	X					X	X	
CCWS	30KAA40AA004	Train 4 Discharge from CCW HTX 40 Check Valve	CL		X			X							
CCWS	30KAA40AA006	Train 4 Discharge from Common Header 2 Hydraulic Valve	FC		X			X							
CCWS	30KAA40AA010	Train 4 Return from Common Header 2 Hydraulic Valve	FC		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAA40AA112	Train 4 Heat Exchanger Bypass MOV	OP		X			X							
CCWS	30KAA40AC001	Train 4 HTX 40	EL		X			X							
CCWS	30KAA40AP001	Train 4 Motor Driven Pump	EL		X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
CCWS	30KAA40BB001	Train 4 Surge Tank	EL		X			X							
CCWS	30KAA42AA005	Train 4 to LHSI HTX 40 Cooling MOV	FO	X		X			X						
CCWS	30KAA42AA012	Train 4 from LHSI HTX 40 Discharge Check Valve	FO			X									
CCWS	30KAB10AA192	CCWS CH1 Return Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB10AA193	FPCS Train 1 Cooling Header Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB20AA192	CCWS CH2 Return Safety Valve	PO		IE		X	IE						X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAB20AA193	FPCS Train 2 Cooling Header Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB30AA049	CCWS CH1 to RCP Thermal Barrier Common Supply MOV	FO		X			X							
CCWS	30KAB30AA050	CCWS CH1 to RCP Thermal Barrier Common Supply MOV	FO		X			X							
CCWS	30KAB30AA051	RCP Thermal Barrier to CCWS CH1 Common Return MOV	FO		X			X							
CCWS	30KAB30AA052	RCP Thermal Barrier to CCWS CH1 Common Return MOV	FO		X			X							
CCWS	30KAB30AA053	CCWS CH2 to RCP Thermal Barrier Common Supply MOV	CL		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAB30AA054	CCWS CH2 to RCP Thermal Barrier Common Supply MOV	CL		X			X							
CCWS	30KAB30AA055	RCP Thermal Barrier to CCWS CH2 Common Return MOV	CL		X			X							
CCWS	30KAB30AA056	RCP Thermal Barrier to CCWS CH2 Common Return MOV	CL		X			X							
CCWS	30KAB30AA191	RCP Thermal Barrier to CCWS CH1 Return Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB30AA192	RCP Thermal Barrier to CCWS CH2 Return Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB60AA013	RCP1/2 Motors CCWS CH1 Common Supply MOV	CL					X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAB60AA014	RCP1/2 Motors CCWS CH1 Common Supply Check Valve	CL					X							
CCWS	30KAB60AA018	RCP1/2 Motors CCWS CH1 Common Return MOV	CL					X							
CCWS	30KAB60AA019	RCP1/2 Motors CCWS CH1 Common Return MOV	CL					X							
CCWS	30KAB60AA191	CVCS HP Cooler 1 Return Safety Valve	PO		IE		X	IE						X	
CCWS	30KAB70AA013	RCP3/4 Motors CCWS CH1 Common Supply MOV	CL					X							
CCWS	30KAB70AA014	RCP3/4 Motors CCWS CH1 Common Supply Check Valve	CL					X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
CCWS	30KAB70AA018	RCP3/4 Motors CCWS CH1 Common Return MOV	CL					X							
CCWS	30KAB70AA019	RCP3/4 Motors CCWS CH1 Common Return MOV	CL					X							
CCWS	30KAB70AA191	CVCS HP Cooler 2 Return Safety Valve	PO		IE		X	IE						X	
CLCWS	30PGB13AA002	Pump 13 Discharge Check Valve	IR		X			X							
CLCWS	30PGB15AA001	HTX Bypass MOV	OP		IE			IE							
CLCWS	30PGB19AA191	Safety Valve	PO	X	IE			IE							
CLCWS	30PGD16AC001	Train 1 HTX	EL		IE			IE							
CLCWS	30PGD17AC001	Train 2 HTX	EL		IE			IE							
CLCWS	30PGD18AC001	Train 3 HTX	EL		IE			IE							
CVCS	30KBA14AA004	Low Pressure Reducing Station Isolation MOV	FC							X	SD IE	SD IE		SD IE	SD IE

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown						
				CDF			LRF			CDF			LRF			
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	
CVCS	30KBA14AA106	CVCS Low Power Reducing Station MOV	FC								X	SD IE	SD IE	X	SD IE	SD IE
EFWS	30LAR11AA001	Train 1 Pump Suction Manual Valve	MEC1		X											
EFWS	30LAR11AA103	Train 1 SG Pressure Control MOV	CF	X	X											
EFWS	30LAR11AA105	Train 1 SG Level Control MOV	CF	X	X											
EFWS	30LAS11AP001	Train 1 Motor Driven Pump	PM	X	X	X	X		X	X						
EFWS	30LAS21AP001	Train 2 Motor Driven Pump	FR	X		X	X		X							
EFWS	30LAS31AP001	Train 3 Motor Driven Pump	PM	X		X	X		X							
EFWS	30LAS41AP001	Train 4 Motor Driven Pump	PM	X	X	X	X		X							
ELEC	1BBH_1BDC1	6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker	FC									X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	1BBH_1BDC2	6.9kV SWGR 31BBH to 6.9kV SWGR 31BDC Circuit Breaker	FC								X				
ELEC	1BBT081BBH	Transformer 31BBT08 to 6.9kV SWGR 31BBH Circuit Breaker	FO								X				
ELEC	1BDA_1BDC1	6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker	OP		X			X			X			X	
ELEC	1BDA_1BDC2	6.9kV SWGR 31BDA to 6.9kV SWGR 31BDC Circuit Breaker	FO		X			X			X			X	
ELEC	1BDA_1BDD1	6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker	OP		X			X							
ELEC	1BDA_1BDD2	6.9kV SWGR 31BDA to 6.9kV SWGR 31BDD Circuit Breaker	OP		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	1BDB1BMT02	6.9kV SWGR 31BDB to Transformer 31BMT02 Circuit Breaker	OP		X			X			X			X	
ELEC	1BDC_1BDB1	6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP		X			X			X			X	
ELEC	1BDC_1BDB2	6.9kV SWGR 31BDC to 6.9kV SWGR 31BDB Circuit Breaker	OP		X			X			X			X	
ELEC	1BDC1BMT03	6.9kV SWGR 31BDC to Transformer 31BMT03 Circuit Breaker	OP											X	
ELEC	1BDD1BMT04	6.9kV SWGR 31BDD to Transformer 31BMT04 Circuit Breaker	OP		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	1BMB1BNB01	480V Load Center 31BMB to 480V MCC 31BNB01 Circuit Breaker	OP					X							
ELEC	1BMB1BNT01	480V Load Center 31BMB to Transformer 31BNT01 Circuit Breaker	OP		X			X			X			X	
ELEC	1BMT021BMB	Transformer 31BMT02 to 480V Load Center 31BMB Circuit Breaker	OP		X			X			X			X	
ELEC	1BMT031BMC	Transformer 31BMT03 to 480V Load Center 31BMC Circuit Breaker	OP											X	
ELEC	1BMT041BMD	Transformer 31BMT04 to 480V Load Center 31BMD Circuit Breaker	OP		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	1BNT011BNB02	Transformer 31BNT01 to 480V MCC 31BNB02 Circuit Breaker	OP		X			X			X			X	
ELEC	1BRU011BRA	Inverter31BRU01 to 480V MCC 31BRA Circuit Breaker	OP		X			X						X	
ELEC	2BDA_2BDB1	6.9kV SWGR 32BDA to 6.9kV SWGR 32BDB Circuit Breaker	OP		X			X			X			X	
ELEC	2BDA_2BDB2	6.9kV SWGR 32BDA to 6.9kV SWGR 32BDB Circuit Breaker	OP		X			X			X			X	
ELEC	2BDA_2BDD1	6.9kV SWGR 32BDA to 6.9kV SWGR 32BDD Circuit Breaker	OP								X				
ELEC	2BDA_2BDD2	6.9kV SWGR 32BDA to 6.9kV SWGR 32BDD Circuit Breaker	OP								X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	2BDB2BMT02	6.9kV SWGR 32BDB to Transformer 32BMT02 Circuit Breaker	OP		X			X			X			X	
ELEC	2BDD2BMT04	6.9kV SWGR 32BDD to Transformer 32BMT04 Circuit Breaker	OP								X				
ELEC	2BMB2BNB01	480V Load Center 32BMB to 480V MCC 32BNB01 Circuit Breaker	OP					X							
ELEC	2BMB2BNT01	480 Load Center 32BMB to Transformer 32BNT01 Circuit Breaker	OP					X			X			X	
ELEC	2BMT022BMB	Transformer 32BMT02 to 480V Load Center 32BMB Circuit Breaker	OP		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	2BMT042BMD	Transformer 32BMT04 to 480V Load Center 32BMD Circuit Breaker	OP								X				
ELEC	2BNT012BNB02	Transformer 32BNT01 to 480V MCC 32BNB02 Circuit Breaker	OP					X			X			X	
ELEC	2BRC_4BRB1	480V MCC 32BRC to 480V MCC 34BRB Circuit Breaker	OP								X			X	
ELEC	2BRC_4BRB2	480V MCC 32BRC to 480V MCC 34BRB Circuit Breaker	OP								X			X	
ELEC	2BRU012BRA	Inverter 32BRU01 to 480V MCC 32BRA Circuit Breaker	OP		X			X							
ELEC	2BRU032BRC	Inverter 32BRU03 to 480V MCC 32BRC Circuit Breaker	OP								X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	2BUD2BRU03	250V Pnl 32BUD to Inverter 32BRU03 Circuit Breaker	OP								X			X	
ELEC	30XKA10	Emergency Diesel Generator XKA10	PM	X	X	X	X	X	X	X		X	X		X
ELEC	30XKA20	Emergency Diesel Generator XKA20	FR	X	X	X	X		X	X	X	X	X		X
ELEC	30XKA30	Emergency Diesel Generator XKA30	FR	X	X	X	X	X	X	X		X	X		X
ELEC	30XKA40	Emergency Diesel Generator XKA40	PM	X	X	X	X		X	X		X	X		X
ELEC	30XKA50	SBO Diesel Generator XKA50	FR	X	X		X			X	X		X		
ELEC	30XKA50_1BBH	SBO DG XKA50 to 6.9kV SWGR 31BBH Circuit Breaker	FC								X				
ELEC	30XKA80	SBO Diesel Generator XKA80	FR	X	X		X			X			X		
ELEC	31BBH	6.9kV SWGR 31BBH	FL								X				
ELEC	31BDA	6.9kV Switchgear 31BDA	FL	X	IE		X	IE			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	31BDB	6.9kV SWGR 31BDB	FL		X			X			X			X	
ELEC	31BDC	6.9kV SWGR 31BDC	FL		X			X			X			X	
ELEC	31BDD	6.9kV SWGR 31BDD	FL		X			X							
ELEC	31BMB	480V Load Center 31BMB	FL		X			X			X			X	
ELEC	31BMC	480V Load Center 31BMC	FL								X			X	
ELEC	31BMC1BNC01	ELEC AC, 480V Bus 31BMC to 480V MCC 31BNC01 Circuit Breaker	OP											X	
ELEC	31BMD	480V Load Center 31BMD	FL		X			X							
ELEC	31BMT02	6.9kV-480V Transformer 31BMT02	FL		X			X			X			X	
ELEC	31BMT03	6.9kV-480V Transformer 31BMT03	FL								X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	31BMT04	6.9kV-480V Transformer 31BMT04	FL		X			X							
ELEC	31BNB01	480V MCC 31BNB01	FL					X							
ELEC	31BNB01	480V MCC 31BNB01 (Rectifier)	FR					X							
ELEC	31BNB02	480V MCC 31BNB02	FL		X			X			X			X	
ELEC	31BNB02	480V MCC 31BNB02 (Rectifier)	FR		X			X			X			X	
ELEC	31BNC01	480V MCC 31BNC01	FL								X			X	
ELEC	31BNC01	480V MCC 31BNC01 (Rectifier)	FR								X			X	
ELEC	31BNT01	Constant Voltage Transformer 31BNT01	FL		X			X			X			X	
ELEC	31BRA	480V MCC 31BRA	FL	X	X		X	X						X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	31BRA	480V MCC 31BRA (Rectifier)	FR	X	X		X	X						X	
ELEC	31BRB	480V MCC 31BRB	FL		X			X							
ELEC	31BRB	480V MCC 31BRB (Rectifier)	FR		X			X							
ELEC	31BRU03	Inverter 31BRU03	FR		X			X							
ELEC	31BRV31BUV	24V DC I&C Power Rack 31BRV/31BUV	FL								X				
ELEC	31BRW10BUW11	24V DC I&C Power Rack 31BRW10/ 31BUW11	FL		X			X							
ELEC	31BRW12BUW13	24V DC I&C Power Rack 31BRW12/ 31BUW13	FL		X						X			X	
ELEC	31BTB01	250V Non 1E 12- hr Battery 31BTB01	ST		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	31BTB01	250V Non 1E 12-hr Battery 31BTB01 (Circuit Breaker)	OP		X			X			X			X	
ELEC	31BTD01	250V 1E 2-hr Battery 31BTD01	ST	X	X	X	X	X	X	X	X	X	X	X	X
ELEC	31BTD01	250V 1E 2-hr Battery 31BTD01 (Circuit Breaker)	OP	X	X	X	X	X	X	X	X	X	X	X	X
ELEC	31BUC	1E 250V DC Switchboard 31BUC	FL		X			X			X			X	
ELEC	31BUD	Non 1E 250V DC Switchboard 31BUD	FL		X			X			X			X	
ELEC	32BDA	6.9kV SWGR 32BDA	FL		IE			IE			X			X	
ELEC	32BDA2BMT03	6.9kV SWGR 32BDA to Transformer 32BMT03 Circuit Breaker	OP											X	
ELEC	32BDB	6.9kV SWGR 32BDB	FL		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	32BDD	6.9kV SWGR 32BDD	FL								X				
ELEC	32BMB	480V Load Center 32BMB	FL		X			X			X			X	
ELEC	32BMD	480V Load Center 32BMD	FL								X				
ELEC	32BMT02	6.9kV-480V Transformer 32BMT02	FL		X			X			X			X	
ELEC	32BMT03	6.9kV-480V Transformer 32BMT03	FL											X	
ELEC	32BMT032BNA02	Transformer 32BMT03 to 480V MCC 32BNA02 Circuit Breaker	OP											X	
ELEC	32BMT04	6.9kV-480V Transformer 32BMT04	FL								X				
ELEC	32BNA02	480V MCC 32BNA02	FL											X	
ELEC	32BNA02	480V MCC 32BNA02 (Rectifier)	FR											X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	32BNB01	480V MCC 32BNB01	FL					X							
ELEC	32BNB01	480V MCC 32BNB01 (Rectifier)	FR					X							
ELEC	32BNB02	480V MCC 32BNB02	FL		X			X			X			X	
ELEC	32BNB02	480V MCC 32BNB02 (Rectifier)	FR		X			X			X			X	
ELEC	32BNT01	Constant Voltage Transformer 32BNT01	FL		X			X			X			X	
ELEC	32BNT04	Voltage Regulating Transformer 32BNT04	FL					X						X	
ELEC	32BRA	480V MCC 32BRA	FL	X	X		X	X						X	
ELEC	32BRA	480V MCC 32BRA (Rectifier)	FR	X	X		X	X						X	
ELEC	32BRB	480V MCC 32BRB	FL		X										

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	32BRB	480V MCC 32BRB (Rectifier)	FR		X										
ELEC	32BRC	480V MCC 32BRC	FL							X				X	
ELEC	32BRU03	Inverter 32BRU03	FR		X			X		X	X			X	
ELEC	32BRU0301	Inverter 32BRU03 Static Switch 32BRU0301	OP							X				X	
ELEC	32BRW30BUW31	24V DC I&C Power Rack 32BRW30/ 32BUW31	FL		X					X				X	
ELEC	32BRW32BUW33	24V DC I&C Power Rack 32BRW32/ 32BUW33	FL		X			X							
ELEC	32BTB01	250V Non 1E 12- hr Battery 32BTB01	ST		X			X						X	
ELEC	32BTB01	250V Non 1E 12- hr Battery 32BTB01 (Circuit Breaker)	OP		X			X						X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	32BTD01	250V 1E 2-hr Battery 32BTD01	ST	X		X	X		X	X	X	X	X	X	X
ELEC	32BTD01	250V 1E 2-hr Battery 32BTD01 (Circuit Breaker)	OP	X		X	X		X	X	X	X	X	X	X
ELEC	32BUC	1E 250V DC Switchboard 32BUC	FL		X			X			X			X	
ELEC	32BUD	Non 1E 250V DC Switchboard 32BUD	FL		X			X			X			X	
ELEC	33BDA	6.9kV SWGR 33BDA	FL		IE			IE			X			X	
ELEC	33BDA3BMT03	6.9kV SWGR 33BDA to Transformer 33BMT03 Circuit Breaker	OP					X						X	
ELEC	33BDB	6.9kV SWGR 33BDB	FL		X			X			X			X	
ELEC	33BDD	6.9kV SWGR 33BDD	FL					X			X				
ELEC	33BMB	480V Load Center 33BMB	FL		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	33BMD	480V Load Center 31BMD	FL					X				X			
ELEC	33BMT02	6.9kV-480V Transformer 33BMT02	FL		X			X				X		X	
ELEC	33BMT03	6.9kV-480V Transformer 33BMT03	FL					X						X	
ELEC	33BMT033BNA02	Transformer 33BMT03 to 480V MCC 33BNA02 Circuit Breaker	OP					X						X	
ELEC	33BMT04	6.9kV-480V Transformer 33BMT04	FL					X				X			
ELEC	33BNA02	480V MCC 33BNA02	FL					X						X	
ELEC	33BNB02	480V MCC 33BNB02	FL		X			X				X		X	
ELEC	33BNB02	480V MCC 33BNB02 (Rectifier)	FR		X			X				X		X	
ELEC	33BNT01	Constant Voltage Transformer 33BNT01	FL		X			X				X		X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	33BRA	480V MCC 33BRA	FL		X			X							
ELEC	33BRA	480V MCC 33BRA (Rectifier)	FR		X			X							
ELEC	33BRB	480V MCC 33BRB	FL		X										
ELEC	33BRB	480V MCC 33BRB (Rectifier)	FR		X										
ELEC	33BRW50BUW51	24V DC I&C Power Rack 33BRW50/ 33BUW51	FL		X			X			X			X	
ELEC	33BRW52BUW53	24V DC I&C Power Rack BRW52/BUW53	FL		X										
ELEC	33BTD01	250V 1E 2-hr Battery 33BTD01	ST	X	X	X	X	X	X	X	X	X	X		X
ELEC	33BTD01	250V 1E 2-hr Battery 33BTD01 (Circuit Breaker)	OP	X	X	X	X	X	X	X	X	X	X		X
ELEC	33BUC	1E 250V DC Switchboard 33BUC	FL		X		X	X			X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	34BDA	6.9kV SWGR 34BDA	FL		IE		X	IE			X			X	
ELEC	34BDB	6.9kV SWGR 34BDB	FL		X			X			X			X	
ELEC	34BDC	6.9kV SWGR 34BDC	FL		X			X			X			X	
ELEC	34BDD	6.9kV SWGR 34BDD	FL					X							
ELEC	34BMB	480V Load Center 34BMB	FL		X			X			X			X	
ELEC	34BMC	480V Load Center 34BMC	FL								X			X	
ELEC	34BMC4BNC011	480V Bus 34BMC to 480V MCC 34BNC01 Circuit Breaker	OP											X	
ELEC	34BMD	480V Load Center 34BMD	FL					X							
ELEC	34BMT02	6.9kV-480V Transformer 34BMT02	FL		X			X			X			X	
ELEC	34BMT03	6.9kV-480V Transformer 34BMT03	FL								X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	34BMT04	6.9kV-480V Transformer 34BMT04	FL					X							
ELEC	34BNB01	480V MCC 34BNB01	FL					X						X	
ELEC	34BNB01	480V MCC 34BNB01 (Rectifier)	FR					X						X	
ELEC	34BNB02	480V MCC 34BNB02	FL		X			X			X			X	
ELEC	34BNB02	480V MCC 34BNB02 (Rectifier)	FR		X			X			X			X	
ELEC	34BNC01	480V MCC 34BNC01	FL					X			X			X	
ELEC	34BNC01	480V MCC 34BNC01 (Rectifier)	FR					X			X			X	
ELEC	34BNT01	Constant Voltage Transformer 34BNT01	FL		X			X			X			X	
ELEC	34BRA	480V MCC 34BRA	FL		X		X	X						X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	34BRA	480V MCC 34BRA (Rectifier)	FR		X		X	X						X	
ELEC	34BRB	480V MCC 34BRB	FL		X			X			X			X	
ELEC	34BRB	480V MCC 34BRB (Rectifier)	FR		X			X			X			X	
ELEC	34BRW72BUW73	24V DC I&C Power Rack 34BRW72/ 34BUW73	FL		X			X						X	
ELEC	34BTD01	250V 1E 2-hr Battery 34BTD01	ST	X	X	X	X	X	X	X	X	X	X	X	X
ELEC	34BTD01	250V 1E 2-hr Battery 34BTD01 (Circuit Breaker)	OP	X	X	X	X	X	X	X	X	X	X	X	X
ELEC	34BUC	1E 250V DC Switchboard 34BUC	FL		X			X			X			X	
ELEC	3BDA_3BDB1	6.9kV SWGR 33BDA to 6.9kV SWGR 33BDB Circuit Breaker	OP		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	3BDA_3BDB2	6.9kV SWGR 33BDA to 6.9kV SWGR 33BDB Circuit Breaker	OP		X			X			X			X	
ELEC	3BDA_3BDD1	6.9kV SWGR 33BDA to 6.9kV SWGR 33BDD Circuit Breaker	OP					X			X				
ELEC	3BDA_3BDD2	6.9kV SWGR 33BDA to 6.9kV SWGR 33BDD Circuit Breaker	OP					X			X				
ELEC	3BDB3BMT02	6.9kV SWGR 33BDB to Transformer 33BMT02 Circuit Breaker	OP		X			X			X			X	
ELEC	3BDD3BMT04	6.9kV SWGR 33BDD to Transformer 33BMT04 Circuit Breaker	OP					X			X				

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown						
				CDF			LRF			CDF			LRF			
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	
ELEC	3BMB3BNT01	480V Load Center 33BMB to Transformer 33BNT01 Circuit Breaker	OP					X				X			X	
ELEC	3BMT023BMB	Transformer 33BMT02 to 480V Load Center 33BMB Circuit Breaker	OP		X			X				X			X	
ELEC	3BMT043BMD	Transformer 33BMT04 to 480V Load Center 33BMD Circuit Breaker	OP					X				X				
ELEC	3BNT013BNB02	Transformer 33BNT01 to 480V MCC 33BNB02 Circuit Breaker	OP					X				X			X	
ELEC	4BDA_4BDC1	6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	OP		X			X							X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	4BDA_4BDC2	6.9kV SWGR 34BDA to 6.9kV SWGR 34BDC Circuit Breaker	FO		X			X						X	
ELEC	4BDB4BMT02	6.9kV SWGR 34BDB to Transformer 34BMT02 Circuit Breaker	OP		X			X						X	
ELEC	4BDC_4BDB1	6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP		X			X						X	
ELEC	4BDC_4BDB2	6.9kV SWGR 34BDC to 6.9kV SWGR 34BDB Circuit Breaker	OP		X			X						X	
ELEC	4BDC4BMT03	6.9kV SWGR 34BDB to Transformer 34BMT03 Circuit Breaker	OP											X	
ELEC	4BMB4BNB01	480V Load Center 34BMB to 480V MCC 34BNB01 Circuit Breaker	OP					X						X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	4BMB4BNT01	480V Load Center 34BMB to Transformer 34BNT01 Circuit Breaker	OP					X						X	
ELEC	4BMT024BMB	Transformer 34BMT02 to 480V Load Center 34BMB Circuit Breaker	OP		X			X						X	
ELEC	4BMT034BMC	Transformer 34BMT03 to 480V Load Center 34BMC Circuit Breaker	OP											X	
ELEC	4BNT014BNB02	Transformer 34BNT01 to 480V MCC 34BNB02 Circuit Breaker	OP					X						X	
ELEC	4BRU014BRA	Inverter 34BRU01 to 480V MCC 34BRA Circuit Breaker	OP					X						X	
ELEC	BDT01	Aux Transformer 30BDT01	FL					X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ELEC	BDT01_1BDA	Aux Transformer 30BDT01 to 6.9kV SWGR 31BDA Circuit Breaker	FO			X		X	X			X			X
ELEC	BDT01_3BDA	Aux Transformer 30BDT01 to 6.9kV SWGR 33BDA Circuit Breaker	FO			X			X	X		X			X
ELEC	BDT02_2BDA	Aux Transformer 30BDT02 to 6.9kV SWGR 32BDA Circuit Breaker	FO			X			X	X		X			X
ELEC	BDT02_4BDA	Aux Transformer 30BDT02 to 6.9kV SWGR 34BDA Circuit Breaker	FO			X			X			X			X
ESWS	30PEB10AA002	Train 1 Pump Recirc MOV	OP		X			X							
ESWS	30PEB10AA005	Train 1 Pump Discharge Isolation MOV	CL		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ESWS	30PEB10AA204	Train 1 Pump Discharge Check Valve	CL		X			X							
ESWS	30PEB10AP001	Train 1 Motor Driven Pump	FR	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
ESWS	30PEB20AA002	Train 2 Pump Recirc MOV	OP								X				
ESWS	30PEB20AA005	Train 2 Pump Discharge Isolation MOV	FO	X	X		X	X			X				
ESWS	30PEB20AA007	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB20AA009	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB20AA027	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB20AA029	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB20AA204	Train 2 Pump Discharge Check Valve	FO					X			X				
ESWS	30PEB20AP001	Train 2 Motor Driven Pump	PM	X	X	X	X	X	X	X	SD IE	SD IE		SD IE	SD IE

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ESWS	30PEB30AA002	Train 3 Pump Recirc MOV	OP					X			X				
ESWS	30PEB30AA005	Train 3 Pump Discharge Isolation MOV	FO	X	X		X	X			X				
ESWS	30PEB30AA007	Train 3 Manual Valve	MEC1		X			X							
ESWS	30PEB30AA009	Train 3 Manual Valve	MEC1		X			X							
ESWS	30PEB30AA027	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB30AA029	Train 2 Manual Valve	MEC1		X			X							
ESWS	30PEB30AA204	Train 3 Pump Discharge Check Valve	FO		X			X			X				
ESWS	30PEB30AP001	Train 3 Motor Driven Pump	PM	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
ESWS	30PEB40AA005	Train 4 Pump Discharge MOV	CL		X			X							
ESWS	30PEB40AA204	Train 4 Pump Discharge Check Valve	CL		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
ESWS	30PEB40AP001	Train 4 Motor Driven Pump	FS	X	X	X	X	X	X		SD IE	SD IE		SD IE	SD IE
ESWS	30PEB80AA002	SA-ESWS Pump 80 Discharge Manual Check Valve	IR		X			X							
FWS	30LAA10BB001	Feedwater Storage Tank	EL		X			X							
FWS	30LAD61AC001	HP Heater	EL		X			X							
FWS	30LAD62AC001	HP Heater	EL		X			X							
FWS	30LAD71AC001	HP Heater	EL		X			X							
FWS	30LAD72AC001	HP Heater	EL		X			X							
HVAC	30SAC01AA003	Normal Air Inlet Motor Operated Damper	CM		X		X	X						X	
HVAC	30SAC01AA004	Div 1 Recirculation Motor Operated Damper	CF		X			X			X			X	
HVAC	30SAC01AA005	Normal Air Inlet Supply Fan Discharge Check Damper	FO			X		X	X			X		X	X

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
HVAC	30SAC01AN001	Normal Air Supply Fan	FR		X		X	X			X		X	X	
HVAC	30SAC02AA003	Normal Air Inlet Motor Operated Damper	CM					X							
HVAC	30SAC02AA004	Div 2 Recirculation Motor Operated Damper	CF					X							
HVAC	30SAC02AA005	Normal Air Inlet Supply Fan Discharge Check Damper	FO			X		X	X			X			X
HVAC	30SAC02AN001	Normal Air Supply Fan	FR					X							
HVAC	30SAC03AA005	Normal Air Inlet Supply Fan Discharge Check Damper	FO			X			X			X			X
HVAC	30SAC03AN001	Normal Air Supply Fan	FR											X	
HVAC	30SAC04AA003	Normal Air Inlet Motor Operated Damper	CM		X		X	X						X	

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
HVAC	30SAC04AA004	Div 4 Recirculation Motor Operated Damper	CF		X		X	X			X			X	
HVAC	30SAC04AA005	Normal Air Inlet Supply Fan Discharge Check Damper	FC			X		X	X			X		X	X
HVAC	30SAC04AN001	Normal Air Supply Fan	FR		X		X	X			X		X	X	
HVAC	30SAC05AA003	Maintenance Division Outside Air Supply Damper	PM				X								
HVAC	30SAC05AN001	Maintenance Division Air Supply Fan	FR												X
HVAC	30SAC08AA003	Maintenance Division Outside Air Supply Damper	PM				X								
HVAC	30SAC08AA005	Maintenance Division Supply Fan Discharge Check Damper	FO												X

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown						
				CDF			LRF			CDF			LRF			
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	
HVAC	30SAC08AN001	Maintenance Division Air Supply Fan	FR													X
HVAC	30SAC31AA002	Normal Air Exhaust Motor Operated Damper	CL		X			X						X		
HVAC	30SAC31AA003	Normal Air Exhaust Supply Fan Discharge Check Damper	FO			X		X	X			X		X	X	
HVAC	30SAC31AN001	Normal Air Exhaust Fan	FR		X		X	X			X		X	X		
HVAC	30SAC32AA002	Normal Air Exhaust Motor Operated Damper	CL					X								
HVAC	30SAC32AA003	Normal Air Exhaust Supply Fan Discharge Check Damper	FO			X		X	X			X				X
HVAC	30SAC32AN001	Normal Air Exhaust Fan	FR					X								
HVAC	30SAC33AA003	Normal Air Exhaust Supply Fan Discharge Check Damper	FO			X			X			X				X

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
HVAC	30SAC33AN001	Normal Air Exhaust Fan	FR											X	
HVAC	30SAC34AA002	Normal Air Exhaust Motor Operated Damper	CL		X			X						X	
HVAC	30SAC34AA003	Normal Air Exhaust Supply Fan Discharge Check Damper	FO			X		X	X			X		X	X
HVAC	30SAC34AN001	Normal Air Exhaust Fan	FR		X		X	X			X		X	X	
HVAC	30SAC35AA002	Maintenance Division Exhaust Fan Motor Operated Damper	FO												X
HVAC	30SAC35AA003	Maintenance Division Exhaust Fan Discharge Check Damper	CL												X
HVAC	30SAC35AN001	Maintenance Division Air Exhaust Fan	FR												X

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown						
				CDF			LRF			CDF			LRF			
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	
HVAC	30SAC38AA002	Maintenance Division Exhaust Fan Motor Operated Damper	FO													X
HVAC	30SAC38AA003	Maintenance Division Exhaust Fan Discharge Check Damper	FO													X
HVAC	30SAC38AN001	Maintenance Division Air Exhaust Fan	FR													X
IRWST	30JNK10AA001	SIS Sump to MHSI/LHSI Train 1 Pumps Suction MOV	CL					X								
IRWST	30JNK10AT001	SIS Sump Strainer to MHSI/LHSI Train 1 Pumps	PG	X	X	X	X	X	X	X		X	X			X
IRWST	30JNK10AT002	SIS Sump Strainer to MHSI/LHSI Train 2 Pumps	PG	X		X	X		X	X		X	X			X
IRWST	30JNK11AT001	SIS Sump Strainer to MHSI/LHSI Train 4 Pumps	PG	X		X	X		X	X		X	X			X

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
IRWST	30JNK11AT002	SIS Sump Strainer to MHSI/LHSI Train 3 Pumps	PG	X		X	X		X	X		X	X		X
IRWST	30JNK11AT003	SAHR Sump Strainer	PG	X		X	X		X	X		X	X		X
MFWS	30LAB14AA002	Pump 14 Discharge Pneumatic Check Valve	IR		X			X							
MFWS	30LAB31AA001	HP Heater Train 1 Bypass MOV	CL		X			X							
MFWS	30LAB31AA002	HP Heater Train 1 Bypass MOV	CL		X			X							
MFWS	30LAB32AA001	HP Heater Train 2 Bypass MOV	CL		X			X							
MFWS	30LAB32AA002	HP Heater Train 2 Bypass MOV	CL		X			X							
MSS	30LBA11AA191	Train 1 Main Steam Safety Relief Valve	FO	X		X									
MSS	30LBA12AA191	Train 1 Main Steam Safety Relief Valve	FO	X		X									
MSS	30LBA13AA001	Train 1 MSRIV	FO	X		X	X	X	X						

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
MSS	30LBA13AA712	Train 1a MSRIV Piston Pilot Valve	FO			X			X						
MSS	30LBA13AA713	Train 1a MSRIV Piston Pilot Valve	FO			X			X						
MSS	30LBA13AA722	Train 1a MSRIV Solenoid Pilot Valve	FO			X			X						
MSS	30LBA13AA723	Train 1a MSRIV Solenoid Pilot Valve	FO			X			X						
MSS	30LBA21AA191	Train 2 Main Steam Safety Relief	FO	X		X									
MSS	30LBA22AA191	Train 2 Main Steam Safety Relief	FO	X		X									
MSS	30LBA23AA001	Train 2 MSRIV	FO	X		X	X	X	X						
MSS	30LBA23AA712	Train 2a MSRIV Piston Pilot Valve	FO			X			X						
MSS	30LBA23AA713	Train 2a MSRIV Piston Pilot Valve	FO			X			X						
MSS	30LBA23AA722	Train 2a MSRIV Solenoid Pilot Valve	FO			X			X						

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
MSS	30LBA23AA723	Train 2a MSRIV Solenoid Pilot Valve	FO			X				X					
MSS	30LBA31AA191	Train 3 Main Steam Safety Relief Valve	FO	X		X									
MSS	30LBA32AA191	Train 3 Main Steam Safety Relief Valve	FO	X		X									
MSS	30LBA33AA001	Train 3 MSRIV	FO	X		X	X	X	X						
MSS	30LBA40AA002	Train 4 Main Steam Isolation Valve	FC	X	X		X	X							
MSS	30LBA41AA191	Train 4 Main Steam Safety Relief Valve	FO	X	X	X		X							
MSS	30LBA42AA191	Train 4 Main Steam Safety Relief Valve	FO	X	X	X		X							
MSS	30LBA43AA001	Train 4 MSRIV	FC	X		X	X	X	X						
MSS	30LBA43AA716	Train 4b MSRIV Piston Pilot Valve	FC			X				X					

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
MSS	30LBA43AA726	Train 4b MSRIV Solenoid Pilot Valve	FC			X			X						
MSS	30LCS71AC001	Reheat 2 Condensate Cooler 1	EL		X			X							
MSS	30LCS72AC001	Reheat 2 Condensate Cooler 2	EL		X			X							
OCWS	30QNA21AN001	Chiller Unit	FR												X
OCWS	30QNA23AN001	Chiller Unit	FR												X
OCWS	30QNA24AN001	Chiller Unit	PM				X								X
RCS	30JEB10 SSSF	Stand Still Seal for RCP1	SF		X			X							
RCS	30JEB10AA001	RCP1 Thermal Barrier Supply Check Valve	CL		X			X							
RCS	30JEB10AA003	RCP1 Thermal Barrier Return SOV	CL		X			X							
RCS	30JEB10AA010	RCP1 Leakoff Isolation MOV	FC	X	X			X							
RCS	30JEB10AA018	RCP1 Nitrogen Supply MOV	FO		X										

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
RCS	30JEB10AA020	RCP1 Seal Nitrogen Venting Isolation MOV	FC	X	X			X							
RCS	30JEB10AA021	RCP1 Thermal Barrier Supply MOV	CL		X			X							
RCS	30JEB10AA191	RCP1 Thermal Barrier Return Safety Valve	PO		X			X							
RCS	30JEB10AP001-BKR	13.8kV SWGR 31BDE Circuit Breaker to RCP	FO		X				X						
RCS	30JEB20 SSSF	Stand Still Seal for RCP2	SF		X			X							
RCS	30JEB20AA001	RCP2 Thermal Barrier Supply Check Valve	CL		X			X							
RCS	30JEB20AA003	RCP2 Thermal Barrier Return SOV	CL		X			X							
RCS	30JEB20AA010	RCP2 Leakoff Isolation MOV	FC	X	X			X							
RCS	30JEB20AA018	RCP2 Nitrogen Supply MOV	FO		X										

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
RCS	30JEB20AA020	RCP2 Seal Nitrogen Venting Isolation MOV	FC	X	X			X							
RCS	30JEB20AA021	RCP2 Thermal Barrier Supply MOV	CL		X			X							
RCS	30JEB20AA191	RCP2 Thermal Barrier Return Safety Valve	PO		X			X							
RCS	30JEB20AP001-BKR	13.8kV SWGR 32BDE Circuit Breaker to RCP	FO		X				X						
RCS	30JEB30 SSSF	Stand Still Seal for RCP3	SF		X			X							
RCS	30JEB30AA001	RCP3 Thermal Barrier Supply Check Valve	CL		X			X							
RCS	30JEB30AA003	RCP3 Thermal Barrier SOV	CL		X			X							
RCS	30JEB30AA010	RCP3 Leakoff Isolation MOV	FC	X	X			X							
RCS	30JEB30AA018	RCP3 Nitrogen Supply MOV	FO		X										

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
RCS	30JEB30AA020	RCP3 Seal Nitrogen Venting Isolation MOV	FC	X	X			X							
RCS	30JEB30AA021	RCP3 Thermal Barrier Supply MOV	CL		X			X							
RCS	30JEB30AA191	RCP3 Thermal Barrier Return Safety Valve	PO		X			X							
RCS	30JEB30AP001-BKR	13.8kV SWGR 33BDE Circuit Breaker to RCP	FO	X	X		X	X	X						
RCS	30JEB40 SSSF	Stand Still Seal for RCP4	SF		X			X							
RCS	30JEB40AA001	RCP4 Thermal Barrier Supply Check Valve	CL		X			X							
RCS	30JEB40AA003	RCP4 Thermal Barrier SOV	CL		X			X							
RCS	30JEB40AA010	RCP4 Leakoff Isolation MOV	FC	X	X			X							
RCS	30JEB40AA018	RCP4 Nitrogen Supply MOV	FO		X										

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
RCS	30JEB40AA020	RCP4 Seal Nitrogen Venting Isolation MOV	FC	X	X			X							
RCS	30JEB40AA021	RCP4 Thermal Barrier Supply MOV	CL		X			X							
RCS	30JEB40AA191	RCP4 Thermal Barrier Return Safety Valve	PO		X			X							
RCS	30JEB40AP001-BKR	13.8kV SWGR 34BDE Circuit Breaker to RCP	FO	X	X		X	X	X						
RCS	30JEF-PSRV	Pressurizer Safety Relief Valve	RC								X				
SAHR	30JMQ40AP001	Motor Driven Pump	PM	X											
SCWS	30QKA10AA101	Train 1 Chiller By-pass MOV	CF					X			X			X	
SCWS	30QKA10AA102	Train 1 Discharge Xtie MOV	CL		X			X			X			X	
SCWS	30QKA10AA103	Train 1 Suction Xtie MOV	CL		X			X			X			X	

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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SCWS	30QKA10AP107	Train 1 Motor Driven Safety Chiller Pump	FR							X			X	X	X
SCWS	30QKA10AP108	Train 1 Motor Driven Safety Chiller Pump	FR											X	
SCWS	30QKA10GH001	Train 1 Chiller Unit	FS	X		X	X	X	X	X	X	X	X	X	X
SCWS	30QKA20AA101	Train 2 Chiller By-pass MOV	FO										X	X	
SCWS	30QKA20AA102	Train 2 Discharge Xtie MOV	CL		X			X			X			X	
SCWS	30QKA20AA103	Train 2 Suction Xtie MOV	CL		X			X			X			X	
SCWS	30QKA20AP107	Train 2 Motor Driven Safety Chiller Pump	FS							X			X	X	X
SCWS	30QKA20GH001	Train 2 Chiller Unit	PM	X			X	X		X		X	X	X	X
SCWS	30QKA30AA101	Train 3 Chiller By-pass MOV	CF		X			X						X	
SCWS	30QKA30AA102	Train 3 Discharge Xtie MOV	CL		X			X			X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SCWS	30QKA30AA103	Train 3 Suction Xtie MOV	CL		X			X			X			X	
SCWS	30QKA30AP107	Train 3 Motor Driven Safety Chiller Pump	FR					X	X			X	X	X	X
SCWS	30QKA30AP108	Train 3 Motor Driven Safety Chiller Pump	FR					X						X	
SCWS	30QKA30GH001	Train 3 Chiller Unit	FR		X		X	X		X		X	X	X	X
SCWS	30QKA40AA101	Train 4 Chiller By-pass MOV	FO				X	X		X	X		X	X	
SCWS	30QKA40AA102	Train 4 Discharge Xtie MOV	CL		X			X			X			X	
SCWS	30QKA40AA103	Train 4 Suction Xtie MOV	CL		X			X			X			X	
SCWS	30QKA40AP107	Train 4 Motor Driven Safety Chiller Pump	FS						X			X	X	X	X
SCWS	30QKA40AP108	Train 4 Motor Driven Safety Chiller Pump	FS											X	
SCWS	30QKA40GH001	Train 4 Chiller Unit	PM	X		X	X	X	X	X	X	X	X	X	X

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SCWS	30QKC10AA026	LHSI Pump 10 Motor Cooling Manual Valve	MEC1		X										
SCWS	30QKC10AA027	LHSI Pump 10 Sealing Fluid Cooling Manual Valve	MEC1		X										
SCWS	30QKC10AA028	Train 1 Discharge of LHSI Pump Seal Cooler Check Valve	FO		X										
SCWS	30QKC10AA101	Return from SAC Div 1 MOV	CF		X			X			X			X	
SCWS	30QKC20AA101	Return from SAC Div 2 MOV	CF					X							
SCWS	30QKC40AA101	Return from SAC Div 4 MOV	CF		X		X	X			X			X	
SIS/RHR	30JNA10AA001	LHSI Pump 10 Hot Leg Suction from RCS MOV	FO			X	X	X	X					X	
SIS/RHR	30JNA10AA002	LHSI Pump 10 Hot Leg Suction from RCS MOV	FO		X	X	X	X	X					X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 57 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JNA10AA003	LHSI Pump 10 Hot Leg Suction from RCS MOV	FO			X	X	X	X						
SIS/RHR	30JNA10AA101	LHSI Train 1 HTX Bypass MOV	CF	X	X		X	X							
SIS/RHR	30JNA10AA191	LHSI Train 1 Safety Valve	PO							X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNA20AA001	LHSI Pump 20 Hot Leg Suction from RCS MOV	FO			X	X		X				X	X	
SIS/RHR	30JNA20AA002	LHSI Pump 20 Hot Leg Suction from RCS MOV	FO			X	X		X				X	X	
SIS/RHR	30JNA20AA003	LHSI Pump 20 Hot Leg Suction from RCS MOV	FO			X	X		X						
SIS/RHR	30JNA20AA101	LHSI Train 2 HTX Bypass MOV	CF	X	X			X		X	X				
SIS/RHR	30JNA20AA191	LHSI Train 2 Safety Valve	PO							X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNA30AA001	LHSI Pump 30 Hot Leg Suction from RCS MOV	FO			X			X				X	X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 58 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown						
				CDF			LRF			CDF			LRF			
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	
SIS/RHR	30JNA30AA002	LHSI Pump 30 Hot Leg Suction from RCS MOV	FO			X				X				X	X	
SIS/RHR	30JNA30AA003	LHSI Pump 30 Hot Leg Suction from RCS MOV	FO			X				X						
SIS/RHR	30JNA30AA101	LHSI Train 3 HTX Bypass MOV	CF								X	X			X	
SIS/RHR	30JNA30AA191	LHSI Train 3 Safety Valve	PO								X	SD IE	SD IE	X	SD IE	SD IE
SIS/RHR	30JNA40AA001	LHSI Pump 40 Hot Leg Suction from RCS MOV	FO			X				X						
SIS/RHR	30JNA40AA002	LHSI Pump 40 Hot Leg Suction from RCS MOV	FO			X				X						
SIS/RHR	30JNA40AA003	LHSI Pump 40 Hot Leg Suction from RCS MOV	FO			X				X						
SIS/RHR	30JNA40AA101	LHSI Train 4 HTX Bypass MOV	CF									X				
SIS/RHR	30JNA40AA191	LHSI Train 4 Safety Valve	PO								X	SD IE	SD IE		SD IE	SD IE

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 59 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JND10AA003	MHSI Pump 10 Discharge Manual Check Valve	MEC1			X	X				X	X			X
SIS/RHR	30JND10AA007	MHSI Pump 10 Discharge Check Valve (CIV)	FC			X		X				X			X
SIS/RHR	30JND10AP001	Train 1 Motor Driven Pump	FR	X		X	X					X	X		X
SIS/RHR	30JND20AA003	MHSI Pump 20 Discharge Manual Check Valve	MEC1			X					X	X		X	X
SIS/RHR	30JND20AA007	MHSI Pump 20 Discharge Check Valve (CIV)	CL			X						X			X
SIS/RHR	30JND20AP001	Train 2 Motor Driven Pump	FR	X		X						X	X		X
SIS/RHR	30JND30AA003	MHSI Pump 30 Discharge Manual Check Valve	MEC1			X					X	X	X	X	X
SIS/RHR	30JND30AA007	MHSI Pump 30 Discharge Check Valve (CIV)	CL			X						X			X
SIS/RHR	30JND30AP001	Train 3 Motor Driven Pump	PM	X		X						X	X		X

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 60 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JND40AA003	MHSI Pump 40 Discharge Manual Check Valve	MEC1			X						X			X
SIS/RHR	30JND40AA007	MHSI Pump 40 Discharge Check Valve (CIV)	CL			X						X			X
SIS/RHR	30JND40AP001	Train 4 Motor Driven Pump	PM	X		X						X	X		X
SIS/RHR	30JNG10AA001	LHSI Pump 10 Suction from IRWST MOV	FC				X	X		X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG10AA003	LHSI Train 1 to Radial Miniflow Motor Operated Check Valve	OP								X				
SIS/RHR	30JNG10AA004	Train 1 Min Flow MOCV	FC		X		X	X							
SIS/RHR	30JNG10AA006	LHSI CL1 Discharge Manual Check Valve	MEC1	X	X	X	X	X				X			
SIS/RHR	30JNG10AA009	LHSI Pump 10 Discharge Check Valve (CIV)	FO		X	X						X			

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 61 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JNG10AA011	LHSI Pump 10 Discharge Check Valve	FO		X	X						X			
SIS/RHR	30JNG10AA102	LHSI Pump 10 Control MOV	CF					X							
SIS/RHR	30JNG10AC001	LHSI Train 1 HTX	TL		X			X			X				
SIS/RHR	30JNG10AP001	Train 1 Motor Driven Pump	PM	X	X	X	X	X	X	X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG13AA005	MHSI/LHSI Train 1 First SIS Isolation Check Valve	FO	X	X	X	X	X	X	X	X	X	X		X
SIS/RHR	30JNG20AA001	LHSI Pump 20 Suction from IRWST MOV	OP				X			X	SD IE	SD IE	X	SD IE	SD IE
SIS/RHR	30JNG20AA003	LHSI Train 2 to Radial Miniflow Motor Operated Check Valve	OP								X			X	
SIS/RHR	30JNG20AA004	Train 2 Min Flow MOCV	FC				X				X			X	
SIS/RHR	30JNG20AA006	LHSI CL2 Discharge Manual Check Valve	MEC1	X	X	X	X	X				X			

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
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System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JNG20AA009	LHSI Pump 20 Discharge Check Valve (CIV)	FO			X						X			
SIS/RHR	30JNG20AA011	LHSI Pump 20 Discharge Check Valve	FO			X						X			
SIS/RHR	30JNG20AA102	LHSI Pump 20 Control MOV	CF								X				
SIS/RHR	30JNG20AC001	LHSI Train 2 HTX	TL								X				
SIS/RHR	30JNG20AP001	Train 2 Motor Driven Pump	PM	X	X	X	X	X	X	X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG23AA005	MHSI/LHSI Train 2 First SIS Isolation Check Valve	FO	X	X	X	X	X	X	X	X	X	X		X
SIS/RHR	30JNG30AA001	LHSI Pump 30 Suction from IRWST MOV	OP								X	SD IE	SD IE	X	SD IE
SIS/RHR	30JNG30AA003	LHSI Train 3 to Radial Miniflow Motor Operated Check Valve	OP								X			X	
SIS/RHR	30JNG30AA004	Train 3 Min Flow MOCV	FC								X			X	

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 63 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JNG30AA006	LHSI CL3 Discharge Manual Check Valve	MEC1	X	X	X						X			
SIS/RHR	30JNG30AA009	LHSI Pump 30 Discharge Check Valve (CIV)	FO			X						X			
SIS/RHR	30JNG30AA011	LHSI Pump 30 Discharge Check Valve	FO			X						X			
SIS/RHR	30JNG30AA102	LHSI Pump 30 Control MOV	CF								X				
SIS/RHR	30JNG30AC001	LHSI Train 3 HTX	TL					X			X				
SIS/RHR	30JNG30AP001	Train 3 Motor Driven Pump	PM	X		X			X	X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG33AA005	MHSI/LHSI Train 3 First SIS Isolation Check Valve	FO	X	X	X	X		X	X	X	X	X		X
SIS/RHR	30JNG40AA001	LHSI Pump 40 Suction from IRWST MOV	FC								SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG40AA006	LHSI CL4 Discharge Manual Check Valve	MEC1			X						X			

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 64 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
SIS/RHR	30JNG40AA009	LHSI Pump 40 Discharge Check Valve (CIV)	FO			X						X			
SIS/RHR	30JNG40AA011	LHSI Pump 40 Discharge Check Valve	FO			X						X			
SIS/RHR	30JNG40AC001	LHSI Train 4 HTX	TL		X			X			X				
SIS/RHR	30JNG40AP001	Train 4 Motor Driven Pump	PM	X		X	X		X	X	SD IE	SD IE		SD IE	SD IE
SIS/RHR	30JNG43AA005	MHSI/LHSI Train 4 First SIS Isolation Check Valve	FO	X		X	X		X	X	X	X	X		X
SSS	30LAH10AA003	SSS Pump Discharge Pneumatic Check Valve	IR					X							
SSS	30LAJ10AP001	SSS Motor Driven Pump	PM				X								
UHS	30PED10AA010	Cooling Tower Train 1 Spray MOV	CL		X			X							
UHS	30PED10AA011	Cooling Tower Train 1 Bypass Line MOV	OP		X			X							

Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 65 of 66

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
UHS	30PED10AN001	Cooling Tower Train 1 Cooling Fan	FR	X	X			X							
UHS	30PED10AN002	Cooling Tower Train 1 Cooling Fan	FS	X	X		X	X							
UHS	30PED20AA010	Cooling Tower Train 2 Spray MOV	FO	X	X		X	X			X				
UHS	30PED20AA011	Cooling Tower Train 2 Bypass Line MOV	OP								X				
UHS	30PED20AN001	Cooling Tower Train 2 Cooling Fan	FS	X	X		X	X							
UHS	30PED20AN002	Cooling Tower Train 2 Cooling Fan	FS	X	X		X	X							
UHS	30PED30AA010	Cooling Tower Train 3 Spray MOV	FO	X	X		X	X			X				
UHS	30PED30AA011	Cooling Tower Train 3 Bypass Line MOV	OP					X			X				

**Table 17.4-1—Input to RAP List from Importance Measures and Initiating Event Contribution
Sheet 66 of 66**

System	Component ID	Component Description	Dominant Failure Mode ¹	At Power						Shutdown					
				CDF			LRF			CDF			LRF		
				FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW	FV	RAW	CCF RAW
UHS	30PED40AA010	Cooling Tower Train 4 Spray MOV	CL		X			X							
UHS	30PED40AA011	Cooling Tower Train 4 Bypass Line MOV	OP		X			X							
UHS	30PED40AN001	Cooling Tower Train 4 Cooling Fan	FR	X	X										

1. Dominant Failure Mode acronyms are listed below:

CF - Fails to Control Flow

CL - Fails to Remain Open, Spurious Operation

CM - Unavailable due to Corrective Maintenance

EL - External Leakage

FC - Fails to Close on Demand

FL - Fails During Operation

FO - Fails to Open on Demand

FR - Fails to Run

FS - Fails to Start on Demand

IR - Internal Rupture

MEC1 - Left in Wrong Position, Non-Monitored

OP - Fails to Remain Closed, Spurious Operation

PG - Plugs

PM - Unavailable due to Preventive Maintenance

PO - Premature Opening

SF - Seal Failure

ST - Fails on Demand

TL - Tube Leakage

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 1 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
PAS	PAS	Process Automation System (PAS) Fails (Estimate)				X	X	X
PS	ALU/APU NS-ALL	CCF of ALU and APU Protection System Computer Processors (Non-Self-Monitored)			X	X	X	X
PS	ALU/APU SM-ALL	CCF of ALU and APU Protection System Computer Processors (Self-Monitored)			X	X	X	X
PS	CLE23EQ001-APUB1-GRP	Acquisition and processing unit (APU) B1, Division 1 Rack/Module Group Fails	X	X				
PS	CLE23EQ001LV60NS	APU B1 Processing module fails (non-self-monitored)		X				
PS	CLE23EQ001LV60S	APU B1 Processing module fails (self-monitored)		X				
PS	CLE-APUB1-PM	Division 1 APU B1 in Preventive Maintenance	X					
PS	CLF23EQ001-APUB1-GRP	Acquisition and processing unit (APU) B1, Division 2 Rack/Module Group Fails	X	X				
PS	CLF23EQ001LV60NS	APU B1 Processing module fails (non-self-monitored)		X				
PS	CLF23EQ001LV60S	APU B1 Processing module fails (self-monitored)		X				

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 2 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
PS	CLF-APUB1-PM	Division 2 APU B1 in Preventive Maintenance	X					
PS	CLG23EQ001-APUB1-GRP	Acquisition and processing unit (APU) B1, Division 3 Rack/Module Group Fails	X	X				
PS	CLG23EQ001LV60NS	APU B1 Processing module fails (non-self-monitored)		X				
PS	CLG23EQ001LV60SM	APU B1 Processing module fails (self-monitored)		X				
PS	CLG-APUB1-PM	Division 3 APU B1 in Preventive Maintenance	X					
PS	CL-PS-A-SWCCF	CCF of Protection System Diversity Group A Application Software			X			
PS	CL-PS-B-SWCCF	CCF of Protection System Diversity Group B Application Software			X	X	X	X
PS	CL-PS-EDG-SWCCF	CCF of EDG Start Function in PS Diversity Groups A&B Software			X	X	X	X
PS	CL-TXS-OSCCF	CCF of TXS Operating System or Other Common Software			X	X	X	X
SAS	SAS CCF-ALL	CCF of SAS Divisions			X	X	X	X
SAS	SAS1-OP	Operating Safety Automation System (SAS) Fails (Division 1) (Estimate)				X	X	X

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 3 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
SAS	SAS3-OP	Operating Safety Automation System (SAS) Fails (Division 3) (Estimate)			X	X		X
SAS	SAS4	Safety Automation System (SAS) Fails (Division 4) (Estimate)				X		
SCDS	BUS UV CCF-ALL	CCF of 6.9KV bus Under Voltage sensors			X	X	X	X
SCDS	EFW FLOW CCF-12	CCF of EFW Pump Discharge Flow Sensors			X			
SCDS	EFW FLOW CCF-123	CCF of EFW Pump Discharge Flow Sensors			X			
SCDS	EFW FLOW CCF-124	CCF of EFW Pump Discharge Flow Sensors			X			
SCDS	EFW FLOW CCF-134	CCF of EFW Pump Discharge Flow Sensors			X			
SCDS	EFW FLOW CCF-234	CCF of EFW Pump Discharge Flow Sensors			X			
SCDS	EFW FLOW CCF-ALL	CCF of EFW Pump Discharge Flow Sensors			X	X		
SCDS	HL LVL CCF-123	CCF of Hot Leg Loop Level Sensors					X	X
SCDS	HL LVL CCF-124	CCF of Hot Leg Loop Level Sensors					X	X
SCDS	HL LVL CCF-134	CCF of Hot Leg Loop Level Sensors					X	X
SCDS	HL LVL CCF-234	CCF of Hot Leg Loop Level Sensors					X	X
SCDS	HL LVL CCF-ALL	CCF of Hot Leg Loop Level Sensors					X	X

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 4 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
SCDS	HL PRES CCF-123	CCF of Hot Leg WR Pressure Sensors					X	
SCDS	HL PRES CCF-124	CCF of Hot Leg WR Pressure Sensors					X	
SCDS	HL PRES CCF-134	CCF of Hot Leg WR Pressure Sensors					X	
SCDS	HL PRES CCF-234	CCF of Hot Leg WR Pressure Sensors					X	
SCDS	HL PRES CCF-ALL	CCF of Hot Leg WR Pressure Sensors					X	
SCDS	HL TEMP CCF-123	CCF of Hot Leg WR Temperature Sensors					X	
SCDS	HL TEMP CCF-124	CCF of Hot Leg WR Temperature Sensors					X	
SCDS	HL TEMP CCF-134	CCF of Hot Leg WR Temperature Sensors					X	
SCDS	HL TEMP CCF-234	CCF of Hot Leg WR Temperature Sensors					X	
SCDS	HL TEMP CCF-ALL	CCF of Hot Leg WR Temperature Sensors					X	
SCDS	I/O MOD CCF	I/O Module Common Cause Failure			X	X	X	X
SCDS	JEF10CP801-SIS1-SIG	PZR Pressure (NR) Sensor Input to APU B1, Division 1 Signal Group Fails		X				
SCDS	JEF10CP801-SNPFL	PZR pressure (NR) Sensor Fails (includes transmitter)		X				
SCDS	JEF10CP803-SIS1-SIG	PZR pressure (NR) Sensor Input to APU B1, Division 2 Signal Group Fails		X				

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 5 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
SCDS	JEF10CP803-SNPFL	PZR Pressure (NR) Sensor Fails (includes transmitter)		X				
SCDS	JEF10CP805-SIS1-SIG	PZR Pressure (NR) Sensor Input to APU B1, Division 3 Signal Group Fails		X				
SCDS	JEF10CP805-SNPFL	PZR Pressure (NR) Sensor Fails (includes transmitter)		X				
SCDS	LAR11CF801-SNFFL	EFW Pump 1 Discharge Flow Sensor Fails (includes transmitter)		X				
SCDS	PZR PRES CCF-12	CCF of Pressurizer (RCS) Pressure Sensors			X			
SCDS	PZR PRES CCF-123	CCF of Pressurizer (RCS) Pressure Sensors			X	X		
SCDS	PZR PRES CCF-124	CCF of Pressurizer (RCS) Pressure Sensors			X	X		
SCDS	PZR PRES CCF-13	CCF of Pressurizer (RCS) Pressure Sensors			X			
SCDS	PZR PRES CCF-134	CCF of Pressurizer (RCS) Pressure Sensors			X	X		
SCDS	PZR PRES CCF-23	CCF of Pressurizer (RCS) Pressure Sensors			X			
SCDS	PZR PRES CCF-234	CCF of Pressurizer (RCS) Pressure Sensors			X	X		

Table 17.4-2—Risk Significant I&C Basic Events
Sheet 6 of 6

I&C System	I&C Basic Event ID	Basic Event Description	At Power				Shutdown	
			CDF			LRF	CDF	LRF
			FV	RAW	CCF RAW	CCF RAW	CCF RAW	CCF RAW
SCDS	PZR PRES CCF-ALL	CCF of Pressurizer (RCS) Pressure Sensors			X	X		
SCDS	RCS TEMP CCG	Common Cause Failure of the RCP Temperature Sensors (12)					X	
SCDS	SG LVL CCG	Common Cause Failure of the SG Level Sensors (32)			X	X		
SCDS	SG PRESS CCG	Common Cause Failure of the SG Pressure Sensors (16)			X			

**Table 17.4-3—Design Certification Scope Systems and Structures Included
Within RAP
Sheet 1 of 3**

System Names	Rationale for Selection
NSSS Support Systems	
Fuel Handling System	Added by expert panel
Chemical & Volume Control System; including RCP Seal Injection	PRA input to the RAP
Reactor Coolant Systems	
Reactor Coolant System	PRA input to the RAP
Frontline Safety Systems	
Combustible Gas Control System	Added by expert panel
Safety Injection System / Residual Heat Removal System	PRA input to the RAP
In Containment Refueling Water Storage Tank System	PRA input to the RAP
Severe Accident Heat Removal System	PRA input to the RAP
Extra Borating System	Added by expert panel
Emergency Feedwater System	PRA input to the RAP
Core Melt Stabilization System	Added by expert panel
Structures	
Emergency Power Generating Buildings	Added by expert panel
Nuclear Island Structural System (Fuel Building, Reactor Building, Shield Building, Safeguard Buildings, Vent Stack)	Added by expert panel
Essential Service Water Cooling Tower Structures & Pump Structure	Added by expert panel
[[Fire Protection Building and Fire Water Storage Tanks]]	Added by expert panel
Distributed Utilities	
Demineralized Water Distribution System	Added by expert panel
Seal Water Supply System	Added by expert panel
Component Cooling Water System	PRA input to the RAP
Essential Service Water System	PRA input to the RAP
Safety Chilled Water System	PRA input to the RAP
Closed Cooling Water System	PRA input to the RAP
Operational Chilled Water System - Nuclear Island	PRA input to the RAP
Fire Water Distribution System	Added by expert panel
Spray Deluge Systems	Added by expert panel
Sprinkler Systems	Added by expert panel
Gaseous Fire Extinguishing Systems	Added by expert panel

**Table 17.4-3—Design Certification Scope Systems and Structures Included
Within RAP
Sheet 2 of 3**

System Names	Rationale for Selection
Power Conversion Systems	
Feedwater System, including Feedwater Heating and Startup & Shutdown Feedwater	PRA input to the RAP
Main Steam System	PRA input to the RAP
Steam Generator Blowdown System	Added by expert panel
HVAC Systems	
Containment Building Ventilation System	Added by expert panel
Annulus Ventilation System	Added by expert panel
Electrical Division of Safeguard Building Ventilation System	PRA input to the RAP
Safeguard Building Controlled Area Ventilation System	Added by expert panel
Fuel Building Ventilation System	Added by expert panel
Main Control Room Air Conditioning System	Added by expert panel
Emergency Power Generating Building Ventilation System	Added by expert panel
Station Blackout Room Ventilation System	Added by expert panel
Essential Service Water Pump Building Ventilation System	Added by expert panel
Auxiliary Systems	
Liquid Waste Storage & Processing System	Added by expert panel
Gaseous Waste Processing System	Added by expert panel
Station Blackout Diesel Generator Set	PRA input to the RAP
Emergency Diesel Generator Set	PRA input to the RAP
Extended Loss of AC Power Diesel Generator	Added by expert panel
Electrical Systems	
Offsite Power System	Added by expert panel
Switchyard	Added by expert panel
Class 1E Uninterruptible Power Supply System	PRA input to the RAP
Emergency Power Supply System	PRA input to the RAP
Non-Class 1E Uninterruptible Power Supply System	Added by expert panel
Normal Power Supply System	PRA input to the RAP
12-Hour Uninterruptible Power Supply System	PRA input to the RAP
I&C Systems	
Boron Concentration Measurement System	Added by expert panel
Process Automation System	PRA input to the RAP

**Table 17.4-3—Design Certification Scope Systems and Structures Included
Within RAP
Sheet 3 of 3**

System Names	Rationale for Selection
Diverse Actuation System	Added by expert panel
Process Information & Control System	Added by expert panel
Communication System	Added by expert panel
Safety Automation System	PRA input to the RAP
Safety Information & Control System	Added by expert panel
Main Control Room	Added by expert panel
Remote Shutdown Station	Added by expert panel
Incore Instrumentation System	Added by expert panel
Excore Instrumentation System	Added by expert panel
Radiation Monitoring System	Added by expert panel
Protection System	PRA input to the RAP
Priority & Actuator Control System	PRA input to the RAP
Signal Conditioning & Distribution System	PRA input to the RAP
Reactor Control, Surveillance & Limitation System	Added by expert panel
Control Rod Drive Control System	Added by expert panel
Reactor Pressure Vessel Level Measurement System	Added by expert panel
Rod Position Measurement System	Added by expert panel
Hydrogen Monitoring System	Added by expert panel
Turbine-Generator Instrumentation and Control System	Added by expert panel
Leak Detection Systems	Added by expert panel
Plant Fire Alarm System	Added by expert panel

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