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MFN 08-113

Docket No. 52-010

February 22, 2008

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 132 Related to ESBWR Design Certification Application, RAI Numbers 19.1-160, 19.1-164 and 19.1-173**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter dated January 15, 2008 (Reference 1). The GEH response to RAI Numbers 19.1-160, 19.1-164 and 19.1-173 are in Enclosure 1.

If you have any questions or require additional information, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN-08-040. Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 132 Related To ESBWR Design Certification Application*, January 15, 2008.

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 132 Related to ESBWR Design Certification Application, ESBWR Probabilistic Risk Assessment, RAI Numbers 19.1-160, 19.1-164 and 19.1-173

2. Enclosure 1, Attachment 1. NEDO-33201, Revision 2 Markups Section 11.2 and 11.3.3.2; Tables 11.3-3, 11.3-4, 11.3-11, 11.3-19, 11.3-20, 11.3-11A, 11.3-22, 11.3-23, 11.3-24, 11.3-25, 11.3-28, 11.3-30, 11.3-32, 11.3-36, 11.3- 37, 11.3-38, 11.3-39

3. Enclosure 1, Attachment 2. NEDO-33201-Section 12.5, Revision 2, Markup

cc:	AE Cubbage	USNRC (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	eDRF Sections	0000-0080-4147
		0000-0080-6961
		0000-0079-8616

Enclosure 1

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Response to Portion of NRC Request for

Additional Information Letter No. 132

Related to ESBWR Design Certification Application

ESBWR Probabilistic Risk Assessment

RAI Numbers 19.1-160, 19.1-164 and 19.1-173

RAI Response 19.1-160

Results of Fire PRA sensitivity studies are presented in a column entitled "Difference" in tables presented in Chapter 11 of NEDO-33201, Revision 2. The tables include: Table 11.3-4, 11.3-6, 11.3-8, 11.3-11, 11.3-19, 11.3-20, 11.3-22, 11.3-23,11.3-24, 11.3-25, 11.3-28, 11.3-30, 11.3-32, 11.3-34, 11.3-36, 11.3-37,11.3-38 and 11.3-39.

However, there is no definition for the "Difference" parameter presented in Section 11. The staff cannot reproduce some of the results and is concerned that there may be some errors in the calculation of "Difference". Please provide the definition of the "Difference" result shown in these tables.

GEH Response

Within Chapter 11, the results indicating difference were calculated to be the difference between the values obtained for the sensitivity and the baseline value divided by the baseline value.

$$Difference = \frac{(Sensitivity - Baseline)}{Baseline}$$

A limited number of Chapter 11 results were calculated as percent difference which is the value difference times 100.

$$\%Difference = \frac{(Sensitivity - Baseline)}{Baseline} * 100$$

For consistency in Chapter 11, all results will be provided in terms of difference. Results previously presented as % difference will be converted to values of difference; the tables will be amended accordingly as discussed below.

Eighteen Chapter 11 tables were identified in the RAI that presented sensitivity results in terms of the value difference or percent difference. Each of the identified tables were reviewed for accuracy and consistency with the definitions discussed; Table 11.3-21A, previously omitted in NEDO-33201 Chapter 11 Rev. 2, was also included in this review. In addition, Chapter 11 contained a large amount of data that was extracted from varied data sources and copied into the identified tables. A review of all data and calculations contained in these tables was performed to verify the correct usage of data and calculations based on data contained in the GEH database, eMatrix. This review shows that all data and calculations were correctly obtained from the GEH eMatrix database.

Transcription errors were identified in fifteen of the eighteen tables. Additional investigations showed that these errors were limited to the tables. The discussions and data provided in the Chapter 11 text were correct. They are based on the data and calculations contained in the verified GEH files. A discussion of these errors and amended tables is provided below. The errors identified as part of this RAI 19.1-160 were

word processing errors that are currently being evaluated in the GEH Corrective Action Program.

Table 11.3-4 –The definition of difference was correctly applied in Table 11.3-4. A typographical error was made in the calculation of difference for the CCF and SLCS in Table 11.3-4. Table 11.3-4 will be amended with the corrected values in the markups shown below. No other changes to the Section 11.3.1.2, 11.3.1.5, 11.3.1.7, 11.3.1.8, 11.3.1.9, 11.3.1.10, 11.3.1.11, 11.3.1.12, 11.3.1.13, or 11.3.1.14 were required in response to the changes in Table 11.3-4.

Table 11.3-6 – The definition of difference was correctly applied in Table 11.3-6.

Table 11.3-8 - The definition of difference was correctly applied in Table 11.3-8.

Table 11.3-11 – The definition of difference was correctly applied in Table 11.3-11. Typographical errors were identified for the 1E-14 difference data; Table 11.3-11 will be amended, as shown, to correctly reflect data discussed in Section 11.3.1.6. No changes to the Section 11.3.1.6 were required to support the changes in Table 11.3-11.

Table 11.3-19 – The definition of % difference was correctly applied in Table 11.3-19; however, the reported values were amended to reflect values of difference for consistency in Chapter 11. Additional data related to the Level 2 Focus and RTNSS sensitivity was provided in both Table 11.3-19 and table 11.3-25. Due to duplication, these data were removed from Table 11.3-19 and remain in Table 11.3-25. A copy of the amended Table 11.3-19 is shown below. No changes to Section 11.3.2.1, 11.3.2.2, and 11.3.2.3 were required to support the changes in Table 11.3-19.

Table 11.3-20 – The definition of difference was correctly applied in Table 11.3-20. A typographical error in the data heading will be amended to correctly identify the results as "Difference" and are shown in the markups of Table 11.3-20 below. No changes to the Section 11.3.3.1 were required to support the changes in Table 11.3-20.

Table 11.3-21A – The definition of difference was correctly applied in Table 11.3-21A. A change in the third paragraph of Section 11.3.3.1 will be required to correctly identify the table containing the results of the RTNSS sensitivity in Table 11.3-21A as shown below.

Table 11.3-22 – The definition of difference was correctly applied in Table 11.3-22. A typographical error in the 1E13 Level 1 fire CDF was identified and will be amended in the markups as shown below. No change to Section 11.3.3.2 was required to support the changes in Table 11.2-22.

Table 11.3-23 - The definition of difference was correctly applied in Table 11.3-23. A typographical error in the 1E14 Level 1 flood RTNSS CDF was identified and will be amended in the markups as shown below. No change to Section 11.3.3.3 was required to support the changes in Table 11.2-23.

Table 11.3-24 - The definition of difference was correctly applied in Table 11.3-24. Several typographical errors and errors in rounding were identified in the difference results and will be amended in the markups as shown below. No change to Section 11.3.3.4 was required to support the changes in Table 11.2-24. In addition, results and values for difference were maintained in their correct form stored in the GEH database, eMatrix.

Table 11.3-25– Table 11.3-25 was a duplication of Table 11.3-28. Changes were made to the table to correctly present Level 2 focus data as shown below. The definition of difference was correctly applied in Table 11.3-25. A change in the first paragraph of Section 11.3.4.1 will be required in response to the changes in Table 11.3-25. This textual change reflects the correct reporting of the Level 2 focus nTSL value at 1E-15 as shown in the mark ups below and will be made to Chapter 11.

Table 11.3-28 – The definition of difference was correctly applied in Table 11.3-28.

Table 11.3-30 – The definition of difference was correctly applied in Table 11.3-30. A typographical error in the difference for nTSL between the focus/RTNSS value was identified and will be amended as shown in the markup of Table 11.3-30 below. No changes to the Section 11.3.4.3 were required to support the changes in Table 11.3-30.

Table 11.3-32 – The definition of difference was correctly applied in Table 11.3-32. A typographical error in the difference for nTSL Tornado F4/F5 RTNSS value was identified and will be amended as shown in markup of Table 11.3-32 below. No changes to the Section 11.3.4.4 were required to support the changes in Table 11.3-32.

Table 11.3-34 – The definition of difference was correctly applied in Table 11.3-34.

Table 11.3-36 – The definition of difference was correctly applied in Table 11.3-36. A typographical error was made in the reporting of the difference between the shutdown focus/RTNSS in Table 11.3-36. Corrected values are shown in the markups below. No changes to the Section 11.3.5.1 were required in response to the changes in Table 11.3-36.

Table 11.3-37– Table 11.3-37 was a duplication of Table 11.3-36. Changes were made to the table to correctly present shutdown fire focus data as shown in the markup of Table 11.3-37 below. The definition of difference was correctly applied in Table 11.3-37. Discussions and results provided in Section 11.3.5.2 were based on the data provided in the amended table as shown below, and as a result, no changes to the Section 11.3.5.2 were required in response to the changes in Table 11.3-37.

Table 11.3-38 – Table 11.3-38 was a duplication of Table 11.3-36. Changes were made to the table to correctly present shutdown flood focus data as shown in the markup of Table 11.3-38 below. The definition of difference was correctly applied in Table 11.3-38. Discussions and results provided in Section 11.3.5.3 were based on the data provided in

the amended table as shown below, and as a result, no changes to the Section 11.3.5.3 were required in response to the changes in Table 11.3-38.

Table 11.3-39 – The definition of difference was correctly applied in Table 11.3-39. A rounding error and two typographical errors in Table 11.3-39 were identified and will be corrected as shown in the markup below. No other changes to the Section 11.3.5.4 were required in response to the changes in Table 11.3-39.

DCD/NEDO-33201 Impact

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

NEDO-33201, Rev. 2 will be revised as noted in Attachment 1.

NRC RAI 19.1-164

The ESBWR PRA, Revision 2, Section 4.7 describes the FAPCS interface with the high pressure RWCU/SDC system (for flow in LPCI mode). This description is not consistent with that provided in DCD, Tier 2, Revision 4, Figure 9.1-1, "FAPCS Schematic Diagram" (i.e. Figure 9/1-1 shows two parallel FAPCS check valves F335A/B that interface with RWCU/SDC which are not included in the ESBWR PRA). The staff requests that GEH clarify this discrepancy.

GEH Response

Check valves F335A/B are in the LPCI injection line from the FAPCS system, and the valves will be included in future revisions of the PRA. The piping section with the valves in question has three pairs of check valves (each pair in parallel). The PRA model includes only two pairs of check valves. The omission of these two check valves has essentially no risk impact to the FAPCS system. The likelihood of two independent failures is much less than the likelihood of common cause related failures. The common cause portion of the risk for the missing valves is already accounted for since these valves would be in the same common cause group as the ones already modeled. The impact of adding these valves will be addressed in Revision 3 of NEDO 33201.

ESBWR DCD Revision 3 did not have these valves and the addition of them to the design for DCD Revision 4 was past the cutoff date for inclusion in ESBWR PRA Revision 2.

DCD/NEDO-033201 Impact

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

The discrepancy in question will be addressed in NEDO-33201 Rev 3.

NRC RAI 19.1-173

Question Summary: Reconcile statements that ESBWR design will prevent spurious actuations with the identification of specific spurious actuations in Table 4-2 of NEDE-33386, Rev 0 (NEDO-33201 Section 12.5, etc.)

Full Text

NEDO-33201 Section 12.5, Cable Selection, as well as sections of the DCD, states that the ESBWR digital instrument and control system designs will prevent spurious actuations. Table 4-2, The Cable Routing Report, of NEDE-33386, Rev 0, identifies a number of postulated spurious actuations.

Please explain how the statement that spurious actuations are prevented is reconciled with the postulation of multiple spurious actuations? In addition, please clarify whether the multiple spurious actuations are assumed to occur one at a time or simultaneously and provide the basis for the approach taken. (See also RAI 19.1-150, Supplement No. 1)

GEH Response

NEDE-33386 Table 4-2 includes the spurious actuation failure modes for some components, which are shown in the following table. A bounding and simplified mapping method was used for the external events PRA model development. However, the postulated spurious actuations caused by a fire in a single fire area would not adversely affect safe shutdown per design requirements. The conservatism associated with some postulated spurious actuations would be removed in future fire PRA model updates when the detailed design information is available.

System	Component	Cable Type	Impact due to Spurious Actuation Failures Modeled in NEDO-33201 Revision 2
RWCU / SDC	MOVs	Power Supply	The spurious failure was included due to over-mapping, which is a bounding and simplified mapping method. Its effects have been bounded by other failure modes already included in the model. (e.g., the valve failure mode of spuriously closing is bounded by the failure mode of failure to open.)
FAPCS	Pumps	Control Signal	The spurious failure was included due to over-mapping, which is a bounding and simplified mapping method. Its effects have been bounded by other failure modes already included in the model. (e.g., the pump failure mode of spuriously tripping is bounded by the failure mode of failure to run.)

System	Component	Cable Type	Impact due to Spurious Actuation Failures Modeled in NEDO-33201 Revision 2
AC Power System	Circuit Breakers	Power Supply	The spurious failure was included due to over-mapping, which is a bounding and simplified mapping method. Its effects have been bounded by other failure modes already included in the model. (e.g., the circuit breaker failure mode of spuriously opening is bounded by the failure mode of failure to close.)
HPNSS	AOVs	Control Signal	The spurious failure was modeled based on limited available system design information with a bounding and simplified mapping method. The postulated spurious closure of the subject AOV will fail the HPNSS supply. However, HPNSS failure does not affect safe shutdown components since accumulators are designed for those components.
ICS	ICS Isolation Valves	Control Signal	The spurious failure was modeled based on limited available system design information with a bounding and simplified mapping method. The postulated spurious closure of the subject isolation valve caused by a fire in a single fire area would fail one out of four ICS cooling paths, which did not fail the ICS cooling function. The detailed ICS design will eliminate the spurious actuations caused by a fire in a single fire area. NEDO-33201 Revision 3 will address the impact associated with the detailed design information.

To provide clarification, the statement in NEDO-33201 Section 12.5 will be revised to be consistent with GEH's response to RAI 19.1-150, Supplement No. 1.

With the bounding approach, the multiple spurious actuations associated with a postulated fire are assumed to occur simultaneously or in rapid succession. The basis for this approach is taken from Rev. 1 of RG 1.189, Section 5.3.4.

DCD Impact

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

NEDO-33201, Section 12.5, Rev 3 will be revised as shown in Attachment 2.

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Enclosure 1, Attachment 1

NEDO-33201, Revision 2 Markups

Section 11.2 and 11.3.3.2

Tables 11.3-4, 11.3-11, 11.3-19, 11.3-20,

11.3-21A, 11.3-22, 11.3-23, 11.3-24, 11.3-25, 11.3-28,

11.3-30, 11.3-32, 11.3-36, 11.3-37, 11.3-38, 11.3-39

11.2 METHODOLOGY

The methodology for conducting the sensitivity and uncertainty analysis was conducted in three phases, (1) selection/identification, (2) implementation/analyses and (3) results/benchmarking. The first step was to evaluate the importance of the sensitivity itself. In some cases, sensitivities were identified, but upon further evaluation were discarded due inherent model conservatisms or were delayed pending more detailed engineering.

Once the sensitivity had been identified, the models and supporting files were generated to facilitate the analysis. In general, the base PRA models were used to conduct the sensitivities with some changes. The base PRA models used for the sensitivity analysis reflect the NEDO-33201, Rev. 2 of the PRA model with some exceptions as noted in the individual sensitivities. Manipulation of existing data, revised engineering calculations or re-quantification of the model was used to obtain the results reflecting the specific sensitivity.

Finally, the results obtained from the sensitivities were benchmarked against the appropriate model results in order to gain insight. These units of measure for benchmarking the sensitivities included:

- CDF, LRF and importance measures from Level 1 and Level 2 PRA models,
- Difference calculated as the normalized difference between the results from the sensitivity and the baseline model,

$$Difference = \frac{(Sensitivity - Baseline)}{Baseline}$$

- NRC Risk goals as discussed in NEDO-33201, Rev 2 Section 17.2, and
- "Significant" definitions as discussed in Section 18.2.

Based on this benchmark, risk important insights or findings were obtained and are summarized in Section 11.6.

additional flag files. The focus Level 1 generated a CDF of 3.22E-04 with 471,592 cutsets; the RTNSS generated a CDF of 4.91E-06 with 550,770 cutsets. The results for the Level 1 focus sensitivity showed significant impact to CDF with the failure of non-safety systems both with and without RTNSS. The inclusion of the RTNSS systems in the model reduces CDF by approximately two orders of magnitude compared to crediting safety-related systems only. The Level 1 focus sensitivity was run using the base model at a truncation of 1E-15 with the additional flag files. CDF results for the Level 1 focus sensitivity are shown in Table 11.3-20.

Additional details of the focus sensitivity are provided in Table 11.3-21. These results showed changes to the distribution of initiators, accident classes, distribution of drywell water level classes or sequence contribution for both the focus and RTNSS sensitivities over the base model. The GEN initiator dominates the Level 1 focus PRA due to common cause failures to safety-related DCIS software, RPS hardware and safety-related inverters. The IORV initiator dominates for RTNSS due to common cause failures of all GDCS check valves or squib valves coupled with operator errors and common cause failures of all DPVs in conjunction with various operator errors.

A series of sensitivities were conducted on the RTNSS focus model to evaluate the impact of individual system failures on the CDF and the RTNSS focus model. In these sensitivities, an additional flag was added to the files to allow for a single RTNSS system to fail while all other RTNSS systems functioned normally. The Level 1 RTNSS sensitivities were run at a truncation of 1E-15 with the additional flag files. These RTNSS sensitivity results are contained in Table 11.3-21A.

The Level 1 PRA model CDF is significantly impacted by the failure of the non-safety and RTNSS systems. RTNSS sensitivities showed the impact to CDF is reduced with the availability of the DPS system. Unavailability of DPS coupled with %T-GEN initiator and common cause failures of safety-related DCIS software or RPS failures are dominant contributors to CDF for RTNSS sensitivities with individual system failures.

11.3.3.2 Focus Level 1 Fire

In order to perform the Level 1 fire focus and RTNSS sensitivities, two flag files were generated (1) to fail all non-safety systems and (2) to fail all non-safety systems except those systems designated as RTNSS. The Level 1 focus fire sensitivity was run using the base fire model at a truncation of 1E-15 with the additional flag files. The Level 1 focus fire generated a CDF of 1.15E-04; the RTNSS generated a CDF of 2.40E-07. The results for the focus fire sensitivity showed significant impact to CDF with the failure of non-safety systems both with and without RTNSS. The inclusion of the RTNSS systems in the model reduces CDF by approximately two orders of magnitude compared to crediting safety-related systems only. CDF results for the Level 1 focus fire sensitivity are shown in Table 11.3-22.

The Level 1 fire PRA model is significantly impacted by the failure of the non-safety and RTNSS systems. The availability of the RTNSS systems significantly reduces CDF. Based on the Level 1 fire focus sensitivities CDF results, the NRC goal of 1E-04/yr CDF is met for both the baseline Level 1 fire model and the RTNSS sensitivities. The focus fire case CDF does not meet the NRC goal. However, the fire analysis is very conservative with no credit for fire suppression or fire severity factors.

The Level 2 focus sensitivity was run using the base model at a truncation of 1E-15 with the additional flag files. The focus Level 2 generated a nTSL release frequency of ~~3.05E-04~~3.04E-04/yr and a CDF of 3.22E-04. ~~However, the presence of multiple flags in the Level 2 cutset results causes a significant overestimation of release frequency because otherwise non minimal cutsets are retained. Setting all Level 2 flags to TRUE and subsuming produces a total nTSL release of 1.18E-4/yr in the focus case.~~

The RTNSS generated a raw nTSL release frequency of 9.06E-08/yr. The results for the focus sensitivity showed significant impact to nTSL release with the failure of non-safety systems both with and without RTNSS. Results showing nTSL for the focus Level 2 sensitivity are shown in Table 11.3-25. These results showed changes to the release categories. Based on the Level 2 focus and RTNSS sensitivities, the NRC goal of 1E-06/yr LRF is met for RTNSS but exceeded by the focus sensitivity. The focus Level 2 results are dominated by the BYP frequency as opposed to other release categories where passive safety-related systems are available. Additional details of the release categories for the Level 2 focus are provided in Table 11.3-26.

A series of sensitivities were conducted on the RTNSS to evaluate the impact of individual system failures on the nTSL release frequency, CDF and the RTNSS focus model. In these sensitivities, an additional flag was added to the files to allow for a single RTNSS system to fail while all other RTNSS systems functioned normally. The Level 2 RTNSS sensitivities were run at a truncation of 1E-15 with the additional flag files. For the sensitivities excluding DPS and ARI systems, the nTSL frequency increased by more that four orders of magnitude ~~to~~ for ARI and greater than 5 orders of magnitude for DPS. In both cases the NRC goal for LRF was exceeded. These RTNSS sensitivity results are contained in Table 11.3-27.

The Level 2 PRA model nTSL frequency is significantly impacted by the failure of the non-safety and RTNSS systems. RTNSS sensitivities showed the impact to nTSL.release is minimized with the availability of the DPS and ARI system. Due to the predominance of containment bypass frequency, the Level 2 PRA focus sensitivity does not meet the NRC goal of less than 1E-06/yr.

11.3.4.2 Focus Level 2 Fire

In order to perform the Level 2 fire focus and RTNSS sensitivities, two flag files were generated (1) to fail all non-safety systems and (2) to fail all non-safety systems except those systems designated as RTNSS. The Level 2 focus fire sensitivity was run using the base model at a truncation of 1E-15 with the additional flag files. The focus Level 2 fire generated a nTSL release frequency of 1.15E-04/yr and a CDF of 1.15E-04. The RTNSS generated a nTSL release frequency of 4.72E-08/yr and a CDF of 2.40E-07. The results for the focus sensitivity showed significant impact to nTSL release frequency with the failure of non-safety systems both with and without RTNSS. The results showed a two order of magnitude decrease in the nTSL frequency with the RTNSS systems available compared to safety-related systems only. Results for the focus Level 2 fire sensitivity are shown in Table 11.3-28.

The Level 2 fire PRA model is significantly impacted by the failure of the non-safety and RTNSS systems. The availability of the RTNSS systems significantly minimizes nTSL release. Based on the Level 2 fire focus sensitivities nTSL results, the NRC goal of 1E-06/yr LRF is met for RTNSS, but this goal is exceed for the focus Level 2 fire. The focus fire Level 2 nTSL is dominated by long-term containment heat removal (OPW2), in which limited equipment is

Table 11.3-4

Level 1 Sensitivity - CDF Results

Truncation	Level 1 ~~Base Model~~		CCF		Difference
	# Cutsets	CDF	# Cutsets	CDF	
1.00E-13	8028	1.066E-08	8028	1.907E-11	~~5.58E+02~~ 9.98E-01
1.00E-14	45518	1.180E-08	45518	2.090E-11	~~5.64E+02~~ 9.98E-01
1.00E-15	173798	1.220E-08	173255	2.185E-11	~~5.57E+02~~ 9.98E-01
Truncation	**Level 1 ~~Base Model~~**		**SLCS**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	7914	9.298E-09	~~1.46E-01~~ 1.28E-01
1.00E-14	45518	1.180E-08	45318	1.043E-08	~~1.31E-01~~ 1.16E-01
1.00E-15	173798	1.220E-08	173005	1.084E-08	~~1.25E-01~~ 1.11E-01
Truncation	**Level 1 ~~Base Model~~**		**SRV CCFs**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8028	1.066E-08	0.00E+00
1.00E-14	45518	1.180E-08	45518	1.180E-08	0.00E+00
1.00E-15	173798	1.220E-08	173255	1.220E-08	0.00E+00
Truncation	**Level 1 ~~Base Model~~**		**SPC/LPCI Pumps**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8296	1.073E-08	6.57E-03
1.00E-14	45518	1.180E-08	47264	1.190E-08	8.47E-03
1.00E-15	173798	1.220E-08	181528	1.232E-08	9.84E-03
Truncation	**Level 1 ~~Base Model~~**		**Turbine Bypass**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8028	1.066E-08	0.00E+00
1.00E-14	45518	1.180E-08	45518	1.180E-08	0.00E+00
1.00E-15	173798	1.220E-08	173255	1.220E-08	0.00E+00
Truncation	**Sens_LOCA**		**Sens_LOCA_x2**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8497	1.191E-08	1.17E-01
1.00E-14	45518	1.180E-08	48383	1.313E-08	1.13E-01
1.00E-15	173251	1.220E-08	188605	1.357E-08	1.12E-01
Truncation	**Sens_LOCA**		**Sens_LOCA_ICS**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8028	1.066E-08	0.00E+00
1.00E-14	45518	1.180E-08	45518	1.180E-08	0.00E+00
1.00E-15	173251	1.220E-08	173255	1.220E-08	0.00E+00

Table 11.3-4

Level 1 Sensitivity - CDF Results

Truncation	Level 1 ~~Base Model~~		CRD Injection		Difference
	# Cutsets	CDF	# Cutsets	CDF	
1.00E-13	8028	1.066E-08	8030	1.066E-08	0.00E+00
1.00E-14	45518	1.180E-08	45528	1.180E-08	0.00E+00
1.00E-15	173798	1.220E-08	1773307	1.220E-08	0.00E+00
Truncation	**Level 1 ~~Base Model~~**		**Accumulator**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	202392	5.416E-06	5.07E+02
Truncation	**Level 1 ~~Base Model~~**		**Vacuum Breaker**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.066E-08	8241	1.167E-08	9.47E-02
1.00E-14	45518	1.180E-08	48786	1.289E-08	9.24E-02
1.00E-15	173798	1.220E-08	203617	1.336E-08	9.51E-02

Table 11.3-11

Level 1 Sensitivity – Component Type Code Data – CDF Results

Type Code	System Name	~~Baseline~~ Level 1 Value	Sens. Value (x10)	Truncation	Results		
					# Cutsets	CDF	Difference
MTS CO	Manual Transfer Switch Spuriously Opens	1.00E-06	1.00E-05	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8031	1.066E-08	0.0E+00
				1.00E-14	45490	1.181E-08	~~-5.9E-04~~8.5E-04
NMO CC	Nitrogen Motor Operated Valve Fails to Open	1.00E-04	1.00E-03	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8031	1.066E-08	0.0E+00
				1.00E-14	45551	1.180E-08	~~-1.7E-04~~0.0E+00
NMO OC	Nitrogen Motor Operated Valve Fails to Close	1.00E-07	1.00E-06	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8028	1.066E-08	0.0E+00
				1.00E-14	45518	1.180E-08	0.0E+00~~-8.5E-05~~
NMO OO	Nitrogen Motor Operated Valve Transfers Closed	1.00E-04	1.00E-03	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8028	1.066E-08	0.0E+00
				1.00E-14	45518	1.180E-08	0.0E+00~~-8.5E-05~~
NPO CC	Nitrogen Piston Operated Valve Fails to Close	1.00E-04	1.00E-03	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8030	1.066E-08	0.0E+00
				1.00E-14	45549	1.180E-08	0.0E+00~~-1.7E-04~~
NPO OC	Nitrogen Piston Operated Valve Fails to Open	1.00E-07	1.00E-06	1.00E-12	1131	8.699E-09	0.0E+00
				1.00E-13	8028	1.066E-08	0.0E+00
				1.00E-14	45518	1.180E-08	0.0E+00~~-8.5E-05~~

~~Baseline CDF~~	Level 1 CDF	Truncation	~~No.~~# Cutsets	~~Result~~ CDF
		1.00E-12	1131	8.699E-09
		1.00E-13	8028	1.066E-08
		1.00E-14	45518	1.180E-08

Table 11.3-19

Level 2 Sensitivity – Base Model and Sensitivity – nTSL Results

Truncation	Level 2 - Base		Level 2 - CIS		Difference	
	nTSL	CDF	nTSL	CDF	nTSL	CDF
1.00E-15	9.62E-10	1.22E-08	9.62E-10	1.22E-08	0.0E+00	0.0E+00
Truncation	**Level 2 - Base**		**Level 2 - PU**		**Difference**	
	nTSL	**CDF**	**nTSL**	**CDF**	**nTSL**	**CDF**
1.00E-15	9.62E-10	1.22E-08	9.64E-10	1.22E-08	2.08E-03	0.0E+00
Truncation	**Level 2 - Base**		**Level 2 - VB**		**Difference**	
	nTSL	**CDF**	**nTSL**	**CDF**	**nTSL**	**CDF**
1.00E-15	9.62E-10	1.22E-08	2.13E-09	1.34E-08	1.21E+00	9.84E-02

Table 11.3-20

Focus Level 1 – CDF Results

Truncation	Level 1 ~~Base Model~~		Level 1 - Focus		~~%~~ Difference
	# Cutsets	CDF	# Cutsets	CDF	
1.00E-13	8028	1.0~~6~~7~~6~~E-08	52255	3.22E-04	3.02E+04
1.00E-14	45518	1.18~~0~~E-08	146352	3.22E-04	2.73E+04
1.00E-15	173798	1.22~~0~~E-08	471592	3.22E-04	2.64E+04
Truncation	**Level 1 ~~Base Model~~**		**Level 1 - RTNSS**		**~~%~~ Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	8028	1.0~~6~~~~6~~7E-08	37951	4.91E-06	4.60E+02
1.00E-14	45518	1.18~~0~~E-08	142840	4.91E-06	4.15E+02
1.00E-15	173798	1.22~~0~~E-08	550770	4.91E-06	4.01E+02
Truncation	**Level 1 - Focus**		**Level 1 - RTNSS**		**~~%~~ Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-13	52255	3.22E-04	37951	4.91E-06	-9.85E-01
1.00E-14	146352	3.22E-04	142840	4.91E-06	-9.85E-01
1.00E-15	471592	3.22E-04	550770	4.91E-06	-9.85E-01

Table 11.3-21A

Focus Level 1 – RTNSS Sensitivity Results

Truncation	Level 1 - RTNSS CDF	Level 1 - RTNSS w/o DPS CDF	Difference CDF
1.00E-15	4.91E-06	2.87E-04	5.75E+01
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o ARI CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.31E-05	3.70E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o FDW runback CDF**	**Difference CDF**
1.00E-15	4.91E-06	5.24E-06	6.72E-02
Truncation	**Level 1 - RTNSS CDF**	**Level 1 – RTNSS w/o PIP CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.11E-05	3.30E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 -RTNSS w/o DG A&B CDF**	**Difference CDF**
1.00E-15	4.91E-06	4.96E-06	1.02E-02
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o FAPCS CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.10E-05	3.28E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 -RTNSS w/o FPS Pool CDF**	**Difference CDF**
1.00E-15	4.91E-06	4.95E-06	8.15E-03
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o RCCW CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.10E-05	3.28E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o TCCW CDF**	**Difference CDF**
1.00E-15	4.91E-06	4.91E-06	0.00E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o PSW CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.10E-05	3.28E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o CWS NI CDF**	**Difference CDF**
1.00E-15	4.91E-06	2.10E-05	3.28E+00
Truncation	**Level 1 - RTNSS CDF**	**Level 1 - RTNSS w/o CWS BOP CDF**	**Difference CDF**
1.00E-15	4.91E-06	4.91E-06	0.00E+00

Table 11.3-22

Focus Level 1 – Fire Sensitivity Results

Truncation	Level 1 ~~Base~~ Fire	Level 1 Fire - Focus ~~Fire~~	Difference
	CDF	CDF	
1.00E-13	7.~~366E~~27E-09	1.15E-04	1.~~56E~~58E+04
1.00E-14	7.80~~3~~E-09	1.15E-04	1.47E+04
1.00E-15	8.~~058E~~06E-09	1.15E-04	1.43E+04
Truncation	**Level 1 ~~Base~~ Fire**	**Level 1 Fire - RTNSS ~~Fire~~**	**Difference**
	CDF	**CDF**	
1.00E-13	7.~~366E~~27E-09	2.35E-07	3.~~08E~~13E+01
1.00E-14	7.80~~3~~E-09	2.38E-07	2.95E+01
1.00E-15	8.~~058E~~06E-09	2.40E-07	2.~~87E~~88E+01

Table 11.3-23

Focus Level 1 – Flood Sensitivity Results

Truncation	Level 1 ~~Base~~ Flood		Level 1 Flood - Focus ~~Flood~~		Difference
	# Cutsets	CDF	# Cutsets	CDF	
1.00E-14	45518	1.62~~2~~E-09	88884	1.15E-05	7.~~11E~~10E+03
Truncation	**Level 1 ~~Base~~ Flood**		**Level 1 ~~Focus~~ Flood - RTNSS**		**Difference**
	# Cutsets	**CDF**	**# Cutsets**	**CDF**	
1.00E-14	45518	1.62~~2~~E-09	45642	9.06~~8.90~~E-09	4.~~49E~~59E+00

Table 11.3-24

Focus Level 1 – High Wind Sensitivity Results

Truncation	Scenario	Level 1 ~~Base~~ High Wind		Level 1 ~~Focus~~ High Wind - Focus		Difference
		# Cutsets	CDF	# Cutsets	CDF	
1.00E-14	Tornado F2/F3	42	4.64E-13	609	8.91E-10	1.92E+03
1.00E-14	Tornado F4/F5	144	4.83E-11	146	4.84E-11	2.07~~4.14E-04~~03
1.00E-14	Hurricane	10235	1.29E-09	23583	1.93E-06	1.50E+03
1.00E-14	**TOTAL**		1.34E-09		1.94E-06	1.45~~4~~E+03

Truncation	Scenario	Level 1 ~~Base~~ High Wind		Level 1 High Wind - RTNSS ~~High Wind~~		Difference
		# Cutsets	CDF	# Cutsets	CDF	
1.00E-14	Tornado F2/F3	42	4.64E-13	44	4.67E-13	6.47~~5.17~~E-03
1.00E-14	Tornado F4/F5	144	4.83E-11	146	4.84E-11	2.07~~4.14E-04~~03
1.00E-14	Hurricane	10235	1.29E-09	5775	1.71E-09	3.26~~4~~E-01
1.00E-14	**TOTAL**		1.34E-09		1.76E-09	3.13~~2~~E-01

Table 11.3-25

Focus Level 2 – nTSL Results

Truncation	Level 2 ~~Model~~			~~Focus Fire~~ Level 2 - Focus			Difference		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-15	9.62E-10	~~7.90E-02~~0.079	1.22~~0~~E-08	3.04~~1.15E~~E-04	~~1.00~~0.943	3.22~~1.15~~E-04	3.16 ~~1.20~~E+05	~~1.17E+01~~ 1.09E+01	~~9.43E+03~~ 2.64E+04
Truncation	**Level 2 ~~Fire Model~~**			**~~RTNSS Fire~~ Level 2 - RTNSS**			**Difference**		
	nTSL	**CCFP**	**CDF**	**nTSL**	**CCFP**	**CDF**	**nTSL**	**CCFP**	**CDF**
1.00E-15	9.62E-10~~4.83E-10~~	~~6.00E-02~~0.079	1.22E-08~~8.060E-09~~	9.06~~4.72~~E-08	0.~~197~~018	~~2.40E-07~~4.91E-06	9.32~~67~~E+01	~~2.28E+00~~ 7.72E-01	~~2.88E+01~~ 4.01E+02
Truncation	**~~Focus Fire~~ Level 2 - Focus**			**~~RTNSS Fire~~ Level 2 - RTNSS**			**Difference**		
	nTSL	**CCFP**	**CDF**	**nTSL**	**CCFP**	**CDF**	**nTSL**	**CCFP**	**CDF**
1.00E-15	3.04~~1.15~~E-04	~~1.00~~0.943	3.22E~~1.15E~~-04	9.06~~4.72E~~-08	0.~~197~~018	~~2.40E-07~~4.91E-06	-1.00E+00	-9.81~~8.03~~E-01	-9.85~~98~~E-01

Table 11.3-28

Focus Level 2 – Fire Sensitivity – nTSL Results

Truncation	~~Fire~~ Level 2 ~~Model~~ Fire			~~Focus~~ Level 2 Fire - Focus			Difference		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-15	4.83E-10	0.060	8.06~~0~~E-09	1.15E-04	1.000	1.15E-04	2.38E+05	1.57E+01	1.43E+04
Truncation	~~Fire~~ Level 2 ~~Model~~ Fire			~~RTNSS~~ Level 2 Fire - RTNSS			Difference		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-15	4.83E-10	0.060	8.06~~0~~E-09	4.72E-08	0.197	2.40E-07	9.67E+01	2.28E+00	2.88E+01
Truncation	~~Focus~~ Level 2 Fire - Focus			~~RTNSS~~ Level 2 Fire - RTNSS			Difference		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-15	1.15E-04	1.000	1.15E-04	4.72E-08	0.197	2.40E-07	-1.00E+00	-8.03E-01	-9.98E-01

Table 11.3-30

Focus Level 2 – Flood ~~sensitivity~~ Sensitivity – nTSL Results

Truncation	Level 2 ~~Base~~ Flood			Level 2 ~~Focus~~ Flood - Focus			Difference		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-~~15~~14	2.07E-10	~~1.28E-0~~10.128	1.62~~0~~E-09	4.49E-06	0.389	1.15E-05	2.17E+04	2.04E+00	7.10E+03
Truncation	**Level 2 ~~Base~~ Flood**			**Level 2 ~~RTNSS~~ Flood - RTNSS**			**Difference**		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-~~15~~14	2.07E-10	~~1.28E-0~~10.128	1.62~~0~~E-09	1.23E-09	0.136	9.06E-09	4.94E+00	6.25E-02	4.59E+00
Truncation	**Level 2 ~~Focus~~ Flood - Focus**			**Level 2 ~~RTNSS~~ Flood - RTNSS**			**Difference**		
	nTSL	CCFP	CDF	nTSL	CCFP	CDF	nTSL	CCFP	CDF
1.00E-~~15~~14	4.49E-06	0.389	1.15E-05	1.23E-09	0.136	9.06E-09	~~-3.65E+03~~ 1.00E+0	-6.50E-01	-9.99E-01

Table 11.3-32

Focus Level 2 – High Wind Sensitivity – nTSL Results

Scenario	Truncation	Level 2 ~~Base~~ High Wind		Level 2 High Wind - Focus ~~High Wind~~		Difference	
		nTSL	CDF	nTSL	CDF	nTSL	CDF
Tornado F2/F3	1.00E-15	0	4.00E-13	8.99E-10	8.~~92E~~91E-10	NA	2.23E+03
Tornado F4/F5	1.00E-15	9.00E-12	4.86E-11	4.88E-11	4.84E-11	4.42E+00	-4.12E-03
Hurricane	1.00E-15	2.10E-11	1.29E-09	3.25E-07	1.93E-06	1.55E+04	1.50E+03
TOTAL	1.00E-15	3.00E-11	1.34E-09	3.26E-07	1.94E-06	1.09E+04	1.45E+03
Scenario	**Truncation**	**Level 2 ~~Base~~ High Wind**		**Level 2 High Wind - RTNSS ~~High Wind~~**		**Difference**	
		nTSL	**CDF**	**nTSL**	**CDF**	**nTSL**	**CDF**
Tornado F2/F3	1.00E-15	0	4.00E-13	2.26E-15	4.67E-13	NA	1.68E-01
Tornado F4/F5	1.00E-15	9.00E-12	4.86E-11	9.~~40E~~41E-12	4.84E-11	4.44~~E~~56E-02	-4.12E-03
Hurricane	1.00E-15	2.10E-11	1.29E-09	6.81E-11	1.71E-09	2.24E+00	3.26E-01
TOTAL	1.00E-15	3.00E-11	1.34E-09	7.75E-11	1.76E-09	1.58E+00	3.13E-01

Table 11.3-36

Focus Shutdown – CDF Results

Truncation	Shutdown ~~Base~~ CDF/LRF	Shutdown - Focus CDF/LRF	Difference
1.00E-13	9.20E-09	1.98E-06	2.14E+02
1.00E-14	9.31E-09	1.99E-06	2.13E+02
1.00E-15	9.37E-09	1.99E-06	2.11E+02
Truncation	**Shutdown ~~Base~~ CDF/LRF**	**~~RTNSS~~ Shutdown - RTNSS CDF/LRF**	**~~%~~ Difference**
1.00E-13	9.20E-09	1.32E-07	1.33E+01
1.00E-14	9.31E-09	1.33E-07	1.33E+01
1.00E-15	9.37E-09	1.33E-07	1.32E+01
Truncation	**Shutdown - Focus CDF/LRF**	**~~RTNSS~~ Shutdown - RTNSS CDF/LRF**	**~~%~~ Difference**
1.00E-13	1.98E-06	1.32E-07	~~-1.40E+01~~ -9.33E-01
1.00E-14	1.99E-06	1.33E-07	-9.33E-01 ~~-1.40E+01~~
1.00E-15	1.99E-06	1.33E-07	-9.33E-01 ~~-1.40E+01~~

Table 11.3-37

Focus ~~Sensitivity~~ Shutdown – Fire Sensitivity – CDF Results

Truncation	~~Base~~ Shutdown Fire	~~Focus~~ Shutdown Fire - Focus	Difference
	CDF/LRF	CDF/LRF	
1.00E-13	~~9.20E-09~~2.64E-08	~~1.98E-06~~2.54E-06	~~2.14E+02~~9.52E+01
1.00E-14	~~9.31E-09~~2.70E-08	~~1.99E-06~~2.54E-06	~~2.13E+02~~9.31E+01
1.00E-15	~~9.37E-09~~2.71E-08	~~1.99E-06~~2.54E-06	~~2.11E+02~~9.27E+01
Truncation	**~~Base~~ Shutdown Fire**	**~~RTNSS~~ Shutdown Fire - RTNSS**	**Difference**
	CDF/LRF	**CDF/LRF**	
1.00E-13	2.64E-08~~9.20E-09~~	~~1.32E-07~~2.67E-07	~~1.33E+01~~9.11E+00
1.00E-14	2.70E-08~~9.31E-09~~	~~1.33E-07~~2.68E-07	~~1.33E+01~~8.93E+00
1.00E-15	2.71E-08~~9.37E-09~~	~~1.33E-07~~2.68E-07	~~1.32E+01~~8.89E+00
Truncation	**~~Focus~~ Shutdown Fire - Focus**	**~~RTNSS~~ Shutdown Fire - RTNSS**	**Difference**
	CDF/LRF	**CDF/LRF**	
1.00E-13	2.54E-06~~1.98E-06~~	2.67E-07~~1.32E-07~~	~~-9.33E-01~~-8.95E-01
1.00E-14	2.54E-06~~1.99E-06~~	2.68E-07~~1.33E-07~~	~~-9.33E-01~~-8.94E-01
1.00E-15	2.54E-06~~1.99E-06~~	2.68E-07~~1.33E-07~~	~~-9.33E-01~~-8.94E-01

Table 11.3-38

Focus Shutdown – Flood Sensitivity – CDF Results

Truncation	~~Base~~ Shutdown Flood	~~Focus~~ Shutdown Flood - Focus	Difference
	CDF/LRF	CDF/LRF	
1.00E-13	9.20E-09	~~1.98E-06~~9.68E-7	1.04~~2.14~~E+02
1.00E-14	9.31E-09	~~1.99E-06~~9.69E-7	1.03~~2.13~~E+02
1.00E-15	9.37E-09	~~1.99E-06~~NA	~~2.11E+02~~NA
Truncation	**~~Base~~ Shutdown Flood**	**~~RTNSS~~ Shutdown Flood - RTNSS**	**Difference**
	CDF/LRF	**CDF/LRF**	
1.00E-13	9.20E-09	1.~~32E~~01E-07	~~1.33E+01~~9.98E+0
1.00E-14	9.31E-09	1.~~33E~~02E-07	~~1.33E+01~~9.96E+0
1.00E-15	9.37E-09	~~1.33E-07~~NA	~~1.32E+01~~NA
Truncation	**~~Focus~~ Shutdown ~~Fire~~Flood - Focus**	**~~RTNSS~~ Shutdown ~~Fire~~Flood - RTNSS**	**Difference**
	CDF/LRF	**CDF/LRF**	
1.00E-13	~~1.98E-06~~9.68E-7	1.~~32E~~01E-07	~~-1.40E+01~~-8.96E-01
1.00E-14	~~1.99E-06~~9.68E-7	1.~~33E~~02E-07	~~-1.40E+01~~-8.95E-01
1.00E-15	~~1.99E-06~~NA	~~1.33E-07~~NA	~~-1.40E+01~~NA

Table 11.3-39

Focus Shutdown – High Wind Sensitivity – CDF Results

Truncation	Scenario	~~Base~~ Shutdown High Wind	~~Focus~~ Shutdown High Wind - Focus	Difference
		CDF/LRF	CDF/LRF	
1.00E-15	Tornado F2/F3	1.20E-11	7.01E-11	4.84E+00
1.00E-15	Tornado F4/F5	1.20E-12	4.61E-12	2.84E+00
1.00E-15	Hurricane	1.18E-09	2.52E-07	2.13E+02
1.00E-15	TOTAL	1.19E-09	2.52E-07	2.11E+02
Truncation	**Scenario**	**~~Base~~Shutdown High Wind**	**~~RTNSS~~ Shutdown High Wind - RTNSS**	**Difference**
		CDF/LRF	**CDF/LRF**	
1.00E-15	Tornado F2/F3	1.20E-11	2.77E-11	1.31E+00
1.00E-15	Tornado F4/F5	1.20E-12	4.61E-12	2.84E+00
1.00E-15	Hurricane	1.18E-09	2.74E-09	1.~~33E~~32E+00
1.00E-15	TOTAL	1.19E-09	2.77E-09	1.33E+00
Truncation	**Scenario**	**~~Focus~~ Shutdown High Wind - Focus**	**~~RTNSS~~ Shutdown High Wind - RTNSS**	**Difference**
		CDF/LRF	**CDF/LRF**	
1.00E-15	Tornado F2/F3	7.01E-11	2.77E-11	~~-1.53E+00~~ 6.05E-01
1.00E-15	Tornado F4/F5	4.61E-12	4.61E-12	0.00E+00
1.00E-15	Hurricane	2.52E-07	2.74E-09	~~-9.10E+01~~ 9.89E-01
1.00E-15	TOTAL	2.52E-07	2.77E-09	~~-8.99E+01~~ 9.89E-01

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Enclosure 1, Attachment 2

NEDO-33201 Section 12.5, Revision 2 Markup

12.5 CABLE SELECTION

Per NUREG/CR-6850, Tasks 3 (cable selection) and Task 9 (detailed circuit failure analysis) are recommended to be performed at the same time. Due to the limitation of the design, no detailed circuits are available for evaluation. However, the ESBWR digital instrument and control system designs will prevent spurious actuations caused by a fire in a single fire area that could adversely affect safe shutdown.

The list of equipment located in each fire area and the cable routing information are included in NEDE/NEDO-33386 Rev. -0 Section 4 (Reference 12-5). The cable routing is ~~assumed~~ postulated for the PRA fire model under the guideline for separation criteria. ~~Slight~~ Reasonable cable routing variations will not significantly impact the PRA results.

This task is performed based on the component support information in the PRA system model database and the general arrangement drawings. Simplified conservative assumptions are made for the potential impact of the failure of these cables to the relevant components. The cables are postulated based on the supports in system models. Mainly four types of cables are postulated:

Support Type	Cables Postulated	Cable Failure Induces Component Failure
Component Cooling		
Control Air		
Control Power	X	X
Control Signal	X	Depends (see note)
Motive Air		
Motive Nitrogen		
Motive Power	X	X
Powered Control Signal	X	Depends(see note)
Room Cooling		

Note: Some components are designed with redundant actuation control signals. Loss of one control signal caused by the postulated cable failure associated with a fire in a single fire area would not result in component failure.

Assumptions 14-18 are made for this task. NEDE/NEDO-33386 Tables 4-2 and 4-3 (Reference 12-5) summarize the cable routing and the rooms/fire areas on the cable routing paths.