APPENDIX C

RISK CALCULATION SPREADSHEETS

Exhibit C-1.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Ingestion**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Soil ingestion rate	IR	50	100	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	4.89E-07	9.78E-07	1/day
LADD intake factor	$LADD_{if}$	4.19E-08	3.49E-07	1/day

Exposure Area : **Lots 1 and 2**

	Soil		**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
COPCs	**EPC (mg/kg)**	**RBA (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Oral RfD (mg/kg-day)**	**CTE (unitless)**	**RME (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**CSF_o (kg-day/mg)**	**CTE (unitless)**	**RME (unitless)**
Arsenic	2.3E+01	1.0	1.1E-05	2.3E-05	3.0E-04	3.8E-02	7.6E-02	9.7E-07	8.1E-06	1.5E+00	1.5E-06	1.2E-05
Benzo(a)anthracene	1.3E-01	1.0	6.4E-08	1.3E-07	NA	NA	NA	5.5E-09	4.6E-08	7.3E-01	4.0E-09	3.3E-08
Benzo(a)pyrene	1.8E-01	1.0	8.8E-08	1.8E-07	NA	NA	NA	7.5E-09	6.3E-08	7.3E+00	5.5E-08	4.6E-07
Benzo(b)fluoranthene	2.0E-01	1.0	9.7E-08	1.9E-07	NA	NA	NA	8.3E-09	6.9E-08	7.3E-01	6.1E-09	5.1E-08
Aroclor 1248	3.0E-01	1.0	1.5E-07	2.9E-07	2.0E-05	7.3E-03	1.5E-02	1.3E-08	1.0E-07	2.0E+00	2.5E-08	2.1E-07
4,4'-DDD	2.4E+00	1.0	1.2E-06	2.4E-06	2.0E-03	6.0E-04	1.2E-03	1.0E-07	8.5E-07	2.4E-01	2.4E-08	2.0E-07
4,4'-DDE	1.1E+00	1.0	5.5E-07	1.1E-06	NA	NA	NA	4.7E-08	3.9E-07	3.4E-01	1.6E-08	1.3E-07
4,4'-DDT	5.1E+01	1.0	2.5E-05	5.0E-05	5.0E-04	5.0E-02	1.0E-01	2.2E-06	1.8E-05	3.4E-01	7.3E-07	6.1E-06
Total						1E-01	2E-01				2E-06	2E-05

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-2.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Dermal**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.02	0.1	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	2.77E+00	1.15E+01	event-cm^2/d-kg

Exposure Area : **Lots 1 and 2**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	0.03	1.4E-08	7.0E-08	4.5E-07	2.2E-06	1.2E-04	3.7E-03	1.8E-02	3.9E-08	8.0E-07	3.7E+00	1.4E-07	2.9E-06
Benzo(a)anthracene	1.3E-01	0.13	3.4E-10	1.7E-09	1.1E-08	5.5E-08	NA	NA	NA	9.4E-10	2.0E-08	7.3E-01	6.8E-10	1.4E-08
Benzo(a)pyrene	1.8E-01	0.13	4.7E-10	2.3E-09	1.5E-08	7.6E-08	NA	NA	NA	1.3E-09	2.7E-08	7.3E+00	9.5E-09	2.0E-07
Benzo(b)fluoranthene	2.0E-01	0.13	5.2E-10	2.6E-09	1.7E-08	8.3E-08	NA	NA	NA	1.4E-09	3.0E-08	7.3E-01	1.0E-09	2.2E-08
Aroclor 1248	3.0E-01	0.14	8.4E-10	4.2E-09	2.7E-08	1.4E-07	2.0E-05	1.4E-03	6.8E-03	2.3E-09	4.8E-08	2.0E+00	4.7E-09	9.7E-08
4,4'-DDD	2.4E+00	0.01	4.9E-10	2.4E-09	1.6E-08	7.9E-08	2.0E-03	7.9E-06	3.9E-05	1.3E-09	2.8E-08	2.4E-01	3.2E-10	6.7E-09
4,4'-DDE	1.1E+00	0.01	2.3E-10	1.1E-09	7.3E-09	3.6E-08	NA	NA	NA	6.2E-10	1.3E-08	3.4E-01	2.1E-10	4.4E-09
4,4'-DDT	5.1E+01	0.03	3.1E-08	1.5E-07	1.0E-06	5.0E-06	5.0E-04	2.0E-03	1.0E-02	8.5E-08	1.8E-06	3.4E-01	2.9E-08	6.1E-07
Total								7E-03	4E-02				2E-07	4E-06

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-3.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_{part} = C_{soil}$ x PEF

$ADD_{if} = Inh_R$ x EF x ED / (AT_n x BW)

$ADD = C_{part}$ x ADD_{if}

HQ = ADD / RfD

$LADD_{if} = Inh_R$ x EF x ED / (AT_c x BW)

$LADD = C_{part}$ x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/yr
Exposure duration	ED	6	25	yr
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 1 and 2**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	1.8E-08	1.2E-09	1.2E-09	3.0E-04	4.0E-06	4.0E-06	1.0E-10	4.3E-10	1.5E+01	1.6E-09	6.5E-09
Benzo(a)anthracene	1.3E-01	9.9E-11	6.8E-12	6.8E-12	NA	NA	NA	5.8E-13	2.4E-12	3.1E-01	1.8E-13	7.5E-13
Benzo(a)pyrene	1.8E-01	1.4E-10	9.3E-12	9.3E-12	NA	NA	NA	8.0E-13	3.3E-12	3.1E+00	2.5E-12	1.0E-11
Benzo(b)fluoranthene	2.0E-01	1.5E-10	1.0E-11	1.0E-11	NA	NA	NA	8.8E-13	3.7E-12	3.1E-01	2.7E-13	1.1E-12
Aroclor 1248	3.0E-01	2.3E-10	1.6E-11	1.6E-11	2.0E-05	7.8E-07	7.8E-07	1.3E-12	5.6E-12	2.0E+00	2.7E-12	1.1E-11
4,4'-DDD	2.4E+00	1.8E-09	1.3E-10	1.3E-10	2.0E-03	6.3E-08	6.3E-08	1.1E-11	4.5E-11	2.4E-01	2.6E-12	1.1E-11
4,4'-DDE	1.1E+00	8.5E-10	5.9E-11	5.9E-11	NA	NA	NA	5.0E-12	2.1E-11	3.4E-01	1.7E-12	7.1E-12
4,4'-DDT	5.1E+01	3.9E-08	2.7E-09	2.7E-09	5.0E-04	5.3E-06	5.3E-06	2.3E-10	9.5E-10	3.4E-01	7.8E-11	3.2E-10
Total						1E-05	1E-05				2E-09	7E-09

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-4.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Ingestion**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Soil ingestion rate	IR	50	100	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	4.89E-07	9.78E-07	1/day
LADD intake factor	$LADD_{if}$	4.19E-08	3.49E-07	1/day

Exposure Area : **Lots 1 and 2**

	Soil		**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
COPCs	**EPC (mg/kg)**	**RBA (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Oral RfD (mg/kg-day)**	**CTE (unitless)**	**RME (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**CSF_o (kg-day/mg)**	**CTE (unitless)**	**RME (unitless)**
Arsenic	2.3E+01	1.0	1.1E-05	2.3E-05	3.0E-04	3.8E-02	7.6E-02	9.7E-07	8.1E-06	1.5E+00	1.5E-06	1.2E-05
Benzo(a)anthracene	1.3E-01	1.0	6.4E-08	1.3E-07	NA	NA	NA	5.5E-09	4.6E-08	7.3E-01	4.0E-09	3.3E-08
Benzo(a)pyrene	1.8E-01	1.0	8.8E-08	1.8E-07	NA	NA	NA	7.5E-09	6.3E-08	7.3E+00	5.5E-08	4.6E-07
Benzo(b)fluoranthene	2.0E-01	1.0	9.7E-08	1.9E-07	NA	NA	NA	8.3E-09	6.9E-08	7.3E-01	6.1E-09	5.1E-08
Aroclor 1248	3.0E-01	1.0	1.5E-07	2.9E-07	2.0E-05	7.3E-03	1.5E-02	1.3E-08	1.0E-07	2.0E+00	2.5E-08	2.1E-07
4,4'-DDD	2.4E+00	1.0	1.2E-06	2.4E-06	2.0E-03	6.0E-04	1.2E-03	1.0E-07	8.5E-07	2.4E-01	2.4E-08	2.0E-07
4,4'-DDE	1.1E+00	1.0	5.5E-07	1.1E-06	NA	NA	NA	4.7E-08	3.9E-07	3.4E-01	1.6E-08	1.3E-07
4,4'-DDT	5.1E+01	1.0	2.5E-05	5.0E-05	5.0E-04	5.0E-02	1.0E-01	2.2E-06	1.8E-05	3.4E-01	7.3E-07	6.1E-06
Total						1E-01	2E-01				2E-06	2E-05

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-5.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Dermal**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.02	0.1	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	2.77E+00	1.15E+01	event-cm^2/d-kg

Exposure Area : **Lots 1 and 2**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	0.03	1.4E-08	7.0E-08	4.5E-07	2.2E-06	1.2E-04	3.7E-03	1.8E-02	3.9E-08	8.0E-07	3.7E+00	1.4E-07	2.9E-06
Benzo(a)anthracene	1.3E-01	0.13	3.4E-10	1.7E-09	1.1E-08	5.5E-08	NA	NA	NA	9.4E-10	2.0E-08	7.3E-01	6.8E-10	1.4E-08
Benzo(a)pyrene	1.8E-01	0.13	4.7E-10	2.3E-09	1.5E-08	7.6E-08	NA	NA	NA	1.3E-09	2.7E-08	7.3E+00	9.5E-09	2.0E-07
Benzo(b)fluoranthene	2.0E-01	0.13	5.2E-10	2.6E-09	1.7E-08	8.3E-08	NA	NA	NA	1.4E-09	3.0E-08	7.3E-01	1.0E-09	2.2E-08
Aroclor 1248	3.0E-01	0.14	8.4E-10	4.2E-09	2.7E-08	1.4E-07	2.0E-05	1.4E-03	6.8E-03	2.3E-09	4.8E-08	2.0E+00	4.7E-09	9.7E-08
4,4'-DDD	2.4E+00	0.01	4.9E-10	2.4E-09	1.6E-08	7.9E-08	2.0E-03	7.9E-06	3.9E-05	1.3E-09	2.8E-08	2.4E-01	3.2E-10	6.7E-09
4,4'-DDE	1.1E+00	0.01	2.3E-10	1.1E-09	7.3E-09	3.6E-08	NA	NA	NA	6.2E-10	1.3E-08	3.4E-01	2.1E-10	4.4E-09
4,4'-DDT	5.1E+01	0.03	3.1E-08	1.5E-07	1.0E-06	5.0E-06	5.0E-04	2.0E-03	1.0E-02	8.5E-08	1.8E-06	3.4E-01	2.9E-08	6.1E-07
Total								7E-03	4E-02				2E-07	4E-06

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-6.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_{part} = C_{soil}$ x PEF

$ADD_{if} = Inh_R$ x EF x ED / (AT_n x BW)

$ADD = C_{part}$ x ADD_{if}

HQ = ADD / RfD

$LADD_{if} = Inh_R$ x EF x ED / (AT_c x BW)

$LADD = C_{part}$ x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 1 and 2**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	1.8E-08	1.2E-09	1.2E-09	3.0E-04	4.0E-06	4.0E-06	1.0E-10	4.3E-10	1.5E+01	1.6E-09	6.5E-09
Benzo(a)anthracene	1.3E-01	9.9E-11	6.8E-12	6.8E-12	NA	NA	NA	5.8E-13	2.4E-12	3.1E-01	1.8E-13	7.5E-13
Benzo(a)pyrene	1.8E-01	1.4E-10	9.3E-12	9.3E-12	NA	NA	NA	8.0E-13	3.3E-12	3.1E+00	2.5E-12	1.0E-11
Benzo(b)fluoranthene	2.0E-01	1.5E-10	1.0E-11	1.0E-11	NA	NA	NA	8.8E-13	3.7E-12	3.1E-01	2.7E-13	1.1E-12
Aroclor 1248	3.0E-01	2.3E-10	1.6E-11	1.6E-11	2.0E-05	7.8E-07	7.8E-07	1.3E-12	5.6E-12	2.0E+00	2.7E-12	1.1E-11
4,4'-DDD	2.4E+00	1.8E-09	1.3E-10	1.3E-10	2.0E-03	6.3E-08	6.3E-08	1.1E-11	4.5E-11	2.4E-01	2.6E-12	1.1E-11
4,4'-DDE	1.1E+00	8.5E-10	5.9E-11	5.9E-11	NA	NA	NA	5.0E-12	2.1E-11	3.4E-01	1.7E-12	7.1E-12
4,4'-DDT	5.1E+01	3.9E-08	2.7E-09	2.7E-09	5.0E-04	5.3E-06	5.3E-06	2.3E-10	9.5E-10	3.4E-01	7.8E-11	3.2E-10
Total						1E-05	1E-05				2E-09	7E-09

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-7.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Ingestion (Subchronic)**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Soil ingestion rate	IR	100	330	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	9.78E-07	3.23E-06	1/day
LADD intake factor	$LADD_{if}$	6.99E-09	4.61E-08	1/day

Exposure Area : **Lots 1 and 2**

	Soil		**ADD (noncancer)**		**Subchronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
COPCs	**EPC (mg/kg)**	**RBA (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Oral RfD (mg/kg-day)**	**CTE (unitless)**	**RME (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**CSF_o (kg-day/mg)**	**CTE (unitless)**	**RME (unitless)**
Arsenic	2.3E+01	1.0	2.3E-05	7.5E-05	3.0E-04	7.6E-02	2.5E-01	1.6E-07	1.1E-06	1.5E+00	2.4E-07	1.6E-06
Benzo(a)pyrene	1.8E-01	1.0	1.8E-07	5.8E-07	NA	NA	NA	1.3E-09	8.3E-09	7.3E+00	9.2E-09	6.1E-08
Aroclor 1248	3.0E-01	1.0	2.9E-07	9.7E-07	3.0E-05	9.8E-03	3.2E-02	2.1E-09	1.4E-08	2.0E+00	4.2E-09	2.8E-08
4,4'-DDT	5.1E+01	1.0	5.0E-05	1.7E-04	5.0E-04	1.0E-01	3.3E-01	3.6E-07	2.4E-06	3.4E-01	1.2E-07	8.1E-07
Total						2E-01	6E-01				4E-07	3E-06

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-8.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Dermal (Subchronic)**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.1	0.3	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	2.31E-01	4.61E-01	event-cm^2/d-kg

Exposure Area : **Lots 1 and 2**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	0.03	7.0E-08	2.1E-07	2.2E-06	6.7E-06	3.0E-04	7.5E-03	2.2E-02	1.6E-08	9.6E-08	3.7E+00	5.9E-08	3.5E-07
Benzo(a)pyrene	1.8E-01	0.13	2.3E-09	7.0E-09	7.6E-08	2.3E-07	NA	NA	NA	5.4E-10	3.2E-09	7.3E+00	3.9E-09	2.4E-08
Aroclor 1248	3.0E-01	0.14	4.2E-09	1.3E-08	1.4E-07	4.1E-07	3.0E-05	4.5E-03	1.4E-02	9.7E-10	5.8E-09	2.0E+00	1.9E-09	1.2E-08
4,4'-DDT	5.1E+01	0.03	1.5E-07	4.6E-07	5.0E-06	1.5E-05	5.0E-04	1.0E-02	3.0E-02	3.6E-08	2.1E-07	3.4E-01	1.2E-08	7.3E-08
Total								2E-02	7E-02				8E-08	5E-07

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-9.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	4.89E-04	9.78E-04	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 1 and 2**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	1.8E-08	1.2E-09	1.2E-09	3.0E-04	4.0E-06	4.0E-06	8.6E-12	1.7E-11	1.5E+01	1.3E-10	2.6E-10
Benzo(a)pyrene	1.8E-01	1.4E-10	9.3E-12	9.3E-12	NA	NA	NA	6.7E-14	1.3E-13	3.1E+00	2.1E-13	4.1E-13
Aroclor 1248	3.0E-01	2.3E-10	1.6E-11	1.6E-11	3.0E-05	5.2E-07	5.2E-07	1.1E-13	2.2E-13	2.0E+00	2.2E-13	4.5E-13
4,4'-DDT	5.1E+01	3.9E-08	2.7E-09	2.7E-09	5.0E-04	5.3E-06	5.3E-06	1.9E-11	3.8E-11	3.4E-01	6.5E-12	1.3E-11
Total						1E-05	1E-05				1E-10	3E-10

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-10.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Ingestion (Subchronic)**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Soil ingestion rate	IR	100	330	mg/day
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	3.52E-08	1.16E-07	1/day
LADD intake factor	$LADD_{if}$	2.52E-10	1.66E-09	1/day

Exposure Area : **Lots 1 and 2**

	Soil		**ADD (noncancer)**		**Subchronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
COPCs	**EPC (mg/kg)**	**RBA (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Oral RfD (mg/kg-day)**	**CTE (unitless)**	**RME (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**CSF_o (kg-day/mg)**	**CTE (unitless)**	**RME (unitless)**
Arsenic	2.3E+01	1.0	8.2E-07	2.7E-06	3.0E-04	2.7E-03	9.0E-03	5.8E-09	3.9E-08	1.5E+00	8.8E-09	5.8E-08
4,4'-DDT	5.1E+01	1.0	1.8E-06	6.0E-06	5.0E-04	3.6E-03	1.2E-02	1.3E-08	8.5E-08	3.4E-01	4.4E-09	2.9E-08
Total						6E-03	2E-02				1E-08	9E-08

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-11.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Dermal (Subchronic)**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.1	0.3	mg/cm^2-event
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	1.16E+00	1.16E+00	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	8.30E-03	1.66E-02	event-cm^2/d-kg

Exposure Area : **Lots 1 and 2**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.3E+01	0.03	7.0E-08	2.1E-07	8.1E-08	2.4E-07	3.0E-04	2.7E-04	8.1E-04	5.8E-10	3.5E-09	3.7E+00	2.1E-09	1.3E-08
4,4'-DDT	5.1E+01	0.03	1.5E-07	4.6E-07	1.8E-07	5.4E-07	5.0E-04	3.6E-04	1.1E-03	1.3E-09	7.7E-09	3.4E-01	4.4E-10	2.6E-09
Total								6E-04	2E-03				3E-09	2E-08

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-12.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	2.47E-03	2.47E-03	m^3/kg-day
LADD intake factor	$LADD_{if}$	1.76E-05	3.52E-05	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 1 and 2**

	Soil	**Particulate**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**EPC**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_i**	**CTE**	**RME**
COPCs	**(mg/kg)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Arsenic	2.3E+01	1.8E-08	4.3E-11	4.3E-11	3.0E-04	1.4E-07	1.4E-07	3.1E-13	6.2E-13	1.5E+01	4.7E-12	9.3E-12
4,4'-DDT	5.1E+01	3.9E-08	9.6E-11	9.6E-11	5.0E-04	1.9E-07	1.9E-07	6.9E-13	1.4E-12	3.4E-01	2.3E-13	4.7E-13
Total						3E-07	3E-07				5E-12	1E-11

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-13.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Ingestion**
Time Frame: **Current / Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Soil ingestion rate	IR	100	100	mg/day
Exposure frequency	EF	35	70	day/yr
Exposure duration	ED	10	10	yr
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	1.88E-07	3.76E-07	1/day
LADD intake factor	$LADD_{if}$	2.69E-08	5.37E-08	1/day

Exposure Area : **Lots 1 and 2**

	Soil		**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**		**CSF_o**	**Cancer Risk [a]**	
COPCs	**EPC (mg/kg)**	**RBA (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Oral RfD (mg/kg-day)**	**CTE (unitless)**	**RME (unitless)**	**CTE (mg/kg-day)**	**RME (mg/kg-day)**	**Slope Factor (kg-day/mg)**	**CTE (unitless)**	**RME (unitless)**
Arsenic	2.3E+01	1.0	4.4E-06	8.7E-06	3.0E-04	1.5E-02	2.9E-02	6.2E-07	1.2E-06	1.5E+00	9.3E-07	1.9E-06
Benzo(a)anthracene	1.3E-01	1.0	2.4E-08	4.9E-08	NA	NA	NA	3.5E-09	7.0E-09	7.3E-01	6.1E-09	1.2E-08
Benzo(a)pyrene	1.8E-01	1.0	3.4E-08	6.8E-08	NA	NA	NA	4.8E-09	9.7E-09	7.3E+00	8.5E-08	1.7E-07
Benzo(b)fluoranthene	2.0E-01	1.0	3.7E-08	7.5E-08	NA	NA	NA	5.3E-09	1.1E-08	7.3E-01	9.3E-09	1.9E-08
Benzo(k)fluoranthene	1.8E-01	1.0	3.4E-08	6.8E-08	NA	NA	NA	4.9E-09	9.7E-09	7.3E-02	8.5E-10	1.7E-09
Indeno(1,2,3-cd)pyrene	1.0E-01	1.0	1.9E-08	3.8E-08	NA	NA	NA	2.7E-09	5.4E-09	7.3E-01	4.8E-09	9.5E-09
Aroclor 1248	3.0E-01	1.0	5.6E-08	1.1E-07	2.0E-05	2.8E-03	5.6E-03	8.1E-09	1.6E-08	2.0E+00	1.6E-08	3.2E-08
4,4'-DDD	2.4E+00	1.0	4.6E-07	9.1E-07	2.0E-03	2.3E-04	4.6E-04	6.5E-08	1.3E-07	2.4E-01	1.6E-08	3.1E-08
4,4'-DDE	1.1E+00	1.0	2.1E-07	4.2E-07	NA	NA	NA	3.0E-08	6.1E-08	3.4E-01	1.0E-08	2.1E-08
4,4'-DDT	5.1E+01	1.0	9.7E-06	1.9E-05	5.0E-04	1.9E-02	3.9E-02	1.4E-06	2.8E-06	3.4E-01	4.7E-07	9.4E-07
Total						4E-02	7E-02				2E-06	3E-06

Notes: ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

[a] A weighted age dependent adjustment factor (ADAF) of 2.4 was applied to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene. See text for derivation and explanation.

Exhibit C-14.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Dermal**
Time Frame: **Current / Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.07	0.07	mg/cm^2-event
Exposure frequency	EF	35	70	day/year
Exposure duration	ED	10	10	year
Event frequency	EV	1	1	event/day
Surface Area	SA	4,800	5,600	cm^2
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
ADD intake factor	ADD_{if}	9.02E+00	2.11E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	1.29E+00	3.01E+00	event-cm^2/d-kg

Exposure Area : **Lots 1 and 2**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk [a] CTE (unitless)	Cancer Risk [a] RME (unitless)
Arsenic	2.3E+01	0.03	4.9E-08	4.9E-08	4.4E-07	1.0E-06	1.2E-04	3.6E-03	8.3E-03	6.3E-08	1.5E-07	3.7E+00	2.3E-07	5.4E-07
Benzo(a)anthracene	1.3E-01	0.13	1.2E-09	1.2E-09	1.1E-08	2.5E-08	NA	NA	NA	1.5E-09	3.6E-09	7.3E-01	2.7E-09	6.2E-09
Benzo(a)pyrene	1.8E-01	0.13	1.6E-09	1.6E-09	1.5E-08	3.4E-08	NA	NA	NA	2.1E-09	4.9E-09	7.3E+00	3.7E-08	8.6E-08
Benzo(b)fluoranthene	2.0E-01	0.13	1.8E-09	1.8E-09	1.6E-08	3.8E-08	NA	NA	NA	2.3E-09	5.4E-09	7.3E-01	4.1E-09	9.5E-09
Benzo(k)fluoranthene	1.8E-01	0.13	1.6E-09	1.6E-09	1.5E-08	3.5E-08	NA	NA	NA	2.1E-09	5.0E-09	7.3E-02	3.7E-10	8.7E-10
Indeno(1,2,3-cd)pyrene	1.0E-01	0.13	9.2E-10	9.2E-10	8.3E-09	1.9E-08	NA	NA	NA	1.2E-09	2.8E-09	7.3E-01	2.1E-09	4.9E-09
Aroclor 1248	3.0E-01	0.14	2.9E-09	2.9E-09	2.7E-08	6.2E-08	2.0E-05	1.3E-03	3.1E-03	3.8E-09	8.8E-09	2.0E+00	7.6E-09	1.8E-08
4,4'-DDD	2.4E+00	0.01	1.7E-09	1.7E-09	1.5E-08	3.6E-08	2.0E-03	7.7E-06	1.8E-05	2.2E-09	5.1E-09	2.4E-01	5.3E-10	1.2E-09
4,4'-DDE	1.1E+00	0.01	7.9E-10	7.9E-10	7.1E-09	1.7E-08	NA	NA	NA	1.0E-09	2.4E-09	3.4E-01	3.5E-10	8.1E-10
4,4'-DDT	5.1E+01	0.03	1.1E-07	1.1E-07	9.8E-07	2.3E-06	5.0E-04	2.0E-03	4.6E-03	1.4E-07	3.3E-07	3.4E-01	4.7E-08	1.1E-07
Total								7E-03	2E-02				3E-07	8E-07

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

[a] A weighted age dependent adjustment factor (ADAF) of 2.4 was applied to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene. See text for derivation and explanation.

Exhibit C-15.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 1 and 2**
Exposure Pathway: **Inhalation**
Time Frame: **Current / Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	2.1	3.5	m^3/day
Exposure frequency	EF	35	70	day/year
Exposure duration	ED	10	10	year
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
ADD intake factor	ADD_{if}	3.95E-03	1.32E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.64E-04	1.88E-03	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 1 and 2**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk [a] CTE (unitless)	Cancer Risk [a] RME (unitless)
Arsenic	2.3E+01	1.8E-08	6.9E-11	2.3E-10	3.0E-04	2.3E-07	7.7E-07	9.9E-12	3.3E-11	1.5E+01	1.5E-10	5.0E-10
Benzo(a)anthracene	1.3E-01	9.9E-11	3.9E-13	1.3E-12	NA	NA	NA	5.6E-14	1.9E-13	3.1E-01	4.1E-14	1.4E-13
Benzo(a)pyrene	1.8E-01	1.4E-10	5.4E-13	1.8E-12	NA	NA	NA	7.7E-14	2.6E-13	3.1E+00	5.7E-13	1.9E-12
Benzo(b)fluoranthene	2.0E-01	1.5E-10	5.9E-13	2.0E-12	NA	NA	NA	8.5E-14	2.8E-13	3.1E-01	6.3E-14	2.1E-13
Benzo(k)fluoranthene	1.8E-01	1.4E-10	5.4E-13	1.8E-12	NA	NA	NA	7.7E-14	2.6E-13	3.1E-02	5.7E-15	1.9E-14
Indeno(1,2,3-cd)pyrene	1.0E-01	7.7E-11	3.0E-13	1.0E-12	NA	NA	NA	4.3E-14	1.4E-13	3.1E-01	3.2E-14	1.1E-13
Aroclor 1248	3.0E-01	2.3E-10	9.0E-13	3.0E-12	2.0E-05	4.5E-08	1.5E-07	1.3E-13	4.3E-13	2.0E+00	2.6E-13	8.6E-13
4,4'-DDD	2.4E+00	1.8E-09	7.3E-12	2.4E-11	2.0E-03	3.6E-09	1.2E-08	1.0E-12	3.5E-12	2.4E-01	2.5E-13	8.3E-13
4,4'-DDE	1.1E+00	8.5E-10	3.4E-12	1.1E-11	NA	NA	NA	4.8E-13	1.6E-12	3.4E-01	1.6E-13	5.5E-13
4,4'-DDT	5.1E+01	3.9E-08	1.5E-10	5.1E-10	5.0E-04	3.1E-07	1.0E-06	2.2E-11	7.3E-11	3.4E-01	7.5E-12	2.5E-11
Total						6E-07	2E-06				2E-10	5E-10

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

[a] A weighted age dependent adjustment factor (ADAF) of 2.4 was applied to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene. See text for derivation and explanation.

Exhibit C-16.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Ingestion**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	50	100	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	4.89E-07	9.78E-07	1/day
LADD intake factor	$LADD_{if}$	4.19E-08	3.49E-07	1/day

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Aroclor 1248	1.6E+00	1.0	7.7E-07	1.5E-06	2.0E-05	3.8E-02	7.7E-02	6.6E-08	5.5E-07	2.0E+00	1.3E-07	1.1E-06
Aroclor 1260	9.0E-02	1.0	4.4E-08	8.8E-08	2.0E-05	2.2E-03	4.4E-03	3.8E-09	3.2E-08	2.0E+00	7.6E-09	6.3E-08
4,4'-DDD	3.1E+01	1.0	1.5E-05	3.1E-05	2.0E-03	7.7E-03	1.5E-02	1.3E-06	1.1E-05	2.4E-01	3.2E-07	2.6E-06
4,4'-DDE	1.7E+01	1.0	8.4E-06	1.7E-05	NA	NA	NA	7.2E-07	6.0E-06	3.4E-01	2.4E-07	2.0E-06
4,4'-DDT	1.1E+03	1.0	5.2E-04	1.0E-03	5.0E-04	1.0E+00	2.1E+00	4.5E-05	3.7E-04	3.4E-01	1.5E-05	1.3E-04
1,4-Dichlorobenzene	5.1E-01	1.0	2.5E-07	5.0E-07	7.0E-02	3.5E-06	7.1E-06	2.1E-08	1.8E-07	2.4E-02	5.1E-10	4.2E-09
Chlorobenzene	1.5E+03	1.0	7.4E-04	1.5E-03	2.0E-02	3.7E-02	7.4E-02	6.3E-05	5.3E-04	NA	NA	NA
Total						1E+00	2E+00				2E-05	1E-04

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-17.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Dermal**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.02	0.1	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
LADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LDAD intake factor	$LADD_{if}$	2.77E+00	1.15E+01	event-cm^2/d-kg

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Aroclor 1248	1.6E+00	0.14	4.4E-09	2.2E-08	1.4E-07	7.1E-07	2.0E-05	7.1E-03	3.5E-02	1.2E-08	2.5E-07	2.0E+00	2.4E-08	5.1E-07
Aroclor 1260	9.0E-02	0.14	2.5E-10	1.3E-09	8.2E-09	4.1E-08	2.0E-05	4.1E-04	2.0E-03	7.0E-10	1.5E-08	2.0E+00	1.4E-09	2.9E-08
4,4'-DDD	3.1E+01	0.01	6.3E-09	3.1E-08	2.0E-07	1.0E-06	2.0E-03	1.0E-04	5.1E-04	1.7E-08	3.6E-07	2.4E-01	4.2E-09	8.7E-08
4,4'-DDE	1.7E+01	0.01	3.4E-09	1.7E-08	1.1E-07	5.5E-07	NA	NA	NA	9.5E-09	2.0E-07	3.4E-01	3.2E-09	6.7E-08
4,4'-DDT	1.1E+03	0.03	6.4E-07	3.2E-06	2.1E-05	1.0E-04	5.0E-04	4.2E-02	2.1E-01	1.8E-06	3.7E-05	3.4E-01	6.0E-07	1.3E-05
1,4-Dichlorobenzene	5.1E-01	0.01	1.0E-10	5.1E-10	3.3E-09	1.6E-08	7.0E-02	4.7E-08	2.3E-07	2.8E-10	5.8E-09	2.4E-02	6.7E-12	1.4E-10
Chlorobenzene	1.5E+03	0.01	3.0E-07	1.5E-06	9.7E-06	4.9E-05	6.2E-03	1.6E-03	7.8E-03	8.3E-07	1.7E-05	NA	NA	NA
Total								5E-02	3E-01				6E-07	1E-05

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-18.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 3 and 4**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Aroclor 1248	1.6E+00	1.2E-09	8.1E-11	8.1E-11	2.0E-05	4.1E-06	4.1E-06	7.0E-12	2.9E-11	2.0E+00	1.4E-11	5.8E-11
Aroclor 1260	9.0E-02	6.8E-11	4.7E-12	4.7E-12	2.0E-05	2.3E-07	2.3E-07	4.0E-13	1.7E-12	2.0E+00	8.0E-13	3.3E-12
4,4'-DDD	3.1E+01	2.4E-08	1.6E-09	1.6E-09	2.0E-03	8.1E-07	8.1E-07	1.4E-10	5.8E-10	2.4E-01	3.3E-11	1.4E-10
4,4'-DDE	1.7E+01	1.3E-08	8.9E-10	8.9E-10	NA	NA	NA	7.6E-11	3.2E-10	3.4E-01	2.6E-11	1.1E-10
4,4'-DDT	1.1E+03	8.1E-07	5.6E-08	5.6E-08	5.0E-04	1.1E-04	1.1E-04	4.8E-09	2.0E-08	3.4E-01	1.6E-09	6.7E-09
1,4-Dichlorobenzene	5.1E-01	3.8E-10	2.6E-11	2.6E-11	2.3E-01	1.2E-10	1.2E-10	2.3E-12	9.4E-12	2.4E-02	5.4E-14	2.3E-13
Chlorobenzene	1.5E+03	1.1E-06	7.8E-08	7.8E-08	2.0E-02	3.9E-06	3.9E-06	6.7E-09	2.8E-08	NA	NA	NA
Total						1E-04	1E-04				2E-09	7E-09

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-19.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Outdoor Vapors from Groundwater**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_a = C_w \times VF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_a \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_a \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day

Exposure Area : **Lots 3 and 4**

	Groundwater		**Ambient Air**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**VF**	**Concentration**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_i**	**CTE**	**RME**
COPCs	**(mg/L)**	**(unitless)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Chloroform	1.9E-01	1.4E-04	2.6E-05	1.8E-06	1.8E-06	3.0E-02	5.9E-05	5.9E-05	1.5E-07	6.4E-07	8.1E-02	1.2E-08	5.1E-08
Trichloroethene	3.9E-02	2.8E-04	1.1E-05	7.5E-07	7.5E-07	1.1E-02	6.8E-05	6.8E-05	6.4E-08	2.7E-07	4.0E-01	2.6E-08	1.1E-07
Total							1E-04	1E-04				4E-08	2E-07

Notes:
ADD = average daily dose
C_a = ambient air concentration
C_w = groundwater concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure
VF = volatilization factor for groundwater to ambient air

Exhibit C-20.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Ingestion**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	50	100	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	4.89E-07	9.78E-07	1/day
LADD intake factor	$LADD_{if}$	4.19E-08	3.49E-07	1/day

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	1.0	1.2E-04	2.5E-04	3.0E-03	4.2E-02	8.3E-02	1.1E-05	8.9E-05	NA	NA	NA
Aroclor 1248	1.6E+00	1.0	7.7E-07	1.5E-06	2.0E-05	3.8E-02	7.7E-02	6.6E-08	5.5E-07	2.0E+00	1.3E-07	1.1E-06
Aroclor 1260	7.0E-02	1.0	3.4E-08	6.9E-08	2.0E-05	1.7E-03	3.4E-03	2.9E-09	2.5E-08	2.0E+00	5.9E-09	4.9E-08
4,4'-DDD	3.3E+01	1.0	1.6E-05	3.3E-05	2.0E-03	8.2E-03	1.6E-02	1.4E-06	1.2E-05	2.4E-01	3.4E-07	2.8E-06
4,4'-DDE	1.4E+01	1.0	7.0E-06	1.4E-05	NA	NA	NA	6.0E-07	5.0E-06	3.4E-01	2.0E-07	1.7E-06
4,4'-DDT	1.1E+03	1.0	5.3E-04	1.1E-03	5.0E-04	1.1E+00	2.1E+00	4.5E-05	3.8E-04	3.4E-01	1.5E-05	1.3E-04
1,4-Dichlorobenzene	6.9E+00	1.0	3.4E-06	6.8E-06	7.0E-02	4.8E-05	9.7E-05	2.9E-07	2.4E-06	2.4E-02	7.0E-09	5.8E-08
Chlorobenzene	8.5E+02	1.0	4.2E-04	8.3E-04	2.0E-02	2.1E-02	4.2E-02	3.6E-05	3.0E-04	NA	NA	NA
Tetrachloroethene	1.3E+00	1.0	6.2E-07	1.2E-06	1.0E-02	6.2E-05	1.2E-04	5.3E-08	4.4E-07	5.4E-01	2.9E-08	2.4E-07
Total						1E+00	2E+00				2E-05	1E-04

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-21.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Dermal**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.02	0.1	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
LADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LDAD intake factor	$LADD_{if}$	2.77E+00	1.15E+01	event-cm^2/d-kg

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	0.001	5.1E-09	2.5E-08	1.6E-07	8.2E-07	6.0E-05	2.7E-03	1.4E-02	1.4E-08	2.9E-07	NA	NA	NA
Aroclor 1248	1.6E+00	0.14	4.4E-09	2.2E-08	1.4E-07	7.1E-07	2.0E-05	7.1E-03	3.5E-02	1.2E-08	2.5E-07	2.0E+00	2.4E-08	5.1E-07
Aroclor 1260	7.0E-02	0.14	2.0E-10	9.8E-10	6.4E-09	3.2E-08	2.0E-05	3.2E-04	1.6E-03	5.5E-10	1.1E-08	2.0E+00	1.1E-09	2.3E-08
4,4'-DDD	3.3E+01	0.01	6.7E-09	3.3E-08	2.2E-07	1.1E-06	2.0E-03	1.1E-04	5.4E-04	1.9E-08	3.9E-07	2.4E-01	4.5E-09	9.3E-08
4,4'-DDE	1.4E+01	0.01	2.9E-09	1.4E-08	9.3E-08	4.6E-07	NA	NA	NA	7.9E-09	1.7E-07	3.4E-01	2.7E-09	5.6E-08
4,4'-DDT	1.1E+03	0.03	6.5E-07	3.2E-06	2.1E-05	1.0E-04	5.0E-04	4.2E-02	2.1E-01	1.8E-06	3.7E-05	3.4E-01	6.1E-07	1.3E-05
1,4-Dichlorobenzene	6.9E+00	0.01	1.4E-09	6.9E-09	4.5E-08	2.2E-07	7.0E-02	6.4E-07	3.2E-06	3.8E-09	8.0E-08	2.4E-02	9.2E-11	1.9E-09
Chlorobenzene	8.5E+02	0.01	1.7E-07	8.5E-07	5.5E-06	2.7E-05	6.2E-03	8.9E-04	4.4E-03	4.7E-07	9.8E-06	NA	NA	NA
Tetrachloroethene	1.3E+00	0.01	2.5E-10	1.3E-09	8.2E-09	4.1E-08	1.0E-02	8.2E-07	4.1E-06	7.0E-10	1.5E-08	5.4E-01	3.8E-10	7.9E-09
Total								5E-02	3E-01				6E-07	1E-05

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-22.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 3 and 4**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) (mg/kg-day)		Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient (unitless)		LADD (cancer) (mg/kg-day)		CSF_i (kg-day/mg)	Cancer Risk (unitless)	
			CTE	RME		CTE	RME	CTE	RME		CTE	RME
Chromium - total	2.5E+02	1.9E-07	1.3E-08	1.3E-08	2.8E-05	4.7E-04	4.7E-04	1.1E-09	4.7E-09	2.9E+02	3.3E-07	1.4E-06
Aroclor 1248	1.6E+00	1.2E-09	8.1E-11	8.1E-11	2.0E-05	4.1E-06	4.1E-06	7.0E-12	2.9E-11	2.0E+00	1.4E-11	5.8E-11
Aroclor 1260	7.0E-02	5.3E-11	3.7E-12	3.7E-12	2.0E-05	1.8E-07	1.8E-07	3.1E-13	1.3E-12	2.0E+00	6.3E-13	2.6E-12
4,4'-DDD	3.3E+01	2.5E-08	1.7E-09	1.7E-09	2.0E-03	8.7E-07	8.7E-07	1.5E-10	6.2E-10	2.4E-01	3.6E-11	1.5E-10
4,4'-DDE	1.4E+01	1.1E-08	7.4E-10	7.4E-10	NA	NA	NA	6.4E-11	2.7E-10	3.4E-01	2.2E-11	9.0E-11
4,4'-DDT	1.1E+03	8.2E-07	5.6E-08	5.6E-08	5.0E-04	1.1E-04	1.1E-04	4.8E-09	2.0E-08	3.4E-01	1.6E-09	6.8E-09
1,4-Dichlorobenzene	6.9E+00	5.3E-09	3.6E-10	3.6E-10	2.3E-01	1.6E-09	1.6E-09	3.1E-11	1.3E-10	2.4E-02	7.4E-13	3.1E-12
Chlorobenzene	8.5E+02	6.4E-07	4.4E-08	4.4E-08	2.0E-02	2.2E-06	2.2E-06	3.8E-09	1.6E-08	NA	NA	NA
Tetrachloroethene	1.3E+00	9.6E-10	6.6E-11	6.6E-11	8.5E-02	7.8E-10	7.8E-10	5.6E-12	2.4E-11	2.1E-02	1.2E-13	4.9E-13
Total						6E-04	6E-04				3E-07	1E-06

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-23.

Scenario: **Outdoor Worker - Redevelopment Scenario**
Age: **Adult**
Medium: **Outdoor Vapors from Groundwater**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_a = C_w \times VF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day

Exposure Area : **Lots 3 and 4**

	Groundwater		**Ambient Air**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**VF**	**Concentration**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_i**	**CTE**	**RME**
COPCs	**(mg/L)**	**(unitless)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Chloroform	1.9E-01	1.4E-04	2.6E-05	1.8E-06	1.8E-06	3.0E-02	5.9E-05	5.9E-05	1.5E-07	6.4E-07	8.1E-02	1.2E-08	5.1E-08
Trichloroethene	3.9E-02	2.8E-04	1.1E-05	7.5E-07	7.5E-07	1.1E-02	6.8E-05	6.8E-05	6.4E-08	2.7E-07	4.0E-01	2.6E-08	1.1E-07
Total							1E-04	1E-04				4E-08	2E-07

Notes:
ADD = average daily dose
C_a = ambient air concentration
C_w = groundwater concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure
VF = volatilization factor for groundwater to ambient air

Exhibit C-24.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Ingestion (Subchronic)**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	100	330	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	9.78E-07	3.23E-06	1/day
LADD intake factor	$LADD_{if}$	6.99E-09	4.61E-08	1/day

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	1.0	2.5E-04	8.2E-04	3.0E-03	8.3E-02	2.7E-01	1.8E-06	1.2E-05	NA	NA	NA
Aroclor 1248	1.6E+00	1.0	1.5E-06	5.1E-06	3.0E-05	5.1E-02	1.7E-01	1.1E-08	7.2E-08	2.0E+00	2.2E-08	1.4E-07
4,4'-DDD	3.3E+01	1.0	3.3E-05	1.1E-04	2.0E-03	1.6E-02	5.4E-02	2.3E-07	1.5E-06	2.4E-01	5.6E-08	3.7E-07
4,4'-DDE	1.4E+01	1.0	1.4E-05	4.6E-05	NA	NA	NA	1.0E-07	6.6E-07	3.4E-01	3.4E-08	2.2E-07
4,4'-DDT	1.1E+03	1.0	1.1E-03	3.5E-03	5.0E-04	2.1E+00	7.0E+00	7.5E-06	5.0E-05	3.4E-01	2.6E-06	1.7E-05
Chlorobenzene	8.5E+02	1.0	8.3E-04	2.7E-03	4.0E-01	2.1E-03	6.9E-03	5.9E-06	3.9E-05	NA	NA	NA
Tetrachloroethene	1.3E+00	1.0	1.2E-06	4.1E-06	1.0E-01	1.2E-05	4.1E-05	8.9E-09	5.8E-08	5.4E-01	4.8E-09	3.2E-08
Total						2E+00	7E+00				3E-06	2E-05

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-25.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Dermal (Subchronic)**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.1	0.3	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
LADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LDAD intake factor	$LADD_{if}$	2.31E-01	4.61E-01	event-cm^2/d-kg

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	0.001	2.5E-08	7.6E-08	8.2E-07	2.5E-06	6.0E-05	1.4E-02	4.1E-02	5.9E-09	3.5E-08	NA	NA	NA
Aroclor 1248	1.6E+00	0.14	2.2E-08	6.6E-08	7.1E-07	2.1E-06	3.0E-05	2.4E-02	7.1E-02	5.1E-09	3.0E-08	2.0E+00	1.0E-08	6.1E-08
4,4'-DDD	3.3E+01	0.01	3.3E-08	1.0E-07	1.1E-06	3.2E-06	2.0E-03	5.4E-04	1.6E-03	7.7E-09	4.6E-08	2.4E-01	1.9E-09	1.1E-08
4,4'-DDE	1.4E+01	0.01	1.4E-08	4.3E-08	4.6E-07	1.4E-06	NA	NA	NA	3.3E-09	2.0E-08	3.4E-01	1.1E-09	6.7E-09
4,4'-DDT	1.1E+03	0.03	3.2E-06	9.7E-06	1.0E-04	3.1E-04	5.0E-04	2.1E-01	6.3E-01	7.4E-07	4.5E-06	3.4E-01	2.5E-07	1.5E-06
Chlorobenzene	8.5E+02	0.01	8.5E-07	2.5E-06	2.7E-05	8.2E-05	2.0E-02	1.4E-03	4.1E-03	2.0E-07	1.2E-06	NA	NA	NA
Tetrachloroethene	1.3E+00	0.01	1.3E-09	3.8E-09	4.1E-08	1.2E-07	1.0E-01	4.1E-07	1.2E-06	2.9E-10	1.8E-09	5.4E-01	1.6E-10	9.5E-10
Total								2E-01	7E-01				3E-07	2E-06

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-26.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	4.89E-04	9.78E-04	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 3 and 4**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	1.9E-07	1.3E-08	1.3E-08	2.8E-05	4.7E-04	4.7E-04	9.4E-11	1.9E-10	2.9E+02	2.8E-08	5.6E-08
Aroclor 1248	1.6E+00	1.2E-09	8.1E-11	8.1E-11	3.0E-05	2.7E-06	2.7E-06	5.8E-13	1.2E-12	2.0E+00	1.2E-12	2.3E-12
4,4'-DDD	3.3E+01	2.5E-08	1.7E-09	1.7E-09	2.0E-03	8.7E-07	8.7E-07	1.2E-11	2.5E-11	2.4E-01	3.0E-12	6.0E-12
4,4'-DDE	1.4E+01	1.1E-08	7.4E-10	7.4E-10	NA	NA	NA	5.3E-12	1.1E-11	3.4E-01	1.8E-12	3.6E-12
4,4'-DDT	1.1E+03	8.2E-07	5.6E-08	5.6E-08	5.0E-04	1.1E-04	1.1E-04	4.0E-10	8.0E-10	3.4E-01	1.4E-10	2.7E-10
Chlorobenzene	8.5E+02	6.4E-07	4.4E-08	4.4E-08	4.0E-01	1.1E-07	1.1E-07	3.2E-10	6.3E-10	NA	NA	NA
Tetrachloroethene	1.3E+00	9.6E-10	6.6E-11	6.6E-11	8.6E-01	7.7E-11	7.7E-11	4.7E-13	9.4E-13	2.1E-02	9.7E-15	1.9E-14
Total						6E-04	6E-04				3E-08	6E-08

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-27.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Outdoor Vapors from Groundwater**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_a = C_w \times VF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_a \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_a \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	4.89E-04	9.78E-04	m^3/kg-day

Exposure Area : **Lots 3 and 4**

	Groundwater		**Ambient Air**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**VF**	**Concentration**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_i**	**CTE**	**RME**
COPCs	**(mg/L)**	**(unitless)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Chloroform	1.9E-01	1.4E-04	2.6E-05	1.8E-06	1.8E-06	7.6E-02	2.3E-05	2.3E-05	1.3E-08	2.6E-08	8.1E-02	1.0E-09	2.1E-09
Trichloroethene	3.9E-02	2.8E-04	1.1E-05	7.5E-07	7.5E-07	1.7E-01	4.5E-06	4.5E-06	5.3E-09	1.1E-08	4.0E-01	2.1E-09	4.3E-09
Total							3E-05	3E-05				3E-09	6E-09

Notes:
ADD = average daily dose
C_a = ambient air concentration
C_w = groundwater concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure
VF = volatilization factor for groundwater to ambient air

Exhibit C-28.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Ingestion (Subchronic)**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	100	330	mg/day
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	3.52E-08	1.16E-07	1/day
LADD intake factor	$LADD_{if}$	2.52E-10	1.66E-09	1/day

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	1.0	9.0E-06	3.0E-05	3.0E-03	3.0E-03	9.9E-03	6.4E-08	4.2E-07	NA	NA	NA
4,4'-DDD	3.3E+01	1.0	1.2E-06	3.9E-06	2.0E-03	5.9E-04	1.9E-03	8.4E-09	5.6E-08	2.4E-01	2.0E-09	1.3E-08
4,4'-DDE	1.4E+01	1.0	5.0E-07	1.7E-06	NA	NA	NA	3.6E-09	2.4E-08	3.4E-01	1.2E-09	8.1E-09
4,4'-DDT	1.1E+03	1.0	3.8E-05	1.3E-04	5.0E-04	7.6E-02	2.5E-01	2.7E-07	1.8E-06	3.4E-01	9.2E-08	6.1E-07
Total						8E-02	3E-01				1E-07	6E-07

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-29.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Dermal (Subchronic)**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.1	0.3	mg/cm^2-event
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
LADD intake factor	ADD_{if}	1.16E+00	1.16E+00	event-cm^2/d-kg
LDAD intake factor	$LADD_{if}$	8.30E-03	1.66E-02	event-cm^2/d-kg

Exposure Area : **Lots 3 and 4**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	0.001	2.5E-08	7.6E-08	3.0E-08	8.9E-08	6.0E-05	4.9E-04	1.5E-03	2.1E-10	1.3E-09	NA	NA	NA
4,4'-DDD	3.3E+01	0.01	3.3E-08	1.0E-07	3.9E-08	1.2E-07	2.0E-03	1.9E-05	5.8E-05	2.8E-10	1.7E-09	2.4E-01	6.7E-11	4.0E-10
4,4'-DDE	1.4E+01	0.01	1.4E-08	4.3E-08	1.7E-08	5.0E-08	NA	NA	NA	1.2E-10	7.1E-10	3.4E-01	4.0E-11	2.4E-10
4,4'-DDT	1.1E+03	0.03	3.2E-06	9.7E-06	3.8E-06	1.1E-05	5.0E-04	7.5E-03	2.3E-02	2.7E-08	1.6E-07	3.4E-01	9.1E-09	5.5E-08
Total								8E-03	2E-02				9E-09	6E-08

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-30.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	2.47E-03	2.47E-03	m^3/kg-day
LADD intake factor	$LADD_{if}$	1.76E-05	3.52E-05	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Lots 3 and 4**

COPCs	Soil Concentration (mg/kg)	Particulate EPC (mg/m^3)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Inhalation RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_i (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Chromium - total	2.5E+02	1.9E-07	4.8E-10	4.8E-10	2.8E-05	1.7E-05	1.7E-05	3.4E-12	6.8E-12	2.9E+02	1.0E-09	2.0E-09
4,4'-DDD	3.3E+01	2.5E-08	6.3E-11	6.3E-11	2.0E-03	3.1E-08	3.1E-08	4.5E-13	8.9E-13	2.4E-01	1.1E-13	2.1E-13
4,4'-DDE	1.4E+01	1.1E-08	2.7E-11	2.7E-11	NA	NA	NA	1.9E-13	3.8E-13	3.4E-01	6.5E-14	1.3E-13
4,4'-DDT	1.1E+03	8.2E-07	2.0E-09	2.0E-09	5.0E-04	4.0E-06	4.0E-06	1.4E-11	2.9E-11	3.4E-01	4.9E-12	9.8E-12
Total						2E-05	2E-05				1E-09	2E-09

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-31.

Scenario: **Excavation Worker**
Age: **Adult**
Medium: **Outdoor Vapors from Groundwater**
Operable Unit **Lots 3 and 4**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_a = C_w \times VF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_a \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_a \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	9	9	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	2.47E-03	2.47E-03	m^3/kg-day
LADD intake factor	$LADD_{if}$	1.76E-05	3.52E-05	m^3/kg-day

Exposure Area : **Lots 3 and 4**

	Groundwater		**Ambient Air**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**VF**	**Concentration**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_I**	**CTE**	**RME**
COPCs	**(mg/L)**	**(unitless)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Chloroform	1.9E-01	1.4E-04	2.6E-05	6.4E-08	6.4E-08	7.6E-02	8.4E-07	8.4E-07	4.6E-10	9.2E-10	8.1E-02	3.7E-11	7.4E-11
Trichloroethene	3.9E-02	2.8E-04	1.1E-05	2.7E-08	2.7E-08	1.7E-01	1.6E-07	1.6E-07	1.9E-10	3.9E-10	4.0E-01	7.7E-11	1.5E-10
Total							1E-06	1E-06				1E-10	2E-10

Notes:
ADD = average daily dose
C_a = ambient air concentration
C_w = groundwater concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
HQ = hazard quotient
LADD = lifetime average daily dose
RfD = reference dose
RME = reasonable maximum exposure
VF = volatilization factor for groundwater to ambient air

Exhibit C-32.

Scenario:	**Outdoor Worker**
Age:	**Adult**
Medium:	**Soil**
Operable Unit	**Riverbank**
Exposure Pathway:	**Ingestion**
Time Frame:	**Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	50	100	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	4.89E-07	9.78E-07	1/day
LADD intake factor	$LADD_{if}$	4.19E-08	3.49E-07	1/day

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.2E+01	1.0	1.1E-05	2.2E-05	3.0E-04	3.6E-02	7.3E-02	9.3E-07	7.8E-06	1.5E+00	1.4E-06	1.2E-05
Chromium - total	1.7E+02	1.0	8.2E-05	1.6E-04	3.0E-03	2.7E-02	5.4E-02	7.0E-06	5.8E-05	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	1.0	7.2E-11	1.4E-10	1.0E-09	7.2E-02	1.4E-01	6.2E-12	5.1E-11	1.3E+05	8.0E-07	6.7E-06
Benzo(a)anthracene	2.6E-01	1.0	1.3E-07	2.6E-07	NA	NA	NA	1.1E-08	9.2E-08	7.3E-01	8.1E-09	6.7E-08
Benzo(a)pyrene	1.8E-01	1.0	8.8E-08	1.8E-07	NA	NA	NA	7.5E-09	6.3E-08	7.3E+00	5.5E-08	4.6E-07
Benzo(b)fluoranthene	2.7E-01	1.0	1.3E-07	2.6E-07	NA	NA	NA	1.1E-08	9.3E-08	7.3E-01	8.1E-09	6.8E-08
Benzo(k)fluoranthene	1.9E-01	1.0	9.1E-08	1.8E-07	NA	NA	NA	7.8E-09	6.5E-08	7.3E-02	5.7E-10	4.7E-09
Dibenz(a,h)anthracene	1.2E-01	1.0	5.8E-08	1.2E-07	NA	NA	NA	5.0E-09	4.2E-08	7.3E+00	3.6E-08	3.0E-07
Indeno(1,2,3-cd)pyrene	1.7E-01	1.0	8.1E-08	1.6E-07	NA	NA	NA	6.9E-09	5.8E-08	7.3E-01	5.1E-09	4.2E-08
Aroclor 1248	1.6E-01	1.0	7.7E-08	1.5E-07	2.0E-05	3.8E-03	7.7E-03	6.6E-09	5.5E-08	2.0E+00	1.3E-08	1.1E-07
Aroclor 1260	3.3E-02	1.0	1.6E-08	3.3E-08	2.0E-05	8.2E-04	1.6E-03	1.4E-09	1.2E-08	2.0E+00	2.8E-09	2.3E-08
4,4'-DDD	3.1E-01	1.0	1.5E-07	3.0E-07	2.0E-03	7.6E-05	1.5E-04	1.3E-08	1.1E-07	2.4E-01	3.1E-09	2.6E-08
4,4'-DDE	8.0E-01	1.0	3.9E-07	7.8E-07	NA	NA	NA	3.4E-08	2.8E-07	3.4E-01	1.1E-08	9.5E-08
4,4'-DDT	3.9E+00	1.0	1.9E-06	3.9E-06	5.0E-04	3.9E-03	7.7E-03	1.7E-07	1.4E-06	3.4E-01	5.6E-08	4.7E-07
Pentachlorophenol	3.9E-01	1.0	1.9E-07	3.8E-07	3.0E-02	6.3E-06	1.3E-05	1.6E-08	1.3E-07	1.2E-01	1.9E-09	1.6E-08
Bis(2-ethylhexyl)phthalate	1.7E+00	1.0	8.3E-07	1.7E-06	2.0E-02	4.1E-05	8.3E-05	7.1E-08	5.9E-07	1.4E-02	9.9E-10	8.3E-09
Total						1E-01	3E-01				2E-06	2E-05

Notes:

ADD	=	average daily dose
C_{soil}	=	soil exposure point concentration
COPC	=	chemical of potential concern
CR	=	cancer risk
CSF	=	cancer slope factor
CTE	=	central tendency exposure
EPC	=	exposure point concentration
HQ	=	hazard quotient
LADD	=	lifetime average daily dose
NA	=	not available
RBA	=	relative bioavailability
RfD	=	reference dose
RME	=	reasonable maximum exposure

Exhibit C-33.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Riverbank**
Exposure Pathway: **Dermal**
Time Frame: **Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = DAD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.02	0.1	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	2.77E+00	1.15E+01	event-cm^2/d-kg

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.2E+01	0.03	1.3E-08	6.7E-08	4.3E-07	2.2E-06	1.2E-04	3.5E-03	1.8E-02	3.7E-08	7.7E-07	3.7E+00	1.4E-07	2.8E-06
Chromium - total	1.7E+02	0.00	3.3E-09	1.7E-08	1.1E-07	5.4E-07	6.0E-05	1.8E-03	9.0E-03	9.2E-09	1.9E-07	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	0.03	8.8E-14	4.4E-13	2.8E-12	1.4E-11	1.0E-09	2.8E-03	1.4E-02	2.4E-13	5.1E-12	1.3E+05	3.2E-08	6.6E-07
Benzo(a)anthracene	2.6E-01	0.13	6.8E-10	3.4E-09	2.2E-08	1.1E-07	NA	NA	NA	1.9E-09	3.9E-08	7.3E-01	1.4E-09	2.9E-08
Benzo(a)pyrene	1.8E-01	0.13	4.7E-10	2.3E-09	1.5E-08	7.6E-08	NA	NA	NA	1.3E-09	2.7E-08	7.3E+00	9.5E-09	2.0E-07
Benzo(b)fluoranthene	2.7E-01	0.13	6.9E-10	3.4E-09	2.2E-08	1.1E-07	NA	NA	NA	1.9E-09	4.0E-08	7.3E-01	1.4E-09	2.9E-08
Benzo(k)fluoranthene	1.9E-01	0.13	4.8E-10	2.4E-09	1.6E-08	7.8E-08	NA	NA	NA	1.3E-09	2.8E-08	7.3E-02	9.8E-11	2.0E-09
Dibenz(a,h)anthracene	1.2E-01	0.13	3.1E-10	1.5E-09	1.0E-08	5.0E-08	NA	NA	NA	8.6E-10	1.8E-08	7.3E+00	6.3E-09	1.3E-07
Indeno(1,2,3-cd)pyrene	1.7E-01	0.13	4.3E-10	2.1E-09	1.4E-08	6.9E-08	NA	NA	NA	1.2E-09	2.5E-08	7.3E-01	8.7E-10	1.8E-08
Aroclor 1248	1.6E-01	0.14	4.4E-10	2.2E-09	1.4E-08	7.1E-08	2.0E-05	7.1E-04	3.5E-03	1.2E-09	2.5E-08	2.0E+00	2.4E-09	5.1E-08
Aroclor 1260	3.3E-02	0.14	9.4E-11	4.7E-10	3.0E-09	1.5E-08	2.0E-05	1.5E-04	7.5E-04	2.6E-10	5.4E-09	2.0E+00	5.2E-10	1.1E-08
4,4'-DDD	3.1E-01	0.01	6.2E-11	3.1E-10	2.0E-09	1.0E-08	2.0E-03	1.0E-06	5.0E-06	1.7E-10	3.6E-09	2.4E-01	4.1E-11	8.6E-10
4,4'-DDE	8.0E-01	0.01	1.6E-10	8.0E-10	5.2E-09	2.6E-08	NA	NA	NA	4.4E-10	9.2E-09	3.4E-01	1.5E-10	3.1E-09
4,4'-DDT	3.9E+00	0.03	2.4E-09	1.2E-08	7.6E-08	3.8E-07	5.0E-04	1.5E-04	7.6E-04	6.6E-09	1.4E-07	3.4E-01	2.2E-09	4.6E-08
Pentachlorophenol	3.9E-01	0.25	1.9E-09	9.6E-09	6.2E-08	3.1E-07	3.0E-02	2.1E-06	1.0E-05	5.3E-09	1.1E-07	1.2E-01	6.4E-10	1.3E-08
Bis(2-ethylhexyl)phthalate	1.7E+00	0.10	3.4E-09	1.7E-08	1.1E-07	5.5E-07	3.8E-03	2.9E-05	1.4E-04	9.3E-09	1.9E-07	7.4E-02	6.9E-10	1.4E-08
Total								9E-03	5E-02				2E-07	4E-06

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-34.

Scenario: **Outdoor Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Riverbank**
Exposure Pathway: **Inhalation**
Time Frame: **Future**

Equations

$C_{part} = C_{soil}$ x PEF

$ADD_{if} = Inh_R$ x EF x ED / (AT_n x BW)

$ADD = C_{part}$ x ADD_{if}

HQ = ADD / RfD

$LADD_{if} = Inh_R$ x EF x ED / (AT_c x BW)

$LADD = C_{part}$ x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	6	25	year
Averaging time noncancer	AT_n	2,190	9,125	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.87E-03	2.45E-02	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Riverbank**

	Soil	**Particulate**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**EPC**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_I**	**CTE**	**RME**
COPCs	**(mg/kg)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Arsenic	2.2E+01	1.7E-08	1.2E-09	1.2E-09	3.0E-04	3.8E-06	3.8E-06	9.9E-11	4.1E-10	1.5E+01	1.5E-09	6.2E-09
Chromium - total	1.7E+02	1.3E-07	8.6E-09	8.6E-09	2.8E-05	3.1E-04	3.1E-04	7.4E-10	3.1E-09	2.9E+02	2.2E-07	9.1E-07
Dioxin/furan TCDD TEQ	1.5E-04	1.1E-13	7.6E-15	7.6E-15	1.0E-09	7.6E-06	7.6E-06	6.5E-16	2.7E-15	1.3E+05	8.7E-11	3.6E-10
Benzo(a)anthracene	2.6E-01	2.0E-10	1.4E-11	1.4E-11	NA	NA	NA	1.2E-12	4.9E-12	3.1E-01	3.6E-13	1.5E-12
Benzo(a)pyrene	1.8E-01	1.4E-10	9.3E-12	9.3E-12	NA	NA	NA	8.0E-13	3.3E-12	3.1E+00	2.5E-12	1.0E-11
Benzo(b)fluoranthene	2.7E-01	2.0E-10	1.4E-11	1.4E-11	NA	NA	NA	1.2E-12	4.9E-12	3.1E-01	3.7E-13	1.5E-12
Benzo(k)fluoranthene	1.9E-01	1.4E-10	9.7E-12	9.7E-12	NA	NA	NA	8.3E-13	3.4E-12	3.1E-02	2.5E-14	1.1E-13
Dibenz(a,h)anthracene	1.2E-01	9.0E-11	6.2E-12	6.2E-12	NA	NA	NA	5.3E-13	2.2E-12	3.1E+00	1.6E-12	6.8E-12
Indeno(1,2,3-cd)pyrene	1.7E-01	1.3E-10	8.6E-12	8.6E-12	NA	NA	NA	7.3E-13	3.1E-12	3.1E-01	2.3E-13	9.5E-13
Aroclor 1248	1.6E-01	1.2E-10	8.2E-12	8.2E-12	2.0E-05	4.1E-07	4.1E-07	7.0E-13	2.9E-12	2.0E+00	1.4E-12	5.8E-12
Aroclor 1260	3.3E-02	2.5E-11	1.7E-12	1.7E-12	2.0E-05	8.7E-08	8.7E-08	1.5E-13	6.2E-13	2.0E+00	3.0E-13	1.2E-12
4,4'-DDD	3.1E-01	2.3E-10	1.6E-11	1.6E-11	2.0E-03	8.0E-09	8.0E-09	1.4E-12	5.7E-12	2.4E-01	3.3E-13	1.4E-12
4,4'-DDE	8.0E-01	6.1E-10	4.2E-11	4.2E-11	NA	NA	NA	3.6E-12	1.5E-11	3.4E-01	1.2E-12	5.0E-12
4,4'-DDT	3.9E+00	3.0E-09	2.0E-10	2.0E-10	5.0E-04	4.1E-07	4.1E-07	1.8E-11	7.3E-11	3.4E-01	6.0E-12	2.5E-11
Pentachlorophenol	3.9E-01	2.9E-10	2.0E-11	2.0E-11	3.0E-02	6.7E-10	6.7E-10	1.7E-12	7.1E-12	1.2E-01	2.1E-13	8.6E-13
Bis(2-ethylhexyl)phthalate	1.7E+00	1.3E-09	8.8E-11	8.8E-11	2.0E-02	4.4E-09	4.4E-09	7.5E-12	3.1E-11	1.4E-02	1.1E-13	4.4E-13
Total						3E-04	3E-04				2E-07	9E-07

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-35.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Soil**
Operable Unit **Riverbank**
Exposure Pathway: **Ingestion (Subchronic)**
Time Frame: **Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	100	330	mg/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	9.78E-07	3.23E-06	1/day
LADD intake factor	$LADD_{if}$	6.99E-09	4.61E-08	1/day

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.2E+01	1.0	2.2E-05	7.2E-05	3.0E-04	7.3E-02	2.4E-01	1.6E-07	1.0E-06	1.5E+00	2.3E-07	1.5E-06
Chromium - total	1.7E+02	1.0	1.6E-04	5.4E-04	3.0E-03	5.4E-02	1.8E-01	1.2E-06	7.7E-06	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	1.0	1.4E-10	4.7E-10	2.0E-08	7.2E-03	2.4E-02	1.0E-12	6.8E-12	1.3E+05	1.3E-07	8.8E-07
Benzo(a)anthracene	2.6E-01	1.0	2.6E-07	8.5E-07	NA	NA	NA	1.8E-09	1.2E-08	7.3E-01	1.3E-09	8.9E-09
Benzo(a)pyrene	1.8E-01	1.0	1.8E-07	5.8E-07	NA	NA	NA	1.3E-09	8.3E-09	7.3E+00	9.2E-09	6.1E-08
Benzo(b)fluoranthene	2.7E-01	1.0	2.6E-07	8.6E-07	NA	NA	NA	1.9E-09	1.2E-08	7.3E-01	1.4E-09	8.9E-09
Dibenz(a,h)anthracene	1.2E-01	1.0	1.2E-07	3.8E-07	NA	NA	NA	8.3E-10	5.5E-09	7.3E+00	6.1E-09	4.0E-08
Indeno(1,2,3-cd)pyrene	1.7E-01	1.0	1.6E-07	5.3E-07	NA	NA	NA	1.2E-09	7.6E-09	7.3E-01	8.4E-10	5.6E-09
Aroclor 1248	1.6E-01	1.0	1.5E-07	5.1E-07	3.0E-05	5.1E-03	1.7E-02	1.1E-09	7.2E-09	2.0E+00	2.2E-09	1.4E-08
4,4'-DDE	8.0E-01	1.0	7.8E-07	2.6E-06	NA	NA	NA	5.6E-09	3.7E-08	3.4E-01	1.9E-09	1.3E-08
4,4'-DDT	3.9E+00	1.0	3.9E-06	1.3E-05	5.0E-04	7.7E-03	2.5E-02	2.8E-08	1.8E-07	3.4E-01	9.4E-09	6.2E-08
Total						1E-01	5E-01				4E-07	3E-06

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-36.

Scenario:	**Construction Worker**
Age:	**Adult**
Medium:	**Soil**
Operable Unit	**Riverbank**
Exposure Pathway:	**Dermal (Subchronic)**
Time Frame:	**Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = DAD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.1	0.3	mg/cm^2-event
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Event frequency	EV	1	1	event/day
Surface Area	SA	3,300	3,300	cm^2
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	3.23E+01	3.23E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	2.31E-01	4.61E-01	event-cm^2/d-kg

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk CTE (unitless)	Cancer Risk RME (unitless)
Arsenic	2.2E+01	0.03	6.7E-08	2.0E-07	2.2E-06	6.5E-06	3.0E-04	7.2E-03	2.2E-02	1.5E-08	9.2E-08	3.7E+00	5.6E-08	3.4E-07
Chromium - total	1.7E+02	0.00	1.7E-08	5.0E-08	5.4E-07	1.6E-06	6.0E-05	9.0E-03	2.7E-02	3.8E-09	2.3E-08	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	0.03	4.4E-13	1.3E-12	1.4E-11	4.3E-11	2.0E-08	7.1E-04	2.1E-03	1.0E-13	6.1E-13	1.3E+05	1.3E-08	7.9E-08
Benzo(a)anthracene	2.6E-01	0.13	3.4E-09	1.0E-08	1.1E-07	3.3E-07	NA	NA	NA	7.9E-10	4.7E-09	7.3E-01	5.8E-10	3.5E-09
Benzo(a)pyrene	1.8E-01	0.13	2.3E-09	7.0E-09	7.6E-08	2.3E-07	NA	NA	NA	5.4E-10	3.2E-09	7.3E+00	3.9E-09	2.4E-08
Benzo(b)fluoranthene	2.7E-01	0.13	3.4E-09	1.0E-08	1.1E-07	3.3E-07	NA	NA	NA	7.9E-10	4.8E-09	7.3E-01	5.8E-10	3.5E-09
Dibenz(a,h)anthracene	1.2E-01	0.13	1.5E-09	4.6E-09	5.0E-08	1.5E-07	NA	NA	NA	3.6E-10	2.1E-09	7.3E+00	2.6E-09	1.6E-08
Indeno(1,2,3-cd)pyrene	1.7E-01	0.13	2.1E-09	6.4E-09	6.9E-08	2.1E-07	NA	NA	NA	4.9E-10	3.0E-09	7.3E-01	3.6E-10	2.2E-09
Aroclor 1248	1.6E-01	0.14	2.2E-09	6.6E-09	7.1E-08	2.1E-07	3.0E-05	2.4E-03	7.1E-03	5.1E-10	3.0E-09	2.0E+00	1.0E-09	6.1E-09
4,4'-DDE	8.0E-01	0.01	8.0E-10	2.4E-09	2.6E-08	7.8E-08	NA	NA	NA	1.8E-10	1.1E-09	3.4E-01	6.3E-11	3.8E-10
4,4'-DDT	3.9E+00	0.03	1.2E-08	3.6E-08	3.8E-07	1.1E-06	5.0E-04	7.6E-04	2.3E-03	2.7E-09	1.6E-08	3.4E-01	9.3E-10	5.6E-09
Total								2E-02	6E-02				8E-08	5E-07

Notes:
- ABS_d = dermal absorption factor
- ADD = average daily dose
- C_{soil} = soil exposure point concentration
- COPC = chemical of potential concern
- CR = cancer risk
- CSF = cancer slope factor
- CTE = central tendency exposure
- DA_{event} = dose absorbed per unit area per event
- EPC = exposure point concentration
- HQ = hazard quotient
- LADD = lifetime average daily dose
- NA = not available
- RfD = reference dose
- RME = reasonable maximum exposure

Exhibit C-37.

Scenario: **Construction Worker**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Riverbank**
Exposure Pathway: **Inhalation (Subchronic)**
Time Frame: **Future**

Equations

$C_{part} = C_{soil}$ x PEF

$ADD_{if} = Inh_R$ x EF x ED / (AT_n x BW)

$ADD = C_{part}$ x ADD_{if}

HQ = ADD / RfD

$LADD_{if} = Inh_R$ x EF x ED / (AT_c x BW)

$LADD = C_{part}$ x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	7	7	m^3/day
Exposure frequency	EF	250	250	day/year
Exposure duration	ED	0.5	1	year
Averaging time noncancer	AT_n	183	365	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	70	70	kg
ADD intake factor	ADD_{if}	6.85E-02	6.85E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	4.89E-04	9.78E-04	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Riverbank**

	Soil	**Particulate**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk**	
	Concentration	**EPC**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_I**	**CTE**	**RME**
COPCs	**(mg/kg)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Arsenic	2.22E+01	1.69E-08	1.2E-09	1.2E-09	3.0E-04	3.8E-06	3.8E-06	8.24E-12	1.65E-11	1.5E+01	1.2E-10	2.5E-10
Chromium - total	1.67E+02	1.26E-07	8.6E-09	8.6E-09	2.8E-05	3.1E-04	3.1E-04	6.18E-11	1.24E-10	2.9E+02	1.8E-08	3.6E-08
Dioxin/furan TCDD TEQ	1.47E-04	1.11E-13	7.6E-15	7.6E-15	2.0E-08	3.8E-07	3.8E-07	5.44E-17	1.09E-16	1.3E+05	7.2E-12	1.4E-11
Benzo(a)anthracene	2.63E-01	1.99E-10	1.4E-11	1.4E-11	NA	NA	NA	9.75E-14	1.95E-13	3.1E-01	3.0E-14	6.0E-14
Benzo(a)pyrene	1.80E-01	1.36E-10	9.3E-12	9.3E-12	NA	NA	NA	6.68E-14	1.34E-13	3.1E+00	2.1E-13	4.1E-13
Benzo(b)fluoranthene	2.65E-01	2.01E-10	1.4E-11	1.4E-11	NA	NA	NA	9.83E-14	1.97E-13	3.1E-01	3.0E-14	6.1E-14
Dibenz(a,h)anthracene	1.19E-01	9.02E-11	6.2E-12	6.2E-12	NA	NA	NA	4.41E-14	8.83E-14	3.1E+00	1.4E-13	2.7E-13
Indeno(1,2,3-cd)pyrene	1.65E-01	1.25E-10	8.6E-12	8.6E-12	NA	NA	NA	6.12E-14	1.22E-13	3.1E-01	1.9E-14	3.8E-14
Aroclor 1248	1.57E-01	1.19E-10	8.2E-12	8.2E-12	3.0E-05	2.7E-07	2.7E-07	5.82E-14	1.16E-13	2.0E+00	1.2E-13	2.3E-13
4,4'-DDE	8.01E-01	6.07E-10	4.2E-11	4.2E-11	NA	NA	NA	2.97E-13	5.94E-13	3.4E-01	1.0E-13	2.0E-13
4,4'-DDT	3.95E+00	2.99E-09	2.0E-10	2.0E-10	5.0E-04	4.1E-07	4.1E-07	1.46E-12	2.93E-12	3.4E-01	5.0E-13	9.9E-13
Total						3E-04	3E-04				2E-08	4E-08

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

Exhibit C-38.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Soil**
Operable Unit **Riverbank**
Exposure Pathway: **Ingestion**
Time Frame: **Current / Future**

Equations

ADD_{if} = IR x EF x ED / (AT_n x BW x CF)

ADD = C_{soil} x RBA x ADD_{if}

HQ = ADD / RfD

$LADD_{if}$ = IR x EF x ED / (AT_c x BW x CF)

LADD = C_{soil} x RBA x $LADD_{if}$

CR = LADD x CSF

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Soil ingestion rate	IR	100	100	mg/day
Exposure frequency	EF	35	70	day/year
Exposure duration	ED	10	10	year
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
Unit conversion factor	CF	1.00E+06	1.00E+06	mg/kg
ADD intake factor	ADD_{if}	1.88E-07	3.76E-07	1/day
LADD intake factor	$LADD_{if}$	2.69E-08	5.37E-08	1/day

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	RBA (unitless)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Oral RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_o (kg-day/mg)	Cancer Risk [a] CTE (unitless)	Cancer Risk [a] RME (unitless)
Arsenic	2.2E+01	1.0	4.2E-06	8.4E-06	3.0E-04	1.4E-02	2.8E-02	6.0E-07	1.2E-06	1.5E+00	9.0E-07	1.8E-06
Chromium - total	1.7E+02	1.0	3.1E-05	6.3E-05	3.0E-03	1.0E-02	2.1E-02	4.5E-06	8.9E-06	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	1.0	2.8E-11	5.5E-11	1.0E-09	2.8E-02	5.5E-02	3.9E-12	7.9E-12	1.3E+05	5.1E-07	1.0E-06
Benzo(a)anthracene	2.6E-01	1.0	4.9E-08	9.9E-08	NA	NA	NA	7.1E-09	1.4E-08	7.3E-01	1.2E-08	2.5E-08
Benzo(a)pyrene	1.8E-01	1.0	3.4E-08	6.8E-08	NA	NA	NA	4.8E-09	9.7E-09	7.3E+00	8.5E-08	1.7E-07
Benzo(b)fluoranthene	2.7E-01	1.0	5.0E-08	1.0E-07	NA	NA	NA	7.1E-09	1.4E-08	7.3E-01	1.2E-08	2.5E-08
Benzo(k)fluoranthene	1.9E-01	1.0	3.5E-08	7.0E-08	NA	NA	NA	5.0E-09	1.0E-08	7.3E-02	8.8E-10	1.8E-09
Chrysene	2.5E-01	1.0	4.8E-08	9.6E-08	NA	NA	NA	6.8E-09	1.4E-08	7.3E-03	1.2E-10	2.4E-10
Dibenz(a,h)anthracene	1.2E-01	1.0	2.2E-08	4.5E-08	NA	NA	NA	3.2E-09	6.4E-09	7.3E+00	5.6E-08	1.1E-07
Indeno(1,2,3-cd)pyrene	1.7E-01	1.0	3.1E-08	6.2E-08	NA	NA	NA	4.4E-09	8.9E-09	7.3E-01	7.8E-09	1.6E-08
Aroclor 1248	1.6E-01	1.0	3.0E-08	5.9E-08	2.0E-05	1.5E-03	3.0E-03	4.2E-09	8.4E-09	2.0E+00	8.4E-09	1.7E-08
Aroclor 1260	3.3E-02	1.0	6.3E-09	1.3E-08	2.0E-05	3.1E-04	6.3E-04	9.0E-10	1.8E-09	2.0E+00	1.8E-09	3.6E-09
4,4'-DDD	3.1E-01	1.0	5.8E-08	1.2E-07	2.0E-03	2.9E-05	5.8E-05	8.3E-09	1.7E-08	2.4E-01	2.0E-09	4.0E-09
4,4'-DDE	8.0E-01	1.0	1.5E-07	3.0E-07	NA	NA	NA	2.2E-08	4.3E-08	3.4E-01	7.3E-09	1.5E-08
4,4'-DDT	3.9E+00	1.0	7.4E-07	1.5E-06	5.0E-04	1.5E-03	3.0E-03	1.1E-07	2.1E-07	3.4E-01	3.6E-08	7.2E-08
Hexachloroethane	6.8E-01	1.0	1.3E-07	2.5E-07	1.0E-03	1.3E-04	2.5E-04	1.8E-08	3.6E-08	1.4E-02	2.5E-10	5.1E-10
Pentachlorophenol	3.9E-01	1.0	7.2E-08	1.4E-07	3.0E-02	2.4E-06	4.8E-06	1.0E-08	2.1E-08	1.2E-01	1.2E-09	2.5E-09
Bis(2-ethylhexyl)phthalate	1.7E+00	1.0	3.2E-07	6.3E-07	2.0E-02	1.6E-05	3.2E-05	4.5E-08	9.1E-08	1.4E-02	6.3E-10	1.3E-09
Hexachlorobenzene	2.2E-02	1.0	4.1E-09	8.3E-09	8.0E-04	5.2E-06	1.0E-05	5.9E-10	1.2E-09	1.6E+00	9.5E-10	1.9E-09
Total						6E-02	1E-01				2E-06	3E-06

Notes:
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RBA = relative bioavailability
RfD = reference dose
RME = reasonable maximum exposure

[a] A weighted age dependent adjustment factor (ADAF) of 2.4 was applied to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. See text for derivation and explanation.

Exhibit C-39.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Soil**
Operable Unit **Riverbank**
Exposure Pathway: **Dermal**
Time Frame: **Current / Future**

Equations

$DA_{event} = C_{soil} \times CF \times AF \times ABS_d$

$ADD_{if} = EF \times ED \times EV \times SA / (AT_n \times BW)$

$ADD = DA_{event} \times ADD_{if}$

$HQ = DAD / RfD$

$LADD_{if} = EF \times ED \times EV \times SA / (AT_c \times BW)$

$LADD = DA_{event} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions

Parameter	Abbrev	CTE	RME	Units
Unit conversion factor	CF	1.0E-06	1.0E-06	kg/mg
Adherence factor	AF	0.07	0.07	mg/cm^2-event
Exposure frequency	EF	35	70	day/year
Exposure duration	ED	10	10	year
Event frequency	EV	1	1	event/day
Surface Area	SA	4,800	5,600	cm^2
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
ADD intake factor	ADD_{if}	9.02E+00	2.11E+01	event-cm^2/d-kg
LADD intake factor	$LADD_{if}$	1.29E+00	3.01E+00	event-cm^2/d-kg

Exposure Area : **Riverbank**

COPCs	Soil EPC (mg/kg)	ABS_d (unitless)	DA_{event} CTE (mg/cm^2-event)	DA_{event} RME (mg/cm^2-event)	ADD (noncancer) CTE (mg/kg-day)	ADD (noncancer) RME (mg/kg-day)	Chronic Dermal RfD (mg/kg-day)	Hazard Quotient CTE (unitless)	Hazard Quotient RME (unitless)	LADD (cancer) CTE (mg/kg-day)	LADD (cancer) RME (mg/kg-day)	CSF_d (kg-day/mg)	Cancer Risk [a] CTE (unitless)	Cancer Risk [a] RME (unitless)
Arsenic	2.2E+01	0.03	4.7E-08	4.7E-08	4.2E-07	9.8E-07	1.2E-04	3.4E-03	8.0E-03	6.0E-08	1.4E-07	3.7E+00	2.2E-07	5.1E-07
Chromium - total	1.7E+02	0.00	1.2E-08	1.2E-08	1.1E-07	2.5E-07	6.0E-05	1.8E-03	4.1E-03	1.5E-08	3.5E-08	NA	NA	NA
Dioxin/furan TCDD TEQ	1.5E-04	0.03	3.1E-13	3.1E-13	2.8E-12	6.5E-12	1.0E-09	2.8E-03	6.5E-03	4.0E-13	9.3E-13	1.3E+05	5.2E-08	1.2E-07
Benzo(a)anthracene	2.6E-01	0.13	2.4E-09	2.4E-09	2.2E-08	5.0E-08	NA	NA	NA	3.1E-09	7.2E-09	7.3E-01	5.4E-09	1.3E-08
Benzo(a)pyrene	1.8E-01	0.13	1.6E-09	1.6E-09	1.5E-08	3.4E-08	NA	NA	NA	2.1E-09	4.9E-09	7.3E+00	3.7E-08	8.6E-08
Benzo(b)fluoranthene	2.7E-01	0.13	2.4E-09	2.4E-09	2.2E-08	5.1E-08	NA	NA	NA	3.1E-09	7.3E-09	7.3E-01	5.4E-09	1.3E-08
Benzo(k)fluoranthene	1.9E-01	0.13	1.7E-09	1.7E-09	1.5E-08	3.6E-08	NA	NA	NA	2.2E-09	5.1E-09	7.3E-02	3.8E-10	8.9E-10
Chrysene	2.5E-01	0.13	2.3E-09	2.3E-09	2.1E-08	4.9E-08	NA	NA	NA	3.0E-09	7.0E-09	7.3E-03	5.2E-11	1.2E-10
Dibenz(a,h)anthracene	1.2E-01	0.13	1.1E-09	1.1E-09	9.8E-09	2.3E-08	NA	NA	NA	1.4E-09	3.3E-09	7.3E+00	2.4E-08	5.7E-08
Indeno(1,2,3-cd)pyrene	1.7E-01	0.13	1.5E-09	1.5E-09	1.4E-08	3.2E-08	NA	NA	NA	1.9E-09	4.5E-09	7.3E-01	3.4E-09	7.9E-09
Aroclor 1248	1.6E-01	0.14	1.5E-09	1.5E-09	1.4E-08	3.2E-08	2.0E-05	6.9E-04	1.6E-03	2.0E-09	4.6E-09	2.0E+00	4.0E-09	9.3E-09
Aroclor 1260	3.3E-02	0.14	3.3E-10	3.3E-10	3.0E-09	6.9E-09	2.0E-05	1.5E-04	3.4E-04	4.2E-10	9.8E-10	2.0E+00	8.4E-10	2.0E-09
4,4'-DDD	3.1E-01	0.01	2.2E-10	2.2E-10	2.0E-09	4.6E-09	2.0E-03	9.8E-07	2.3E-06	2.8E-10	6.5E-10	2.4E-01	6.7E-11	1.6E-10
4,4'-DDE	8.0E-01	0.01	5.6E-10	5.6E-10	5.1E-09	1.2E-08	NA	NA	NA	7.2E-10	1.7E-09	3.4E-01	2.5E-10	5.7E-10
4,4'-DDT	3.9E+00	0.03	8.3E-09	8.3E-09	7.5E-08	1.7E-07	5.0E-04	1.5E-04	3.5E-04	1.1E-08	2.5E-08	3.4E-01	3.6E-09	8.5E-09
Hexachloroethane	6.8E-01	0.01	4.7E-10	4.7E-10	4.3E-09	1.0E-08	5.0E-04	8.5E-06	2.0E-05	6.1E-10	1.4E-09	2.8E-02	1.7E-11	4.0E-11
Pentachlorophenol	3.9E-01	0.25	6.7E-09	6.7E-09	6.1E-08	1.4E-07	3.0E-02	2.0E-06	4.7E-06	8.7E-09	2.0E-08	1.2E-01	1.0E-09	2.4E-09
Bis(2-ethylhexyl)phthalate	1.7E+00	0.10	1.2E-08	1.2E-08	1.1E-07	2.5E-07	3.8E-03	2.8E-05	6.5E-05	1.5E-08	3.6E-08	7.4E-02	1.1E-09	2.6E-09
Hexachlorobenzene	2.2E-02	0.01	1.5E-11	1.5E-11	1.4E-10	3.2E-10	8.0E-04	1.7E-07	4.1E-07	2.0E-11	4.6E-11	1.6E+00	3.2E-11	7.4E-11
Total								9E-03	2E-02				4E-07	8E-07

Notes:
ABS_d = dermal absorption factor
ADD = average daily dose
C_{soil} = soil exposure point concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
DA_{event} = dose absorbed per unit area per event
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

[a] A weighted age dependent adjustment factor (ADAF) of 2.4 was applied to benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. See text for derivation and explanation.

Exhibit C-40.

Scenario: **Trespasser**
Age: **Adult**
Medium: **Outdoor Particulates**
Operable Unit **Riverbank**
Exposure Pathway: **Inhalation**
Time Frame: **Current / Future**

Equations

$C_{part} = C_{soil} \times PEF$

$ADD_{if} = Inh_R \times EF \times ED / (AT_n \times BW)$

$ADD = C_{part} \times ADD_{if}$

$HQ = ADD / RfD$

$LADD_{if} = Inh_R \times EF \times ED / (AT_c \times BW)$

$LADD = C_{part} \times LADD_{if}$

$CR = LADD \times CSF$

Adult Exposure Assumptions				
Parameter	**Abbrev**	**CTE**	**RME**	**Units**
Inhalation rate	Inh_R	2.1	3.5	m^3/day
Exposure frequency	EF	35	70	day/year
Exposure duration	ED	10	10	year
Averaging time noncancer	AT_n	3,650	3,650	day
Averaging time cancer	AT_c	25,550	25,550	day
Body weight	BW	51	51	kg
ADD intake factor	ADD_{if}	3.95E-03	1.32E-02	m^3/kg-day
LADD intake factor	$LADD_{if}$	5.64E-04	1.88E-03	m^3/kg-day
Particulate Emission Factor	PEF	7.6E-10	7.6E-10	kg/m^3

Exposure Area : **Riverbank**

	Soil	**Particulate**	**ADD (noncancer)**		**Chronic**	**Hazard Quotient**		**LADD (cancer)**			**Cancer Risk [a]**	
	Concentration	**EPC**	**CTE**	**RME**	**Inhalation RfD**	**CTE**	**RME**	**CTE**	**RME**	**CSF_I**	**CTE**	**RME**
COPCs	**(mg/kg)**	**(mg/m^3)**	**(mg/kg-day)**		**(mg/kg-day)**	**(unitless)**		**(mg/kg-day)**		**(kg-day/mg)**	**(unitless)**	
Arsenic	2.2E+01	1.7E-08	6.7E-11	2.2E-10	3.0E-04	2.2E-07	7.4E-07	9.5E-12	3.2E-11	1.5E+01	1.4E-10	4.8E-10
Chromium - total	1.7E+02	1.3E-07	5.0E-10	1.7E-09	2.8E-05	1.8E-05	5.9E-05	7.1E-11	2.4E-10	2.9E+02	2.1E-08	7.0E-08
Dioxin/furan TCDD TEQ	1.5E-04	1.1E-13	4.4E-16	1.5E-15	1.0E-09	4.4E-07	1.5E-06	6.3E-17	2.1E-16	1.3E+05	8.3E-12	2.8E-11
Benzo(a)anthracene	2.6E-01	2.0E-10	7.9E-13	2.6E-12	NA	NA	NA	1.1E-13	3.7E-13	3.1E-01	8.4E-14	2.8E-13
Benzo(a)pyrene	1.8E-01	1.4E-10	5.4E-13	1.8E-12	NA	NA	NA	7.7E-14	2.6E-13	3.1E+00	5.7E-13	1.9E-12
Benzo(b)fluoranthene	2.7E-01	2.0E-10	7.9E-13	2.6E-12	NA	NA	NA	1.1E-13	3.8E-13	3.1E-01	8.4E-14	2.8E-13
Benzo(k)fluoranthene	1.9E-01	1.4E-10	5.6E-13	1.9E-12	NA	NA	NA	8.0E-14	2.7E-13	3.1E-02	5.9E-15	2.0E-14
Chrysene	2.5E-01	1.9E-10	7.6E-13	2.5E-12	NA	NA	NA	1.1E-13	3.6E-13	3.1E-03	8.1E-16	2.7E-15
Dibenz(a,h)anthracene	1.2E-01	9.0E-11	3.6E-13	1.2E-12	NA	NA	NA	5.1E-14	1.7E-13	3.1E+00	3.8E-13	1.3E-12
Indeno(1,2,3-cd)pyrene	1.7E-01	1.3E-10	4.9E-13	1.6E-12	NA	NA	NA	7.1E-14	2.4E-13	3.1E-01	5.2E-14	1.7E-13
Aroclor 1248	1.6E-01	1.2E-10	4.7E-13	1.6E-12	2.0E-05	2.3E-08	7.8E-08	6.7E-14	2.2E-13	2.0E+00	1.3E-13	4.5E-13
Aroclor 1260	3.3E-02	2.5E-11	1.0E-13	3.3E-13	2.0E-05	5.0E-09	1.7E-08	1.4E-14	4.8E-14	2.0E+00	2.9E-14	9.5E-14
4,4'-DDD	3.1E-01	2.3E-10	9.2E-13	3.1E-12	2.0E-03	4.6E-10	1.5E-09	1.3E-13	4.4E-13	2.4E-01	3.2E-14	1.1E-13
4,4'-DDE	8.0E-01	6.1E-10	2.4E-12	8.0E-12	NA	NA	NA	3.4E-13	1.1E-12	3.4E-01	1.2E-13	3.9E-13
4,4'-DDT	3.9E+00	3.0E-09	1.2E-11	3.9E-11	5.0E-04	2.4E-08	7.9E-08	1.7E-12	5.6E-12	3.4E-01	5.7E-13	1.9E-12
Hexachloroethane	6.8E-01	5.1E-10	2.0E-12	6.7E-12	1.0E-03	2.0E-09	6.7E-09	2.9E-13	9.6E-13	1.4E-02	4.0E-15	1.3E-14
Pentachlorophenol	3.9E-01	2.9E-10	1.2E-12	3.8E-12	3.0E-02	3.8E-11	1.3E-10	1.6E-13	5.5E-13	1.2E-01	2.0E-14	6.6E-14
Bis(2-ethylhexyl)phthalate	1.7E+00	1.3E-09	5.1E-12	1.7E-11	2.0E-02	2.5E-10	8.4E-10	7.2E-13	2.4E-12	1.4E-02	1.0E-14	3.4E-14
Hexachlorobenzene	2.2E-02	1.7E-11	6.6E-14	2.2E-13	8.0E-04	8.2E-11	2.7E-10	9.4E-15	3.1E-14	1.6E+00	1.5E-14	5.0E-14
Total						2E-05	6E-05				2E-08	7E-08

Notes:
ADD = average daily dose
C_{part} = particulate exposure point concentration
C_{soil} = soil concentration
COPC = chemical of potential concern
CR = cancer risk
CSF = cancer slope factor
CTE = central tendency exposure
EPC = exposure point concentration
HQ = hazard quotient
LADD = lifetime average daily dose
NA = not available
RfD = reference dose
RME = reasonable maximum exposure

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