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NSWC WHITE OAK
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Section : 03.06
Site 20903-5640 (White Oak)
Doc. #: 0006

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C-49-7-6-105

July 10, 1996

Project Number 2295

Ms. Donna W. Jordan
Remedial Project Manager
Engineering Field Activity Chesapeake
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Washington Navy Yard
Washington, DC 20374-5018

Reference: Clean Contract No. N62472-90-D-1298
Contract Task Order No. 0180

Subject: Naval Surface Warfare Center - White Oak
Silver Spring, Maryland
Risk Assessment Calculation for Sites 8, 9, and 11

Dear Ms. Jordan:

Brown & Root Environmental (B&R Environmental) has completed a risk assessment calculation associated with exposure to soil at the target removal action concentrations proposed for use during the removal actions at Sites 8, 9, and 11 at the Naval Surface Warfare Center, White Oak, Silver Spring, Maryland. As requested, the target removal action concentrations developed by the Base Closure Team (received by B&R Environmental via FAX on June 24, 1996) were incorporated into the calculation. The calculation evaluated two residential exposure pathways: soil ingestion and dermal contact with soil.

The calculation of both carcinogenic and non-carcinogenic risks and related assumptions are attached for your review. In general, exposure to soils at the target removal action concentrations should pose minimal risks to residential receptors. The exposure assumptions and calculation methodology should be reviewed by the Base Closure Team prior to commencement of the removal actions, to ensure their acceptance.

Please feel free to contact me with any comments and questions regarding the information submitted at 412-921-7134.

Very truly yours,

Scott A. Nesbit

Scott A. Nesbit
Project Manager

SAN/
Attachment
cc: Mr. Roger Boucher, North Div (w/o attachment)
~~Mr. David Mills, EFACHES~~
Mr. John Trepanowski, BRE
Mr. Gordon Bullard, BRE (w/o attachment)
Mr. Robert Hubbard, BRE
Project File 2295

RISK-ASSESSMENT CALCULATIONS FOR WHITE OAK SITES 8, 9 AND 11
RESIDENTIAL LAND USE

OBJECTIVE:

Determine Hazard Quotients and Lifetime Incremental Cancer Risks associated with residential land use of Sites 8, 9, and 11 at the White Oak Naval Weapons Station. Use the target removal action concentrations developed by the BCT as the exposure concentrations. Consider two primary exposure pathways: 1) soil ingestion; 2) dermal contact.

ASSUMPTIONS:

- The soil ingestion algorithm and default input parameters provided in the EPA Region III Risk-Based concentration table are appropriate (EPA, April 1996).
- EPA Region III dermal exposure assessment guidance may be used as the basis for the dermal risk assessment calculations (EPA, December 1995).
- EPA Region III does not have published absorption efficiency data (absorbed versus administered dose). The EPA Region IV defaults may be used (EPA, November 1995).
- EPA Region III promotes a time-weighted averaging approach for carcinogenic risk estimates. No guidance exists for time-weighting of dermal exposure. An approach similar to that used for water and soil ingestion and air inhalation may be used.
- Chromium exists in its hexavalent form. However, noncarcinogenic risks will be determined since hexavalent chromium is not known to be carcinogenic via ingestion or dermal contact.
- Arsenic may be treated as a noncarcinogen since inhalational exposure is not under consideration.
- The dose-response parameters presented in the most recent EPA Region III guidance document are appropriate (EPA, April 1996).
- Noncarcinogenic effects associated with exposure to thallium may be estimated using the Reference Dose for thallium carbonate. This chemical has the lowest Reference Dose of any of the thallium species with the exception of thallic oxide.
- Lead need not be evaluated. Reference Doses and Slope Factors have not been developed for lead.
- The compound 1,2-dichloroethene may be treated as a mixture of the cis- and trans- isomers if the identity is not reported.
- The exposed surface area (arms, hands, and legs) of a child from 0 to 6 years of age is equal to one half of the adult area (actual areas for a 0 to 6 year old child are not presented in the Exposure Factors Handbook).
- The midpoint of the range of the soil adherence factor (0.2 - 1.0) reported in the dermal exposure assessment guidance document is an appropriate value for this parameter.

RELEVANT EQUATIONS:

As per EPA Region III guidance as outlined in the Risk-Based Concentration Tables dated April 19, 1996, the equations used to determine the carcinogenic and noncarcinogenic risks from soil ingestion are as follows:

$$LICR = \frac{C_s \ x \ EF \ x \ IFS_{adj} \ x \ SF_o}{CF \ x \ AT_c}$$

$$HQ = \frac{C_s \ x \ EF \ x \ ED_c \ x \ IRS_c}{RfD_o \ x \ BW_c \ x \ AT_n \ x \ CF}$$

Where:

LICR is the lifetime incremental cancer risk (dimensionless)
HQ is the Hazard Quotient (dimensionless)
C_S is the soil exposure concentration (mg/kg)
EF is the exposure frequency (days/year)

IFS_{adj} is the age-adjusted soil ingestion rate (mg yr/kg day)
IRS_c is the child soil ingestion rate (mg/day)
ED_c is the child exposure duration (years)
AT_c is the averaging time for carcinogenic effects (days)
AT_n is the averaging time for noncarcinogenic effects (days)
BW_c is the child receptor body weight (kg)
CF is a conversion factor (mg/kg)
SF_o is the oral cancer slope factor $(mg/kg/day)^{-1}$
RfD_o is the oral reference dose (mg/kg/day)

The default input parameters for determination of the residential risks associated with soil ingestion may be summarized as follows (EPA, June 1996):

Parameter	Noncarcinogens	Carcinogens
Age-adjusted Soil Ingestion Rate (mg yr/kg day)	NA	114.29
Child Soil Ingestion Rate (mg/day)	200	NA
Exposure Frequency (days/yr)	350	350
Exposure Duration (years)	6	NA
Child Body Weight (kg)	15	NA
Averaging Time (days)	2,190 (6 x 365)	25,550 (70 x 365)

Conversion factors (concentration to LICRs and HQs) may be determined for noncarcinogenic and carcinogenic effects, respectively, as follows:

$$LICR = \frac{C_s \frac{mg}{kg} x\ 350 \frac{days}{year} x\ 114.29 \frac{mg\ yr}{kg\ day} x\ SF_o \frac{kg\ day}{mg}}{10^6 \frac{mg}{kg} x\ 25{,}550\ days} = 1.57x10^{-6}\ x\ C_s\ x\ SF_o$$

$$HQ = \frac{C_s \frac{mg}{kg} x\ 350 \frac{days}{year} x\ 6\ years\ x\ 200 \frac{mg}{day}}{RfD_o \frac{mg}{kg\ day} x\ 15\ kg\ x\ 6\ years\ x\ 365 \frac{days}{year} x\ 10^6 \frac{mg}{kg}} = \frac{1.28x10^{-5}\ x\ C_s}{RfD_o}$$

Relevant equations for the determination of noncarcinogenic and carcinogenic risks associated with dermal exposure to soil are as follows (EPA, December 1995 and EPA, December 1989):

$$LICR = \frac{C_s\ x\ SA\ x\ AF\ x\ ABS\ x\ EF\ x\ ED\ x\ SF_o}{CF\ x\ BW\ x\ AT_c\ x\ AE}$$

$$HQ = \frac{C_s\ xSA\ x\ AF\ x\ ABS\ EF\ x\ ED_c}{RfD_o\ x\ BW_c\ x\ AT_n\ x\ CF\ x\ AE}$$

Where:

LICR is the lifetime incremental cancer risk (dimensionless)
HQ is the Hazard Quotient (dimensionless)
C_S is the soil exposure concentration (mg/kg)
SA is the exposed skin surface area of the receptor (cm^2/event)
AF is the soil adherence factor (mg/cm^2)
ABS is the chemical-specific absorption factor (dimensionless)

EF is the exposure frequency (events/year)
ED_c is the child exposure duration (years)
AT_c is the averaging time for carcinogenic effects (days)
AT_n is the averaging time for noncarcinogenic effects (days)
BW is the receptor body weight (kg)
BW_c is the child receptor body weight (kg)
CF is a conversion factor (mg/kg)
SF_o is the oral cancer slope factor $(mg/kg/day)^{-1}$
RfD_o is the oral reference dose (mg/kg/day)
AE is the absorption efficiency relating administered to absorbed dose (dimensionless)

To ensure that the dermal assessment is consistent with current EPA Region III policy, the intake for carcinogenic effects is adjusted in a manner similar to the age-adjustment completed by EPA Region III for air inhalation, soil ingestion, and water ingestion. The following generic equation is used by EPA Region III to complete age adjustment of ingestion intakes (EPA, April 1996):

$$IF_{adj} = \frac{ED_c \ x \ IR_c}{BW_c} + \frac{(ED_{tot} - ED_c) \ x \ IR_a}{BW_a}$$

Where:

IF_{adj} = the age-adjusted ingestion factor (mg yr/kg day)
ED_c = the child exposure duration (years)
ED_{tot} = the total exposure duration (years)
IR_c = the child ingestion rate (mg/day)
IR_a = the adult ingestion rate (mg/day)
BW_c = the child body weight (kg)
BW_a = the adult body weight (kg)

For the dermal exposure pathway, the parameter parameters that differ for the child versus the adult receptor are the exposure duration, the body weight, and the exposed skin surface area (SA). Via a slight modification, the generic age adjustment equation may be revised to reflect the age dependent variables for dermal exposure, as follows:

$$SA_{adj} = \frac{ED_c \ x \ SA_c}{BW_c} + \frac{(ED_{tot} - ED_c) \ x \ SA_a}{BW_a}$$

Where:

SA_{adj} = the age-adjusted surface area (cm^2 yr/event kg)
ED_c = the child exposure duration (years)
ED_{tot} = the total exposure duration (years)
SA_c = the child exposed surface area (cm^2/event)
SA_a = the adult exposed surface area (cm^2/event)
BW_c = the child body weight (kg)
BW_a = the adult body weight (kg)

By default, the child exposure duration is 6 years and the adult exposure duration is 24 years. Similarly, the child body weight is 15 kg and the adult body weight is 70 kg. The surface area of the hands, arms, and feet of an adult receptor is 8,600 cm^2. Since no information is available regarding the average surface area of a child receptor from 0 to 6 years, a conservative assumption that it is 1/2 the adult surface area will be made. Hence the age-adjusted surface area may be determined as:

$$SA_{adj} = \frac{6\ years\ x\ 4300\ cm^2\ /\ event}{15\ kg} + \frac{24\ years\ x\ 8600\ cm^2\ /\ event}{70\ kg} = 4,670\ \frac{cm^2\ yr}{event\ kg}$$

The default input parameters for determination of the residential risks associated with dermal contact with soil may be summarized as follows (EPA, December 1989; EPA January 1992; EPA November 1995 and EPA April 1996):

Parameter	Noncarcinogens	Carcinogens
Adherence Factor (mg/cm^2)	0.6	0.6
Absorption Factor (dimensionless) - Inorganics	0.01	0.01
Absorption Factor (dimensionless) - Volatiles	0.03	0.03
Absorption Factor (dimensionless) - Semivolatiles	0.1	0.1
Age-adjusted Surface Area (cm^2 yr/event kg)	NA	4,670
Child Surface Area (cm^2/event)	4,300	NA
Exposure Frequency (events/yr)	350	350
Exposure Duration (years)	6	NA
Child Body Weight (kg)	15	NA
Absorption Efficiency - Inorganics	0.2	0.2
Absorption Efficiency - Volatiles	0.8	0.8
Absorption Efficiency - Semivolatiles	0.5	0.5
Averaging Time (days)	2,190 (6 x 365)	25,550 (70 x 365)

Conversion factors (concentration to LICRs and HQs) may be determined for noncarcinogenic and carcinogenic effects, as shown previously. Note that modification of the carcinogenic risk equation is necessary when the age-adjustment factor is used. Furthermore, since the ABS and AE differ for each class of chemicals, six separate sets of calculations are necessary. For the sake of brevity, only the conversion factors for the inorganics are developed, as follows:

$$LICR = \frac{C_s\ \frac{mg}{kg}\ x\ 4,670\ \frac{cm^2\ yr}{event\ kg}\ x\ 0.6\ \frac{mg}{cm^2}\ x\ 0.01\ x\ 350\ \frac{events}{year}\ x\ SF_o\ \frac{kg\ day}{mg}}{10^6\ \frac{mg}{kg}\ x\ 25,550\ days\ x\ 0.2} = 1.92x10^{-6}\ x\ C_s\ x\ SF_o$$

$$HQ = \frac{C_s\ \frac{mg}{kg}\ x\ 4,300\ \frac{cm^2}{event}\ x\ 0.6\ \frac{mg}{cm^2}\ x\ 0.01\ x\ 350\ \frac{events}{year}\ x\ 6\ years}{15\ kg\ x\ 365\ \frac{days}{year}\ x\ 6 years\ x\ RfD_o\ \frac{mg}{kg\ day}\ x\ 0.2\ x\ 10^6\ \frac{mg}{kg}} = \frac{8.25x10^{-6}\ x\ C_s}{RfD_o}$$

Using a similar process, the following conversion factors may be developed for the volatile organics and semivolatile organics (including the energetics):

Class of COPCs	Absorption Factor	Absorption Efficiency	HQ Conversion Factor	LICR Conversion Factor
Volatile Organics	0.03	0.8	6.18E-6	1.44E-6
Semivolatile Organics	0.1	0.5	3.29E-5	7.68E-6
Energetics	0.1	0.5	3.29E-5	7.68E-6

It should be noted that EPA Region III has also developed specific absorption factors for some chemicals. The only chemical under consideration for this analysis that has a specific absorption factor is arsenic (0.032).

Based on the preceding formulae, risk assessment calculations were completed for each of the chemicals of potential concern at Sites 8, 9, and 11. The calculations are provided on the attached spreadsheets.

RESULTS:

Cumulative Hazard Indices and Lifetime Incremental Cancer Risks for each of the three sites may be summarized as follows:

Risk Estimator	Site 8	Site 9	Site 11
Hazard Index - Ingestion	3.46	1.69	3.53
Hazard Index - Dermal	2.39	4.12	2.43
Hazard Index - Total	5.85	5.81	5.96
Cancer Risk - Ingestion	6.74E-06	5.75E-06	4.82E-08
Cancer Risk - Dermal	8.27E-06	2.80E-05	4.43E-08
Cancer Risk - Total	1.50E-05	3.38E-05	9.25E-08

As shown in the preceding table, the projected cumulative incremental cancer risks are within or below the EPA's target risk range of 10^{-4} to 10^{-6}. Although the cumulative Hazard Indices exceed unity for all three sites, this is not considered indicative of potential post removal action noncarcinogenic risks for several reasons: 1) the noncarcinogens were not segregated according to target organ effect of endpoints for this analysis; 2) the dermal exposure assessment process is considered conservative given the use of the default absorption factors and absorption efficiencies; 3) it is unlikely that all of the chemicals of potential concern will be detected at the same location at or above the target concentrations.

REFERENCES:

EPA (United States Environmental Protection Agency), December 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response. Washington, D.C. EPA/540/1-89/002.

EPA (United States Environmental Protection Agency), January 1992. Dermal Exposure Assessment: Principles and Applications. Office of Research and Development. Washington, D.C. EPA/600/8-91/011B.

EPA (United States Environmental Protection Agency), November 1995. Supplemental Guidance to RAGS: Region IV Bulletins - Human Health Risk Assessment (Bulletin 2, Toxicity Assessment). EPA Region IV, Atlanta, GA.

EPA (United States Environmental Protection Agency), December 1995. Assessing Dermal Exposure From Soil. EPA Region III. Philadelphia, PA. EPA/903-K-95-003.

EPA (United States Environmental Protection Agency), April 1996. Risk-Based Concentration Table, January-June 1996. EPA Region III. Philadelphia, PA.

Residential Risk Estimates - Soil Ingestion and Dermal Contact with Soil - Site 8

Chemical of Potential Concern	Basis of RBC	Target Conc. (mg/Kg)	Region III RBC (mg/Kg)	Absorption Factor (ABS)	Absorption Efficiency (AE)	Reference Dose (mg/kg/day)	Slope Factor (kg-day/mg)	Hazard Quotient		Cancer Risk	
								Soil Ingestion	Dermal Contact	Soil Ingestion	Dermal Contact
Inorganics											
Antimony	n	31	31	0.01	0.20	4.00E-04		9.91E-01	6.39E-01	NA	NA
Arsenic	n	2.5	23	0.032	0.20	3.00E-04		1.07E-01	2.20E-01	NA	NA
Barium	n	32	5500	0.01	0.20	7.00E-02		5.84E-03	3.77E-03	NA	NA
Beryllium	c	1	0.15	0.01	0.20	5.00E-03	4.30E+00	2.56E-03	1.65E-03	6.73E-06	8.25E-06
Cadmium	n	6	39	0.01	0.20	5.00E-04		1.53E-01	9.90E-02	NA	NA
Chromium (VI)	n	19	390	0.01	0.20	5.00E-03		4.86E-02	3.13E-02	NA	NA
Copper	n	3100	3100	0.01	0.20	4.00E-02		9.91E-01	6.39E-01	NA	NA
Mercury	n	3	23	0.01	0.20	3.00E-04		1.28E-01	8.25E-02	NA	NA
Nickel	n	21	1600	0.01	0.20	2.00E-02		1.34E-02	8.66E-03	NA	NA
Cyanide	n	1600	1600	0.01	0.20	2.00E-02		1.02E+00	6.60E-01	NA	NA
Volatile Organics											
1,1,2-Trichloroethane	c	0.01	11	0.03	0.80	4.00E-03	5.70E-02	3.20E-05	1.55E-05	8.92E-10	8.20E-10
Toluene	n	5	16000	0.03	0.80	2.00E-01		3.20E-04	1.55E-04	NA	NA
Chloroform	c	0.3	100	0.03	0.80	1.00E-02	6.10E-03	3.84E-04	1.86E-04	2.87E-09	2.63E-09
Methylene chloride	c	0.01	85	0.03	0.80	6.00E-02	7.50E-03	2.13E-06	1.03E-06	1.17E-10	1.08E-10
Tetrachloroethene	c	0.04	12	0.03	0.80	1.00E-02	5.20E-02	5.11E-05	2.47E-05	3.26E-09	2.99E-09
Trichloroethene	c	0.02	58	0.03	0.80	6.00E-03	1.10E-02	4.26E-05	2.06E-05	3.44E-10	3.17E-10
Semivolatile Organics											
N-Nitrosodiphenylamine	c	0.2	130	0.1	0.50		4.90E-03	NA	NA	1.53E-09	7.52E-09
Total - Site 8								3.46E+00	2.39E+00	6.74E-06	8.27E-06

Residential Risk Estimates - Soil Ingestion and Dermal Contact with Soil - Site 9

Chemical of Potential Concern	Basis of RBC	Target Conc. (mg/Kg)	Region III RBC (mg/Kg)	Absorption Factor (ABS)	Absorption Efficiency (AE)	Reference Dose (mg/kg/day)	Slope Factor (kg-day/mg)	Hazard Quotient		Cancer Risk	
								Soil Ingestion	Dermal Contact	Soil Ingestion	Dermal Contact
Inorganics											
Mercury	n	3	23	0.01	0.20	3.00E-04		1.28E-01	8.25E-02	NA	NA
Volatile Organics											
1,2-Dichloroethene	n	0.2	700	0.03	0.80	9.00E-03		2.84E-04	1.37E-04	NA	NA
trans-1,2-Dichloroethene	n	0.3	1600	0.03	0.80	2.00E-02		1.92E-04	9.28E-05	NA	NA
Chloroform	c	0.3	100	0.03	0.80	1.00E-02	6.10E-03	3.84E-04	1.86E-04	2.87E-09	2.63E-09
Methylene chloride	c	0.01	85	0.03	0.80	6.00E-02	7.50E-03	2.13E-06	1.03E-06	1.17E-10	1.08E-10
Tetrachloroethene	c	0.04	12	0.03	0.80	1.00E-02	5.20E-02	5.11E-05	2.47E-05	3.26E-09	2.99E-09
Toluene	n	5	16000	0.03	0.80	2.00E-01		3.20E-04	1.55E-04	NA	NA
Trichloroethene	c	0.02	58	0.03	0.80	6.00E-03	1.10E-02	4.26E-05	2.06E-05	3.44E-10	3.17E-10
Trichlorofluormethane	n	13	23000	0.03	0.80	3.00E-01		5.54E-04	2.68E-04	NA	NA
Vinyl chloride	c	0.01	0.34	0.03	0.80		1.90E+00	NA	NA	2.97E-08	2.73E-08
Semivolatile Organics											
Benzo(a)anthracene	c	0.7	0.88	0.1	0.50		7.30E-01	NA	NA	8.00E-07	3.92E-06
Benzo(b)fluoranthene	c	0.88	0.88	0.1	0.50		7.30E-01	NA	NA	1.01E-06	4.93E-06
Benzo(k)fluoranthene	c	4	8.8	0.1	0.50		7.30E-02	NA	NA	4.57E-07	2.24E-06
Benzo(a)pyrene	c	0.088	0.088	0.1	0.50		7.30E+00	NA	NA	1.01E-06	4.93E-06
Benzo(g,h,i)perylene	c	4	8.8	0.1	0.50		7.30E-02	NA	NA	4.57E-07	2.24E-06
Energetics											
RDX	c	5.8	5.8	0.1	0.50	3.00E-03	1.10E-01	2.47E-02	6.38E-02	9.99E-07	4.90E-06
HMX	n	3900	3900	0.1	0.50	5.00E-02		9.97E-01	2.57E+00	NA	NA
2,4,6-Trinitrotoluene	c	21	21	0.1	0.50	5.00E-04	3.00E-02	5.37E-01	1.39E+00	9.86E-07	4.84E-06
2,6-Dinitrotoluene	n	0.1	78	0.1	0.50	1.00E-03		1.28E-03	3.30E-03	NA	NA
2,4-Dinitrotoluene	n	0.2	160	0.1	0.50	2.00E-03		1.28E-03	3.30E-03	NA	NA
Nitrobenzene	n	0.09	39	0.1	0.50	5.00E-04		2.30E-03	5.94E-03	NA	NA
Total - Site 9								1.69E+00	4.12E+00	5.75E-06	2.80E-05

Residential Risk Estimates - Soil Ingestion and Dermal Contact with Soil - Site 11

Chemical of Potential Concern	Basis of RBC	Target Conc. (mg/Kg)	Region III RBC (mg/Kg)	Absorption Factor (ABS)	Absorption Efficiency (AE)	Reference Dose (mg/kg/day)	Slope Factor (kg-day/mg)	Hazard Quotient		Cancer Risk	
								Soil Ingestion	Dermal Contact	Soil Ingestion	Dermal Contact
Inorganics											
Arsenic	n	2.5	23	0.032	0.20	3.00E-04		1.07E-01	2.20E-01	NA	NA
Cadmium	n	6	39	0.01	0.20	5.00E-04		1.53E-01	9.90E-02	NA	NA
Chromium (VI)	n	19	390	0.01	0.20	5.00E-03		4.86E-02	3.13E-02	NA	NA
Copper	n	3100	3100	0.01	0.20	4.00E-02		9.91E-01	6.39E-01	NA	NA
Mercury	n	3	23	0.01	0.20	3.00E-04		1.28E-01	8.25E-02	NA	NA
Nickel	n	21	1600	0.01	0.20	2.00E-02		1.34E-02	8.66E-03	NA	NA
Silver	n	390	390	0.01	0.20	5.00E-03		9.97E-01	6.43E-01	NA	NA
Thallium (Carbonate)	n	0.4	6.3	0.01	0.20	8.00E-05		6.39E-02	4.12E-02	NA	NA
Cyanide	n	1600	1600	0.01	0.20	2.00E-02		1.02E+00	6.60E-01	NA	NA
Volatile Organics											
1,1-Dichloroethane	n	11	7800	0.03	0.80	1.00E-01		1.41E-03	6.80E-04	NA	NA
1,2-Dichloroethane	c	0.03	7	0.03	0.80		9.10E-02	NA	NA	4.27E-09	3.93E-09
1,1-Dichloroethene	c	0.03	1.1	0.03	0.80	9.00E-03	6.00E-01	4.26E-05	2.06E-05	2.82E-08	2.59E-08
1,2-Dichloroethene	n	0.2	700	0.03	0.80	9.00E-03		2.84E-04	1.37E-04	NA	NA
1,1,1-Trichloroethane	n	0.02	2700	0.03	0.80	3.50E-02		7.31E-06	3.53E-06	NA	NA
trans-1,2-Dichloroethene	n	0.3	1600	0.03	0.80	2.00E-02		1.92E-04	9.28E-05	NA	NA
1,2-Dichloropropane	c	0.02	9.4	0.03	0.80		6.80E-02	NA	NA	2.13E-09	1.96E-09
Carbon tetrachloride	c	0.03	4.9	0.03	0.80	7.00E-04	1.30E-01	5.48E-04	2.65E-04	6.11E-09	5.61E-09
Chloroform	c	0.3	100	0.03	0.80	1.00E-02	6.10E-03	3.84E-04	1.86E-04	2.87E-09	2.63E-09
Methylene chloride	c	0.01	85	0.03	0.80	6.00E-02	7.50E-03	2.13E-06	1.03E-06	1.17E-10	1.08E-10
Tetrachloroethene	c	0.04	12	0.03	0.80	1.00E-02	5.20E-02	5.11E-05	2.47E-05	3.26E-09	2.99E-09
1,1,2-Trichloroethane	c	0.01	11	0.03	0.80	4.00E-03	5.70E-02	3.20E-05	1.55E-05	8.92E-10	8.20E-10
Trichloroethene	c	0.02	58	0.03	0.80	6.00E-03	1.10E-02	4.26E-05	2.06E-05	3.44E-10	3.17E-10
Semivolatile Organics											
1,2,4-Trichlorobenzene	n	2	780	0.03	0.50	1.00E-02		2.56E-03	1.98E-03	NA	NA
Total - Site 11								3.53E+00	2.43E+00	4.82E-08	4.43E-08