ATTACHMENT 2-F

13-NS-C074, Revision 0, Significance Determination of Containment Sump Air Entrainment

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NUCLEAR GENERATING STATION

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Significance Determination of Containment Sump Air Entrainment

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1.0 Introduction

The purpose of this study is to document Palo Verde's Phase III significance determination of the containment sump air entrainment condition. Specifically, this condition is the lack of water upstream of the sump check valves to the inside containment sump isolation valves. When the sump isolation valves are opened by the Recirculation Actuation Signal (RAS), that air does not have a chance to escape back to the containment atmosphere, but is swept along with the sump water to the suction piping of the ECCS and Containment Spray pumps.

The NRC's significance determination showed this condition to be a YELLOW finding (delta-CDF between 1E-5 and 1E-4/yr). This study will show that it is a WHITE finding (delta-CDF between 1E-6 and 1E-5/yr).

Section 2 will first compare and contrast the assumptions the NRC used in their Phase 3 analysis using their SPAR model vs. modeling assumptions in the PVNGS PRA. Section 3 presents the methodology employed by PVNGS for our Phase 3 analysis. Section 4 shows the results of our analysis. The appendices present background material to support our analysis.

The PRA model used for the analysis is as documented in Engineering Study 13-NS-C029 Rev 13, Ref. 1, with changes as noted in Section 2.

2.0 Assumptions and Initial Conditions

2.1 Comparison of NRC and PVNGS Assumptions

Prior to presenting the PVNGS analysis, it is useful to see the differences between the NRC SPAR model analysis and the PVNGS PRA.

NRC	PVNGS
HPSI and Cont Spray fail on RAS	HPSI only fails for breaks 2" or less; CS not affected
Operators recover HPSI by venting	No HPSI recovery; venting not credited
Operators recover CS by venting	N/A since CS not affected
No alternative success path for high pressure sump recirculation or containment spray	Cool-down and depressurization for SIT injection and low pressure sump recirculation
Consequential RCP seal LOCA for transients and Loss of Off-Site Power	RCP seal LOCA no longer modeled due to low leak rates and insignificant contribution even for catastrophic pump failures
Consequential PSV lifting not included in LOOP/SBO	Consequential PSV lift is modeled for SBO

2.2 Initial Conditions Resulting From Tests

The initial conditions for the modeling performed in this study rely on testing performed by FAI and Wyle Labs and analysis performed by Westinghouse. The results of the analysis and testing programs are reported in Ref. 3. This reference determines the effect on the ECCS and Containment Spray pumps of the air entrained in the sump water as recirculation is initiated following emptying of the Refueling Water Tank (RWT). The following conclusions were drawn and modeled in the PRA accordingly:

a. There is no significant effect on the Containment Spray Pumps. Therefore, the containment spray function was modeled normally.
b. For breaks larger than two (2) inches equivalent diameter, the HPSI pumps showed temporary degradation as the air moved through the pump, but HPSI was able to perform its safety function.
c. For breaks less than two (2) inches, HPSI was unable to supply adequate flow at sufficient head to perform its safety function. Importantly, there was no damage to the pump, as long as the backpressure was low enough for pump to work against. This means that a degraded pump may be recoverable by venting the piping, though this is not credited in this analysis.
d. The division of small/medium sized breaks used in the PRA model is 2.3 inches. Therefore, medium and large LOCAs were modeled normally. To simplify the modeling, all small LOCAs (conservatively including those between 2.0 and 2.3 inches) were modeled with HPSI failing upon initiation of sump recirculation.
e. There is no significant pooling of air at the suction of the LPSI pumps. These pumps remain available for restart to back-up HPSI after depressurization throughout the event.

2.3 Pressurizer Safety Valve Failing Open

Under the assumption that if a pressurizer safety valve (PSV) fails open, it will be fully open (as currently modeled), PSV LOCAs may be modeled normally, because the equivalent break size of a fully-stuck-open PSV is 2.34 inches. However, for this analysis, the assumption will be made that if a PSV fails open, it will be in a partially-open state, resulting in HPSR not being capable of its mitigation and requiring mitigation using the same strategy used for Small LOCA breaks less than two inches (cool-down for SIT injection and sump recirculation using a LPSI pump).

Westinghouse computer simulations using the CENTS code (Ref. 6) and simulator runs performed at PVNGS (which uses the RELAP code) showed that the small LOCA modeling in the PRA was not complete with regard to plant and operator response to a failed high pressure injection or containment sump recirculation condition. Appendix B identifies the changes necessary for the Small LOCA event tree.

2.4 Verification of Operator Actions

The key operator action in these sequences is the successful diagnosis of the need to continue with the cool-down and depressurization of the reactor such that Safety Injection Tank inventory is available for make-up and sump recirculation with a LPSI pump may be used. The initial cool-down for the expected use of the Shutdown Cooling System would be well along when the

Recirculation Actuation Signal occurs, and it is discovered that high pressure sump recirculation is not functioning. Since this constitutes loss of a safety function, the operators are directed to the Functional Recovery Procedure, Ref. 8. The HRA 1RC-SBLOCA-L-2HR was examined to ensure it reflects the proper diagnosis and implementation timing. This HRA had been based on avoiding containment failure. Basing it on avoiding core damage did not change its value.

Several simulator runs were done as part of this investigation. They provided confidence that the operators would properly diagnose the LOCA, commence cool-down expeditiously, and then properly respond to the loss of high pressure sump recirculation. The value of 1RC-SBLOCA-L-2HR is 6.70E-3 with an error factor of 5. Thus the median value, which many references, including NUREG-1278 suggest using, is a factor of 1.7 lower. Therefore the value used in the PVNGS PRA model is believed to be conservative and robust.

It should also be pointed out that, whereas the HRA is part of the accident sequence and on the HPSI success path, the NRC's SDP evaluation applied a non-recovery factor (value of 0.24) to the results of their analysis to credit venting of piping as a HPSI pump recovery strategy. This action would be done under much greater stress and involve ex-control room actions. The two actions are thus very different and should not be compared.

2.5 Discussion of RCP Seal Leak/LOCA

The NRC's SPAR model includes RCP seal leak/LOCA. This was removed from the PVNGS PRA model because of CE/Westinghouse development of a new failure model, Ref. 9, which is nearing NRC approval, and due to the fact that the CE-KSB pumps used at Palo Verde have a very tight clearance between the pump seal package and shaft, such that only 17gpm leakage would result if all three seal stages on a pump failed (Ref. 4). All four pumps together would result in a leak rate within the capacity of two charging pumps. Sensitivity studies done as part of the impact that removed the seal modeling (2001-216) showed that using the CE/W model with conservative assumptions resulted in no significant increase in risk from failed RCP seals.

2.6 Internal Fires

The mitigating event trees for internal fires use internal event transient trees as their basis. The effect of a potential partially-stuck-open Pressurizer Safety Valve is also quantified as part of this analysis.

3.0 Solution Methodology

3.1 Determination of New Baseline Recovered CDF and LERF Values

The PRA model was re-quantified for internal events following introduction of the changes intended to be permanent. Those changes are confined to the Small LOCA analysis as noted in Section 2.2. The addition of HPSR failure mitigation for transient events used for the PSV LOCA sensitivity analysis was not included. The new baseline values are:

$$CDF_{base} = 1.34E\text{-}5/yr$$
$$LERF_{base} = 1.57E\text{-}6/yr$$

3.2 Determination of Small LOCA Risk Increase with HPSR Failed

A new house event, HPSR-FAIL, was added to gate GHR-6-8, which is the top gate for function event HPSR. House event HPSR-FAIL was added to the boundary condition set SLOCA-SDC, which is only used in the IESLOCA event tree. With the house event set TRUE, the HPSR function event is forced to failure, thus all small LOCAs must be mitigated by depressurization and cooldown in order to use low pressure recirculation. Results are reported in Section 4.1.

3.3 PSV Partial Open Failure - Internal Events and Internal Fires

The current modeling of Pressurizer Safety Valves failing to reseat cannot account for sump recirculation failure due to air entrainment. HPSI with sump recirculation following RAS is the only mitigation currently credited. Thus the alternative success path of cool-down and depressurization to allow SIT injection and subsequent sump recirculation using a LPSI pump must be added to the model. The PSV fail-open event occurs in most of the transient event trees, most fire mitigation event trees, the Steam Line Break event tree and the Loss of Off-Site Power event tree. Appendix C shows the model changes done to accomplish this. Results are reported in Section 4.2.

3.4 External Events

The review of external events was based upon the Palo Verde Individual Plant Evaluation for External Events (IPEEE). The external events reviewed were 1) high winds, 2) external flooding, 3) transportation and nearby facility accidents, 4) lightning, 5) sand storms 6) extreme heat and 7) seismic events.

The methodology used to assess the impact of external events will be to evaluate each external event for the potential to:

- Increase the likelihood of an initiating event that uses high pressure recirculation,
- Impact the reliability or availability of mitigating equipment used in the same accident sequences as high pressure recirculation,
- Create a new accident sequence that would result in the need for high pressure recirculation.

The above criteria are consistent with those used by the NRC in their Phase 3 review for external events.

3.5 Review of Open Impacts

Open impacts against the PRA model were reviewed to determine if any would have an impact on the results of this analysis. Of the 97 non-document revision update impacts, only Impact 2005-2, which is incorporated in this analysis, and 2005-14 would have any impact. 2005-14, if resolved as expected, would decrease the PSV failure probability. Thus the error is conservative for this analysis. It does not significantly impact the overall conclusions, because of the relatively small impact from the PSVs. See Attachment A for the complete impact review.

4.0 Results and Conclusions

4.1 Small LOCA

The change in CDF and LERF were determined given that LOCAs of two inches or less equivalent diameter cannot be mitigated using HPSR. CDF_{base} and $LERF_{base}$ are the values reported in Section 3.1. $CDF_{no\text{-}hpsr}$ and $LERF_{no\text{-}hpsr}$ are from Appendix B:

$$\text{Delta CDF} = CDF_{no\text{-}hpsr} - CDF_{base}$$
$$= 1.79E\text{-}5/yr - 1.34E\text{-}5/yr$$
$$= 4.5E\text{-}6/yr$$

$$\text{Delta LERF}_{no\text{-}hpsr} - LERF_{base}$$
$$= 1.57E\text{-}6/yr - 1.57E\text{-}6/yr$$
$$= 0.0/yr.$$

These results are sufficient to show that LERF is not affected by the inability of HPSR to address small LOCA. Thus it will not be considered any further in this study. This is consistent with the NRC's analysis.

4.2 PSV Partial Open Failure

Appendix B shows the determination of risk increase for PSV failing open assuming HPSR is not capable of its mitigation. The change in risk is:

Delta CDF for Internal Events = 2.4E-7/yr
Delta CDF for Internal Fires = 1.8E-6/yr

Fire is dominant because there are so many fire event trees which contain the PSV failing open, and because many have boundary conditions that disable some mitigating equipment.

4.3 External Events

4.3.1 External Flooding, Transportation and Nearby Facility Accidents, Sandstorms and Extreme Heat

External flooding, transportation and nearby facility accidents, sandstorms and extreme heat fall in the category where plant design is adequate to prevent a plant trip or the frequency of a plant trip was negligible when compared with other plant trip sources. Additionally, none of these events would have an impact on the availability or the reliability of mitigation equipment used in the same accident sequences as high pressure recirculation, nor would they create a new accident sequence that would result in the need for high pressure recirculation.

Therefore, there is no or a negligible increase in risk due to external flooding, transportation and nearby facility accidents, sandstorms and extreme heat given the "dry containment sump" deficiency.

4.3.2 High Winds

High winds would have no impact on the reliability or availability of mitigating equipment used in the same accident sequences as high pressure recirculation. Additionally, high winds would not create a new sequence that would result in the need for recirculation. The most likely plant impact due to high winds would be a loss of offsite power. The loss of offsite power accident sequence can result in the need for high pressure recirculation in the event of a stuck open primary safety valve following a loss and subsequent recovery of Auxiliary Feedwater.

However, high wind events applicable to Palo Verde are already accounted for in the weather induced contribution to loss of offsite power initiator in the internal events PRA. Therefore, high winds quantified separately would not result in an increase in the likelihood of an initiating event that relied upon high pressure recirculation as a mitigating function.

4.3.3 Seismic

Palo Verde, in the IPEEE, utilized the Seismic Margins Assessment methodology to evaluate seismic threats. The Seismic Margin Assessment verified the ability to: 1) place the plant in safe shutdown following a seismic event, and 2) mitigate the consequences of a seismically induced small break LOCA. Palo Verde evaluated its mitigation equipment against a review level earthquake (RLE) of greater than 0.3g, which is estimated to occur at a frequency of 3.0E-05/year.

In regard to these two analyzed plant end states, the risk increase due to operation with a "dry containment sump" would only be impacted by a seismically induced small break LOCA. The only mitigation equipment impacted would be high pressure recirculation, which is impacted due to the "dry containment sump" condition, not the seismic event.

For input to the seismic analysis, the conditional core damage probability for Small LOCA alone is required. The Small LOCA event tree was quantified by itself with and without the house event HPSR-FAIL set to TRUE. The basic event LOOP---------2PW was added to each of the boundary condition sets used in the IESLOCA event tree and set to TRUE to cause off-site power not to be available. The difference was taken, then divided by the Small LOCA frequency:

$$CCDP_{SLOCA} = (1.169E\text{-}5/yr - 6.023E\text{-}6/yr) / 3.6E\text{-}4/yr$$
$$= 1.57E\text{-}2$$

Calculation of the risk increase due to seismic events is as follows:

CDFseismic = IESeismicEvent * [CCDP (small-break LOCA)]

$$= 3E\text{-}05/year * 1.57E\text{-}02$$
$$= 4.72E\text{-}07/year$$

Seismic events at the level of the RLE are not expected to impact on the reliability or availability of mitigating equipment used to mitigate the initiators from the internal events evaluation. Seismic events are not expected to create a new sequence that would result in the need for recirculation.

4.3.4 Impact of External Events - Conclusion

Upon review of the external events potentially impacting PVNGS, most external events were either found to be negligible in comparison to the corresponding internal events or occurred at a frequency judged to be high enough to be included as part of the internal initiating event frequency. External events are not expected to impact the reliability or availability of mitigating equipment used to mitigate the initiators from the internal events evaluation. External events are not expected to create a new sequence that would result in the need for recirculation.

The contribution to risk from the "dry containment sump" condition due to external events is dominated by seismic events and is estimated to be 4.72E-07/year.

4.4 Internal Flooding

Internal flooding does have the potential to impact initiators loss of condenser vacuum (IECONDVAC) and loss of nuclear cooling water (IENCW), where the result of a plant trip could lead to a stuck-open primary safety valve (transient induced LOCA requiring high pressure recirculation). Upon review of the PVNGS internal events event trees, IECONDVAC and IENCW are two transients that are subject to internal flooding and whose event tree includes the potential for a stuck-open primary safety valve.

As addressed in Section 2, loss of RCP seal cooling leading to RCP seal failure would not result in a small break LOCA. The RCS leakage from the failed RCP(s) seals would be within the capacity of the charging system. Hence, loss of plant cooling water or loss of nuclear cooling water events would not impact the subject performance deficiency due to a failed RCP seal.

Turbine building flooding is not included in the PVNGS PRA, since its contribution is negligible compared with other events that could cause a plant trip. To be consistent with the NRC Phase 3 review, the same bounding frequency (9.6E-04/year) for internal flooding will be used with IECONDVAC and IENCW. The change in core damage frequency (delta-CDF) would then be the difference between the internal events model that includes the partially stuck open primary safety valve and the internal events baseline model. The impact of a partially stuck open primary safety valve and impact upon HPSI recirculation is discussed in Appendix B. Both models will include an additional 9.6E-04/year (due to flooding) for both IECONDVAC and IENCW.

Model Configuration and Calculation (including modified IECONDVAC and IENCW for flooding)	**IE value with flood**
IECONDVAC	4.50E-02/year
IENCW	9.88E-03/year
	CDF (per yr)
PSV without HPSR with IE Flood	1.290E-5/yr
PSV without HPSR	1.289E-5/yr
(delta-CDF)	**1E-8/yr**

The delta-CDF for stuck-open PSV internal events and fire is 2.4E-7/year. Calculating the delta-CDF using the modified IECONDVAC and IENCW initiating event frequencies including flooding resulted in an insignificant amount of additional delta-CDF.

Internal flooding would have no impact on the reliability or availability of mitigating equipment used to mitigate the initiators from the internal events evaluation. Therefore, the risk increase contribution due to internal flooding is negligible when compared with the risk increase contribution due to internal initiating events.

4.5 Summary of Results

The following table shows the overall impact of loss of HPSR for break sizes of two inches or less.

Initiator	Delta-CDF (per year)
Small LOCA	4.5E-6
PSV – Internal Events Plus Fire	2.0E-6
Seismic	4.7E-7
Total	**7.0E-6**

Using best-estimate values, the only significant contributors to risk increase with the dry containment sumps are small LOCAs, stuck-open pressurizer safety valves (under the assumption that HPSR would not function) and seismically-induced small LOCAs. The sum of these is well within the WHITE significance category.

References

1. Engineering Study 13-NS-C029 Rev.13, *Interim PRA Change Documentation*
2. NRC Special Inspection Report, Letter EA-04-221 from Arthur T. Howell III to Greg R Overbeck, dated January 5, 2005
3. Significant CRDR 2726509, *Safety Significance Evaluation of ECCS Containment Sump Voided Piping*
4. *Seal Flow and Leakage Retrofit Report for Reactor Coolant Pumps at the Palo Verde Nuclear Generating Station (SBP1 Seal Type RCR950-B3)*, Sulzer Bingham Pumps, July 1996
5. PRA Model Impact 2005-2
6. Westinghouse Report DAR-OA-05-3 Rev 0, *Report of SBLOCA Analyses with Degraded ECCS Flow After RAS Performed for Arizona Public Service Company in Support of Palo Verde Nuclear Generating Stations Units 1, 2 & 3*, January 2005
7. Emergency Operating Procedure 40EP-9EO03 Rev 17, *Loss of Coolant Accident*
8. Emergency Operating Procedure 40EP-9EO09 Rev 22, *Functional Recovery*
9. WCAP-16175-P, *Model for Failure of RCP Seals Given Loss of Seal Cooling in CE NSSS Plants*, January 2004

Appendix A – Small LOCA Event Tree Changes

1.0 Event Tree and Top Logic Fault Tree Changes

Detailed changes are documented in Impact 2005-002 (Ref. 5.) Briefly,

a. The function event SDC1 contained both the HRA for cool-down and the Shutdown Cooling System, SDC (see Figure 1, Current Small LOCA Event Tree). It was necessary to split out the HRA, 1RC-SBLOCA-L-2HR, into a separate function event called DPRS3 to allow separate failures of the HRA and SDC system (see Figure 2, Modified SLOCA Event Tree). This allows modeling the condition of interest, where the operators are successful in commencing depressurization and cool-down with the intention of utilizing Shutdown Cooling, then find that High Pressure Safety Recirculation (HPSR) does not function. Whereas HPSR failure previously went directly to core damage, new sequences were added. Shutdown cooling is not asked in this situation; the operators would proceed directly to Low Pressure Safety Recirculation (LPSR).

b. Due to the modeling change in (a), there is a redundant HRA for depressurization and cool-down in the DPRS1 function event (1RCS-DEPRES--2HR) in the case of HPSR failure. This event is still required, however, for the early HPSI failure case. To alleviate this problem, the HRA was removed from the top logic for DPRS1 and placed under the new DPRS3 function event. The failure branch goes directly to core damage; the success branch proceeds as before. There is no impact to the HPSI failure sequence results due to this change.

c. Although the computer modeling by Westinghouse and simulator runs were not designed to specifically determine success criteria, they implied that all four Safety Injection Tanks (SITs) are needed during the cool-down process when HPSR is not available. It is reasonable to believe that this would also be the case if HPSI were initially unavailable. Therefore, the success criterion for SITs was changed from 2-of-4 to 4-of-4. (SITs are part of the function event DPRS1.) A new common-cause failure for the SIT discharge check valves was also added. The original and modified fault trees are shown in Figures 3 and 4, respectively.

2.0 Functional Success Criteria

Each of the function events with their success criteria is presented below:

2.1 Reactor Trip (RXTRIP)

Reactor trip is successful if no more than four CEAs fail to insert into the core to shutdown the chain reaction. Failure of reactor trip is treated in a separate event tree.

2.2 High Pressure Safety Injection (HPSI)

HPSI is required for inventory makeup to the Reactor Coolant System. Any size break in the small LOCA break size range is large enough to depressurize the RCS to the Safety Injection

Actuation setpoint. HPSI is successful if at least one pump operates to inject water from the RWT through at least three of the four available injection pathways.

2.3 Secondary Heat Removal (SGHR)

Heat removal through the steam generators is required to achieve core cooling for all Small LOCAs. This is the basis for the division between small and medium LOCAs. With successful HPSI, secondary cooling success is at least one AFW pump supplying either of the two steam generators and at least one ADV or steam bypass valve steaming. (A different success criterion for secondary cooling is used in the DPRS1 function discussed below.)

2.4 Operators Cool Down and Depressurize the Plant (DPRS3)

This function consists of a single basic event, which is a HRA. However, two different HRAs are used depending on the sequence. Where HPSI is successful, the operators are following the LOCA emergency procedure (Ref. 7) and have a considerable amount of time to diagnose and execute plant cool-down, although it is expected to commence expeditiously; i.e., within about 30 minutes. However, if HPSI fails, the operators are directed to the functional recovery procedure (Ref. 8). This is a much more urgent situation, because considerably less time is available due to the high rate of blowdown with no makeup. Success in either case is the proper diagnosis, commencement and execution of cooling down and depressurizing the RCS.

2.5 High Pressure Safety Recirculation (HPSR)

After depletion of the RWT, a Recirculation Actuation Signal (RAS) is generated, which opens the containment sump isolation valves to supply suction to the Containment Spray pumps and the HPSI pumps. (LPSI pumps are shut down by the RAS, but may be restarted if needed.) HPSR success is opening of the sump isolation valves and closure of either the RWT outlet check valves or outlet isolation valves, such that sump water is not diverted back to the RWT.

2.6 Shutdown Cooling (SDC1)

If the accident proceeds as expected, the operators will align and start shutdown cooling in order to bring the reactor to a cold shutdown and depressurized condition, which essentially terminates the LOCA, thus minimizing the need for makeup. One SDC loop, which consists of a LPSI pump taking suction from a hot leg and pumping it through a Shutdown Cooling Heat Exchanger and back to the RCS through one of two available cold leg injection points is required for success.

2.7 Depressurize for Low Pressure Safety Injection (DPRS1)

Low Pressure Safety Injection, LPSI, can be used to replace a failed HPSI or HPSR function. This requires that the operators cool down the plant further than would be necessary for the use of Shutdown Cooling. The operator actions themselves are contained in function event DPRS3. DPRS1 consists of the plant equipment required to achieve this, which are one AFW pump supplying water to <u>both</u> steam generators; one ADV on each steam generator or steam bypass valves; also all four Safety Injection Tanks (SITs) are required for inventory control; and finally for the HPSI failure sequence, one LPSI pump supplying injection to at least one cold leg.

2.8 Low Pressure Safety Recirculation (LPSR)

Since HPSI or HPSR is failed in the sequences requiring this function, sump recirculation to the reactor using the LPSI pump is necessary. Success is one LPSI pump restarting and taking suction from the sump and delivering water to at least one of the two available cold leg injection points.

2.9 Containment Heat Removal (CHR)

Containment Spray is required for those sequences where the reactor cannot be cooled down sufficiently to use either Shutdown Cooling or Low Pressure Safety Recirculation. These conditions imply that RCS temperature and subsequently the containment pressure may be great enough to challenge containment integrity. Success is one of two Containment Spray pumps taking suction from the containment sump and pumping the water through a Shutdown Cooling Heat Exchanger and associated spray piping in containment. This is also the heat removal mechanism for the core.

3.0 Accident Sequence Descriptions

Referring to Figure 2:

3.1 **Sequence 3:** Successful reactor trip; successful HPSI; successful secondary heat removal; operators cool down and depressurize the reactor for shutdown cooling entry per the LOCA procedure; successful high pressure recirculation; shutdown cooling system fails; containment heat removal fails.

3.2 **Sequence 5:** Successful reactor trip; successful HPSI; successful secondary heat removal; operators cool down and depressurize the reactor intending to go onto Shutdown Cooling per the LOCA procedure; however, HPSR fails upon RAS; continued cool-down and depressurization using secondary cooling per the functional recovery procedure (both SGs) and SITs for makeup are successful; LPSI fails in the recirculation mode.

3.3 **Sequence 6:** Successful reactor trip; successful HPSI; successful secondary heat removal; operators cool down and depressurize the reactor intending to go onto Shutdown Cooling; however, HPSR fails upon RAS; equipment required for achievement of plant conditions for LPSR fails (secondary cooling using both SGs, or SITs).

3.4 **Sequence 8:** Successful reactor trip; successful HPSI; successful secondary heat removal; operators fail to diagnose or execute plant cool-down; HPSR is successful; containment heat removal fails.

3.5 **Sequence 9:** Successful reactor trip; successful HPSI; successful secondary heat removal; operators fail to diagnose or execute plant cool-down; HPSR fails.

3.6 **Sequence 10:** Successful reactor trip; successful HPSI; secondary heat removal fails.

3.7 **Sequence 12:** Successful reactor trip; HPSI fails; operators cool down and depressurize the reactor per the functional recovery procedure; cool-down and depressurization using

secondary cooling (both SGs) and SITs for makeup are successful, along with a successful restart of a LPSI pump with successful injection; however, LPSI fails in the recirculation mode.

3.8 **Sequence 13:** Successful reactor trip; HPSI fails; operators cool down and depressurize the reactor per the functional recovery procedure; secondary cooling (both SGs), SITs or LPSI for makeup, fails.

3.9 **Sequence 14:** Successful reactor trip; HPSI fails; operators fail to diagnose or execute plant cool-down.

3.10 **Sequence 15:** Reactor trip fails; HPSI is successful. This leads to an ATWS sequence that can be mitigated in a separate event tree.

3.11 **Sequence 16:** Reactor trip fails; HPSI fails. This leads to an ATWS sequence that is assumed cannot be mitigated, so leads directly to core damage.

Figure 1 – Current Small LOCA Event Tree

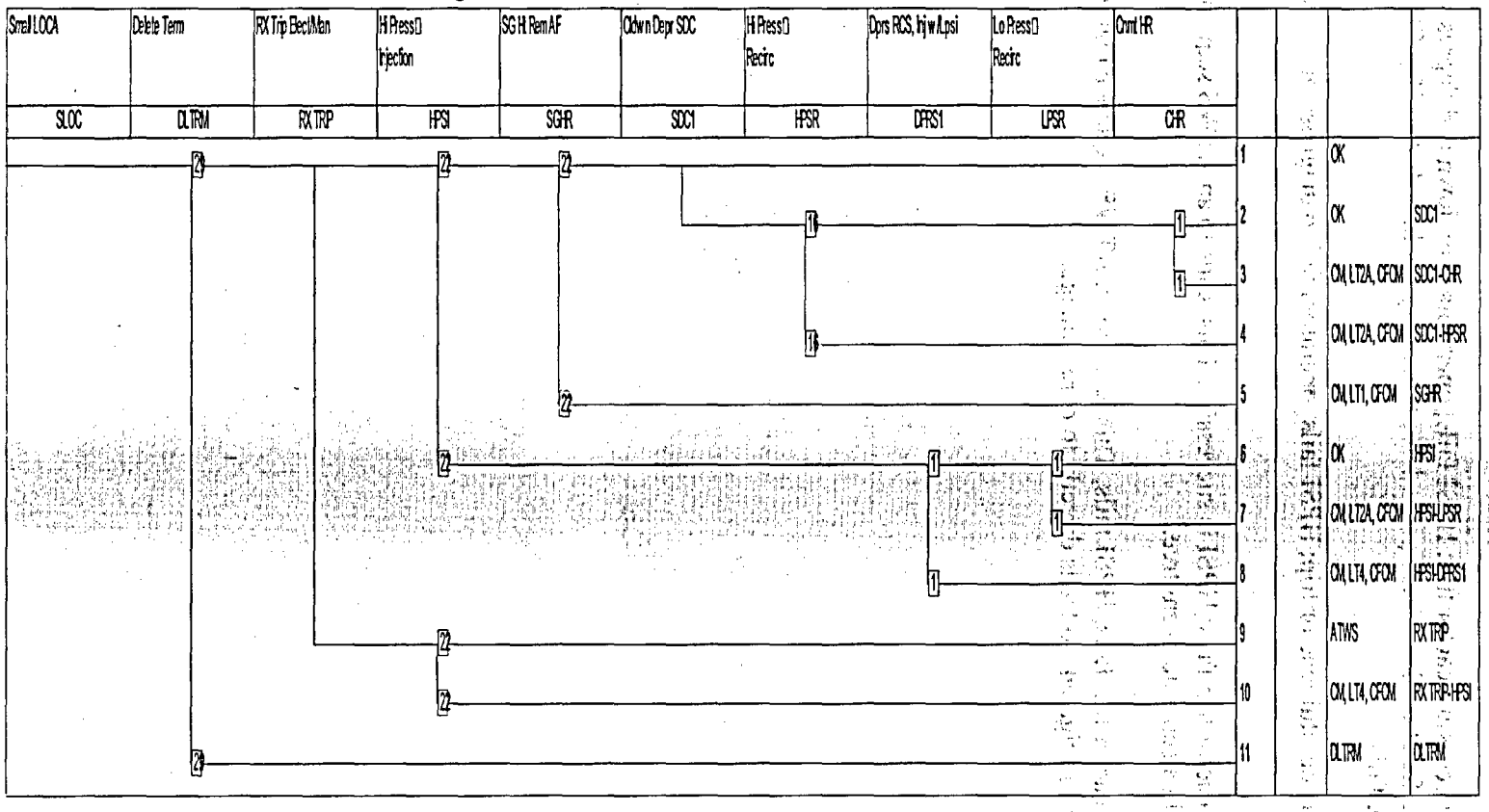


Figure 2 – Modified Small LOCA Event Tree

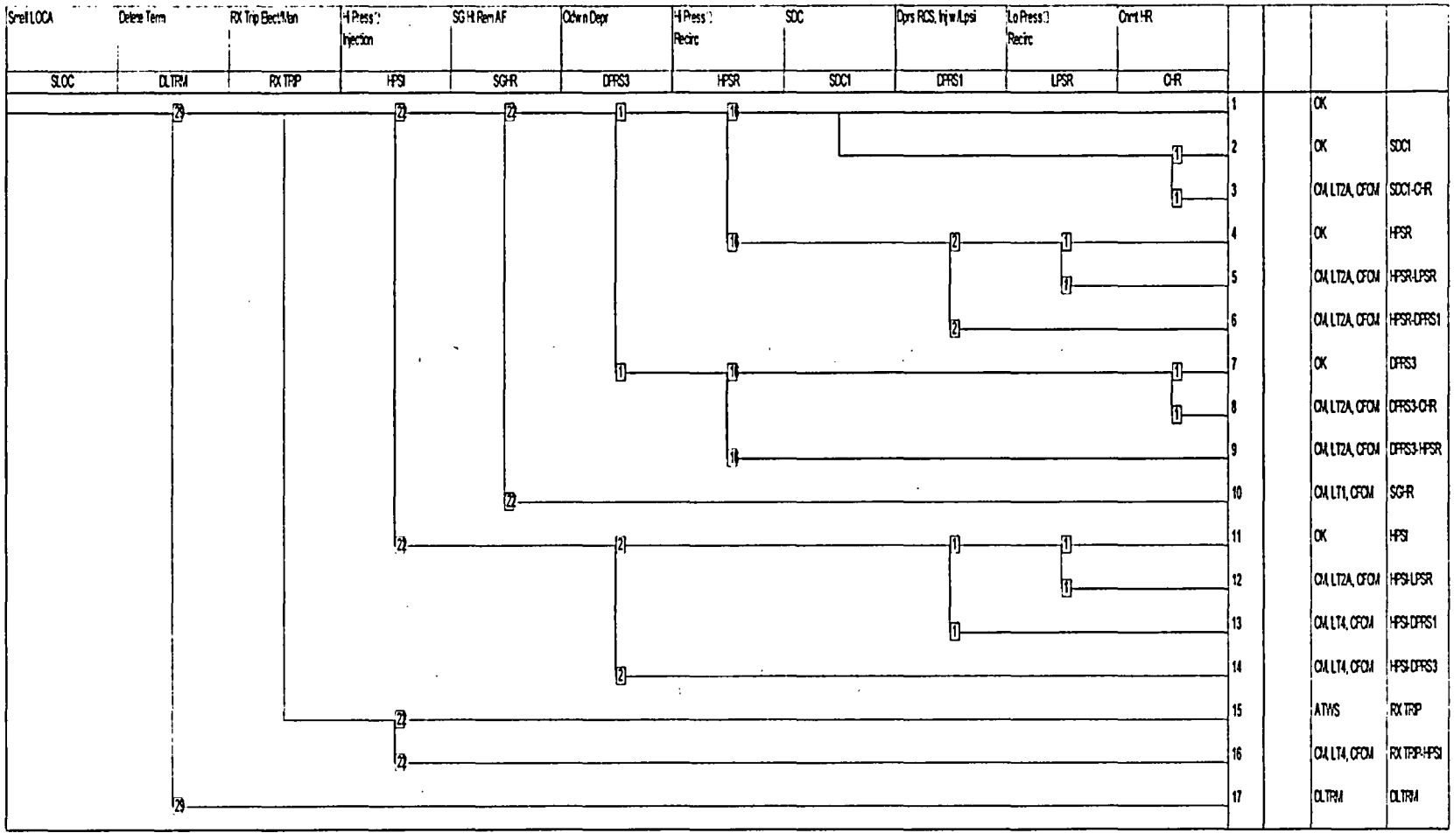


Figure 3 – Current Safety Injection Tank Fault Tree

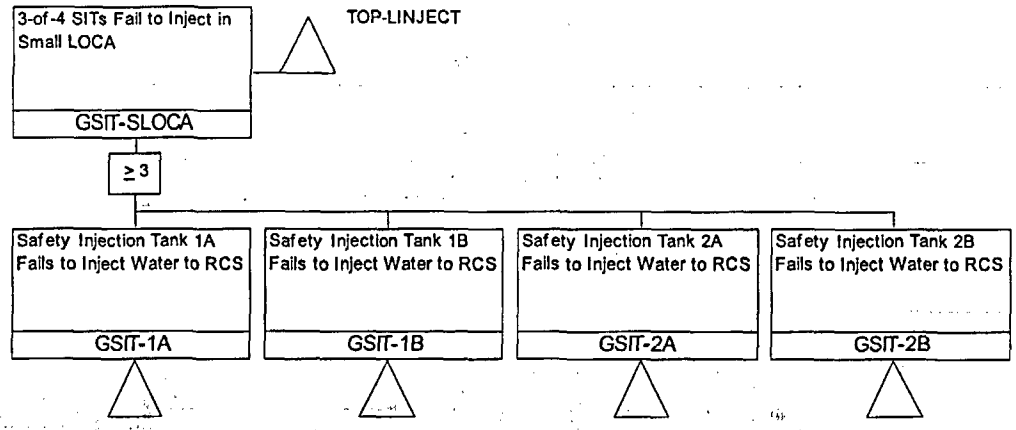
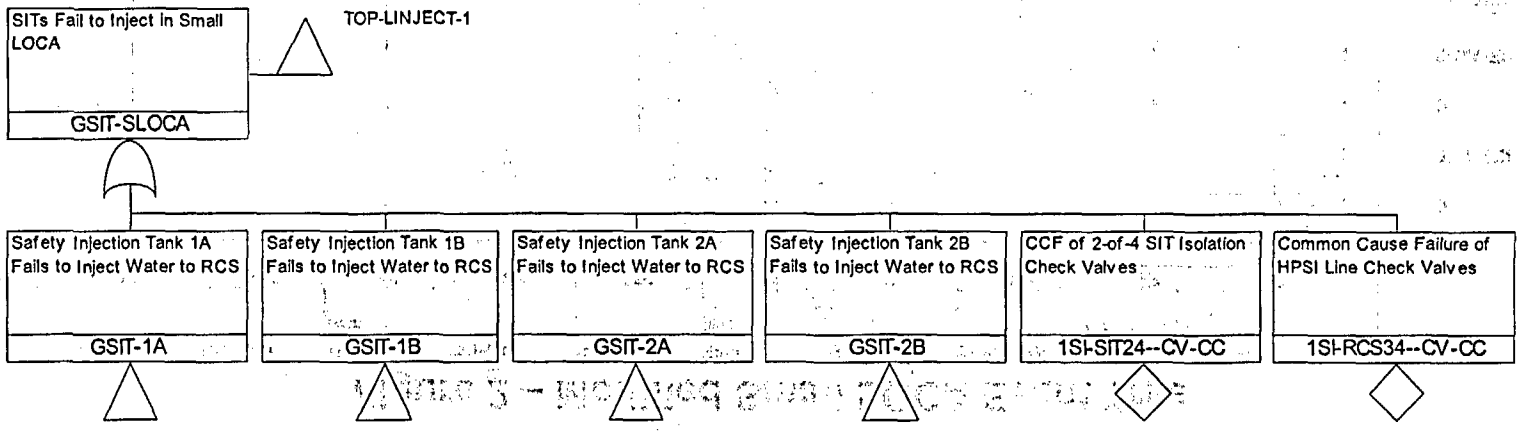


Figure 4 – Modified Safety Injection Tank Fault Tree



Appendix B –PSV Fail-Open Mitigation

1.0 Model Changes

To allow an alternate success path for HPSR failure following a PSV failing to close, top logic must be altered for the HPSR function event, such that it includes the systems and operator actions necessary to effect a rapid cool-down and depressurization to allow SITs to inject and ultimately sump recirculation via a LPSI pump, which would have to be restarted (RAS shuts down the LPSI pumps).

The current model was used as a starting point and so does not contain the changes made to evaluate Small LOCA. However, Small LOCA modeling may be used as a guide, since this alternate success is included for the HPSI failure sequence. The top logic tree GTLINJECT, Figure 2, includes the systems and HRAs needed. The effect of a PSV sticking open is dominated by water relief sequences where AF has failed and Alternate Feedwater has succeeded. Thus calling in AF in the HPSR function event would always lead to failure. However, since Alt Feedwater succeeded, not only is secondary cooling successful, but the operators must also have been successful in cooling down and depressurizing the plant. With SG pressure low enough to allow use of condensate pumps to feed, primary pressure allowing 20F subcooling would be about 500 psia. This is low enough to have SITs injecting. Thus the logic under gate GTLINJECT-1 is not required. Only that under GTLINJECT-4 is required. Also, LPSI injection is not required, but low pressure sump recirculation is. Therefore, gate GLR-4-4 is substituted for GLI-4-4.

However, two minor non-conservatisms result by not including the AFW input and the depressurization HRA:

1) Both would still be needed for the PSV steam relief sequences and for the SBO water relief sequence; these sequences were quantified and the error was found to contribute much less than one percent of CDF. The PSV steam relief sequences in the fire model were also checked and all were much less than one percent.

2) The success criterion for Alternate Feedwater in the SGHR_CD function event is one pump to <u>either</u> steam generator, whereas the success criterion in the HPSR function event should be one pump to <u>both</u> steam generators. The ALTFW top gate was solved both as an AND gate and as an OR gate. The difference was about 0.4 percent.

Model changes are as follows:

- Create new gate and fault tree HPSR-FAILS-1 as shown in Figure 1.
- Add Function Event Alternative 25 to Function Event HPSR. Alternative 25 uses gate HPSR-FAILS-1. There is no boundary condition set applied.
- This alternative provides for mitigation using SITs, and LPSR and is assigned to HPSR events in trees that include PSV, both in internal events and fire mitigation event trees.
- Gate HPSR-FAILS-1 has two variations. The first uses the nominal fault tree input for the HPSR function (GHR-7-8). The second has the gate GHR-7-8 set to TRUE.

- Change gate GSIT-SLOCA from a 3-of-4 K/N gate to a simple OR gate, as shown in Figure 2. Tests and simulator runs show that all four SITs are required.

2.0 Results

The model is quantified for both internal events and fire with normal HPSR logic and with the HPSR top gate, GHR-7-8, set to TRUE. The results are shown in the table below:

Delta CDF for PSV Stuck Open Mitigation

Model	Internal Events	Internal Fires
HPSR Fails	1.289E-5/yr	4.316E-6/yr
HPSR Available (baseline)	1.265E-5/yr	4.138E-6/yr
Delta CDF	**2.4E-7/yr**	**1.8E-6/yr**

Figure 1

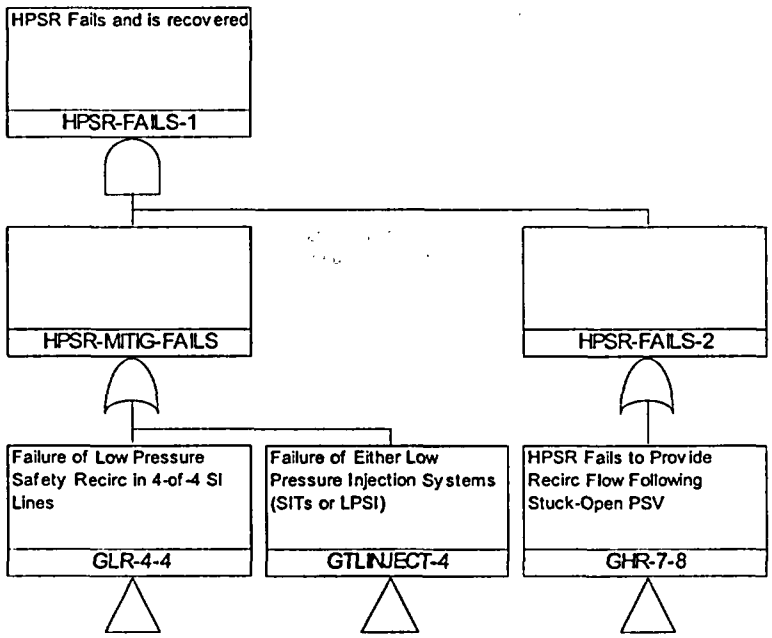


Figure 2

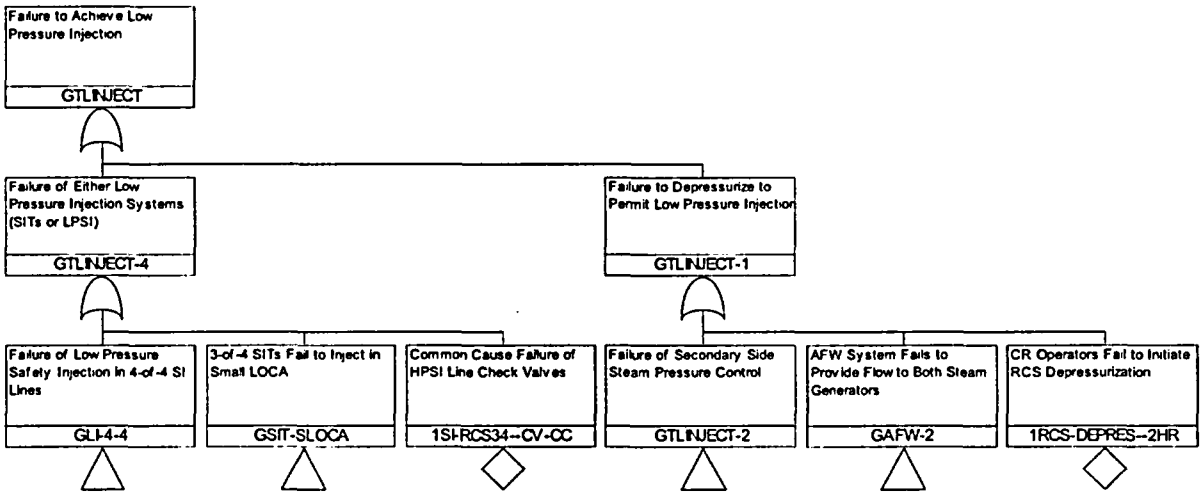
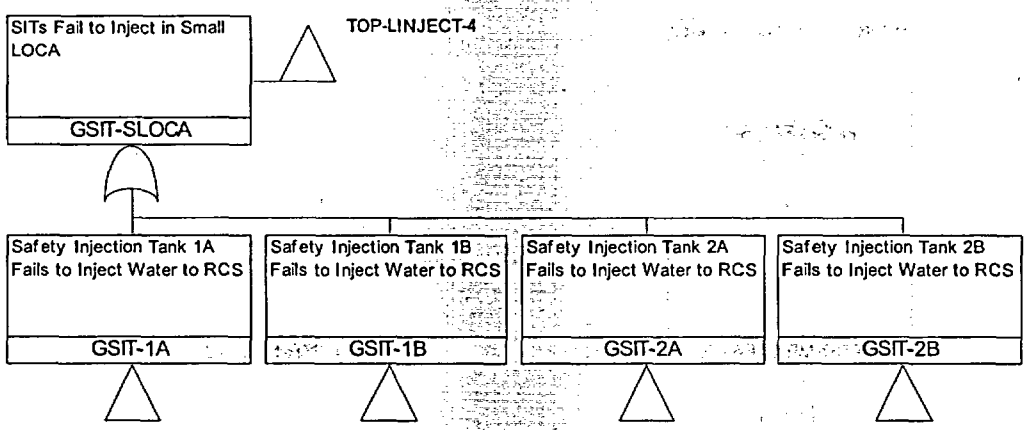


Figure 3


SITs Fail to Inject in Small LOCA
GSIT-SLOCA
TOP-LINJECT-4
Safety Injection Tank 1A Fails to Inject Water to RCS
GSIT-1A
Safety Injection Tank 1B Fails to Inject Water to RCS
GSIT-1B
Safety Injection Tank 2A Fails to Inject Water to RCS
GSIT-2A
Safety Injection Tank 2B Fails to Inject Water to RCS
GSIT-2B

Appendix C - NRC Phase 3 Review for External Events, Assumptions and Conclusions

1.0 General Criteria for Evaluating External Events

1. For the subject performance deficiency to cause an increase in plant risk from an external initiator, the initiator had to do one of three things:
    a. Cause an increase in the likelihood of an internal event affected by the subject performance deficiency
    b. Affect the reliability or availability of mitigating equipment used to mitigate the initiators from the eternal event evaluation; or
    c. Cause a new sequence that would result in the need for recirculation.

2.0 Transportation Incidents, External Fires

Assumptions

1. The impact upon transients from the subject performance deficiency is the potential to induce a stuck open safety valve.
2. The impact upon loss of offsite power from the subject performance deficiency is the potential to induce a RCP seal failure.
3. Events that were initiated and remained outside of the plant, would not be expected to cause a plant system pipe break.
4. Likelihood of having an external event occur simultaneously with a major pipe break was considered to be negligible.
5. The potential for transportation incidents or external fires to induce a stuck open safety valve would be negligible.

Conclusions

1. Transportation incidents and external fires would only affect plant transients and loss of offsite power.
2. Since transportation incidents and external fires are rare events in comparison to equipment related and weather related events, the change in initiator event likelihood would be very low.
3. The increase in risk associated with the subject performance deficiency was negligible with respect to transportation events and external fires.

3.0 External Flooding

Assumptions

1. Because of the topography of the site and nature of the desert, all external floods will drain or quickly be absorbed by the environment.
2. External flooding had no expected affect on total risk

Conclusions

1. Site flooding was not a significant threat for severe accident because the effect of the probable maximum precipitation, based on Hershfield's statistics of extreme events, was less limiting than the design basis calculations from the Updated Final Safety Analysis Report.
2. External flooding would have no effect on the initiating event likelihoods for any initiator.

4.0 Internal Flooding

Assumptions

1. There is a low frequency of the external event and the resulting low likelihood that a flood takes out all equipment to cause a complete loss of cooling water systems.
2. The high likelihood of a transient from other causes results in a negligible change in the initiating event likelihood due to internal flooding.
3. The loss of open-loop cooling water systems occurs at a rate of 9.6×10^{-4} events/year (NUREG/CR-5750). This is greater than the expected rate of piping failures large enough to cause substantial flooding in the pump areas. As a result, the analyst assumed that the impact of internal flooding initiated loss of nuclear or plant cooling water systems on the CDF was no more than equal to the effect from internal events, regardless of whether the performance deficiency existed.

Conclusions

1. Internal floods have a potential to affect the initiating event frequency of loss of cooling water systems and plant transients. Internal floods would have this similar affect with or without the subject performance deficiency.

5.0 High Winds

Assumptions

1. Likelihood of having an external event occur simultaneously with a major pipe break was considered to be negligible therefore, these events would only affect plant transients and losses of offsite power.
2. The impact upon transients from the subject performance deficiency is the potential to induce a stuck open safety valve.
3. The potential for high winds to induce a stuck open safety valve would be negligible.
4. High winds would affect loss of offsite power which affects reactor coolant pump seal failure.
5. High winds occur often enough that the impact of these severe weather events are already incorporated into the initiating event frequencies for plant transients and loss of offsite power.

Conclusions

1. The total impact on high winds on the increase on CDF related to the subject performance deficiency was evaluated as part of the internal initiating events review.

6.0 Seismic

Facts

1. Seismic events with a magnitude greater than the review level earthquake were expected to occur at a frequency of 3.0E-05/year.
2. All Seismic 1 structures were built to withstand this review level earthquake with appropriate engineering margin.
3. Frequency of transients and loss of off-site power events would be several orders of magnitude higher that that of severe seismic events.

Assumptions

1. The normal engineering factors and resulting rigidity that were built into the Palo Verde units were sufficient to protect the plant from all but the most severe of seismic events.
2. The analyst assumed that the likelihood of a seismic event causing an initiator by affecting Seismic Category 1 equipment was low and that the change in risk associated with the subject finding would be negligible. This is based on the assumption that a seismic event large enough to cause a major pipe rupture would likely result in core damage.
3. Because of the low frequency of seismic events and the low likelihood that seismic events would cause a loss of mitigating equipment, combined with the high likelihood of a transient or loss of off-site power, the change in initiating event likelihood (added: due to seismic events) would be very low.
4. The EPRI seismic margins assessment evaluation was conservative and there was a probability that the reactor coolant system would survive earthquakes larger than the review level earthquake.
5. Seismic induced small-break loss of coolant accident could result at a rate of 3.0E-05/year.

7.0 Internal Fire

Assumptions

1. The probability of an internal fire causing a loss of nuclear cooling water was extremely low, based upon normal separation.
2. Internal fires could not cause a medium or large-break loss of coolant accident.
3. Probability of an internal fire causing a loss of offsite power was extremely low, because of equipment separation inside the plant.
4. The probability of an internal fire resulting in a stuck-open safety relief valve that was not recoverable, that the relief valve caused a plant transient, and the that the operators were unable to take the plant to cold shutdown conditions prior to recirculation was judged extremely low.
5. Internal fire events happen frequently enough that the impacts of these events are already incorporated into the initiating event frequency for a transient.
6. Internal fire could result in the complete loss of the plant cooling water system. However, the effect of this event would be no different if it were caused by an internal fire than it would be if it were initiated by equipment related problems.

Conclusions

1. The effect of internal fires was considered to be negligible with respect to the dominant transient sequences.

2. Most of the impact of internal fires on the increase in core damage frequency related to plant transients was evaluated as part of the internal initiating events review.
3. Control room fire could induce a RCP seal failure. However, recent studies by Combustion Engineering indicate that these seals would not result in a small-break loss of coolant accident under these conditions.
4. The effect of internal fire on the loss of plant cooling water initiating event frequency is potentially large enough that the effect of the subject performance deficiency could not be ruled out.

8.0 Other External Events

Facts

1. Analyst reviewed other external initiators to determine if they had the potential to cause one of the three effects that would cause an increase in risk related to the subject performance deficiency. The initiators review included: lightning, sand storms, extreme heat, and roof ponding.

Conclusions

1. The effects of these initiators were determined, qualitatively, to either be negligible, or to already be included in the internal events initiating event frequency.

9.0 External Event Quantification

9.1 Small-Break Loss of Coolant Accident (LOCA)

Assumptions

1. Internal fires have the potential of resulting in a small-break LOCA.
2. Increase in risk would be bounded by the change in risk associated with the subject performance deficiency for internal events (9.14E-07)

Quantification

Fire (9.14E-07/year) + Seismic (3.0E-05/year*CDP_{SMLOCA}) = 8.81E-06/year NRC evaluation

9.2 Plant Transients

Assumptions

1. The frequency of seismic events, internal floods, external fires, and transportation issues is so low compared to that of equipment and human error related plant transients, the impact from these external initiators is considered negligible.
2. High winds, internal fires, and certain other external events have occurred at such a high rate throughout the industry that the analyst believes they are well represented in the published plant transient initiating event frequencies. This resulted in the effect on risk, related to the subject performance deficiency, being fully quantified during the internal events analysis.

Quantification

1. The total effect of external initiators on the change in core damage frequency from plant transients related to the subject performance deficiency was determined to be negligible.

9.3 Loss of Offsite Power

Assumptions

1. Many of the external initiators appear to cause an increase in the initiating event likelihood for a loss of offsite power.
2. High winds and certain other external events have occurred at such a high rate throughout the industry, the analyst believes they are well represented in the published loss of offsite power initiating event frequencies.
3. Internal fires were not likely to increase the probability of a loss of offsite power significantly because of the normal separation of plant equipment and because the published initiating events frequencies would include the contribution from large switchyard fires.

Conclusions

1. The frequency of seismic events, external fires, and transportation issues is low compared to equipment and human error loss of offsite power events. Since the frequency for these events is so low, the impact from these external initiators is considered negligible.
2. Since high winds and certain other external events have occurred at such a high rate throughout the industry, their effect on risk related to the subject performance deficiency is fully quantified during the internal events analysis.
3. The total effect on the change in CDF from a loss of offsite power related to the subject performance deficiency was determined to be negligible.

9.4 Loss of Plant Cooling Water System

Assumptions

1. The effect from the subject performance deficiency on a loss of plant cooling water initiating event would be an increase in the initiating event frequency from an internal flood or an internal fire affecting all system pumps.
2. The increase in risk from internal floods is assumed to be bounded by the change in CDF from the equipment related initiator (1.22E-09).
3. The probability of a large oil fire causing a loss of plant cooling water system initiating event was at lease an order of magnitude lower because the fire had to initiate, cause spilling of oil, and spread rapidly enough to damage system equipment, but not so rapidly that it would extinguish before causing a loss of the entire system.
4. The increase in CDF from an internal fire would be not greater than the internally initiated change in risk. However, because of uncertainties in the data and to ensure that the risk is appropriately bounded, the analyst assumed that the change in CDF could be as much as 10 times higher than for internally initiated events alone (1.22E-08).

Quantification

Change in CDF_{LOPCW} = flood contribution + fire contribution

Change in CDF_{LOPCW} = 1.22E-09 + 1.22E-08 = 1.34E-08

9.5 Loss of Nuclear Cooling Water

Facts

1. The internal events contribution to the change in CDF was evaluated to be 1.22E-09/year.

Assumptions

1. Internal floods had the potential to increase the initiating event frequency by no more than that of internal events because the frequency of large piping failures tends to be smaller than the published failure rate of open loop cooling water systems.

Conclusions

1. The analyst assigned the change in CDF from external events causing a loss of nuclear cooling water initiator to be equal to that of the internal events change in risk (1.22E-09/year).

Impact Review

ChangeID	Change Description	Disposition
2000-85	PSA Peer Review Observation AS-02 states that discussion of internal flooding evaluation results should be added to the Initiating Event study.	The internal flooding analysis is currently in progress. Internal flooding is being addressed in this study.
2000-86	PSA Peer Review Observations SY-03 and SY-05 find the existing documentation is difficult for external observers to link references to individual assumptions and key inputs to the model (reliabilities, probabilities, basic events and gates).	There is no impact on Total CDF or LERF.
2000-87	PSA Peer Review Observations DA-03 and DA-06 state that the process used to group components together for data development be documented.	This is a documentation enhancement and there is no impact on Total CDF or LERF.
2000-91	PSA Peer Review Observation QU-01 found the documentation of quantification difficult to follow and recommended adding a section covering the delete term logic and recovery pattern table to 13-NS-B67.	This is a documentation enhancement and there is no impact on Total CDF or LERF.
2000-92	PSA Peer Review Observations DA-04 and DA-05 advocate use of newer 1998 INEEL data for determining common cause.	This is in progress. There is not expected to be a significant impact to CDF or LERF. There would be virtually no impact to the delta-CDFs being determined for this application.
2001-246	Add the GTG control power and diesel start batteries to the model, they are not tested by the GTG monthly start or 6 month loaded run, they are required for success in a blackout, and have a different test interval than the rest of the GTG.	There would be virtually no impact to the delta-CDFs being determined for this application.
2001-247	Establish an engineering reference document for operation of electric AF pump on one GTG and operation of HPSI and AF pump on paralleled GTGs as currently assumed for success criteria in 13-NS-B061. Update GTG failure rates given new isochronous testing.	This impact is resolved. It resulted in less than 1% change to CDF and LERF. There would be virtually no impact to the delta-CDFs being determined for this application.

ChangeID	Change_Description	Disposition
2002-111	Add individual loads failing to shed properly as impacting EDG. Issue resulted from CEOG task to extend ISG test interval.	This impact is nearly resolved, with the exception of identifying a viable data source. Using data available in the model, CDF increased less than 1%. There would be virtually no impact to the delta-CDFs being determined for this application.
2002-150	Reliability Data Update - incorporated into 13-NS-B063 Rev 6 and associated Risk Spectrum model update.	This periodic update is in progress. No significant change to CDF or LERF is expected. There would be virtually no impact to the delta-CDFs being determined for this application.
2002-177	Currently for demanded components, the failure likelihood is assumed directly related to the surveillance interval.	No significant change to CDF or LERF is expected. There would be virtually no impact to the delta-CDFs being determined for this application.
2002-21	Some of the cutsets containing the PK battery demand failure do not indicate that a change to the electrical train demand occurred and thus, a true demand on the battery was not made. These cutsets would seem to be invalid.	Any error would be conservative. There would be virtually no impact to the delta-CDFs being determined for this application.
2002-220	House Event FIRE-NK-1 under gate 1NKNM45-125--1PW is contradicted when OOS-GTNBOTH is set which falses gate GPBA-2-1GTG.	This only affects equipment out-of-service calculations. There is no impact to this application.
2002-222	Conversion of IEDCHVAC1[2] event tree into EOOS is incorrect. EOOS does not recognize the exchange of gates to FALSE events due to the house event IE-DCRHVAC-WCN set in BC set DCRHVAC-IE.	No impact to the PRA model in Risk Spectrum. EOOS issue only.
2002-3	Modify LERF trees to address more recent PVNGS, industry and regulatory technical postions regarding AFW level control, AFW PRA success, and probability of Pressure and Thermally induced SG tube ruptures.	This is not expected to have a significant impact on results. There would be virtually no impact to the delta-CDFs being determined for this application.
2002-45	Several Memos are not linked to anything.	Documentation issue; no impact
2002-69	Fire initiating event frequency calculation for Fire Zone 93 (Start-up Transformer Yard) is incorrect as it counts NANX01 as the fire initiator rather than NANX02 and NANX03.	This impact is resolved. No significant impact to CDF or LERF. There would be virtually no impact to the delta-CDFs being determined for this application.

ChangeID	Change_Description	Disposition
2002-87	Change LOCA frequencies to the values in SECY-04-0060 (issued April 13, 2004). The IE values from NUREG/CR-5750 (in Rev4) may be under estimates. The CRDM Nozzle events at Summer & Davis Besse caused this re-evaluation.	No significant impact is expected when the Reg Guide is finally issued. There would be virtually no impact to the delta-CDFs being determined for this application.
2003-13	ERIN fire model peer review F&O 1-1; level D	Documentation only. No impact.
2003-14	ERIN fire model peer review F&O 1-2. Level C	This has been resolved. Documentation only. No impact.
2003-15	ERIN fire model peer review F&O 2-2. Level C	Fire frequencies to be updated as part of a periodic process. No significant change is expected. There would be no impact to the delta-CDFs calculated for this application.
2003-17	ERIN fire model peer review F&O 3-3. Level D.	Documentation only. No impact.
2003-173	Clarify reference to fire brigade in memo S-13-NS-C053. Current wording implies an implicit crediting of fire detection and brigade response, which is misleading.	This is resolved. Documentation only. No impact.
2003-174	Investigate the modeling assumptions of JCDNPV0200**VALVEX with respect to common mode failure of all 3 CD Pumps.	This is resolved. Less than 1% change to CDF and LERF. There would be no impact to delta-CDFs calculated for this application.
2003-18	ERIN fire model peer review F&O 3-4. Level D.	Any error is expected to be small and in the conservative direction. There would be no impact to the delta-CDFs calculated for this application.
2003-20	ERIN fire model peer review F&O 4-2. Level C	This is resolved. There was no measurable effect on CDF or LERF.
2003-22	ERIN fire model peer review F&O 4-4. Level D	This is resolved. Documentation only. No impact.
2003-23	ERIN fire model peer review F&O 4-6. Level B	This is resolved. Documentation only. No impact.
2003-24	ERIN fire model peer review F&O 4-7. Level C	This is resolved. There was no measurable effect on CDF or LERF.
2003-27	ERIN fire model peer review F&O 5-2. Level C	This is resolved. There was no measurable effect on CDF or LERF.

ChangeID	Change_Description	Disposition
2003-274	Add modeling for AFB-P01 conduit presence in Fire Zone 74B. Cable E-AF01-BC-1CA (power cable to pump) in conduits 1EZC1EBRC01 and/or 1EZC1EBRC06 are not shielded and would be vulnerable to transient fire on the floor.	Impact is expected to be low due to low fire frequency for this room, and the limited area of the room where a transient fire could affect the conduit.
2003-275	Add modeling for fire in Radwaste Bldg zone 62I. Correct load center number included in ignition frequency (L16 vs. L13). L16 affects L06, which has M50 (Control Room and Bldg HVAC).	Impact is expected to be low based on lack of fire initiators in 62I and no direct trip initiator.
2003-28	ERIN fire model peer review F&O 5-3. Level C	Impact is expected to be small. There would be no impact to the delta-CDFs calculated for this application.
2003-31	ERIN fire model peer review F&O 5-6. Level D	This is resolved. Documentation only. No impact.
2003-329	In the Test tables of EOOS test 36ST9SE05xA should be 36ST9SE05xN.	EOOS issue only. No impact.
2003-33	ERIN fire model peer review F&O 5-8. Level D	This is resolved. Documentation only. No impact.
2003-34	ERIN fire model peer review F&O 5-9. Level D	This is resolved. Documentation only. No impact.
2003-36	ERIN fire model peer review F&O 5-11. Level D	This is resolved. Documentation only. No impact.
2003-38	ERIN fire model peer review F&O 5-13. Level D	This is resolved. Less than 1% change to CDF and LERF. There would be no impact to delta-CDFs calculated for this application.
2003-39	ERIN fire model peer review F&O 5-14. Level D	This is resolved. Less than 1% change to CDF and LERF. There would be no impact to delta-CDFs calculated for this application.
2003-54	Link ATWS sequences to the internal events ATWS event trees similar to the way the fire model was done. This provides a more accurate ATWS determination and avoids forgetting to update ATWS IEs when their contributor IE values change.	This is only a change in how ATWS is handled by the software. There is no significant impact to CDF or LERF.

ChangeID	Change_Description	Disposition
2003-55	Risk category for EQIDs/Test numbers evaluated by EOOS needs revision based upon PRA review.	EOOS issue only.
2003-60	Remodel compartment 56B using proper FIGNs and modify the general description to properly reflect the scenarios. There should be two fixed ignition sources. Currently, the FIGNs for compartment 47B are used.	This is resolved. Less than 1% change to CDF and LERF. There would be no impact to delta-CDFs calculated for this application.
2003-64	Remove logic and basic events associated with fire suppression for fire zones 5A and 5B, ESF Switchgear Rooms. Impact 2003-41 removed the suppression function event from those two event trees.	Documentation only. No impact.
2004-125	The NIRM PROC document is 40EP-9EO10 R032 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO10 R031	Documentation only. No impact.
2004-132	S/U Transformer SWYD breakers OOS (both) incorrectly fails power to NAN-S05/6 even when loads are transferred to the Alternate S/U Transformer	This only affect out-of-service modeling. No impact to this application.
2004-133	Revise the IELOOP value (in study 13-NS-C004) based on the new EPRI study TR-1009889 dated April 2004.	This is in progress. Value changes are expected to lead to an increase in CDF and LERF. However, for this application, LOOP is not a significant contributor, and delta-CDFs would not be impacted.
2004-134	EOOS System Alignment congifuration file and PRA Model do not allow proper settings for S03B/S04B FBT and NBNS01C Blocking.	EOOS issue. No impact.
2004-135	The NIRM DWG document is 01-M-CDP-0001 R016 this revision is later than the revision indicated by Risk Spectrum which is 01-M-CDP-0001 R015	Document Revision change only. No impact.
2004-136	The NIRM DWG document is 01-E-PGA-0003 R007 this revision is later than the revision indicated by Risk Spectrum which is 01-E-PGA-0003 R006	Document Revision change only. No impact.

ChangeID	Change Description	Disposition
2004-137	The NIRM DWG document is 01-M-RCP-0001 R031 this revision is later than the revision indicated by Risk Spectrum which is 01-M-RCP-0001 R030	Document Revision change only. No impact.
2004-138	The NIRM DWG document is 01-M-CDP-0002 R015 this revision is later than the revision indicated by Risk Spectrum which is 01-M-CDP-0002 R014	Document Revision change only. No impact.
2004-139	The NIRM DWG document is 01-M-SCP-0001 R046 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SCP-0001 R045	Document Revision change only. No impact.
2004-140	The NIRM DWG document is 01-M-CHP-0002 R044 this revision is later than the revision indicated by Risk Spectrum which is 01-M-CHP-0002 R043	Document Revision change only. No impact.
2004-142	The NIRM PROC document is 73ST-9AF03 R014 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9AF03 R013	Document Revision change only. No impact.
2004-143	The NIRM PROC document is 40DP-9OP06 R072 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP06 R071	Document Revision change only. No impact.
2004-144	The NIRM PROC document is 40OP-9SA01 R018 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SA01 R017	Document Revision change only. No impact.
2004-145	The NIRM PROC document is 73ST-9XI33 R030 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI33 R029	Document Revision change only. No impact.
2004-146	The NIRM PROC document is 73ST-9SI10 R029 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SI10 R028	Document Revision change only. No impact.
2004-147	The NIRM PROC document is 40OP-9SI02 R048 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R047	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-148	The NIRM PROC document is 41AL-1RK1B R034 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK1B R033	Document Revision change only. No impact.
2004-149	The NIRM PROC document is 41AL-1RK1C R031 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK1C R030	Document Revision change only. No impact.
2004-150	The NIRM PROC document is 41AL-1RK5A R029 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK5A R028	Document Revision change only. No impact.
2004-151	The NIRM PROC document is 41AL-1RK5B R023 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK5B R022	Document Revision change only. No impact.
2004-152	The NIRM PROC document is 40OP-9WC01 R015 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9WC01 R014	Document Revision change only. No impact.
2004-153	The NIRM PROC document is 73ST-9SG01 R019 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SG01 R018	Document Revision change only. No impact.
2004-154	The NIRM PROC document is 40AL-9RK3A R010 this revision is later than the revision indicated by Risk Spectrum which is 40AL-9RK3A R009	Document Revision change only. No impact.
2004-155	The NIRM PROC document is 40OP-9CH05 R007 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9CH05 R006	Documentation issue not expected to have a significant impact to CDF or LERF. In any event, the delta-CDFs calculated for this application would not be affected.
2004-156	The NIRM PROC document is 40DP-9OP19 R077 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP19 R076	Document Revision change only. No impact.
2004-157	The NIRM DWG document is 01-E-NGA-0001 R004 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NGA-0001 R003	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-158	The NIRM DWG document is 01-E-NHA-0013 R021 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NHA-0013 R020	Document Revision change only. No impact.
2004-159	The NIRM DWG document is 01-E-WCB-0002 R006 this revision is later than the revision indicated by Risk Spectrum which is 01-E-WCB-0002 R005	Any change to the normal chiller control circuit is expected to have a negligible impact to the model results. Delta-CDFs calculated for this application would be unaffected.
2004-160	The NIRM DWG document is 01-M-RCP-0001 R032 this revision is later than the revision indicated by Risk Spectrum which is 01-M-RCP-0001 R030	Document Revision change only. No impact.
2004-161	The NIRM DWG document is A0-M-FPP-0001 R031 this revision is later than the revision indicated by Risk Spectrum which is A0-M-FPP-0001 R030	Document Revision change only. No impact.
2004-162	The NIRM PROC document is 40OP-9ZZ04 R045 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ04 R042	Document Revision change only. No impact.
2004-163	The NIRM PROC document is 40ST-9DG02 R024 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9DG02 R023	Document Revision change only. No impact.
2004-164	The NIRM PROC document is 40ST-9DG01 R021 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9DG01 R020	Document Revision change only. No impact.
2004-165	The NIRM PROC document is 32MT-9ZZ58 R021 this revision is later than the revision indicated by Risk Spectrum which is 32MT-9ZZ58 R020	Document Revision change only. No impact.
2004-166	The NIRM PROC document is 36ST-9SI04 R015 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI04 R014	Document Revision change only. No impact.
2004-167	The NIRM PROC document is 36ST-9SI05 R013 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI05 R012	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-168	The NIRM PROC document is 40OP-9ZZ05 R096 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ05 R092	Document Revision change only. No impact.
2004-169	The NIRM PROC document is 14FT-1FP03 R007 this revision is later than the revision indicated by Risk Spectrum which is 14FT-1FP03 R006	Document Revision change only. No impact.
2004-170	The NIRM PROC document is 14FT-9FP28 R015 this revision is later than the revision indicated by Risk Spectrum which is 14FT-9FP28 R014	Document Revision change only. No impact.
2004-171	The NIRM PROC document is 40EP-9EO09 R019 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO09 R018	Document Revision change only. No impact.
2004-172	The NIRM PROC document is 40EP-9EO10 R033 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO10 R031	Document Revision change only. No impact.
2004-173	The NIRM PROC document is 41AL-1RK2A R043 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK2A R042	Document Revision change only. No impact.
2004-174	The NIRM PROC document is 36ST-9SB14 R014 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SB14 R013	This impact is resolved. Documentation issue only. No impact.
2004-175	The NIRM PROC document is 40AL-9RK3A R011 this revision is later than the revision indicated by Risk Spectrum which is 40AL-9RK3A R009	Document Revision change only. No impact.
2004-176	The NIRM PROC document is 40AO-9ZZ12 R019 this revision is later than the revision indicated by Risk Spectrum which is 40AO-9ZZ12 R018	Document Revision change only. No impact.
2004-177	Add components 1MFPNHV0802 and 1MFPNHV0803 to the components table in Risk Spectrum. Link to same BEs as 1JFPNHV0802 and 1JFPNHV0803.	This impact is resolved. Documentation issue only. No impact.

ChangeID	Change Description	Disposition
2004-178	Change letdown line isolation valve solenoid valve 1JCHEHY0239 component ID and Basic Event name to match SWMS train designation (N).	This impact is resolved. Documentation issue only. No impact.
2004-179	Event Tree IESLB Sequence #22 Consequences should be CM, LT2, CFCM (versus OK).	This impact is resolved. Insignificant change to CDF.
2004-180	Make changes to the EOOS.mdb to include components listed on UNA_FAQ.xls. This will also include possible component additions to Risk Spectrum.	EOOS issue. No impact.
2004-182	Remove consideration of fire propagation where fire suppression is not credited (or add justification) for the lower branch of SELF_X. No data exist to support the split fractions used. The affected compartments are 5A, 5B, 42B and 47A.	This impact is resolved. It resulted in a 5% increase in CDF. However, the delta-CDFs calculated for this application are not affected.
2004-183	The basis of undeveloped and calculated parameters is not captured in 13-NS-B063 and is documented in their respective System Studies via Risk Spectrum memos. This documentation needs to meet RG 1.200 and ASME Std RA-S-2002 using the format from B063 R6.	Documentation only. No impact.
2004-184	Revise parameter names to meet parameter format rather than be same as basic event for parameters included in 13-NS-B063. Add new parameter to be included in upcoming revision of 13-NS-B063.	This impact is resolved. Documentation only. No impact.
2004-185	Replace the function event RPS with RXC in event trees FIRE-LOP-SWYD, FIRE-SWYD-AFN and FIRE-SWYD-DGA. These are all LOP events, so RPS malfunction is irrelevant.	This is resolved. No measurable impact to CDF or LERF.
2004-186	The NIRM DWG document is A0-E-NBA-0001 R017 this revision is later than the revision indicated by Risk Spectrum which is A0-E-NBA-0001 R016	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-187	The NIRM DWG document is 01-E-SGB-0019 R006 this revision is later than the revision indicated by Risk Spectrum which is 01-E-SGB-0019 R005	This addresses new blowdown valves installed with new steam generators. No measurable impact to CDF or LERF is expected.
2004-188	The NIRM PROC document is 40DP-9OP06 R074 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP06 R071	Document Revision change only. No impact.
2004-189	The NIRM PROC document is 40OP-9ZZ04 R046 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ04 R042	Document Revision change only. No impact.
2004-190	The NIRM PROC document is 40OP-9SA01 R019 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SA01 R017	Document Revision change only. No impact.
2004-191	The NIRM PROC document is 73ST-9XI33 R031 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI33 R029	Document Revision change only. No impact.
2004-192	The NIRM PROC document is 73ST-9XI09 R009 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI09 R008	Document Revision change only. No impact.
2004-193	The NIRM PROC document is 73ST-9XI10 R013 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI10 R012	Document Revision change only. No impact.
2004-194	The NIRM PROC document is 40DP-9OP29 R028 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP29 R026	Document Revision change only. No impact.
2004-195	The NIRM PROC document is 40EP-9EO01 R011 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO01 R010	Document Revision change only. No impact.
2004-196	The NIRM PROC document is 40EP-9EO03 R016 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO03 R014	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-197	The NIRM PROC document is 40EP-9EO05 R014 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO05 R013	Document Revision change only. No impact.
2004-198	The NIRM PROC document is 40EP-9EO09 R021 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO09 R018	Document Revision change only. No impact.
2004-199	The NIRM PROC document is 73ST-9SG01 R020 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SG01 R018	Document Revision change only. No impact.
2004-2	The U-2 MAAP4 Parameter file (Part of 13-NS-C036) was completed per design values. Review actual U-2 performance values (Press, temp, level, flow, etc.) and identify MAAP4 changes. Achieved secondary Press is about 23 psi lower tha design prediction.	This is not expected to have any measurable impact to CDF or LERF. There would be no impact to the delta-CDFs calculated for this application.
2004-200	The NIRM PROC document is 40OP-9ZZ14 R034 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ14 R033	Document Revision change only. No impact.
2004-201	The NIRM PROC document is 40DP-9OP19 R078 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP19 R076	Document Revision change only. No impact.
2004-202	Make the following minor and miscellaneous changes to the fire model.	No significant changes to results are expected from any issues documented here.
2004-203	ADV solenoid valve CompIDs have incorrect basic event assigned to them. Assign the solenoid valve basic events to each solenoid valve CompID and delete the air valve BE from the solenoid valve CompID for each ADV.	This impact is resolved. Documentation issue. No impact.
2004-204	10 of 12 DG Cooler Inlet/Outlet SP valves are mapped to their associated SP pump. The other two are mapped to the associated DG. They should all be mapped to the associated DG. --- GRD EOOS Train table sets 1SPxP01--STATUS=True versus =.9999 --- MAH	This impact is resolved. Documentation issue. No impact.

ChangeID	Change_Description	Disposition
2004-205	There are 10 check valves model in the AF System. Two (AFA-V005 and AFB-V009) are modeled for failure modes FO and RO. The remaining eight are only modeled with FO failure modes.	This impact is resolved. No model change was warranted.
2004-206	The NIRM CALC document is 01-EC-MA-0221 R009 this revision is later than the revision indicated by Risk Spectrum which is 01-EC-MA-0221 R008	Document Revision change only. No impact.
2004-207	The NIRM DBM document is IA R009 this revision is later than the revision indicated by Risk Spectrum which is IA R008	Document Revision change only. No impact.
2004-208	The NIRM DWG document is 01-E-NHA-0019 R013 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NHA-0019 R012	Document Revision change only. No impact.
2004-209	The NIRM DWG document is 01-M-SCP-0001 R048 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SCP-0001 R046	Document Revision change only. No impact.
2004-210	The NIRM DWG document is 01-P-SGF-0120 R004 this revision is later than the revision indicated by Risk Spectrum which is 01-P-SGF-0120 R003	Document Revision change only. No impact.
2004-211	The NIRM DWG document is 01-P-RCF-0149 R001 this revision is later than the revision indicated by Risk Spectrum which is 01-P-RCF-0149 R000	Document Revision change only. No impact.
2004-212	The NIRM DWG document is A0-M-FPP-0005 R029 this revision is later than the revision indicated by Risk Spectrum which is A0-M-FPP-0005 R028	Document Revision change only. No impact.
2004-213	The NIRM DWG document is 01-M-WCP-0001 R025 this revision is later than the revision indicated by Risk Spectrum which is 01-M-WCP-0001 R023	Document Revision change only. No impact.
2004-214	The NIRM PROC document is 40DP-9OP06 R075 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP06 R074	Document Revision change only. No impact.

ChangeID	Change Description	Disposition
2004-215	The NIRM PROC document is 40OP-9SI02 R050 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R048. Upon review, Rev 051 was found to be effective.	Document Revision change only. No impact.
2004-216	The NIRM PROC document is 40OP-9ZZ05 R097 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ05 R096	Document Revision change only. No impact.
2004-217	The NIRM PROC document is 40EP-9EO03 R017 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO03 R016	Document Revision change only. No impact.
2004-218	The NIRM PROC document is 40EP-9EO04 R016 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO04 R015	Document Revision change only. No impact.
2004-219	The NIRM PROC document is 40EP-9EO05 R015 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO05 R014	Document Revision change only. No impact.
2004-220	The NIRM PROC document is 40EP-9EO06 R010 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO06 R009	Document Revision change only. No impact.
2004-221	The NIRM PROC document is 40EP-9EO07 R011 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO07 R010	Document Revision change only. No impact.
2004-222	The NIRM PROC document is 40EP-9EO09 R022 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO09 R021	This impact is resolved. Documentation change only. No effect on model.
2004-223	The NIRM PROC document is 40EP-9EO10 R034 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO10 R033	Document Revision change only. No impact.
2004-224	The NIRM PROC document is 38FT-9QK14 R004 this revision is later than the revision indicated by Risk Spectrum which is 38FT-9QK14 R003	Document Revision change only. No impact.

ChangeID	Change Description	Disposition
2004-225	The NIRM PROC document is 30DP-9MT03 R009 this revision is later than the revision indicated by Risk Spectrum which is 30DP-9MT03 R008	Document Revision change only. No impact.
2004-226	The process of getting into the AF pump rooms has been changed. RE-AFA-LOCAL must now include these new steps contained in 40DP-9ZZ19.	Impact answered, ready for tech review. No change is expected to result. However, if a change does result, there would be no impact to the delta-CDFs calculated for this application.
2004-227	Add the unavailability events for the Condensate Pumps to the fault trees. They were inadvertently left out during the implementation of Impact 2002-110.	This impact is resolved. There is no impact to CDF or LERF.
2004-228	The NIRM DWG document is 01-M-SIP-0001 R029 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SIP-0001 R026	Document Revision change only. No impact.
2004-229	The NIRM PROC document is 73ST-9XI20 R017 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI20 R016	Document Revision change only. No impact.
2004-23	Re-examine mission time for charging system. 24 hours was based on RCP seals (AssumptionCH013, which is no longer needed). According to SC_CH02, APSS has an actual MT requirement of only 8 hours. ATWS requires only 15 minutes (SC_CH01).	This is resolved. There was a slight decrease to CDF. There would be no impact to the delta-CDFs calculated for this application.
2004-230	The NIRM PROC document is 36ST-9SI04 R016 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI04 R015	Document Revision change only. No impact.
2004-231	The NIRM PROC document is 36ST-9SI05 R014 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI05 R013	Document Revision change only. No impact.
2004-232	The NIRM PROC document is 40ST-9SI04 R003 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9SI04 R002	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-233	The NIRM PROC document is 40DP-9OPA3 R050 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OPA3 R048	Document Revision change only. No impact.
2004-234	The NIRM PROC document is 40OP-9SI02 R052 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R051	Document Revision change only. No impact.
2004-235	The NIRM PROC document is 40DP-9AP14 R016 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9AP14 R015	Document Revision change only. No impact.
2004-236	The NIRM PROC document is 41AL-1RK2A R044 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK2A R043	Document Revision change only. No impact.
2004-237	The NIRM PROC document is 40OP-9CH01 R036 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9CH01 R035	Document Revision change only. No impact.
2004-238	The NIRM PROC document is 40ST-9SI09 R020 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9SI09 R017	Document Revision change only. No impact.
2004-239	The NIRM PROC document is 40DP-9OP19 R080 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP19 R078	Document Revision change only. No impact.
2004-240	The NIRM PROC document is 36ST-9SB58 R008 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SB58 R007	Document Revision change only. No impact.
2004-241	Change BE IDs and add memos as necessary to support event tree study restructuring.	Editorial changes only. No impact.
2004-242	Complete EOOS revisions based on changes made to RS in closed Impacts 2004-98 and 2003-1. Delete abandoned assignments made in the "overmappingfortagtable" table.	EOOS issue only.

ChangeID	Change_Description	Disposition
2004-243	Delete parameters that are orphaned or generic parameters that have no basis events assigned consistent with 13-NS-B063 R6.	No impact.
2004-244	Reassign existing Basic Events to new parameters generated by 13-NS-B063 R6.	No impact.
2004-245	Revise existing RS parameters to new values generated by 13-NS-B063 R6.	Editorial changes only. No impact.
2004-246	The NIRM CALC document is 13-MC-SI-0309 R004 this revision is later than the revision indicated by Risk Spectrum which is 13-MC-SI-0309 R003	Document Revision change only. No impact.
2004-247	The NIRM DWG document is 01-E-NKA-0001 R009 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NKA-0001 R008	Document Revision change only. No impact.
2004-248	The NIRM DWG document is 01-E-NKA-0002 R006 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NKA-0002 R005	Document Revision change only. No impact.
2004-249	The NIRM DWG document is 01-E-PKA-0002 R016 this revision is later than the revision indicated by Risk Spectrum which is 01-E-PKA-0002 R015	Document Revision change only. No impact.
2004-25	Update unfavorable MTC parameters for current core construction, which does not go less negative than -0.61 and goes less negative for longer for -0.77.	The impact of this change is a 1.2% increase in internal CDF and 2.2% increase in internal LERF, therefore the priority is low. There would be no impact to the delta-CDFs calculated for this application.
2004-250	The NIRM DWG document is 01-E-PKA-0005 R009 this revision is later than the revision indicated by Risk Spectrum which is 01-E-PKA-0005 R008	Document Revision change only. No impact.
2004-251	The NIRM DWG document is 01-E-NHA-0008 R008 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NHA-0008 R007	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-252	The NIRM DWG document is 01-E-PKA-0001 R005 this revision is later than the revision indicated by Risk Spectrum which is 01-E-PKA-0001 R004	Document Revision change only. No impact.
2004-253	The NIRM PROC document is 40OP-9SA01 R020 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SA01 R019	Document Revision change only. No impact.
2004-254	The NIRM PROC document is 73ST-9XI24 R005 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI24 R004	Document Revision change only. No impact.
2004-255	The NIRM PROC document is 73ST-9SI10 R030 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SI10 R029	Document Revision change only. No impact.
2004-256	The NIRM PROC document is 73ST-9SI11 R017 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SI11 R015	Document Revision change only. No impact.
2004-257	The NIRM PROC document is 73ST-9XI21 R027 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI21 R026	Document Revision change only. No impact.
2004-258	The NIRM PROC document is 36ST-9SI05 R015 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI05 R014	Document Revision change only. No impact.
2004-259	The NIRM PROC document is 36ST-9SB02 R029 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SB02 R028	Document Revision change only. No impact.
2004-260	The NIRM PROC document is 73ST-9SI06 R016 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SI06 R015	Document Revision change only. No impact.
2004-261	The NIRM PROC document is 40OP-9SI02 R053 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R052	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-262	The NIRM PROC document is 40EP-9EO10 R035 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO10 R034	Document Revision change only. No impact.
2004-263	The NIRM PROC document is 73DP-9XI01 R015 this revision is later than the revision indicated by Risk Spectrum which is 73DP-9XI01 R009	Document Revision change only. No impact.
2004-264	The NIRM PROC document is 55OP-0GT01 R040 this revision is later than the revision indicated by Risk Spectrum which is 55OP-0GT01 R039	Document Revision change only. No impact.
2004-265	The NIRM PROC document is 40OP-9CH01 R037 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9CH01 R036	Document Revision change only. No impact.
2004-266	The NIRM PROC document is 40DP-9OP19 R082 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP19 R080	Document Revision change only. No impact.
2004-267	In the formula.txt files for units 1-3, there are errors and omissions in the IEATWS2 equation. IEATWS2 equation should match the IETT equation.	EOOS issue.
2004-268	Add component to system links that were neglected in the resolution of Impact 2004-180.	EOOS issue.
2004-269	Impact 2004-132 did not specify EOOS changes (S/U Transformer SWYD breakers OOS (both) incorrectly fails power to NAN-S05/6 even when loads are transferred to the Alternate S/U Transformer)	EOOS issue.
2004-270	In the EOOS_Test_Table_generator.mdb, in the associated TEST tables, the train designator for 72PA-9ZZ08 is missing. Also in the EOOS.mdb, in the TEST_U3, 72PA-9ZZ08 has the wrong unit designator.	EOOS issue.

ChangeID	Change_Description	Disposition
2004-271	A part of Impact 2003-169 was not implemented into gron-pinne.RSD and the impact was closed. Step 1, which deals with adding 1MAFAK01 to the component table was not implemented.	EOOS issue.
2004-273	Impact 2003-005 revised several AF common cause values in 13-NS-C029 Rev 13. The impact did not revise the common cause values in the EOOS train tables (OOS condition).	EOOS issue.
2004-274	Resolve discrepancy between actions of tag and train tables in EOOS regarding normal pressurizer spray.	EOOS issue.
2004-275	EOOS Train table does not set house event OOS-PKDH14 for train PK-DH14. All other trains are correctly modeled. Error does not disallow use of PKB/D swing charger to supply B bus when PKD charger is OOS.	EOOS issue.
2004-276	TRAIN table is missing entries for NKN-F19 and NKN-H19. The impact of these components OOS is captured by entries in the TAG table, however we try to allow the additional flexibility of taking the component OOS on the train level.	EOOS issue.
2004-277	The NIRM DWG document is 01-M-SIP-0001 R030 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SIP-0001 R029	Document Revision change only. No impact.
2004-278	The NIRM DWG document is 01-E-SGB-0019 R007 this revision is later than the revision indicated by Risk Spectrum which is 01-E-SGB-0019 R005	Document Revision change only. No impact.
2004-279	The NIRM DWG document is 01-M-SCP-0004 R012 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SCP-0004 R011	Document Revision change only. No impact.
2004-280	The NIRM PROC document is 36ST-9SA02 R028 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SA02 R026	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-281	The NIRM PROC document is 40OP-9ZZ04 R047 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ04 R046	Document Revision change only. No impact.
2004-282	The NIRM PROC document is 40ST-9DG02 R025 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9DG02 R024	Document Revision change only. No impact.
2004-283	The NIRM PROC document is 40ST-9DG01 R022 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9DG01 R021	Document Revision change only. No impact.
2004-284	The NIRM PROC document is 32MT-9ZZ58 R022 this revision is later than the revision indicated by Risk Spectrum which is 32MT-9ZZ58 R021	Document Revision change only. No impact.
2004-285	The NIRM PROC document is 73ST-9XI33 R032 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI33 R031	Document Revision change only. No impact.
2004-286	The NIRM PROC document is 36ST-9SI04 R017 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SI04 R016	Document Revision change only. No impact.
2004-287	The NIRM PROC document is 40AO-9ZZ07 R014 this revision is later than the revision indicated by Risk Spectrum which is 40AO-9ZZ07 R013	Document Revision change only. No impact.
2004-288	The NIRM PROC document is 36ST-9SA01 R030 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SA01 R029	Document Revision change only. No impact.
2004-289	The NIRM PROC document is 73ST-9SI06 R017 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SI06 R016	Document Revision change only. No impact.
2004-290	The NIRM PROC document is 40OP-9SI02 R054 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R053	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-291	The NIRM PROC document is 74DP-9CY04 R029 this revision is later than the revision indicated by Risk Spectrum which is 74DP-9CY04 R027	Document Revision change only. No impact.
2004-292	The NIRM PROC document is 40OP-9ZZ05 R098 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ05 R097	Document Revision change only. No impact.
2004-293	The NIRM PROC document is 40EP-9EO10 R036 this revision is later than the revision indicated by Risk Spectrum which is 40EP-9EO10 R035	Document Revision change only. No impact.
2004-294	The NIRM PROC document is 41AL-1RK5B R024 this revision is later than the revision indicated by Risk Spectrum which is 41AL-1RK5B R023	Document Revision change only. No impact.
2004-295	The NIRM PROC document is 40OP-9WC01 R016 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9WC01 R015	Document Revision change only. No impact.
2004-296	The NIRM PROC document is 73ST-9SG01 R021 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SG01 R020	Document Revision change only. No impact.
2004-297	The NIRM PROC document is 40ST-9ZZ13 R004 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9ZZ13 R003	Document Revision change only. No impact.
2004-298	The NIRM PROC document is 40ST-9ZZ09 R010 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9ZZ09 R008	Document Revision change only. No impact.
2004-299	The NIRM PROC document is 40OP-9ZZ14 R036 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ14 R034	Document Revision change only. No impact.
2004-300	The NIRM PROC document is 40DP-9OP19 R083 this revision is later than the revision indicated by Risk Spectrum which is 40DP-9OP19 R082	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2004-301	The NIRM PROC document is 40AO-9ZZ12 R020 this revision is later than the revision indicated by Risk Spectrum which is 40AO-9ZZ12 R019	Document Revision change only. No impact.
2004-302	Loss of Turbine Cooling Water is modeled for Instrument Air Compressors, but loss of cooling due to blockage in the Air Compresssor After Cooler is not modeled and has no Memo Assumption explaning why this should not be modeled.	Document issue. No impact.
2004-57	Determine the appropriate RCS T_ave for units 1, 3. Incorporate that T_ave into 13-NS-C036 (into PVA.par, parameter TWPSNM & TWPSQ). And determine the impact on MAAP4.0.4 existing applications.	This is not expected to have any measurable impact to CDF or LERF. There would be no impact to the delta-CDFs calculated for this application.
2004-59	The DLTRM fault tree contains events that have been identified as #EOOS# events. If these events are set to true then the DLTRM tree solution removes valid cutsets as well as the invalid ones. Fix the tree.	EOOS issue only. No impact.
2004-72	Address discrepancy between how local valve failure and control circuit failure are modeled for the SI pump combined miniflow valves, SIA-UV659 and SIB-UV660; one is tested, the other is mission time. Ref gates GLI137 and GLI237.	This is resolved. Less than 1% change to CDF and LERF. There would be no impact to delta-CDFs calculated for this application.
2004-73	The ATWS4 event tree has sequences that are going to a Level 2 PKA tree but the boundary condition set for the ATWS tree is MISC.	The ATWS4 tree was run using first the MISC BC set, then the PKAM41 BC set. The PKA was only slightly higher. No significant impact to CDF. There would be no impact to delta-CDFs calculated for this application.
2004-75	Correct application of error factor for ten probability parameters to bring the 95th percentile value to <=1.00. Uncertainty analysis must have probability values less than or equal to 1.0.	Mean values are not affected, so these is no impact to the results.
2004-76	Consider PSV relief and induced-LOCA in SBO tree following SGHR-E success. MAAP indicates PSVs begin lifting at about 20 Minutes. A large part of AFW-A failure is recoverable manually, but time to effect may be longer than 20 minutes.	Documentation only. No impact.

ChangeID	Change_Description	Disposition
2004-78	Mapping in the Switchyard tables does not account for the multiple record manipulation required for some of the component ids	EOOS issue. No impact
2004-99	The NIRM DWG document is 01-E-NAB-0014 R011 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NAB-0014 R009	This is resolved. No impact.
2005-10	The NIRM PROC document is 40OP-9SI02 R055 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9SI02 R054 [Rev 56 was found to be current during review.]	Document Revision change only. No impact.
2005-11	The NIRM PROC document is 73ST-9SP01 R021 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9SP01 R020	Document Revision change only. No impact.
2005-12	The NIRM PROC document is 40OP-9ZZ05 R099 this revision is later than the revision indicated by Risk Spectrum which is 40OP-9ZZ05 R098	Document Revision change only. No impact.
2005-13	The NIRM PROC document is 40AO-9ZZ12 R021 this revision is later than the revision indicated by Risk Spectrum which is 40AO-9ZZ12 R020 [Rev 22 was found to be current during review on 1/26/2005]	Document Revision change only. No impact.
2005-14	Using corrected values for PSV blowdown in MAAP 4 indicates that only steam reliefs will be experienced for one hour loss of feedwater/MSIV. Substitute failure to reseat after steam relief for all failure to reseat after water relief in model.	This is expected to result in a decrease in CDF and LERF. This will result in a conservative error in this application.
2005-2	Modify Small LOCA event tree to reflect testing and analysis done in support of the sump air entrainment issue under CRDR 2726509.	This impact is resolved. It was generated by the containment sump air entrainment issue, and is fully incorporated in the model used for that application.
2005-3	The NIRM DWG document is 01-M-SGP-0001 R049 this revision is later than the revision indicated by Risk Spectrum which is 01-M-SGP-0001 R048	Document Revision change only. No impact.

ChangeID	Change_Description	Disposition
2005-4	The NIRM DWG document is 01-E-NAB-0021 R003 this revision is later than the revision indicated by Risk Spectrum which is 01-E-NAB-0021 R002	Document Revision change only. No impact.
2005-5	The NIRM DWG document is A0-E-NAA-0006 R002 this revision is later than the revision indicated by Risk Spectrum which is A0-E-NAA-0006 R001	Document Revision change only. No impact.
2005-6	The NIRM PROC document is 36ST-9SA02 R029 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SA02 R028	Document Revision change only. No impact.
2005-7	The NIRM PROC document is 73ST-9XI24 R006 this revision is later than the revision indicated by Risk Spectrum which is 73ST-9XI24 R005	Document Revision change only. No impact.
2005-8	The NIRM PROC document is 40ST-9SI04 R004 this revision is later than the revision indicated by Risk Spectrum which is 40ST-9SI04 R003	Document Revision change only. No impact.
2005-9	The NIRM PROC document is 36ST-9SA01 R031 this revision is later than the revision indicated by Risk Spectrum which is 36ST-9SA01 R030	Document Revision change only. No impact.