TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Gowanus Canal Remedial Investigation, Brooklyn, New York

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational	Adult	Exposed and near shore sediment in Gowanus Canal	CSed	Chemical Concentration in Sediment	Table 3.1.RME	mg/kg	Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	EPA, 1991, (1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent (12-18 years)	Exposed and near shore sediment in Gowanus Canal	CSed	Chemical Concentration in Sediment	Table 3.1.RME	mg/kg	Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	50	mg/day	EPA, 1991, (1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6	years	(5)	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	57	kg	EPA, 1997, (6)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child (1-6 years)	Exposed and near shore sediment in Gowanus Canal	CSed	Chemical Concentration in Sediment	Table 3.1.RME	mg/kg	Table 3.1.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Sed	Ingestion Rate of Sediment	100	mg/day	EPA, 1991, (1)	CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
Dermal	Recreational	Adult	Exposed and near shore sediment in Gowanus Canal	CSed	Chemical Concentration in Sediment	Table 3.1.RME	mg/kg	Table 3.1.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	6,925	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004, (8)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational	Adolescent (12-18 years)	Exposed and near shore sediment in Gowanus Canal	CSed SA SSAF DABS CF EF ED BW AT-C AT-N	Chemical Concentration in Sediment Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Table 3.1.RME 10,470 0.2 chem specific 0.000001 26 6 57 25,550 2,190	mg/kg cm^2 mg/cm^2-day -- kg/mg days/year years kg days days	Table 3.1.RME EPA, 2004, (7) EPA, 1997, (4) EPA, 2004 - - (2) (5) EPA, 1997, (6) EPA, 1989 EPA, 1989	CDI (mg/kg-day) = CSed x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT
Dermal	Recreational	Child (1-6 years)	Exposed and near shore sediment in Gowanus Canal	CSed SA SSAF DABS CF EF ED BW AT-C AT-N	Chemical Concentration in Sediment Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Table 3.1.RME 2,800 0.2 chem specific 0.000001 26 6 15 25,550 2,190	mg/kg cm^2 mg/cm^2-day -- kg/mg days/year years kg days days	Table 3.1.RME EPA, 2004, (3) EPA, 2004, (4) EPA, 2004 - - (2) EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989	CDI (mg/kg-day) = CSed x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT

Notes:
(1) Assumed sediment ingestion rate is equal to 1/2 of the incidental soil ingestion rate.
(2) Professional judgement, conservatively assumed recreational use of the canal would occur 1 day per week for one-half the year.
(3) SA includes head, hands, forearms, lower legs, and feet.
(4) Average adherence factor for children in wet soil.
(5) Professional Judgement assuming adolescents from 12 to 18 years of age.
(6) Body weight is average of the mean values for boys and girls for the ages 12 through 18.
(7) SA includes head, hands, arms, legs, and feet.
(8) Average adherence factor for reed gatherers (from Exhibit 3-3 of EPA, 2004).

Sources:
 EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
 EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
 EPA, 1997: Exposure Factors Handbook. EPA/ 600/P-95/Fa, Fb, and Fc.
 EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healtbul.htm.
 EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational	Adult	Gowanus Canal	CSW IR-SW ET EF ED CF1 BW AT-C AT-N	Chemical Concentration in Surface Water Ingestion Rate of Surface Water Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.2.RME and 3.3.RME 0.05 2.6 26 24 0.001 70 25,550 8,760	µg/l l/hour hr/day days/year years mg/µg kg days days	Tables 3.2.RME and 3.3.RME EPA,1989, (1) EPA, 1989, (2) (3) EPA, 1991 - - EPA, 1991 EPA, 1989 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSW x IR-SW x ET x EF x ED x CF1 x 1/BW x 1/AT
		Adolescent (12-18 years)	Gowanus Canal	CSW IR-SW ET EF ED CF1 BW AT-C AT-N	Chemical Concentration in Surface Water Ingestion Rate of Surface Water Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.2.RME and 3.3.RME 0.05 2.6 26 6 0.001 57 25,550 2,190	µg/l l/hour hr/day days/year years mg/µg kg days days	Tables 3.2.RME and 3.3.RME EPA,1989, (1) EPA, 1989, (2) (3) (4) - - EPA, 1991, (5) EPA, 1989 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSW x IR-SW x ET x EF x ED x CF1 x 1/BW x 1/AT
		Child	Gowanus Canal	CSW IR-SW ET EF ED CF1 BW AT-C AT-N	Chemical Concentration in Surface Water Ingestion Rate of Surface Water Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.2.RME and 3.3.RME 0.05 2.6 26 6 0.001 15 25,550 2,190	µg/l l/hour hr/day days/year years mg/µg kg days days	Tables 3.2.RME and 3.3.RME EPA,1989, (1) EPA, 1989, (2) (3) EPA, 1991 - - EPA, 1991 EPA, 1989 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSW x IR-SW x ET x EF x ED x CF1 x 1/BW x 1/AT
Dermal	Recreational	Adult	Gowanus Canal	CSW DAevent FA Kp τ t* B t_{event} SA EV EF ED BW AT-C AT-N CF1 CF2	Chemical Concentration in Surface Water Dermally Absorbed Dose per Event Fraction absorbed water Permeability Coefficient Lag Time Time to Reach Steady-state Epidermis Event Time Skin Surface Area Available for Contact Event Frequency Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) Conversion Factor 1 Conversion Factor 2	Tables 3.2.RME and 3.3.RME calculated chemical specific chemical specific chemical specific chemical specific chemical specific 2.6 18,000 1 26 24 70 25,550 8,760 0.001 0.001	µg/l mg/cm^2-event dimensionless cm/hr hr/event hours dimensionless hr/day cm^2 events/day days/year years kg days days mg/µg l/cm^3	Tables 3.2.RME and 3.3.RME calculated EPA, 2004 EPA, 2004 EPA, 2004 EPA, 2004 EPA, 2004 EPA, 1989, (2) EPA, 2004 EPA, 2004 (3) EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 - - - -	CDI (mg/kg-day) = DAevent x SA x EV x EF x ED x 1/BW x 1/AT Inorganics: DAevent (mg/cm^2-event) = Kp x CW x t_{event} x CF1 x CF2 Organics : t_{event}<t*: DAevent (mg/cm^2-event) = 2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π)) x CF1 x CF2 t_{event}>t*: DAevent (mg/cm^2-event) = FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x ((1 + 3B + 3B^2)/(1+B)^2)) x CF1 x CF2

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Recreational	Adolescent (12-18 years)	Gowanus Canal	CSW	Chemical Concentration in Surface Water	Tables 3.2.RME and 3.3.RME	$\mu g/l$	Tables 3.2.RME and 3.3.RME	CDI (mg/kg-day) = $DAevent \times SA \times EV \times EF \times ED \times 1/BW \times 1/AT$
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	$Kp \times CW \times t_{event} \times CF1 \times CF2$
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989, (2)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	15,758	cm^2	EPA, 1997, (6)	$2 \times FA \times Kp \times CW \times (sqrt((6 \times \tau \times t_{event})/\pi))$
				EV	Event Frequency	1	events/day	EPA, 2004	$\times CF1 \times CF2$
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	6	years	(4)	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	57	kg	EPA, 1991, (5)	$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau \times$
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	$((1 + 3B + 3B^2)/(1+B)^2)) \times CF1 \times CF2$
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/μg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
		Child	Gowanus Canal	CSW	Chemical Concentration in Surface Water	Tables 3.2.RME and 3.3.RME	$\mu g/l$	Tables 3.2.RME and 3.3.RME	CDI (mg/kg-day) = $DAevent \times SA \times EV \times EF \times ED \times 1/BW \times 1/AT$
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	$Kp \times CW \times t_{event} \times CF1 \times CF2$
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989, (2)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	6,600	cm^2	EPA, 2004	$2 \times FA \times Kp \times CW \times (sqrt((6 \times \tau \times t_{event})/\pi))$
				EV	Event Frequency	1	events/day	EPA, 2004	$\times CF1 \times CF2$
				EF	Exposure Frequency	26	days/year	(3)	
				ED	Exposure Duration	6	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau \times$
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	$((1 + 3B + 3B^2)/(1+B)^2)) \times CF1 \times CF2$
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/μg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Notes:
(1) Ingestion rate of surface water for swimming.
(2) National average time spent swimming per swimming event.
(3) Professional judgement, conservatively assumed recreational use of the canal would occur 1 day per week for one-half the year.
(4) Professional Judgement assuming adolescents from 12 to 18 years of age.
(5) Body weight is average of the mean values for boys and girls for the ages 12 through 18.
(6) Average total body surface area of boys and girls from 12 to 18 years of age.

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Sources:
 EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
 EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
 EPA, 1997: Exposure Factors Handbook. EPA/ 600/P-95/Fa, Fb, and Fc.
 EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational	Adult	Ambient air at canal level	Cair ET EF ED CF1 AT-C AT-N	Chemical Concentration in Air Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.4.RME and 3.5.RME 2.6 26 24 1/24 25,550 8,760	mg/m^3 hr/day days/year years day/hr days days	Tables 3.4.RME and 3.5.RME EPA, 1989, (1) (2) EPA, 1991 - - EPA, 1989 EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED x CF x 1/AT
		Adolescent (12-18 years)	Ambient air at canal level	Cair ET EF ED CF1 AT-C AT-N	Chemical Concentration in Air Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.4.RME and 3.5.RME 2.6 26 6 1/24 25,550 2,190	mg/m^3 hr/day days/year years day/hr days days	Tables 3.4.RME and 3.5.RME EPA, 1989, (1) (2) (3) - - EPA, 1989 EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED x CF x 1/AT
		Child	Ambient air at canal level	Cair ET EF ED CF1 AT-C AT-N	Chemical Concentration in Air Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.4.RME and 3.5.RME 2.6 26 6 1/24 25,550 2,190	mg/m^3 hr/day days/year years day/hr days days	Tables 3.4.RME and 3.5.RME EPA, 1989, (1) (2) EPA, 1991 - - EPA, 1989 EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED x CF x 1/AT
	Industrial Worker	Adult	Ambient air at street level	Cair EF ED AT-C AT-N	Chemical Concentration in Air Exposure Frequency Exposure Duration Averaging Time (Cancer) Averaging Time (Non-Cancer)	Tables 3.6.RME and 3.7.RME 250 25 25,550 9,125	mg/m^3 days/year years days days	Tables 3.6.RME and 3.7.RME EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x EF x ED x 1/AT
	Resident	Adult	Ambient air at street level	Cair ET EF ED CF1 AT-N	Chemical Concentration in Air Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Non-Cancer)	Tables 3.6.RME and 3.7.RME 24 350 24 1/24 8,760	mg/m^3 hr/day days/year years day/hr days	Tables 3.6.RME and 3.7.RME EPA, 1991 EPA, 1991 EPA, 1991 - - EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED x CF x 1/AT
		Child	Ambient air at street level	Cair ET EF ED CF1 AT-N	Chemical Concentration in Air Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Non-Cancer)	Tables 3.6.RME and 3.7.RME 24 350 6 1/24 2,190	mg/m^3 hr/day days/year years day/hr days	Tables 3.6.RME and 3.7.RME EPA, 1991 EPA, 1991 EPA, 1991 - - EPA, 1989	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED x CF x 1/AT

TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Gowanus Canal Remedial Investigation, Brooklyn, New York

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Child/Adult	Ambient air at street level	Cair	Chemical Concentration in Air	Tables 3.6.RME and 3.7.RME	mg/m^3	Tables 3.6.RME and 3.7.RME	Exposure Concentration (EC) (mg/m^3) =
				ET	Exposure Time	24	hr/day	EPA, 1991	CA x ET x EF x ED x CF x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	30	years	EPA, 1991	
				CF1	Conversion Factor 1	1/24	day/hr	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Notes:
(1) National average time spent swimming per swimming event.
(2) Professional judgement, conservatively assumed recreational use of the canal would occur 1 day per week for one-half the year.
(3) Professional Judgement assuming adolescents from 12 to 18 years of age.

Sources:
  EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
  EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

Table 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Gowanus Canal Remedial Investigation, Brooklyn, New York

Scenario Timeframe: Current/Future
Medium: Surface Water / Sediment
Exposure Medium: Fish and Crab Tissue

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler	Adult	Striped Bass White Perch Eel	CFish	Chemical Concentration in Fish	Tables 3.8.RME, 3.9.RME, and 3.10.RME	mg/kg	Tables 3.8.RME, 3.9.RME, and 3.10.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	26	g/day	EPA, 1997, (1)	CFish x IR-Fish x FI x EF x ED x CF3 x 1/BW x 1/AT
				FI	Fraction Ingested -	fish specific	unitless	EPA, 2000	
					Striped Bass	0.47	unitless	Connelly, 1992, (4)	
					White Perch	0.09	unitless	Connelly, 1992, (4)	
					Eel	0.44	unitless	Connelly, 1992, (4)	
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF3	Conversion Factor 3	0.001	kg/g	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent (12-18 years)	Striped Bass White Perch Eel	CFish	Chemical Concentration in Fish	Tables 3.8.RME, 3.9.RME, and 3.10.RME	mg/kg	Tables 3.8.RME, 3.9.RME, and 3.10.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	17	g/day	(2)	CFish x IR-Fish x FI x EF x ED x CF3 x 1/BW x 1/AT
				FI	Fraction Ingested -	fish specific	unitless	EPA, 2000	
					Striped Bass	0.47	unitless	Connelly, 1992, (4)	
					White Perch	0.09	unitless	Connelly, 1992, (4)	
					Eel	0.44	unitless	Connelly, 1992, (4)	
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				BW	Body Weight	57	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child	Striped Bass White Perch Eel	CFish	Chemical Concentration in Fish	Tables 3.8.RME, 3.9.RME, and 3.10.RME	mg/kg	Tables 3.8.RME, 3.9.RME, and 3.10.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Fish	9	g/day	(3)	CFish x IR-Fish x FI x EF x ED x CF3 x 1/BW x 1/AT
				FI	Fraction Ingested -	fish specific	unitless	EPA, 2000	
					Striped Bass	0.47	unitless	Connelly, 1992, (4)	
					White Perch	0.09	unitless	Connelly, 1992, (4)	
					Eel	0.44	unitless	Connelly, 1992, (4)	
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Scenario Timeframe: Current/Future
Medium: Surface Water / Sediment
Exposure Medium: Fish and Crab Tissue

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler	Adult	Blue Crab	CFish	Chemical Concentration in Crab	Table 3.11.RME	mg/kg	Table 3.11.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Crab	23	g/day	Burger, 2002	CFish x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF3	Conversion Factor 3	0.001	kg/g	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Adolescent (12-18 years)	Blue Crab	CFish	Chemical Concentration in Crab	Table 3.11.RME	mg/kg	Table 3.11.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Crab	15	g/day	(2)	CFish x IR-Fish x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF3	Conversion Factor 3	0.001	kg/g	- -	
				BW	Body Weight	57	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child	Blue Crab	CFish	Chemical Concentration in Crab	Table 3.11.RME	mg/kg	Table 3.11.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-Fish	Ingestion of Crab	8	g/day	(3)	CFish x IR-Fish x EF x ED x CF3 x 1/BW x 1/AT
				EF	Exposure Frequency	365	days/year	EPA, 1997	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Conversion Factor	0.001	kg/g	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Notes:
(1) 95th percentile recreational freshwater anglers fish ingestion rate.
(2) Ingestion rate assumed to be 2/3 the adult ingestion rate.
(3) There are no recreational fish ingestion values or crab ingestion values for children. Therefore, ingestion rate assumed to be 1/3 the adult ingestion rate.
(4)   Bottom feeders percent consumption (44%) used to for eel, intermediate level percent consumption (47%) used for striped bass, and remaining percent (4%) used for white perch.

Sources:
  Connelly, Nancy A., Barbara A. Knuth, and Carole A. Bisogni, 1992. Effects of the Health Advisory and Advisory Changes on Fishing Habits and Fish Consumption in New York Sport Fisheries.
      Report for New York Sea Grant Institute Project No. R/FHD-2=PD. September.
  Burger, 2002: Consumption Patterns and Why People Fish. Environmental Research Section A 90, 125-135.
  EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
  EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
  EPA, 1997: Exposure Factors Handbook. EPA/ 600/P-95/Fa, Fb, and Fc.

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Overflow Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed IR-Sed EF ED CF BW AT-C AT-N	Chemical Concentration in Sediment Ingestion Rate of Sediment Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Table 3.12.RME 100 9 25 0.000001 70 25,550 9,125	mg/kg mg/day days/year years kg/mg kg days days	Table 3.12.RME EPA, 2002, (1) (2) EPA, 1991 - - EPA, 1991 EPA, 1989 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
	Residential	Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed IR-Sed EF ED CF BW AT-N	Chemical Concentration in Sediment Ingestion Rate of Sediment Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Non-Cancer)	Table 3.12.RME 100 9 24 0.000001 70 8,760	mg/kg mg/day days/year years kg/mg kg days	Table 3.12.RME EPA, 2002, (1) (2) EPA, 1991 - - EPA, 1991 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT
		Child	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed IR-Sed EF ED CF BW AT-N	Chemical Concentration in Sediment Ingestion Rate of Sediment Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Non-Cancer)	Table 3.12.RME 200 9 6 0.000001 15 2,190	mg/kg mg/day days/year years kg/mg kg days	Table 3.12.RME EPA, 2002, (1) (2) EPA, 1991 - - EPA, 1991 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSed x IR-Sed x EF x ED x CF x 1/BW x 1/AT

TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Gowanus Canal Remedial Investigation, Brooklyn, New York

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Overflow Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Residential	Child/Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed IR-Sed IR-Sedc IR-Seda EF EDc EDa CF BWc BWa AT-C	Chemical Concentration in Sediment Ingestion Rate of Sediment-adjusted Ingestion Rate of Sediment, child Ingestion Rate of Sediment, adult Exposure Frequency Exposure Duration , child Exposure Duration, adult Conversion Factor Body Weight, child Body Weight, adult Averaging Time (Cancer)	Table 3.12.RME 114.3 200 100 9 6 24 0.000001 15 70 25,550	mg/kg mg-year/kg-day mg/day mg/day days/year years years kg/mg kg kg days	Table 3.12.RME calculated EPA, 1991, (1) EPA, 1991, (1) (2) EPA, 1991 EPA, 1991 - - EPA, 1991 EPA, 1991 EPA, 1989	Chronic Daily Intake (CDI) (mg/kg-day) = CSed x IR-Sed x EF x CF x 1/AT IR-Sed = (EDc x IR-Sedc/ BWc) + (EDa x IR-Seda/BWa)
Dermal	Industrial Worker	Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed SA SSAF DABS CF EF ED BW AT-C AT-N	Chemical Concentration in Sediment Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer)	Table 3.12.RME 3,300 0.2 chem specific 0.000001 9 25 70 25,550 9,125	mg/kg cm^2 mg/cm^2-day -- kg/mg days/year years kg days days	Table 3.12.RME EPA, 2004, (3) EPA, 2004, (5) EPA, 2004 - - (2) EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989	CDI (mg/kg-day) = CSed x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT
	Residential	Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed SA SSAF DABS CF EF ED BW AT-N	Chemical Concentration in Sediment Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Non-Cancer)	Table 3.12.RME 5,700 0.2 chem specific 0.000001 9 24 70 8,760	mg/kg cm^2 mg/cm^2-day -- kg/mg days/year years kg days	Table 3.12.RME EPA, 2004, (3) EPA, 2004, (4) EPA, 2004 - - (2) EPA, 1991 EPA, 1991 EPA, 1989	CDI (mg/kg-day) = CSed x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Overflow Surface Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Residential	Child	areas adjacent to Gowanus Canal associated with canal	CSed	Chemical Concentration in Sediment	Table 3.12.RME	mg/kg	Table 3.12.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004, (3)	CSed x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004, (4)	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	9	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Sediment deposited in areas adjacent to Gowanus Canal associated with canal overflow	CSed	Chemical Concentration in Sediment	Table 3.12.RME	mg/kg	Table 3.12.RME	CDI (mg/kg-day) =
				SAc	Skin Surface Area Available for Contact, child	2,800	cm^2	EPA, 2004, (3)	CSed x SA x DABS x CF x EF x 1/AT
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004, (4)	
				EDc	Exposure Duration, child	6	years	EPA, 1991	SA = ((EDc x SAc/BWc) x SSAF) +
				BWc	Body Weight, child	15	kg	EPA, 1991	((EDa x SAa/BWa) x SSAF)
				SAa	Skin Surface Area Available for Contact, adult	5,700	cm^2	EPA, 2004, (3)	
				EDa	Exposure Duration , adult	24	years	EPA, 1991	
				BWa	Body Weight ,adult	70	kg	EPA, 1991	
				SA	Skin Surface Area adjusted	615	cm^2-year/kg-day	calculated	
				DABS	Dermal Absorption Factor Solids	chem specific	--	EPA, 2004	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	9	days/year	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Notes:

(1) Assumed sediment ingestion rate is equal to the incidental soil ingestion rate.

(2) Professional judgement, conservatively assumes canal overflows 3 times a year, and remains on surface 3 days per each overflow event.

(3) SA includes head, hands, forearms, lower legs, and feet (for child only) for residents and head, hands, and forearms for industrial worker.

(4) Average adherence factor for children in wet soil.

(5) Adherence factor for adult industrial worker from Exhibit 3-5 of EPA, 2004.

Sources:

  EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

  EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

  EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

  EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Overflow Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Industrial Worker	Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.05	l/hour	EPA, 1989, (1)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	8	hr/day	(2)	1/BW x 1/AT
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	25	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
	Resident	Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.05	l/hour	EPA, 1989, (1)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989, (3)	1/BW x 1/AT
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-SW	Ingestion Rate of Surface Water	0.05	l/hour	EPA, 1989, (1)	CSW x IR-SW x ET x EF x ED x CF1 x
				ET	Exposure Time	2.6	hr/day	EPA, 1989, (3)	1/BW x 1/AT
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BW	Body Weight	15	kg	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
		Child/Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-SW-Adj	Ingestion Rate of Surface Water, age-adjusted	0.037	l-year/kg-hour	calculated	CSW x IR-SW-adj x ET x EF x CF1 x 1/AT
				IR-SWc	Ingestion Rate of Surface Water, child	0.05	l/hour	EPA, 1989, (1)	
				IR-Swa	Ingestion Rate of Surface Water, adult	0.05	l/hour	EPA, 1989, (1)	
				ET	Exposure Time	2.6	hr/day	EPA, 1989, (3)	
				EF	Exposure Frequency	9	days/year	(5)	IR-W-Adj (liter-year/kg-hour) =
				EDc	Exposure Duration, chiild	6	years	EPA, 1991	(EDc x IR-SWc/BWc) + (EDa x IR-SWa/BWa)
				EDa	Exposure Duration, adult	24	years	EPA, 1991	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				BWc	Body Weight, child	15	kg	EPA, 1991	
				BWa	Body Weight, adult	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Overflow Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Industrial Worker	Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME calculated	µg/l	Table 3.13.RME calculated	CDI (mg/kg-day) = DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event		
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t$_{event}$ x CF1 x CF2
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t$_{event}$	Event Time	8	hr/day	(2)	t$_{event}$<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (4)	2 x FA x Kp x CW x (sqrt((6 x τ x t$_{event}$)/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	25	years	EPA, 1991	t$_{event}$>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t$_{event}$/(1+B) + 2 x τ x
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	((1 + 3B + 3B^2)/(1+B)^2)) x CF1 x CF2
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
	Residential	Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME calculated	µg/l	Table 3.13.RME calculated	CDI (mg/kg-day) = DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event		
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t$_{event}$ x CF1 x CF2
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t$_{event}$	Event Time	2.6	hr/day	EPA, 1989, (3)	t$_{event}$<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	EPA, 2004, (4)	2 x FA x Kp x CW x (sqrt((6 x τ x t$_{event}$)/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	24	years	EPA, 1991	t$_{event}$>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	70	kg	EPA, 1991	FA x Kp x CW x (t$_{event}$/(1+B) + 2 x τ x
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Overflow Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Residential	Child	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	calculated	mg/cm^2-event	calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Organics :
				t_{event}	Event Time	2.6	hr/day	EPA, 1989, (3)	t_{event}<t*: DAevent (mg/cm^2-event) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	EPA, 2004, (4)	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EV	Event Frequency	1	events/day	EPA, 2004	x CF1 x CF2
				EF	Exposure Frequency	9	days/year	(5)	
				ED	Exposure Duration	6	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BW	Body Weight	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	
Dermal	Residential	Child/Adult	Canal Overflow - Surface Water	CSW	Chemical Concentration in Surface Water	Table 3.13.RME	µg/l	Table 3.13.RME	CDI (mg/kg-day) =
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	calculated	mg-year/event-kg	calculated	DA-Adj x EF x 1/AT
				DAevent-A	Dermally Absorbed Dose per Event, adult	calculated	mg/cm^2-event	calculated	
				DAevent-C	Dermally Absorbed Dose per Event, adult	calculated	mg/cm^2-event	calculated	DA-Adj = (DAevent-A x SAa x EDa x 1/BWa)
				FA	Fraction absorbed water	chemical specific	dimensionless	EPA, 2004	+ (DAevent-C x SAc x EDc x 1/BWc)
				Kp	Permeability Coefficient	chemical specific	cm/hr	EPA, 2004	
				τ	Lag Time	chemical specific	hr/event	EPA, 2004	
				t*	Time to Reach Steady-state	chemical specific	hours	EPA, 2004	Inorganics: DAevent (mg/cm^2-event) =
				B	Epidermis	chemical specific	dimensionless	EPA, 2004	Kp x CW x t_{event} x CF1 x CF2
				t_{event}	Event Time	2.6	hr/day	EPA, 1989, (3)	
				SAc	Skin Surface Area Available for Contact, child	2,800	cm^2	EPA, 2004, (4)	Organics :
				SAa	Skin Surface Area Available for Contact, adult	5,700	cm^2	EPA, 2004, (4)	t_{event}<t*: DAevent (mg/cm^2-event) =
				EV	Event Frequency	1	events/day	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π))
				EF	Exposure Frequency	9	days/year	(5)	x CF1 x CF2
				EDc	Exposure Duration, child	6	years	EPA, 1991	
				EDa	Exposure Duration, adult	24	years	EPA, 1991	t_{event}>t*: DAevent (mg/cm^2-event) =
				BWc	Body Weight, child	15	kg	EPA, 1991	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				BWa	Body Weight, adult	70	kg	EPA, 1991	$((1 + 3B + 3B^2)/(1+B)^2))$ x CF1 x CF2
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	

Notes:
(1) Assumed ingestion rate for canal overflow water would be 1/2 of mean water ingestion rate for adults for exposure scenarios involving swimming activities.
(2) Professional judgement, conservatively assumes industrial receptors will contact overflow ponded surface water 8 hours per day.
(3) Professional judgement, conservatively assumes residential receptor will contact overflow surface water for the same exposure time as the national average time spent swimming per swimming event.
(4) SA includes head, hands, forearms, lower legs, and feet (for child only).
(5) Professional judgement, conservatively assumes canal overflows 3 times a year, and remains on surface 3 days per each overflow event.

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Overflow Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Sources:
  EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
  EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
  EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.