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TABLE 4.3-2: REASONABLE MAXIMUM EXPOSURE PARAMETERS UTILIZED FOR HUMAN RECEPTORS

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

Receptors:		Off-site Resident		Fisherperson		Adolescent Trespasser		Recreator	
Parameter	Units								
Surface area available for exposure	cm^2/day	5560	2	5560	2	4381	2	5560	2
Total skin surface area	cm^2	20000	3	20000	3	15758	15	20000	3
% skin surface area available for exposure	%	27.8%	3	27.8%	3	27.8%	3	27.8%	3
Adherence factor	mg/cm^2	0.018	3	0.63	3	0.63	3	0.025	3
Absorption factor - dioxins/furans		0.03	4	0.03	4	0.03	4	0.03	4
Absorption factor - semivolatiles		0.1	4	0.1	4	0.1	4	0.1	4
Absorption factor - PCBs		0.14	4	0.14	4	0.14	4	0.14	4
Absorption factor - PAHs		0.13	4	0.13	4	0.13	4	0.13	4
Absorption factor - inorganics		0.01	4	0.01	4	0.01	4	0.01	4
Absorption factor - arsenic		0.03	4	0.03	4	0.03	4	0.03	4
Absorption factor - cadmium		0.001	4	0.001	4	0.001	4	0.001	4
Exposure time	hours/day	NA		4	1	1	12	NA	
Exposure frequency	days/year	350	5	84	1	24	1	20	1
Exposure frequency for eating fish	meals/yr	NA		62	3	NA		NA	
Exposure duration	years	30	5	30	5	6	1	25	5
Body weight	kg	70	5	70	5	56	15	70	5
Averaging time - noncarcinogenic	days	10950	5	10950	5	2190	1	9125	5
Averaging time - carcinogenic	days	25550	6	25550	6	25550	6	25550	6
Ingestion rate for fish	g/meal	NA		38.74	3	NA		NA	
Ingestion rate for soil	mg/day	100	5	100	5	100	5	100	5
Matrix effect - volatiles		1	1	1	1	1	1	1	1
Matrix effect - semivolatiles		0.29	7	0.29	7	0.29	7	0.29	7
Matrix effect - inorganics		1	1	1	1	1	1	1	1
Matrix effect - dioxins/PCBs		1	1	1	1	1	1	1	1
Inhalation rate	m^3/day	20	6	NA		0.83	6	20	6
Fraction of airborne volatiles respirable		1	1	NA		1	1	1	1
Fraction of PM_{15} respirable (≤ 10 μm)		0.84	9	NA		0.84	9	0.84	9
Retention factor - volatiles		1	1	NA		1	1	1	1
Retention factor - semivolatiles		0.75	10	NA		0.75	10	0.75	10
Retention factor - inorganics		0.75	10	NA		0.75	10	0.75	10

NA - not applicable

* Represents parameters for maintenance worker exposed to soil in EU 1, surface water and sediment

1 reasonable assumption
2 calculated
3 USEPA 1997, Exposure Factors Handbook
4 USEPA Dermal Assessment Workgroup
5 USEPA 1994, Region I Risk Update Number 2
6 USEPA 1991, HHEM Supplemental Guidances
7 Magee et al., 1996
8 Layton, 1993
9 Cowherd, 1985
10 International Commission on Radiological Protection
11 Based on calculations in MDEQ 1995, Operational Memorandum #14, Revision 2
12 USEPA 1992, Dermal Exposure Assessment
13 Carey, 1988
14 Calbrese et al., 1987
15 Calculated based on distributions in USEPA 1997, Exposure Factors Handbook

TABLE 4.3-2: REASONABLE MAXIMUM EXPOSURE PARAMETERS UTILIZED FOR HUMAN RECEPTORS

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

Receptors:		Maintenance Worker		Maintenance Worker*		Office Worker		Construction Worker	
Parameter	Units								
Surface area available for exposure	cm^2/day	5560	2	5560	2	NA		5560	2
Total skin surface area	cm^2	20000	3	20000	3	NA		20000	3
% skin surface area available for exposure	%	27.8%	3	27.8%	3	NA		27.8%	3
Adherence factor	mg/cm^2	0.077	3	0.63	3	NA		0.077	3
Absorption factor - dioxins/furans		0.03	4	0.03	4	NA		0.03	4
Absorption factor - semivolatiles		0.1	4	0.1	4	NA		0.1	4
Absorption factor - PCBs		0.14	4	0.14	4	NA		0.14	4
Absorption factor - PAHs		0.13	4	0.13	4	NA		0.13	4
Absorption factor - inorganics		0.01	4	0.01	4	NA		0.01	4
Absorption factor - arsenic		0.03	4	0.03	4	NA		0.03	4
Absorption factor - cadmium		0.001	4	0.001	4	NA		0.001	4
Exposure time	hours/day	NA		8	1	NA		8	1
Exposure frequency	days/year	150	5	10	1	150	5	120	1
Exposure frequency for eating fish	meals/yr	NA		NA		NA		NA	
Exposure duration	years	25	5	25	5	25	5	1	1
Body weight	kg	70	5	70	5	70	5	70	5
Averaging time - noncarcinogenic	days	9125	5	9125	5	9125	5	120	1
Averaging time - carcinogenic	days	25550	6	25550	6	25550	6	25550	6
Ingestion rate for fish	g/meal	NA		NA		NA		NA	
Ingestion rate for soil	mg/day	100	5	100	5	NA		200	1
Matrix effect - volatiles		1	1	1	1	NA		1	1
Matrix effect - semivolatiles		0.29	7	0.29	7	NA		0.29	7
Matrix effect - inorganics		1	1	1	1	NA		1	1
Matrix effect - dioxins/PCBs		1	1	1	1	NA		1	1
Inhalation rate	m^3/day	20	6	20	6	20	6	20	6
Fraction of airborne volatiles respirable		1	1	1	1	1	1	1	1
Fraction of PM_{15} respirable ($\leq$ 10 μm)		0.84	9	0.84	9	0.84	9	0.84	9
Retention factor - volatiles		1	1	1	1	1	1	1	1
Retention factor - semivolatiles		0.75	10	0.75	10	0.75	10	0.75	10
Retention factor - inorganics		0.75	10	0.75	10	0.75	10	0.75	10

NA - not applicable

* Represents parameters for maintenance worker exposed to soil in EU 1, surface water and sediment

1 reasonable assumption
2 calculated
3 USEPA 1997, Exposure Factors Handbook
4 USEPA Dermal Assessment Workgroup
5 USEPA 1994, Region I Risk Update Number 2
6 USEPA 1991, HHEM Supplemental Guidances
7 Magee et al., 1996
8 Layton, 1993
9 Cowherd, 1985
10 International Commission on Radiological Protection
11 Based on calculations in MDEQ 1995, Operational Memorandum #14, Revision 2
12 USEPA 1992, Dermal Exposure Assessment
13 Carey, 1988
14 Calbrese et al., 1987
15 Calculated based on distributions in USEPA 1997, Exposure Factors Handbook

TABLE 4.3-1: CENTRAL TENDANCY EXPOSURE PARAMETERS UTILIZED FOR HUMAN RECEPTORS

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

Receptors:		Off-site Resident		Fisherperson		Adolescent Trespasser		Recreator	
Parameter	Units								
Surface area available for exposure	cm^2/day	2680	2	2680	2	2112	2	2680	2
Total skin surface area	cm^2	20000	3	20000	3	15758	15	20000	3
% skin surface area available for exposure	%	13.4%	3	13.4%	3	13.4%	3	13.4%	3
Adherence factor	mg/cm^2	0.018	3	0.63	3	0.63	3	0.025	3
Absorption factor - dioxins/furans		0.03	4	0.03	4	0.03	4	0.03	4
Absorption factor - semivolatiles		0.1	4	0.1	4	0.1	4	0.1	4
Absorption factor - PCBs		0.14	4	0.14	4	0.14	4	0.14	4
Absorption factor - PAHs		0.13	4	0.13	4	0.13	4	0.13	4
Absorption factor - inorganics		0.01	4	0.01	4	0.01	4	0.01	4
Absorption factor - arsenic		0.03	4	0.03	4	0.03	4	0.03	4
Absorption factor - cadmium		0.001	4	0.001	4	0.001	4	0.001	4
Exposure time	hours/day	NA		2	1	1	12	NA	
Exposure frequency	days/year	234	5	20	1	7	6	12	1
Exposure frequency for eating fish	meals/yr	NA		18	3	NA		NA	
Exposure duration	years	9	5	9	5	6	1	5.5	13
Body weight	kg	70	5	70	5	56	15	70	5
Averaging time - noncarcinogenic	days	3285	5	3285	5	2190	1	2007.5	13
Averaging time - carcinogenic	days	25550	6	25550	6	25550	6	25550	6
Ingestion rate for fish	g/meal	NA		10.9	3	NA		NA	
Ingestion rate for soil	mg/day	50	5	50	5	50	5	50	5
Matrix effect - volatiles		1	1	1	1	1	1	1	1
Matrix effect - semivolatiles		0.29	7	0.29	7	0.29	7	0.29	7
Matrix effect - inorganics		1	1	1	1	1	1	1	1
Matrix effect - dioxins/PCBs		1	1	1	1	1	1	1	1
Inhalation rate	m^3/day	13.5	8	NA		0.83	6	13.5	8
Fraction of airborne volatiles respirable		1	1	NA		1	1	1	1
Fraction of PM_{15} respirable ($\leq$ 10 μm)		0.84	9	NA		0.84	9	0.84	9
Retention factor - volatiles		1	1	NA		1	1	1	1
Retention factor - semivolatiles		0.75	10	NA		0.75	10	0.75	10
Retention factor - inorganics		0.75	10	NA		0.75	10	0.75	10

NA - not applicable

* Represents parameters for maintenance worker exposed to soil in EU 1, surface water and sediment

1 reasonable assumption
2 calculated
3 USEPA 1997, Exposure Factors Handbook
4 USEPA Dermal Assessment Workgroup
5 USEPA 1994, Region I Risk Update Number 2
6 USEPA 1991, HHEM Supplemental Guidances
7 Magee et al., 1996
8 Layton, 1993
9 Cowherd, 1985
10 International Commission on Radiological Protection
11 Based on calculations in MDEQ 1995, Operational Memorandum #14, Revision 2
12 USEPA 1992, Dermal Exposure Assessment
13 Carey, 1988
14 Calbrese et al., 1987
15 Calculated based on distributions in USEPA 1997, Exposure Factors Handbook

TABLE 4.3-1: CENTRAL TENDANCY EXPOSURE PARAMETERS UTILIZED FOR HUMAN RECEPTORS

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

Receptors:		Maintenance Worker		Maintenance Worker*		Office Worker		Construction Worker	
Parameter	Units								
Surface area available for exposure	cm^2/day	2680	2	2680	2	NA		2680	2
Total skin surface area	cm^2	20000	3	20000	3	NA		20000	3
% skin surface area available for exposure	%	13.4%	3	13.4%	3	NA		13.4%	3
Adherence factor	mg/cm^2	0.077	3	0.63	3	NA		0.077	3
Absorption factor - dioxins/furans		0.03	4	0.03	4	NA		0.03	4
Absorption factor - semivolatiles		0.1	4	0.1	4	NA		0.1	4
Absorption factor - PCBs		0.14	4	0.14	4	NA		0.14	4
Absorption factor - PAHs		0.13	4	0.13	4	NA		0.13	4
Absorption factor - inorganics		0.01	4	0.01	4	NA		0.01	4
Absorption factor - arsenic		0.03	4	0.03	4	NA		0.03	4
Absorption factor - cadmium		0.001	4	0.001	4	NA		0.001	4
Exposure time	hours/day	NA		5	1	NA		8	1
Exposure frequency	days/year	61	11	6	1	150	5	60	1
Exposure frequency for eating fish	meals/yr	NA		NA		NA		NA	
Exposure duration	years	5.5	13	5.5	13	5.5	13	1	1
Body weight	kg	70	5	70	5	70	5	70	5
Averaging time - noncarcinogenic	days	2007.5	13	2007.5	13	2007.5	13	60	1
Averaging time - carcinogenic	days	25550	6	25550	6	25550	6	25550	6
Ingestion rate for fish	g/meal	NA		NA		NA		NA	
Ingestion rate for soil	mg/day	50	5	50	5	NA		50	5
Matrix effect - volatiles		1	1	1	1	NA		1	1
Matrix effect - semivolatiles		0.29	7	0.29	7	NA		0.29	7
Matrix effect - inorganics		1	1	1	1	NA		1	1
Matrix effect - dioxins/PCBs		1	1	1	1	NA		1	1
Inhalation rate	m^3/day	13.5	8	13.5	8	6.67	6	13.5	8
Fraction of airborne volatiles respirable		1	1	1	1	1	1	1	1
Fraction of PM_{15} respirable ($\leq$ 10 μm)		0.84	9	0.84	9	0.84	9	0.84	9
Retention factor - volatiles		1	1	1	1	1	1	1	1
Retention factor - semivolatiles		0.75	10	0.75	10	0.75	10	0.75	10
Retention factor - inorganics		0.75	10	0.75	10	0.75	10	0.75	10

NA - not applicable

* Represents parameters for maintenance worker exposed to soil in EU 1, surface water and sediment

1 reasonable assumption
2 calculated
3 USEPA 1997, Exposure Factors Handbook
4 USEPA Dermal Assessment Workgroup
5 USEPA 1994, Region I Risk Update Number 2
6 USEPA 1991, HHEM Supplemental Guidances
7 Magee et al., 1996
8 Layton, 1993
9 Cowherd, 1985
10 International Commission on Radiological Protection
11 Based on calculations in MDEQ 1995, Operational Memorandum #14, Revision 2
12 USEPA 1992, Dermal Exposure Assessment
13 Carey, 1988
14 Calbrese et al., 1987
15 Calculated based on distributions in USEPA 1997, Exposure Factors Handbook

TABLE 4.3.1-42: DERMAL EXPOSURE TO SOIL BY MAINTENANCE WORKER - EU 1 - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/shift	5560	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		27.8%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1997, EFH
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
ABS_{cd} - Absorption - cadmium =		0.001	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	shifts/year	10	reasonable maximum
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	9.81E-03	4.04E-10	NA	NA	1.44E-10	1.50E+05	2.16E-05
Inorganics							
Aluminum	5.24E+04	7.19E-04	1.00E+00	7.19E-04	2.57E-04		
Arsenic	6.88E+00	2.83E-07	3.00E-04	9.43E-04	1.01E-07	1.50E+00	1.52E-07
Cadmium	2.11E+02	2.90E-07	1.00E-03	2.90E-04	1.03E-07		
Chromium - trivalent	7.82E+03	1.07E-04	1.00E+00	1.07E-04	3.83E-05		
Chromium - hexavalent	7.92E+02	1.09E-05	5.00E-03	2.17E-03	3.88E-06		
Copper	3.57E+03	4.90E-05	4.00E-02	1.22E-03	1.75E-05		
Iron	2.43E+04	3.33E-04	3.00E-01	1.11E-03	1.19E-04		
Lead	4.58E+02	6.28E-06	NA	NA	2.24E-06		
Zinc	1.31E+04	1.80E-04	3.00E-01	6.00E-04	6.43E-05		
Semivolatiles							
3-Methylcholanthrene	3.68E-01	5.04E-08	NA	NA	1.80E-08		
Acenaphthylene	2.70E-01	3.70E-08	NA	NA	1.32E-08		
Benzo[a]pyrene Equiv.	5.17E+00	9.22E-07	NA	NA	3.29E-07	7.30E+00	2.40E-06
Benzo[ghi]perylene	2.68E+00	4.78E-07	NA	NA	1.71E-07		
Phenanthrene	4.29E+00	7.65E-07	NA	NA	2.73E-07		

NA - Not Available

Total Hazard Index = 7.16E-03

Total Cancer Risk = 2.42E-05

TABLE 4.3.1-43: INGESTION OF SOIL BY MAINTENANCE WORKERS -EU 1 - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/shift	100	USEPA 1994, Region I
EF - Exposure frequency =	shifts/year	10	USEPA 1994, Region I
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_v - Matrix effect - volatiles =		1	reasonable maximum
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable maximum
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable maximum
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	9.81E-03	3.84E-10	NA	NA	1.37E-10	1.50E+05	2.06E-05
Inorganics							
Aluminum	5.24E+04	2.05E-03	1.00E+00	2.05E-03	7.33E-04		
Arsenic	6.88E+00	2.69E-07	3.00E-04	8.97E-04	9.61E-08	1.50E+00	1.44E-07
Cadmium	2.11E+02	8.27E-06	1.00E-03	8.27E-03	2.95E-06		
Chromium - trivalent	7.82E+03	3.06E-04	1.00E+00	3.06E-04	1.09E-04		
Chromium - hexavalent	7.92E+02	3.10E-05	5.00E-03	6.20E-03	1.11E-05		
Copper	3.57E+03	1.40E-04	4.00E-02	3.50E-03	4.99E-05		
Iron	2.43E+04	9.50E-04	3.00E-01	3.17E-03	3.39E-04		
Lead	4.58E+02	1.79E-05	NA	NA	6.41E-06		
Zinc	1.31E+04	5.14E-04	3.00E-01	1.71E-03	1.83E-04		
Semivolatiles							
3-Methylcholanthrene	3.68E-01	4.17E-09	NA	NA	1.49E-09		
Acenaphthylene	2.70E-01	3.06E-09	NA	NA	1.09E-09		
Benzo[a]pyrene Equiv.	5.17E+00	5.87E-08	NA	NA	2.10E-08	7.30E+00	1.53E-07
Benzo[ghi]perylene	2.68E+00	3.04E-08	NA	NA	1.09E-08		
Phenanthrene	4.29E+00	4.87E-08	NA	NA	1.74E-08		
Volatiles							
Tetrachloroethene	2.06E-02	8.07E-10	1.00E-02	8.07E-08	2.88E-10	5.20E-02	1.50E-11

~~HE~~ x-03
2.05
.897
8.27
.306
6.20
3.50
3.17
1.71
26.103
~~26.07~~
2.61E-02

2.06 -05
.0144
.0153
2.0897
2.09-05

TABLE 4.3.1-48: DERMAL EXPOSURE TO SOIL BY MAINTENANCE WORKER - EU 2 - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/shift	5600	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		28%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1997, EFH
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	shifts/year	150	USEPA 1994, Region I
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg/day	Oral Chronic RfD mg/kg/day	Hazard Index	Average Lifetime Daily Intake mg/kg/day	Cancer Slope Factor 1/(mg/kg/day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	2.53E-04	1.57E-10	NA	NA	5.62E-11	1.50E+05	8.42E-06
Inorganics							
Arsenic	6.88E+00	4.27E-06	3.00E-04	1.42E-02	1.53E-06	1.50E+00	2.29E-06
Chromium - trivalent	7.82E+03	1.62E-03	1.00E+00	1.62E-03	5.78E-04		
Chromium - hexavalent	7.92E+02	1.64E-04	5.00E-03	3.28E-02	5.86E-05		
Lead	6.84E+01	1.42E-05	NA	NA	5.06E-06		
Semivolatiles							
Benzo[a]pyrene Equiv.	8.74E-01	2.35E-06	NA	NA	8.41E-07	7.30E+00	6.14E-06
Benzo[ghi]perylene	3.89E-01	1.05E-06	NA	NA	3.74E-07		
Phenanthrene	5.27E-01	1.42E-06	NA	NA	5.07E-07		

NA - Not Available

Total Hazard Index = 4.87E-02

Total Cancer Risk = 1.68E-05

TABLE 4.3.1-49: INGESTION OF SOIL BY MAINTENANCE WORKERS -EU 2 - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/shift	100	USEPA 1994, Region I
EF - Exposure frequency =	shifts/year	150	USEPA 1994, Region I
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable maximum
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable maximum
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg/day	Oral Chronic RfD mg/kg/day	Hazard Index	Average Lifetime Daily Intake mg/kg/day	Cancer Slope Factor 1/(mg/kg/day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	2.53E-04	1.49E-10	NA	NA	5.31E-11	1.50E+05	7.96E-06
Inorganics							
Arsenic	6.88E+00	4.04E-06	3.00E-04	1.35E-02	1.44E-06	1.50E+00	2.16E-06
Chromium - trivalent	7.82E+03	4.59E-03	1.00E+00	4.59E-03	1.64E-03		
Chromium - hexavalent	7.92E+02	4.65E-04	5.00E-03	9.30E-02	1.66E-04		
Lead	6.84E+01	4.02E-05	NA	NA	1.43E-05		
Semivolatiles							
Benzo[a]pyrene Equiv.	8.74E-01	1.49E-07	NA	NA	5.32E-08	7.30E+00	3.88E-07
Benzo[ghi]perylene	3.89E-01	6.62E-08	NA	NA	2.37E-08		
Phenanthrene	5.27E-01	8.97E-08	NA	NA	3.20E-08		

TABLE 4.3-58: DERMAL EXPOSURE TO SURFACE WATER BY MAINTENANCE WORKER - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cw*SA*Kp*ABS*ET*EF*ED*CF}{BW*AT}$$

C_w - Concentration in surface water =	mg/L	chem. spec.	
SA - Surface area available for exposure =	cm^2	5560	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		27.8%	USEPA 1997, EFH
Kp - Dermal permeability constant =	cm/hr	chem. spec.	
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
ET - Exposure time =	hrs/day	8	reasonable assumption
EF - Exposure frequency =	days/year	10	reasonable assumption
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	L/cm^3	1.00E-03	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Surface Water mg/L	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	1.07E-07	7.82E-11	NA	NA	2.79E-11	1.50E+05	4.19E-06
Inorganics							
Aluminum	2.44E+00	4.25E-07	NA	NA	1.52E-07		
Arsenic	5.99E-03	1.50E-09	3.00E-04	5.00E-06	5.35E-10	1.50E+00	8.03E-10
Barium	1.28E-01	2.23E-08	7.00E-02	3.18E-07	7.95E-09		
Copper	7.00E-02	1.22E-08	3.50E+00	3.48E-09	4.35E-09		
Iron	1.06E+02	1.85E-05	NA	NA	6.60E-06		
Lead	4.24E-02	5.93E-10	NA	NA	2.12E-10		
Manganese	3.19E+00	5.55E-07	NA	NA	1.98E-07		
Thallium	2.92E-03	4.19E-11	NA	NA	1.50E-11		
Vanadium	2.22E-02	3.86E-09	7.00E-03	5.52E-07	1.38E-09		
Zinc	6.93E-01	1.21E-07	3.00E-01	4.02E-07	4.31E-08		
Semivolatiles							
Benzo[a]pyrene Equiv.	1.42E-02	3.86E-05	NA	NA	1.38E-05	7.30E+00	1.01E-04
Benzo[ghi]perylene	6.64E-03	1.11E-03	NA	NA	3.97E-04		
Bis(2-Ethylhexyl)phthalate	5.33E-03	1.43E-06	2.00E-02	7.17E-05	5.12E-07	1.40E-02	7.17E-09
Carbazole	4.00E-03	3.23E-07	NA	NA	1.15E-07	2.00E-02	2.31E-09
Phenanthrene	7.71E-03	4.02E-06	NA	NA	1.43E-06		

NA - Not Available

Total Hazard Index = 7.79E-05

Total Cancer Risk = 1.05E-04

TABLE 4.3-61: DERMAL EXPOSURE TO SEDIMENT BY MAINTENANCE WORKER - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cd*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cd - Concentration in sediment =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/day	5560	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1996, EFH
Fs - Fraction of skin surface area available for exposure =		27.8%	USEPA 1996, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1996, EFH
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pcb} - Absorption - PCBs =		0.14	USEPA Dermal Assessment Workgroup
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
ABS_{cd} - Absorption - cadmium =		0.001	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	days/year	10	reasonable maximum
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Sediment mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	9.34E-05	3.84E-12	NA	NA	1.37E-12	1.20E+05	1.65E-07
Inorganics							
Arsenic	6.45E+00	2.65E-07	3.00E-04	8.84E-04	9.48E-08	1.50E+00	1.42E-07
Beryllium	5.07E-01	6.95E-09	5.00E-03	1.39E-06	2.48E-09	5.70E-06	1.41E-14
Cadmium	4.20E+00	5.76E-09	1.00E-03	5.76E-06	2.06E-09		
Chromium - trivalent	1.62E+02	2.22E-06	1.00E+00	2.22E-06	7.94E-07		
Chromium - hexavalent	1.64E+01	2.25E-07	5.00E-03	4.50E-05	8.04E-08		
Iron	2.34E+04	3.21E-04	3.00E-01	1.07E-03	1.15E-04		
Lead	1.03E+02	1.42E-06	NA	NA	5.07E-07		
Pesticides/PCBs							
Aroclor-1016	1.04E-01	2.00E-08	7.00E-05	2.85E-04	7.13E-09		
Aroclor-1221	1.98E-01	3.80E-08	2.00E-05	1.90E-03	1.36E-08		
Aroclor-1232	1.04E-01	2.00E-08	2.00E-05	9.98E-04	7.13E-09		
Aroclor-1242	1.12E-01	2.15E-08	2.00E-05	1.07E-03	7.68E-09		
Aroclor-1248	1.29E-01	2.48E-08	2.00E-05	1.24E-03	8.84E-09		
Aroclor-1254	2.10E+00	4.03E-07	2.00E-05	2.01E-02	1.44E-07		
Aroclor-1260	1.81E-01	3.48E-08	2.00E-05	1.74E-03	1.24E-08		
Semivolatiles							
Acenaphthylene	5.71E-01	7.82E-08	NA	NA	2.79E-08		
Benzo[a]pyrene Equiv.	2.65E+00	4.72E-07	NA	NA	1.69E-07	7.30E+00	1.23E-06
Benzo[ghi]perylene	1.29E+00	2.29E-07	NA	NA	8.19E-08		
Bis(2-Ethylhexyl)phthalate	1.78E+00	2.44E-07	2.00E-02	1.22E-05	8.71E-08	1.40E-02	1.22E-09
Phenanthrene	1.41E+00	2.52E-07	NA	NA	9.00E-08		

NA - Not Available

Total Hazard Index = 2.94E-02

Total Cancer Risk = 1.54E-06

TABLE 4.3-62: INGESTION OF SEDIMENT BY MAINTENANCE WORKER - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cd*IngR*EF*ED*CF*ME}{BW*AT}$$

Cd - Concentration in sediment =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/day	100	USEPA 1994, Region I
EF - Exposure frequency =	days/year	10	reasonable maximum
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable assumption
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable maximum
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Sediment mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	9.34E-05	3.66E-12	NA	NA	1.31E-12	1.20E+05	1.57E-07
Inorganics							
Arsenic	6.45E+00	2.52E-07	3.00E-04	8.42E-04	9.02E-08	1.50E+00	1.35E-07
Beryllium	5.07E-01	1.98E-08	5.00E-03	3.97E-06	7.08E-09	5.70E-06	4.04E-14
Cadmium	4.20E+00	1.64E-07	1.00E-03	1.64E-04	5.87E-08		
Chromium - trivalent	1.62E+02	6.34E-06	1.00E+00	6.34E-06	2.27E-06		
Chromium - hexavalent	1.64E+01	6.43E-07	5.00E-03	1.29E-04	2.30E-07		
Iron	2.34E+04	9.15E-04	3.00E-01	3.05E-03	3.27E-04		
Lead	1.03E+02	4.05E-06	NA	NA	1.45E-06		
Pesticides/PCBs							
Aroclor-1016	1.04E-01	4.07E-09	7.00E-05	5.81E-05	1.45E-09		
Aroclor-1221	1.98E-01	7.75E-09	2.00E-05	3.87E-04	2.77E-09		
Aroclor-1232	1.04E-01	4.07E-09	2.00E-05	2.04E-04	1.45E-09		
Aroclor-1242	1.12E-01	4.38E-09	2.00E-05	2.19E-04	1.57E-09		
Aroclor-1248	1.29E-01	5.05E-09	2.00E-05	2.52E-04	1.80E-09		
Aroclor-1254	2.10E+00	8.21E-08	2.00E-05	4.10E-03	2.93E-08		
Aroclor-1260	1.81E-01	7.10E-09	2.00E-05	3.55E-04	2.54E-09		
Semivolatiles							
Acenaphthylene	5.71E-01	6.48E-09	NA	NA	2.31E-09		
Benzo[a]pyrene Equiv.	2.65E+00	3.01E-08	NA	NA	1.07E-08	7.30E+00	7.84E-08
Benzo[ghi]perylene	1.29E+00	1.46E-08	NA	NA	5.22E-09		
Bis(2-Ethylhexyl)phthalate	1.78E+00	2.02E-08	2.00E-02	1.01E-06	7.21E-09	1.40E-02	1.01E-10
Phenanthrene	1.41E+00	1.61E-08	NA	NA	5.73E-09		

NA - Not Available

Total Hazard Index = 9.78E-03

Total Cancer Risk = 3.70E-07

TABLE 4.3-6: DERMAL EXPOSURE TO SOIL BY OFF-SITE RESIDENT - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/day	5560	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1996, EFH
Fs - Fraction of skin surface area available for exposure =		27.8%	USEPA 1996, EFH
AH - Adherence factor =	mg/cm^2	0.018	USEPA 1996, EFH
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	days/year	350	USEPA 1994, Region I
ED - Exposure duration =	years	30	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	10950	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Semivolatiles							
Benzo[a]pyrene Equiv.	1.19E+00	2.13E-07	NA	NA	9.12E-08	7.30E+00	6.66E-07
Benzo[ghi]perylene	4.29E-01	7.64E-08	NA	NA	3.27E-08		
Phenanthrene	2.32E+00	4.14E-07	NA	NA	1.78E-07		

NA - Not Available

Total Cancer Risk = 6.66E-07

TABLE 4.3-7: INGESTION OF SOIL BY OFF-SITE RESIDENT - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/day	100	USEPA 1994, Region I
EF - Exposure frequency =	days/year	350	USEPA 1994, Region I
ED - Exposure duration =	years	30	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	10950	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Semivolatiles							
Benzo[a]pyrene Equiv.	1.19E+00	4.74E-07	NA	NA	7.01E-08	7.30E+00	5.12E-07
Benzo[ghi]perylene	4.29E-01	1.70E-07	NA	NA	2.52E-08		
Phenanthrene	2.32E+00	9.23E-07	NA	NA	1.37E-07		

NA - Not Available

Total Cancer Risk = 5.12E-07

TABLE 4.3-36: DERMAL EXPOSURE TO SOIL BY RECREATOR - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/day	5560	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		27.8%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.025	USEPA 1997, EFH
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	days/year	20	reasonable assumption
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Inorganics							
Arsenic	6.90E+00	2.25E-08	3.00E-04	7.51E-05	8.04E-09	1.50E+00	1.21E-08
Lead	2.02E+02	2.20E-07	NA	NA	7.85E-08		
Semivolatiles							
Phenanthrene	4.80E-02	6.79E-10	NA	NA	2.42E-10		

NA - Not Applicable

Total Hazard Index = 7.51E-05

Total Cancer Risk = 1.21E-08

TABLE 4.3-37: INGESTION OF SOIL BY RECREATOR - RME

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/day	100	USEPA 1994, Region I
EF - Exposure frequency =	days/year	20	reasonable assumption
ED - Exposure duration =	years	25	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_i - Matrix effect - inorganics =		1	reasonable assumption
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	9125	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Chronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Inorganics							
Arsenic	6.90E+00	5.40E-07	3.00E-04	1.80E-03	1.93E-07	1.50E+00	2.89E-07
Lead	2.02E+02	1.58E-05	NA	NA	5.65E-06		
Semivolatiles							
Phenanthrene	4.80E-02	1.09E-09	NA	NA	3.89E-10		

NA - Not Applicable

Total Hazard Index = 1.80E-03

Total Cancer Risk = 2.89E-07

SID TABLES CITED IN RESPONSE TO QUESTION 5

TABLE 4.3.1-39: DERMAL EXPOSURE TO SOIL BY MAINTENANCE WORKER - EU 1 - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/shift	2680	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		13.4%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1997, EFH
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
ABS_{cd} - Absorption - cadmium =		0.001	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	shifts/year	6	MDEQ 1995, Operational Memo #14, Rev. 2
ED - Exposure duration =	years	5.5	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2007.5	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg-day	Oral Subchronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	9.81E-03	1.17E-10	NA	NA	9.17E-12	1.50E+05	1.38E-06
Inorganics							
Aluminum	5.24E+04	2.08E-04	NA	NA	1.63E-05		
Arsenic	6.88E+00	8.18E-08	3.00E-04	2.73E-04	6.43E-09	1.50E+00	9.64E-09
Cadmium	2.11E+02	8.38E-08	NA	NA	6.58E-09		
Chromium - trivalent	7.82E+03	3.10E-05	1.00E+00	3.10E-05	2.44E-06		
Chromium - hexavalent	7.92E+02	3.14E-06	2.00E-02	1.57E-04	2.47E-07		
Copper	3.57E+03	1.42E-05	3.70E-02	3.83E-04	1.11E-06		
Iron	2.43E+04	9.63E-05	NA	NA	7.56E-06		
Lead	4.58E+02	1.82E-06	NA	NA	1.43E-07		
Zinc	1.31E+04	5.20E-05	3.00E-01	1.73E-04	4.09E-06		
Semivolatiles							
3-Methylcholanthrene	3.68E-01	1.46E-08	NA	NA	1.15E-09		
Acenaphthylene	2.70E-01	1.07E-08	NA	NA	8.41E-10		
Benzo[a]pyrene Equiv.	5.17E+00	2.67E-07	NA	NA	2.10E-08	7.30E+00	1.53E-07
Benzo[ghi]perylene	2.68E+00	1.38E-07	NA	NA	1.09E-08		
Phenanthrene	4.29E+00	2.21E-07	NA	NA	1.74E-08		

NA - Not Available

Total Hazard Index = 1.02E-03

Total Cancer Risk = 1.54E-06

TABLE 4.3.1-40: INGESTION OF SOIL BY MAINTENANCE WORKERS -EU 1 - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/shift	50	USEPA 1994, Region I
EF - Exposure frequency =	shifts/year	6	MDEQ 1995, Operational Memo #14, Rev. 2
ED - Exposure duration =	years	5.5	USEPA 1994, Region I
CF - Conversion factor =	kg/mg	1.00E-06	
ME_v - Matrix effect - volatiles =		1	reasonable maximum
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable maximum
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable maximum
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2008	USEPA 1994, Region I
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg/day	Oral Subchronic RfD mg/kg/day	Hazard Index	Average Lifetime Daily Intake mg/kg/day	Cancer Slope Factor 1/(mg/kg/day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	9.81E-03	1.15E-10	NA	NA	9.05E-12	1.50E+05	1.36E-06
Inorganics							
Aluminum	5.24E+04	6.15E-04	NA	NA	4.84E-05		
Arsenic	6.88E+00	8.07E-08	3.00E-04	2.69E-04	6.34E-09	1.50E+00	9.52E-09
Cadmium	2.11E+02	2.48E-06	NA	NA	1.95E-07		
Chromium - trivalent	7.82E+03	9.18E-05	1.00E+00	9.18E-05	7.21E-06		
Chromium - hexavalent	7.92E+02	9.30E-06	2.00E-02	4.65E-04	7.31E-07		
Copper	3.57E+03	4.20E-05	3.70E-02	1.13E-03	3.30E-06		
Iron	2.43E+04	2.85E-04	NA	NA	2.24E-05		
Lead	4.58E+02	5.38E-06	NA	NA	4.23E-07		
Zinc	1.31E+04	1.54E-04	3.00E-01	5.14E-04	1.21E-05		
Semivolatiles							
3-Methylcholanthrene	3.68E-01	1.25E-09	NA	NA	9.84E-11		
Acenaphthylene	2.70E-01	9.19E-10	NA	NA	7.22E-11		
Benzo[a]pyrene Equiv.	5.17E+00	1.76E-08	NA	NA	1.38E-09	7.30E+00	1.01E-08
Benzo[ghi]perylene	2.68E+00	9.13E-09	NA	NA	7.18E-10		
Phenanthrene	4.29E+00	1.46E-08	NA	NA	1.15E-09		
Volatiles							
Tetrachloroethene	2.06E-02	2.42E-10	1.00E-02	2.42E-08	1.90E-11	5.20E-02	9.89E-13

TABLE 4.3.1-45: DERMAL EXPOSURE TO SOIL BY MAINTENANCE WORKER - EU 2 - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/shift	2680	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		13.4%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1997, EFH
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
EF - Exposure frequency =	shifts/year	61	MDEQ 1995, Operational Memo #14, Rev. 2
ED - Exposure duration =	years	5.5	Carey, 1988
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2007.5	Carey, 1988
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg/day	Oral Subchronic RfD mg/kg/day	Hazard Index	Average Lifetime Daily Intake mg/kg/day	Cancer Slope Factor 1/(mg/kg/day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	2.53E-04	3.06E-11	NA	NA	2.40E-12	1.50E+05	3.61E-07
Inorganics							
Arsenic	6.88E+00	8.32E-07	3.00E-04	2.77E-03	6.53E-08	1.50E+00	9.80E-08
Chromium - trivalent	7.82E+03	3.15E-04	1.00E+00	3.15E-04	2.48E-05		
Chromium - hexavalent	7.92E+02	3.19E-05	2.00E-02	1.60E-03	2.51E-06		
Lead	6.84E+01	2.76E-06	NA	NA	2.17E-07		
Semivolatiles							
Benzo[a]pyrene Equiv.	8.74E-01	4.58E-07	NA	NA	3.60E-08	7.30E+00	2.63E-07
Benzo[ghi]perylene	3.89E-01	2.04E-07	NA	NA	1.60E-08		
Phenanthrene	5.27E-01	2.76E-07	NA	NA	2.17E-08		

NA - Not Available

Total Hazard Index = 4.68E-03

Total Cancer Risk = 7.21E-07

TABLE 4.3.1-46: INGESTION OF SOIL BY MAINTENANCE WORKERS - EU 2 - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cs*IngR*EF*ED*CF*ME}{BW*AT}$$

Cs - Concentration in soil =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/shift	50	USEPA 1994, Region I
EF - Exposure frequency =	shifts/year	61	MDEQ 1995, Operational Memo #14, Rev. 2
ED - Exposure duration =	years	5.5	Carey, 1988
CF - Conversion factor =	kg/mg	1.00E-06	
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable maximum
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable maximum
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2007.5	Carey, 1988
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Soil mg/kg	Average Daily Intake mg/kg/day	Oral Subchronic RfD mg/kg/day	Hazard Index	Average Lifetime Daily Intake mg/kg/day	Cancer Slope Factor 1/(mg/kg/day)	Cancer Risk
Dioxins							
2,3,7,8-TCDD Equiv.	2.53E-04	3.02E-11	NA	NA	2.37E-12	1.50E+05	3.56E-07
Inorganics							
Arsenic	6.88E+00	8.21E-07	3.00E-04	2.74E-03	6.45E-08	1.50E+00	9.67E-08
Chromium - trivalent	7.82E+03	9.33E-04	1.00E+00	9.33E-04	7.33E-05		
Chromium - hexavalent	7.92E+02	9.46E-05	2.00E-02	4.73E-03	7.43E-06		
Lead	6.84E+01	8.17E-06	NA	NA	6.42E-07		
Semivolatiles							
Benzo[a]pyrene Equiv.	8.74E-01	3.03E-08	NA	NA	2.38E-09	7.30E+00	1.74E-08
Benzo[ghi]perylene	3.89E-01	1.35E-08	NA	NA	1.06E-09		
Phenanthrene	5.27E-01	1.82E-08	NA	NA	1.43E-09		

TABLE 4.3-57: DERMAL EXPOSURE TO SURFACE WATER BY MAINTENANCE WORKER - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cw*SA*Kp*ABS*ET*EF*ED*CF}{BW*AT}$$

C_w - Concentration in surface water =	mg/L	chem. spec.	
SA - Surface area available for exposure =	cm^2	2680	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		13.4%	USEPA 1997, EFH
Kp - Dermal permeability constant =	cm/hr	chem. spec.	
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_s - Absorption - semivolatiles =		0.1	USEPA Dermal Assessment Workgroup
ABS_i - Absorption - inorganics =		0.01	USEPA Dermal Assessment Workgroup
ABS_{as} - Absorption - arsenic =		0.03	USEPA Dermal Assessment Workgroup
ET - Exposure time =	hrs/day	5	reasonable assumption
EF - Exposure frequency =	days/year	6	reasonable assumption
ED - Exposure duration =	years	5.5	Carey, 1988
CF - Conversion factor =	L/cm^3	1.00E-03	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2007.5	Carey, 1988
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Surface Water mg/L	Average Daily Intake mg/kg-day	Oral Subchronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	1.07E-07	1.41E-11	NA	NA	1.11E-12	1.50E+05	1.67E-07
Inorganics							
Aluminum	2.44E+00	7.67E-08	NA	NA	6.03E-09		
Arsenic	5.99E-03	2.71E-10	3.00E-04	9.03E-07	2.13E-11	1.50E+00	3.19E-11
Barium	1.28E-01	4.03E-09	7.00E-02	5.75E-08	3.16E-10		
Copper	7.00E-02	2.20E-09	3.70E-02	5.95E-08	1.73E-10		
Iron	1.06E+02	3.34E-06	NA	NA	2.62E-07		
Lead	4.24E-02	1.07E-10	NA	NA	8.43E-12		
Manganese	3.19E+00	1.00E-07	NA	NA	7.89E-09		
Thallium	2.92E-03	7.57E-12	NA	NA	5.95E-13		
Vanadium	2.22E-02	6.98E-10	7.00E-03	9.98E-08	5.49E-11		
Zinc	6.93E-01	2.18E-08	3.00E-01	7.27E-08	1.71E-09		
Semivolatiles							
Benzo[a]pyrene Equiv.	1.42E-02	6.98E-06	NA	NA	5.49E-07	7.30E+00	4.00E-06
Benzo[ghi]perylene	6.64E-03	2.01E-04	NA	NA	1.58E-05		
Bis(2-Ethylhexyl)phthalate	5.33E-03	2.59E-07	NA	NA	2.04E-08	1.40E-02	2.85E-10
Carbazole	4.00E-03	5.84E-08	NA	NA	4.59E-09	2.00E-02	9.18E-11
Phenanthrene	7.71E-03	7.26E-07	NA	NA	5.70E-08		

NA - Not Available

Total Hazard Index = 1.19E-06

Total Cancer Risk = 4.17E-06

TABLE 4.3-59: DERMAL EXPOSURE TO SEDIMENT BY MAINTENANCE WORKER - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cd*SA*AH*ABS*EF*ED*CF}{BW*AT}$$

Cd - Concentration in sediment =	mg/kg	chem. spec.	
SA - Surface area available for exposure =	cm^2/day	2680	calculated
SA_t - Total skin surface area =	cm^2	20000	USEPA 1997, EFH
Fs - Fraction of skin surface area available for exposure =		13.4%	USEPA 1997, EFH
AH - Adherence factor =	mg/cm^2	0.63	USEPA 1997, EFH
ABS_{pah} - Absorption - PAHs =		0.13	USEPA Dermal Assessment Workgroup
ABS_d - Absorption - dioxins =		0.03	USEPA Dermal Assessment Workgroup
ABS_{pcb} - Absorption - PCBs =		0.14	USEPA Dermal Assessment Workgroup
ABS_s - Absorption - semivolatiles =		0.1	USEPA 1995, Region III
ABS_i - Absorption - inorganics =		0.01	USEPA 1995, Region III
ABS_{as} - Absorption - arsenic =		0.03	USEPA 1995, Region III
ABS_{cd} - Absorption - cadmium =		0.001	USEPA 1995, Region III
EF - Exposure frequency =	days/year	6	reasonable assumption
ED - Exposure duration =	years	5.5	Carey, 1988
CF - Conversion factor =	kg/mg	1.00E-06	
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2008	Carey, 1988
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Sediment mg/kg	Average Daily Intake mg/kg-day	Oral Subchronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	9.34E-05	1.11E-12	NA	NA	8.73E-14	1.20E+05	1.05E-08
Inorganics							
Arsenic	6.45E+00	7.67E-08	3.00E-04	2.56E-04	6.03E-09	1.50E+00	9.04E-09
Beryllium	5.07E-01	2.01E-09	5.00E-03	4.02E-07	1.58E-10	4.30E+00	6.79E-10
Cadmium	4.20E+00	1.67E-09	NA	NA	1.31E-10		
Chromium - trivalent	1.62E+02	6.43E-07	1.00E+00	6.43E-07	5.05E-08		
Chromium - hexavalent	1.64E+01	6.51E-08	2.00E-02	3.26E-06	5.12E-09		
Iron	2.34E+04	9.27E-05	NA	NA	7.29E-06		
Lead	1.03E+02	4.10E-07	NA	NA	3.22E-08		
Pesticides/PCBs							
Aroclor-1016	1.04E-01	5.77E-09	7.00E-05	8.25E-05	4.54E-10		
Aroclor-1221	1.98E-01	1.10E-08	2.00E-05	5.50E-04	8.64E-10		
Aroclor-1232	1.04E-01	5.77E-09	2.00E-05	2.89E-04	4.54E-10		
Aroclor-1242	1.12E-01	6.22E-09	2.00E-05	3.11E-04	4.88E-10		
Aroclor-1248	1.29E-01	7.16E-09	2.00E-05	3.58E-04	5.63E-10		
Aroclor-1254	2.10E+00	1.16E-07	5.00E-05	2.33E-03	9.15E-09		
Aroclor-1260	1.81E-01	1.01E-08	5.00E-05	2.01E-04	7.91E-10		
Semivolatiles							
Acenaphthylene	5.71E-01	2.26E-08	NA	NA	1.78E-09		
Benzo[a]pyrene Equiv.	2.65E+00	1.37E-07	NA	NA	1.07E-08	7.30E+00	7.83E-08
Benzo[ghi]perylene	1.29E+00	6.63E-08	NA	NA	5.21E-09		
Bis(2-Ethylhexyl)phthalate	1.78E+00	7.05E-08	2.00E-02	3.53E-06	5.54E-09	1.40E-02	7.76E-11
Phenanthrene	1.41E+00	7.29E-08	NA	NA	5.73E-09		

NA - Not Available

Total Hazard Index = 4.38E-03

Total Cancer Risk = 9.86E-08

TABLE 4.3-60: INGESTION OF SEDIMENT BY MAINTENANCE WORKER - CENTRAL TENDENCY

SIKORSKY AIRCRAFT CORPORATION - STRATFORD, CT
PUBLIC HEALTH AND ENVIRONMENTAL RISK EVALUATION

$$\text{Intake (mg/kg-day)} = \frac{Cd*IngR*EF*ED*CF*ME}{BW*AT}$$

Cd - Concentration in sediment =	mg/kg	chem. spec.	
IngR - Ingestion rate for soil =	mg/day	50	USEPA 1994, Region I
EF - Exposure frequency =	days/year	6	reasonable assumption
ED - Exposure duration =	years	5.5	Carey, 1988
CF - Conversion factor =	kg/mg	1.00E-06	
ME_d - Matrix effect - dioxins/PCBs =		1	reasonable assumption
ME_s - Matrix effect - semivolatiles =		0.29	Magee et al., 1996
ME_i - Matrix effect - inorganics =		1	reasonable assumption
BW - Body weight =	kg	70	USEPA 1994, Region I
AT_n - Averaging time - noncarcinogenic =	days	2007.5	Carey, 1988
AT_c - Averaging time - carcinogenic =	days	25550	USEPA 1991, HHEM

Constituent	Concentration in Sediment mg/kg	Average Daily Intake mg/kg-day	Oral Subchronic RfD mg/kg-day	Hazard Index	Average Lifetime Daily Intake mg/kg-day	Oral Cancer Slope Factor 1/(mg/kg-day)	Cancer Risk
Dioxins/Furans							
2,3,7,8-TCDD Equiv.	9.34E-05	1.10E-12	NA	NA	8.62E-14	1.20E+05	1.03E-08
Inorganics							
Arsenic	6.45E+00	7.57E-08	3.00E-04	2.52E-04	5.95E-09	1.50E+00	8.93E-09
Beryllium	5.07E-01	5.95E-09	5.00E-03	1.19E-06	4.68E-10	4.30E+00	2.01E-09
Cadmium	4.20E+00	4.93E-08	NA	NA	3.88E-09		
Chromium - trivalent	1.62E+02	1.90E-06	1.00E+00	1.90E-06	1.50E-07		
Chromium - hexavalent	1.64E+01	1.93E-07	2.00E-02	9.64E-06	1.52E-08		
Iron	2.34E+04	2.75E-04	NA	NA	2.16E-05		
Lead	1.03E+02	1.22E-06	NA	NA	9.55E-08		
Pesticides/PCBs							
Aroclor-1016	1.04E-01	1.22E-09	7.00E-05	1.74E-05	9.59E-11		
Aroclor-1221	1.98E-01	2.32E-09	2.00E-05	1.16E-04	1.83E-10		
Aroclor-1232	1.04E-01	1.22E-09	2.00E-05	6.11E-05	9.59E-11		
Aroclor-1242	1.12E-01	1.32E-09	2.00E-05	6.58E-05	1.03E-10		
Aroclor-1248	1.29E-01	1.51E-09	2.00E-05	7.57E-05	1.19E-10		
Aroclor-1254	2.10E+00	2.46E-08	5.00E-05	4.92E-04	1.93E-09		
Aroclor-1260	1.81E-01	2.13E-09	5.00E-05	4.26E-05	1.67E-10		
Semivolatiles							
Acenaphthylene	5.71E-01	1.94E-09	NA	NA	1.53E-10		
Benzo[a]pyrene Equiv.	2.65E+00	9.02E-09	NA	NA	7.09E-10	7.30E+00	5.17E-09
Benzo[ghi]perylene	1.29E+00	4.38E-09	NA	NA	3.44E-10		
Bis(2-Ethylhexyl)phthalate	1.78E+00	6.06E-09	2.00E-02	3.03E-07	4.76E-10	1.40E-02	6.66E-12
Phenanthrene	1.41E+00	4.82E-09	NA	NA	3.78E-10		

NA - Not Available

Total Hazard Index = 1.14E-03

Total Cancer Risk = 2.65E-08