Appendix E

RAGS D TABLE 4s

TABLE 4.1 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Total Soil (Surface + Subsurface)
Exposure Medium:	Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Industrial Worker	Adult	Total Soil (Surface + Subsurface) (0 to 18 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	100	mg/day	EPA, 2002	
				EF	Exposure Frequency	250	days/year	EPA,1991	
				ED	Exposure Duration	25	years	EPA,1991	
				FI	Fraction Ingested	1	unitless	Professional Judgement	
				CF1	Conversion Factor 1	1.0E-06	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)	9,125	days	EPA, 1989	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future industrial worker exposure to soil.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.1 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Total Soil (Surface + Subsurface)
Exposure Medium:	Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Industrial Worker	Adult	Total Soil (Surface + Subsurface) (0 to 18 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	100	mg/day	EPA, 2002	
				EF	Exposure Frequency	219	days/year	EPA,1996	
				ED	Exposure Duration	6.6	years	EPA,1997	
				FI	Fraction Ingested	1	unitless	Professional Judgement	
				CF1	Conversion Factor 1	1.0E-06	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)	2,409	days	EPA, 1989	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future industrial worker exposure to soil.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1996. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil.
EPA, 1997. Exposure Factors Handbook.
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.2 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Total Soil (Surface + Subsurface)
Exposure Medium:	Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	Total Soil (Surface + Subsurface) (0 to 18 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	330	mg/day	EPA, 2002	
				EF	Exposure Frequency	90	days/year	Professional Judgment	
				ED	Exposure Duration	1	years	EPA, 1991	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	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)	120	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future construction worker exposure to soil.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.2 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Total Soil (Surface + Subsurface)
Exposure Medium:	Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	Total Soil (Surface + Subsurface) (0 to 18 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	330	mg/day	EPA, 2002	
				EF	Exposure Frequency	30	days/year	Professional Judgment	
				ED	Exposure Duration	1	years	EPA, 1991	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	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)	42	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future construction worker exposure to soil.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.3 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Surface and Total Soil (Surface + Subsurface)
Exposure Medium:	Suface and Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	Surface Soil (0 to 2 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	EPA, 1991	CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
			Total Soil	ED	Exposure Duration	24	years	EPA, 1991	
			(Surface + Subsurface)	FI	Fraction Ingested	1	unitless	Professional Judgment	
			(0 to 18 feet)	CF1	Conversion Factor 1	1.0E-06	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	
		Child	Surface Soil (0 to 2 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1991	CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
			Total Soil	ED	Exposure Duration	6	years	EPA, 1991	
			(Surface + Subsurface)	FI	Fraction Ingested	1	unitless	Professional Judgment	
			(0 to 18 feet)	CF1	Conversion Factor 1	1.0E-06	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	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future resident exposure to soils (current exposure to surface and future exposure to total)

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

TABLE 4.3 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Surface and Total Soil (Surface + Subsurface)
Exposure Medium:	Suface and Total Soil (Surface + Subsurface)

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	Surface Soil (0 to 2 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	EPA, 1997	CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgment	
			Total Soil	ED	Exposure Duration	9	years	Professional Judgment	
			(Surface + Subsurface)	FI	Fraction Ingested	1	unitless	Professional Judgment	
			(0 to 18 feet)	CF1	Conversion Factor 1	1.0E-06	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)	3,285	days	EPA, 1989	
		Child	Surface Soil (0 to 2 feet)	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 1997	CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgment	
			Total Soil	ED	Exposure Duration	6	years	EPA, 1991	
			(Surface + Subsurface)	FI	Fraction Ingested	1	unitless	Professional Judgment	
			(0 to 18 feet)	CF1	Conversion Factor 1	1.0E-06	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	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current and future resident exposure to soils (current exposure to surface and future exposure to total)

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997. Exposure Factors Handbook.

TABLE 4.4 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

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	Industrial Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	25	years	EPA,1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Industrial Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	3,300	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	25	years	EPA,1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that an industrial worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 26 days/year with only 60 minutes/day (1 hour) wading in surface water, and assumes an industrial worker is exposed once per week during warmest 6 months of the year (26 days/yr).
(3) Professional Judgement; due to shallow water depths, it was assumed that an industrial worker skin surface area for water exposure would be no more than the skin surface area exposed to soil (3300 cm^2) recommended by EPA, 2004.

*Parameters on this table will be used for the Daily Intake Calculations for current/future industrial worker exposure to surface water.

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

TABLE 4.4 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

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	Industrial Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6.6	years	EPA,1997	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,409	days	EPA, 1989	
Dermal	Industrial Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	3,300	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6.6	years	EPA,1997	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,409	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that an industrial worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 26 days/year with only 60 minutes/day (1 hour) wading in surface water, and assumes an industrial worker is exposed once per week during warmest 6 months of the year (26 days/yr).
(3) Professional Judgement; due to shallow water depths, it was assumed that an industrial worker skin surface area for water exposure would be no more than the skin surface area exposed to soil (3300 cm^2) recommended by EPA, 2004.

*Parameters on this table will be used for the Daily Intake Calculations for current/future industrial worker exposure to surface water.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997. Exposure Factors Handbook.
EPA, 2004. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final.

TABLE 4.5 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

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	Construction Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	90	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	120	days	Adjusted per EPA Region 7	
Dermal	Construction Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	3,300	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	90	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	120	days	Adjusted per EPA Region 7	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that a construction worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 90 days/year with 60 minutes/day (1 hour) exposure to surface water, and assumes a construction period of 4 months (120 days).
(3) Professional Judgement; due to shallow water depths, it was assumed that a construction worker skin surface area for water exposure would be no more than the skin surface area exposed to soil (3300 cm^2) recommended by EPA, 2004.

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to surface water.

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

TABLE 4.5 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

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	Construction Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	30	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	42	days	EPA, 1989	
Dermal	Construction Worker	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	3,300	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	30	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	42	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that a construction worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 30 days/year with 60 minutes/day (1 hour) exposure to surface water, and assumes a construction period of 6 weeks (42 days).
(3) Professional Judgement; due to shallow water depths, it was assumed that a construction worker skin surface area for water exposure would be no more than the skin surface area exposed to soil (3300 cm^2) recommended by EPA, 2004.

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to surface water.

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

TABLE 4.6 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

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	Residential	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				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	
		Child	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				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	Residential	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	5700	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				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	

TABLE 4.6 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

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	Residential	Child	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	2800	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound	Chemical-Specific	--	EPA, 2004	or
					through the stratum comeum relative to its				
					permeability coefficient across the viable				DA-event = FA x Kp x CW x ((t-event/(1+B)) +
					epedermis				2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				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	

Sources:

(1) Due to shallow water depths (1 foot or less) , it was assumed that an adult or child resident would incidentally ingest 0.01 L/hour (1/5 of the amount that is ingested while swimming).
(2) Professional Judgment - For 210 Tributary, assumes an adult or child resident may be exposed 2 days/week during warmest 6 months of the year (52 days/yr).
(3) Professional Judgement; due to shallow water depths, it was assumed that an adult and child skin surface area for water exposure would be no more than the skin surface area exposed to soil recommended by EPA, 2004 (5700 cm^2 and 2800 cm^2 for the adult and child, respectively).

*Parameters on this table will be used for the Daily Intake Calculations for current/future residential exposure to surface water.

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

TABLE 4.6 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

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	Residential	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	9	years	Professional Judgment	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	0.01	L/hour	(1)	CW x IR x EF x ED x ET x 1/BW x 1/AT
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				ET	Exposure Time	1	hour/day	Professional Judgement	
				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	Residential	Adult	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	5700	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	9	years	Professional Judgment	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.6 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

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	Residential	Child	210 Tributary	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	2800	cm^2	(3)	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF1 x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	26	days/year	(2)	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF1	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				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	

Sources:

(1) Due to shallow water depths (1 foot or less) , it was assumed that an adult or child resident would incidentally ingest 0.01 L/hour (1/5 of the amount that is ingested while swimming).
(2) Professional Judgment - For 210 Tributary, assumes an adult or child resident may be exposed 1 days/week during warmest 6 months of the year (26 days/yr).
(3) Professional Judgement; due to shallow water depths, it was assumed that an adult and child skin surface area for water exposure would be no more than the skin surface area exposed to soil recommended by EPA, 2004 (5700 cm^2 and 2800 cm^2 for the adult and child, respectively).

*Parameters on this table will be used for the Daily Intake Calculations for current/future residential exposure to surface water.

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

TABLE 4.7 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Water	2	L/day	EPA, 1991	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				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	
		Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	1	L/day	EPA, 1991	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				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	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Dermally Absorbed Dose (DAD) (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	18,000	cm2	EPA, 2004	Absorbed Dose Per Event (DA-event) (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	0.58	hours/event	EPA, 2004	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	24	years	EPA, 1991	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm3	--	
				BW	Body Weight	70	kg	EPA, 2004	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 2004	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 2004	

TABLE 4.7 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Dermal	Resident	Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	--	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	6,600	cm2	EPA, 2004	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	EPA, 2004	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--		or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	350	days/year	EPA, 2004	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm3	--	
				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	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2004. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Adherance factors based on the Gardeners and Grounds Keeper activity, respectively.

TABLE 4.7 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Water	2	L/day	EPA, 1991	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	9	years	Professional Judgement	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	1	L/day	EPA, 1991	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	6	years	EPA, 1991	
				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	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Dermally Absorbed Dose (DAD) (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	18,000	cm2	EPA, 2004	Absorbed Dose Per Event (DA-event) (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	0.25	hours/event	EPA, 2004	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	9	years	Professional Judgement	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm3	--	
				BW	Body Weight	70	kg	EPA, 2004	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 2004	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	

TABLE 4.7 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Dermal	Resident	Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	DAD (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	--	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	6,600	cm2	EPA, 2004	DA-event (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	0.33	hours/event	EPA, 2004	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	6	years	EPA, 1991	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm3	--	
				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	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2004. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Adherance factors based on the Gardeners and Grounds Keeper activity, respectively.

TABLE 4.8 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Indoor Vapors	K	volatilization factor	0.0005 x 1000	L/m^3	Andelman, 1990	CW x K x IR x EF x ED x 1/BW x 1/AT
			due to water use	IR	Inhalation Rate	20	m^3/day	EPA, 1991	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				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	
		Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Indoor Vapors	K	volatilization factor	0.0005 x 1000	L/m^3	Andelman, 1990	CW x K x IR x EF x ED x 1/BW x 1/AT
			due to water use	IR	Inhalation Rate	10	m^3/day	EPA, 1997	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	years	EPA, 1991	
				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	

Sources:

Andelman, 1990. Total Exposure to Volatile Organic Chemicals in Potable Water.
EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997. Exposure Factors Handbook.

TABLE 4.8 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Resident	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Indoor Vapors	K	volatilization factor	0.0005 x 1000	L/m^3	Andelman, 1990	CW x K x IR x EF x ED x 1/BW x 1/AT
			due to water use	IR	Inhalation Rate	20	m^3/day	EPA, 1991	
				EF	Exposure Frequency	234	days/year	Professional Judgment	
				ED	Exposure Duration	9	years	Professional Judgment	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Indoor Vapors	K	volatilization factor	0.0005 x 1000	L/m^3	Andelman, 1990	CW x K x IR x EF x ED x 1/BW x 1/AT
			due to water use	IR	Inhalation Rate	10	m^3/day	EPA, 1997	
				EF	Exposure Frequency	234	days/year	Professional Judgment	
				ED	Exposure Duration	6	years	EPA, 1991	
				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	

Sources:

Andelman, 1990. Total Exposure to Volatile Organic Chemicals in Potable Water.

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

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

EPA, 1997. Exposure Factors Handbook.

TABLE 4.9 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Soil/Groundwater
Exposure Medium:	Indoor/Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Industrial Worker	Adult	Air (Indoor/Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m^3	**	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	20	m^3/day	EPA,1991	
				EF	Exposure Frequency	250	days/year	EPA,1991	
				ED	Exposure Duration	25	years	EPA,1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future industrial worker exposure to indoor/outdoor air
** Indoor air concentrations will be based on measured indoor air concentrations (See Table 3). Outdoor air concentrations will be developed based on modeling results (see Appendix C).

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

TABLE 4.9 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Soil/Groundwater
Exposure Medium:	Indoor/Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Industrial Worker	Adult	Air (Indoor/Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m3	**	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x ET x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	20	m^3/day	EPA,1991	
				EF	Exposure Frequency	219	days/year	EPA,1996	
				ED	Exposure Duration	6.6	years	EPA,1997	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,409	days	EPA, 1989	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future industrial worker exposure to outdoor air
** Indoor air concentrations will be based on measured indoor air concentrations (See Table 3). Outdoor air concentrations will be developed based on modeling results (see Appendix C).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1996. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil.
EPA, 1997. Exposure Factors Handbook.

TABLE 4.10 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Soil/Groundwater
Exposure Medium:	Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Construction Worker	Adult	Air (Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m^3	**	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	20	m^3/day	EPA,1991	
				EF	Exposure Frequency	90	days/year	Professional Judgment	
				ED	Exposure Duration	1	year	EPA, 1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	120	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to outdoor air
** Outdoor air concentrations will be developed based on modeling results (see Appendix C).

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

TABLE 4.10 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Soil/Groundwater
Exposure Medium:	Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Construction Worker	Adult	Air (Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m3	**	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	20	m^3/day	EPA,1991	
				EF	Exposure Frequency	30	days/year	Professional Judgment	
				ED	Exposure Duration	1	year	EPA,1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	42	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to outdoor air
** Outdoor air concentrations will be developed based on modeling results (see Appendix C).

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

TABLE 4.11 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Groundwater/Soil
Exposure Medium:	Indoor/Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Resident	Adult	Air (Indoor/Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m^3	see Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	20	m^3/day	EPA, 1991	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	24	year	EPA, 1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				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	
		Child	Air (Indoor/Outdoor Vapors)	CS**	Chemical Concentration in Air	**	ug/m^3	see Table 3	CDI (mg/kg-day) = CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				IR	Inhalation Rate	10	m^3/day	EPA, 1997	
				EF	Exposure Frequency	350	days/year	EPA, 1991	
				ED	Exposure Duration	6	year	EPA, 1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				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	

Sources:
*Parameters on this table will be used for the Daily Intake Calculations for current/future residential exposure to indoor and outdoor air
** Indoor air concentrations will be based on measured indoor air concentrations (See Table 3). Outdoor air concentrations will be developed based on modeling results (see Appendix C).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997. Exposure Factors Handbook.

TABLE 4.11 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Current/Future
Medium:	Groundwater/Soil
Exposure Medium:	Indoor/Outdoor Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Resident	Adult	Air	CS**	Chemical Concentration in Air	**	ug/m^3	see Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			(Indoor/Outdoor Vapors)	IR	Inhalation Rate	20	m^3/day	EPA, 1991	CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	9	year	Professional Judgement	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	EPA, 1989	
		Child	Air	CS**	Chemical Concentration in Air	**	ug/m^3	see Table 3	CDI (mg/kg-day) =
			(Indoor/Outdoor Vapors)	IR	Inhalation Rate	10	m^3/hr	EPA,1997	CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	234	days/year	Professional Judgement	
				ED	Exposure Duration	6	year	EPA,1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				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	

Sources:
*Parameters on this table will be used for the Daily Intake Calculations for current/future residential exposure to indoor and outdoor air
** Indoor air concentrations will be based on measured indoor air concentrations (See Table 3). Outdoor air concentrations will be developed based on modeling results (see Appendix C).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997. Exposure Factors Handbook.

TABLE 4.12 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Water
Exposure Medium:	Sanitary Sewer Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate (incidental)	0.01	L/hr	(1)	CW x IR x EF x ED x 1/BW x 1/AT
				ET	Exposure Time	1	hour/day	Professional Judgement	
				EF	Exposure Frequency	90	days/year	(2)	
				ED	Exposure Duration	1	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)	120	days	Adjusted per EPA Region 7	
Dermal	Construction Worker	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Dermally Absorbed Dose (DAD) (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	9,000	cm2	(3)	Absorbed Dose Per Event (DA-event) (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	EPA, 1991	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	90	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm3	--	
				BW	Body Weight	70	kg	EPA, 2004	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	120	days	Adjusted per EPA Region 7	

Notes:
(1) Based on professional judgement, it was assumed that a construction worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 90 days/year with 60 minutes/day (1 hour) exposure to sewer water, and assumes a construction period of 4 months (120 days).
(3) Professional Judgement; due to nature of sewer worker exposure, it was assumed that a construction worker skin surface area for sewer water exposure would be no more than half of the total water contact skin surface area of an adult (18,000 cm^2) recommended by EPA, 2004.

Sources:
EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2004. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Adherance factors based on the Gardeners and Grounds Keeper activity, respectively.

TABLE 4.12 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Water
Exposure Medium:	Sanitary Sewer Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate (incidental)	0.01	L/hr	(1)	CW x IR x EF x ED x 1/BW x 1/AT
				ET	Exposure Time	1	hour/day	Professional Judgement	
				EF	Exposure Frequency	30	days/year	(2)	
				ED	Exposure Duration	1	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)	42	days	Adjusted per EPA Region 7	
Dermal	Construction Worker	Adult	On-Site	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Dermally Absorbed Dose (DAD) (mg/kd-day)=
				FA	Fraction Absorbed Water	Chemical-Specific	--	EPA, 2004	DA-event x EV x ED x EF x SA x 1/BW x 1/AT
				Kp	Permeability Constant	Chemical-Specific	cm/hour	EPA, 2004	where for organic compounds,
				SA	Skin Surface Area	9,000	cm^2	(3)	Absorbed Dose Per Event (DA-event) (mg/cm2-event) =
				tau-event	Chemical Specific	Chemical-Specific	hours/event	EPA, 2004	2 FA x Kp x CW x CF x SQRT(6 x tau-event x t-event/pi)
				t-event	Event Duration	1	hours/event	Professional Judgement	
				t*	time to reach steady state	Chemical-Specific	hour	EPA, 2004	
				B	Ratio of permeability Coefficient of a compound through the stratum comeum relative to its permeability coefficient across the viable epedermis	Chemical-Specific	--	EPA, 2004	or DA-event = FA x Kp x CW x ((t-event/(1+B)) + 2 x tau-event x ((1+(3xB) + (3 xBxB))/(1+B)2))
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	30	days/year	(2)	
				ED	Exposure Duration	1	years	EPA, 1991	
				CF	Volumetric Conversion Factor for Water	0.001	L/cm^3	--	
				BW	Body Weight	70	kg	EPA, 1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	42	days	Adjusted per EPA Region 7	

Notes:
(1) Based on professional judgement, it was assumed that a construction worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 30 days/year with 60 minutes/day (1 hour) exposure to surface water, and assumes a construction period of 6 weeks (42 days).
(3) Professional Judgement; due to nature of sewer worker exposure, it was assumed that a construction worker skin surface area for sewer water exposure would be no more than half of the total water contact skin surface area of an adult (18,000 cm^2) recommended by EPA, 2004.

Sources:
EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2004. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Adherance factors based on the Gardeners and Grounds Keeper activity, respectively.

TABLE 4.13 RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Water
Exposure Medium:	Sewer Water Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Construction Worker	Adult	On-Site Air	CS**	Chemical Concentration in Air	**	ug/m^3	**	Chronic Daily Intake (CDI) (mg/kg-day) =
			(Vapors from sanitary sewer water)	IR	Inhalation Rate	20	m^3/day	EPA, 1991	CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	90	days/year	Professional Judgement	
				ED	Exposure Duration	1	year	EPA, 1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	120	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to sanitary sewer water vapors.
** Sanitary sewer water vapor air concentrations will be based on modelling results (See Appendix C).

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

TABLE 4.13 CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDENCY EXPOSURE
RIVERFRONT OU4

Scenario Timeframe:	Future
Medium:	Water
Exposure Medium:	Sewer Water Vapors

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Construction Worker	Adult	On-Site Air	CS**	Chemical Concentration in Air	**	ug/m^3	**	Chronic Daily Intake (CDI) (mg/kg-day) =
			(Vapors from sanitary sewer water)	IR	Inhalation Rate	20	m^3/day	EPA,1991	CS x IR x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	30	days/year	Professional Judgement	
				ED	Exposure Duration	1	year	EPA,1991	
				CF1	Conversion Factor 1	1.0E-03	mg/ug	--	
				BW	Body Weight	70	kg	EPA,1991	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	42	days	Adjusted per EPA Region 7	

Sources:

*Parameters on this table will be used for the Daily Intake Calculations for current/future construction worker exposure to sanitary sewer water vapors.
** Sanitary sewer water vapor air concentrations will be based on modelling results. See Appendix C.

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