

ENCLOSURE 1 TO NL-17-002

ENTERGY ENGINEERING REPORT NO. IP-RPT-16-00077,

"INDIAN POINT RAI CLI-16-07 MACCS2 SENSITIVITIES," REV. 0 (JAN. 4, 2017)

**ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
DOCKET NOS. 50-247 AND 50-286**



ENTERGY NUCLEAR
Engineering Report Cover Sheet

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Indian Point RAI CLI-16-07 MACCS2 Sensitivities

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ANO1 <input type="checkbox"/>	ANO2 <input type="checkbox"/>	ECH <input type="checkbox"/>	GGNS <input type="checkbox"/>	RBS <input type="checkbox"/>	WF3 <input type="checkbox"/>	PLP <input type="checkbox"/>

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Advancing the Science of Safety

Indian Point RAI CLI-16-07 MACCS2 Sensitivities 21059-CALC-13106

Prepared for:

Entergy / Indian Point Energy Center


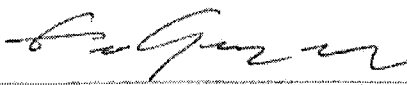



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Revision	Revision Summary
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APPENDICES**A SAMA CANDIDATE MACCS2 RUNS**

1.0 PURPOSE

This calculation documents a series of MACCS2 sensitivity cases that were performed to support the response to an NRC Staff Request for Additional Information (RAI) pertaining to the NRC Commission Decision CLI-16-07 for Indian Point Energy Center (IPEC).

On May 4, 2016, the Commission issued a decision (CLI-16-07) [1] in the Indian Point Nuclear Generating Unit Nos 2 and 3 (IP2 and IP3) license renewal proceeding, in which it directed the NRC staff to supplement the IP2 and IP3 Severe Accident Mitigation Alternatives (SAMA) analysis with additional sensitivity analyses. Specifically, the Commission held that documentation was lacking for two inputs – decontamination time (TIMDEC) and cost to decontaminate non-farmland (CDNFRM) -- used in the MELCOR Accident Consequence Code (MACCS)¹ computer analyses, and that uncertainties in those input values could potentially affect the SAMA analysis cost-benefit conclusions. The Commission therefore directed the NRC staff to perform additional sensitivity analyses.

In a Request for Additional Information (RAI) dated September 12, 2016 [2], the NRC staff requested the following additional information:

1. Entergy Nuclear Operations, Inc. (Entergy) is requested to scale up the value of nonfarm wealth (VALWNF) input to the SAMA analysis' base-year dollars (see pp. 41-42 of CLI-16-07), and to re-run its base analyses using this corrected VALWNF input. Entergy is requested to evaluate how the change in VALWNF may affect its identification of potentially cost-beneficial SAMAs.
2. Using the revised baseline from Request 1, Entergy is requested to run supplemental sensitivity analyses using the input values specified in CLI-16-07. Specifically:
 - Apply the maximum values specified by the Commission and allowed by the MACCS code for TIMDEC and CDNFRM values (one year (365 days) and \$100,000, respectively) for "heavy decontamination" (i.e., the decontamination/dose reduction factor of 15).
 - Exercise the additional option to explain, with sufficient justification, its rationale for choosing any additional values for the TIMDEC and CDNFRM inputs for its sensitivity analyses.

Entergy at a minimum should run its sensitivity analyses for the four worst release categories, as specified in CLI-16-07. Entergy is requested to evaluate how these sensitivity analyses may affect its identification of potentially cost-beneficial SAMAs.

Upon completing these additional analyses, Entergy is requested to submit the input and output files for the IP2 and IP3 MACCS code. Additionally, Entergy is requested to submit the spreadsheet (or equivalent table if another method is used) that conveys the population dose and off-site economic cost for each release category and integrates the results into a Population Dose Risk and an Offsite Economic Cost Risk for IP2 and IP3.

¹ The text in this section is largely taken from the NRC RAI. Whereas the RAI text specifies the MACCS code, it is understood that the more current version of the code, typically referred to as MACCS2, is intended. The MACCS2 code was used in this analysis.

2.0 REFERENCES

The following references are used in this calculation:

1. ML16125A150, NRC Commission Memorandum and Order (CLI-16-07), May 4, 2016.
2. ML16232A119, "Request for Additional Information Related to the Indian Point Nuclear Generating Unit Nos. 2 and 3 License Renewal Application Environmental Review, Severe Accident Mitigation Alternatives", NRC, September 12, 2016.
3. IP-CALC-09-00265, "Re-analysis of MACCS2 Models for IPEC," Rev. 0, December 2009.
4. ENERCON, "Site Specific MACCS2 Input Data for Indian Point Energy Center," Rev. 1, December 2009.
5. NUREG/CR-7110, "State-of-the-Art Reactor Consequence Analyses Project Volume 1: Peach Bottom Integrated Analysis," Rev. 1, May 2013.
6. IP-RPT-07-00007, "IP2 Cost-Benefit Analysis of Severe Accident Mitigation Alternatives," Rev. 0, April 2007.
7. IP-RPT-07-00008, "IP3 Cost-Benefit Analysis of Severe Accident Mitigation Alternatives," Rev. 0, April 2007.
8. NUREG/CR-6613, "Code Manual for MACCS2, User's Guide," Vol. 1, SAND97-0594, Sandia National Laboratories, May 1998.
9. NUREG/CR-6525, "SECPOP2000: Sector Population, Land Fraction, and Economic Estimation Program," Rev. 1, 2003.

3.0 ASSUMPTIONS AND LIMITATIONS

The following assumptions are used in the calculation:

- All assumptions utilized in Reference 3, the MACCS2 model analysis calculation that serves as the basis for the SAMA, are carried forward to this calculation.

4.0 METHODOLOGY

To address this RAI, a series of MACCS2 (version 1.13.1) sensitivity cases are performed with adjustments to select MACCS2 parameter input values. For each sensitivity case, the MACCS2 results for total 50-mile offsite costs and 50-mile population dose for each release category are multiplied by the applicable release category frequency to calculate the SAMA metrics of Offsite Economic Cost Risk (OECR) and Population Dose Risk (PDR). The OECR and PDR of the various sensitivity cases are then compared against applicable reference cases to determine the impact of the revised parameters.

It is noted that more MACCS2 cases are documented than are strictly required to address the RAI response. These additional cases were performed to gain more refined insights into the sensitivity of OECR and PDR results to select input values. They are documented herein for completeness purposes.

For each IPEC unit, the following sensitivity cases are performed:

- Case 0
 - SAMA Base Case Check
 - This case confirms that the results of Reference 3 can be reproduced with the applicable MACCS2 files upon which the sensitivity cases are built.
- Case 1
 - TIMDEC is escalated to one year (365 days) for DF=15 in the CHRONC input file.
 - This TIMDEC value represents the maximum value allowed by MACCS2.
 - This case is not used to support the RAI response.
- Case 2
 - CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - This CDNFRM value represents the maximum value allowed by MACCS2.
 - This case is not used to support the RAI response.
- Case 3
 - TIMDEC is escalated to one year (365 days) and CDNFRM was escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - This TIMDEC and CDNFRM values represent the maximum values allowed by MACCS2.
 - This case is not used to support the RAI response.
- Case 4
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values. VALWNF is used in the CHRONC input file and represents an average value for the 50 mile region. VNFRM is used in the SITE input file and is calculated on a county-specific basis. Calculation of these values is presented below.
 - This case addresses Part 1 of the RAI (i.e., corrected VALWNF), and represents the "revised baseline" as specified in the RAI.
- Case 5
 - TIMDEC is escalated to one year (365 days) and CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - This case addresses Part 2(a) of the RAI.
- Case 6
 - TIMDEC is escalated to one year (365 days) and CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - VALWNF & VNFRM without including lost tourism and business.
 - This case is not used to support the RAI response.
- Case 7
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - The dry deposition velocity, VDEPOS, is set to 0.003 m/sec in the ATMOS input file rather than the Reference 3 value of 0.010 m/sec. The value of 0.003m/sec is documented by the recent NRC's State-of-the-Art Reactor Consequence Analyses (SOARCA) Project to be the dominant or average value for use in SOARCA

(Reference 5) and is viewed as more representative of severe accident source terms than the value of 0.010m/sec used in the NUREG-1150 studies.

- Similar to Case 4, Case 7 addresses Part 1 of the RAI (i.e., corrected VALWNF), and represents the “revised baseline” as specified in the RAI, except with an updated dry deposition velocity.
- Case 8
 - TIMDEC is escalated to one year (365 days) and CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - The dry deposition velocity, VDEPOS, is set to 0.003 m/sec in the ATMOS input file rather than the Reference 3 value of 0.010 m/sec.
 - Similar to Case 5, Case 8 addresses Part 2(a) of the RAI (i.e., corrected VALWNF, increased TIMDEC & CDNFRM), as specified in the RAI, except with an updated dry deposition velocity.

The parameter value changes are applied to all IP2 and IP3 release categories for consistency, (i.e., not just the four worst release categories as specified in the RAI.)

VALWNF Calculation

This section documents the escalation of the Reference 3 VALWNF value to 2005 dollars for use in the MACCS2 sensitivity cases.

- Original (without lost tourism/business) VALWNF = \$163,631/person (see Reference 4 Section 5.2.8). This was developed using SECPOP2000 and its economic database from the 1997 Census of Agriculture.
- VALWNF with lost tourism / business = \$208,838/person (see Reference 4 Section 5.2.8). The lost tourism / business component is based on 2004 data. The lost tourism/business component is \$45,207/person.

Consumer Price Index Values (Series CUUR0000SA0, All Urban Consumers) are used for escalation purposes:

- Annual 1997 CPI = 160.5
- Annual 2004 CPI = 188.9
- Annual 2005 CPI = 195.3
- Escalation Factor 1997-2005 = 1.22
- Escalation Factor 2004-2005 = 1.03

2005 VALWNF is calculated as follows:

- VALWNF without lost tourism/business = \$163,631/person * 1.22 = \$199,630/person
- Lost tourism / business component = \$45,207/person * 1.03 = \$46,563/person
- Total with lost tourism/ business (2005 dollars)= \$246,193/person, rounded up to **\$247,000/person**
- Total without lost tourism/business (2005 dollars), rounded up = **\$200,000/person**.

VNFRM Calculation

This section documents the escalation of the Reference 3 VNFRM values to 2005 dollars for use in the MACCS2 sensitivity cases. The same approach and CPI escalation values developed for the VALWNF calculation are applied at the county level data. The values for each region (i.e., county) are shown below.

Region	Basis Year for Dollar Value:	1997	1997, 2004	2004	2005	2005
	County	Original No Tourism VNFRM (\$)	With Tourism VNFRM (\$)	Tourism Portion (\$)	With Tourism VNFRM (\$)	No Tourism VNFRM (\$)
1	FAIRFIELD	232659	287881	55222	340723	283844
2	BERGEN	205863	262186	56323	309166	251153
3	LITCHFIELD	148522	186016	37494	219816	181197
4	NEWHAVEN	144105	192427	48322	225580	175808
5	ESSEX	147351	197400	50049	231319	179768
6	DUTCHESS	129000	169417	40417	199010	157380
7	MORRIS	213389	277661	64272	326535	260335
8	PASSAIC	121880	161864	39984	189877	148694
9	SUSSEX	136197	165741	29544	196591	166160
10	UNION	160860	209708	48848	246563	196249
11	KINGS	104714	123701	18987	147308	127751
12	NASSAU	192755	239932	47177	283753	235161
13	ORANGE	113976	148873	34897	174995	139051
14	PUTNAM	154926	180274	25348	215118	189010
15	QUEENS	169126	226728	57602	265664	206334
16	ROCKLAND	163105	203359	40254	240450	198988
17	SUFFOLK	149615	192471	42856	226672	182530
18	SULLIVAN	104859	139374	34515	163478	127928
19	ULSTER	104090	138739	34649	162678	126990
20	WESTCHESTR	217278	263389	46111	312573	265079

SAMA Candidate Specific MACCS2 Calculations

For the IPEC SAMA analysis, the evaluation of several SAMA candidates included MACCS2 specific runs to model to a potential benefit (e.g., sprays that would reduce the source term released to the environment). The original evaluations are documented in References 6 and 7. These SAMA candidate specific MACCS2 cases have been re-performed using the re-analyzed meteorology for the IPEC site per Reference 3 and the applicable cases above to address CLI-16-07. These cases and results are documented in Appendix A.

5.0 RESULTS

Tables 1A and 1B summarize the MACCS2 sensitivity case results for PDR and OECR for Units 2 and 3, respectively.

Comparison of Case 4 to the Base Case demonstrates that the escalation of the value of non-farm wealth to 2005 dollar values results in a modest OECR increase of approximately 9-10%. There is no appreciable change in the PDR. Similarly, comparison of Case 5 to the Base Case demonstrates that when the TIMDEC and CDNFRM values are increased to the maximum MACCS2 allowed values as stipulated in the RAI, along with the non-farm wealth escalation (2005 dollars values), the OECR increases approximately 126% for IP2 and 133% for IP3. The PDR increase is much smaller, approximately 12% for IP2 and 11% for IP3.

As noted in the methodology section, the original IPEC SAMA analysis used a deposition velocity of 0.010 m/sec. The more recent NRC's SOARCA analysis (Reference 5) indicates that a value of 0.003 m/sec is more representative of an average value. When this value of 0.003 m/sec is employed, the RAI requested results in Cases 7 and 8 are appreciably lower than those results for a higher deposition velocity in Cases 4 and 5. Specifically, Case 7 shows that the lower deposition velocity more than offsets the increase associated with escalating the value of non-farm wealth to 2005 values. The OECR decreases approximately 10% for IP2 and 17% for IP3 when compared to the SAMA Base Case results. The PDR value changes a small amount (2.5% decrease for U2; 1.8% increase for U3). Case 8 demonstrates that when the TIMDEC and CDNFRM values are increased to the maximum MACCS2 allowed values as stipulated in the RAI, along with the non-farm wealth escalation (2005 dollars values), and the revised deposition velocity, the OECR increases approximately 91% for IP2 and 82% for IP3. The PDR increase is much smaller, approximately 7% for IP2 and 10% for IP3.

Tables 2A-2I and Tables 3A-3I present the detailed results (i.e., conditional and frequency weighted) for each of the sensitivity cases for PDR and OECR, for IP2 and IP3, respectively. Note that the frequencies used to weight the conditional results are those from the SAMA Reanalysis (Table E.1-13) [3].

Results associated with SAMA candidate specific MACCS2 cases that have been re-performed using the reanalyzed meteorology per Reference 3 and the applicable cases above to address CLI-16-07 are documented in Appendix A.

Table 1A – IP2 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	8.74E+01	—	2.12E+05	—
1	8.34E+01	-4.5%	2.64E+05	24.5%
2	1.09E+02	25.3%	3.96E+05	86.8%
3	9.72E+01	11.3%	4.47E+05	110.9%
4 (RAI Part 1)	8.74E+01	0.0%	2.33E+05	9.9%
5 (RAI Part 2a)	9.77E+01	11.8%	4.78E+05	125.7%
6	9.71E+01	11.2%	4.40E+05	107.8%
7 (RAI Part 1) (VDEPOS)	8.51E+01	-2.5%	1.90E+05	-10.3%
8 (RAI Part 2a) (VDEPOS)	9.30E+01	6.5%	4.05E+05	91.1%

Table 1B – IP3 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	9.49E+01	—	2.62E+05	—
1	8.98E+01	-5.4%	3.36E+05	28.5%
2	1.20E+02	26.1%	4.94E+05	89.0%
3	1.04E+02	9.8%	5.70E+05	117.8%
4 (RAI Part 1)	9.50E+01	0.1%	2.85E+05	9.0%
5 (RAI Part 2a)	1.05E+02	10.7%	6.08E+05	132.5%
6	1.04E+02	9.7%	5.62E+05	114.7%
7 (RAI Part 1) (VDEPOS)	9.66E+01	1.8%	2.19E+05	-16.5%
8 (RAI Part 2a) (VDEPOS)	1.04E+02	9.9%	4.75E+05	81.7%

Table 2A – IP2 Base Case MACCS2 Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.51E+07	4.23E+01	48.44%	2.05E+11	1.33E+05	62.87%
H/L	6.88E-07	1.63E+07	1.12E+01	12.84%	4.64E+10	3.19E+04	15.06%
M/E	4.23E-07	1.94E+07	8.21E+00	9.39%	5.87E+10	2.48E+04	11.71%
M/L	3.43E-06	6.87E+06	2.36E+01	26.98%	6.06E+09	2.08E+04	9.81%
L/E	1.11E-07	7.93E+06	8.80E-01	1.01%	6.39E+09	7.09E+02	0.33%
L/L	6.43E-07	1.61E+06	1.04E+00	1.19%	6.59E+08	4.24E+02	0.20%
LL/L	5.82E-08	1.38E+06	8.03E-02	0.09%	5.62E+08	3.27E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	9.98E+04	1.19E+00	0.00%
Total	1.79E-05	--	8.74E+01	100%	--	2.12E+05	100%

Table 2B – IP2 Case 1 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.02E+07	3.91E+01	46.91%	2.60E+11	1.69E+05	64.04%
H/L	6.88E-07	1.59E+07	1.09E+01	13.11%	5.51E+10	3.79E+04	14.36%
M/E	4.23E-07	1.87E+07	7.91E+00	9.48%	7.41E+10	3.13E+04	11.88%
M/L	3.43E-06	6.82E+06	2.34E+01	28.04%	7.07E+09	2.43E+04	9.19%
L/E	1.11E-07	7.88E+06	8.75E-01	1.05%	7.39E+09	8.20E+02	0.31%
L/L	6.43E-07	1.61E+06	1.04E+00	1.24%	8.33E+08	5.36E+02	0.20%
LL/L	5.82E-08	1.37E+06	7.97E-02	0.10%	7.14E+08	4.16E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.07%	9.98E+04	1.19E+00	0.00%
Total	1.79E-05	--	8.34E+01	100%	--	2.64E+05	100%

Table 2C – IP2 Case 2 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	9.41E+07	6.12E+01	55.88%	4.16E+11	2.70E+05	68.28%
H/L	6.88E-07	1.78E+07	1.22E+01	11.19%	7.13E+10	4.91E+04	12.39%
M/E	4.23E-07	2.29E+07	9.69E+00	8.85%	1.02E+11	4.31E+04	10.90%
M/L	3.43E-06	7.07E+06	2.43E+01	22.16%	9.19E+09	3.15E+04	7.96%
L/E	1.11E-07	8.16E+06	9.06E-01	0.83%	9.46E+09	1.05E+03	0.27%
L/L	6.43E-07	1.65E+06	1.06E+00	0.97%	1.18E+09	7.59E+02	0.19%
LL/L	5.82E-08	1.41E+06	8.21E-02	0.07%	1.01E+09	5.88E+01	0.01%
NCF	1.19E-05	4.75E+03	5.65E-02	0.05%	9.98E+04	1.19E+00	0.00%
Total	1.79E-05	--	1.09E+02	100%	--	3.96E+05	100%

Table 2D – IP2 Case 3 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.84E+07	5.10E+01	52.44%	4.70E+11	3.06E+05	68.34%
H/L	6.88E-07	1.69E+07	1.16E+01	11.96%	7.99E+10	5.50E+04	12.30%
M/E	4.23E-07	2.06E+07	8.71E+00	8.97%	1.17E+11	4.95E+04	11.07%
M/L	3.43E-06	6.94E+06	2.38E+01	24.49%	1.02E+10	3.50E+04	7.83%
L/E	1.11E-07	8.02E+06	8.90E-01	0.92%	1.05E+10	1.17E+03	0.26%
L/L	6.43E-07	1.63E+06	1.05E+00	1.08%	1.36E+09	8.74E+02	0.20%
LL/L	5.82E-08	1.39E+06	8.09E-02	0.08%	1.16E+09	6.75E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	9.98E+04	1.19E+00	0.00%
Total	1.79E-05	--	9.72E+01	100%	--	4.47E+05	100%

Table 2E – IP2 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.51E+07	4.23E+01	48.44%	2.27E+11	1.48E+05	63.33%
H/L	6.88E-07	1.63E+07	1.12E+01	12.84%	5.04E+10	3.47E+04	14.88%
M/E	4.23E-07	1.94E+07	8.21E+00	9.39%	6.36E+10	2.69E+04	11.55%
M/L	3.43E-06	6.87E+06	2.36E+01	26.98%	6.59E+09	2.26E+04	9.70%
L/E	1.11E-07	7.94E+06	8.81E-01	1.01%	6.93E+09	7.69E+02	0.33%
L/L	6.43E-07	1.61E+06	1.04E+00	1.19%	7.15E+08	4.60E+02	0.20%
LL/L	5.82E-08	1.38E+06	8.03E-02	0.09%	6.10E+08	3.55E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	1.07E+05	1.27E+00	0.00%
Total	1.79E-05	--	8.74E+01	100%	--	2.33E+05	100%

Table 2F – IP2 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.90E+07	5.14E+01	52.57%	5.03E+11	3.27E+05	68.35%
H/L	6.88E-07	1.69E+07	1.16E+01	11.90%	8.56E+10	5.89E+04	12.31%
M/E	4.23E-07	2.06E+07	8.71E+00	8.92%	1.25E+11	5.29E+04	11.05%
M/L	3.43E-06	6.97E+06	2.39E+01	24.48%	1.09E+10	3.74E+04	7.82%
L/E	1.11E-07	8.03E+06	8.91E-01	0.91%	1.12E+10	1.24E+03	0.26%
L/L	6.43E-07	1.63E+06	1.05E+00	1.07%	1.45E+09	9.32E+02	0.19%
LL/L	5.82E-08	1.39E+06	8.09E-02	0.08%	1.24E+09	7.22E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	1.07E+05	1.27E+00	0.00%
Total	1.79E-05	--	9.77E+01	100%	--	4.78E+05	100%

Table 2G – IP2 Case 6 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.83E+07	5.09E+01	52.41%	4.63E+11	3.01E+05	68.33%
H/L	6.88E-07	1.69E+07	1.16E+01	11.97%	7.87E+10	5.41E+04	12.29%
M/E	4.23E-07	2.06E+07	8.71E+00	8.97%	1.15E+11	4.86E+04	11.04%
M/L	3.43E-06	6.94E+06	2.38E+01	24.51%	1.01E+10	3.46E+04	7.87%
L/E	1.11E-07	8.02E+06	8.90E-01	0.92%	1.03E+10	1.14E+03	0.26%
L/L	6.43E-07	1.63E+06	1.05E+00	1.08%	1.34E+09	8.62E+02	0.20%
LL/L	5.82E-08	1.39E+06	8.09E-02	0.08%	1.15E+09	6.69E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	9.81E+04	1.17E+00	0.00%
Total	1.79E-05	--	9.71E+01	100%	--	4.40E+05	100%

Table 2H – IP2 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.85E+07	4.45E+01	52.30%	1.94E+11	1.26E+05	66.34%
H/L	6.88E-07	1.60E+07	1.10E+01	12.93%	3.71E+10	2.55E+04	13.43%
M/E	4.23E-07	1.90E+07	8.04E+00	9.44%	4.28E+10	1.81E+04	9.52%
M/L	3.43E-06	5.80E+06	1.99E+01	23.37%	5.71E+09	1.96E+04	10.30%
L/E	1.11E-07	6.40E+06	7.10E-01	0.83%	4.67E+09	5.18E+02	0.27%
L/L	6.43E-07	1.33E+06	8.55E-01	1.00%	3.72E+08	2.39E+02	0.13%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.08%	3.19E+08	1.86E+01	0.01%
NCF	1.19E-05	3.25E+03	3.87E-02	0.05%	4.00E+03	4.76E-02	0.00%
Total	1.79E-05	--	8.51E+01	100%	--	1.90E+05	100%

Table 2I – IP2 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.90E+07	5.14E+01	55.22%	4.49E+11	2.92E+05	72.05%
H/L	6.88E-07	1.66E+07	1.14E+01	12.28%	7.10E+10	4.88E+04	12.06%
M/E	4.23E-07	1.99E+07	8.42E+00	9.05%	7.96E+10	3.37E+04	8.31%
M/L	3.43E-06	5.87E+06	2.01E+01	21.65%	8.57E+09	2.94E+04	7.26%
L/E	1.11E-07	6.45E+06	7.16E-01	0.77%	7.02E+09	7.79E+02	0.19%
L/L	6.43E-07	1.33E+06	8.55E-01	0.92%	7.21E+08	4.64E+02	0.11%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.07%	6.09E+08	3.54E+01	0.01%
NCF	1.19E-05	3.25E+03	3.87E-02	0.04%	4.00E+03	4.76E-02	0.00%
Total	1.79E-05	--	9.30E+01	100%	--	4.05E+05	100%

Table 3A – IP3 Base Case MACCS2 Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.08E+07	4.79E+01	50.50%	1.70E+11	1.60E+05	61.28%
H/L	4.23E-07	1.63E+07	6.89E+00	7.27%	4.61E+10	1.95E+04	7.45%
M/E	1.24E-06	2.00E+07	2.48E+01	26.14%	5.55E+10	6.88E+04	26.31%
M/L	2.01E-06	6.85E+06	1.38E+01	14.51%	6.06E+09	1.22E+04	4.66%
L/E	1.46E-07	5.21E+06	7.61E-01	0.80%	3.58E+09	5.23E+02	0.20%
L/L	3.75E-07	1.61E+06	6.04E-01	0.64%	6.58E+08	2.47E+02	0.09%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.08%	5.62E+08	3.18E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	2.95E+05	1.86E+00	0.00%
Total	1.15E-05	--	9.49E+01	100%	--	2.62E+05	100%

Table 3B – IP3 Case 1 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	4.66E+07	4.39E+01	48.96%	2.30E+11	2.17E+05	64.53%
H/L	4.23E-07	1.59E+07	6.73E+00	7.49%	5.48E+10	2.32E+04	6.90%
M/E	1.24E-06	1.93E+07	2.39E+01	26.66%	6.52E+10	8.08E+04	24.06%
M/L	2.01E-06	6.80E+06	1.37E+01	15.23%	7.07E+09	1.42E+04	4.23%
L/E	1.46E-07	5.16E+06	7.53E-01	0.84%	4.11E+09	6.00E+02	0.18%
L/L	3.75E-07	1.60E+06	6.00E-01	0.67%	8.33E+08	3.12E+02	0.09%
LL/L	5.66E-08	1.37E+06	7.75E-02	0.09%	7.14E+08	4.04E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.06%	2.95E+05	1.86E+00	0.00%
Total	1.15E-05	--	8.98E+01	100%	--	3.36E+05	100%

Table 3C – IP3 Case 2 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	7.12E+07	6.71E+01	56.12%	3.62E+11	3.41E+05	69.04%
H/L	4.23E-07	1.78E+07	7.53E+00	6.29%	7.10E+10	3.00E+04	6.07%
M/E	1.24E-06	2.36E+07	2.93E+01	24.46%	8.33E+10	1.03E+05	20.89%
M/L	2.01E-06	7.05E+06	1.42E+01	11.84%	9.19E+09	1.85E+04	3.74%
L/E	1.46E-07	5.47E+06	7.99E-01	0.67%	5.22E+09	7.62E+02	0.15%
L/L	3.75E-07	1.64E+06	6.15E-01	0.51%	1.18E+09	4.43E+02	0.09%
LL/L	5.66E-08	1.40E+06	7.92E-02	0.07%	1.01E+09	5.72E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.04%	2.95E+05	1.86E+00	0.00%
Total	1.15E-05	--	1.20E+02	100%	--	4.94E+05	100%

Table 3D – IP3 Case 3 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.88E+07	5.54E+01	53.21%	4.23E+11	3.99E+05	70.01%
H/L	4.23E-07	1.69E+07	7.15E+00	6.86%	7.96E+10	3.37E+04	5.91%
M/E	1.24E-06	2.11E+07	2.62E+01	25.11%	9.30E+10	1.15E+05	20.24%
M/L	2.01E-06	6.93E+06	1.39E+01	13.37%	1.02E+10	2.05E+04	3.60%
L/E	1.46E-07	5.29E+06	7.72E-01	0.74%	5.75E+09	8.40E+02	0.15%
L/L	3.75E-07	1.63E+06	6.11E-01	0.59%	1.36E+09	5.10E+02	0.09%
LL/L	5.66E-08	1.39E+06	7.87E-02	0.08%	1.16E+09	6.57E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	2.95E+05	1.86E+00	0.00%
Total	1.15E-05	--	1.04E+02	100%	--	5.70E+05	100%

Table 3E – IP3 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.09E+07	4.80E+01	50.55%	1.86E+11	1.75E+05	61.50%
H/L	4.23E-07	1.63E+07	6.89E+00	7.26%	5.00E+10	2.12E+04	7.42%
M/E	1.24E-06	2.00E+07	2.48E+01	26.12%	6.01E+10	7.45E+04	26.13%
M/L	2.01E-06	6.85E+06	1.38E+01	14.50%	6.59E+09	1.32E+04	4.64%
L/E	1.46E-07	5.21E+06	7.61E-01	0.80%	3.87E+09	5.65E+02	0.20%
L/L	3.75E-07	1.61E+06	6.04E-01	0.64%	7.14E+08	2.68E+02	0.09%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.08%	6.10E+08	3.45E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	3.17E+05	2.00E+00	0.00%
Total	1.15E-05	--	9.50E+01	100%	--	2.85E+05	100%

Table 3F – IP3 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.95E+07	5.61E+01	53.42%	4.51E+11	4.25E+05	69.93%
H/L	4.23E-07	1.69E+07	7.15E+00	6.81%	8.52E+10	3.60E+04	5.93%
M/E	1.24E-06	2.12E+07	2.63E+01	25.03%	9.95E+10	1.23E+05	20.29%
M/L	2.01E-06	6.95E+06	1.40E+01	13.30%	1.09E+10	2.19E+04	3.60%
L/E	1.46E-07	5.30E+06	7.74E-01	0.74%	6.15E+09	8.98E+02	0.15%
L/L	3.75E-07	1.63E+06	6.11E-01	0.58%	1.45E+09	5.44E+02	0.09%
LL/L	5.66E-08	1.39E+06	7.87E-02	0.07%	1.24E+09	7.02E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	3.17E+05	2.00E+00	0.00%
Total	1.15E-05	--	1.05E+02	100%	--	6.08E+05	100%

Table 3G – IP3 Case 6 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.87E+07	5.54E+01	53.18%	4.17E+11	3.93E+05	70.01%
H/L	4.23E-07	1.69E+07	7.15E+00	6.87%	7.85E+10	3.32E+04	5.91%
M/E	1.24E-06	2.11E+07	2.62E+01	25.14%	9.16E+10	1.14E+05	20.22%
M/L	2.01E-06	6.92E+06	1.39E+01	13.36%	1.01E+10	2.03E+04	3.61%
L/E	1.46E-07	5.29E+06	7.72E-01	0.74%	5.66E+09	8.26E+02	0.15%
L/L	3.75E-07	1.63E+06	6.11E-01	0.59%	1.34E+09	5.03E+02	0.09%
LL/L	5.66E-08	1.39E+06	7.87E-02	0.08%	1.15E+09	6.51E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	2.90E+05	1.83E+00	0.00%
Total	1.15E-05	--	1.04E+02	100%	--	5.62E+05	100%

Table 3H – IP3 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.49E+07	5.18E+01	53.59%	1.45E+11	1.37E+05	62.57%
H/L	4.23E-07	1.60E+07	6.77E+00	7.01%	3.71E+10	1.57E+04	7.18%
M/E	1.24E-06	2.03E+07	2.52E+01	26.06%	4.36E+10	5.41E+04	24.74%
M/L	2.01E-06	5.79E+06	1.16E+01	12.05%	5.71E+09	1.15E+04	5.25%
L/E	1.46E-07	4.48E+06	6.54E-01	0.68%	2.85E+09	4.16E+02	0.19%
L/L	3.75E-07	1.33E+06	4.99E-01	0.52%	3.72E+08	1.40E+02	0.06%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.07%	3.19E+08	1.81E+01	0.01%
NCF	6.30E-06	5.54E+03	3.49E-02	0.04%	1.17E+04	7.37E-02	0.00%
Total	1.15E-05	--	9.66E+01	100%	--	2.19E+05	100%

Table 3I – IP3 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	6.16E+07	5.81E+01	55.72%	3.59E+11	3.39E+05	71.22%
H/L	4.23E-07	1.65E+07	6.98E+00	6.70%	7.10E+10	3.00E+04	6.32%
M/E	1.24E-06	2.11E+07	2.62E+01	25.10%	7.15E+10	8.87E+04	18.65%
M/L	2.01E-06	5.85E+06	1.18E+01	11.28%	8.56E+09	1.72E+04	3.62%
L/E	1.46E-07	4.52E+06	6.60E-01	0.63%	4.10E+09	5.99E+02	0.13%
L/L	3.75E-07	1.33E+06	4.99E-01	0.48%	7.21E+08	2.70E+02	0.06%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.06%	6.09E+08	3.45E+01	0.01%
NCF	6.30E-06	5.54E+03	3.49E-02	0.03%	1.17E+04	7.37E-02	0.00%
Total	1.15E-05	--	1.04E+02	100%	--	4.75E+05	100%

A. SAMA CANDIDATE MACCS2 RUNS

A.1. PURPOSE

This appendix documents additional MACCS2 runs performed for specific SAMA candidates to model the potential benefit. These runs support the response to the NRC RAI pertaining to the NRC Commission Decision CLI-16-07 for IPEC.

A.2. METHODOLOGY

The original SAMA candidate evaluations are documented in References 6 and 7. These SAMA candidate specific MACCS2 cases are re-performed using the reanalyzed meteorology for the IPEC site per Reference 3 and the applicable cases in the main body of this document (i.e., cases 4, 5, 7, and 8) to address CLI-16-07. Specifically, MACCS2 cases were re-performed to address the following SAMA candidates:

- IP2 Phase II Candidate 020 - Revised the fission product release fractions for H-E, M-E, L-E release categories to those specified in "IP2 Radionuclide Release Results-Level1-20.xls". Original results for PDR and OECR are documented in "sumi2NS-noE-R-NmetEC.xls".
- IP3 Phase II Candidate 018 - Revised the fission product release fractions for H-E, M-E, L-E release categories to those specified in "IP3 Radionuclide Release Results-Level2-18.xls". Original results for PDR and OECR are documented in "sumi3NS-noE-NmetEC-R-level130a.xls".
- IP2 TI-SGTR (RAI #5) - Revised the release attributes for the H-E release category to those specified in "IP2 Radionuclide Release Results-RAI#5.xls". Original results for PDR and OECR are documented in "sumi2NS-noE-R-NmetEC-Base-RAI5.xls". Release category frequencies for NCF and H-E are revised for this RAI.
- IP3 TI-SGTR (RAI #5) - Revised the release attributes for the H-E release category to those specified in "IP3 Radionuclide Release Results-Base-RAI#5.xls". Original results for PDR and OECR are documented in "sumi3NS-noE-NmetEC-R-level130a-RAI5.xls". Release category frequencies for NCF and H-E are revised for this RAI.
- Spreadsheets identified above for the SAMA candidate cases were provided by Entergy consultant (L. Potts).

For each sensitivity case, the MACCS2 results for total 50-mile offsite costs and 50-mile population dose for each release category are multiplied by the applicable release category frequency to calculate the OECR and PDR. The OECR and PDR of the various sensitivity cases are then compared against applicable reference cases to determine the impact of the revised parameters.

For each SAMA candidate, the following cases are performed.

- SAMA Base Case Check
 - This case confirms that the results can be reproduced with the applicable MACCS2 files upon which the sensitivity cases are built.

- **Case 4**
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values. VALWNF is used in the CHRONC input file and represents an average value for the 50 mile region. VNFRM is used in the SITE input file and is calculated on a county basis. Calculation of these values is presented below in the main report.
 - This case addresses Part 1 of the RAI (i.e., corrected VALWNF), and represents the “revised baseline” as specified in the RAI.
- **Case 5**
 - TIMDEC is escalated to one year (365 days) and CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - This case addresses Part 2(a) of the RAI.
- **Case 7**
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - The dry deposition velocity, VDEPOS, is set to 0.003 m/sec in the ATMOS input file rather than the Reference 3 value of 0.010 m/sec. The value of 0.003m/sec is documented by the recent NRC’s SOARCA Project to be the dominant or average value for use in SOARCA (Reference 5) and is viewed as more representative of severe accident source terms than the value of 0.010m/sec used in the NUREG-1150 studies.
 - Similar to Case 4, Case 7 addresses Part 1 of the RAI (i.e., corrected VALWNF), and represents the “revised baseline” as specified in the RAI, except with an updated dry deposition velocity.
- **Case 8**
 - TIMDEC is escalated to one year (365 days) and CDNFRM is escalated to \$100,000/person for DF=15 in the CHRONC input file.
 - VALWNF & VNFRM (including lost tourism and business) are escalated to 2005 values in the CHRONC and SITE input files, respectively.
 - The dry deposition velocity, VDEPOS, is set to 0.003 m/sec in the ATMOS input file rather than the Reference 3 value of 0.010 m/sec.
 - Similar to Case 5, Case 8 addresses Part 2(a) of the RAI (i.e., corrected VALWNF, increased TIMDEC & CDNFRM), as specified in the RAI, except with an updated dry deposition velocity.

Cases 4, 5, 7, and 8 parameter value changes are applied to all IPEC release categories for consistency, (i.e., not just the four worst release categories as specified in the RAI.)

A.3. RESULTS

Tables A-1A and A-1B summarize the SAMA candidate specific MACCS2 sensitivity case results for PDR and OECR for IP2 and Tables A-1C and A-1D summarize the results for IP3.

Tables A-2A through A-2J and Tables A-3A through A-3J present the detailed results (i.e., conditional and frequency weighted) for each of the sensitivity cases for PDR and OECR, for IP2 and IP3, respectively.

Table A-1A - IP2 Candidate 020 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	8.47E+01	--	2.02E+05	--
4	8.49E+01	0.2%	2.22E+05	9.8%
5	9.43E+01	11.3%	4.52E+05	123.5%
7	8.23E+01	-2.9%	1.82E+05	-9.9%
8	8.95E+01	5.6%	3.88E+05	91.6%

Table A-1B - IP2 RAI #5 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	1.09E+02	--	2.75E+05	--
4	1.09E+02	0.1%	3.02E+05	10.0%
5	1.23E+02	13.2%	6.37E+05	132.0%
7	1.08E+02	-0.5%	2.47E+05	-10.0%
8	1.19E+02	9.2%	5.48E+05	99.4%

Table A-1C - IP3 Candidate 018 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	8.44E+01	--	2.26E+05	--
4	8.44E+01	0.0%	2.48E+05	9.4%
5	9.28E+01	10.0%	5.34E+05	135.8%
7	8.41E+01	-0.3%	1.95E+05	-13.8%
8	9.04E+01	7.1%	4.16E+05	83.9%

Table A-1D - IP3 RAI #5 MACCS2 Case Comparison

Case	Population Dose Risk (p-rem/yr)	Δ Base (%)	Offsite Economic Cost Risk (\$/yr)	Δ Base (%)
Base Case	1.31E+02	--	3.67E+05	--
4	1.31E+02	0.1%	4.00E+05	9.0%
5	1.47E+02	12.9%	8.83E+05	140.9%
7	1.36E+02	4.1%	3.15E+05	-14.1%
8	1.48E+02	13.7%	7.11E+05	93.9%

Table A-2A – IP2-020 Base Case MACCS2 Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.30E+07	4.10E+01	48.33%	2.01E+11	1.31E+05	64.54%
H/L	6.88E-07	1.63E+07	1.12E+01	13.24%	4.64E+10	3.19E+04	15.77%
M/E	4.23E-07	1.65E+07	6.98E+00	8.24%	4.27E+10	1.81E+04	8.92%
M/L	3.43E-06	6.87E+06	2.36E+01	27.81%	6.06E+09	2.08E+04	10.27%
L/E	1.11E-07	7.59E+06	8.42E-01	0.99%	4.97E+09	5.52E+02	0.27%
L/L	6.43E-07	1.61E+06	1.04E+00	1.22%	6.59E+08	4.24E+02	0.21%
LL/L	5.82E-08	1.38E+06	8.03E-02	0.09%	5.62E+08	3.27E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.07%	9.98E+04	1.19E+00	0.00%
Total	1.79E-05	--	8.47E+01	100%	--	2.02E+05	100%

Table A-2B – IP2-020 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.33E+07	4.11E+01	48.45%	2.22E+11	1.44E+05	64.92%
H/L	6.88E-07	1.63E+07	1.12E+01	13.21%	5.04E+10	3.47E+04	15.60%
M/E	4.23E-07	1.65E+07	6.98E+00	8.22%	4.63E+10	1.96E+04	8.81%
M/L	3.43E-06	6.87E+06	2.36E+01	27.75%	6.59E+09	2.26E+04	10.17%
L/E	1.11E-07	7.59E+06	8.42E-01	0.99%	5.40E+09	5.99E+02	0.27%
L/L	6.43E-07	1.61E+06	1.04E+00	1.22%	7.15E+08	4.60E+02	0.21%
LL/L	5.82E-08	1.38E+06	8.03E-02	0.09%	6.10E+08	3.55E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.07%	1.07E+05	1.27E+00	0.00%
Total	1.79E-05	--	8.49E+01	100%	--	2.22E+05	100%

Table A-2C – IP2-020 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.61E+07	4.95E+01	52.47%	4.98E+11	3.24E+05	71.54%
H/L	6.88E-07	1.69E+07	1.16E+01	12.33%	8.56E+10	5.89E+04	13.02%
M/E	4.23E-07	1.71E+07	7.23E+00	7.67%	7.20E+10	3.05E+04	6.73%
M/L	3.43E-06	6.97E+06	2.39E+01	25.36%	1.09E+10	3.74E+04	8.26%
L/E	1.11E-07	7.67E+06	8.51E-01	0.90%	9.36E+09	1.04E+03	0.23%
L/L	6.43E-07	1.63E+06	1.05E+00	1.11%	1.45E+09	9.32E+02	0.21%
LL/L	5.82E-08	1.39E+06	8.09E-02	0.09%	1.24E+09	7.22E+01	0.02%
NCF	1.19E-05	4.75E+03	5.65E-02	0.06%	1.07E+05	1.27E+00	0.00%
Total	1.79E-05	--	9.43E+01	100%	--	4.52E+05	100%

Table A-2D – IP2-020 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	6.70E+07	4.36E+01	52.92%	1.88E+11	1.22E+05	66.99%
H/L	6.88E-07	1.60E+07	1.10E+01	13.38%	3.71E+10	2.55E+04	13.99%
M/E	4.23E-07	1.47E+07	6.22E+00	7.56%	3.40E+10	1.44E+04	7.88%
M/L	3.43E-06	5.80E+06	1.99E+01	24.18%	5.71E+09	1.96E+04	10.74%
L/E	1.11E-07	5.96E+06	6.62E-01	0.80%	4.25E+09	4.72E+02	0.26%
L/L	6.43E-07	1.33E+06	8.55E-01	1.04%	3.72E+08	2.39E+02	0.13%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.08%	3.19E+08	1.86E+01	0.01%
NCF	1.19E-05	3.25E+03	3.87E-02	0.05%	4.00E+03	4.76E-02	0.00%
Total	1.79E-05	--	8.23E+01	100%	--	1.82E+05	100%

Table A-2E – IP2-020 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	6.50E-07	7.68E+07	4.99E+01	55.78%	4.40E+11	2.86E+05	73.75%
H/L	6.88E-07	1.66E+07	1.14E+01	12.76%	7.10E+10	4.88E+04	12.60%
M/E	4.23E-07	1.51E+07	6.39E+00	7.14%	5.29E+10	2.24E+04	5.77%
M/L	3.43E-06	5.87E+06	2.01E+01	22.50%	8.57E+09	2.94E+04	7.58%
L/E	1.11E-07	6.01E+06	6.67E-01	0.75%	6.30E+09	6.99E+02	0.18%
L/L	6.43E-07	1.33E+06	8.55E-01	0.96%	7.21E+08	4.64E+02	0.12%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.07%	6.09E+08	3.54E+01	0.01%
NCF	1.19E-05	3.25E+03	3.87E-02	0.04%	4.00E+03	4.76E-02	0.00%
Total	1.79E-05	—	8.95E+01	100%	—	3.88E+05	100%

Table A-2F – IP2-RAI5 Base Case MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.90E-07	6.44E+07	6.37E+01	58.59%	1.98E+11	1.96E+05	71.34%
H/L	6.88E-07	1.63E+07	1.12E+01	10.31%	4.64E+10	3.19E+04	11.62%
M/E	4.23E-07	1.94E+07	8.21E+00	7.54%	5.87E+10	2.48E+04	9.04%
M/L	3.43E-06	6.87E+06	2.36E+01	21.68%	6.06E+09	2.08E+04	7.57%
L/E	1.11E-07	7.93E+06	8.81E-01	0.81%	6.39E+09	7.10E+02	0.26%
L/L	6.43E-07	1.61E+06	1.04E+00	0.95%	6.59E+08	4.24E+02	0.15%
LL/L	5.82E-08	1.38E+06	8.04E-02	0.07%	5.62E+08	3.27E+01	0.01%
NCF	1.15E-05	4.75E+03	5.48E-02	0.05%	9.98E+04	1.15E+00	0.00%
Total	1.79E-05	—	1.09E+02	100%	—	2.75E+05	100%

Table A-2G – IP2-RAI5 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.90E-07	6.45E+07	6.38E+01	58.62%	2.19E+11	2.17E+05	71.72%
H/L	6.88E-07	1.63E+07	1.12E+01	10.30%	5.04E+10	3.47E+04	11.47%
M/E	4.23E-07	1.94E+07	8.21E+00	7.54%	6.36E+10	2.69E+04	8.90%
M/L	3.43E-06	6.87E+06	2.36E+01	21.66%	6.59E+09	2.26E+04	7.49%
L/E	1.11E-07	7.94E+06	8.82E-01	0.81%	6.93E+09	7.70E+02	0.25%
L/L	6.43E-07	1.61E+06	1.04E+00	0.95%	7.15E+08	4.60E+02	0.15%
LL/L	5.82E-08	1.38E+06	8.04E-02	0.07%	6.10E+08	3.55E+01	0.01%
NCF	1.15E-05	4.75E+03	5.48E-02	0.05%	1.07E+05	1.23E+00	0.00%
Total	1.79E-05	--	1.09E+02	100%	--	3.02E+05	100%

Table A-2H – IP2-RAI5 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.90E-07	7.76E+07	7.68E+01	62.37%	4.91E+11	4.86E+05	76.24%
H/L	6.88E-07	1.69E+07	1.16E+01	9.44%	8.56E+10	5.89E+04	9.24%
M/E	4.23E-07	2.06E+07	8.71E+00	7.08%	1.25E+11	5.29E+04	8.30%
M/L	3.43E-06	6.97E+06	2.39E+01	19.43%	1.09E+10	3.74E+04	5.87%
L/E	1.11E-07	8.03E+06	8.92E-01	0.72%	1.12E+10	1.24E+03	0.20%
L/L	6.43E-07	1.63E+06	1.05E+00	0.85%	1.45E+09	9.32E+02	0.15%
LL/L	5.82E-08	1.39E+06	8.09E-02	0.07%	1.24E+09	7.22E+01	0.01%
NCF	1.15E-05	4.75E+03	5.48E-02	0.04%	1.07E+05	1.23E+00	0.00%
Total	1.79E-05	--	1.23E+02	100%	--	6.37E+05	100%

Table A-2I – IP2-RAI5 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.90E-07	6.83E+07	6.76E+01	62.46%	1.85E+11	1.83E+05	74.10%
H/L	6.88E-07	1.60E+07	1.10E+01	10.17%	3.71E+10	2.55E+04	10.33%
M/E	4.23E-07	1.90E+07	8.04E+00	7.43%	4.28E+10	1.81E+04	7.33%
M/L	3.43E-06	5.80E+06	1.99E+01	18.40%	5.71E+09	1.96E+04	7.93%
L/E	1.11E-07	6.40E+06	7.11E-01	0.66%	4.67E+09	5.19E+02	0.21%
L/L	6.43E-07	1.33E+06	8.55E-01	0.79%	3.72E+08	2.39E+02	0.10%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.06%	3.19E+08	1.86E+01	0.01%
NCF	1.15E-05	3.25E+03	3.75E-02	0.03%	4.00E+03	4.61E-02	0.00%
Total	1.79E-05	--	1.08E+02	100%	--	2.47E+05	100%

Table A-2J – IP2-RAI5 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.90E-07	7.79E+07	7.71E+01	64.92%	4.39E+11	4.34E+05	79.33%
H/L	6.88E-07	1.66E+07	1.14E+01	9.62%	7.10E+10	4.88E+04	8.92%
M/E	4.23E-07	1.99E+07	8.42E+00	7.09%	7.96E+10	3.37E+04	6.15%
M/L	3.43E-06	5.87E+06	2.01E+01	16.97%	8.57E+09	2.94E+04	5.37%
L/E	1.11E-07	6.45E+06	7.16E-01	0.60%	7.02E+09	7.80E+02	0.14%
L/L	6.43E-07	1.33E+06	8.55E-01	0.72%	7.21E+08	4.64E+02	0.08%
LL/L	5.82E-08	1.12E+06	6.52E-02	0.05%	6.09E+08	3.55E+01	0.01%
NCF	1.15E-05	3.25E+03	3.75E-02	0.03%	4.00E+03	4.61E-02	0.00%
Total	1.79E-05	--	1.19E+02	100%	--	5.48E+05	100%

Table A-3A – IP3-018 Base Case MACCS2 Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	4.81E+07	4.54E+01	53.75%	1.61E+11	1.52E+05	67.11%
H/L	4.23E-07	1.63E+07	6.89E+00	8.17%	4.61E+10	1.95E+04	8.62%
M/E	1.24E-06	1.38E+07	1.71E+01	20.28%	3.40E+10	4.22E+04	18.63%
M/L	2.01E-06	6.85E+06	1.38E+01	16.32%	6.06E+09	1.22E+04	5.38%
L/E	1.46E-07	3.59E+06	5.24E-01	0.62%	2.07E+09	3.02E+02	0.13%
L/L	3.75E-07	1.61E+06	6.04E-01	0.72%	6.58E+08	2.47E+02	0.11%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.09%	5.62E+08	3.18E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.06%	2.95E+05	1.86E+00	0.00%
Total	1.15E-05	--	8.44E+01	100%	--	2.26E+05	100%

Table A-3B – IP3-018 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	4.81E+07	4.54E+01	53.75%	1.77E+11	1.67E+05	67.42%
H/L	4.23E-07	1.63E+07	6.89E+00	8.17%	5.00E+10	2.12E+04	8.54%
M/E	1.24E-06	1.38E+07	1.71E+01	20.28%	3.68E+10	4.56E+04	18.43%
M/L	2.01E-06	6.85E+06	1.38E+01	16.32%	6.59E+09	1.32E+04	5.35%
L/E	1.46E-07	3.59E+06	5.24E-01	0.62%	2.24E+09	3.27E+02	0.13%
L/L	3.75E-07	1.61E+06	6.04E-01	0.72%	7.14E+08	2.68E+02	0.11%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.09%	6.10E+08	3.45E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.06%	3.17E+05	2.00E+00	0.00%
Total	1.15E-05	--	8.44E+01	100%	--	2.48E+05	100%

Table A-3C – IP3-018 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.59E+07	5.27E+01	56.78%	4.35E+11	4.10E+05	76.88%
H/L	4.23E-07	1.69E+07	7.15E+00	7.70%	8.52E+10	3.60E+04	6.75%
M/E	1.24E-06	1.43E+07	1.77E+01	19.10%	5.18E+10	6.42E+04	12.04%
M/L	2.01E-06	6.95E+06	1.40E+01	15.05%	1.09E+10	2.19E+04	4.11%
L/E	1.46E-07	3.65E+06	5.33E-01	0.57%	3.84E+09	5.61E+02	0.11%
L/L	3.75E-07	1.63E+06	6.11E-01	0.66%	1.45E+09	5.44E+02	0.10%
LL/L	5.66E-08	1.39E+06	7.87E-02	0.08%	1.24E+09	7.02E+01	0.01%
NCF	6.30E-06	8.04E+03	5.07E-02	0.05%	3.17E+05	2.00E+00	0.00%
Total	1.15E-05	—	9.28E+01	100%	—	5.34E+05	100%

Table A-3D – IP3-018 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.20E+07	4.90E+01	58.30%	1.38E+11	1.30E+05	66.74%
H/L	4.23E-07	1.60E+07	6.77E+00	8.05%	3.71E+10	1.57E+04	8.05%
M/E	1.24E-06	1.26E+07	1.56E+01	18.58%	3.01E+10	3.73E+04	19.14%
M/L	2.01E-06	5.79E+06	1.16E+01	13.84%	5.71E+09	1.15E+04	5.89%
L/E	1.46E-07	3.07E+06	4.48E-01	0.53%	1.34E+09	1.96E+02	0.10%
L/L	3.75E-07	1.33E+06	4.99E-01	0.59%	3.72E+08	1.40E+02	0.07%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.08%	3.19E+08	1.81E+01	0.01%
NCF	6.30E-06	5.54E+03	3.49E-02	0.04%	1.17E+04	7.37E-02	0.00%
Total	1.15E-05	--	8.41E+01	100%	—	1.95E+05	100%

Table A-3E – IP3-018 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	9.43E-07	5.78E+07	5.45E+01	60.29%	3.35E+11	3.16E+05	75.94%
H/L	4.23E-07	1.65E+07	6.98E+00	7.72%	7.10E+10	3.00E+04	7.22%
M/E	1.24E-06	1.30E+07	1.61E+01	17.83%	4.21E+10	5.22E+04	12.55%
M/L	2.01E-06	5.85E+06	1.18E+01	13.01%	8.56E+09	1.72E+04	4.14%
L/E	1.46E-07	3.09E+06	4.51E-01	0.50%	2.17E+09	3.17E+02	0.08%
L/L	3.75E-07	1.33E+06	4.99E-01	0.55%	7.21E+08	2.70E+02	0.06%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.07%	6.09E+08	3.45E+01	0.01%
NCF	6.30E-06	5.54E+03	3.49E-02	0.04%	1.17E+04	7.37E-02	0.00%
Total	1.15E-05	—	9.04E+01	100%	—	4.16E+05	100%

Table A-3F – IP3-RAI5 Base Case MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	1.54E-06	5.42E+07	8.37E+01	64.09%	1.72E+11	2.65E+05	72.42%
H/L	4.23E-07	1.63E+07	6.89E+00	5.28%	4.61E+10	1.95E+04	5.32%
M/E	1.24E-06	2.00E+07	2.47E+01	18.96%	5.55E+10	6.87E+04	18.73%
M/L	2.01E-06	6.85E+06	1.37E+01	10.53%	6.06E+09	1.22E+04	3.32%
L/E	1.46E-07	5.21E+06	7.59E-01	0.58%	3.58E+09	5.21E+02	0.14%
L/L	3.75E-07	1.61E+06	6.03E-01	0.46%	6.58E+08	2.47E+02	0.07%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.06%	5.62E+08	3.18E+01	0.01%
NCF	5.70E-06	8.04E+03	4.58E-02	0.04%	2.95E+05	1.68E+00	0.00%
Total	1.15E-05	—	1.31E+02	100%	—	3.67E+05	100%

Table A-3G – IP3-RAI5 Case 4 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	1.54E-06	5.43E+07	8.38E+01	64.14%	1.88E+11	2.90E+05	72.59%
H/L	4.23E-07	1.63E+07	6.89E+00	5.27%	5.00E+10	2.11E+04	5.29%
M/E	1.24E-06	2.00E+07	2.47E+01	18.94%	6.01E+10	7.44E+04	18.60%
M/L	2.01E-06	6.85E+06	1.37E+01	10.52%	6.59E+09	1.32E+04	3.31%
L/E	1.46E-07	5.21E+06	7.59E-01	0.58%	3.87E+09	5.63E+02	0.14%
L/L	3.75E-07	1.61E+06	6.03E-01	0.46%	7.14E+08	2.68E+02	0.07%
LL/L	5.66E-08	1.38E+06	7.81E-02	0.06%	6.10E+08	3.45E+01	0.01%
NCF	5.70E-06	8.04E+03	4.58E-02	0.04%	3.17E+05	1.81E+00	0.00%
Total	1.15E-05	--	1.31E+02	100%	--	4.00E+05	100%

Table A-3H – IP3-RAI5 Case 5 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	1.54E-06	6.38E+07	9.85E+01	66.85%	4.54E+11	7.01E+05	79.34%
H/L	4.23E-07	1.69E+07	7.14E+00	4.85%	8.52E+10	3.60E+04	4.08%
M/E	1.24E-06	2.12E+07	2.62E+01	17.81%	9.95E+10	1.23E+05	13.94%
M/L	2.01E-06	6.95E+06	1.39E+01	9.47%	1.09E+10	2.19E+04	2.48%
L/E	1.46E-07	5.30E+06	7.72E-01	0.52%	6.15E+09	8.95E+02	0.10%
L/L	3.75E-07	1.63E+06	6.11E-01	0.41%	1.45E+09	5.43E+02	0.06%
LL/L	5.66E-08	1.39E+06	7.87E-02	0.05%	1.24E+09	7.02E+01	0.01%
NCF	5.70E-06	8.04E+03	4.58E-02	0.03%	3.17E+05	1.81E+00	0.00%
Total	1.15E-05	--	1.47E+02	100%	--	8.83E+05	100%

Table A-3I – IP3-RAI5 Case 7 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	1.54E-06	5.90E+07	9.11E+01	67.05%	1.51E+11	2.33E+05	74.05%
H/L	4.23E-07	1.60E+07	6.76E+00	4.98%	3.71E+10	1.57E+04	4.98%
M/E	1.24E-06	2.03E+07	2.51E+01	18.49%	4.36E+10	5.39E+04	17.14%
M/L	2.01E-06	5.79E+06	1.16E+01	8.55%	5.71E+09	1.15E+04	3.64%
L/E	1.46E-07	4.48E+06	6.52E-01	0.48%	2.85E+09	4.15E+02	0.13%
L/L	3.75E-07	1.33E+06	4.98E-01	0.37%	3.72E+08	1.39E+02	0.04%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.05%	3.19E+08	1.81E+01	0.01%
NCF	5.70E-06	5.54E+03	3.16E-02	0.02%	1.17E+04	6.66E-02	0.00%
Total	1.15E-05	--	1.36E+02	100%	--	3.15E+05	100%

Table A-3J – IP3-RAI5 Case 8 MACCS2 Sensitivity Results

Release Category	Frequency (per yr)	Population Dose (p-rem)	Population Dose Risk (p-rem/yr)	PDR % of Total	Offsite Economic Cost (\$)	Offsite Economic Cost Risk (\$/yr)	OECR % of Total
H/E	1.54E-06	6.63E+07	1.02E+02	68.96%	3.72E+11	5.74E+05	80.79%
H/L	4.23E-07	1.65E+07	6.97E+00	4.70%	7.10E+10	3.00E+04	4.22%
M/E	1.24E-06	2.11E+07	2.61E+01	17.59%	7.15E+10	8.85E+04	12.45%
M/L	2.01E-06	5.85E+06	1.17E+01	7.91%	8.56E+09	1.72E+04	2.42%
L/E	1.46E-07	4.52E+06	6.58E-01	0.44%	4.10E+09	5.97E+02	0.08%
L/L	3.75E-07	1.33E+06	4.98E-01	0.34%	7.21E+08	2.70E+02	0.04%
LL/L	5.66E-08	1.12E+06	6.34E-02	0.04%	6.09E+08	3.45E+01	0.00%
NCF	5.70E-06	5.54E+03	3.16E-02	0.02%	1.17E+04	6.66E-02	0.00%
Total	1.15E-05	--	1.48E+02	100%	--	7.11E+05	100%