Risk Based IST Program - Risk Ranking Determination

Component Level Risk Significance Determination in Support of the Risk Based IST Program

13-NS-C05, Revision 0

Executive Summary

In support of the Risk-Based IST Pilot Program, the Maintenance Rule Expert Panel evaluated valves in the current IST program to determine their risk significance. Additional valves that are modeled in the PVNGS PRA were also considered to determine if there were any high risk significant valves that are not currently being tested in the IST Program.

The results of this study are a list of IST valves that are low and high risk significant.

For the low risk valves that are included in the IST program and modeled in the PRA, the cumulative impact of extending their test intervals was evaluated and it was concluded that the extension would not result in a significant increase in risk (as measured by Core Damage Frequency, Large Early Release Frequency and Off-site Consequences). Low Risk Valves that are not modeled will not have their test frequencies changed until such time as the PRA model is enhanced to include these components. (For a small number of components, the expert panel may determine that modeling is not required if they conclude that the cumulative impact can be determined qualitatively.)

Finally, one valve (AFN-V012) was identified as being of high risk significance but not currently in the IST program. Further evaluation will be performed by the IST Section to determine if this valve warrants inclusion in the IST program and to ensure that it is tested commensurate with its importance to safety.

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1.0 Background

In-Service Testing (IST) programs were developed to ensure the reliable operation of safety-related pumps and valves at nuclear power plants. The codes, standards and guides for these tests were developed by the American Society of Mechanical Engineers (ASME) Operations and Maintenance (O&M) Committee at the request of the Nuclear Regulatory Commission (NRC). The regulation governing IST is 10 CFR 50.55, implemented using ASME Section XI for both passive component examinations (e.g., welds and studs) and for active component testing (pumps and valves).

For the past several years, both the nuclear industry and the NRC have devoted significant attention and resources aimed at improving the performance of pumps and valves. In a letter dated September 9, 1991, from James E. Richardson of the NRC to Forrest T. Rhodes of ASME, the NRC requested that the ASME O&M Committee consider revising existing requirements for in-service testing. The letter requested revisions to ensure the ability of certain pumps and valves to perform their intended hydraulic and mechanical safety functions. The revisions requested would:

- Expand the scope to include specific components that are not constructed in accordance with ASME Code Section III rules for construction or tested in accordance with ASME Code Section XI;
- Require verification of each safety function for each included component;
- Require such verification to be accomplished at design basis conditions, or, where such verification is not possible, a test at less than design basis conditions combined with an analysis may be substituted; and
- Compare data collected during component testing with data taken during previous tests to allow determination of the condition of the component.

The NRC made the request due to concerns with the ability of some components (e.g., motor-operated valves and check valves) to perform their safety functions under design basis conditions. The NRC expressed concern that the in-service tests required by ASME Section XI and incorporated by reference into 10CFR50.55a(f) do not:

- Include each component that has a hydraulic or safety-related function;
- Accomplish verification of each safety function of each safety-related component; or
- Require that such verification be accomplished at the design basis conditions.

The scope of the current IST program includes all active safety-related pumps and valves credited in the plant's safety analysis. The IST scope is developed by reviewing plant drawings showing ASME Class 1, 2 and 3 classification boundaries. All components within the boundaries are reviewed to determine if they perform an active safety function under the plant licensing basis. The Updated Final Safety Analysis Report analyses and other design basis documentation are reviewed to make this determination.

As a result of the NRC request for IST program enhancement, there are industry concerns involving the restrictive nature and basis for these requirements and their impact on plant operation. Unnecessarily restrictive requirements can degrade plant safety through needless component testing and undue burden during plant outages, complicate plant operation and cause unwarranted operating costs.

Developments in the industry demonstrate the use of risk-based approaches using a plant's Probabilistic Risk Analysis (PRA) to identify prescriptive regulations that have marginal safety benefits and identify those areas where safety enhancements are appropriate. The momentum for the use of PRA is evidenced by recent NRC interest in graded Quality Assurance, EPRI's Applications of Risk-Based Technologies program and the recent issuance of the NRC's final policy statement on the use of PRA in nuclear regulatory activities (Reference 1).

Similarly, improvements to the IST program using a risk-based approach can reduce operating costs while maintaining a high level of plant safety. Possible savings from improved IST programs include:

- Reduced costs of engineering analysis to develop test criteria that adequately demonstrate functional capability at design basis conditions;
- Reduced costs of plant modifications where current configurations do not support testing at or near design basis conditions;
- Reduced costs for development of new test procedures implementing the new test criteria; and
- Reduction of incremental costs associated with performing the new test, including:
    1. Additional time required to perform the test and analyze results;
    2. Costs of specialized test equipment or vendor services;
    3. Critical path outage duration; and
    4. Increased radiation exposure.

For these reasons it is advantageous and prudent for utilities to pursue IST program improvements. The impact of changes on plant safety is of primary interest and is the controlling factor in implementing such changes. However, changes that negligibly degrade plant safety should be considered, especially if such changes can lead to significant plant performance improvements in other areas.

2.0 Scope and Objective

The scope of this project is to perform a review of the PVNGS IST program that optimizes the safety benefits in assuring valve performance. (At this time only valves are being considered. A preliminary assessment indicated that most of the pumps would be considered high risk significant.) It provides a methodology for a risk-based approach to IST program implementation that is founded on a blend of probabilistic and deterministic methods. This methodology has as its principal results, recommendations for adjustments to test frequency for components in the program. (Appropriate test methods for high and low risk significant components is currently being considered by the ASME and will be implemented as appropriate.) The intent is to optimize the testing that is performed rather than reducing the number of components in the IST program. At this time, PVNGS, while examining all components within the scope of the IST program, chose to make recommendations that address only those components that are less risk significant or that were of high risk significance but not presently included within the scope of the IST program. The ASME O&M Committee intends to review the In-Service testing of the higher risk significant components and to make recommendations regarding any modifications sometime in the near future.

The objectives of this program are to:

- Apply risk-based technologies to IST components to determine their risk significance;
- Apply risk-based technologies to risk-significant components identified in the PRA and outside the scope of ASME Code Classes 1, 2 and 3 to determine whether additional testing is appropriate;
- Apply a combination of deterministic and risk-based methods to determine appropriate testing requirements; and
- Determine, where feasible, if the IST methods and frequency applied to risk-significant components can be improved.

Several safety enhancements to a plant IST program can be derived, both directly and indirectly, by using the probabilistic and deterministic insights from a risk-based approach to IST. These safety enhancements are similar to those attendant with the optimized performance of motor-operated valves discussed in NUMARC 93-05, from which elements of the following discussion are taken.

2.1 Direct Safety Enhancements

Greater attention and resources devoted to the high risk IST components translates into many direct safety enhancements as discussed below:

- This group of components will be subjected to, where practicable and meaningful, more frequent periodic tests than the lower risk components. The timeliness of any problem identification and resolution will be improved;

- Requirements associated with the high risk group of components will be more rigorous and demanding than for the low risk components. These requirements provide added assurance that any problems that may impact the functionality of the components will be identified and resolved;
- The risk-based IST program will consider whether risk-significant components that are outside of the scope of ASME Code Classes 1, 2 and 3 should receive enhanced testing to improve reliability; and
- Because extensive testing can have adverse safety and operational consequences, reduction of testing will reduce wear-out and operator burden.

2.2 Indirect Safety Enhancements

The risk-based approach to IST identifies the safety-significant IST components and the impact of their potential failure on plant safety. In addition, PRAs identify important scenarios that provide information with respect to the operational demand that may be placed on the component. Such information is valuable because it relates the performance of the IST component to the broader context of plant safety. This allows more rational decision making, more efficient use of resources and is central to optimizing safety benefits.

PRAs identify safety-significant IST components that are not within the scope of ASME Code Classes 1, 2 and 3 that may be used to mitigate an accident. As part of PVNGS's overall safety mission, these components are evaluated for possible addition to the IST program (or other testing programs) to ensure that the components are tested commensurate with their safety significance.

3.0 General Approach

The PVNGS risk-based IST project was conducted in conjunction with the ASME research program funded by the NRC, the Westinghouse and Combustion Engineering Owners Groups, the Nuclear Energy Institute (NEI) and other utilities. This project was also coordinated with various other risk-based initiatives such as graded Quality Assurance and implementation of the Maintenance Rule. The PVNGS project was designed to provide plant-specific benefits and, as a pilot project, to provide generic insights and tools that will benefit similar industry projects. In particular, the project developed generic methods for identifying opportunities to reduce those IST-related regulatory requirements and commitments that require significant resources to comply with and/or implement, but contribute little to safe or reliable operation.

The project was divided into three phases:

- Phase 1 involved the development of the methodology to prioritize components in the IST program;
- Phase 2 involved determination of the components to be deferred based on the risk insights and component performance; and
- Phase 3 involved assessing the impact of the proposed test frequency changes on risk.

The work activities in each of these phases was performed by PVNGS engineers, reviewed by the Expert Panel and presented to various other peer groups. The various tasks that support the project are described in more detail in the sections that follow.

Review of the appropriate test methods for high risk significant components will be performed after completion of the ASME efforts in this area.

4.0 Evaluation Methodology

This methodology was developed consistent with the guidelines contained in NUMARC 93-01 (Maintenance Rule) and 93-05 (MOV testing). The system level ranking approach from the maintenance rule process was combined with the component level ranking approach used for MOV testing. Both the system and component level rankings were used to ensure that the risk-based IST program would be a comprehensive evaluation that could be used for other risk-based initiatives with minor modification.

During the development of this methodology, EPRI and NEI completed the development of the PSA Applications Guide (Reference 3). In general, this methodology is consistent with the guide.

The general approach taken included five steps:

- First, risk importance was determined. This determination was based on the results of the full power PRA and other plant operating modes, such as outage modes. In addition, severe accidents leading to large and early fission product releases were analyzed and the insights from the IPEEE were evaluated. Finally, the importance of components not modeled in the PRA were evaluated;
- Second, the completeness and adequacy of the PRA was evaluated through a number of sensitivity studies;
- Third, an expert panel that was knowledgeable of plant risk, plant design, plant operations practices, and plant performance reviewed the results. This process blended deterministic safety insights with quantitative risk insights to ensure that risk significance was appropriately identified.
- Fourth, the less safety significant components were reviewed by the IST engineers to determine if past performance and/or service conditions warranted extension of the test intervals; and
- Fifth, the cumulative impact of extending the test intervals for low risk significant components on plant risk was evaluated. This step provided technical justification for proposed test intervals for less risk significant components in the existing IST Program.

The following sections further describe the methodology and provide additional background.

The 1994 version of the PVNGS PRA was used as the basis for the determination of component relative risk ranking. No components will be removed from the IST program as a result of this process.

4.1 Expert Panel Process

For the PVNGS Risk-Based In-Service Testing Program, an Expert Panel was established to make the final determination of risk ranking for the components in the IST program. The members of the panel were selected based on their nuclear power plant experience which included expertise in the areas of:

- Plant operations at the Senior Reactor Operator level;
- Maintenance;
- Engineering;
- Safety Analysis;
- Scheduling; and
- Probabilistic Risk Assessment.

The expert panel also used the expertise of other engineers as needed. For the IST program, an IST engineer attended several meetings to determine if specific IST expertise was required to establish component level risk significance. The IST engineer is also responsible for evaluating performance factors prior to changing the test interval of components.

The expert panel made a qualitative assessment of the risk importance categories that were developed for the components using the PRA results and insights discussed in the following sections of this report. This assessment was based on deterministic insights, plant history, engineering judgments, regulatory requirements, and PRA insights. The expert panel reviewed the PRA component risk rankings, analyzed applicable deterministic information and determined the final safety significance categorizations for all the IST components.

Additional details of the expert panel process are discussed below.

4.1.1 Purpose and Responsibility

An expert panel was formed to review the quantitative risk significance data. The purpose of the panel is to determine the final safety significance categorization for each IST component. The deterministic insights and engineering judgments of the expert panel along with a review of the sensitivity study results compensate for the limitations of the PRA risk-ranking process and results in a comprehensive ranking which assures an adequate level of safety and quality.

4.1.2 Panel Makeup

The panel members were selected with expertise in the following disciplines: Maintenance, Operations, Scheduling, Safety Analysis, Engineering and Probabilistic Risk Assessment. The qualification for membership on the panel is provided in Table 1:

Table 1 - Expert Panel Qualifications

Discipline	Experience Requirement
Maintenance	6 years experience (2 Maintenance)
Operations	6 years experience and valid SRO
Scheduling	6 years experience (4 Scheduling)
Safety Analysis	B.S. in Engineering & 6 years experience (4 Safety Analysis)

Table 1 - Expert Panel Qualifications

Discipline	Experience Requirement
Engineering	B.S. in Engineering & 6 years experience (4 System/Design Engineering)
PRA	B.S. in Engineering & 6 years experience (4 PRA)

The actual panel membership included personnel with over 106 years of experience and 3 members who were either currently licensed or previously licensed as an SRO.

4.1.3 Process Considerations

The process used by the expert panel to establish risk significance can be described in 5 steps. These steps include:

4.1.3.1 System Level Screening

As part of the Maintenance Rule Implementation at PVNGS, all systems were ranked as either high or low Risk Significant based on their safety function and risk contribution. Components that were contained in Low Risk Systems and were not modeled in the PRA nor interfaced with a High Risk Significant System were considered to be of Less Safety Significance. Components in Low Risk Systems that were explicitly modeled in the PRA or interfaced with a High Risk System were subject to the further review discussed in Sections 4.1.3.2 through 4.1.3.5..

4.1.3.2 Deterministic Evaluation

All non-screened components were reviewed to determine if they were required to meet the safety function of the system or supported system. For this evaluation, all operating modes including shutdown were considered. Components that were required to meet the safety function of the system were considered of high safety significance unless:

- there was a high degree of confidence in the high reliability of the component;
- there was a high degree of redundancy/diversity for performing the function; or
- the component did not provide a significant contribution to meeting the safety function.

The safety functions considered were:

- Reactivity Control;
- Maintenance of Vital Auxiliaries (including instrumentation, annunciation and habitability);
- RCS Heat Removal;
- RCS Pressure and Inventory Control;

- Containment Atmospheric Control; and
- Containment Integrity.

4.1.3.3 Initiating Events

All non-screened components were evaluated based on the likelihood of causing an initiating event. Those components whose failure would directly cause an initiating event and those components whose failure could cause a complicated initiating event without operator action to prevent the event were considered to have high risk significance unless the probability of failure was considered to be extremely low.

4.1.3.4 External Events

All non-screened components were evaluated based on the insights gained from the external event evaluation. Components that were considered to provide a significant mitigation function following an external event that were not already considered to be of high risk significance were considered high risk unless the frequency of the event was considered so low as to be improbable. Also considered was whether the function of the component for mitigating the external event was different from the function of the component for initiating events from full power.

4.1.3.5 Shutdown Risk

PVNGS is in the process of developing a Shutdown PRA model. For the past 4 years a team of SROs, PRA engineers, STAs, Outage Schedulers and Nuclear Assurance personnel have reviewed the unit's refueling outage schedules from a risk and safety perspective. As a result of this effort and the preliminary results from the shutdown model, the IST valves important to shutdown were identified by a qualitative review with the lead engineer responsible fro the Shutdown Risk Assessment Program.

4.2 Risk Importance Determination

Risk importance rankings of the IST components were determined based on the results of the PVNGS PRA. These risk rankings were then complemented with the deterministic rankings discussed in Section 4.1.3.

Each of these evaluations considered importance with respect to core damage prevention. Core damage prevention has been found to be a good measure of the spectrum of releases that can result from severe accidents. However, several components can have a large impact of release potential without impacting core damage. Therefore, risk rankings were complemented by considering components important to preventing large, early releases. This approach is consistent with the intent of the safety goal and the severe accident policy statement and is a requirement of the PSA Applications Guide.

In applying this methodology, it was found that a significant fraction of IST components are not modeled in the PRA. This methodology specifically evaluated

each component and the design basis functions addressed by the IST program. Many components that are not modeled in the PRA were found to be implicitly modeled. That is, the PRA determined that the components were either not required for the system to prevent severe accidents or they performed functions that were extremely unlikely to be required. The systematic review of these components used quantitative and qualitative insights to determine whether components should be considered more or less risk significant.

The risk ranking process can also identify components that are more risk significant but which are not in the IST program. These components typically are found to be outside the code class boundary and therefore not subject to IST requirements. These components were considered to determine appropriate test strategies that would identify failure modes important for reducing risk.

4.2.1 Quantitative Criteria

The risk-based prioritization of a component relates the performance of a component to overall public safety. Public safety is maintained through the use of multiple barriers including the fuel cladding, primary system pressure boundary and containment. For risk ranking, core damage frequency and large early release frequency were chosen as the primary figures of merit as these measures directly relate to the prevention or mitigation of off-site release that could impact public safety.

4.2.1.1 Selecting Importance Categories

The purpose of ranking IST components is to assign specific testing requirements according to their safety significance. Because there are many components within the scope of ASME Code Classes 1, 2 and 3, it is impractical to develop a different set of requirements for each component. Therefore, once components have been ranked according to their safety significance, it is useful to group them into priority or importance categories. Each category will then have distinct requirements regarding type of testing, test frequency, etc.

4.2.1.2 Use of Risk Importance Measures

The most common risk importance measures, i.e., those identified in NUMARC 93-01 and 93-05 and in the PSA Applications Guide, are:

- Risk Achievement Worth (RAW);
- Fussell-Vesely Importance (F-V);
- Risk Reduction Worth (RRW); and
- Core Damage Frequency Contribution.

RRW and FV measures are related, yielding essentially identical rankings in the range in which most ranking decisions are made. The core damage frequency contribution measure provides the most insight for systems or highly important components. Because it offered insufficient resolution for lower ranked components and less insight into the component's role in the plant model, it was eliminated from consideration for component level ranking.

The risk-based prioritization of a component relates the performance of a component to overall public safety. Public safety is maintained through the use of multiple barriers including the fuel cladding, primary system pressure boundary and containment. For risk ranking, core damage frequency was chosen as the primary figure of merit as most of the components being considered are used to prevent or mitigate core damage. For most accidents, if core damage is prevented, the primary system pressure boundary and containment are not challenged. Additional figures of merit including Large Early Release Frequency were used to provide additional insights with regards to risk significance as well as address those components that do not impact core damage.

The PVNGS PRA was used to provide an initial risk-ranking of components. Fussell-Vesely (F-V) and Risk Achievement Worth (RAW) calculated with respect to Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) RAW were used as the initial indicators of risk significance. F-V was used as an indicator. It represents the fraction of the CDF that includes failure of the component of interest. This can be interpreted as the likelihood of a core damage event with failure of the component. RAW provides an indicator of the importance of extreme degradation in reliability. PVNGS used the criteria in Table 2 for this initial risk indication.

Components were initially categorized based on the highest indicator. In order to address assumptions that were made in the PRA with regards to events that were assumed to impact a particular train (i.e., LOCAs and SGTRs), components were grouped by function and the highest importance value from either train was used for the risk ranking.

The use of RAW for CDF, Common Cause and LERF was used to identify those components that have a low probability of failure but whose failure could have significant consequences.

Because Risk Reduction Worth (RRW) and F-V provide similar insights in the range of interest, RRW was not used in this analysis.

The PVNGS PRA was used to provide an initial risk-ranking of components. F-V and RAW calculated with respect to CDF and LERF RAW were used as the initial indicators of risk significance. Common cause RAW was also used to insure that the impact of changes on multiple trains of equipment were considered.

4.2.1.3 Number of Categories

The scoped components were divided into three categories based on the risk importance measures for each risk indicator. There were no rigorous rules to establish the number of categories or the boundaries of each category. Too few categories results in a loss of the benefits from grading requirements. Too many categories can make implementation unnecessarily burdensome and little distinction between requirements for different categories could become arbitrary and unimportant.

4.2.1.4 Boundaries Between Categories

Category boundaries were chosen so that completeness issues were addressed. The boundaries between categories were based on engineering judgement with recognition that normally only order of magnitude changes are significant due to the uncertainties associated with PRAs. The categories chosen are provided in Table 3.

The CDF F-V criteria were used from NUMARC 93-05. It should be noted that the boundary for the low category is somewhat less than 0.005, the value recommended by the EPRI PSA Applications Guide.

The values chosen for CDF RAW are different from the other RAW boundaries to reflect the lower likelihood that a common mode failure will occur when compared to the probability of failure of a single component.

When using the importance values, the highest category for a group of components is used as the PRA risk ranking. Appendix C provides the importance values for each group of components and the PRA risk indication.

PVNGS used the criteria in Table 2 for this initial risk indication:

Table 2 - Risk Ranking Criteria

Indicator	Criteria	Risk Indication
CDF F-V	>=0.01	High
	>=0.001	Medium
	<0.001	Low
CDF RAW	>=10	High
	>=2	Medium
	<2	Low
LERF RAW	>=10	High
	>=2	Medium
	<2	Low
Common Cause RAW	<5	Low
	>=5	Medium
	>=10	High

Components are initially categorized based on the highest indicator.

4.3 Reconciliation of Qualitative and Quantitative Results

After the expert panel made the preliminary disposition for each component, the

quantitative results were reviewed. If the initial disposition by the expert panel was high risk but the quantitative results indicated low risk, then the component was classified as high risk significant. If the initial panel disposition was low risk but the quantitative results indicate medium risk, the panel reviewed their determination in light of the quantitative information. Part of this review included a review of the modeling assumptions in the PRA. The panel then made a final determination and provided specific documentation of the justification for any deviations from the quantitative results. If the initial panel determination was low risk and the quantitative results indicated high risk, the panel performed a review similar to what was done for medium risk components. However, a sensitivity study was required (where practical) to validate the panels decision prior to declaring the component low risk significant. This decision criteria used by the expert panel is summarized in Table 3.

Table 3 - Final Safety Ranking Decision Criteria

Quantitative Results	Qualitative Results	Final Determination
High	High	High
High	Low	High (unless sensitivity studies substantiate Low)
Medium	High	High
Medium	Low	High (unless documented justification for Low)
Low	High	High
Low	Low	Low

4.4 Completeness Issues

Since all quantitative risk models have limitations, the limitations were compensated for by evaluating:

- Truncation limits;
- IST components masked by PRA Assumptions;
- Common cause failures;
- Data; and
- Selected sensitivity studies.

4.4.1 Truncation Limits

The risk ranking process uses the F-V and RAW importance measures as the primary risk indicators. The values for these importance measures are calculated using cutset manipulation. The cumulative effects analysis also uses cutset manipulation. Cutsets are obtained by solving the model with a truncation limit. Experience has shown that setting the truncation limit arbitrarily low creates

inefficiencies in solving the model without adding significant risk insights. The next revision to thid study will evaluate the impact of the truncation limit used in the PVNGS PRA to determine if lower truncation limits would significantly impact the risk ranking process.

4.4.2 Masking of Events

The PRA model sometimes "masks" certain components because they are associated with supercomponents, human events or initiating events but are not explicitly modeled. The components masked by the PRA model are typically small contributors to the overall probability of the event. However, it is appropriate to verify this consideration. This methodology evaluated those IST components that were:

- Contained in supercomponents (e.g., various components on the diesel generator skid);
- Required to function as part of a human action; or
- Could cause a significant plant initiator.

4.4.3 Common Cause Failures

Risk ranking results can be strongly affected by the contribution of common cause failure. The approach used in this methodology was to evaluate the impact on CDF if it was assumed that the components in both trains of a system were assumed to be failed. Common Cause impacts are evaluated as part of the initial risk ranking process discussed in Section 4.2.1.

4.4.4 Data

Both risk ranking measures used are influenced by the reliability data assigned to the component. The PVNGS PRA uses both plant specific data and generic data. Plant specific data is used for those components where the assumed unavailabilities are most sensitive to determining CDF and where adequate data was available.

4.4.5 Sensitivity Studies

Finally, the completeness of the models, assumptions and input data were tested by sensitivity studies. Sensitivity studies include:

- dynamic risk ranking;
- consideration of failures of two or three components simultaneously; and
- the impact on risk ranking results assuming operator recovery actions always fail.

4.5 Aggregate Impact of Test Interval Changes

A risk ranking approach based on importance measures does not guarantee that acceptable levels of risk will result when changes are made to the test strategies for multiple components. Risk importance measures are based on changes to components one at a time. Simultaneous changes to many components may

cause unintended increases in risk despite meeting the risk ranking measures. An analysis was performed to determine the potential risk impact of increasing in-service testing intervals simultaneously on all less risk significant components. Consideration was given to available information on how changes in test intervals will change component unavailability. Uncertainty in this information, together with the complexity required to model such an approach, dictated the use of a conservative approach. That is, risk impact was measured assuming that component unavailability increased by the same factor that the test interval increased.

The impact of the changes to the IST program was evaluated by increasing the failure probability of affected components to reflect the new test frequency. The changes in CDF, LERF and Public Consequences were then calculated by updating the basic event probabilities in a copy of the basecase cutset file using the 1994 PRA Model.

4.5.1 Modeling Assumptions

The analysis performed was based on the following assumptions:

1. The failure rate for all of the valves was considered to be completely time dependent. The failure probabilities are therefore calculated as:

$$P = \frac{1}{2}\lambda T$$

   It is further assumed that the changes to the IST Program will not change the failure rate (lamba) as neither the type of test nor any PMs are being changed. It is recognized that some component of demand related failure rates are time dependent but it is not clear what the appropriate ratio of time related and pure demand related failures is. By assuming that all of the failure mechanisms are time related, the calculated impact on CDF, LERF and Public Consequences is maximized.
2. No credit was taken for tests performed more frequently than the IST (e.g., Surveillance Testing).
3. Reduction in risk due to reduced opportunities for failing to restore components or test induced failures were not considered.

4.6 Living PRA and Feedback Loop

A living PRA is essential to the ongoing implementation of a risk-based IST program. At PVNGS, the PRA is expected to be reviewed every 18 months to determine if an update is required. Updates will incorporate all applicable design changes as well as performance data (including the results of IST tests). The risk ranking process will then be re-evaluated by the expert panel to determine if changes to the risk ranking results (and therefore test frequencies) are appropriate.

5.0 Evaluation

This section provides the detailed evaluation for determining the risk significance of IST components

5.1 Scope

The scope of components that were considered for risk-based IST includes all of the valves that are in the current IST program as well as all valves that are modeled in the PVNGS PRA. This ensured that all valves that could be of high risk significance were identified. Appendix A provides the list of valves that were reviewed to determine risk significance.

5.2 System Level Ranking

As part of the Maintenance Rule Implementation at PVNGS, all systems were ranked as either high or low Risk Significant based on their safety function and risk contribution. Components that were contained in Low Risk Systems which were not modeled in the PRA nor interfaced with a High Risk Significant System were considered to be of Less Safety Significance. Components in Low Risk Systems that were explicitly modeled in the PRA or interfaced with a High Risk System were subject to further review. Appendix B (obtained from Reference 2.) provides a list of PVNGS systems and their risk significance. Table B1 is a list of high risk significant systems and the safety functions that each system performs. Table B2 provides a list of low risk significant systems.

5.3 Deterministic Evaluation

The expert panel reviewed the remaining valves using the deterministic considerations discussed in Sections 4.1.3.2. The results of these considerations are provided in Appendix C.

5.4 PRA Insights

The PRA input to the risk ranking process (CDF RAW/F-V, CCF RAW and LERF RAW) for each group of valves is provided in Appendix C. Appendix C also provides the PRA indication (High, Medium or Low Risk) for each group.

5.4.1 Symmetry

When component ranking is performed, the preciseness of the ranking often exposes certain limitations in the PRA that are important to ranking within systems. One such limitation is the asymmetrical nature of the PRA models. This limitation can cause disparate rankings for similar components in the same system. At PVNGS, these differences are predominantly due to model assumptions with regards to event location, e.g., LOCA location. To compensate for this limitation, components within a system in functionally identical trains were grouped together and the group was assigned the highest Risk Indication of any component within the group.

5.4.2 External Events

All of the previous analysis are based on the Internal Events PRA. While internal events dominate risk at PVNGS, other initiators have the potential for causing some components to have higher risk importance. To address these concerns, each component was reviewed to determine if it had a function during an external event that was different from the function of the component for internal events. If there was a difference in function, the relative importance was determined by assessing the impact of failure of the component and the relative likelihood of the external events. In the case of Fire, the most important systems were the electrical systems which are not included in the IST program. For Siesmic, the dominant contributors were a Loss of Off-Site Power and a small LOCA which are bounded by the full power PRA. As a result of these reviews by the PRA engineers no additional functions were identified.

5.4.3 Shutdown Risk

PVNGS is in the process of developing a Shutdown PRA model. For the past 4 years a team of SROs, PRA engineers, STAs, Outage Schedulers and Nuclear Assurance personnel have reviewed the unit's refueling outage schedules from a risk and safety perspective. As a result of this effort and the preliminary results from the shutdown model, the IST valves important to shutdown have been identified. Appendix C contains the results of this effort.

5.4.4 Containment Isolation Valves

Ranking of the Containment isolation valves was based upon several factors. The limited time the valves are open, the design of the plant (i.e. several valves in series), and most of the valves are in closed systems. The PRA insights indicate that failure of containment isolation is dominated by instrumentation/automatic signals. Therefore, containment isolation valves were ranked by the expert panel as low risk significant. However, there are several cases where the panel determined that the additional containment isolation function warrants consideration of the valve as high risk significant. Results of this ranking can be found in Appendix C.

5.4.5 Interfacing Systems LOCA

Based upon the Level II results of the at power PRA model LERF is dominated by SGTR (by several orders of magnitude) and not the interfacing systems LOCAS identified in the model. Therefore, valves that contribute to ISL were not condidered as high risk significant unless other considerations warranted their inclusion.

5.4.6 Completeness Issues

Quantitative risk models have limitations associated with the structure of the models and the assumptions and the input data used. The limitations were compensated for by several sensitivity studies. The details of the evaluations of each of these issues is discussed below.

5.4.6.1 Truncation

The present model was solved by truncating the fault tree solution at 1E-8 and accident sequences at 1E-10. After recovery was applied only cutsets greater than 1E-9 were kept. Plans to solve the model at lower limits (i.e., 1E-10 or 1E-11) are being instituted. The results of this effort will be completed prior to implementing the risk based IST program.

5.4.6.2 Human Recovery Actions

To consider the impact of human event modeling, risk ranking results will be compared assuming operator events in the PRA always failed to occur. This analysis will also be completed prior to implementing the risk based IST program.

5.4.6.3 Initiating Events

All non-screened components were evaluated based on the likelihood of causing an initiating event. Those components whose failure would directly cause an initiating event and those components whose failure could cause a complicated initiating event without operator action to prevent the event were considered to have high risk significance unless the probability of failure was considered to be extremely low. The results of this review is provided in Appendix C.

5.4.6.4 Combinations of Failures Any Two and Three at a Time

As part of a joint effort, Comanche Peak is performing this sensitivity study. If their results indicate that additional components should be considered high risk significant that are not identified through other means, Palo Verde will perform this analysis prior to implementing the risk based IST program.

5.4.6.5 Dynamic Risk Ranking

Pre-planned maintenance configurations can impose changes to the PVNGS risk profile that may not be accounted for in the PRA (which assumes that maintenance activities are random in nature). Therefore, a sensitivity study will be performed to determine the impact of the PVNGS 12 week maintenance schedule on risk significance. This analysis will be completed prior to implementing the risk based IST program.

5.5 Cumulative Effects

Using the list of valves from that were determined by the IST group as candidates for frequency changes (Appendix D), a comparison of valves to basic events was prepared and is also documented in Appendix D. Several time intervals were selected to establish the sensitivity of the results to the selected test interval.

A number of low risk valves in the IST are not modeled in the PRA. As the PRA was a comprehensive evaluation of all combinations of failures that could lead to either core damage or large early release, it is assumed that the impact of changes to the IST Program for these valves would have a negligible impact when compared to the valves that were modeled in the PRA. However, it is planned that

all valves will be modeled prior to changing the test frequency of the valve.

5.5.1 Analysis Results

The changes to basic event probabilities were made to the results case istlow and istlerf (copies of the 1994 basecase). The resulting CDF, LERF and Man-Rem are provide in Table 4.

Table 4. Aggregate Impact on Risk

Test Interval (years)	CDF (/yr)	LERF (/yr)	90 mile Dose (Man-Rem/yr)
Base Case	4.74E-5	2.13E-6	40.2
3	4.92E-5 (+4%)	2.44E-6 (+14%)	46.9 (+17%)
6	5.12E-5 (+8%)	2.51E-6 (+18%)	47.9 (+19%)
9	5.33E-5 (+12%)	2.57E-6 (+21%)	49.3 (+23%)
12	5.55E-5 (+17%)	2.64E-6 (+24%)	51.2 (+27%)
15	5.80E-5 (+22%)	2.71E-6 (+27%)	53.8 (+34%)

As the risk based IST program will be extending the test interval to 6 years, the increase in risk is a 8% increase in CDF, a 18% increase in LERF and a 19% increase in off-site consequences.

(Note that the first quantification resulted in a CDF increase of greater than 300% and was dominated by the changes made to the AF valves. As a result, valves AFBHV30, AFBHV31, AFAHV32, AFCHV33, AFBUV34, AFBUV35, AFCUV36, AFAUV37, AFAV137 and AFBV138 will not have their IST Tests deferred at this time.)

5.5.2 EPRI Comparison

The results of this analysis were compared to the PSA Applications Guideline (Reference 3), Table 4-1 Quantitative Screening Criteria. From this table, the CDF screening criteria is:

$$\log(\Delta CDF\%) = (-0.5 \times \log(CDF_{Baseline})) - 1$$

$$\log(\Delta CDF\%) = (-0.5 \times \log(4.74E\text{-}5)) - 1$$

$$\log(\Delta CDF\%) = 1.16$$

$$\Delta CDF\% = 14.5\%$$

and:

$$\log(\Delta LERF\%) = (-0.5 \times \log(LERF_{Baseline})) - 1.5$$

$$\log(\Delta LERF\%) = (-0.5 \times \log(2.13 \times 10^{-6})) - 1.5$$

$$\log(\Delta LERF\%) = 1.34$$

$$\Delta LERF\% = 21.7\%$$

As both the CDF and LERF are well below the quantitative screening criteria, the proposed changes in test frequencies will maintain an adequate level of public safety.

6.0 Results and Conclusions

6.1 Results

A detailed listing of the components considered and the ranking results is provided in Appendix C.

6.2 Summary and Conclusions

The risk ranking process was concluded to be rigorous. It generated results that were, in general, consistent with deterministic insights from the expert panel and found to be safety neutral by an evaluation of cumulative effects. The following spectrum of risk and deterministic insights demonstrates this conclusion:

A spectrum of risk sources were considered, i.e., PRA, external and outage events;

- Multiple risk measures were considered, i.e., CDF and LERF;
- Diverse importance measures were used, i.e., F-V and RAW;
- Sensitivity studies consistently demonstrated that the risk significant had been identified;
- Both PRA and design basis functions were compared and evaluated and considered in an integrated manner; and
- Both PRA and deterministic insights from the expert panel were incorporated into both the ranking results and the resulting IST plan.

The scope and level of detail of the results reviewed by the expert panel, the emphasis placed on understanding why components were ranked high or low, the careful comparison of the PRA, the plant design basis and the sensitivity studies performed all demonstrated the technical adequacy of the PRA to serve as the basis for this and other risk based applications. The resulting risk based IST program is considered by the expert panel to have the appropriate changes (both increases as well as decreases in testing) and the appropriate checks and balances to ensure burden reduction can be achieved while maintaining or even

improving plant safety.

7.0 References

1. Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement (Federal Register Vol. 60, No. 158, pg 42622-9)
2. Engineering Study 13-NS-B28 Rev. 1, Risk Significant Determination for Implementation of the Maintenance Rule
3. EPRI TR-105396, PSA Applications Guide
4. Procedure 70AC-0MT01, Maintenance Rule Expert Panel
5. Procedure 73PR-1(2,3)XI01, PVNGS ASME Section XI Pump and Valve Inservice Testing Program, Unit 1 (Unit 2, Unit 3), Rev 1.
6. NUMARC 93-01, Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants
7. NUMARC 93-05, Guideline for Optimizing Safety Benefits in Assuring the Performance of Motor Operated Valves.

Appendix A
Scope of Risk Based IST Program Evaluation

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
Containment Purge	
CPA-UV2A	CTMT BLDG Refueling Purge Sup. Duct Isolation Damper
CPA-UV2B	CTMT BLDG Refueling Purge Exh. Duct Isolation Damper
CPB-UV3A	CTMT BLDG Refueling Purge Sup. Duct Isolation Damper
CPB-UV3B	CTMT BLDG Refueling Purge Exh. Duct Isolation Damper
CPA-UV4A	CTMT BLDG Pwr. Acc. Purge Sup. Duct Isolation Damper
CPA-UV4B	CTMT BLDG Pwr. Acc. Purge Exh. Duct Isolation Damper
CPB-UV5A	CTMT BLDG Pwr. Acc. Purge Sup. Duct Isolation Damper
CPB-UV5B	CTMT BLDG Pwr. Acc. Purge Exh. Duct Isolation Damper
Condensate Storage & Transfer	
CTA-HV004	CTAHV4 AFN-P01 Suction From Condensate Storage Tank
CTA-HV001	AFN-P01 Suction From Condensate Storage Tank
CTB-V014	AF B Pump Suct
CTA-V015	AF A Pmp Suct
CTA-V016	CDNS Transfer Pump CTA-P01 Disch Chk Vlv
CTA-V018	"Pink" "A" CST Pump to SFP
CTB-V019	CST Pump "B" to SFP
CTB-V020	CDNS Transfer Pump B Disch Chk Vlv
CTA-V037	Fuel Pool Supply Line Chk Vlv from CTA-P01
CTB-V038	Fuel Pool Supply Line Chk Vlv from CTB-P01
Demineralized Water	
DWE-V061	CTMT Isolation
DWE-V062	CTMT Isolation
Essential Chilled Water	
ECA-V002	Chilled Water Circ Pump ECA-P01 Suct Isol Vlv
ECA-V011	Ess Chlr ECA-E01 Outlet Isol
ECB-V065	ECW Circ PP ECB-P01 Suct Isol Vlv
ECB-V068	Ess Chlr ECB-E01 Outlet Isol

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
ECA-PSV75	ECWS Exp Tank A Press Relief Valve
ECB-PSV76	ECWS Exp Tank B Press Relief Valve
ECA-PSV95	ESF SWGR RM A ESS AHU Press Relief Valve
ECB-PSV96	ESF SWGR RM B ESS AHU Press Relief Valve
ECA-PSV97	Control Room A Ess AHU Relief Valve
ECB-PSV98	Control Room B Ess AHU Relief Valve
ECA-PSV99	Elec Pen Rm West Ess ACU Relief Valve
ECB-PSV100	Elec Pen Rm East Ess ACU Relief Valve
ECA-PSV101	ECWS PP RM A ESS AHU Press Relief Valve
ECB-PSV102	ECWS PP RM B ESS AHU Press Relief Valve
ECA-PSV103	CS RM A ESS AHU Press Relief Valve
ECB-PSV104	CS RM B ESS AHU Press Relief Valve
ECA-PSV105	HPSI Pump RM A ESS AHU Press Relief Valve
ECB-PSV106	HPSI Pump RM B ESS AHU Press Relief Valve
ECA-PSV107	LPSI Pump RM A ESS AHU Press Relief Valve
ECB-PSV108	LPSI Pump RM B ESS AHU Press Relief Valve
ECB-PSV109	AFW Pump RM B ESS AHU Press Relief Valve
ECA-PSV117	AFW Pump RM A ESS AHU Press Relief Valve
ECB-PSV120	Chan B DC Equip RM ESS ACU Relief Valve
ECA-PSV121	Chan A DC Equip RM ESS ACU Relief Valve
Fire Protection	
FPE-V089	CTMT Isol East PPR
FPE-V090	CTMT Isol Check Valve
Service Gas	
GAE-V011	High Pressure N2 Sply to CTMT Chk Valve
GAE-V015	Low Pressure N2 Sply to CTMT Chk Valve
GAA-UV1	HP N2 Sply HDR to CTMT Isol Valve
GAA-UV2	LP N2 Sply HDR to CTMT Isol Valve
Gaseous Radwaste	
GRA-UV1	RDT/Gas Surge Header-Int CTMT Isolation
GRB-UV2	RDT/Gas Surge Header-Int CTMT Isolation (Outside CTMT)

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
HVAC - Containment Building	
HCB-UV44	RU-1 Inlet Isol CTMT Side
HCA-UV45	RU-1 Inlet Isol Outside CTMT
HCA-UV46	Solenoid Valve Isolation Valve for RU-1
HCB-UV47	RU-1 Outlet Isol CTMT Side
Hydrogen Purge	
HPA-V002	CTMT H2 CNTRL RTN Line Chk Valve (Trn A)
HPB-V004	CTMT H2 CNTRL RTN Line Ckt Valve (Trn B)
HPA-HV7A	CTMT Post-LOCA H2 Monitor Inlet Sol Valve
HPA-HV7B	CTMT Post-LOCA H2 Monitor Outlet Sol Valve
HPB-HV8A	CTMT Post-LOCA H2 Monitor Inlet Sol Valve
HPB-HV8B	CTMT Post-LOCA H2 Monitor Exhaust
HPA-UV1	CTMT H2 Control Upstream Supply Isolation
HPB-UV2	CTMT H2 Control Upstream Supply Isolation
HPA-UV3	CTMT H2 Control Downstream Supply Isolation
HPB-UV4	CTMT H2 Control Downstream Supply Isolation
HPA-UV5	CTMT H2 Control Return Isolation
HPB-UV6	CTMT H2 Control Return Isolation
HPA-UV23	CTMT H2 Return Isolation from PASS
HPA-UV24	CTMT H2 Supply Isolation to PASS
Instrument Air	
IAE-V021	CTMT Isolation Air Supply Check Valve
IAE-V072	Service Air CTMT Isol West PPR
IAE-V073	CTMT Isolation Air Supply Check Valve
IAA-UV2	Inst Air CTMT Isol Valve
Nuclear Cooling Water	
NCE-V118	Chk Valve Between CTMT and HCV-492
NCB-UV401	CTMT Isol Valve to NCWS Supply
NCA-UV402	CTMT Isol Valve to NCWS Return
NCB-UV403	CTMT Isol Valve to NCWS Return
NCA-PSV250	Fuel Pool HT Ex A NCWS Relief

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
NCB-PSV251	Fuel Pool HT Ex B NCWS Relief
Plant Cooling Water	
PCE-V070	Fuel Pool Cleanup Suct CTMT Isol WPPR
PCE-V071	Fuel Pool Cleanup Suct CTMT Isol 90' SW
PCE-V075	Fuel Pool Cleanup Rtn CTMT Isol 90' SW
PCE-V076	Fuel Pool Cleanup Rtn CTMT Isol WPPR
PCN-V215	SFP to BAMP Isolation Valve
PCA-PSV35	Pressure Relief PCA-E01 Hx
PCB-PSV36	Pressure Relief PCB-E01 Hx
Radioactive Drains	
RDA-UV23	Internal CTMT Isol Valve from Rad Sump Pumps
RDB-UV24	External CTMT Isol Valve from Rad Sump Pumps
RDB-UV407	CTMT Radwaste Sump Pumps Discharge for PASS
Nuclear Sampling System	
SSB-UV200	Hot Leg Sample CTMT Isol
SSB-UV201	Press Surge Sample CTMT Isol
SSB-UV202	Press S/S Sample CTMT Isol
SSA-UV203	Hot Leg Sample CTMT Isol
SSA-UV204	Press Surge Sample CTMT Isol
SSA-UV205	Press S/S Sample CTMT Isol
Normal Chilled Water	
WCE-V039	Check Valve Inlet to CTMT Isol at U060
WCB-UV61	CHW Return CTMT Isol
WCA-UV62	Normal CHW Return CTMT Isol
WCB-UV63	Norm CHW Sup CTMT Isol
Auxiliary Feedwater	
AFA-V007	AFW Pump AFA-P01 Suction Check Valve
AFA-V015	AFW PP AFA-P01 Disch Chk Valve
AFA-V137	AFW PP AFA-P01 Disch Chk Valve
AFB-V022	Check Valve on Suction side of Pump AFB-P01

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
AFB-V024	Check Valve from AFW Pump AFB-P01 on Discharge
AFB-V138	AFB-P01 Disch side Chk Valve
AFA-V079	AFA-P01 DISCHARGE TO FW SG
AFB-V080	AFB-P01 DISCHARGE TO FW SG
AFB-HV30	AFW Pump B Flow Control Valve to SG 1
AFB-HV31	AFW Pump B Flow Control Valve to SG 2
AFB-UV34	AFW Pump B Supply to SG 1 Isolation
AFB-UV35	AFW Pump B Supply to SG2 Isolation
AFA-HV32	AFW Pump A Disch Isol to SG 1
AFC-HV33	AFW Pump A Disch Isol to SG 2
AFC-UV36	AFW to SG1 Downstream Valve
AFA-UV37	AFW to SG2 Downstream Valve
AFA-HV54	AFW Turbine Trip And Throttle Valve
AFA-V002	MS Supply to AFW PP A
AFA-V006	AFA-P01 CST Suct
AFA-V016	AFA-P01 Disch
AFB-V021	AFB-P01 CST Suct
AFB-V025	AFB-P01 Disch
AFN-V001	AFN-P01 Suction
AFN-V012	AFW PP AFN-P01 Disch Chk
AFN-V013	AFW PP AFN-P01 Disch
Diesel Fuel Oil	
DFA-V012	DG F.O. Transfer Pump Dfa-p01 Discharge
DFB-V019	DG F.O. Transfer Pump Dfb-p01 Disch Chk Vlv
DGA-V066	Start Air Dryer DGN-F01B Disch Chk
DGA-V067	Start Air Dryer DGN-F01A Disch Chk
DGB-V068	Start Air Dryer DGN-F02A Disch Chk
DGB-V069	Start Air Dryer DGN-F02B Disch Chk
DGA-V317	Jkt Wtr Circ Pump DGA-P02 Disch
DGB-V417	DG B Jkt Wtr Circ Pump DGB-P02 Disch
DGA-V318	Jkt Wtr Htr DGA-M01 Disch
DGB-V418	DG B Jkt Wtr Htr DGB-M01 Disch

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
DGA-V332	DGA F.O. Suct. Strnr Disch Chk Valve
DGB-V432	DGB F.O. Suct. Strnr Disch Chk Valve
DGA-V355	Internal Relief Check Valve
DGB-V455	Spring Loaded Chk Valve at L.O. PP DGB-P03
DGA-V364	AT L.O. Circ Htr DGA-M02
DGB-V464	DGB L.O. Circ Htr DGB-M02
DGA-V396	DFA Right Bank Start Air Chk Vlv
DGA-V397	DFA Left Bank Start Air Chk Vlv
DGB-V496	DFB Right Bank Start Air Chk Vlv
DGB-V497	DFB Left Bank Start Air Chk Vlv
DGA-V510	Turbochgr Fltrs DGA-F10A & B Inlet Chk Vlv
DGB-V610	Check Valve for Turbo LO Filters F10A and F10B
DGA-V520	Check Valve at Fuel Oil Supply Header
DGB-V620	DGB FO Sply HDR Chk Vlv
DGA-V523	DGA Turbo Air Disch To Rt Bank Start Air Chk Vlv
DGA-V524	DGA Turbo Air Disch To Lft Bank Start Air Chk Vlv
DGB-V623	DGB Turbo Air Disch To Rt Bank Start Air Chk Vlv
DGB-V624	DGB Turbo Air Disch To Lft Bank Start Air Chk Vlv
DGA-UV3	DGA Start Air Rt Bk #2 Control Valve
DGB-UV4	DGB Start Air Rt Bk #2 Control Valve
DGA-UV5	DGA Start Air Lft Bk #1 Control Valve
DGB-UV6	DGB Start Air Lft Bk #1 Control Valve
DGA-UV7	DGA Start Air Lft Bk #2 Control Valve
DGB-UV8	DGB Start Air Lft Bk #2 Control Valve
DGA-UV9	DGA Emrg Mode Fuel CTR #1 Control Valve
DGB-UV10	DGB Emrg Mode Fuel CTR #1 Control Valve
DGA-UV11	DGA Emrg Mode Fuel CTR #2 Control Valve
DGB-UV12	DGB Emrg Mode Fuel CTR #2 Control Valve
DGA-UV15	DGA Strt Air Rt Bank #1 Control Valve
DGB-UV16	DGB Strt Air Rt Bank #1 Control Valve
DGA-PSV5	DGA Start Air Rec A Press Safety Valve
DGB-PSV6	DGB Start Air Rec A Press Safety Valve

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
DGA-PSV7	DGA Start Air Rec B Press Safety Valve
DGB-PSV8	DGB Start Air Rec B Press Safety Valve
Essential Cooling Water	
EWA-UV65	EW X-Tie to NC
EWA-UV145	EW X-Tie to NC
EWA-PSV47	S/D HX A PRV
EWB-PSV48	S/D HX B PRV
EWA-PSV61	ESS Chlr A PRV
EWB-PSV62	ESS Chlr B PRV
EWA-PSV79	ECWS HX A PRV
EWB-PSV80	ECWS HX B PRV
EWA-PSV103	Surge Tk A PRV
EWB-PSV104	Surge Tk B PRV
EWA-PSV105	Surge Tk A Vacuum Relief Valve
EWB-PSV106	Surge Tk B Vacuum Relief Valve
EWA-HCV41	SDCHX A Inlet
EWB-HCV42	SDCHX B Inlet
EWA-HCV53	SDCHX A Outlet
EWB-HCV54	SDCHX B Outlet
EWA-HCV005	A Pump Suct
EWB-HCV006	B Pump Suct
EWA-HCV135	A Pump Disch
EWB-HCV136	B Pump Disch
EWA-HCV071	EW A HX Inlet
EWB-HCV072	EW B HX Inlet
EWA-V021	EC Chiller A Inlet
EWB-V043	EC Chiller B Inlet
EWA-V022	EC Chiller A Outlet
EWB-V044	EC Chiller B Outlet
Reactor Coolant	
RCA-HV101	Reactor Vessel Head Vent To Reactor Drain Tank

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
RCB-HV102	Reactor Vessel Head Vent To Reactor Drain Tank
RCA-HV103	Pressurizer Vent
RCB-HV105	Pressurizer/reactor Vessel Head Vent To Reactor Drain Tank
RCA-HV106	Pressurizer/reactor Vessel Head Vent To Containment
RCB-HV108	Pressurizer Vent
RCB-HV109	Pressurizer Vent
RCE-PSV200	Relief Pressure To Reactor Drain Tank From Pressurizer
RCE-PSV201.	Relief Pressure To Reactor Drain Tank From Pressurizer
RCE-PSV202	Relief Pressure To Reactor Drain Tank From Pressurizer
RCE-PSV203	Relief Pressure To Reactor Drain Tank From Pressurizer
RCN-HV446	RCP 1A Cooler Inlet
RCN-HV450	RCP 1A Cooler Outlet
RCN-HV447	RCP 1B Cooler Inlet
RCN-HV451	RCP 1B Cooler Outlet
RCN-HV448	RCP 2A Cooler Inlet
RCN-HV452	RCP 2A Cooler Outlet
RCN-HV449	RCP 2B Cooler Inlet
RCN-HV453	RCP 2B Cooler Outlet
RCE-V090	Pzr Vent Isol
Main Steam	
SGN-V097	Downcomer Manual Isolation Valves
SGN-V098	Downcomer Manual Isolation Valves
SGN-V431	Downcomer Check Valves
SGN-V432	Downcomer Check Valves
SGN-FV1113	Downcomer Control Valves
SGN-FV1123	Downcomer Control Valves
SGN-HV1143	Feedwater Isolation Bypass Valves
SGN-HV1145	Feedwater Isolation Bypass Valves
SGN-PV1128	N2 Supply Valve
SGN-V967	N2 Accumulator Isolation Valve
SGN-V968	N2 Supply to SGN-PSL-1128 Isolation
SGN-V002	Chk Valve for SG-1 AFW Line

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SGN-V008	Chk Valve for SG-1 AFW Line
SGN-V435	Air/N2 Supply to Downcomer Valves
SGN-V437	Air/N2 Supply to Downcomer Valves
SGN-V440	1 in Valve
SGN-V441	1 in Valve
SGN-V959	N2 Check Valve
SG-PCV1130	N2 Supply Regulator
SG-PCV1147	N2 to Downcomer
SG-PSV1131	N2 Supply Relief
SG-PSV1147	N2 to Downcomer
SG-V289	SG Blowdown Manual Isolation
SG-V290	SG Blowdown Manual Isolation
SGE-V003	Isol Chk Valve for SG-1 Econ FW DWSTR
SGE-V007	Isol Chk Valve for SG-1 Econ FW DWSTR
SGE-V005	Economizer Line Stop Valves. MOVs
SGE-V006	Economizer Line Stop Valves. MOVs
SGA-V043	Steam Supply Check Valves to A AF Pump
SGA-V044	Steam Supply Check Valves to A AF Pump
SGE-V334	Chk Vlv for SG-2 ADV N2 Supply
SGE-V339	Chk Vlv for N2 Supply to HY 78C
SGE-V350	Chk Vlv for N2 Supply to HY 78C
SGE-V360	Chk Vlv for SG-2 ADV N2 Supply
SGE-V337	ADV 179 Accum Isol
SGE-V342	ADV 184 Accum Isol
SGE-V354	ADV 178 Accum Isol
SGE-V363	Accumulator Isolation Valve
SGE-V346	Chk Valve from Inst Air to HY-184C
SGE-V348	Chk Valve from Inst Air to HY-79C
SGE-V357	Check Valve from Inst Air to HY 178C
SGE-V358	Check Valve from Inst Air to HY 185C
SGE-V642	Downcomer Containment Isolation
SGE-V652	Downcomer Containment Isolation

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SGE-V653	Downcomer Containment Isolation
SGE-V693	Downcomer Containment Isolation
SGE-V885	Steam Bypass to AF Turbine
SGE-V886	Steam Bypass to AF Turbine
SGE-V887	Steam Bypass Check Valves
SGE-V888	Steam Bypass Check Valves
SGE-V889	Combined Steam Bypass to AF Turb
SGE-V963	Instrument Air Filter Inlet Valves
SGE-V964	Instrument Air Filter Inlet Valves
SGE-V965	Instrument Air Filter Inlet Valves
SGE-V966	Instrument Air Filter Inlet Valves
SGB-HV-178	SG1 LINE 2 ATM DUMP
SGA-HV-179	SG2 LINE 2 ATM DUMP
SGA-HV-184	SG1 LINE 1 ATM DUMP
SGB-HV-185	SG2 LINE 1 ATM DUMP
SGB-HV200	SG-1 Chemical Injection Isol. Valve
SGB-HV201	Chemical Injection
SGB-UV130	Downcomer Isolation Valves
SGB-UV135	Downcomer Isolation Valves
SGA-UV172	Downcomer Isolation Valves
SGA-UV175	Downcomer Isolation Valves
SGB-UV132	SG-1 Econ FW Dwnstr Isol
SGB-UV137	SG-2 Econ FW Dwnstr Isol
SGA-UV174	SG-1 Econ FW Upstr Isol
SGA-UV177	SG-2 Econ FW Upstr Isol
SGA-UV134	SG 1 Steam Supply To Aux Feed Pump Turb
SGA-UV138	SG 2 Steam Supply To Aux Feed Pump Turb
SGA-UV134A	SG 1 Steam Supply To Af Pump Turbine
SGA-UV138A	SG 2 Steam Supply To Af Pump Turbine
SGE-UV169	MSIV Bypass Isolation Valves
SGE-UV183	MSIV Bypass Isolation Valves
SGE-UV170	SG1 Line 1 MSIV

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SGE-UV171	SG2 Line 1 MSIV
SGE-UV180	SG1 Line 2 MSIV
SGE-UV181	SG2 Line 2 MSIV
SGE-VA019	MS1V Quality Class Break Inst. Air Check Valve
SGE-VA020	MSIV Quality Class Break Inst. Air Check Valve
SGE-VA021	MSIV Quality Class Break Inst. Air Check Valve
SGE-VA022	MSIV Quality Class Break Inst. Air Check Valve
SGE-VA023	MSIV Quality Class Break Inst. Air Check Valve
SGE-VA024	MSIV Quality Class Break Inst. Air Check Valve
SGB-VA030	FWIV Quality Class Break Inst. Air Check Valve
SGE-VA025	MSIV Quality Class Break Inst. Air Check Valve
SGE-VA026	MSIV Quality Class Break Inst. Air Check Valve
SGA-VA027	FWIV Quality Class Break Inst. Air Check Valve
SGA-VA028	FWIV Quality Class Break Inst. Air Check Valve
SGB-VA029	FWIV Quality Class Break Inst Air Check Valve
SGA-UV204	SG-1 Hot Leg Blowdown Sample Line Isol Valve
SGA-UV211	SG-1 Cold Leg Blowdown Sample Line Isol Valve
SGB-UV219	SG-1 Hot Leg Blowdown Sample Line Isol Valve
SGA-UV220	SG-1 Downcomer Blowdown Sample Line Isol Valve
SGB-UV221	SG-1 Downcomer Blowdown Sample Line Isol Valve
SGB-UV222	SG-2 Cold Leg Blowdown Sample Line Isol Valve
SGA-UV223	SG-2 Cold Leg Blowdown Sample Line Isol Valve
SGB-UV224	SG-2 Hot Leg Blowdown Sample Line Isol Valve
SGA-UV225	SG-2 Hot Leg Blowdown Sample Line Isol Valve
SGB-UV226	SG-2 Downcomer Blowdown Sample Line Isol Valve
SGA-UV227	SG-2 Downcomer Blowdown Sample Line Isol Valve
SGB-UV228	SG-1 Hot Leg Blowdown Sample Line Isol Valve
SGA-UV500P	Blowdown Isolation
SGB-UV500Q	Blowdown Isolation
SGB-UV500R	Blowdown Isolation
SGA-UV500S	Blowdown Isolation
SGA-UV1133	Stm Trap SGN-M23 Isol Valve

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SGA-UV1134	Stm Trap SGN-M24 Isol Valve
SGB-UV1135A	Stm Trap SGN-M01 Isol Valve
SGB-UV1135B	Stm Trap SGN-M02 Isol Valve
SGB-UV1136A	Stm Trap SGN-M03 Isol Valve
SGB-UV1136B	Stm Trap SGN-M04 Isol Valve
SGE-PSV554	Relief Safety SG2 Main Steam Line 1
SGE-PSV555	Relief Safety SG2 Main Steam Line 1
SGE-PSV556	Relief Safety SG2 Main Steam Line 1
SGE-PSV557	Relief Safety SG2 Main Steam Line 1
SGE-PSV558	Relief Safety SG2 Main Steam Line 2
SGE-PSV559	Relief Safety SG2 Main Steam Line 2
SGE-PSV560	Relief Safety SG2 Main Steam Line 2
SGE-PSV561	Relief Safety SG2 Main Steam Line 2
SGE-PSV572	Relief Safety SG1 Main Steam Line 1
SGE-PSV573	Relief Safety SG1 Main Steam Line 1
SGE-PSV574	Relief Safety SG1 Main Steam Line 1
SGE-PSV575	Relief Safety SG1 Main Steam Line 1
SGE-PSV576	Relief Safety SG1 Main Steam Line 2
SGE-PSV577	Releif Safety SG1 Main Steam Line 2
SGE-PSV578	Relief Safety SG1 Main Steam Line 2
SGE-PSV579	Safety Relief SG1 Main Steam Line 2
SGE-PSV691	Relief Safety SG1 Main Steam Line 2
SGE-PSV692	Relief Safety SG1 Main Steam Line 1
SGE-PSV694	Relief Safety SG2 Main Steam Line 2
SGE-PSV695	Safety Relief SG2 Main Steam Line 1
SGB-PSV302	Accumulator Line Relief
SGA-PSV309	Accumulator Line Relief
SGA-PSV316	Accumulator Line Relief
SGB-PSV322	Accumulator Line Relief
SGB-PSV305	N2 Line Relief
SGA-PSV312	N2 Line Relief
SGA-PSV319	N2 Line Relief

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SGB-PSV325	N2 Line Relief
Safety Injection	
SIA-V105	CS Pump suction
SIB-V104	CS Pump suction
SIE-V113	Discharge HPSI To Reactor Coolant Loop 2A
SIE-V123	Discharge HPSI Train A & B To Reactor Coolant Loop 2B
SIE-V133	Discharge HPSI Train A & B To Reactor Coolant Loop 1A
SIE-V143	Discharge HPSI Trains A & B To Reactor Coolant Loop 1B
SIE-V114	Discharge LPSI Train B To Reactor Coolant Loop 2A
SIE-V124	Discharge LPSI Train B To Reactor Coolant Loop 2B
SIE-V134	Discharge LPSI Train A To Reactor Coolant Loop 1A
SIE-V144	Discharge LPSI Train A To Reactor Coolant Loop 1B
SIA-V157	Check Valve on Suction Side of CS Pump
SIB-V158	Check Valve on Suction Side of CS Pump
SIA-V164	CTMT Isol Check Valve at Pen U021
SIB-V165	CTMT Isol Check Valve at Pen U022
SIA-V201	LPSI Pump 1 Suction Check Valve
SIB-V200	LPSI Pump 2 Suction Check Valve
SIA-V205	Containment Recirculationsump Screen
SIB-V206	Containment Recirculation Sump Screen
SIE-V215	SI Tank Discharge Check Valve
SIE-V225	SI Tank Discharge Check Valve
SIE-V235	SI Tank Discharge Check Valve
SIE-V245	SI Tank Discharge Check Valve
SIE-V217	Discharge SI Tank 2A To Reactor Coolant Loop 2A
SIE-V227	Discharge SI Tank 2B To Reactor Coolant Loop 2B
SIE-V237	Discharge SI Tank 1A To Reactor Coolant Loop 1A
SIE-V247	Discharge SI Tank 1B To Reactor Coolant Loop 1B
SIA-V470	HPSI Pump suction
SIB-V402	HPSI Pump suction
SIA-V404	HPSI Pump 1 Check Valve
SIB-V405	HPSI Pump 2 Check Valve

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SIA-V424	Check Valve on HPSI Recirc
SIB-V426	Check Valve on HPSI Recirc
SIA-V434	LPSI Pump 1 Discharge Check Valve
SIB-V446	LPSI Pump 2 Discharge Check Valve
SIA-V435	LPSI Pump disch
SIB-V447	LPSI Pump disch
SIA-V451	Check Valve on LPSI Recirc
SIB-V448	Check Valve on HPSI Recirc
SIE-V463	SIT to RWT outboard isolation.
SIA-V476	HPSI Pump disch
SIB-V478	HPSI Pump disch
SIA-V485	CS Pump 1 Discharge Check Valve
SIB-V484	CS Pump 2 Discharge Check Valve
SIA-V486	Check Valve on CS Recirc
SIB-V487	Check Valve on CS Recirc
SIA-V522	Check Valve on HPSI 1 to RC Loop 1
SIB-V532	Check Valve on HPSI 2 to RC Loop 2
SIA-V523	Isolation Check Valve on HPSI 1
SIB-V533	CTMT Isolation at U067
SIE-V540	Discharge HPSI And LPSI HDR To Reactor Coolant Loop 2A
SIE-V541	Discharge HPSI And LPSI HDR To Reactor Coolant Loop 2B
SIE-V542	Discharge HPSI And LPSI HDR To Reactor Coolant Loop 1A
SIE-V543	Discharge HPSI And LPSI HDR To Reactor Coolant Loop 1B
SIA-V957	HLI valve
SIB-V958	HLI valve
SIA-HV306	LPSI HDR Discharge Isol Train A
SIB-HV307	LPSI HDR Discharge Isol Train B
SIA-HV604	HPSI Long Term Recirc Isol Train A
SIB-HV609	HPSI Long Term Recirc Isol Vlv Train B
SIC-HV321	HPSI Long Term Recirc Ctmt Isol Train A
SID-HV331	HPSI Long Term Recirc Ctmt Isol Train B
SIA-HV605	SI Tank 1 Vent

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SIA-HV606	SI Tank 2 Vent
SIA-HV607	SI Tank 3 Vent
SIA-HV608	SI Tank 4 Vent
SIB-HV613	SI Tank 1 Vent
SIB-HV623	SI Tank 2 Vent
SIB-HV633	SI Tank 3 Vent
SIB-HV643	SI Tank 4 Vent
SIA-HV657	SDC Temp Control Train A
SIB-HV658	SDC Temp Control Train B
SIA-HV683	LPSI Pump A Isol
SIB-HV692	LPSI Pump A Isol
SIA-HV678	SDC HE Isol Train A
SIB-HV679	SDC HE Isol Train B
SIA-HV684	SDC HE Isol Train A
SIB-HV689	SDC HE Isol Train B
SIA-HV685	LPSI Cross Connect To SDCHE Train A
SIB-HV694	LPSI Cross Connect To SDCHE Train B
SIA-HV686	Crossover SDCHE And LPSI HDR Train A
SIB-HV696	Crossover SDCHE And LPSI HDR Train B
SIA-HV687	CS Isol Train A
SIB-HV695	CS Isol Train B
SIA-HV688	SDC HE A Bypass
SIB-HV693	SDC HE B Bypass
SIA-HV691	Shutdown Cooling Warmup Bypass Ctmt Isol Train A
SIB-HV690	Shutdown Cooling Warmup Bypass Ctmt Isol Train B
SIA-HV698	HPSI Pump A Disch
SIB-HV699	HPSI Pump B Disch
SIB-UV322	Hot Leg Inj A Chk Valve Leakoff Isol
SIB-UV332	Hot Leg Inj B Chk Valve Leakoff Isol
SIB-UV611	2A SIT Fill and Drn Isol
SIB-UV621	2B SIT Fill and Drn
SIB-UV631	1A SIT Fill and Drn

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SIB-UV641	1B SIT Fill and Drn
SIA-UV634	SIT Tank 1A Isol Disch
SIA-UV644	SIT Tank 1B Isol Disch
SIB-UV614	SIT Tank 2A Isol Disch
SIB-UV624	SIT Tank 2B Isol Disch
SIA-UV635	LPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 1A
SIA-UV645	LPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 1B
SIB-UV615	LPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 2A
SIB-UV625	LPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 2B
SIA-UV617	HPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 2A
SIB-UV616	HPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 2A
SIA-UV627	HPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 2B
SIB-UV626	HPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 2B
SIA-UV637	HPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 1A
SIB-UV636	HPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 1A
SIA-UV647	HPSI Disch Hdr Ctmt Isol Vlv Train A To RC Loop 1B
SIB-UV646	HPSI Disch Hdr Ctmt Isol Vlv Train B To RC Loop 1B
SIB-UV618	SI Loop 2A Drain
SIB-UV628	SI Loop 2B Drain
SIB-UV638	SI Loop 1A Drain
SIB-UV648	SI Loop 1B Drain
SIA-UV651	Shutdown Cooling Suction Isol Vlv Train A
SIB-UV652	Shutdown Cooling Suction Isol Vlv Train B
SIA-UV655	Shutdown Cooling Suction Ctmt Isol Vlv Train A
SIB-UV656	Shutdown Cooling Suction Ctmt Isol Vlv Train B
SIC-UV653	Shutdown Cooling Suction Ctmt Isol Vlv Train A
SID-UV654	Shutdown Cooling Suction Ctmt Isol Vlv Train B
SIA-UV660	Train A Recirc to RWT
SIB-UV659	Train B Recirc to RWT
SIA-UV664	CS Pump A to RWT Isol
SIB-UV665	CS Pump B to RWT Isol
SIA-UV666	HPSI Pump A to RWT Isol

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SIB-UV667	HPSI Pump B to RWT Isol
SIA-UV669	LPSI Pump A to RWT Isol
SIB-UV668	LPSI Pump B to RWT Isol
SIA-UV672	Ctmt Spray Control Vlv Train A
SIB-UV671	Ctmt Spray Control Vlv Train B
SIA-UV673	Butterfly Containment Sump Isolation Train A
SIA-UV674	Butterfly Containment Sump Isolation Train A
SIB-UV675	Butterfly Containment Sump Isolation Train B
SIB-UV676	Butterfly Containment Sump Isolation Train B
SIA-UV682	SIT Fill and Drn Hdr CTMT Isol
SIA-UV708	Recirc Sump A for PASS
SIA-UV709	HPSI Pump A for PASS
SIB-UV710	HPSI Pump B for PASS
SIA-PSV151	CTMT Recirc Sump AE Relief
SIB-PSV140	Pressure Relief Valve CTMT Recirc Sump B
SIA-PSV150	PSV Fuel Pool Clg A to EDT
SIB-PSV141	PSV Fuel Pool Clg B to EDT
SIA-PSV161	PSV LPSI A to Fuel Pool Clg
SIA-PSV162	PSV LPSI A to Fuel Pool Clg
SIB-PSV192	PSV LPSI B to Fuel Pool Clg
SIB-PSV193	PSV LPSI B to Fuel Pool Clg
SIA-PSV468	PSV HPSI Pump A LTC
SIB-PSV166	PSV HPSI Pump B LTC
SIA-PSV469	PSV SDC Train A
SIB-PSV169	PSV SDC Train B
SIA-PSV179	Relief Pressure Shutdown Cooling Train A Return
SIB-PSV189	Relief Pressure Shutdown Cooling Train B Return
SIA-PSV194	PSV SDC HE Out Train A to EDT
SIB-PSV191	PSV SDC HE Out Train B to EDT
SIE-PSV211	PSV SI Tank 1
SIE-PSV221	PSV SI Tank 2
SIE-PSV231	PSV SI Tank 3

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SIE-PSV241	PSV SI Tank 4
SIA-PSV285	PSV Train A Recirc Thermal Relief
SIB-PSV286	PSV Train B Recirc Thermal Relief
SIA-PSV289	PSV SDC Train A Recirc Thermal Relief
SIB-PSV287	PSV SDC Train B Recirc Thermal Relief
SIE-PSV288	PSV SI Drn Hdr to EDT
SIE-PSV407	SIT Fill and Drn Hdr Relief to EDT - Outside CTMT
SIA-PSV417	PSV HPSI A Therm Relf to EDT
SIB-PSV409	PSV HPSI B Therm Relf to EDT
SIA-PSV439	PSV LPSI A Therm Relf to EDT
SIB-PSV449	PSV HPSI B Therm Relf to EDT
SIE-PSV473	SIT Fill and Drn Hdr Relief to RDT - Inside CTMT
SIE-PSV474	PSV SI Drn to RDT
Essential Spray Ponds	
SPB-V012	Check Valve Disch Side ESP Pump SPB-P01
SPA-V041	Check Valve Disch Side ESP Pump SPA-P01
SPA-HV49A	SP A Inlet Isol Valve
SPB-HV50A	SP B Inlet Isol Valve
SPA-HV49B	SP A Inlet Spray By-pass
SPB-HV50B	SP B Inlet Spray By-pass
SPE-HCV-207	Spray Pond Cross-Connect
SPE-HCV-208	Spray Pond Cross-Connect
SPA-PSV29	ECW HE A Relief
SPB-PSV30	ECW HE B Relief
SPA-PSV137	DGA Fuel Oil Clr Out
SPB-PSV144	DGB Fuel Oil Clr Out
SPA-PSV139	DGA Jacket Water Clr Out
SPB-PSV142	DGB Jacket Water Clr Out
SPB-PSV138	DGB Lube Oil Clr Out
SPA-PSV143	DGA Lube Oil Clr Out
SPB-PSV140	DGB Air Aft Clr Out
SPA-PSV141	DGA Air Aft Clr Out

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
SPA-HCV125	DGA Jacket Water Cooler Inlet
SPB-HCV126	DGB Lube Oil Cooler Inlet
SPA-HCV-127	DGA Jacket Water Cooler Outlet
SPB-HCV128	DGB Lube Oil Cooler Outlet
SPA-HCV133	DGA Lube Oil Cooler Inlet
SPB-HCV134	DGB Jacket Water Cooler Inlet
SPA-HCV135	DGA Lube Oil Cooler Outlet
SPB-HCV136	DGB Jacket Water Cooler Outlet
SPA-HCV045	EW HE A Inlet
SPB-HCV046	EW HE B Inlet
SPA-HCV047	EW HE A Outlet
SPB-HCV048	EW HE B Outlet
Chemical and Volume Control	
CHA-HV205	Isolation Between Regenerative Heat Exchanger And Auxiliary Spray Line
CHA-V306	Refueling Water Tank Line To Safety Injection Pumps
CHB-HV203	Isolation Between Regenerative Heat Exchanger And Auxiliary Spray Line
CHB-V305	For Refueling Water Tank And Safety Injection Pumps Train B
CHB-V327	Isolation For Safety Injection Pump Suction Line To CVCS Train B Charging
CHE-HV536	Isolation For Refueling Water Tank Gravity Feed Line To Charging Pumps
CHE-V429	Charging Pumps To Regenerative Heatexchanger Line
CHE-V431	For Inlet Side To Pressure Auxiliary Spray
CHE-V435	Spring Cooled Regenerative Heat Exchanger Charging Line To RC Loop 2A HV-239
CHE-VM70	Charging Pumps To Regenerative Heat Exchanger Inlet Line
CHN-UV501	For Volume Control Tank Outlet Line
CHAHV524	Charging line isolation Containment Isolation Valve
CHAPSV315	Charging Pump Suction Pressure Relief Valve
CHBPSV318	Charging Pump Suction Pressure Relief Valve
CHEPSV321	Charging Pump Suction Pressure Relief Valve
CHAPCV326	Charging Pump Discharge Pressure Relief Valve
CHBPSV325	Charging Pump Discharge Pressure Relief Valve
CHEPSV324	Charging Pump Discharge Pressure Relief Valve

Table A1 - Valves Contained within IST Program Evaluation

ID	Description
CHAUV506	Reactor Coolant Seal Bleedoff Containment Isolation Valve
CHBUV505	Reactor Coolant Seal Bleedoff Containment Isolation Valve
CHAUV516	Letdown Isolation Valve
CHAUV560	Reactor Drain Tank Outlet Isolation Valve
CHAUV580	Reactor Makeup Water to RDT Containment Isolation Valve
CHAUV715	PASS Containment Isolation Vavle
CHBHV255	RCP Seal Injection Containment Isolation Valve
CHBUV515	Letdown Isolation Valve
CHBUV523	Regen Heat Exchanger Outlet Containment Isolation Valve
CHBUV561	Reactor Drain Tank Outlet Isolation Valve
CHBUV924	Letdown to PASS Isolation Valve
CHNPSV115	VCT Outlet Pressure Relief Valve
CHNPSV199	Valve Relief for Reactor Coolant Pump Containment
CHNPSV345	Intermediate Letdown Pressure Relief Valve
CHNPSV354	Intermediate Letdown Pressure Relief Valve
CHNPSV865	Seal Injection Heat Exch Pressure Relief Valve
CHNUV514	Boric Acid Makeup Line Isolation Valve
CHEV440	Charging Pump Discharge to HPSI Cross-Connect Check Valve
CHEV854	Charging Line Chemical Addition Isolation Valve
CHNV118	VCT Outlet Check Valve
CHNV144	Manual Isolation Valve from RWT to Spent Fuel Pool Cleanup Pumps
CHNV154	Boric Acid Makeup Pump Discharge Check Valve
CHNV155	Boric Acid Makeup Pump Discharge Check Valve
CHNV164	Boric Acid Makeup Filter Bypass Valve
CHNV494	Reactor Makeup Water Supply Check Valve to RDT
CHNV835	RCP Seal Injection Supply Line Check Valve

Appendix B

System Level Risk Significance

Table B1 - High Risk Significant Systems

ID	Description	Reactivity Control	Maintenance of Vital Auxiliaries	Inventory & Pressure Control	RCS Heat Removal	Containment Integrity	Containment Atmosphere Control	Trip Initiator	Indirect Radioactive Release
AF	Auxiliary Feedwater				X			X	
CH	Chemical And Volume Control	X		X					
DF	Diesel Fuel Oil & Transfer		X						
DG	Diesel Generator		X						
EC	HVAC - Essential Chilled Water		X						
EW	Essential Cooling Water		X		X		X		
HD	HVAC - Diesel Generator Building		X						
NA	Non-Class 1E 13.8kv Power		X					X	
PB	Class 1E 4.16kv Power		X						
PE	Class 1E Standby Generation		X						
PK	Class 1E 125 V-DC Power		X					X	
RC	Reactor Coolant			X	X			X	
SA	Engineered Safety Features Actuation System	X		X	X	X	X	X	X
SB	Reactor Protection	X						X	
SF	Reactor Control	X			X			X	
SG	Main Steam				X			X	X
SI	Safety Injection and Shutdown Cooling	X		X	X		X		X
SP	Essential Spray Pond		X		X				
	Switchyard/Grid		X					X	

Table B2 - Low Risk Significant Systems

ID	Description
CD	Condensate
CE	Stator Cooling
CO	Main Turbine Generator Control Oil
ED	Feedwater Heater Extraction Steam and Drains
ES	Safety Equipment Status System
FT	Steam Generator Feedwater Pump Turbine
FW	Feedwater
GA	Service Gases
GT	Gas Turbine Generator
HA	HVAC - Auxiliary Building
HC	HVAC - Containment Building
HF	HVAC - Fuel Building
HJ	HVAC - Control Building
HP	Containment Hydrogen Control
IA	Instrument & Service Air
LO	Lube Oil System
MA	Main Generation
MB	Excitation and Voltage Regulation
MT	Main Turbine (and MSRs)
MX	Remote Multiplex
NB	Non-Class 1E 4.16kv Power
NC	Nuclear Cooling Water
NG	Non-Class 1E 480V Switchgear
NH	Non-Class 1E 480V MCC
NN	Non-Class 1E Instrument AC Power (Limited)
PC	Fuel Pool Cooling and Cleanup
PG	Class 1E 480V Power Switchgear
PH	Class 1E 480V Power MCC
PN	Class 1E Instrument AC Power
QB	Essential Lighting (Limited)
QD	Emergency Lighting
QF	In-Plant Communications

Table B2 - Low Risk Significant Systems

ID	Description
RD	Radioactive Waste Drain
RI	In-core Reactor Instrumentation
RJ	Plant Computer (Limited)
RK	Plant Annunciator (Limited)
RM	Main Control Board
SC	Secondary Chemical Control
SD	ERFDADS
SE	Ex-core Neutron Monitoring
H	Quality Safety Parameter Display System
SQ	Radiation Monitoring
SS	Nuclear Sampling System
WC	HVAC - Chilled Water
ZA	Auxiliary Building
ZC	Containment Building
ZF	Fuel Building
ZG	Diesel Generator Building
ZJ	Control Building
ZM	Main Steam Support Structure (MSSS)
ZR	Radwaste Building
	Containment Isolation
	Instrumentation/Indication

Appendix C

IST Component Risk Significance Determination

The following tables contain the results of the IST component risk significance determination.

Table C1 - Summary of CP Valve Risk Significance Determination

CP Functions - Containment Integrity															
Valve ID	RS	IST	IPE	Function	F-V	RAW	LER RAW	CC	PRA Imprt	IE	SDR	SEIS	FIRE	FLOOD	Comments
CPA-UV2A CPB-UV3A	L	Y	N	CTMT Bldg Refueling Purge Sup. Duct Isolation Damper	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
CPA-UV2B CPB-UV3B	L	Y	N	CTMT Bldg Refueling Purge Exh. Duct Isolation Damper	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
CPA-UV4A CPB-UV5A	L	Y	N	CTMT Bldg Pwr. Acc. Purge Sup. Duct Isolation Damper	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
CPA-UV4B CPB-UV5B	L	Y	N	CTMT Bldg Pwr. Acc. Purge Exh. Duct Isolation Damper	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C2 - Summary of CT Valve Risk Significance Determination

CT Functions - Heat Removal - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Imprt	IE	SDR	SEIS	FIRE	FLOOD	Comments
CTA-V016 CTB-V020	L	Y	N	Cdns Transfer Pump Disch Chk Vlv	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
CTA-V018 CTB-V019	L	Y	N	"Pink" CST Pump to SFP	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
CTA-V037 CTA-V038	L	Y	N	Fuel Pool Supply Line Chk Vlv from CT Pump	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
CTA-V015	See AFA-V006														
CTB-V014	See AFB-V021														
CTA-HV004 CTA-HV001	See AF Table														

Table C3 - Summary of DW Valve Risk Significance Determination

DW Functions - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
DWE-V061 DWE-V062	L	Y	N	CTMT Isolation	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant

Table C4 - Summary of FP Valve Risk Significance Determination

FP Functions - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
FPE-V089 FPE-V090	L	Y	N	CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant

Table C5 - Summary of GA Valve Risk Significance Determination

GA Functions - Containment Integrity															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
GAE-V011	L	Y	N	High Pressure N2 Sply to CTMT Chk Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
GAE-V015	L	Y	N	Low Pressure N2 Sply to CTMT Chk Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
GAA-UV1	L	Y	N	HP N2 Sply HDR to CTMT Isol Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
GAA-UV2	L	Y	N	LP N2 Sply HDR to CTMT Isol Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C6 - Summary of GR Valve Risk Significance Determination

GR Functions - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
GRA-UV1 GRB-UV2	L	Y	N	RDT/Gas Surge Header-CTMT Isolation	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant

Table C7 - Summary of HC Valve Risk Significance Determination

HC Functions - Containment Integrity															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
HCB-UV44 HCA-UV45	L	Y	N	RU-1 CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
HCA-UV46 HCB-UV47	L	Y	N	Solenoid Valve Isolation Valve for RU-1	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C8 - Summary of HP Valve Risk Significance Determination

HP Functions - Containment Atmosphere Control															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
HPA-V002 HPB-V004	L	Y	N	CTMT H2 Cntrl Rtn Line Chk Valve (Trn A)	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
HPA-HV7A HPB-HV8A	L	Y	N	CTMT Post-LOCA H2 Monitor Inlet Sol Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
HPA-HV7B HPB-HV8B	L	Y	N	CTMT Post-LOCA H2 Monitor Outlet Sol Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C8 - Summary of HP Valve Risk Significance Determination

HP Functions - Containment Atmosphere Control															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
HPA-UV1 HPB-UV2	L	Y	N	CTMT H2 Control Upstream Supply Isolation	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
HPA-UV3 HPB-UV4	L	Y	N	CTMT H2 Control Down-stream Supply Isolation	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
HPA-UV5 HPB-UV6	L	Y	N	CTMT H2 Control Return Iso-lation	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
HPA-UV23	L	Y	N	CTMT H2 Return Isolation from PASS	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
HPA-UV24	L	Y	N	CTMT H2 Supply Isolation to PASS	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C9 - Summary of IA Valve Risk Significance Determination

IA Functions - Containment Integrity															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
IAE-V021 IAE-V073	L	Y	N	CTMT Isolation Air Supply Check Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
IAE-V072	L	Y	N	Service Air CTMT Isol West PPR	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
IAA-UV2	L	Y	N	Inst Air CTMT Isol Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C10 - Summary of NC Valve Risk Significance Determination

NC Functions - Maintenance of Vital Auxiliaries - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
NCE-V118	L	Y	Y	Chk Valve Between CTMT and HCV-492	Trun	Trun	Trun	Trun	L	Trun	Trun	Trun	Trun	Trun	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
NCB-UV401	L	Y	Y	CTMT Isol Valve to NCWS Supply	Trun	Trun	Trun	Trun	L	Trun	Trun	Trun	Trun	Trun	
NCA-UV402 NCB-UV403	L	Y	Y	CTMT Isol Valve to NCWS Return	Trun	Trun	Trun	Trun	L	Trun	Trun	Trun	Trun	Trun	
NCA-PSV250 NCB-PSV251	L	Y	N	Fuel Pool HT Ex A NCWS Relief	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C11 - Summary of PC Valve Risk Significance Determination

PC Functions - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
PCE-V070 PCE-V071	L	Y	N	Fuel Pool Cleanup Suct CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
PCE-V075 PCE-V076	L	Y	N	Fuel Pool Cleanup Rtn CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
PCN-V215	L	Y	N	SFP to BAMP Isolation Valve	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
PCA-PSV35 PCB-PSV36	L	Y	N	Pressure Relief PC Hx	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C12 - Summary of RD Valve Risk Significance Determination

RD Functions - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
RDA-UV23 RDB-UV24	L	Y	N	CTMT Isol Valve from Rad Sump Pumps	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
RDB-UV407	L	Y	N	CTMT Radwaste Sump Pumps Discharge for PASS	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C13 - Summary of SS Valve Risk Significance Determination

SS Functions - Maintenance of Vital Auxiliaries - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SSB-UV200 SSA-UV203	L	Y	N	Hot Leg Sample CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
SSB-UV201 SSA-UV204	L	Y	N	Press Surge Sample CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
SSB-UV202 SSA-UV205	L	Y	N	Press S/S Sample CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C14 - Summary of WC Valve Risk Significance Determination

WC Functions - Maintenance of Vital Auxiliaries															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
WCE-V039	L	Y	N	Check Valve Inlet to CTMT Isol at U060	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	System Determined to be Low Risk Significant, therefore all components are Low Risk Significant
WCB-UV61 WCA-UV62	L	Y	N	CHW Return CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	
WCB-UV63	L	Y	N	Norm CHW Sup CTMT Isol	Not Mod.	Not Mod.	Not Mod.	Not Mod.	L	Not Mod.	Not Mod.	Not Mod.	Not Mod.	Not Mod.	

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFA-V007	L	Y	Y	AFW Pump AFA-P01 Suction Check Valve Prevent reverse flow in the suction side piping of the A-train pump and to open to allow sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability) and 3 redundant AF Pumps.

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFA-V015 AFA-V137	L	Y	Y	AFW PP AFA-P01 Disch Chk Valve To close to prevent reverse flow in the discharge side piping of the A- train pump and to open to allow sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	2E-4	2.38	2	0	M	NA	L	NA	NA	NA	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability) and 3 redundant AF Pumps.
AFB-V022	L	Y	Y	Suction Check Valve Pump AFB-P01 To close to prevent reverse flow in the suction side piping of the B-train pump and to open to allow sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability) and 3 redundant AF Pumps.
AFB-V024 AFB-V138	L	Y	Y	AFB-P01 Disch side Chk Valve To close to prevent reverse flow in the discharge side piping of the B-train pumps and to open to allow sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	2E-3	8.97	4	0	M	NA	L	NA	NA	NA	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability) and 3 redundant AF Pumps.

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFA-V079 AFB-V080	H	Y	Y	AF Pump Discharge To FW SG To remain closed to prevent reverse flow of main feedwater into AF System A- and B-train piping, to open to allow sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events. Containment Isolation	2E-3	9.99	197	0	H	NA	L	NA	NA	NA	High Risk due to consequences of failure (high LERF RAW) even though there is a low probability of failure.
AFB-HV30 AFB-HV31	L	Y	Y	AFW Pump B Flow Control Valve to SG To regulate the flow of auxiliary feedwater at the discharge side of B- train pump. The AF System is designed to provide sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	5E-4	1.23	6	0	M	NA	L	NA	NA	NA	Low Risk Significant due to multiple levels of redundancy. Each AF pump can supply feed to either SG and 1 SG with feed from 1 pump is adequate to maintain heat removal. There are therefore 6 flow paths to provide heat removal.

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFB-UV34 AFB-UV35	L	Y	Y	AFW Pump B Supply to SG Isolation To isolate the flow of auxiliary feedwater at the discharge side of B-train pump and to provide sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events. Containment Isolation	5E-4	1.23	6	0	M	NA	L	NA	NA	NA	Low Risk Significant due to multiple levels of redundancy. Each AF pump can supply feed to either SG and 1 SG with feed from 1 pump is adequate to maintain heat removal. There are therefore 6 flow paths to provide heat removal.
AFA-HV32 AFC-HV33	L	Y	Y	AFW Pump A Disch Isol to SG To regulate the flow of auxiliary feedwater at the discharge side of A-train pump to provide sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	1E-4	1.06	0	0	L	NA	L	NA	NA	NA	Low Risk Significant due to multiple levels of redundancy. Each AF pump can supply feed to either SG and 1 SG with feed from 1 pump is adequate to maintain heat removal. There are therefore 6 flow paths to provide heat removal.

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFC-UV36 AFA-UV37	L	Y	Y	AFW to SG Downstream Valve To isolate the flow of auxiliary feedwater at the discharge side of A- train pump and to provide sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events. Containment Isolation	1E-4	1.06	2	0	M	NA	L	NA	NA	NA	Low Risk Significant due to multiple levels of redundancy. Each AF pump can supply feed to either SG and 1 SG with feed from 1 pump is adequate to maintain heat removal. There are therefore 6 flow paths to provide heat removal.
AFA-HV54	H	Y	Y	AFW Turbine Trip And Throttle Valve To act as a trip valve during normal operation for the A-train pump turbine drive and to provide sufficient flow to the operable steam generator(s) to support an orderly, or controlled, shutdown and cooldown of the reactor following design basis events.	1E-3	3.11	2	NA	M	NA	L	NA	NA	NA	Required for Manual operation of the A Pump. Also provides pump protection.
AFA-V002	L	N	Y	MS Supply to AFW PP A	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
AFA-V006 CTA-V015	L	N	Y	AFA-P01 CST Suct	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFA-V016	L	N	Y	AFA-P01 Disch	3E-4	2.38	2	0	M	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
AFB-V021 CTB-V014	L	N	Y	AFB-P01 CST Suct	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
AFB-V025	L	N	Y	AFB-P01 Disch	2E-3	8.97	4	NA	M	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
AFN-V001	L	N	Y	AFN-P01 Suction	Trun.	Trun.	NA	NA	L	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
AFN-V012	H	N	Y	AFW PP AFN-P01 Disch Chk To prevent reverse flow in the discharge side piping of the N-train pump and to provide sufficient flow to the steam generator(s) for the control of reactor coolant temperature during normal start-up, hot standby and shutdown conditions, and for initial fill and makeup.	3E-4	2.59	2	NA	M	NA	L	NA	NA	NA	Potential for vapor binding/failure of the pump due to a leaking check valve. This has occurred in the industry and therefore this valve is considered high risk.

Table C15 - Summary of AF Valve Risk Significance Determination

AF Functions - Heat Removal - Trip Initiator														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
AFN-V013	L	N	Y	AFW PP AFN-P01 Disch	3E-4	2.59	2	NA	M	NA	L	NA	NA	NA	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve
CTA-HV004 CTA-HV001	H	Y	Y	AFN-P01 Suction From Condensate Storage Tank	4E-3	3.1	2.4	NA	M	NA	L	H	NA	NA	Close function low risk - normally closed (no automatic open) except during startup/shutdown. Required to be closed following a seismic event. Considered low risk due to redundant valves to perform the close function. Open function high risk as valves are required for the N pump.

Table C16 - Summary of DG/DF Valve Risk Significance Determination

DG Maintenance Rule Functions - Maintenance of Vital Auxiliaries														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
DFA-V012 DFB-V019	L	Y	N	DG F.O. Transfer Pump Disch Chk Vlv	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to low probability of failure. 2 hour storage capacity of day tank should be adequate for most Loss of Off-Site Power events. Well lubricated environment should result in maintaining low failure rate.

Table C16 - Summary of DG/DF Valve Risk Significance Determination

DG Maintenance Rule Functions - Maintenance of Vital Auxiliaries														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
DGA-V066 DGA-V067 DGB-V068 DGB-V069	L	Y	N	Start Air Dryer Disch Chk	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to redundant valves within each train. This results in much lower probability of failure caused by the valves as compared to the failure probability for the EDG.
DGA-V317 DGB-V417	H	Y	N	DG Jkt Wtr Circ Pump Disch	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as Jacket Water Cooling is required for the successful operation of the EDG.
DGA-V318 DGB-V418	H	Y	N	Jkt Wtr Htr Disch	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as the ability to close is important to ensure adequate EDG cooling.
DGA-V332 DGB-V432	L	Y	N	DG F.O. Suct. Stmr Disch Chk Valve	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk as EDG can operated regardless of position of valve.
DGA-V355 DGB-V455	H	Y	N	Spring Loaded Chk Valve at L.O. PP	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as Lube Oil is required for the successful operation of the EDG.
DGA-V364 DGB-V464	H	Y	N	DG L.O. Circ Htr	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as the ability to close is important to ensure EDG operation.
DGA-V396 DGA-V397 DGB-V496 DGB-V497	L	Y	N	DG Start Air Chk Vlv	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to redundant valves within each train.
DGA-V510 DGB-V610	H	Y	N	Check Valve for Turbo LO Filters	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as Lube Oil is required for the successful operation of the EDG.
DGA-V520 DGB-V620	H	Y	N	DG FO Sply HDR Chk Vlv	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk as Fuel Oil is required for the successful operation of the EDG.

Table C16 - Summary of DG/DF Valve Risk Significance Determination

DG Maintenance Rule Functions - Maintenance of Vital Auxiliaries														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
DGA-V523 DGA-V524 DGB-V623 DGB-V624	L	Y	N	DG Turbo Air Disch To Start Air Chk Vlv	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to redundant valves within each train. Combustible mixture is unlikely to develop in normal recovery run if valves fail.
DGA-UV3 DGB-UV4 DGA-UV5 DGB-UV6 DGA-UV7 DGB-UV8 DGA-UV9 DGB-UV10 DGA-UV11 DGB-UV12 DGA-UV15 DGB-UV16	L	Y	N	DG Start Air Control Valve	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to multiple redundancy in air start paths.
DGA-PSV5 DGB-PSV6 DGA-PSV7 DGB-PSV8	L	Y	N	DG Start Air Rec Press Safety Valve	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk due to low probability of spurious valve opening and low likelihood of an overpressure event requiring valve opening

Table C17 - Summary of EC Valve Risk Significance Determination

EC Maintenance Rule Functions - Maintenance of Vital Auxiliaries															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
ECA-V002 ECA-V011 ECB-V065 ECB-V068	L	N	Y	Essential Chiller Unit Water and Oil Cooler Manual Valve	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.
ECA-PSV75 ECB-PSV76	L	Y	N	Expansion Tank Pressure Relief Valves To prevent system overpressurization in case of volume expansion.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECA-PSV95 ECB-PSV96	L	Y	N	ESF Switchgear Room Essential ACUs (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case complete/ partial plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECA-PSV97 ECB-PSV98	L	Y	N	Control Room Complex Essential Air Filtration Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case complete/ partial plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.

Table C17 - Summary of EC Valve Risk Significance Determination

EC Maintenance Rule Functions - Maintenance of Vital Auxiliaries															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
ECA-PSV99 ECB-PSV100	L	Y	N	Electrical Penetration Room Air Cooling Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECA-PSV101 ECB-PSV102	L	Y	N	ECW Pump Room Air Cooling Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECA-PSV103 ECB-PSV104	L	Y	N	CS Pump Room Air Cooling Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECA-PSV105 ECB-PSV106	L	Y	N	HPSI Pump Room Air Cooling Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.

Table C17 - Summary of EC Valve Risk Significance Determination

EC Maintenance Rule Functions - Maintenance of Vital Auxiliaries															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
ECA-PSV107 ECB-PSV108	L	Y	N	LPSI Pump Room Air Cooling Units (Cooling Coil) Pressure Relief Valves. To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECB-PSV109 ECA-PSV117	L	Y	N	Auxiliary Feed Water Pump Room Air Cooling Units (Cooling Coil) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
ECB-PSV120 ECA-PSV121	L	Y	N	DC Equipment Room Air Cooling Units (Cooling Coils) Pressure Relief Valves To prevent system overpressurization in case plugging of tubes or inadvertent closure of isolation valve	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.

Table C18 - Summary of EW Valve Risk Significance Determination

EW Maintenance Rule Functions - Heat Removal - Maintenance of Vital Auxiliaries - Containment Atmosphere Control															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
EWA-UV65 EWA-UV145	L	Y	Y	NC Cross-tie Valve. To allow the return of EW water from NC priority load components	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Open Function is Low Risk Significant as NC is Low Risk Significant. Close function is low risk significant due to the low probability of multiple train failures of EW concurrent with failure of NC and an event requiring a SIAS
EWA-PSV47 EWB-PSV48	L	Y	N	SDC HX Safeties	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
EWA-PSV61 EWB-PSV62	L	Y	N	EW Service Water Safeties	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
EWA-PSV79 EWB-PSV80	L	Y	N	EW HX Safeties	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
EWA-PSV103 EWB-PSV104 EWA-PSV105 EWB-PSV106	L	Y	N	EW Surge Tank Safeties	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
EWA-HCV41 EWB-HCV42 EWA-HCV53 EWB-HCV54	L	N	Y	EW to SDCHX Manual Service Valves	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.

Table C18 - Summary of EW Valve Risk Significance Determination

EW Maintenance Rule Functions - Heat Removal - Maintenance of Vital Auxiliaries - Containment Atmosphere Control														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
EWA-HCV005 EWB-HCV006 EWA-HCV135 EWB-HCV136	L	N	Y	EW Pump Suction and Header Isolation Valves	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.
EWA-HCV071 EWB-HCV072	L	N	Y	EW HX Inlet Isolation	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.
EWA-V021 EWB-V043	L	N	Y	EW to Essential Chiller Inlet Isolation	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.
EWA-V022 EWB-V044	L	N	Y	EW to Essential Chiller Outlet	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. This results in a low probability of failure due to spurious closure and justifies designation as Low Risk Significant.

Table C19 - Summary of RC Valve Risk Significance Determination

RC Maintenance Rule Functions - Heat Removal - Pressure and Inventory Control - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
RCA-HV101 RCB-HV102	H	Y	N	RCGVS Reactor Vessel Vent Isolation Valve(s) (Solenoid). To remotely vent non-condensable gases from the Reactor Vessel head.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Vent valves only method to depressurize RCS and vent non-condensables.
RCA-HV103	H	Y	Y	RCGVS Reactor Vessel Vent Isolation Valve(s) (Solenoid). To remotely vent non-condensable gases from the Reactor Vessel head.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Vent valves only method to depressurize RCS and vent non-condensables.
RCB-HV105	H	Y	Y	RCGVS Reactor Vessel Drain Tank Valve (Solenoid). Provide venting to drain tank. Venting from Reactor Vessel and PZR is directed to RDT	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Vent valves only method to depressurize RCS and vent non-condensables.
RCA-HV106	H	Y	Y	Provide isolation to containment, valve provides the option to dump gas to containment if overpressurization of RTD is possible. RCGVS Containment Isolation Valve	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Vent valves only method to depressurize RCS and vent non-condensables.
RCB-HV108 RCB-HV109	H	Y	Y	Pressurizer Gas and Steam Vent Valve(s) (Solenoid). To remotely vent non-condensable gases from pressurizer steam space.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Vent valves only method to depressurize RCS and vent non-condensables.

Table C19 - Summary of RC Valve Risk Significance Determination

RC Maintenance Rule Functions - Heat Removal - Pressure and Inventory Control - Trip Initiator															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
RCE-PSV200 RCE-PSV201 RCE-PSV202 RCE-PSV203	H	Y	Y	Pressurizer Safety Valve(s). Limit the RCS pressure to less than 110% of design pressure.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Required for over pressure protection.
RCA-HV446 RCA-HV450 RCB-HV447 RCB-HV451 RCA-HV448 RCA-HV452 RCB-HV449 RCB-HV453	L	N	Y	High Pressure Seal Cooler Isolation Valve	Trun.	Trun.	0	N/A	L	N/A	L	N/A	N/A	N/A	Valves are normally open with breakers open. NC isolation valves and relief valves are available to prevent a release in the event of a HP Seal Cooler rupture.
RCA-V090	L	N	Y	Pzr Vents (Manual)	Trun	Trun	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Valves are normally open and are not required to change state to allow for depressurization of the RCS or the removal or non-condensable gases.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGN-V097 SGN-V098	L	N	Y	Downcomer Manual Isolation Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. Spurious Closure causes minor perturbation but not a trip.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGN-V431 SGN-V432	L	N	Y	Downcomer Check Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Normal plant operation validates low probability of failure to open (valve is normally open). Low Risk Significant due to low probability of failure (compared to pump failure probability) and 3 redundant AF Pumps.
SGN-FV1113 SGN-FV1123	L	N	Y	Downcomer Control Valves	0.001	1.35	9	0	M	L	L	N/A	N/A	N/A	Normal plant operation validates operation of valve. Failures would be immediately detectable Low Risk Significant due to low probability of failure for a normally open valve (compared to pump failure probability) and 3 redundant AF Pumps.
SGN-HV1143 SGN-HV1145	L	N	Y	Feedwater Isolation Bypass Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Valve is normally closed. N pump flow to one SG is sufficient for all likely scenarios. Therefore valve is considered to be of low risk significance.
SGN-PV1128	L	N	Y	N2 Supply Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SGN-V967	L	N	Y	N2 Accumulator Isolation Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SGN-V968	L	N	Y	N2 Supply to SGN-PSL-1128 Isolation	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGN-V002 SGN-V008	L	N	Y	Chk Valve for AFW Line	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	N pump flow to one SG is sufficient for all likely scenarios. Therefore, due to multiple levels of redundancy (3 pumps with capability to supply 2 SGs), the valves are considered low risk significant.
SGN-V435 SGN-V437	L	N	Y	Air/N2 Supply to Downcomer Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. The valve is not required to change state to allow AF flow to the SGs.
SGN-V440 SGN-V441	L	N	Y	Check Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SGN-V959	L	N	Y	N2 Check Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SG-PCV1130	L	N	Y	N2 Supply Regulator	5E-5	1	1	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SG-PCV1147	L	N	Y	N2 to Downcomer	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SG-PSV1131	L	N	Y	N2 Supply Relief	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SG-PSV1147	L	N	Y	N2 to Downcomer	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SG-V289 SG-V290	L	N	Y	SG Blowdown Manual Isolation	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. The valve is not required to change state to allow AF flow to the SGs.
SGE-V003 SGE-V007	L	Y	N	Isol Chk Valve for Econ FW DWSTR	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. The valve is not required to change state to allow AF flow to the SGs.
SGE-V005 SGE-V006	L	Y	N	Economizer Line Stop Valves	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as Valves are normally Open, have a low probability of failing closed and do not receive an Automatic Actuation.
SGA-V043 SGA-V044	L	Y	Y	Steam Supply Check Valves to A AF Pump	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low risk significant due to low probability of having a faulted generator, loss of power (Station Blackout) and check valve failure. All of these event are required to occur concurrently for these valves to have an impact on risk.
SGE-V334 SGE-V339 SGE-V350 SGE-V360	L	N	Y	Chk Vlv for ADV N2 Supply	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significant due to redundant Steam paths, redundant air supplies and ADVs can be manually opened following a loss of air supply.
SGE-V337 SGE-V342 SGE-V354 SGE-V363	L	N	Y	Accumulator Isolation Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valves are normally Locked Open
SGE-V346 SGE-V348 SGE-V357 SGE-V358	L	N	Y	IA Check Valve	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significant due to redundant Steam paths, redundant air supplies and ADVs can be manually opened following a loss of air supply.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGE-V642 SGE-V652 SGE-V653 SGE-V693	L	Y	Y	Downcomer Containment Isolation	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. Spurious Closure causes minor perturbation but not a trip. Multiple valves available to perform containment isolation function.
SGE-V885 SGE-V886	L	N	Y	Steam Bypass to AF Turbine	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low risk significant due to low probability of having a faulted generator, loss of power (Station Blackout) and check valve failure. All of these event are required to occur concurrently for these valves to have an impact on risk.
SGE-V887 SGE-V888	L	Y	Y	Steam Bypass Check Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk due to low impact on CDF/LERF/SDR.
SGE-V889	L	N	Y	Combined Steam Bypass to AF Turb	6E-5	1.8	1	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valve is a normally Open Manual Valve
SGE-V963 SGE-V964 SGE-V965 SGE-V966	L	N	Y	Instrument Air Filter Inlet Valves	Trun	Trun	N/A	N/A		L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SGB-HV-178 SGA-HV-179 SGA-HV-184 SGB-HV-185	H	Y	Y	ADVs	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	High Risk as ADVs are a primary means of ensuring a steam path for heat removal.
SGB-HV200 SGB-HV201	L	Y	N	Chemical Injection	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valve is normally closed.
SGB-UV130 SGB-UV135 SGA-UV172 SGA-UV175	L	Y	Y	Downcomer Isolation Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Due to valve being normally open. Spurious Closure causes minor perturbation but not a trip.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGB-UV132 SGB-UV137 SGA-UV174 SGA-UV177	L	Y	N	Econ FW Isol	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as Valves are trip initiators but do not cause any further complications such as loss of mitigating equipment.
SGA-UV134 SGA-UV138	H	Y	Y	Steam supply to AF Pump	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	High Risk as valves are required to operate A AF Pump
SGA-UV134A SGA-UV138A	H	Y	Y	Steam supply to AF pump	.003	3.8	2	N/A	M	L	L	N/A	N/A	N/A	High Risk as valves are required to operate A AF Pump
SGE-UV169 SGE-UV183	L	Y	Y	MSIV Bypass Isolation Valves	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valve is normally closed.
SGE-UV170 SGE-UV171 SGE-UV180 SGE-UV181	H	Y	N	MSIVs	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	
SGE-VA019 SGE-VA020 SGE-VA021 SGE-VA022	H	Y	N	Air reservoir for MSIVs	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	High Risk as redundant trains are required to close MSIVs
SGE-VA023 SGE-VA024 SGE-VA025 SGE-VA026	L	Y	N	MSIV Quality Class Break Inst. Air Check Valve	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valves close on a loss of air.
SGA-VA027 SGB-VA030 SGA-VA028 SGB-VA029	L	Y	N	FWIV Quality Class Break Inst. Air Check Valve	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as valves close on a loss of air.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGA-UV204 SGA-UV211 SGB-UV219 SGA-UV220 SGB-UV221 SGB-UV222 SGA-UV223 SGB-UV224 SGA-UV225 SGB-UV226 SGA-UV227 SGB-UV228	L	Y	N	SG-1 Hot Leg Blowdown Sample Line Isol Valve	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as Steam Generator Blowdown System evaluated as low risk.
SGA-UV500P SGB-UV500Q SGB-UV500R SGA-UV500S	L	Y	Y	Blowdown Isolation	Trun	Trun	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as Steam Generator Blowdown System evaluated as low risk.
SGA-UV1133 SGA-UV1134	L	Y	N	Steam Trap Isolation	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as failure of these valves has no immediate impact on safety and valves are alarmed.
SGB-UV1135A SGB-UV1135B SGB-UV1136A SGB-UV1136B	L	Y	N	Steam Trap Isolation	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk as failure of valves has no impact on plant.

Table C20 - Summary of SG Valve Risk Significance Determination

SG Maintenance Rule Functions - Heat Removal - Trip Initiator - Indirect Radioactive Release														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SGE-PSV554 SGE-PSV555 SGE-PSV556 SGE-PSV557 SGE-PSV558 SGE-PSV559 SGE-PSV560 SGE-PSV561 SGE-PSV572 SGE-PSV573 SGE-PSV574 SGE-PSV575 SGE-PSV576 SGE-PSV577 SGE-PSV578 SGE-PSV579 SGE-PSV691 SGE-PSV692 SGE-PSV694 SGE-PSV695	H	Y	N	Main Steam Relief	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	High Risk as all Safety Valves are required per the Safety Analysis.
SGB-PSV302 SGA-PSV309 SGA-PSV316 SGB-PSV322	L	Y	N	Accumulator Line Relief	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)
SGB-PSV305 SGA-PSV312 SGA-PSV319 SGB-PSV325	L	Y	N	N2 Line Relief	N/A	N/A	N/A	N/A	L	L	L	N/A	N/A	N/A	Low Risk Significance due to multiple redundancy in flow paths for providing adequate air pressure (IA/GA/Accumulators)

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-V105 SIB-V104	L	N	Y	CS Pump suction	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Closed to use CS for SDC. Procedurally used in EOPs. Low Risk Significant as it is only used after failure of both SDC trains. Backed up with a check valve
SIE-V113 SIE-V123 SIE-V133 SIE-V143	H	Y	Y	Discharge HPSI To Reactor Coolant Loops Containment isolation. Prevents reverse flow and provides isolation during SDC operation. Open to allow HPSI flow.	2E-4	1.79	0	6	M	N/A	H	N/A	N/A	N/A	Risk Significant due to impact of Common Cause Failures and Shutdown Risk.
SIE-V114 SIE-V124 SIE-V134 SIE-V144	H	Y	Y	Discharge LPSI To Reactor Coolant Loops Containment isolation. Prevents pressurization of low pressure header during HPSI operation. Open to allow LPSI or SDC Flow.	1E-2	4.63	2	15	H	N/A	H	N/A	N/A	N/A	Risk Significant due to F-V, RAW, Common Cause Failure and Shutdown Risk.
SIA-V157 SIB-V158	L	Y	Y	Check Valve on Suction Side of CS Pump Prevent reverse flow during normal shutdown cooling or pump maintenance. Open to allow suction path for CS flow.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-V164 SIB-V165	L	Y	Y	CTMT Isol Check Valve at Pen U021 Containment Isolation. Prevent reverse drainage of containment spray header. Open to allow containment spray flow.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low probability of failure and valve not subject to significant wear or corrosion
SIA-V201 SIB-V200	L	Y	Y	LPSI Pump 1 Suction Check Valve Prevent reverse flow during shutdown cooling and pump maintenance. Open to allow LPSI flow.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).
SIA-V205 SIB-V206	H	Y	Y	Containment Recirculation Sump Screen Prevent reverse flow of RWT to sump. Open to allow SI flow from the containment sump.	2E-4	2	1	5	M	N/A	L	N/A	N/A	N/A	Low Risk Significant as failure to open fails HPSI/LPSI/CS and based on HPSI's importance for once through cooling in the event of loss of SDC (both trains). Also required to support gravity feed in the event of a Station Blackout. Determined to be of High Risk Significance due to the high impact of common cause failure and impact on Shutdown Risk
SIE-V215 SIE-V225 SIE-V235 SIE-V245	L	Y	Y	SI Tank Discharge Check Valve Isolate the SITs from the RCS when RCS pressure is above SIT pressure during heatup, shutdown and normal operating conditions. Open to allow SIT flow.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability events and multiple trains are available

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIE-V217 SIE-V227 SIE-V237 SIE-V247	H	Y	Y	Discharge SI Tank To Reactor Coolant Loops Isolate the SIS from the RCS when RCS pressure is above SIS pressure during heatup, shutdown and normal operating conditions. Open to allow SIT, LPSI, HPSI, and/or SDC flow.	2E-4	1.79	0	6	M	N/A	L	N/A	N/A	N/A	High Risk Significance as valves are an RCS Pressure Boundary
SIA-V470 SIB-V402	L	N	Y	HPSI Pump suction	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valve is normally open.
SIA-V404 SIB-V405	L	Y	Y	HPSI Pump Check Valve Prevent reverse flow during pump maintenance and check valve testing (via charging pumps). Open to allow HPSI flow.	1E-4	1.67	0	4	M	N/A	H	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).
SIA-V424 SIB-V426	L	Y	N	Check Valve on HPSI Recirc Prevent reverse flow during LPSI and RCS pump testing and shutdown cooling operation. (This assures double valve isolation of potential flowpaths to the RWT.) Open to provide miniflow protection for the HPSI pumps.	N/A	N/A	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-V434 SIB-V446	L	Y	Y	LPSI Pump 1 Discharge Check Valve Prevent reverse flow during pump maintenance and potential overpressurization due to transient thermal effects. Open to provide LPSI or shutdown cooling flow.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).
SIA-V435 SIB-V447	L	N	Y	LPSI Pump disch	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valve is normally open.
SIA-V451 SIB-V448	L	Y	Y	Check Valve on LPSI Recirc Prevent reverse flow during HPSI and CS pump testing. Open to provide miniflow protection for the LPSI pumps.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).
SIE-V463	L	Y	N	SIT to RWT outboard isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valve is normally closed.
SIA-V476 SIB-V478	L	N	Y	HPSI Pump disch	4E-4	2.24	0	5	M	N/A	H	N/A	N/A	N/A	Low Risk Significant as valve is normally open.
SIA-V485 SIB-V484	L	Y	N	CS Pump Discharge Check Valve Prevent reverse flow during pump maintenance and potential overpressurization due to transient thermal effects. Open to allow CS pump flow.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-V486 SIB-V487	L	Y	Y	Check Valve on CS Recirc Prevent reverse flow during LPSI and HPSI pump and shutdown cooling operations. Open to provide mini-flow protection for the CSPs.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Surveillance Testing of Pump validates low probability of failure and also tests the valve. Low Risk Significant due to low probability of failure (compared to pump failure probability).
SIA-V522 SIB-V532	L	Y	Y	Check Valve on HPSI RC Loop Prevent reverse flow during normal RC and shutdown cooling operations. Open to allow hot leg injection flow.	9E-6	1.05	0	3	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability events and multiple trains are available
SIA-V523 SIB-V533	L	Y	Y	Isolation Check Valve on HPSI Prevent reverse flow during normal RC and shutdown cooling operations. Open to allow hot leg injection flow. Containment Isolation.	9E-6	1.05	0	3	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability events and multiple trains are available
SIE-V540 SIE-V541 SIE-V542 SIE-V543	H	Y	Y	Discharge HPSI And LPSI HDr To Reactor Coolant Loop (Class boundary) Prevent reverse flow for SIS-RCS isolation. Open to provide HPSI, LPSI and/or SDC flow.	2E-4	1.79	0	6	M	N/A	H	N/A	N/A	N/A	High Significant due to Potential for MOV Thermal Binding
SIA-V957 SIB-V958	L	N	Y	HLI valve	7E-7	1.05	0	3	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valves are locked open

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-HV306 SIB-HV307	H	Y	Y	LPSI Hdr Discharge Isol Throttled as necessary during SDC operation to maintain RCS cooldown rates.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	High Risk Significant as valves are required for SDC
SIA-HV604 SIB-HV609	H	Y	Y	HPSI Long Term Recirc Isol Open for Long Term Cooling.	5E-3	1.25	0	3	M	N/A	H	N/A	N/A	N/A	High Risk Significant due to high F-V and valves required for SDC Gravity Feed Flow Path
SIC-HV321 SID-HV331	H	Y	Y	HPSI Long Term Recirc Ctmt Isol Opened for hot leg injection during long term recirculation. Containment Isolation.	5E-3	1.25	N/A	3	M	N/A	H	N/A	N/A	N/A	High Risk Significant due to high F-V and required for SDC Gravity Feed Flow Path
SIA-HV605 SIA-HV606 SIA-HV607 SIA-HV608 SIB-HV613 SIB-HV623 SIB-HV633 SIB-HV643	L	Y	N	SI Tan Vent Open to allow SITs to be depressurized during cooldowns.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as multiple failures required to fail a tank and multiple tanks need to fail to fail the function.
SIA-HV657 SIB-HV658	L	Y	Y	SDC Temp Control Throttled open for SDC initiation.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as other valves are used for throttling SDC. Only spurious closure of the valve will fail the function while SDC is in operation.
SIA-HV683 SIB-HV692	L	N	Y	LPSI Pump Isol Close to initiate SDC.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as valves are backed up by check valves
SIA-HV678 SIB-HV679	L	N	Y	SDC HE Isol Throttle augment LPSI Train with CS pump flow.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are only used to back up LPSI with CS for SDC.

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-HV684 SIB-HV689	L	N	Y	SDC HE Isol Closed for initiation of LPSI train SDC. Open to augment LPSI Train with CS pump flow.	Trun.	Trun.	N/A	N/A		N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are only used to back up LPSI with CS for SDC.
SIA-HV685 SIB-HV694	H	Y	Y	LPSI Cross Connect To SDCHE Open to Initiate SDC.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	High Risk Significant as valves are required to operated for successful SDC.
SIA-HV686 SIB-HV696	H	Y	Y	Crossover SDCHE And LPSI Open to Initiate SDC.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	High Risk Significant as valves are required to operated for successful SDC.
SIA-HV687 SIB-HV695	L	N	Y	CS Isol Closed for Initiation of SDC.	5E-5	1.08	3	3	L	N/A	H	N/A	N/A	N/A	Low Risk Significant as other valves are available for SDC
SIA-HV688 SIB-HV693	L	Y	N	SDC HE A Bypass Open to assure CS flow capability down to 200F during Shutdown Cooling.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability accidents during limited periods of time
SIA-HV691 SIB-HV690	H	Y	Y	Shutdown Cooling Warm-up Bypass Ctmt Isol Opened for SDC initiation. Containment Isolation.	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	High Risk Significant as valves are required to operated for successful SDC.
SIA-HV698 SIB-HV699	L	Y	Y	HPSI Pump A Disch Required to close for Hot Leg Injection capability.	5E-3	4	2	9	M	N/A	H	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability events and multiple trains are available

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIB-UV322 SIB-UV332	L	Y	N	Hot Leg Inj Chk Valve Leakoff Isol Open to allow drain off of RCS leakage to RDT accumulating past first SI header check valve.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are only required for low probability events and multiple trains are available
SIB-UV611 SIB-UV621 SIB-UV631 SIB-UV641	L	Y	N	SIT Fill and Dm Isol Open to allow filling and draining of SIT liquid water inventory. Close to assure SIT integrity assuming of LOCA during SIT fill & drain.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are normally closed and the probability of a LOCA while open is low.
SIA-UV634 SIA-UV644 SIB-UV614 SIB-UV624	L	Y	Y	SIT Tank Isol Disch Although normally open, receives signal to open on SIAS to provide SI path to the RCS.	4E-5	1	0	4	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are downpowered and normally open.
SIA-UV635 SIA-UV645 SIB-UV615 SIB-UV625	H	Y	Y	LPSI Disch Hdr Ctmt Isol Vlv Throttled open for SDCS warm-up during SDC initiation. Open for LPSI LOCA flow. Containment Isolation.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk Significant as valves are used for both SDC and for performing a Containment Isolation Function.

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-UV617 SIB-UV616 SIA-UV627 SIB-UV626 SIA-UV637 SIB-UV636 SIA-UV647 SIB-UV646	H	Y	Y	HPSI Disch Hdr Ctmt Isol Vlv Required to open on SIAS to provide SI path to the RCS. Provide throttling capability during injection mode of operation and during long-term recirculation. Containment Isolation.	3E-3	2.5	0	16	H	N/A	L	N/A	N/A	N/A	High Risk Significant as valves are required for HPSI and perform a containment isolation function.
SIB-UV618 SIB-UV628 SIB-UV638 SIB-UV648	L	Y	N	SI Loop Drain Allows drain off of RCS leakage to RDT accumulating past first SI header check valve. Close to assure SIT integrity for LOCA postulated during bleed-off options.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are normally closed and the probability of a LOCA while open is low.
SIA-UV651 SIB-UV652	H	Y	Y	Shutdown Cooling Suction Isol Vlv Open to initiate SDC and/or LTOP. Close to isolate RCS from SIS.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk Significant as valves are required for SDC and LTOP Protection.
SIA-UV655 SIB-UV656 SIC-UV653 SID-UV654	H	Y	Y	Shutdown Cooling Suction Ctmt Isol Vlv Open to initiate SDC. Close to isolate RCS from SIS. Containment Isolation.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	High Risk Significant as valves are required to operated for successful SDC.

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-UV660 SIB-UV659	L	Y	Y	Recirc to RWT Close on RAS to preclude flow of water to the RWT. Close on initiation of shut-down cooling to preclude flow of water to the RWT.	5E-5	1.08	3	3	M	N/A	L	N/A	N/A	N/A	Low Risk Significant as there are redundant Isolation valves for each pump.
SIA-UV664 SIB-UV665	L	Y	Y	CS Pump to RWT Isol Close on RAS to preclude flow of water to the RWT. Close on initiation of shut-down cooling to preclude flow to the RWT.	5E-5	1.08	0	3	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as there are redundant Isolation valves for each pump.
SIA-UV666 SIB-UV667	L	Y	N	HPSI Pump to RWT Isol Close on RAS to preclude flow of water to the RWT.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as there are redundant Isolation valves for each pump.
SIA-UV669 SIB-UV668	L	Y	Y	LPSI Pump A to RWT Isol Close on initiation of shut-down cooling. Note that valve also closes on RAS even though LPSIs are off during recirculation mode. This conservative design feature precludes flow to the RWT if the LPSI fails "on".	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as there are redundant Isolation valves for each pump.
SIA-UV672 SIB-UV671	H	Y	Y	Ctmt Spray Control Vlv Open on CSAS to provide containment spray. Containment Isolation.	1E-3	1.46	11	4	H	N/A	L	N/A	N/A	N/A	High Risk Significant due to valves needed for Containment Heat removal and high common mode and LERF

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-UV673 SIA-UV674 SIB-UV675 SIB-UV676	H	Y	Y	Butterfly Containment Sump Isolation To open on RAS. Containment Isolation.	1E-2	4.14	69	17	H	N/A	L	N/A	N/A	N/A	High Risk Significant due to valves needed for Recirculation and high common mode and LERF
SIA-UV682	L	Y	N	SIT Fill and Drn Hdr CTMT Isol Open to allow filling and draining of SIT liquid water inventory. Close to assure SIT integrity for LOCA postulated during SIT fill and drain. Containment Isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are normally closed and the probability of a LOCA while open is low.
SIA-UV708	L	Y	N	Recirc Sump A for PASS Open to allow PASS operations. Close for Containment Isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are normally closed and the probability of a LOCA while open is low. PASS is considered low risk significant.
SIA-UV709 SIB-UV710	L	Y	N	HPSI Pump for PASS Open to allow PASS operations. Close on SIAS to preclude diversion of SI minimum flow.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as valves are normally closed and the probability of a LOCA while open is low. PASS is considered low risk significant.
SIA-PSV151 SIB-PSV140	L	Y	N	CTMT Recirc Sump Relief Open to provide system overpressure protection. Containment Isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-PSV150 SIB-PSV141	L	Y	N	PSV Fuel Pool Clg to EDT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV161 SIA-PSV162 SIB-PSV192 SIB-PSV193	L	Y	N	PSV LPSI to Fuel Pool Clg Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV468 SIB-PSV166	L	Y	Y	PSV HPSI Pump LTC Open to provide system overpressure protection.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV469 SIB-PSV169	L	Y	N	PSV SDC Open to provide system overpressure protection. Containment Isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV179 SIB-PSV189	H	Y	N	Relief Pressure Shutdown Cooling Open to provide system overpressure protection. Open to provide RCS LTOP. Containment Isolation	Trun.	Trun.	N/A	N/A	L	N/A	H	N/A	N/A	N/A	High Risk Significant as these are the LTOP Valves
SIA-PSV194 SIB-PSV191	L	Y	N	PSV SDC HE Out to EDT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIE-PSV211 SIE-PSV221 SIE-PSV231 SIE-PSV241	L	Y	N	PSV SI Tank Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as failure of valves has impact on system performance and the valves are highly reliable.

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIA-PSV285 SIB-PSV286	L	Y	N	PSV Recirc Thermal Relief Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV289 SIB-PSV287	L	Y	N	PSV SDC Recirc Thermal Relief Open to provide system overpressure protection	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIE-PSV288	L	Y	N	PSV SI Dm Hdr to EDT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIE-PSV407	L	Y	N	SIT Fill and Dm Hdr Relief to EDT - Outside CTMT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV417 SIB-PSV409	L	Y	Y	PSV Therm Relf to EDT Open to provide system overpressure protection.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIA-PSV439 SIB-PSV449	L	Y	N	PSV LPSI Therm Relf to EDT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening
SIE-PSV473	L	Y	N	SIT Fill and Dm Hdr Relief to RDT - Inside CTMT Open to provide system overpressure protection.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening

Table C21 - Summary of SI Valve Risk Significance Determination

SI Maintenance Rule Functions - Reactivity Control - Heat Removal - Inventory & Pressure Control - Containment Atmosphere Control - Trip Initiator - Indirect Radioactive Release															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SIE-PSV474	L	Y	N	PSV SI Dm to RDT Open to provide system overpressure protection. Containment Isolation.	N/A	N/A	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant due to low flow rates and low probability of spuriously opening

Table C22 - Summary of SP Valve Risk Significance Determination

SP Maintenance Rule Functions - Maintenance of Vital Auxiliaries - Heat Removal															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SPB-V012 SPA-V041	L	Y	Y	Check Valve Disch Side ESP Pump Pump Discharge Check Valve. Flow/Pressure Control such that SP System operates at its designed pressure and flow.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Passive Valve. Normally open and required to remain open. Surveillance Testing of Pump validates low probability of failure and also tests the valve

Table C22 - Summary of SP Valve Risk Significance Determination

SP Maintenance Rule Functions - Maintenance of Vital Auxiliaries - Heat Removal														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SPA-HV49A SPB-HV50A	L	Y	Y	SP Inlet Isol Valve Spray Header MOV. Normally open valves. Allow SP flow to spray nozzles for heat rejection to atmosphere.	0.0013	3.2	50	5	H	N/A	L	L	N/A	N/A	Low Risk Significant as the valves are normally open and de-energized.
SPA-HV49B SPB-HV50B	L	Y	Y	SP Inlet Spray By-pass Spray Header Bypass MOV. HV-49B/50B are normally closed; HV-50B/49B may be opened (and HV-50A/49A closed) to bypass the spray nozzles.	Trun.	Trun.	N/A	N/A	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as the valves are normally open and de-energized.
SPE-HCV-207 SPE-HCV-208	L	Y	N	Spray Pond Cross-Connect Spray Pond Cross Tie Valves. To provide isolation between spray ponds A and B when both SP trains are operating. During single train operation, allows both volumes of pond water to be available for long term cooling.	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to the long time (many days) available to provide makeup.
SPA-PSV29 SPB-PSV30	L	Y	N	Essential Cooling Water Heat Exchanger Tube Side Thermal Relief	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
SPA-PSV137 SPB-PSV144	L	Y	N	Fuel Oil Cooler Thermal Relief	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.

Table C22 - Summary of SP Valve Risk Significance Determination

SP Maintenance Rule Functions - Maintenance of Vital Auxiliaries - Heat Removal															
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	LER RAW	CC	PRA Impt	IE	SDR	SEIS	FIRE	FLOOD	Comments
SPA-PSV139 SPB-PSV142	L	Y	N	Diesel Generator Jacket Water Cooler Thermal Relief	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
SPB-PSV138 SPA-PSV143	L	Y	N	Lube Oil Cooler Thermal Relief	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
SPB-PSV140 SPA-PSV141	L	Y	N	Air Intercooler Thermal Relief	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	N/A	N/A	Low Risk Significant due to low probability of need for relief and small valve size that limits flow diversion from spurious operation.
SPA-HCV125 SPB-HCV126 SPA-HCV-127 SPB-HCV128 SPA-HCV133 SPB-HCV134 SPA-HCV135 SPB-HCV136	L	N	Y	Diesel Generator Jacket Water and Lube Oil Cooler Manual Isolation Valves. Diesel Generator Jacket Water and Lube Oil Cooler Heat Exchanger Isolation	6E-5	1.42	0	0	L	N/A	L	N/A	N/A	N/A	Low Risk Significant as the valves are normally locked open and only used for maintenance activities.
SPA-HCV045 SPB-HCV046 SPA-HCV047 SPB-HCV048	L	N	Y	Essential Cooling Water Heat Exchanger Manual Isolation Valves	Truncated	N/A	N/A	N/A	L	L	N/A				Low Risk Significant as the valves are normally locked open and only used for maintenance activities.

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHB-V305 CHA-V306	H	Y	Y	Refueling Water Tank And Safety Injection Pumps	0.0009	1.28	18	N/A	1	M	N/A	N/A	N/A	Failure to open fails HPSI/LPSI/CS Medium Risk during shutdown based on HPSI's importance for once through cooling in the event of loss of SDC (both trains). Also required to support gravity feed in the event of a Station Blackout. Determined to be of High Risk Significance due to the high impact of common cause failure and impact on Shutdown Risk
CHE-V429 CHE-VM70	H	Y	N	Charging Pumps To Regenerative Heatex-changer Line	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Considered of High Risk Significance as single failure will cause failure of APS
CHE-V431	H	Y	N	For Inlet Side To Pressure Auxiliary Spray	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Considered of High Risk Significance as single failure will cause failure of APS
CHE-V435	H	Y	N	Spring Cooled Regenerative Heat Exchanger Charging Line To RC Loop 2A HV-239	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low risk for Shutdown as Normal CH Line would have to fail before this line would be used. Considered of High Risk Significance as single failure will cause failure of APS

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHB-HV203 CHA-HV205	H	Y	Y	Isolation Between Regenerative Heat Exchanger And Auxiliary Spray Line	Trun	Trun	Trun	N/A	Trun	L	N/A	N/A	N/A	Not credited for Shutdown Considered of High Risk Significance as failure to close could lead to an uncontrolled depressurization/loss of level control.
CHE-HV239 CHE-PDV240	L	Y	Y	Close to Assure Flow to APS	Trun	Trun	Trun	N/A	Trun	L	N/A	N/A	N/A	Low risk for shutdown as Normal Charging - only used if HPSI fails. Considered Low Risk Significance due to redundant valves and valves fails closed on loss of air.
CHB-HV530 CHA-HV531	L	Y	Y	RWT Outlet MOV	0.0003	2.06	5	0	M	L	N/A	N/A	N/A	Failure to Remain Open fails HPSI/LPSI/CS Medium Risk for Shutdown Based on HPSI's importance for once through cooling in the event of loss of SDC (both trains). Also required to support gravity feed in the event of a Station Blackout. Considered of Low Risk Significance as valves are normally open and due not receive a close signal on a RAS that could cause spurious closure. Impact on indirect release also considered low due to redundant check valves.

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHE-HV536	H	Y	N	Isolation For Refueling Water Tank Gravity Feed Line To Charging Pumps	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk for Shutdown as Other sources available to supply RWT to CH Considered of High Risk Significance due as it is the primary flow path for from the RWT for Aux. Press. Spray and Emergency Boration
CHN-UV501	H	Y	N	For Volume Control Tank Outlet Line	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk for Shutdown as Other sources available to supply RWT to CH Considered of High Risk due to potential for gas binding the charging pumps if valve fails to close.
CHB-V327	H	Y	N	Charging pump common isolation valves from SI train B suction line (normally closed valve)	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	High risk significant as it is the only flow path that will allow use of full RWT inventory for Aux. Press. Spray or Emergency Boration.
CHAV177	L	Y	N	Boric Acid Makeup Check Valve to VCT Outlet	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAV190	L	Y	N	RWT to VCT Line Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAV316 CHBV319 CHEV322	L	Y	N	Charging Pump suction isolation valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance due to multiple charging pumps. Failure of 1 valve to close to align suction source from SI does not diable other pumps.
CHAV328 CHBV331 CHEV334	L	Y	N	Charging Pump Discharge Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance due to multiple charging pumps.

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHAV755 CHBV756 CHEV757	L	Y	N	Charging Pump Alternate suction isolation valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance due to multiple charging pumps. Failure of 1 valve to close to align suction source from SI does not diable other pumps.
CHEV433	L	Y	N	Charging Line to RCS	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAHV524	L	Y	N	Charging line isolation Containment Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance due to power disabled with valve in the open position.
CHAPSV315 CHBPSV318 CHEPSV321	L	Y	N	Charging Pump Suction Pressure Relief Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAPCV326 CHBPSV325 CHEPSV324	L	Y	N	Charging Pump Discharge Pressure Relief Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAUV506 CHBUV505	L	Y	N	Reactor Coolant Seal Bleedoff Containment Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAUV516	L	Y	N	Letdown Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAUV560	L	Y	N	Reactor Drain Tank Outlet Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.
CHAUV580	L	Y	N	Reactor Makeup Water to RDT Containment Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS.

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHAUV715	L	Y	N	PASS Containment Isolation Vavle	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS and PASS is Low Risk Significant.
CHBHV255	L	Y	N	RCP Seal Injection Containment Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHBUV515	L	Y	N	Letdown Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHBUV523	L	Y	N	Regen Heat Exchanger Outlet Containment Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHBUV561	L	Y	N	Reactor Drain Tank Outlet Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHBUV924	L	Y	N	Letdown to PASS Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS and PASS is Low Risk Significant.
CHNPSV115	L	Y	N	VCT Outlet Pressure Relief Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNPSV199	L	Y	N	Valve Relief for Reactor Coolant Pump Containment	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNPSV345 CHNPSV354	L	Y	N	Intermediate Letdown Pressure Relief Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNPSV865	L	Y	N	Seal Injection Heat Exch Pressure Relief Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .

Table C23 Summary of CH Valve Risk Significance Determination

CH Maintenance Rule Functions -Reactivity Control - Pressure & Inventory Controll														
Valve ID	RS	IST	IPE	Description/Function	F-V	RAW	CC	IE	LER RAW	SDR	SEIS	FIRE	FLOOD	Comments
CHNUV514	L	Y	N	Boric Acid Makeup Line Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significant due to redundant flow paths. Other sources are available to supply RWT to CH.
CHEV440	L	Y	N	Charging Pump Discharge to HPSI Cross-Connect Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHEV854	L	Y	N	Charging Line Chemical Addition Isolation Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNV118	L	Y	N	VCT Outlet Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significant as valve can not be relied on to prevent gas binding of the charging pumps.
CHNV144	L	Y	N	Manual Isolation Valve from RWT to Spent Fuel Pool Cleanup Pumps	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significant as 3 other sources of borated water are available. This path is the last choice.
CHNV154 CHNV155	L	Y	N	Boric Acid Makeup Pump Discharge Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNV164	L	Y	N	Boric Acid Makeup Filter Bypass Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significant due to multiple flow paths available to supply borated water to the charging pumps.
CHNV494	L	Y	N	Reactor Makeup Water Supply Check Valve to RDT	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .
CHNV835	L	Y	N	RCP Seal Injection Supply Line Check Valve	N/A	N/A	N/A	N/A	N/A	L	N/A	N/A	N/A	Low Risk Significance as function of valve does not impact APSS .

Appendix D

Safety Significance Analysis of deferring IST Testing for Low Risk Significant Valves

The analysis performed determines the increase in CDF and LERF associated with changing the test frequency for Low Risk Significant Valves. Table D1 provides a list of valves that were determined by the IST engineer to be candidates for deferral. Tables D2 and D3 provide the changes made to basic event probabilities for various test intervals.

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
AFAHV32[a]	STEAMDRIVEN AFW PUMP FLOW CONTROL VALVE
AFAUV37[a]	STEAMDRIVEN AFW PUMP ISOLATION VALVE
AFBHV30[a]	MOTORDRIVEN AFW PUMP FLOW CONTROL VALVE
AFBHV31[a]	MOTORDRIVEN AFW PUMP FLOW CONTROL VALVE
AFBUV34[a]	MOTORDRIVEN AFW PUMP ISOLATION VALVE
AFBUV35[a]	MOTORDRIVEN AFW PUMP ISOLATION VALVE
AFCHV33[a]	STEAMDRIVEN AFW PUMP FLOW CONTROL VALVE
AFCUV36[a]	STEAMDRIVEN AFW PUMP ISOLATION VALVE
CHAHV524	CHARGING LINE ISOLATION CONTAINMENT ISOLATION VALVE
CHAHV531	RWT OUTLET ISOLATION VALVE
CHAPSV315	CHARGING PUMP SUCTION PRESSURE RELIEF VALVE
CHAPSV326	CHARGING PUMP DISCHARGE PRESSURE RELIEF VALVE
CHAUV506	REACTOR COOLANT SEAL BLEEDOFF CONTAINMENT ISOLATION VALVE
CHAUV516	LETDOWN ISOLATION VALVE
CHAUV560	REACTOR DRAIN TANK OUTLET ISOLATION VALVE
CHAUV580	REACTOR MAKEUP WATER TO RDT CONTAINMENT ISOLATION VALVE
CHAUV715	PASS CONTAINMENT ISOLATION VALVE
CHBHV255	RCP SEAL INJECTION CONTAINMENT ISOLATION VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
CHBHV530	REFUELING WATER TANK OUTLET ISOLATION VALVE
CHBPSV318	CHARGING PUMP SUCTION PRESSURE RELIEF VALVE
CHBPSV325	CHARGING PUMP DISCHARGE PRESSURE RELIEF VALVE
CHBUV505	REACTOR COOLANT SEAL BLEEDOFF CONTAINMENT ISOLATION VALVE
CHBUV515	LETDOWN ISOLATION VALVE
CHBUV523	REGEN HEAT EXCHANGER OUTLET CONTAINMENT ISOLATION VALVE
CHBUV561	REACTOR DRAIN TANK OUTLET ISOLATION VALVE
CHBUV924	LETDOWN TO PASS ISOLATION VALVE
CHEHV239	CHARGING ISOLATION VALVE
CHEPDV240	CHARGING ISOLATION VALVE
CHEPSV321	CHARGING PUMP SUCTION PRESSURE RELIEF VALVE
CHEPSV324	CHARGING PUMP DISCHARGE PRESSURE RELIEF VALVE
CHNPSV115	VOLUME CONTROL TANK OUTLET PRESSURE RELIEF VALVE
CHNPSV199	VALVE RELIEF FOR REACTOR COOLANT PUMP CONTAINMENT
CHNPSV345	INTERMEDIATE LETDOWN PRESSURE RELIEF VALVE
CHNPSV354	INTERMEDIATE LETDOWN PRESSURE RELIEF VALVE
CHNPSV865	SEAL INJECTION HEAT EXCH PRESSURE RELIEF VALVE
CHNUV514	BORIC ACID MAKEUP LINE ISOLATION VALVE
CPAUV2A	CONTAINMENT REFUELING PURGE SUPPLY VALVE
CPAUV2B	CONTAINMENT REFUELING PURGE EXHAUST VALVE
CPAUV4A	CONTAINMENT POWER ACCESS PURGE SUPPLY VALVE
CPAUV4B	CONTAINMENT POWER ACCESS PURGE EXHAUST VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
CPBUV3A	CONTAINMENT REFUELING PURGE SUPPLY VALVE
CPBUV3B	CONTAINMENT REFUELING PURGE EXHAUST VALVE
CPBUV5A	CONTAINMENT POWER ACCESS PURGE SUPPLY VALVE
CPBUV5B	CONTAINMENT POWER ACCESS PURGE EXHAUST VALVE
DGAPSV5	EDG START AIR RECEIVER SAFETY RELIEF VALVE
DGAPSV7	EDG START AIR RECEIVER SAFETY RELIEF VALVE
DGBPSV6	EDG START AIR RECEIVER SAFETY RELIEF VALVE
DGBPSV8	EDG START AIR RECEIVER SAFETY RELIEF VALVE
ECAPSV75	ESSENTIAL CHILLED WATER EXPANSION TANK PRESSURE RELIEF VALVE
ECAPSV95	ESF SWGR ROOM A ESS AHU PRESS RELIEF VALVE
ECAPSV97	CONTROL ROOM A ESS AHU RELIEF VALVE
ECAPSV99	ELEC PENE ROOM WEST ESS ACU RELIEF VALVE
ECAPSV101	ESSENTIAL CHILLED WATER PUMP ROOM A ESS ACU PRESS RELIEF VALVE
ECAPSV103	CONTAINMENT SPRAY ROOM A ESS AHU RELIEF VALVE
ECAPSV105	HPSI PUMP ROOM A ESS ACU RELIEF VALVE
ECAPSV107	LPSI PUMP ROOM A ESS ACU RELIEF VALVE
ECAPSV117	AFW PUMP ROOM A ESS ACU RELIEF VALVE
ECAPSV121	CHAN A DC EQUIP ROOM ESS ACU RELIEF VALVE
ECBPSV76	ESSENTIAL CHILLED WATER EXPANSION TANK PRESSURE RELIEF VALVE
ECBPSV96	ESF SWGR ROOM B ESS AHU RELIEF VALVE
ECBPSV98	CNTRL ROOM B ESS AHU RELIEF VALVE
ECBPSV100	ELEC PENE ROOM EAST ESS ACU RELIEF VALVE
ECBPSV102	ESSENTIAL CHILLED WATER PUMP ROOM B ESS ACU RELIEF VALVE
ECBPSV104	CONTAINMENT SPRAY ROOM ESS ACU RELIEF VALVE
ECBPSV106	HPSI PUMP ROOM B ESS ACU RELIEF VALVE
ECBPSV108	LPSI PUMP ROOM B ESS ACU RELIEF VALVE
ECBPSV109	AFW PUMP ROOM B ESS ACU RELIEF VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
ECBPSV120	CHAN B DC EQUIP ROOM ESS ACU RELIEF VALVE
EWAPSV47	SHUTDOWN HEAT EXCHANGER A RELIEF VALVE
EWAPSV61	ESS CHILLER A PRESSURE RELIEF VALVE
EWAPSV79	ESSENTIAL CHILLED WATER HEAT EXCHANGER A PRESSURE RELIEF VALVE
EWAPSV103	ESSENTIAL CHILLED WATER SURGE TANK A PRESSURE RELIEF VALVE
EWAUV65	NUCLEAR COOLING WATER RETURN ISOLATION VALVE
EWAUV145	NUCLEAR COOLING WATER SUPPLY ISOLATION VALVE
EWBPSV48	SHUTDOWN HEAT EXCHANGER B PRESSURE RELIEF VALVE
EWBPSV62	ESS CHILLER B PRESSURE RELIEF VALVE
EWBPSV80	ESSENTIAL CHILLED WATER HEAT EXCHANGER B PRESSURE RELIEF VALVE
EWBPSV104	ESSENTIAL CHILLED WATER SURGE TANK B PRESSURE RELIEF VALVE
GAAUV1	HIGH PRESSURE NITROGEN CONTAINMENT ISOLATION VALVE
GAAUV2	LOW PRESSURE NITROGEN CONTAINMENT ISOLATION VALVE
GRAUV1	REACTOR DRAIN TANK VENT HEADER CONTAINMENT ISOLATION VALVE
GRBUV2	REACTOR DRAIN TANK VENT HEADER CONTAINMENT ISOLATION VALVE
HCAUV45	CONTAINMENT ATMOSPHERE RADIATION MONITOR INLET CONTAINMENT ISOLATION VALVE
HCAUV46	CONTAINMENT ATMOSPHERE RADIATION MONITOR OUTLET CONTAINMENT ISOLATION VALVE
HCBUV44	CONTAINMENT ATMOSPHERE RADIATION MONITOR INLET CONTAINMENT ISOLATION VALVE
HCBUV47	CONTAINMENT ATMOSPHERE RADIATION MONITOR OUTLET CONTAINMENT ISOLATION VALVE
HPAHV7A	POSTLOCA H2 MONITOR INLET CONTAINMENT ISOLATION VALVE
HPAHV7B	POSTLOCA H2 MONITOR OUTLET CONTAINMENT ISOLATION VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
HPAUV1	CONTAINMENT H2 CONTROL SYSTEM EXHAUST CONTAINMENT ISOLATION VALVE
HPAUV3	CONTAINMENT H2 CONTROL SYSTEM EXHAUST CONTAINMENT ISOLATION VALVE
HPAUV5	CONTAINMENT H2 CONTROL SYSTEM SUPPLY CONTAINMENT ISOLATION VALVE
HPAUV23	CONTAINMENT H2 CONTROL SYSTEM FROM PASS CONTAINMENT ISOLATION VALVE
HPAUV24	CONTAINMENT H2 CONTROL SYSTEM TO PASS CONTAINMENT ISOLATION VALVE
HPBHV8A	POSTLOCA H2 MONITOR INLET CONTAINMENT ISOLATION VALVE
HPBHV8B	POSTLOCA H2 MONITOR OUTLET CONTAINMENT ISOLATION VALVE
HPBUV2	CONTAINMENT H2 CONTROL SYSTEM EXHAUST CONTAINMENT ISOLATION VALVE
HPBUV4	CONTAINMENT H2 CONTROL SYSTEM EXHAUST CONTAINMENT ISOLATION VALVE
HPBUV6	CONTAINMENT H2 CONTROL SYSTEM SUPPLY CONTAINMENT ISOLATION VALVE
IAAUV2	INSTRUMENT AIR SUPPLY CONTAINMENT ISOLATION VALVE
NCAPSV250	FUEL POOL HEAT EXCHANGER A NUCLEAR COOLING WATER PRESSURE RELIEF VALVE
NCAUV402	NUCLEAR COOLING WATER RETURN FROM RCP COOLER CONTAINMENT ISOLATION VALVE
NCBPSV251	FUEL POOL HEAT EXCHANGER B NUCLEAR COOLING WATER PRESSURE RELIEF VALVE
NCBUV401	NUCLEAR COOLING WATER SUPPLY TO RCP COOLER CONTAINMENT ISOLATION VALVE
NCBUV403	NUCLEAR COOLING WATER SUPPLY TO RCP COOLER CONTAINMENT ISOLATION VALVE
PCAPSV35	SPENT FUEL POOL COOLING HEAT EXCHANGER PRESSURE RELIEF VALVE
PCBPSV36	SPENT FUEL POOL COOLING HEAT EXCHANGER PRESSURE RELIEF VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
RDAUV23	RADIOACTIVE WASTE DRAIN CONTAINMENT ISOLATION VALVE
RDBUV24	RADIOACTIVE WASTE DRAIN CONTAINMENT ISOLATION VALVE
RDBUV407	RADIOACTIVE WASTE DRAIN CONTAINMENT ISOLATION VALVE
SGAPSV309	ADV SGAHV179 NITROGEN ACCUMULATOR PRESSURE RELIEF VALVE
SGAPSV312	ADV SGAHV179 NITROGEN SUPPLY PRESSURE RELIEF VALVE
SGAPSV316	ADV SGAHV184 NITROGEN ACCUMULATOR PRESSURE RELIEF VALVE
SGAPSV319	ADV SGAHV184 NITROGEN SUPPLY PRESSURE RELIEF VALVE
SGAUV172	SG 1 DOWNCOMER FEEDWATER UPSTREAM ISOLATION VALVE
SGAUV174	SG 1 ECONOMIZER FEEDWATER UPSTREAM ISOLATION VALVE
SGAUV175	SG 2 DOWNCOMER FEEDWATER UPSTREAM ISOLATION VALVE
SGAUV177	SG 2 ECONOMIZER FEEDWATER UPSTREAM ISOLATION VALVE
SGAUV204	SG 1 HOT LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV211	SG 1 COLD LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV220	SG 1 DOWNCOMER BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV223	SG 2 COLD LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV225	SG 2 HOT LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV227	SG 2 DOWNCOMER BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGAUV500P	SG 1 SECONDARY CHEMICAL UPSTREAM ISOLATION VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SGAUV500S	SG 2 SECONDARY CHEMICAL DOWNSTREAM ISOLATION VALVE
SGAUV1133	STEAM TRAP SGNM23 ISOLATION VALVE
SGAUV1134	STEAM TRAP SGNM24 ISOLATION VALVE
SGBHV200	SG 1 CHEMICAL INJECTION LINE ISOLATION VALVE
SGBHV201	SG 2 CHEMICAL INJECTION LINE ISOLATION VALVE
SGBPSV302	ADV SGBHV178 NITROGEN ACCUMULATOR PRESSURE RELIEF VALVE
SGBPSV305	ADV SGBHV178 NITROGEN SUPPLY PRESSURE RELIEF VALVE
SGBPSV322	ADV SGBHV185 NITROGEN ACCUMULATOR PRESSURE RELIEF VALVE
SGBPSV325	ADV SGBHV185 NITROGEN SUPPLY PRESSURE RELIEF VALVE
SGBUV130	SG 1 DOWNCOMER FEEDWATER DOWNSTREAM ISOLATION VALVE
SGBUV132	SG 1 ECONOMIZER FEEDWATER DOWNSTREAM ISOLATION VALVE
SGBUV135	SG 2 DOWNCOMER FEEDWATER DOWNSTREAM ISOLATION VALVE
SGBUV137	SG 2 ECONOMIZER FEEDWATER DOWNSTREAM ISOLATION VALVE
SGBUV219	SG 1 HOT LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV221	SG 1 DOWNCOMER BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV222	SG 2 COLD LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV224	SG 2 HOT LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV226	SG 2 DOWNCOMER BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV228	SG 1 COLD LEG BLOWDOWN SAMPLE LINE ISOLATION VALVE
SGBUV500Q	SG 1 SECONDARY CHEMICAL DOWNSTREAM ISOLATION VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SGBUV500R	SG 2 SECONDARY CHEMICAL UPSTREAM ISOLATION VALVE
SGBUV1135A	STEAM TRAP SGNM01 ISOLATION VALVE
SGBUV1135B	STEAM TRAP SGNM02 ISOLATION VALVE
SGBUV1136A	STEAM TRAP SGNM03 ISOLATION VALVE
SGBUV1136B	STEAM TRAP SGNM04 ISOLATION VALVE
SGEUV169	SG1 MSIV BYPASS VALVE
SGEUV183	SG2 MSIV BYPASS VALVE
SIAHV605	SAFETY INJECTION TANK2A ATMOSPHERIC VENT VALVE
SIAHV606	SAFETY INJECTION TANK2B ATMOSPHERIC VENT VALVE
SIAHV607	SAFETY INJECTION TANK1A ATMOSPHERIC VENT VALVE
SIAHV608	SAFETY INJECTION TANK1B ATMOSPHERIC VENT VALVE
SIAHV657	SHUTDOWN COOLING HEAT EXCHANGER OUTLET THROTTLE VALVE
SIAHV688	CONTAINMENT SPRAY PUMP DISCHARGE ISOLATION VALVE TO SPRAY HEADER
SIAHV698	HPSI HEADER DISCHARGE ISOLATION VALVE
SIAPSV150	LPSI PUMP SUCTION LINE FROM FUEL POOL COOLING PRESSURE RELIEF VALVE
SIAPSV151	SI PUMP SUCTION LINE FROM CONTMT SUMP PRESSURE RELIEF VALVE
SIAPSV161	LPSI LINE PRESSURE RELIEF VALVE
SIAPSV162	LPSI PUMP DISCHARGE LINE TO FUEL POOL COOLING PRESSURE RELIEF VALVE
SIAPSV194	SHUTDOWN COOLING HEAT EXCHANGEROUTLET PRESSURE RELIEF VALVE
SIAPSV285	TRAIN A COMBINED RECIRC PRESSURE RELIEF VALVE
SIAPSV289	CONTAINMENT SPRAY LINE PRESSURE RELIEF VALVE
SIAPSV417	HPSI LINE PRESSURE RELIEF VALVE
SIAPSV439	LPSI LINE PRESSURE RELIEF VALVE
SIAPSV468	HPSI LONG TERM RECIRC PRESSURE RELIEF VALVE
SIAPSV469	SHUTDOWN COOLING LINE PRESSURE RELIEF VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SIAUV634	SAFETY INJECTION TANK 1A DISCHARGE ISOLATION VALVE
SIAUV644	SAFETY INJECTION TANK 1B DISCHARGE ISOLATION VALVE
SIAUV660	SI COMBINED RECIRC TO RWT ISOLATION VALVE
SIAUV664	CONTAINMENT SPRAY PUMP RECIRC TO RWT ISOLATION VALVE
SIAUV666	HPSI PUMP RECIRC TO RWT ISOLATION VALVE
SIAUV669	LPSI PUMP RECIRC TO RWT ISOLATION VALVE
SIAUV682	SAFETY INJECTION TANKFILL LINE CONTAINMENT ISOLATION VALVE
SIAUV708	CONTAINMENT SUMP TRAIN A SAMPLE TO PASS ISOLATION VALVE
SIAUV709	SI COMBINED RECIRC TO PASS ISOLATION VALVE
SIBHV613	SAFETY INJECTION TANK2A ATMOSPHERIC VENT VALVE
SIBHV623	SAFETY INJECTION TANK2B ATMOSPHERIC VENT VALVE
SIBHV633	SAFETY INJECTION TANK1A ATMOSPHERIC VENT VALVE
SIBHV643	SAFETY INJECTION TANK1B ATMOSPHERIC VENT VALVE
SIBHV658	SHUTDOWN COOLING HEAT EXCHANGER OUTLET THROTTLE VALVE
SIBHV693	CONTAINMENT SPRAY BYPASS VALVE
SIBHV699	HPSI HEADER DISCHARGE ISOLATION VALVE
SIBPSV140	SI PUMP SUCTION LINE FROM CONTAINMENT SUMP PRESSURE RELIEF VALVE
SIBPSV141	LPSI PUMP SUCTION LINE FROM FUEL POOL COOLING PRESSURE RELIEF VALVE
SIBPSV166	HPSI LONG TERM RECIRC PRESSURE RELIEF VALVE
SIBPSV169	SHUTDOWN COOLING LINE PRESSURE RELIEF VALVE
SIBPSV191	SHUTDOWN COOLING HEAT EXCHANGEROUTLET PRESSURE RELIEF VALVE
SIBPSV192	LPSI PUMP DISCHARGE LINE TO FUEL POOL COOLING PRESSURE RELIEF VALVE
SIBPSV193	LPSI LINE PRESSURE RELIEF VALVE
SIBPSV286	TRAIN A COMBINED RECIRC PRESSURE RELIEF VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SIBPSV287	CONTAINMENT SPRAY LINE PRESSURE RELIEF VALVE
SIBPSV409	HPSI LINE PRESSURE RELIEF VALVE
SIBPSV449	LPSI LINE PRESSURE RELIEF VALVE
SIBUV322	HOT LEG INJECTION CHECK VALVE VALVE LEAK ISOLATION VALVE
SIBUV332	HOT LEG INJECTION CHECK VALVE VALVE LEAK ISOLATION VALVE
SIBUV611	SAFETY INJECTION TANK 2A FILL/DRAIN ISOLATION VALVE
SIBUV614	SAFETY INJECTION TANK 2A DISCHARGE ISOLATION VALVE
SIBUV618	SAFETY INJECTION TANK 2A CHECKVALVE LEAKAGE TEST LINE ISOLATION VALVE
SIBUV621	SAFETY INJECTION TANK 2B FILL/DRAIN ISOLATION VALVE
SIBUV624	SAFETY INJECTION TANK 2B DISCHARGE ISOLATION VALVE
SIBUV628	SAFETY INJECTION TANK 2B CHECKVALVE LEAKAGE TEST LINE ISOLATION VALVE
SIBUV631	SAFETY INJECTION TANK 1A FILL/DRAIN ISOLATION VALVE
SIBUV638	SAFETY INJECTION TANK 1A CHECKVALVE LEAKAGE TEST LINE ISOLATION VALVE
SIBUV641	SAFETY INJECTION TANK 1B FILL/DRAIN ISOLATION VALVE
SIBUV648	SAFETY INJECTION TANK 1B CHECKVALVE LEAKAGE TEST LINE ISOLATION VALVE
SIBUV659	SI COMBINED RECIRC TO RWT ISOLATION VALVE
SIBUV665	CONTAINMENT SPRAY PUMP RECIRC TO RWT
SIBUV667	HPSI PUMP RECIRC TO RWT
SIBUV668	LPSI PUMP RECIRC TO RWT
SIBUV710	SI COMBINED RECIRC TO PASS ISOLATION VALVE
SIEPSV211	SAFETY INJECTION TANK 2A PRESSURE RELIEF VALVE
SIEPSV221	SAFETY INJECTION TANK 2B PRESSURE RELIEF VALVE
SIEPSV231	SAFETY INJECTION TANK 1A PRESSURE RELIEF VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SIEPSV241	SAFETY INJECTION TANK 1B PRESSURE RELIEF VALVE
SIEPSV288	SAFETY INJECTION TANK 1B PRESSURE RELIEF VALVE
SIEPSV407	SAFETY INJECTION TANK FILL/DRAIN LINE PRESSURE RELIEF VALVE
SIEPSV473	SAFETY INJECTION TANK FILL/DRAIN LINE PRESSURE RELIEF VALVE
SIEPSV474	SAFETY INJECTION TANK FILL/DRAIN LINE PRESSURE RELIEF VALVE
SPAPSV29	ESSENTIAL COOLING WATER HEAT EXCHANGER PRESSURE RELIEF VALVE
SPAPSV137	EDG FUEL OIL COOLER PRESSURE RELIEF VALVE
SPAPSV139	EDG JACKET WATER COOLER PRESSURE RELIEF VALVE
SPAPSV141	EDG AIR INTERCOOLER PRESSURE RELIEF VALVE
SPAPSV143	EDG LUBE OIL COOLER PRESSURE RELIEF VALVE
SPBPSV30	ESSENTIAL COOLING WATER HEAT EXCHANGER PRESSURE RELIEF VALVE
SPBPSV138	EDG LUBE OIL COOLER PRESSURE RELIEF VALVE
SPBPSV140	EDG AIR INTERCOOLER PRESSURE RELIEF VALVE
SPBPSV142	EDG JACKET WATER COOLER PRESSURE RELIEF VALVE
SPBPSV144	EDG FUEL OIL COOLER PRESSURE RELIEF VALVE
SPEHCV207	SPRAY POND CROSSCONNECT VALVE
SPEHCV208	SPRAY POND CROSSCONNECT VALVE
SSAUV203	HOT LEG SAMPLE CONTAINMENT ISOLATION VALVE
SSAUV204	PRESSURIZER SURGE SAMPLE CONTAINMENT ISOLATION VALVE
SSAUV205	PRESSURIZER STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE
SSBUV200	HOT LEG SAMPLE CONTAINMENT ISOLATION VALVE
SSBUV201	PRESSURIZER SURGE LINE SAMPLE CONTAINMENT ISOLATION VALVE
SSBUV202	PRESSURIZER STEAM SPACE SAMPLE CONTAINMENT ISOLATION VALVE
WCAUV62	NORMAL CHILLED WATER CONTAINMENT ISOLATION VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
WCBUV61	NORMAL CHILLED WATER CONTAINMENT ISOLATION VALVE
WCBUV63	NORMAL CHILLED WATER CONTAINMENT ISOLATION VALVE
AFAV007	AFW PUMP AFAP01 SUCTION CHECK VALVE
AFAV015	AFW PUMP AFAP01 DISCHARGE LINE CHECK VALVE
AFAV137[a]	AFW PUMP AFAP01 DISCHARGE CHECK VALVE
AFBV022	AFW PUMP AFBP01 SUCTION CHECK VALVE
AFBV024	AFW PUMP AFBP01 DISCHARGE CHECK VALVE
AFBV138[a]	AFW PUMP AFBP01 DISCHARGE CHECK VALVE
CHAV177	BORIC ACID MAKEUP CHECK VALVE TO VCT OUTLET
CHAV190	RWT TO VCT LINE CHECK VALVE
CHAV316	CHARGING PUMP CHAP01 NORMAL SUCTION FROM VCT MANUAL ISOLATION VALVE
CHAV328	CHARGING PUMP CHAP01 DISCHARGE CHECK VALVE
CHAV755	CHARGING PUMP CHAP01 ALTERNATE SUCTION MANUAL ISOLATION VALVE
CHBV319	CHARGING PUMP CHBP01 NORMAL SUCTION FROM VCT MANUAL ISOLATION VALVE
CHBV331	CHARGING PUMP CHBP01 DISCHARGE CHECK VALVE
CHBV756	CHARGING PUMP CHBP01 ALTERNATE SUCTION MANUAL ISOLATION VALVE
CHEV322	CHARGING PUMP CHEP01 NORMAL SUCTION FROM VCT MANUAL ISOLATION VALVE
CHEV334	CHARGING PUMP CHEP01 DISCHARGE CHECK VALVE
CHEV433	CHARGING LINE CHECK VALVE TO RCS
CHEV440	CHARGING PUMP DISCHARGE LINE TO HPSI CROSS-CONNECT CHECK VALVE
CHEV757	CHARGING PUMP CHEP01 ALTERNATE SUCTION MANUAL ISOLATION VALVE
CHEV854	CHARGING LINE CHEMICAL ADDITION ISOLATION VALVE
CHNV118	VOLUME CONTROL TANK OUTLET CHECK VALVE
CHNV144	MANUAL ISOLATION VALVE FROM RWT TO SPENT FUEL POOL CLEANUP PUMPS

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
CHNV154	BORIC ACID MAKEUP PUMP DISCHARGE CHECK VALVE
CHNV155	BORIC ACID MAKEUP PUMP DISCHARGE CHECK VALVE
CHNV164	BORIC ACID MAKEUP FILTER BYPASS VALVE
CHNV494	REACTOR MAKEUP WATER SUPPLYCHECK VALVE TO RDT
CHNV835	RCP SEAL INJECTION SUPPLY LINE CHECK VALVE
CTAV016	CONDENSATE TRANSFER PUMP DISCHARGE CHECK VALVE
CTAV018	CONDENSATE TRANSFER TO SPENT FUEL POOL ISOLATION VALVE
CTAV037	CONDENSATE TRANSFER TO SPENT FUEL POOL CHECK VALVE
CTBV019	CONDENSATE TRANSFER TO SPENT FUEL POOL ISOLATION VALVE
CTBV020	CONDENSATE TRANSFER PUMP DISCHARGE CHECK VALVE
CTBV038	CONDENSATE TRANSFER TO SPENT FUEL POOL CHECK VALVE
DGAV066	EDG STARTING AIR DRYER OUTLET CHECK VALVE
DGAV067	EDG STARTING AIR DRYER OUTLET CHECK VALVE
DGBV068	EDG STARTING AIR DRYER OUTLET CHECK VALVE
DGBV069	EDG STARTING AIR DRYER OUTLET CHECK VALVE
DWEV061	DW SUPPLY HEADER CONTAINMENT ISOLATION VALVE
DWEV062	DW SUPPLY HEADER CONTAINMENT ISOLATION VALVE
FPEV089	FIRE WATER CONTAINMENT ISOLATION VALVE
FPEV090	FIRE WATER CONTAINMENT ISOLATION VALVE
GAEV011	HIGH PRESSURE NITROGEN SUPPLY CONTAINMENT ISOLATION CHECK VALVE
GAEV015	LOW PRESSURE NITROGEN SUPPLY CONTAINMENT ISOLATION CHECK VALVE
HPAV002	CONTAINMENT H2 CONTROL RETURN LINE CHECK VALVE
HPBV004	CONTAINMENT H2 CONTROL RETURN LINE CHECK VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
IAEV021	INSTRUMENT AIR SUPPLY CONTAINMENT ISOLATION VALVE
IAEV072	SERVICE AIR CONTAINMENT ISOLATION VALVE
IAEV073	SERVICE AIR SUPPLY CONTAINMENT ISOLATION VALVE
NCEV118	NUCLEAR COOLING WATER SUPPLY TO RCP COOLER CONTAINMENT ISOLATION CHECK VALVE
PCEV070	REFUELING POOL PURIFICATION RETURN CONTAINMENT ISOLATION VALVE
PCEV071	REFUELING POOL PURIFICATION RETURN CONTAINMENT ISOLATION VALVE
PCEV075	REFUELING POOL PURIFICATION SUPPLY CONTAINMENT ISOLATION VALVE
PCEV076	REFUELING POOL PURIFICATION SUPPLY CONTAINMENT ISOLATION VALVE
PCNV215	RWT TO SPENT FUEL POOL MANUAL ISOLATION VALVE
SGAV043	STEAM SUPPLY CHECK VALVE TO TURBINEDRIVEN AFW PUMP
SGAV044	STEAM SUPPLY CHECK VALVE TO TURBINEDRIVEN AFW PUMP
SGEV003	ECONOMIZER FEEDWATER LINE CHECK VALVE
SGEV005	ECONOMIZER FEEDWATER LINE CHECK VALVE
SGEV006	ECONOMIZER FEEDWATER LINE CHECK VALVE
SGEV007	ECONOMIZER FEEDWATER LINE CHECK VALVE
SGEV642	DOWNCOMER FEEDWATER LINE CHECK VALVE
SGEV652	DOWNCOMER FEEDWATER LINE CHECK VALVE
SGEV653	DOWNCOMER FEEDWATER LINE CHECK VALVE
SGEV693	DOWNCOMER FEEDWATER LINE CHECK VALVE
SGEV887	WARMUP LINE CHECK VALVE TO TURBINEDRIVEN AFW PUMP
SGEV888	WARMUP LINE CHECK VALVE TO TURBINEDRIVEN AFW PUMP
SIAV157	CONTAINMENT SPRAY PUMP SUCTION LINE CHECK VALVE
SIAV164	CONTAINMENT SPRAY HEADER CHECK VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
SIAV201	LPSI PUMP SUCTION LINE CHECK VALVE
SIAV404	HPSI PMP DISCHARGE CHECK VALVE
SIAV424	HPSI PUMP RECIRC LINE CHECK VALVE
SIAV434	LPSI PUMP DISCHARGE CHECK VALVE
SIAV451	LPSI PMP RECIRC LINE CHECK VALVE
SIAV485	CONTAINMENT SPRAY PUMP DISCHARGE CHECK VALVE
SIAV486	CONTAINMENT SPRAY PMP RECIRC LINE CHECK VALVE
SIAV522	HPSI LONGTERM RECIRC CHECK VALVE
SIAV523	HPSI LONGTERM RECIRC CHECK VALVE
SIBV158	CONTAINMENT SPRAY PUMP SUCTION LINE CHECK VALVE
SIBV165	CONTAINMENT SPRAY HEADER CHECK VALVE
SIBV200	LPSI PUMP SUCTION LINE CHECK VALVE
SIBV405	HPSI PMP DISCHARGE CHECK VALVE
SIBV426	HPSI PUMP RECIRC LINE CHECK VALVE
SIBV446	LPSI PUMP DISCHARGE CHECK VALVE
SIBV448	LPSI PMP RECIRC LINE CHECK VALVE
SIBV484	CONTAINMENT SPRAY PUMP DISCHARGE CHECK VALVE
SIBV487	CONTAINMENT SPRAY PMP RECIRC LINE CHECK VALVE
SIBV532	HPSI LONGTERM RECIRC CHECK VALVE
SIBV533	HPSI LONGTERM RECIRC CHECK VALVE
SIEV215	SAFETY INJECTION TANK DISCHARGE CHECK VALVE
SIEV225	SAFETY INJECTION TANK DISCHARGE CHECK VALVE
SIEV235	SAFETY INJECTION TANK DISCHARGE CHECK VALVE
SIEV245	SAFETY INJECTION TANK DISCHARGE CHECK VALVE
SIEV463	SAFETY INJECTION TANK FILL/DRAIN HEADER CONTAINMENT ISOLATION VALVE
SPAV041	ESSENTIAL SPRAY POND PUMP DISCHARGE CHECK VALVE
SPBV012	ESSENTIAL SPRAY POND PUMP DISCHARGE CHECK VALVE

Table D1 List of Candidate Valves for Deferral

ID	DESCRIPTION
WCEV039	NORMAL CHILLED WATER CONTAINMENT ISOLATION CHECK VALVE
DGAUV15	EDG STARTING AIR VALVE
DGAUV5	EDG STARTING AIR VALVE
DGAUV7	EDG STARTING AIR VALVE
DGAV396	EDG STARTING AIR CHECK VALVE
DGBUV6	EDG STARTING AIR VALVE
DGBUV8	EDG STARTING AIR VALVE
DGBV496	EDG STARTING AIR CHECK VALVE
DGBV497	EDG STARTING AIR CHECK VALVE
DGAUV3	EDG STARTING AIR VALVE
DGAV397	EDG STARTING AIR CHECK VALVE
DGBUV16	EDG STARTING AIR VALVE
DGBUV4	EDG STARTING AIR VALVE

a. After initial quantification, these valves were not deferred due to impact on CDF.

Table D2 tabulates the chagnes that were made to the basic event unavailabilities for an extension to 3 years. Table D3 tabulates changes for other test intervals including 6 yrs.

Table D2 - Changes to Basic Event Probabilities

Valve	Basic Event	Old Prob.	New Prob.	Comments
AFAV007	1AFAP01----TPAFS	1.68E-2	1.80E-2	Increase (12 x 3 x 1.1E-5) added to pump failure rate as valve truncated. Also include impact of 1SGEV887, 888
AFBV022	1AFBP01----MPAFS	1.76E-3	2.16E-3	Increase (12 x 3 x 1.1E-5) added to pump failure rate as valve truncated.
AFAV015	1AFAV015---CV-FO	1.97E-4	3.94E-4	x2 - Tested every outage
AFBV024	1AFBV024---CV-FO	1.97E-4	3.94E-4	x2 - Tested every outage
CHAHV531	1CHAHV0531-MV-RO	2.52E-4	2.27E-3	x9 - Tested every 4 months
CHBHV530	1CHBHV0530-MV-RO	2.52E-4	2.27E-3	x9 - Tested every 4 months
CHEHV239	None	None	None	Fail to remain open failure mode not captured by IST
CHEPDV240	None	None	None	Fail to remain open failure mode not captured by IST

Table D2 - Changes to Basic Event Probabilities

Valve	Basic Event	Old Prob.	New Prob.	Comments
EWAUV145	1RCPSEALLEAK-2OP	8E-2	0.12	Increase (2 x 1.91E-2) added to seal leak probability. PRA assumes valves tested every outage.
EWAUV65	N/A	N/A	N/A	Increased applied from EWAUV145 assumed to cover effects of this valve as failure of the crosstie by itself will not cause a seal leak.
NCAUV402	N/A	N/A	N/A	See ISL Analysis
NCBUV401	N/A	N/A	N/A	See ISL Analysis
NCBUV403	N/A	N/A	N/A	See ISL Analysis
NCEV118	N/A	N/A	N/A	See ISL Analysis
SGEV887	1SGEV889---NV-RM (1SGEV887---CV-FO)	7.5E-5 (2.23E-5)	4.76E-4 (4.01E-4)	x18 - Tested every other month. Add to SGEV889 as 887 was truncated from the results
SGEUV169				
SGEUV183				
SGAUV172	N/A	N/A	N/A	Fail to remain open failure mode not captured by IST
SGAUV175	N/A	N/A	N/A	Fail to remain open failure mode not captured by IST
SGAUV500P	1BLOWDOWN----2HR	9E-4	2.36E-2	Increase of 1.03E-2 x 2 (Include 500Q Impact - reason for x2)
SGAUV500S	N/A	N/A	N/A	Impact included with SGAUV500P as tube rupture is modeled in SG1 only
SGAV043 and 44	1SGAUV0134ACXXFO (1SGAV043---CV-FO) (1SGAV044--CV-FO)	1.20E-3 (1.1E-5) (1.1E-5)	1.46E-3 (1.32E-4) (1.32E-4)	Increase x12. Note that valves is tested monthly for non-IST
SGBUV130	N/A	N/A	N/A	Fail to remain open failure mode not captured by IST
SGBUV135	N/A	N/A	N/A	Fail to remain open failure mode not captured by IST
SGBUV500Q	N/A	N/A	N/A	See SGAUV500P
SGBUV500R	N/A	N/A	N/A	Impact included with SGAUV500Q as tube rupture is modeled in SG1 only

Table D2 - Changes to Basic Event Probabilities

Valve	Basic Event	Old Prob.	New Prob.	Comments
SGEV642	1AFW-MFW------HR (1SGEV642---CV-FO)	1.0E-3 (7.2E-7)	1.01E-3 (2.16E-5)	x30 - The valve is modeled with a 24 hr mission time. However, the failure probability should be demand related based on the test frequency. This adjustment equates to the nominal test interval of monthly used in converting demand failures to failure rates. It also assumes that the failure probability is independent of test interval as the valve is normally open and closes when feedwater is terminated. It then needs to be reopened to allow flow from either the N pump or the condensate pumps. This closure can be considered a demand that if failed would still allow flow through the check valve
SGEV652	1SGEV652---CV-FO	7.2E-7	2.16E-5	See comment for SGEV642
SGEV653	1SGEV653---CV-FO	7.2E-7	2.16E-5	See comment for SGEV642
SGEV693	1SGEV693---CV-FO	7.2E-7	2.16E-5	See comment for SGEV642
SGEV887	(1AFAP01----TPAFS) (1SGEV887---CV-FO)	(2.23E-5)	(8.02E-4)	6x3 as valve is tested every other month. x2] to consider SGEV888. See AFAV007 for final probability addition.
SGEV888	N/A	N/A	N/A	Added to SGEV887
SIAV404	1SIAV404---CV-FO	1.97E-4	3.94E-4	x2 - Tested every outage
SIBV405	1SIBV405---CV-FO	1.97E-4	3.94E-4	x2 - Tested every outage
SIBHV699	1SIBHV0699-MV-FC	1.91E-2	3.82E-2	x2 - Tested every outage
SIAHV657	1SDCPROC-OP--2HR (4SIAHV0657-MV-FO)	1.5E-3 (3.18E-3)	2.96E-3 (3.82E-2)	x12 (However, the event is anded with opposite train valves, therefore the increase is squared to reflected the and). Includes impact from SIB658.
SIAUV634	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIAUV644	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIAUV660	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIAUV664	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIAUV669	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIAV157	4SIAUV0672-MV-FO (4SIAV157---CV-FO)	2.16E-3 (3.28E-5)	2.85E-3 (3.94E-4)	x12 for SIAV157 + 2.95E-4 for SAIV164

Table D2 - Changes to Basic Event Probabilities

Valve	Basic Event	Old Prob.	New Prob.	Comments
SIAV164	See SIAV157 4SIAV164---CV-FO	1.97E-4	2.95E-4	x1.5 current assumed test interval is every 2 years. Added to 4SIAUV0672-MV-FO (SIAV157)
SIAV201	1SIAP01----CX6FS 4SIA-P01----MP2HR (4SIAV201---CV-FO)	1.8E-3 1.0E-3 (2.4E-7)	2.58E-3 1.78E-3 3.89E-4	x45 x36- The valve is modeled with a 16 hr mission time. However, the failure probability should be demand related based on the test frequency. This adjustment equates to the nominal test interval of monthly used in converting demand failures to failure rates. The failure rate is then raised to considered the extended test interval. Additional probability added to two basic events as SIAV201 is used in both the Ipsl44 and Ipsr44 trees which use different probabilities for pump failures. Also included in these events are the additional probabilities for SIAV434
SIAV434	(4SIAV434---CV-FO)	(2.4E-7)	(3.89E-4)	See comment for SIAV201. Additional probability added to SIAV201 events
SIAV451	1SIAUV0660-SV9CM (1SIAV451---CV-FO)	5.88E-4 (3.28E-5)	9.82E-4 (3.94E-4)	x12
SIAV486	None (1SIAV486---CV-FO)	None (3.28E-5)	None (3.94E-4)	x12 -resulting probability (3.9E-4) is less than the probability of 1SIAFO0021-PXOPG (9E-4) which is still truncated. Therefore, increased test interval has no substantial impact on CDF or LERF
SIAV522	1SIAV522---CV-FO	1.97E-4	3.94E-4	x2 - currently tested every cycle
SIAV523	1SIAV523---CV-FO	1.97E-4	3.94E-4	x2 - currently tested every cycle
SIBV658	1SDCPROC-OP--2HR (4SIBHV0658-MV-FO)	N/A 3.2E-3	N/A (3.82E-2)	x12 - Increase included with SIA657
SIBUV614	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIBUV659	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIBUV665	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIBUV668	N/A	N/A	N/A	Failure to remain open mode not detected by IST
SIBV158	4SIBUV0671-MV-FO (4SIBV158---CV-FO)	2.16E-3 (3.28E-5)	2.85E-3 (3.94E-4)	x12 for SIBV158 + 2.95E-4 for SIBV165
SIBV165	See SIBV158 (4SIBV165---CV-FO)	(1.97E-4)	2.95E-4	x1.5 current assumed test interval is every 2 years. Added to 4SIBUV0671-MV-FO (SIBV158)

Table D2 - Changes to Basic Event Probabilities

Valve	Basic Event	Old Prob.	New Prob.	Comments
SIBV200	1SIBP01----CX6FS 4SI-P01-----MP2HR (4SIBV200---CV-FO)	1.8E-3 1.0E-3 (2.4E-7)	2.58E-3 1.78E-3 (3.89E-4)	x45 x36- The valve is modeled with a 16 hr mission time. However, the failure probability should be demand related based on the test frequency. This adjustment equates to the nominal test interval of monthly used in converting demand failures to failure rates. The failure rate is then raised to considered the extended test interval. Additional probability added to two basic events as SIBV200 is used in both the Ipsl44 and Ipsr44 trees which use different probabilities for pump failures. Also included in these events are the additional probabilities for SIBV446. Note that 4SI-P01----MP2HR is not increased additionally for SIBV200 as it was already increased for SIAV201.
SIBV446	See SIBV200 (4SIBV446---CV-FO)	 (2.4E-7)	 (3.89E-4)	See comments for SIBV200
SIBV448	1SIBUV0659-SV9CM (1SIBV448---CV-FO)	5.88E-4 (3.28E-5)	9.82E-4 (3.94E-4)	x12
SIBV487	None (1SIBV487---CV-FO)	(3.28E-5)	(3.94E-4)	x12 -resulting probability (3.9E-4) is less than the probability of 1SIBFO0022-PXOPG (9E-4) which is still truncated. Therefore, increased test interval has no substantial impact on CDF or LERF
SIBV532	1SIBV532---CV-FO	1.97E-4	3.94E-4	x2 - currently tested every cycle
SIBV533	1SIBV533---CV-FO	1.97E-4	3.94E-4	x2 - currently tested every cycle
SIEV215	1SIBUV0614-MV-RO (1SIEV215---CV-FO)	1.51E-3 (1.97E-4)	1.90E-3 (3.94E-4)	x2 - currently tested every cycle
SIEV225	1SIBUV0624-MV-RO (1SIEV225---CV-FO)	1.51E-3 (1.97E-4)	1.90E-3 (3.94E-4)	x2 - currently tested every cycle
SIEV235	None (1SIEV235---CV-FO)	(1.97E-4)	(3.94E-4)	x2 - currently tested every cycle. This event is not modeled in a fault tree due break location assumptions. Therefore, its impact is adequately addressed by the impact on SIEV215, 225 and 245.
SIEV245	1SIAUV0644-MV-RO (1SIEV245---CV-FO)	1.51E-3 (1.97E-4)	1.90E-3 (3.94E-4)	x2 - currently tested every cycle
SPAV041	1SPAP01----CX5FS (1SPAV041---CV-FO)	1.1E-3 (1.1E-5)	1.23E-3 (1.32E-4)	x12 - IST Quarterly even though valve is tested monthly
SPBV012	1SPBP01----CX5FS (1SPBV012---CV-FO)	1.1E-3 (1.1E-5)	1.23E-3 (1.32E-4)	x12 - IST Quarterly even though valve is tested monthly

Table D3Changes to Unavailabilities for Alternate Test Intervals

Valve	Basic Event	6 yr	9 yr	12 yr	15 yr
AFAV007	1AFAP01----TPAFS	1.92E-2	2.04E-2	2.16E-2	2.28E-2
AFBV022	1AFBP01----MPAFS	2.55E-3	2.95E-3	3.34E-3	3.74E-3
EWAUV145	1RCPSEALLEAK-2OP	1.56E-1	1.95E-1	2.33E-1	2.71E-1
SGAUV500P	1BLOWDOWN----2HR	4.21E-2	6.27E-2	8.33E-2	1.04E-1
SGAV043 and 44	1SGAUV0134ACXXFO	2.78E-3	3.58E-3	4.37E-3	5.16E-3
SGEV642	1AFW-MFW------HR	1.04E-3	1.06E-3	1.09E-3	1.11E-3
SGEV652	1SGEV652---CV-FO	4.32E-5	6.48E-5	8.64E-5	1.08E-4
SGEV653	1SGEV653---CV-FO	4.32E-5	6.48E-5	8.64E-5	1.08E-4
SGEV693	1SGEV693---CV-FO	4.32E-5	6.48E-5	8.64E-5	1.08E-4
SIAHV657	1SDCPROC-OP--2HR	7.32E-3	1.46E-2	2.48E-2	3.79E-2
SIAV157	4SIAUV0672-MV-FO	3.54E-3	4.23E-3	4.92E-3	5.61E-3
SIAV201	1SIAP01----CX6FS 4SIA-P01----MP2HR	3.36E-3 2.56E-3	4.13E-3 3.33E-3	4.91E-3 4.11E-3	5.69E-3 4.89E-3
SIAV451	1SIAUV0660-SV9CM	1.38E-3	1.77E-3	2.16E-3	2.56E-3
SIAV522	1SIAV522---CV-FO	7.88E-4	1.18E-3	1.58E-3	1.97E-3
SIAV523	1SIAV523---CV-FO	7.88E-4	1.18E-3	1.58E-3	1.97E-3
SIBV158	4SIBUV0671-MV-FO	2.12E-3	2.81E-3	3.50E-3	4.19E-3
SIBV200	1SIBP01----CX6FS	3.36E-3	4.13E-3	4.91E-3	5.69E-3
SIBV448	1SIBUV0659-SV9CM	1.38E-3	1.77E-3	2.16E-3	2.56E-3
SIBV532	1SIBV532---CV-FO	7.88E-4	1.18E-3	1.58E-3	1.97E-3
SIBV533	1SIBV533---CV-FO	7.88E-4	1.18E-3	1.58E-3	1.97E-3
SIEV215	1SIBUV0614-MV-RO	2.30E-3	2.69E-3	3.09E-3	3.48E-3
SIEV225	1SIBUV0624-MV-RO	2.30E-3	2.69E-3	3.09E-3	3.48E-3
SIEV245	1SIAUV0644-MV-RO	2.30E-3	2.69E-3	3.09E-3	3.48E-3
SPAV041	1SPAP01----CX5FS	1.36E-3	1.50E-3	1.63E-3	1.76E-3
SPBV012	1SPBP01----CX5FS	1.36E-3	1.50E-3	1.63E-3	1.76E-3
CHAHV531	1CHAHV0531-MV-RO	4.54E-3	6.80E-3	9.07E-3	1.13E-2
CHBHV530	1CHBHV0530-MV-RO	4.54E-3	6.80E-3	9.07E-3	1.13E-2

SIBHV699	1SIBHV0699-MV-FC	7.64E-2	1.15E-1	1.53E-1	1.91E-1
AFAB015	1AFAV015---CV-FO	7.78E-2	1.17E-1	1.56E-1	1.94E-1
AFBV024	1AFBV024---CV-FO	7.78E-2	1.17E-1	1.56E-1	1.94E-1
SGEV887	1SGEV889---NV-RM	8.78E-4	1.28E-3	1.68E-3	2.08E-3
SIBV405	1SIBV405---CV-FO	7.78E-2	1.17E-1	1.56E-1	1.94E-1
SIAV404	1SIAV404---CV-FO	7.78E-2	1.17E-1	1.56E-1	1.94E-1