

**Table 1: Calculation of Excess Lifetime Cancer Risk Based on Adulthood Exposure For Average Groundwater Concentration
Olin Chemical Superfund Site
Wilmington, Massachusetts**

Residential Drinking Water Ingestion Cancer Risk for 9.59×10^{-6} mg/L of n-nitrosodimethylamine, assuming mutagenic mode of carcinogenesis

Receptor	CW (mg/L)	IR ¹ (L/day)	EF (days/yr)	ED (yr)	BW ² (kg)	AT-c (days)	LADD (mg/kg-day)	SF (mg/kg-day) ⁻¹	ADAF	ELCR
Adult	9.59E-06	2.268	350	70	71.8	25550	2.9E-07	5.1E+01	1	1.5E-05

Total ELCR: 1E-05

¹ 90th percentile per capita ingestion from Table 3-8 EFH

² mean weight from Table 7-11 EFH

CW = Concentration in Water, the average of all samples collected between 2005 and 2010.

IR = Ingestion Rate

EF = Exposure Frequency

ED = Exposure Duration

BW = Body Weight

AT-c = Averaging Time, cancer

LADD = Lifetime Average Daily Dose

SF = oral Slope Factor

ELCR = Excess Lifetime Cancer Risk

ADAF = Age Dependent Adjustment Factor

EFH = U.S. EPA. Exposure Factors Handbook (Final Report) 1997. U.S. Environmental Protection Agency, Washington, DC, EPA/600/P-95/002F a-c, 1997.

$$LADD = CW * IR * EF * ED * 1/BW * 1/AT-c$$

$$ELCR = \sum(LADD * SF * ADAF)$$

Prepared by: KASK 9/30/2010

Checked by: BJR 10/1/2010

**Table 2: Calculation of Excess Lifetime Cancer Risk Based on Childhood and Adult Exposure For Average Groundwater Concentration
Olin Chemical Superfund Site
Wilmington, Massachusetts**

Residential Drinking Water Ingestion Cancer Risk for 9.59×10^{-6} mg/L of n-nitrosodimethylamine, assuming mutagenic mode of carcinogenesis

Age	CW (mg/L)	IR ¹ (L/day)	EF (days/yr)	ED (yr)	BW ² (kg)	AT-c (days)	LADD (mg/kg-day)	SF (mg/kg-day) ⁻¹	ADAF	ELCR
Birth to < 1 month	9.59E-06	0.839	350	0.08	4.8	25550	1.9E-09	5.1E+01	10	9.8E-07
1 to <3 months	9.59E-06	0.896	350	0.17	5.6	25550	3.5E-09	5.1E+01	10	1.8E-06
3 to < 6 months	9.59E-06	1.056	350	0.25	7.4	25550	4.7E-09	5.1E+01	10	2.4E-06
6 to < 12 months	9.59E-06	1.055	350	0.5	9.2	25550	7.5E-09	5.1E+01	10	3.8E-06
1 to < 2 years	9.59E-06	0.837	350	1	11.4	25550	9.6E-09	5.1E+01	10	4.9E-06
2 to < 3 years	9.59E-06	0.877	350	1	13.8	25550	8.3E-09	5.1E+01	3	1.3E-06
3 to <6 years	9.59E-06	1.078	350	3	18.6	25550	2.3E-08	5.1E+01	3	3.5E-06
6 to < 11 years	9.59E-06	1.235	350	5	31.8	25550	2.6E-08	5.1E+01	3	3.9E-06
11 to < 16 years	9.59E-06	1.727	350	5	56.8	25550	2.0E-08	5.1E+01	3	3.1E-06
16 to < 18 years	9.59E-06	1.983	350	2	71.6	25550	7.3E-09	5.1E+01	1	3.7E-07
18 to < 21 years	9.59E-06	2.54	350	3	71.6	25550	1.4E-08	5.1E+01	1	7.1E-07
21 to < 70 years	9.59E-06	2.54	350	49	71.6	25550	2.3E-07	5.1E+01	1	1.2E-05

Total ELCR: 4E-05

¹ 95th percentile per capita ingestion from Table 3-1 CSEFH

² mean weight from Table 8-1 CSEFH

CW = Concentration in Water, the average of all samples collected between 2005 and 2010.

IR = Ingestion Rate

EF = Exposure Frequency

ED = Exposure Duration

BW = Body Weight

AT-c = Averaging Time, cancer

LADD = Lifetime Average Daily Dose

SF = oral Slope Factor

ELCR = Excess Lifetime Cancer Risk

ADAF = Age Dependent Adjustment Factor

CSEFH = U.S. EPA. Child-Specific Exposure Factors Handbook (Final Report) 2008. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-06/096F, 2008.

$$LADD = CW * IR * EF * ED * 1/BW * 1/AT-c$$

$$ELCR = \sum(LADD * SF * ADAF)$$

Prepared by: KASK 9/30/2010

Checked by: BJR 10/1/2010

**Table 3: Calculation of Excess Lifetime Cancer Risk Based on Adulthood Exposure Based on Most Recent Groundwater Concentration
Olin Chemical Superfund Site
Wilmington, Massachusetts**

Residential Drinking Water Ingestion Cancer Risk for 3.10×10^{-5} mg/L of n-nitrosodimethylamine, assuming mutagenic mode of carcinogenesis

	CW	IR ¹	EF	ED	BW ²	AT-c	LADD	SF	ADAF	ELCR
Receptor	(mg/L)	(L/day)	(days/yr)	(yr)	(kg)	(days)	(mg/kg-day)	(mg/kg-day) ⁻¹		
Adult	3.10E-05	2.268	350	70	71.8	25550	9.4E-07	5.1E+01	1	4.8E-05

Total ELCR: 5E-05

¹ 90th percentile per capita ingestion from Table 3-8 EFH

² mean weight from Table 7-11 EFH

CW = Concentration in Water, the most recent detected concentration (August 2010 sample).

IR = Ingestion Rate

EF = Exposure Frequency

ED = Exposure Duration

BW = Body Weight

AT-c = Averaging Time, cancer

LADD = Lifetime Average Daily Dose

SF = oral Slope Factor

ELCR = Excess Lifetime Cancer Risk

ADAF = Age Dependent Adjustment Factor

EFH = U.S. EPA. Exposure Factors Handbook (Final Report) 1997. U.S. Environmental Protection Agency, Washington, DC, EPA/600/P-95/002F a-c, 1997.

$$\text{LADD} = \text{CW} * \text{IR} * \text{EF} * \text{ED} * 1/\text{BW} * 1/\text{AT-c}$$

$$\text{ELCR} = \sum(\text{LADD} * \text{SF} * \text{ADAF})$$

Prepared by: KASK 9/30/2010

Checked by: BJR 10/1/2010

**Table 4. Calculation of Excess Lifetime Cancer Risk Based on Childhood and Adult Exposure Based On Most Recent Groundwater Concentration
Olin Chemical Superfund Site
Wilmington, Massachusetts**

Residential Drinking Water Ingestion Cancer Risk for 0.000031 mg/L of n-nitrosodimethylamine, assuming mutagenic mode of carcinogenesis

Age	CW (mg/L)	IR ¹ (L/day)	EF (days/yr)	ED (yr)	BW ² (kg)	AT-c (days)	LADD (mg/kg-day)	SF (mg/kg-day) ⁻¹	ADAF	ELCR
Birth to < 1 month	3.1E-05	0.839	350	0.08	4.8	25550	6.2E-09	5.1E+01	10	3.2E-06
1 to <3 months	3.1E-05	0.896	350	0.17	5.6	25550	1.1E-08	5.1E+01	10	5.8E-06
3 to < 6 months	3.1E-05	1.056	350	0.25	7.4	25550	1.5E-08	5.1E+01	10	7.7E-06
6 to < 12 months	3.1E-05	1.055	350	0.5	9.2	25550	2.4E-08	5.1E+01	10	1.2E-05
1 to < 2 years	3.1E-05	0.837	350	1	11.4	25550	3.1E-08	5.1E+01	10	1.6E-05
2 to < 3 years	3.1E-05	0.877	350	1	13.8	25550	2.7E-08	5.1E+01	3	4.1E-06
3 to <6 years	3.1E-05	1.078	350	3	18.6	25550	7.4E-08	5.1E+01	3	1.1E-05
6 to < 11 years	3.1E-05	1.235	350	5	31.8	25550	8.2E-08	5.1E+01	3	1.3E-05
11 to < 16 years	3.1E-05	1.727	350	5	56.8	25550	6.5E-08	5.1E+01	3	9.9E-06
16 to < 18 years	3.1E-05	1.983	350	2	71.6	25550	2.4E-08	5.1E+01	1	1.2E-06
18 to < 21 years	3.1E-05	2.54	350	3	71.6	25550	4.5E-08	5.1E+01	1	2.3E-06
21 to < 70 years	3.1E-05	2.54	350	49	71.6	25550	7.4E-07	5.1E+01	1	3.8E-05

Total ELCR: 1E-04

¹ 95th percentile per capita ingestion from Table 3-1 CSEFH

² mean weight from Table 8-1 CSEFH

CW = Concentration in Water, most recent detected concentration, (August 2010)

IR = Ingestion Rate

LADD = $CW * IR * EF * ED * 1/BW * 1/AT-c$

EF = Exposure Frequency

ELCR = $\sum(LADD * SF * ADAF)$

ED = Exposure Duration

BW = Body Weight

AT-c = Averaging Time, cancer

LADD = Lifetime Average Daily Dose

SF = oral Slope Factor

ELCR = Excess Lifetime Cancer Risk

ADAF = Age Dependent Adjustment Factor

CSEFH = U.S. EPA. Child-Specific Exposure Factors Handbook (Final Report) 2008. U.S. Environmental Protection Agency,

Prepared by: MJM 10/1/2010

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