

Revisions to Tables in ISR Report 13014-01-01:
Review of Indian Point Severe Accident Off Site Consequence Analysis (21 Dec 2011)

These revised tables include the following changes that account for the differences with the ISR Report:

- Exclusion of compensation costs from *Site Restoration* and Reichmuth data (Tables 2 and 5);
- Exclusion of surface water and farm area so that only nonfarm area is considered when determining CDNFRM (Tables 3-4, 7-10); and
- Update of conclusions as a result of these changes (Tables 11 and 13).

Table 2: Modified decontamination costs (2005 USD) for NYC using building density multiplier

	Luna, Survey of Costs	Site Restoration (Albuquerque)			ISR Using Actual Building Densities (NYC)			
Land Use	Area Fraction in NYC	Light (2<DF<5) (\$M/km ²)	Moderate (5<DF<10) (\$M/km ²)	Heavy (DF>10) (\$M/km ²)	Building Density Multiplier	Light (2<DF<5) (\$M/km ²)	Moderate (5<DF<10) (\$M/km ²)	Heavy (DF>10) (\$M/km ²)
Residential	0.287	\$20.8	\$38.7	\$36.0	8.98	\$186.7	\$347.8	\$323.0
Commercial	0.164	\$21.4	\$34.5	\$57.8	8.98	\$192.3	\$309.8	\$518.6
Industrial	0.068	\$33.3	\$35.3	\$59.3	1	\$33.3	\$35.3	\$59.3
Streets	0.25	\$4.0	\$4.6	\$50.0	1	\$4.0	\$4.6	\$50.0
Vacant land	0.238	\$19.3	\$20.4	\$21.8	1	\$19.3	\$20.4	\$21.8
Overall cost		\$98.7	\$133.6	\$224.8		\$435.50	\$717.86	\$972.78

Table 3: Suggested values of CDNFRM assuming cost (cesium) = cost (plutonium) (costs in 2005 USD)

	Light Decontamination (DF=3)		Heavy Decontamination (DF=15)	
	NYC metro	Area Outside NYC Metro Area	NYC metro	Area Outside NYC Metro Area
Cost per km ² (\$) from <i>Site Restoration / Survey of Costs</i>	4.36E+08	9.87E+07	9.73E+08	2.25E+08
Total nonfarm area within 50-mi radius (km ²)	558	15441	558	15441
Total cost for the area (\$)	2.43E+11	1.52E+12	5.43E+11	3.47E+12
Total cost over 50-mi radius (\$)	1.77E+12		4.01E+12	
Population over 50-mi radius	19,228,712		19,228,712	
CDNFRM				
Per capita cost (\$/person)	91,936		208,780	

Table 4: Suggested values of CDNFRM assuming cost (cesium) = 2 × cost (plutonium) (costs in 2005 USD)

	Light Decontamination (DF=3)		Heavy Decontamination (DF=15)	
	NYC metro	Area Outside NYC Metro Area	NYC metro	Area Outside NYC Metro Area
Cost per km ² (\$) from <i>Site Restoration / Survey of Costs</i>	8.71E+08	1.97E+08	1.95E+09	4.50E+08
Total nonfarm area within 50-mi radius (km ²)	558	15441	558	15441
Total cost for the area (\$)	4.86E+11	3.05E+12	1.09E+12	6.94E+12
Total cost over 50-mi radius (\$)	3.54E+12		8.03E+12	
Population over 50-mi radius	19,228,712		19,228,712	
CDNFRM				
Per capita cost (\$/person)	183,871		417,561	

Table 7: Costs using CONDO values assuming the NYC metro area is classified as urban and the area outside the NYC metro area is classified as semi-urban (costs in 2005 USD)

	Light Decontamination (DF=3)		Heavy Decontamination (DF=15)	
	NYC metro	Area Outside NYC Metro Area	NYC metro	Area Outside NYC Metro Area
Cost per km ² , (\$) (Annex C)	2.78E+07	1.82E+07	1.31E+08	8.40E+07
Total nonfarm area within 50-mi radius (km ²)	558	15441	558	15441
Total cost for the area (\$)	1.55E+10	2.81E+11	7.31E+10	1.30E+12
Total cost over 50-mi radius (\$)	2.97E+11		1.37E+12	
Population over 50-mi radius	19,228,712		19,228,712	
CDNFRM				
Per capita cost (\$/person)	15,422		71,255	

Table 8: Costs using CONDO values assuming the NYC metro area is classified as hyper-urban and the area outside the NYC metro area is classified as urban (costs in 2005 USD)

	Light Decontamination (DF=3)		Heavy Decontamination (DF=15)	
	NYC metro	Area Outside NYC Metro Area	NYC metro	Area Outside NYC Metro Area
Cost per km ² , (\$) (Annex C)	5.61E+07	2.78E+07	2.64E+08	1.31E+08
Total nonfarm area within 50-mi radius (km ²)	558	15441	558	15441
Total cost for the area (\$)	3.13E+10	4.29E+11	1.47E+11	2.02E+12
Total cost over 50-mi radius (\$)	4.61E+11		2.17E+12	
Population over 50-mi radius	19,228,712		19,228,712	
CDNFRM	23,952		112,856	
Per capita cost (\$/person)				

Table 9: Costs using RISO values assuming the NYC metro area is classified as urban and the area outside the NYC metro area is classified as semi-urban (costs in 2005 USD)

	Light Decontamination (DF=3)	
	NYC metro	Area Outside NYC Metro Area
Cost per km ² (\$) (Annex C)	5.46E+07	3.34E+07
Total nonfarm area within 50-mi radius (km ²)	558	15441
Total cost for the area (\$)	3.05E+10	5.16E+11
Total cost over 50-mi radius (\$)	5.46E+11	
Population over 50-mi radius	19,228,712	
CDNFRM	28,405	
Per capita cost (\$/person)		

Table 10: Costs using RISO values assuming the NYC metro area is classified as hyper-urban and the area outside the NYC metro area is classified as urban (costs in 2005 USD)

	Light Decontamination (DF=3)	
	NYC metro	Area Outside NYC Metro Area
Cost per km ² (\$) (Annex C)	1.17E+08	5.46E+07
Total nonfarm area within 50-mi radius (km ²)	558	15441
Total cost for the area (\$)	6.53E+10	8.43E+11
Total cost over 50-mi radius (\$)	9.08E+11	
Population over 50-mi radius	19,228,712	
CDNFRM	47,240	
Per capita cost (\$/person)		

Table 5: Summary of the decontamination costs (2005 USD) based on Reichmuth's studies

Target (population density)	Cesium Activity	Affected Area	Total Cost of Restoration	Cost per person of Decontamination (excl. compensation)
NYC (10,000 persons/km ²)	1.0E+4 Ci (3.7E+14 Bq)	60 km ²	\$97 Billion	\$97,000
Vancouver (5,000 persons/km ²)	1.0E+3 Ci (3.7E+13 Bq)	6 km ²	\$8 Billion	\$150,720

Personal communication with Dr. Steven M Short and Dr. Tom Cousins, April 27, 2012

Table 11: Summary of ISR's decontamination costs

Approach	Reference or Source of Data	CDNFRM (\$/person, 2005)	
		Light Decontamination	Heavy Decontamination
-	Entergy (Sample Problem A)	5,184	13,824
A	<i>Site Restoration</i> /Luna	91,936 - 183,871	208,780 - 417,561
B	Reichmuth	Not available	97,000 - 150,720
C	CONDO	15,422 - 23,952	71,255 - 112,856
D	RISO	28,405 - 47,240	Not available
-	Aggregate	15,000 - 184,000	71,000 - 418,000

Table 13: Summary of ISR proposed inputs and calculated OECRs (costs in 2005 USD)

Parameter	Description	Entergy's value	ISR's proposed input value		ISR's calculated OECR (\$/yr) and ratio ^a	
			Minimum	Maximum	Minimum	Maximum
CDNFRM (DF=3)	Per capita cost of nonfarm light decontamination	\$5,184	\$15,000	\$184,000	3.68E+05 (1.74)	1.18E+06 (5.57)
CDNFRM (DF=15)	Per capita cost of nonfarm heavy decontamination	\$13,824	\$71,000	\$418,000		
TIMDEC (DF=3)	Time required for light decontamination	60 d	1 y	15 y	4.43E+05 (2.09)	1.20E+06 (5.66)
TIMDEC (DF=15)	Time required for heavy decontamination	120 d	2 y	30 y		
VALWNF	Per capita value of nonfarm wealth (2004 USD)	\$208,838	\$284,189		2.51E+05 (1.18)	
DPRATE	Depreciation rate	20%	20%		2.12E+05 (1)	
DSRATE	Societal discount rate for property	12%	5%	7%	1.87E+05 (0.88)	1.95E+05 (0.92)
POPCST	Per capita cost of long-term relocation	\$8,640	\$10,640	\$49,857	2.23E+05 (1.05)	4.41E+05 (2.08)
FRNFIM	Nonfarm wealth improvements fraction	80%	90%		2.19E+05 (1.03)	
Using all of ISR's proposed input values					6.34E+05 (2.99)	1.47E+06 (6.93)

Notes: ^a The ratio shown in brackets is the ratio of the ISR-calculated OECR to the Entergy-calculated OECR (\$2.12E+05/yr).